Ashbourne Transport Study

Stage 1 Report

FINAL

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Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
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1. Introduction

1.1 Overview

1.1.1 AECOM was commissioned by Derbyshire County Council (DCC) to prepare a study into the impacts, causes and potential solutions to travel delays within Ashbourne.

1.1.2 Ashbourne is located on the A52 and A515 corridors. These routes provide key links through Derbyshire, with the A52 linking Ashbourne with Stoke-on-Trent to the west, whilst the A515 connects Ashbourne with Buxton to the north. Ashbourne itself is a location of planned development, with housing and employment proposed on the former Ashbourne Airfield as part of the Derbyshire Dales Local Plan.

1.1.3 Prior to preparing this report, three interim reports were issued to DCC to describe the baseline conditions, likely future growth in vehicle trips which would be experienced in the area, and potential options to improve journey time and reduce delay. This report combines these interim reports and is intended as a standalone report which supersedes the previous documentation.

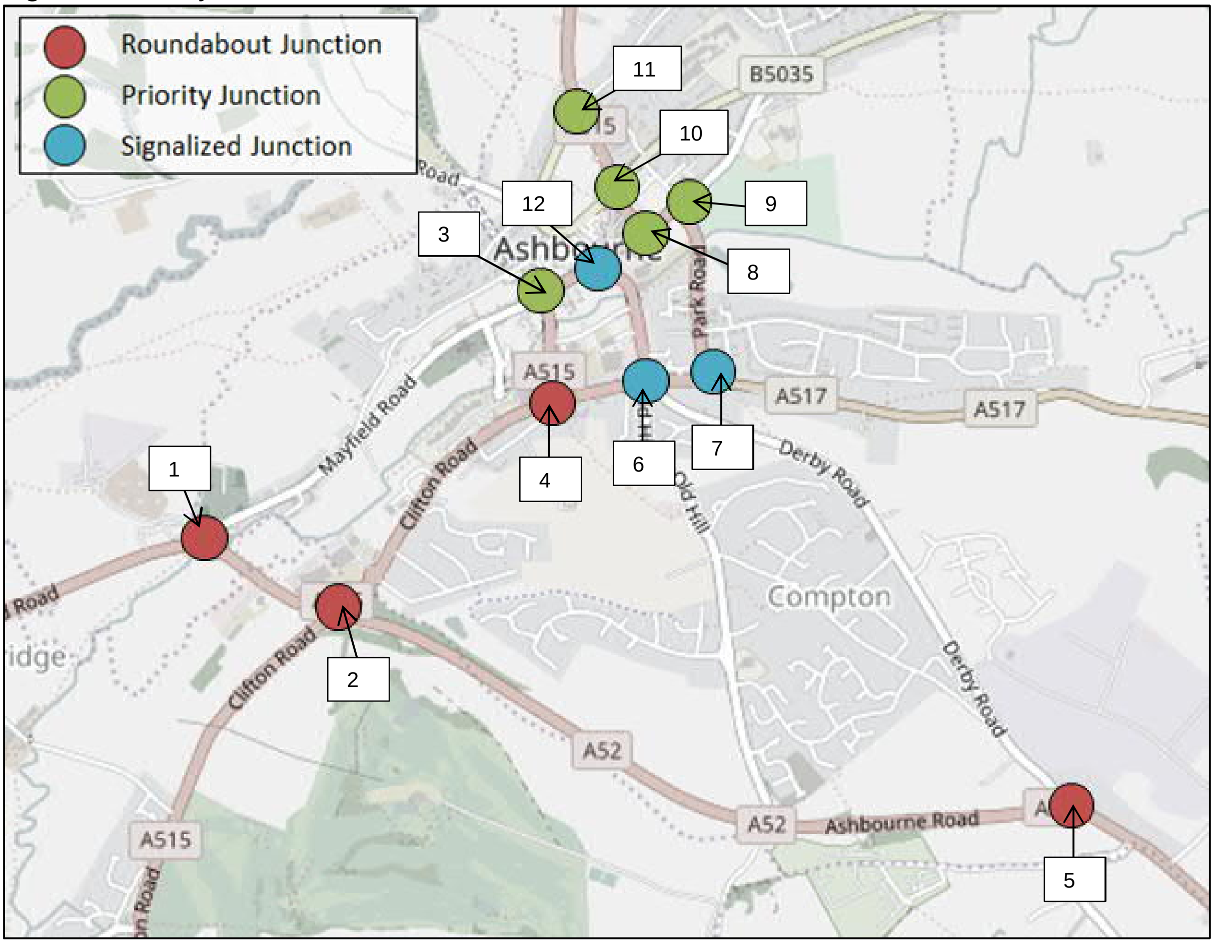
1.1.4 This report is a **Stage 1** report. Following receipt of the initial documents (i.e. the now superseded baseline conditions, future year forecasting and options reports) DCC has now commissioned AECOM to determine the methodology required to prepare a full Business Case in respect of the Ashbourne Bypass. The Business Case will require a more detailed traffic model than has been used in this Stage 1 report (and would also be needed in order to satisfy the Department for Transport, DfT, at the point of any funding application) and therefore options for the development of this model are now being separately explored.

1.2 Study Area

1.2.1 Figure 1.1 shows the Study Area for the Stage 1 report. It includes the following twelve junctions, which form the main junctions and roads used by traffic routeing through and within Ashbourne, as well as the key A515 and A52 junctions to the south of the town.

- (1) A52 / Mayfield Road;
- (2) A52 / A515;
- (3) Mayfield Road / Station Road / Church Street;
- (4) A515 / Station Road;
- (5) A52 / Derby Road;
- (6) A515 / Sturston Road / Derby Road / Old Hill;
- (7) Park Road / Sturston Road / A517 Belper Road
- (8) A515 / St John Street;
- (9) St John Street / Park Road / Cockayne Avenue;
- (10) A515 / B5035;
- (11) A515 / North Avenue / Windmill Lane; and
- (12) A515 / St. John Street.

Figure 1.1: Study Area



1.3 Methodology

1.3.1 The DfT Appraisal Process identifies several steps prior to selection of a package to be presented for funding opportunities. This process is summarised below:

- Stage 1, Step 1: Understanding the Current Situation;
- Stage 1, Step 2: Understanding the Future Situation;
- Stage 1, Step 3: Establishing the Need for Intervention;
- Stage 1, Step 4: Defining Objectives / Define Geographic Area of Impact to be Addressed by the Intervention;
- Stage 1, Step 5: Option Generation;
- Stage 1, Step 6: Undertake Initial Sift;
- Stage 1, Step 7: Develop and Assess Potential Options;
- Stage 1, Step 8: Develop the Option in an Option Assessment Report;
- Stage 1, Step 9: Develop and Scope of better performing options in Appraisal Specification Report;
- Stage 2: Further Appraisal; and
- Stage 3: Implementation, Monitoring and Evaluation.

1.3.2 The remaining Sections of this report describe each above the above steps up to and including Stage 1, Step 6.

2. Understanding the Current Situation: Traffic Flow

2.1 Overview

2.1.1 The purpose of this section is to identify the traffic flows within Ashbourne and on the A52 – A515 corridor for use later in this study. It is based on traffic surveys specifically undertaken to support this study, and also data provided by DCC.

2.2 Traffic Surveys

2.2.1 According to the document, *How the National Road Traffic Estimates are Made* (DfT, 2007), traffic counts are normally undertaken during the 'neutral' months of March, April, May, June, September and October (but outside of school holidays). This is to ensure seasonal impacts are minimised. The traffic surveys undertaken to support this study were undertaken on Thursday 29th June 2017. On this date, traffic conditions were monitored throughout the day and the weather conditions were recorded. There were no significant events or unforeseen circumstances to affect the results of the traffic surveys and whilst the weather was cloudy and rainy, there was no disruptive weather. In addition, DCC confirmed that there were no roadworks booked that would have disrupted normal traffic flows.

2.2.2 The traffic surveys included Manual Classified Counts (MCCs) and queue length surveys. For the MCCs, all possible traffic movements were recorded in 15 minutes intervals, between the times of 07:00 – 19:00hrs. The following COBA[1] classifications were used:

- PC – Pedal cycles using the road; this does not include cyclists using the pavement.
- MC – Two wheeled motor cycles;
- Car – Including taxis, state cars, 'people carriers' and other passenger vehicles (for example, minibuses and camper vans) with a gross vehicle weight of less than 3.5 tonnes, normally ones which can accommodate not more than 15 seats. Three-wheeled cars, motor invalid carriages, Land Rovers, Range Rovers and Jeeps and smaller ambulances are included. Cars towing caravans or trailers are counted as one vehicle;
- LGV – Light Goods Vehicle. Includes all goods vehicles up to 3.5 tonnes gross vehicle weight (goods vehicles over 3.5 tonnes have sideguards fitted between axles), including those towing a trailer or caravan. This includes all car delivery vans and those of the next larger carrying capacity such as transit vans. Included here are small pickup vans, three-wheeled goods vehicles, milk floats and pedestrian controlled motor vehicles. Most of this group are delivery vans of one type or another;
- OGV1 – Other Goods Vehicles Category 1. Includes all rigid vehicles over 3.5 tonnes gross vehicle weight with two or three axles. Includes larger ambulances, tractors (without trailers), road rollers for tarmac pressing, box vans and similar large vans. A two or three axle motor tractive without a trailer is also included;
- OGV2 – Other Goods Vehicles Category 2. Includes all rigid vehicles with four or more axles and all articulated vehicles. Also included in this class are OGV1 goods vehicles towing a caravan or trailer;
- PSV – Buses and Coaches. Includes all public service vehicles and works buses with a gross vehicle weight of 3.5 tonnes or more, usually vehicles with more than 16 seats.

2.2.3 For the queue length surveys, the length of queues was recorded in metres at each junction on the same day as the turning counts between 07:00 – 10:00hrs & 16:00 – 19:00hrs, every five minutes.

[1] Design Manual for Roads and Bridge, DMRB, Volume 13, Paragraph 8.1 & Figure 8/1

2.2.4 Automatic Traffic Counts (ATCs) were also collected on the following roads between Thursday 29th June and Wednesday 5th July 2017. ATC equipment collects traffic flow as axle pairs, which are then converted to vehicles. Traffic flows are recorded for every hour by direction over the period of installation.

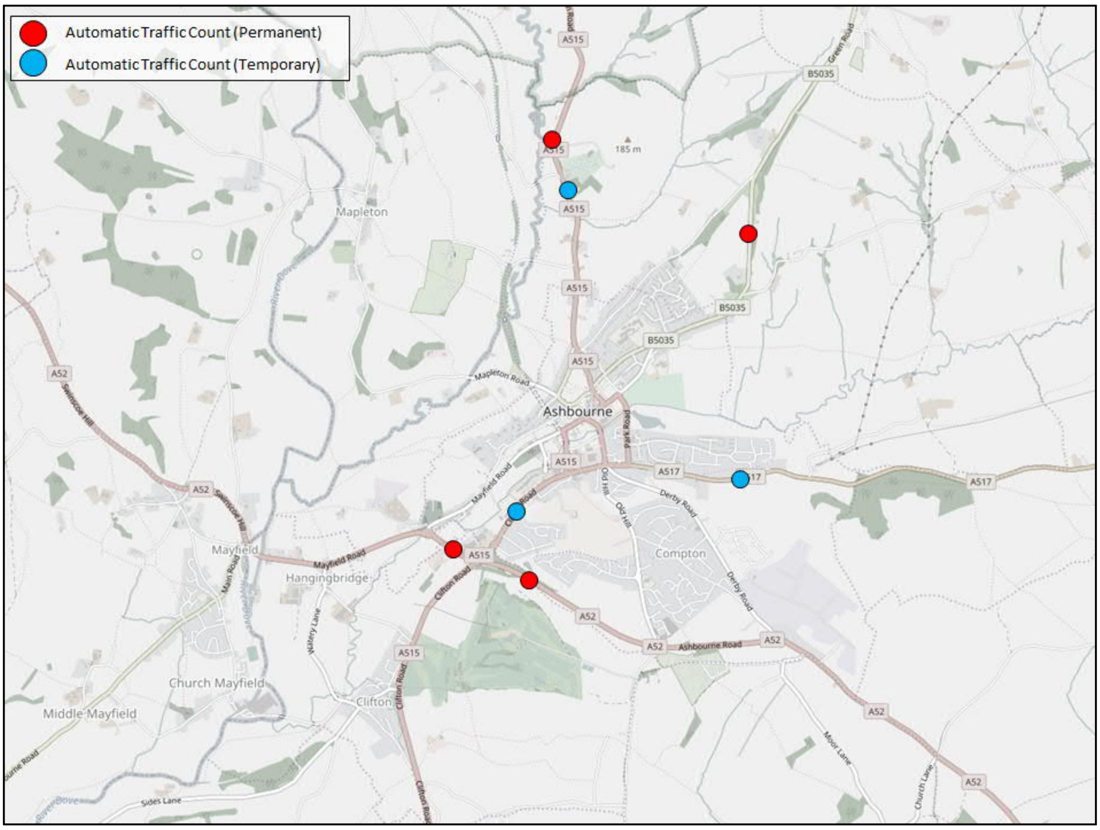
- A515 (North of the Windmill Lane / North Avenue junction);
- A517 Belper Road (East of the Sturston Road / Park Road / A517 Belper Road junction); and
- A515 Clifton Road (Between the A515 / A52 junction and the A515 / Station Road junction).

2.2.5 In addition to the traffic data obtained specifically for this study, DCC maintain several permanent traffic count data points across the County. The permanent count points record traffic flows in vehicles. Flows are recorded every hour, by direction. Near to Ashbourne, data from the following sites has been obtained:

- A52 (South of the A515 / A52 junction);
- A52 (Between the A52 / Mayfield Road junction and the A52 / A515 junction);
- A515 (North of the Windmill Lane / North Avenue junction); and
- B5035 (East of the B5035 / A515 junction).

2.2.6 A plan showing the locations of the ATCs (both temporary and permanent) is provided as Figure 2.1.

Figure 2.1: Location of ATC Sites (Temporary and Permanent)



2.3 Local Network Peak Hours

2.3.1 Analysis of the MCC data has been undertaken to identify the busiest individual 60 minute segment in both the AM (0700 – 1000hrs) and PM (1600 – 1900hrs) peak periods. Table 2.1 shows this analysis for each junction, with the overall busiest 60 minute periods being identified as 0800 – 0900hrs in the AM and 1645 – 1745hrs in the PM. These hours have been used as the local AM and PM peak hours on which the junction specific analysis later in this study will be based.

Table 2.1: Busiest Sixty Minute Segment in the AM and PM peak period

Junction	Junction Name	AM Peak	PM Peak
1	A515 / B5035	08.00-09.00	16.45-17.45
2	A515 / St John Street	08.00-09.00	16.45-17.45
3	Cockayne Avenue / Park Road / St Jon Street	08.00-09.00	16.30-17.30
4	A517 / Park Road	08.00-09.00	17.00-18.00
5	A515 / A517 / Derby Road / Old Hill	08.00-09.00	17.15-18.15
6	A515 / Station Road	09.30-10.30	16.45-17.45
7	A515 / Windmill Lane / North Avenue	08.00-09.00	16.15-17.15
8	Station Road / Church Street	08.15-09.15	16.45-17.45
9	A52 / Derby Road	08.15-09.15	17.00-18.00
10	A515 / A52	08.15-09.15	16.45-17.45
11	A52 / Mayfield Road	08.15-09.15	17.00-18.00

2.3.2 Figures 2.3 and 2.4 illustrate how traffic conditions vary across the AM and PM periods, respectively by showing the total inflows into every junction recorded by the MCC traffic surveys described previously.

Figure 2.3: Traffic Flow Profile – All Junctions – AM Period

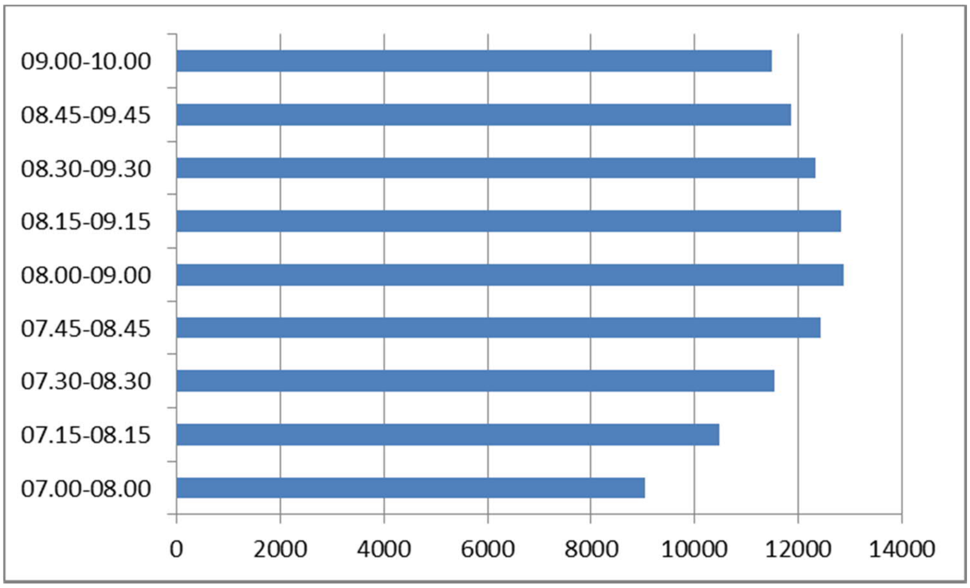
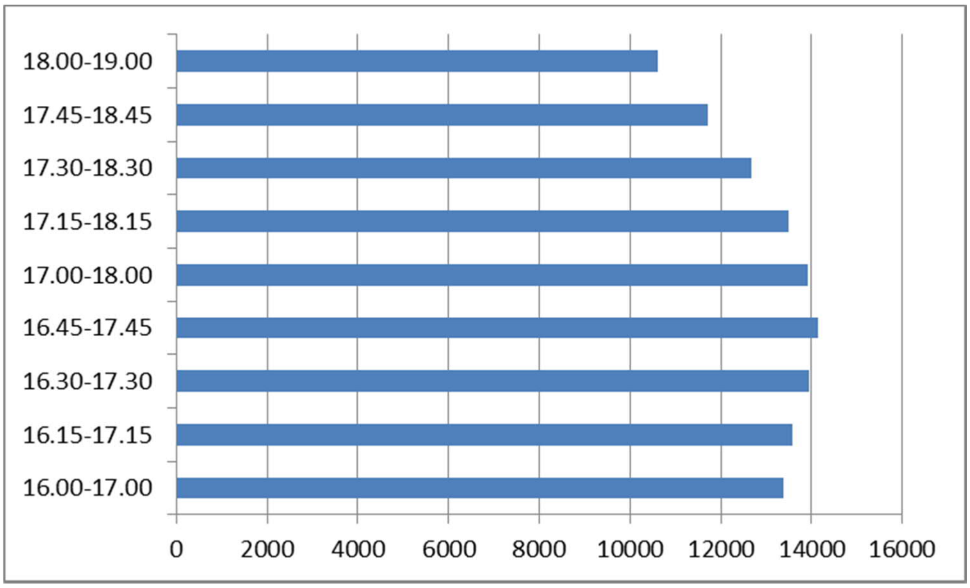


Figure 2.4: Traffic Flow Profile – All Junctions – PM Period



2.3.3 Figures 2.3 and 2.4 show that there is not a 'flat' profile of traffic flow in either the AM or PM, and that the busiest sixty minute period is not representative of conditions across the wider three hour period. As such, this information has been used to expand the traffic delays calculated from the traffic models described later in this report, for the purposes of valuation of these delays.

2.4 Comparison with Longer Term Counts

2.4.1 A comparison between the one-day MCCs and the longer term ATCs (whether permanent or temporary) has been undertaken to determine if the MCCs are representative of longer term conditions. In this regard, it should be noted that normal variation in 'day to day' traffic flow can be in the order of ± 15%.

2.4.2 Table 2.2 shows this comparison in both the AM and PM peak hour. The comparison was undertaken using the two-way traffic flow at the nearby junction. The comparison was undertaken for the AM and PM peak hours respectively.

Table 2.2: Percentage difference between MCC (one day observation) and ATC data (averaged across all weekdays in the sample)

Road / Link	AM Peak Hour	PM Peak Hour
A52 (Between A52 / A515 junction and A52 / Mayfield Road junction)	*-0.9%*	*-3.2%*
A52 (South of A52 / A515 junction)	*-4.9%*	*-2.6%*
A515 (Between A52 / A515 junction and A515 / Station Road junction)	7%	*-8%*
A517 Belper Road (West of Park Road / Sturston Road / Belper Road junction)	27.7%	21.2%
B5035 King Street (West of A515 / B5035 junction)	10%	9%
A515 (North of Windmill Lane / North Avenue junction)	12%	11%
Note: a positive % indicates the MCC recorded more traffic than the ATC. Grey shading indicates comparison of the MCC against a permanent ATC with data taken from August 2016 to August 2017, whilst other comparisons are of the MCC against the average weekday taken from the 7-day ATCs undertaken in June and July 2017		

2.4.3 The key A52 and A515 routes are within expected variations. The two locations which show the greatest discrepancy are (1) A517, and (2) the B5035. In the case of the latter, whilst the percentage differences are over 15% in the AM peak the difference in actual vehicle numbers between the MCC and average weekday in the ATC are smaller (+50 two-way vehicles in the AM peak hour). For the A517, it is not clear if the variation relates to a localised issue at this junction at the time of the survey. Notwithstanding this, the overall pattern is that the MCC recorded more traffic flow than the longer term ATCs (whether temporary or permanent). This is discussed in more detail below.

2.4.4 Data from the permanent count sites have also been used to identify variance on a month-by-month basis by calculating an average of weekday traffic flow within each month. This data is presented in Tables 2.3 to 2.6, and an average of all sites is given in Table 2.7. This shows that traffic counts collected in June are likely to be higher than the average weekday traffic flow across the full year by an average of 6.0%. It is noted that the permanent traffic counts, being located outside Ashbourne town centre and carrying a large volume of 'through traffic', may flatten the overall seasonality affect within the town centre.

2.4.5 An August seasonality uplift of 12% was identified in the 2009 Ashbourne Traffic Study (prepared by Scott Wilson Ltd.), which is similar to that recorded in Table 2.5. It is noted that there will be specific Summer weeks and weekends (including Easter) on which Ashbourne becomes particularly busy given its status as a tourism destination.

Table 2.3: Comparison of 24-hr weekday traffic flow (Month Total / Year Month Average – Weekday Traffic Totals) – at Permanent Count Site (A52, east of A515)

January	**February**	**March**	**April**	**May**	**June**
91.0%	93.6%	99.7%	105.2%	105.2%	104.0%
July	**August**	**September**	**October**	**November**	**December**
105.9%	102.3%	100.8%	101.6%	97.6%	93.1%
This table has been calculated by dividing the total average weekday 24hr traffic in a particular month, by the total average weekday 24hr traffic recorded across the entire of 2016					

Table 2.4: Comparison of 24-hr weekday traffic flow (Month Total / Year Month Average – Weekday Traffic Totals) – at Permanent Count Site (A52, west of A515)

January	**February**	**March**	**April**	**May**	**June**
91.2%	95.9%	102.7%	109.8%	110.3%	109.8%
July	**August**	**September**	**October**	**November**	**December**
112.3%	91.7%	87.4%	100.1%	95.2%	93.7%
This table has been calculated by dividing the total average weekday 24hr traffic in a particular month, by the total average weekday 24hr traffic recorded across the entire of 2016					

Table 2.5: Comparison of 24-hr weekday traffic flow (Month Total / Year Month Average – Weekday Traffic Totals) – at Permanent Count Site (A515, north of Ashbourne)

January	**February**	**March**	**April**	**May**	**June**
87.5%	90.2%	96.5%	103.7%	104.8%	107.6%
July	**August**	**September**	**October**	**November**	**December**
111.5%	112.1%	103.4%	100.3%	93.1%	89.4%
This table has been calculated by dividing the total average weekday 24hr traffic in a particular month, by the total average weekday 24hr traffic recorded across the entire of 2016					

Table 2.6: Comparison of 24-hr weekday traffic flow (Month Total / Year Month Average – Weekday Traffic Totals) – at Permanent Count Site (B5035)

January	February	March	April	May	June
100.6%	110.3%	117.7%	98.3%	96.4%	95.4%
July	**August**	**September**	**October**	**November**	**December**
98.6%	101.8%	97.4%	93.7%	95.7%	94.2%
This table has been calculated by dividing the total average weekday 24hr traffic in a particular month, by the total average weekday 24hr traffic recorded across the entire of 2016					

Table 2.7: Comparison of 24-hr weekday traffic flow (Month Total / Year Month Average – Weekday Traffic Totals) – at All Permanent Count Sites

January	February	March	April	May	June
91.5%	95.7%	102.3%	105.9%	106.0%	106.0%
July	**August**	**September**	**October**	**November**	**December**
108.7%	100.2%	95.8%	99.8%	95.5%	92.7%
This table has been calculated by dividing the total average weekday 24hr traffic in a particular month, by the total average weekday 24hr traffic recorded across the entire of 2016					

2.5 Baseline Traffic Flows

2.5.1 Diagrams showing the traffic flow through each of the study area junctions are shown in Appendix A. As the MCCs only recorded vehicles passing through the junction, vehicles that were recorded as queuing at the end of each of the peak sixty minute period have also been added to the recorded traffic flow through each junction (proportioned to each individual turning movement) so that the full demand through each junction is identified; i.e.

*Baseline 2017 = (Junction MCC + Queuing Traffic at Period End) * 0.94*

2.5.2 A factor of 0.94 has been applied to reduce June traffic to the yearly average (i.e. given that Table 2.7 identifies June traffic flow as being 6% higher than the average yearly conditions). Application of this factor is appropriate because the traffic flows are not being used to design new junctions, rather they are being used ultimately to value delay occurring on the network across the entire year. (i.e. the final objective of this work is to calculate a set of annual average peak hour traffic flows on each link of the highway network. This method should therefore result in a robust / conservative transport economic efficiency calculation).

2.6 Annual Average Daily Traffic

2.6.1 The road safety assessment (contained later in this report) requires data in Annual Average Daily Traffic (AADT) format. The permanent and temporary count sites on the A52 and A515 have therefore been examined to determine a factor that could be applied to expand information from the existing traffic count data to AADT flows.

2.6.2 Table 2.8 and Table 2.9 show the average 5-day (weekday) and 7-day traffic flow recorded in August 2016 to August 2017 and has been used to calculate annualisation factors for the A52 bypass, whilst Table 2.10 shows the average 5-day (weekday) and 7-day traffic flow recorded between Thursday 29th June and Wednesday 5th July 2017 and have been used to calculate an annualisation factor for the Ashbourne area.

Table 2.8: A52 (East of A52 / A515 junction): Average 5-day (weekday) and 7-day traffic flows (August 2016 – August 2017) (Source: DCC Permanent Traffic Count Data)

Hour	Weekday	7 Day	
00:00:00	23	30	
01:00:00	18	20	
02:00:00	17	18	
03:00:00	25	23	
04:00:00	52	44	
05:00:00	145	116	
06:00:00	300	232	
07:00:00	566	433	
08:00:00	766	613	
09:00:00	637	590	
10:00:00	606	622	
11:00:00	598	629	
12:00:00	604	624	
13:00:00	613	606	
14:00:00	651	627	**IP Average**
15:00:00	739	685	**635**
16:00:00	854	754	
17:00:00	937	790	
18:00:00	571	507	
19:00:00	322	294	
20:00:00	198	184	
21:00:00	139	131	
22:00:00	92	88	
23:00:00	49	49	
24-Hr Total	**9,524**	**8,708**	

Table 2.9: A52 (West of A52 / A515 junction): Average 5-day (weekday) and 7-day traffic flows (August 2016 – August 2017) (Source: DCC Permanent Traffic Count Data)

Hour	Workday	7 Day	
00:00:00	28	38	
01:00:00	16	21	
02:00:00	16	17	
03:00:00	23	21	
04:00:00	48	39	
05:00:00	145	115	
06:00:00	368	281	
07:00:00	727	551	
08:00:00	955	771	
09:00:00	879	817	
10:00:00	888	924	
11:00:00	882	955	
12:00:00	866	935	
13:00:00	855	898	
14:00:00	930	945	**IP Average**
15:00:00	1025	1015	**907**
16:00:00	1167	1074	
17:00:00	1236	1082	
18:00:00	827	741	
19:00:00	484	445	
20:00:00	302	281	
21:00:00	204	191	
22:00:00	132	126	
23:00:00	66	68	
24-Hr Total	**13,067**	**12,349**	

Table 2.10: Ashbourne: Average 5-day (weekday) and 7-day traffic flows (2016) (Source: Temporary ATC count Data)

Hour	Workday	7 Day	
00:00:00	15	22	
01:00:00	6	10	
02:00:00	4	7	
03:00:00	11	10	
04:00:00	14	12	
05:00:00	73	58	
06:00:00	126	102	
07:00:00	354	278	
08:00:00	461	380	
09:00:00	381	348	
10:00:00	360	363	
11:00:00	343	358	
12:00:00	342	358	
13:00:00	336	347	
14:00:00	365	367	**IP Average**
15:00:00	412	403	**360**
16:00:00	447	426	
17:00:00	485	432	
18:00:00	354	327	
19:00:00	231	224	
20:00:00	151	149	
21:00:00	114	106	
22:00:00	73	72	
23:00:00	34	35	
24-Hr Total	**5,492**	**5,195**	

2.6.3 The factor would therefore be the 7-day total divided by the sum of the AM, PM and IP period, i.e.:

A52 (East of A52 / A515 junction): 8,708 / (766 + 937 + 635) = 3.725

A52 (West of A52 / A515 junction): 12,349 / (955 + 1,236 + 907) = 3.986

Ashbourne: 5,195 / (461 + 485 + 360) = 3.978

2.6.4 Table 2.11 provides a comparison of the AADT values calculated for links for which actual AADT values are known, to test the above factors. As could be expected, they provide a good fit with the available data.

Table 2.11: Comparison of Actual and Calculated AADT

Link	Actual AADT	Calculated AADT	Difference
A52 from Mayfield Road to A515	12,349	12,850	4%
A52 from A515 to Derby Road	8,708	9,500	9%
A515 from North Avenue / Windmill Lane to Spend Lane	7,053	8,250	17%
Belper Road from Park Road	5,195	6,150	18%
A515 from A52 to Station Road	11,762	12,350	5%

2.6.5 Table 2.12 provides the AADT values across the study area network, rounded to the nearest 50 vehicles.

Table 2.12: Study Area AADT Values*

Link Number	Link	AADT
1	A52 from Mayfield to Mayfield Road	11,200
2	Mayfield Road from A52 to Station Road	6,450
3	A52 from Mayfield Road to A515**	12,350
4	A515 from Clifton to A52	11,000
5	A515 from A52 to Station Road	12,350
6	A52 from A515 to Derby Road**	8,700
7	A52 from Derby Road	11,550
8	Derby Road from A515 to A52	11,600
9	Old Hill from A515	1,150
10	A515 from Station Road to A515 Dig Street	9,200
11	Station Road from Church Street to A515	4,600
12	Church Street from Station Road to A515	5,900
13	A515 from Derby Road to St John Street	4,300
14	Sturston Road from A515 to Park Road	12,950
15	Belper Road from Park Road	6,150
16	Park road from St John Street to Sturston Road	9,350
17	Cockayne Avenue from St John Street	6,800
18	St John Street from A515 to Park Road	4,500
19	A515 from A515 Dig Street to A515 Buxton Road	7,100
20	A515 from A515 St John Street to B5035	8,900
22	B5035 from A515	3,300
23	A515 from B5035 to North Avenue / Windmill Lane	7,700
24	North Avenue from A515	1,550
25	Windmill Lane from A515	1,000
26	A515 from North Avenue / Windmill Lane to Spend Lane**	7,050

*Shown as rounded to the nearest 50

** For these three roads the figures are actual AADT values, all others are factored from AM, IP and PM peak flows

2.7 Bluetooth Data

2.7.1 On the day of the junction surveys, Bluetooth data loggers were installed on routes into and from Ashbourne to log the Bluetooth IDs (of vehicles transmitting Bluetooth IDs) passing points A to F between 0700 and 1900hrs:

- A. A515 Buxton Road
- B. B5035
- C. A517 Belper Road
- D. A52
- E. A515 Clifton Road
- F A52 Mayfield Road

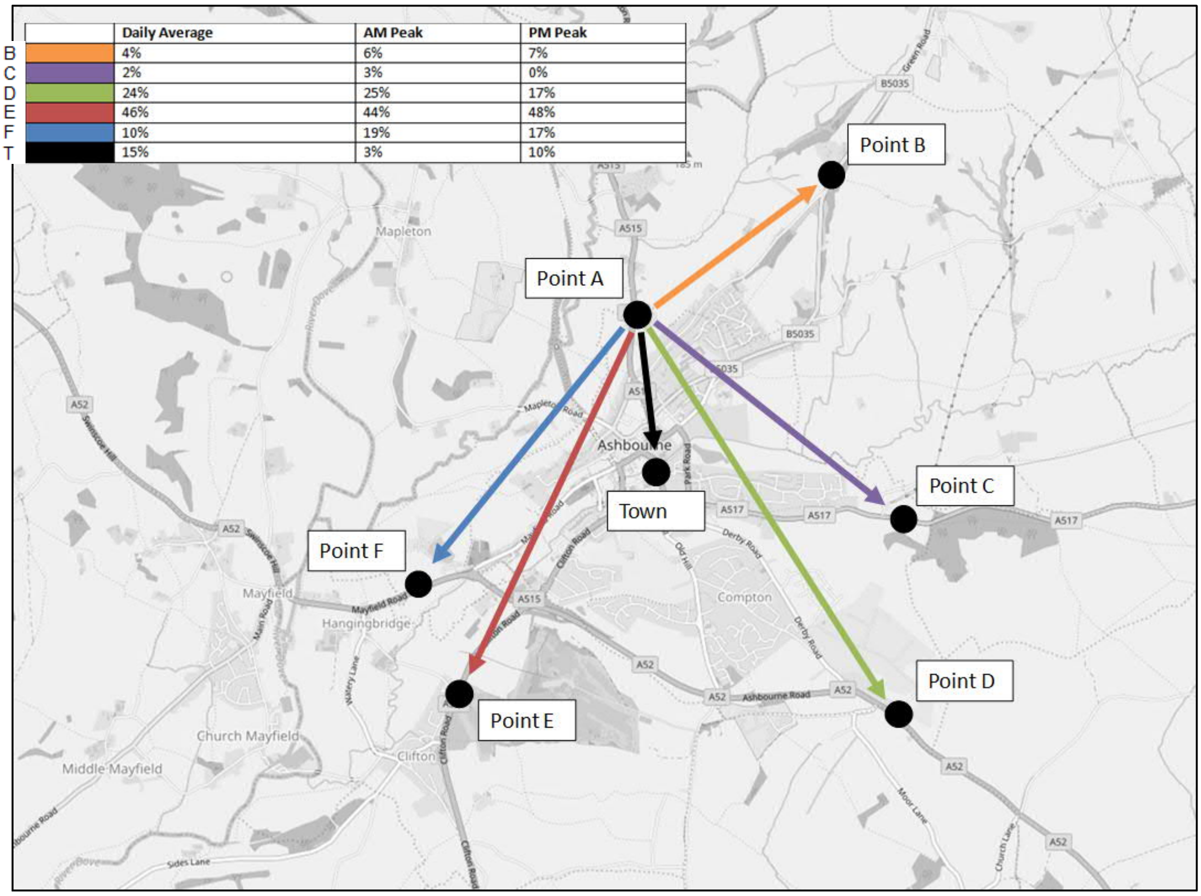
2.7.2 IDs were matched to create an origin / destination matrix for detected vehicles. The following information was recorded for each vehicle passing each cordon point:

- Cordon point passed;
- Bluetooth ID; and
- Time the vehicle passes the cordon point (ss:mm:hh).

2.7.3 This data was then matched and data summarised to provide an origin-destination matrix for vehicles passing through the cordon. This information is contained in Appendix B, and is summarised for the movements from each respective origin destination in Figures 2.5 – 2.10. If a journey took longer than ten minutes, a stop within town has been assumed. In this respect, it should be noted that a Bluetooth survey does have disadvantages over a traditional Road Side Interview survey, in that it is passive and it is recognised that there may be some bias in the sample towards newer vehicles. As with all origin-destination surveys, some calibration and validation of the data is required. The advantage of Bluetooth, however, is that it is less disruptive and a larger overall sample can be obtained. The key risk for this study is that trips to / from Ashbourne itself may be underestimated.

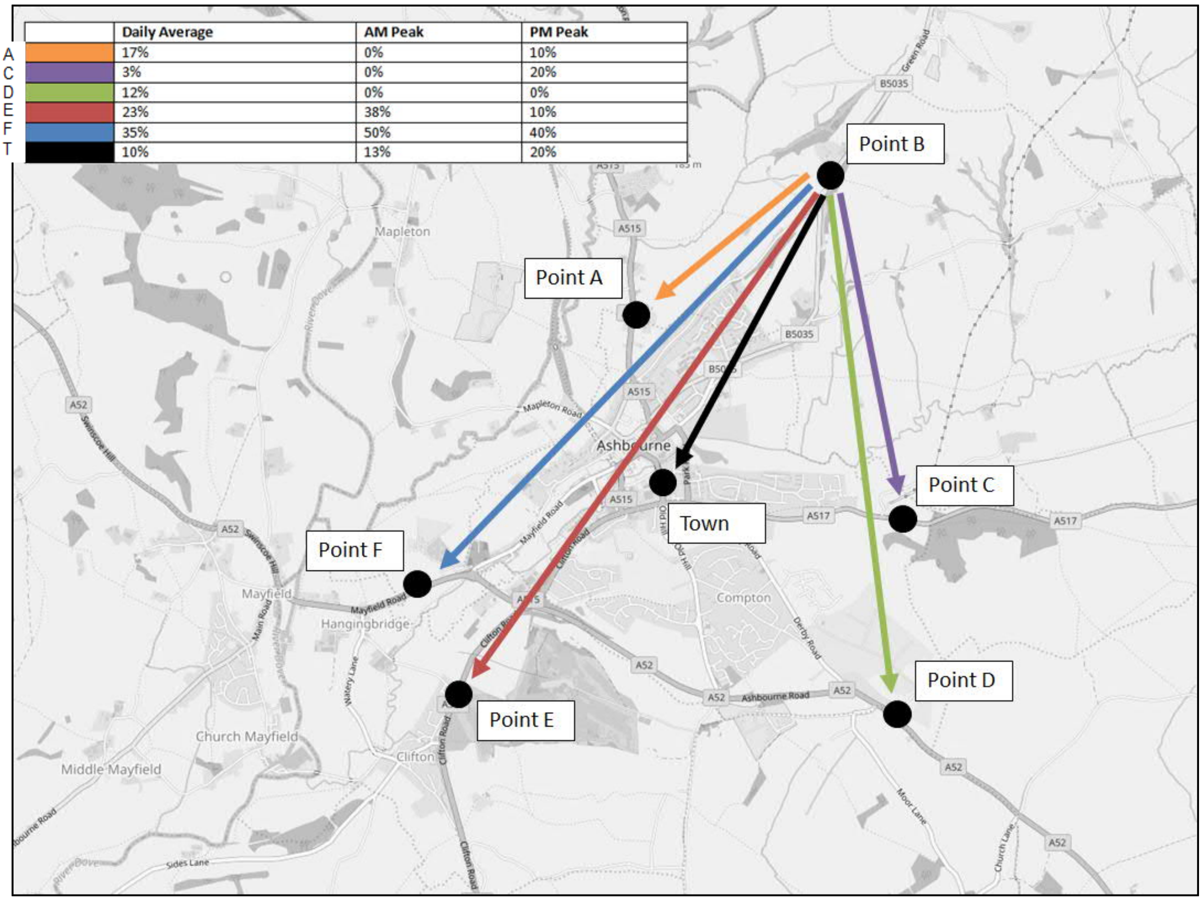
2.7.4 Figures 2.5 – 2.10 show the distribution from each origin point to each destination point and are shown as a 12-hour distribution, an AM distribution and a PM distribution.

Figure 2.5: Destination Distribution from Point A



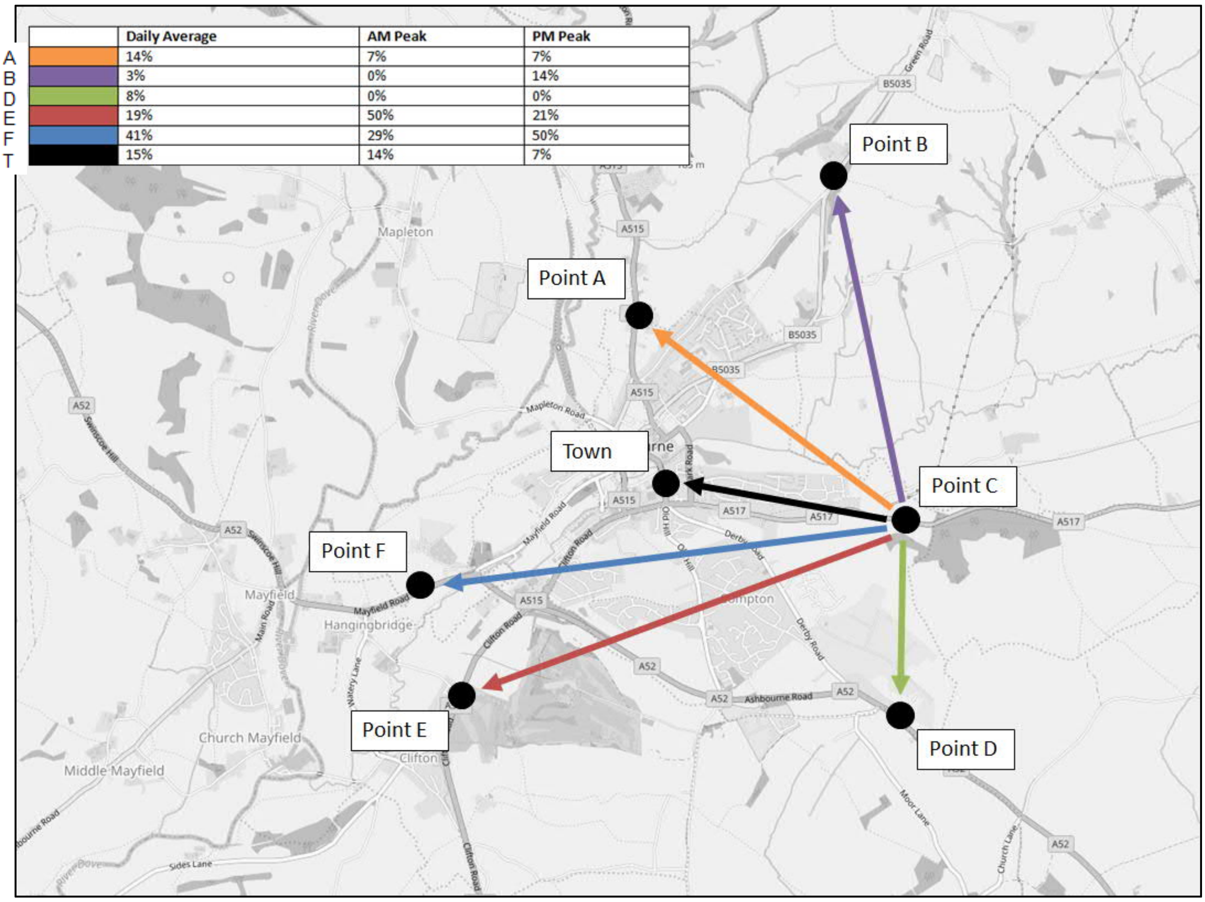
		Daily Average	AM Peak	PM Peak
B	(orange)	4%	6%	7%
C	(purple)	2%	3%	0%
D	(green)	24%	25%	17%
E	(red)	46%	44%	48%
F	(blue)	10%	19%	17%
T	(black)	15%	3%	10%

Figure 2.6: Destination Distribution from Point B



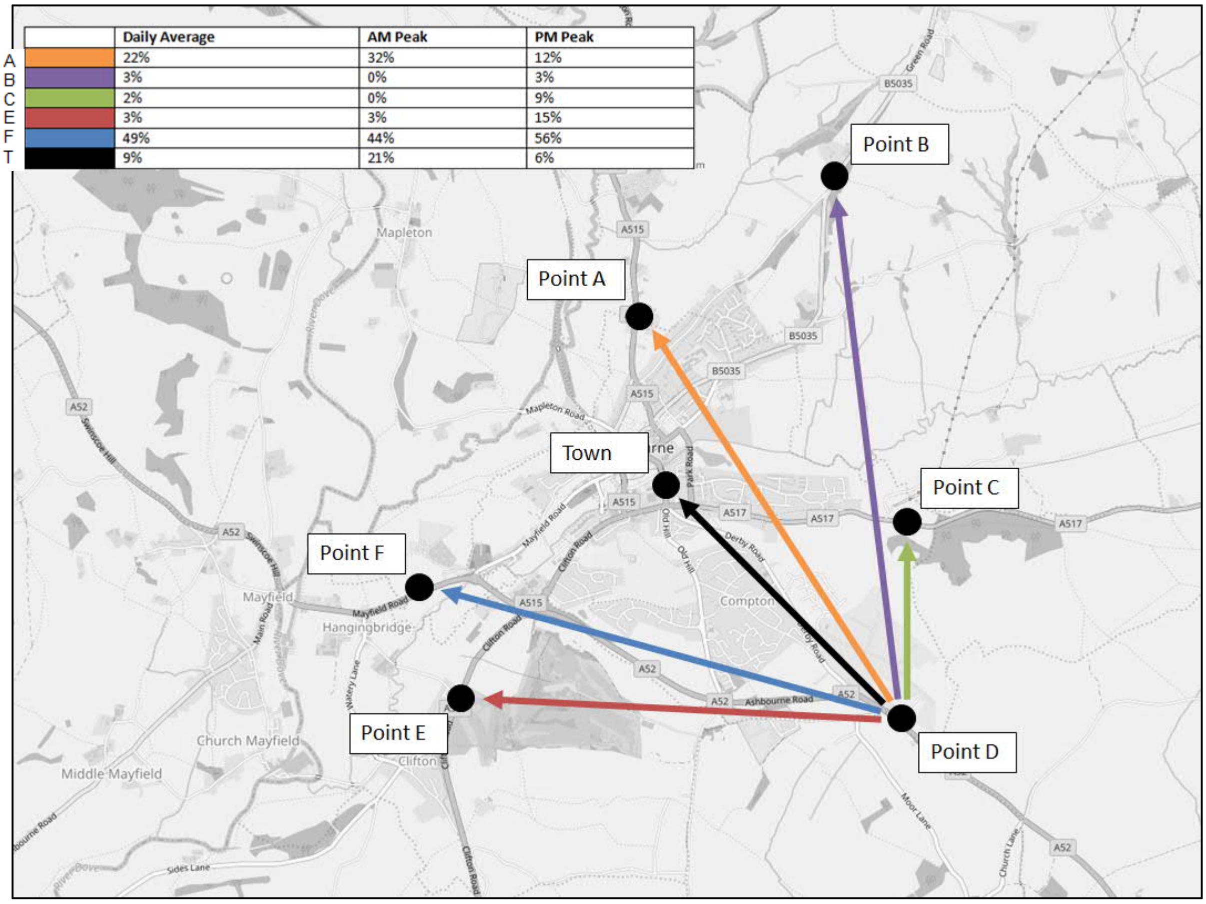
		Daily Average	AM Peak	PM Peak
A	(orange)	17%	0%	10%
C	(purple)	3%	0%	20%
D	(green)	12%	0%	0%
E	(red)	23%	38%	10%
F	(blue)	35%	50%	40%
T	(black)	10%	13%	20%

Figure 2.7: Destination Distribution from Point C



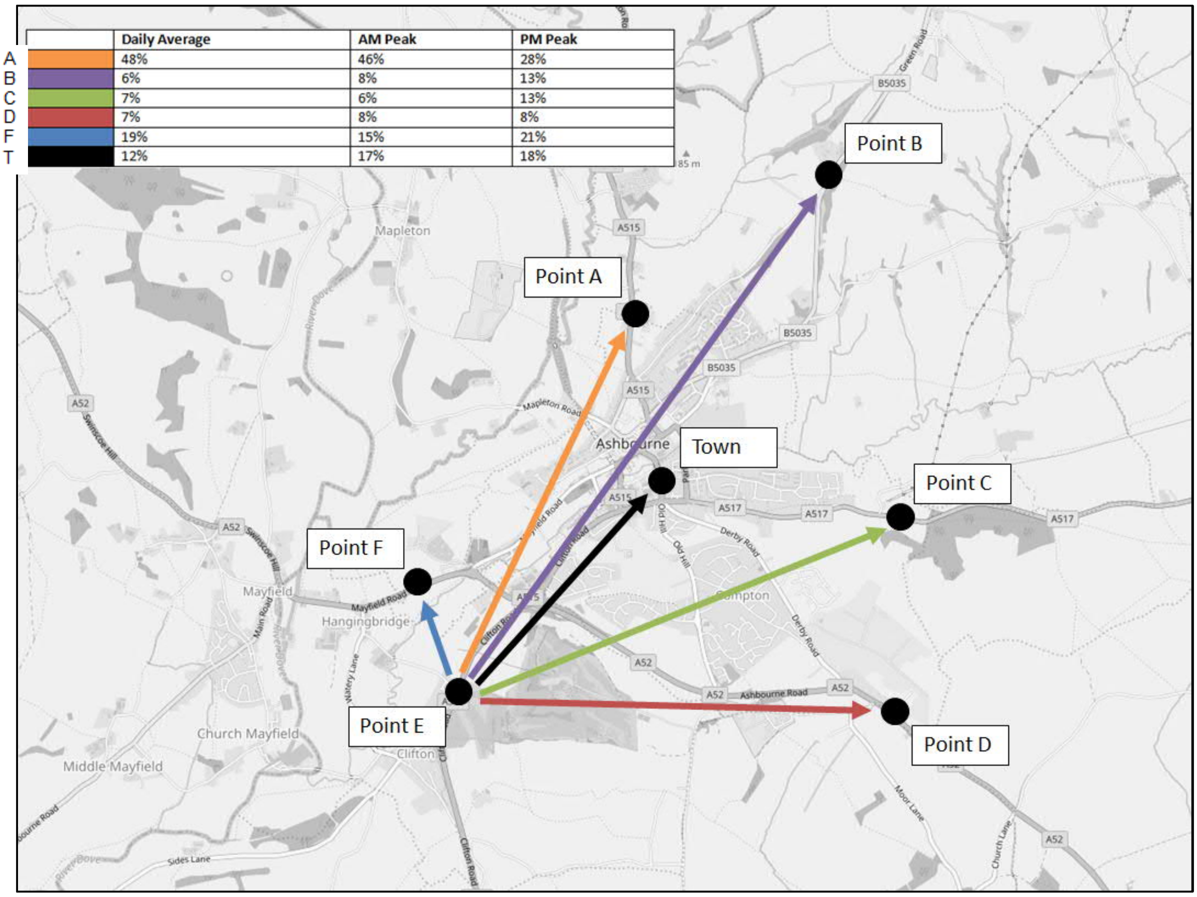
		Daily Average	AM Peak	PM Peak
A	(orange)	14%	7%	7%
B	(purple)	3%	0%	14%
D	(green)	8%	0%	0%
E	(red)	19%	50%	21%
F	(blue)	41%	29%	50%
T	(black)	15%	14%	7%

Figure 2.8: Destination Distribution from Point D



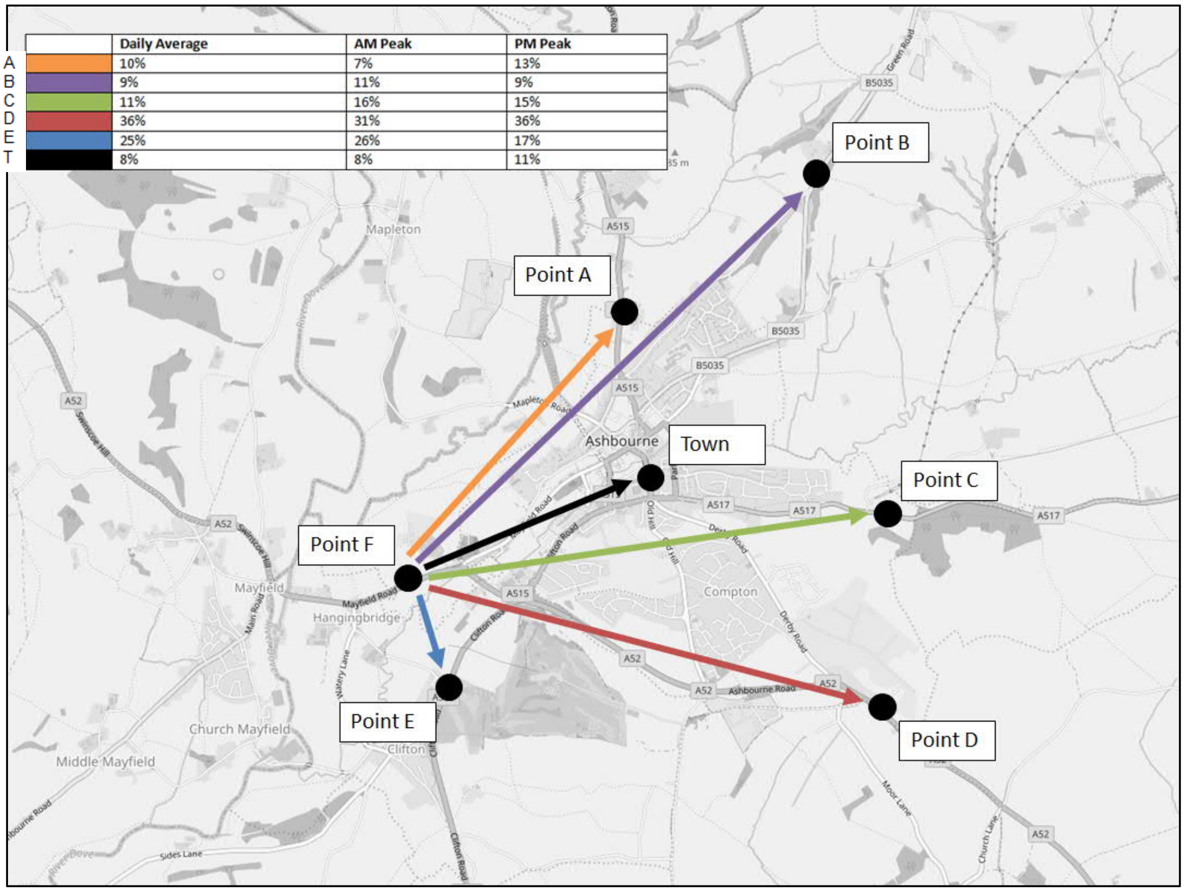
		Daily Average	AM Peak	PM Peak
A	(orange)	22%	32%	12%
B	(purple)	3%	0%	3%
C	(green)	2%	0%	9%
E	(red)	3%	3%	15%
F	(blue)	49%	44%	56%
T	(black)	9%	21%	6%

Figure 2.9: Destination Distribution from Point E



	Daily Average	AM Peak	PM Peak
A	48%	46%	28%
B	6%	8%	13%
C	7%	6%	13%
D	7%	8%	8%
F	19%	15%	21%
T	12%	17%	18%

Figure 2.10: Destination Distribution from Point F



	Daily Average	AM Peak	PM Peak
A	10%	7%	13%
B	9%	11%	9%
C	11%	16%	15%
D	36%	31%	36%
E	25%	26%	17%
T	8%	8%	11%

3. Understanding the Current Situation: Junction Performance

3.1 Overview

3.1.1 The purpose of this section is to describe the junctions within the study area, and how each junction has been modelled. Baseline traffic flows have been entered into each model as calculated from Section 2.

3.2 A52 / Mayfield Road

3.2.1 The A52 / Mayfield Road junction is a conventional roundabout, and has been modelled using ARCADY (which is recommended by the DfT for measuring the capacity of this junction type).

3.2.2 Traffic flow profiles through the AM and PM peak hours for the priority controlled junctions are given in Appendix C. Given these profiles, the ARCADY software has been run using a synthesised profile and provides outputs in the form of Ratios of Flow to Capacity (RFC) and queue length (Q). A synthesised profile includes a 12.5% mid-peak 'surge' to robustly test the performance of the junction whereas a 'flat' profile assumes a constant arrival pattern of traffic through the hour being assessed.

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

3.2.4 Geometrical parameters have been measured from OS mapping, with entry widths measured on site. Table 3.1 summarises the results of the ARCADY modelling, with full results provided in Appendix D. Table 3.1 shows the junction operating well within capacity during each of the assessed hours.

Table 3.1: ARCADY Results for the A52 / Mayfield Road Junction – Highest RFC Approach

Flow Profile	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
Synthesised	0.40	0.67	0.30	0.42	0.44	0.77

Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis

3.3 A52 / A515

3.3.1 The A52 / A515 junction is a conventional roundabout, and has been modelled using ARCADY.

3.3.2 Geometrical parameters have been measured from OS mapping, with entry widths measured on site. Table 3.2 summarises the results of the ARCADY modelling, with full results provided in Appendix E.

Table 3.2: ARCADY Results for the A52 / A515 Junction – Highest RFC Approach

Flow Profile	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
Synthesised	0.56	1.27	0.43	0.75	0.63	1.66
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

3.3.3 Table 3.2 shows the junction operating well within capacity during each of the assessed hours.

3.4 Church Street / Station Road

3.4.1 The Church Street / Station Road junction is a priority T-junction, with Station Road forming the minor arm. There is no right-turn harbourage provided, meaning that vehicles waiting to turn right into the minor arm block ahead moving traffic on Church Street.

3.4.2 The junction has been modelled using PICADY (which is recommended by the DfT for measuring the capacity of this junction type).

3.4.3 As per the roundabout junctions, PICADY software has been run using a synthesised profile, with outputs provided in the form of Ratios of Flow to Capacity (RFC) and queue length (Q). For a new junction, a worst-arm target RFC value of 0.85 during a single time segment is preferred (or 0.75 in a rural location) as this minimises the chance that queuing will occur at a new junction on opening. For existing junctions, RFC values above 0.85 are likely to produce queues which increase slowly. Above an RFC value of 1.0, a junction is more than likely to be at capacity (with resulting larger increases in queue length).

3.4.4 Geometrical parameters have been measured from OS mapping, with entry widths measured on site. Table 3.3 summarises the results of the PICADY modelling, with full results provided in Appendix F.

Table 3.3: PICADY Results for the Church Street / Station Road Junction – Highest RFC Approach

Flow Profile	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
Synthesised	0.32	0.47	0.36	0.57	0.46	0.84
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

3.4.5 Table 3.3 shows the junction operating well within capacity during each of the assessed hours.

3.5 A515 / Station Road

3.5.1 The A515 / Station Road junction is a mini-roundabout, and has been modelled using ARCADY (which is recommended by the DfT for measuring the capacity of this junction type).

3.5.2 Traffic flow profiles through the AM and PM peak hours for the priority controlled junctions are given in Appendix C. Given these profiles, the ARCADY software has been run using a 'flat' profile and provides outputs in the form of Ratios of Flow to Capacity (RFC) and queue length (Q). A synthesised profile includes a 12.5% mid-peak 'surge' to robustly test the performance of the junction whereas a 'flat' profile assumes a constant arrival pattern of traffic through the hour being assessed.

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

3.5.4 Geometrical parameters have been measured from OS mapping, with entry widths measured on site. Table 3.4 summarises the results of the ARCADY modelling, with full results provided in Appendix G. Table 3.4 shows the junction approaching capacity in the AM peak hour, but within capacity during the interpeak and PM peak hour.

Table 3.4: ARCADY Results for the A515 / Station Road junction – Highest RFC Approach

Flow Profile	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
Synthesised	0.63	1.70	0.71	2.39	0.70	2.29

Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis

3.6 A52 / Derby Road

3.6.1 The A52 / Derby Road junction is a conventional roundabout, and has been modelled using ARCADY.

3.6.2 Geometrical parameters have been measured from OS mapping, with entry widths measured on site. Table 3.5 summarises the results of the ARCADY modelling, with full results provided in Appendix H. Table 3.5 shows the junction operating well within capacity during each of the assessed hours.

Table 3.5: ARCADY Results for the A52 / Derby Road Junction – Highest RFC Approach

Flow Profile	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
Synthesised	0.47	0.89	0.32	0.46	0.54	1.16

Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis

3.7 A515 / Derby Road / Sturston Road / Old Hill & Park Road / Sturston Road / Belper Road

3.7.1 The A515 / Derby Road / Sturston Road / Old Hill & Park Road / Sturston Road / Belper Road junctions are two traffic signalled junctions that are controlled together as a single junction. As such, it has been modelled using LINSIG based on the signal specification provided by DCC. Table 3.6 summarises the results of the LINSIG modelling, with full results provided in Appendix I.

Table 3.6: LINSIG Results for the 3.7 A515 / Derby Road / Sturston Road / Old Hill & Park Road / Sturston Road / Belper Road – Overall Junction Performance

Scenario	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	PRC	Delay	PRC	Delay	PRC	Delay
Baseline	1.5%	25.19	14.4%	18.55	8.0%	23.77
Notes: PRC = Percentage of Reserve Capacity. A measure of the overall "spare" capacity at a junction. Delay = Vehicle Delay in PCU/hrs.						

3.7.2 Within LINSIG, a PRC value of greater than 0% indicates a junction operating within capacity. PRC falls below 0% (i.e. a negative result is provided) when an individual approach arm exceeds a ratio of flow to capacity of 90%. Table 3.6 shows the junction operating at near to capacity in the AM peak hour.

3.8 A515 (Dig Street) / Church Street / St John Street

3.8.1 The A515 / Church Street / St John Street junction is a signalised junction. As such, it has been modelled using LINSIG based on the signal specification provided via DCC. Table 3.7 summarises the results of the LINSIG modelling, with full results provided in Appendix J. The junction is part of a one-way system through the town and no left turn takes place from St John Street to A515 (the minor arm).

Table 3.7: LINSIG Results for the A515 / Church Street / St John Street – Overall Junction Performance

Scenario	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	PRC	Delay	PRC	Delay	PRC	Delay
Baseline	78.8%	4.53	94.8%	4.17	57.7%	5.23
Notes: PRC = Percentage of Reserve Capacity. A measure of the overall "spare" capacity at a junction. Delay = Vehicle Delay in PCU/hrs.						

3.8.2 Table 3.7 shows the junction operating well within capacity during all assessed hours (i.e. throughout the working day). This assumes that the pedestrian stages are called every cycle.

3.9 A515 / St John Street

3.9.1 The A515 / St John Street junction is a priority junction and, as such, has been modelled in PICADY. The junction is part of a one-way system through the town and no right turns are permitted to take place at this junction.

3.9.2 Geometrical parameters have been measured from OS mapping, with entry widths measured on site. Table 3.8 summarises the results of the PICADY modelling, with full results provided in Appendix K.

Table 3.8: PICADY Results for the A515 / St John Street junction – Highest RFC Approach

Flow Profile	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
Synthesised	0.33	0.49	0.43	0.73	0.37	0.57
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

3.9.3 Table 3.8 shows that the junction is operating within capacity in all of the assessed hours.

3.10 Cokayne Avenue / Park Road / St John Street

3.10.1 The Cokayne Avenue / Park Road / St John Street junction is a priority junction and, as such, has been modelled in PICADY. The junction is part of a one-way system through the town and no right or left turns takes place from Cokayne Avenue and Park Road to St John Street (the minor arm).

3.10.2 Geometrical parameters have been measured from OS mapping, with entry widths measured on site. Table 3.9 summarises the results of the PICADY modelling, with full results provided in Appendix L.

Table 3.9: PICADY Results for the Cokayne Avenue / Park Road / St John Street junction – Highest RFC Approach

Flow Profile	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
Synthesised	0.54	1.15	0.63	1.88	0.54	1.32
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

3.10.3 Table 3.9 shows that the junction is operating within capacity in all of the assessed hours.

3.11 A515 / B5035 (King Street)

3.11.1 The A515 / B5035 junction is a priority junction and, as such, has been modelled in PICADY.

3.11.2 Geometrical parameters have been measured from OS mapping, with entry widths measured on site. Table 3.10 summarises the results of the PICADY modelling, with full results provided in Appendix M.

Table 3.10: PICADY Results for the A515 / B5035 junction – Highest RFC Approach

Flow Profile	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
Synthesised	0.28	0.56	0.14	0.21	0.24	0.52
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

3.11.3 Table 3.10 shows that the junction is operating within capacity in all of the assessed hours.

3.12 A515 / Windmill Lane / North Avenue

3.12.1 The A515 / Windmill Lane / North Avenue junction is a priority junction and, as such, has been modelled in PICADY.

3.12.2 Geometrical parameters have been measured from OS mapping, with entry widths measured on site. Table 3.11 summarises the results of the PICADY modelling, with full results provided in Appendix N.

Table 3.11: PICADY Results for the A515 / Windmill Lane / North Avenue junction – Highest RFC Approach

Flow Profile	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	Q	RFC	Q	RFC	Q
Synthesised	0.29	0.59	0.17	0.33	0.26	0.52
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

3.12.3 Table 3.11 shows that the junction is operating within capacity in all of the assessed hours.

3.13 Summary

3.13.1 Table 3.12 summarises the performance of the junctions outlined in Tables 3.1 to 3.11.

Table 3.12: Summary of Baseline Junction Performance

Junction	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	**Q**	**RFC**	**Q**	**RFC**	**Q**
A52 / Mayfield Road	0.40	0.67	0.30	0.42	0.44	0.77
A52 / A515	0.56	1.27	0.43	0.75	0.63	1.66
Church Street / Station Road	0.32	0.47	0.36	0.57	0.46	0.84
A515 / Station Road	0.63	1.70	0.71	2.39	0.70	2.29
A52 / Derby Road	0.47	0.89	0.32	0.46	0.54	1.16
	PRC	**Delay**	**PRC**	**Delay**	**PRC**	**Delay**
A515 / Derby Road / Sturston Road / Old Hill & Park Road / Sturston Road / Belper Road	1.5%	25.19	14.4%	18.55	8.0%	23.77
	RFC	**Q**	**RFC**	**Q**	**RFC**	**Q**
A515 / St John Street	0.33	0.49	0.43	0.73	0.37	0.57
Cokayne Avenue / Park Road / St John Street	0.54	1.15	0.63	1.88	0.54	1.32
A515 / B5035 (King Street)	0.28	0.56	0.14	0.21	0.24	0.52
A515 / Windmill Lane / North Avenue	0.29	0.59	0.17	0.33	0.26	0.52

Notes: PRC = Percentage of Reserve Capacity. A measure of the overall “spare” capacity at a junction. Delay = Vehicle Delay in PCU/hrs. RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a ‘worst arm’ basis

4. Understanding the Current Situation: Valuation of Delays

4.1 Overview

4.1.1 The purpose of this section is to provide a valuation of the cost of delays within the Ashbourne study area[2].

4.2 Methodology and Outputs

4.2.1 The value of travel time at each junction has been calculated from the junction operational assessments described in Section 3. Overall junction delay in the baseline models has been extracted from each model and travel time has been monetised using average Values of Travel Time Savings by vehicle class. Values of travel time savings (2010 resource cost prices) were taken from Table A1.3.5 of the WebTAG databook (published July 2017) and weighted using vehicle proportions from observed count data.

4.2.2 Travel time savings costs in each time period were annualised to present the total travel time delay costs in the baseline year. The economic valuation of journey time delays considers an AM period (0700 – 1000hrs), interpeak period (1000 – 1600hrs) and PM period (1600 – 1900hrs). The busiest sixty minute period identified in Table 2.1 has been used in the isolated junction models (and therefore generates time delays relevant to this busiest sixty minute period), but this would overestimate delays across the full AM and PM Peak periods. As such, a factor of 0.865 has been applied to the delays in the AM peak period, and 0.893 in the PM peak period to arrive at delays within each respective period. These factors are calculated from Figures 2.3 and 2.4.

4.2.3 The spreadsheets containing this analysis are given as Appendix O, with a summary by junction provided in Table 4.1.

[2] Refer to DfT: “Understanding & Valuing Impacts of Transport Investment – updating WEI Guidance (September 2016)”

Table 4.1: Potential for Travel Time Savings – Baseline Year (2017 Observed Traffic)

Junction	**Potential Travel Time Savings (2010 Market Prices)**
A515 / A52	£89,610
A52 / Mayfield Rd	£44,339
Church Street / Station Road	£36,212
A515 / Station Road	£143,732
A515 / Church Street	£167,145
Derby Road/A52	£46,197
A515 / Sturston Road / Derby Road / Old Hill	£466,132
Park Road / Belper Road / Sturston Road	£306,687
Cockayne Avenue / Park Road / St Johns Street	£64,015
A515 / St Johns Street	£21,723
A515 / B5035 (King Street)	£35,613
A515 / Windmill Lane/North Avenue	£61,600
Total	**£1,483,005**

4.2.4 In reading Table 4.1, it is important to note that:

- no improvement schemes will totally eliminate delay, as delays will occur at all junction types (even if such junctions are improved). As such, Table 4.1 provides a measure of the total delays occurring at junctions and therefore an upper bound on the travel time savings that might be claimed by an improvement scheme.
- Scheme benefits and costs are normally calculated over a 60 year period, and therefore benefits accumulate over the lifetime of a scheme appraisal.

5. Understanding the Current Situation: Road Safety

5.1 Overview

5.1.1 The purpose of this section is to identify the road safety performance of the local highway network. It is informed by STATS19 data obtained via DCC. The Guidance on Transport Assessment (DfT, 2007) states that a TA should “establish the current personal injury accident records for the most recent three-year period, or five years if this is considered to be more appropriate.” As such, road safety collision records have been obtained for the five years from 01/01/2012 to 31/12/2016.

5.1.2 The data obtained relates to those collisions that resulted in a personal injury and which were reported to the police. This data (known as STATS19 statistics) is generally recognised to be the most complete record of road collisions occurring on the local highway network. For the avoidance of doubt, and as is normal practice, they do not include statistics from collisions resulting in “damage-only” to vehicles, or which were not reported to the police.

5.1.3 Each collision resulting in a personal injury is classed as either ‘slight’, ‘serious’ or ‘fatal’ by the police depending on the most serious injury resulting from the collision (i.e. a collision resulting in two ‘slight’ injuries and one ‘serious’ injury would be classified as a ‘serious’ collision). Collisions classified as ‘serious’ generally involve an overnight stay in hospital. Fatal collisions are those in which a casualty dies within 30 days of the collision occurring.

5.2 Road Collision Trends

5.2.1 Table 5.1 shows how the number of collisions has changed within the study area.

Table 5.1: Road Collision Trends

Year	Slight	Serious	Fatal	Total	Moving Avg.
2012	12	2	0	14	-
2013	4	0	0	4	9
2014	8	1	0	9	8.3
2015	10	2	0	12	9
2016	5	1	0	6	-
Total	**39**	**6**	**0**	**45**	

5.3 Collision Clusters

5.3.1 Table 5.2 identifies where on the highway corridor the collisions have been occurring. Collisions occurring at links along the corridor are shown in *italics*, whilst collisions occurring at junctions are shown in **bold**.

Table 5.2: Collision Locations by Link / Junction

Node / Link Number	**Description**	**Collisions by Severity**			
		Slight	**Serious**	**Fatal**	**Total**
1	*A52 West to Mayfield Road*	0	0	0	**0**
1	**A52 / Mayfield**	1	0	0	**1**
2	*Mayfield Road*	4	0	0	**4**
3	*A52 North*	0	0	0	**0**
2	**A515 / A52**	2	0	0	**2**
4	*A515 West until Node 2*	1	0	0	**1**
5	*A515 West from Node 2 to Node 4*	2	0	0	**2**
3	**Church Street / Station Road**	1	0	0	**1**
6	*A52 South*	0	1	0	**1**
7	*A52 East past Node 5*	0	0	0	**0**
4	**A515 / Station Road**	1	0	0	**1**
8	*Derby Road*	5	0	0	**5**
9	*Old Hill*	0	0	0	**0**
5	**A52 / Derby Road**	0	0	0	**0**
10	*A515 East between Node 4 and 6*	0	0	0	**0**
11	*Station Road*	0	0	0	**0**
12	*Church Street East*	0	0	0	**0**
6	**A515 / Sturston Road / Derby Road / Old Hill**	3	0	0	**3**
13	*A515 North between Node 6 and 7*	3	0	0	**3**
14	*Sturston Road*	0	0	0	**0**
7	**Church Street / A515**	2	0	0	**2**
15	*Belper Road*	0	0	0	**0**
16	*Park Road*	3	0	0	**3**
8	**A515 / St Johns Street**	1	0	0	**1**
17	*Cokayne Avenue*	2	0	0	**2**
18	*St Johns Street*	0	0	0	**0**
19	*A515 East between Node 7 and 8*	0	0	0	**0**
9	**St Johns Street / Cokayne Avenue / Park Road**	0	0	0	**0**
20	*A515 North between Node 8 and 11*	1	1	0	**2**
21	*Union Street*	1	0	0	**1**
22	*B5035 Kings Street*	1	1	0	**2**
10	**Sturston Road / Belper Road / Park Road**	0	0	0	**0**
23	*A515 North between Node 11 and 12*	0	0	0	**0**
24	*North Avenue*	0	0	0	**0**
25	*Windmill Lane*	0	0	0	**0**
11	**A515 / B5035 King Street**	0	1	0	**1**
26	*A515 North between Node 12 and 13*	2	0	0	**2**
27	*Spend Lane*	0	0	0	**0**
12	***A515 / North Avenue / Windmill Lane***	0	0	0	**0**
28	*A515 North past Node 13*	1	1	0	**2**
13	**A515 / Spend Lane**	2	1	0	**3**
Total		**39**	**6**	**0**	**45**

5.3.2 There is only one road link at which there have been five or more collisions occurring in a single location, this is Derby Road; however, none of these accidents appeared in the same spot and were spread along the road link.

5.4 COBALT Analysis

5.4.1 The number of collisions occurring on the highway network can be compared to statistics collected across the United Kingdom to determine if there are more collisions occurring on a network than could be expected for the type of road and the volume of traffic using those roads. This analysis is conducted by the computer software, COBALT. Version 2013.02

5.4.2 COBALT is a computer-based mathematical representation of the road network. COBALT derives the travel and accident characteristics of the road based on measured geometrical data and observed accident data for each link and junction in the model. Until 2013, the economic appraisal of impacts in road schemes was calculated, amongst other travel objectives, in a program called COBA. COBALT is an excel spreadsheet-based version of this, carrying out only the accident-appraisal parts.

5.4.3 Two scenarios have been run to determine the baseline performance of the network:

- firstly, one in which observed collision data was used for every existing link in the COBA network, which in turn produced a calculated accident rate for that link.
- secondly, one in which no observed collision data was used, thus making COBALT use its default values for roads similar in type to those within the Ashbourne study area.

5.4.4 The purpose of the accident assessment in this report is to calculate the monetary costs of collisions occurring in the baseline scenario. The total cost of accidents on the network for a “Do Something” scenario and subtracting these from the total cost of accidents in the “Do Minimum” scenario. In this case, the Baseline (2017) only has been appraised to establish the existing accident conditions in the study area network.

5.4.5 COBALT requires two input files in order to produce its outputs. An economic parameters file consisting of a series of data tables of standard parameters required to calculate accident impacts in line with WebTAG guidance, and a scheme specific input file, produced by the user, which contains data specific to the scheme being modelled, such as the scheme network and traffic flows.

5.4.6 COBALT link and junction types were classified by assigning a COBALT link or junction type using observations of the type of link or junction. A possible 15 different links and 96 different junction types can be entered.

5.4.7 Annual Average Daily Traffic (AADT) flows were entered for each link for the base year (from Table 2.11), and junction flows were represented using AADT entry flows per arm.

5.4.8 The COBALT analysis has been run using ‘separate’ accident analysis for links & junctions. That is, the software calculates accident benefits separately for links and junctions (defined as those accidents occurring within 20 m of a junction).

5.4.9 For each link an accident rate per million vehicle kilometres (mvkm), the total distance travelled in mvkm during that year and the monetary value of a single accident has been calculated.

5.4.10 Table 5.3 shows the number of collisions forecast in 2017 in COBALT, for (1) the model that has been loaded with the historic DCC collision data and (2) the model that has been set to use default values.

Table 5.3: COBALT Outputs – 2017 Collisions

COBALT with Historic Collision Data	COBALT with Default Values
9.5 Collisions (Value £17,189)	34.1 Collisions (Value £58,243)

5.4.11 The results in Table 5.3 indicate that the Ashbourne network is experiencing fewer collisions than expected for the type of roads and volumes of traffic using the road links and junctions.

6. Understanding the Current Situation: Other Issues

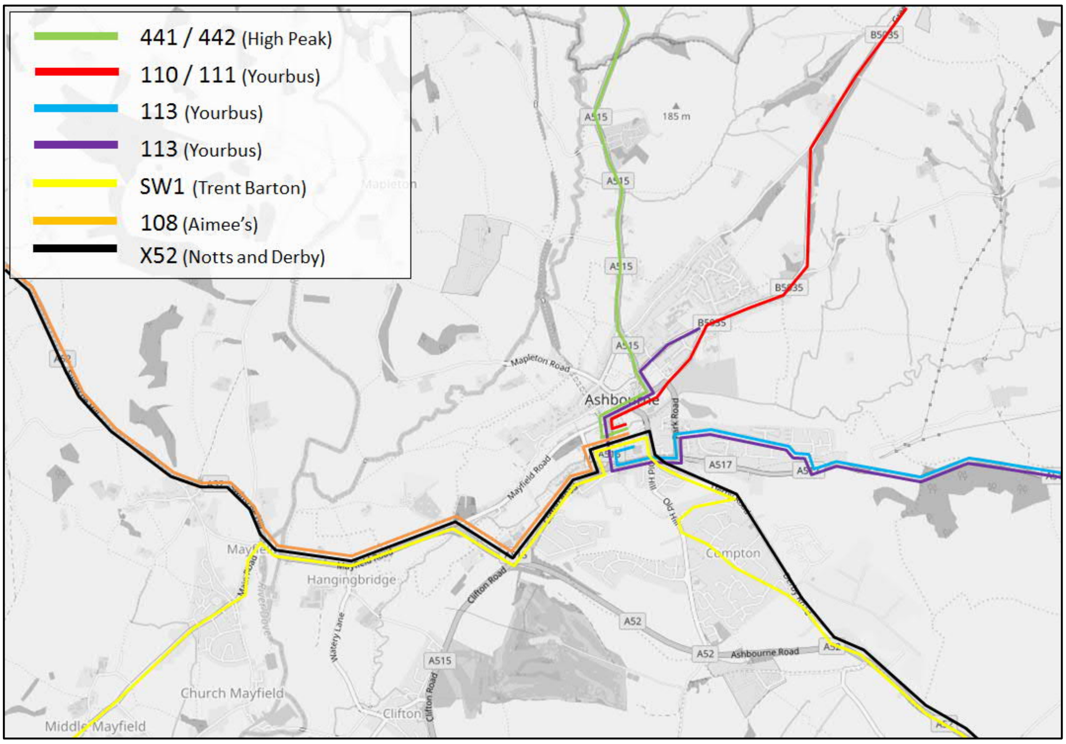
6.1 Overview

6.1.1 The preceding sections have concentrated on the operational performance of the network in terms of traffic flow, junction capacity and the valuation of traffic delays. However, there are several other issues that are known to exist in Ashbourne which are highlighted in this section.

6.2 Public Transport

6.2.1 Figure 6.1 shows the public transport routes through Ashbourne. This shows that there is a concentration of routes that use Station Road, A515 St John Street and Sturston Road. As such, public transport routes will be delayed as they travel through the Sturston Road / Park Road / Belper Road double junction.

Figure 6.1: Public Transport Services



6.3 Heavy Goods Vehicles

6.3.1 A number of quarries operate to the north of Ashbourne, with HGVs routeing south along the A515. At the present time, these have no choice but to route through the town. These are transporting materials critical to national housebuilding and infrastructure programmes and there is no likelihood (even taking into account rail options) that the quantities being hauled are going to decrease. The traffic surveys described earlier in this report identify 11.3% of vehicles using the A515 north of Ashbourne are HGVs.

6.3.2 The situation is exacerbated by the steep incline of the A515 approaching Ashbourne town centre, and that such HGVs must negotiate tight bends as they pass through the historic St. John's Street area. Photograph 1 and 2 show the steepness of the hill near to St. John's Street.

Photograph 1: A515 approaching St. John's Street.

Photograph 2: A515 approaching St. John's Street.

7. Understanding the Future Situation: Sources and Application of Traffic Growth

7.1 Overview

7.1.1 The purpose of this section is to summarise the methodology used to identify potential growth in Ashbourne and the major routes running near to the town.

7.1.2 There are three main potential sources of traffic growth:

- background growth from increased person-trip frequency and longer-distance trips;
- trips generated by committed development;
- trips generated by the occupation of sites in the Local Plan; and
- trips induced by new opportunities for travel.

7.1.3 The first three sources of growth have been manually added together to identify the total growth that could occur in the Ashbourne area to a forecast year of 2032. This forecast year has been selected because it is the horizon year of the Derbyshire Dales Local Plan documents (which is the administrative area within which Ashbourne is located).

7.1.4 It is possible that any significant new infrastructure could induce new travel and lead to traffic growth within the Study Area. However, for the purposes of this report, an assessment of induced trips was not been made. A more detailed assessment of induced trips would need to be made at a detailed modelling stage if an Ashbourne Bypass, for instance, is pursued.

7.2 Background Growth

7.2.1 The National Trip End Model (NTEM) database has been interrogated to identify the likely background trip end growth likely to be experienced by the highway network in the study area up to a design horizon of 2032.

7.2.2 NTEM is a database developed by the Department for Transport (DfT) as part of the National Transport Model (NTM). The NTEM database can be interrogated to find the forecast year trip-end growth projections for travel including by car, thus allowing local area traffic models to be developed on a consistent basis with regard to future year national growth.

7.2.3 The forecast outputs from NTEM for a specific area are based upon Local and National Planning Policy aspirations regarding population projections, wealth, future employment and housing levels that have been input to the NTM.

7.2.4 The growth factors are described in Table 7.1. These factors have been applied to movements on the A52 and A515 that *do not* route via Ashbourne town centre. (See Section 2.4 for the growth assumptions relating to the town of Ashbourne itself).

Table 7.1: NTEM Growth Factors

Year	AM Growth Factor	Interpeak Growth Factor	PM Growth Factor
2017 - 2032	14.1%	19.7%	13.9%

7.3 Derbyshire Dales Local Plan Traffic

7.3.1 For trips to / from Ashbourne itself, trip generation estimates, associated with committed developments and proposed Local Plan allocations, have been extracted from the Derbyshire Dales Local Plan Transport Evidence Base (AECOM, December 2016). This assumes that Local Plan traffic constitutes the main element of growth within Ashbourne town centre itself, and is therefore provides a better estimate of future trip growth assumptions than provided by NTEM for the local study area.

7.3.2 Modifications to the Derbyshire Dales Local Plan were published in October 2017, but no updates were made to the AECOM Transport Evidence Base. Given that AECOM has now been asked to move forward to a full business case and the modifications do not fundamentally alter the quantum of housing proposed in Ashbourne, no re-working of the future trip growth identified in the Transport Evidence Base has been undertaken in this report.

7.4 Data Gaps

7.4.1 Information extracted from Derbyshire Dales Local Plan Transport Evidence Base only provided trip generation estimates in the AM and PM peak hours. As such, permanent traffic count data for the Ashbourne area has been used to calculate a factor to estimate the inter-peak period traffic flows for the Local Plan forecasts. This is acceptable for this stage of the study because business cases are based primarily on travel time savings in the peak hours. Once an infrastructure project is developed further then a more robust traffic model would be developed.

7.5 Summary

7.5.1 Traffic flow diagrams showing the total forecast traffic flows are given within Appendix P.

7.5.2 It is important to note that these are the future year forecasts under a scenario where there is no significant new highway infrastructure. Section 8 identifies how trip patterns could change in the case that an option for a western bypass was introduced.

8. Understanding the Future Situation: Potential Bypass Reassignments

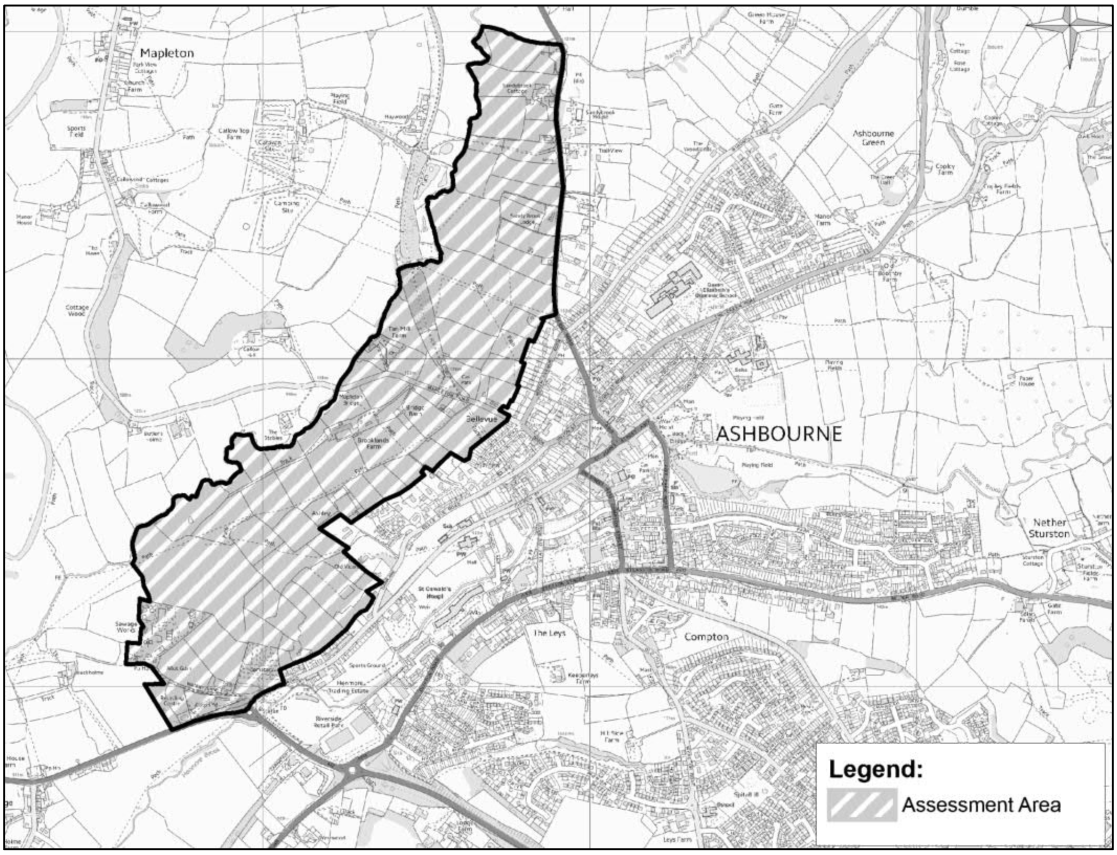
8.1 Overview

8.1.1 The purpose of this section is to describe the potential changes in traffic flow that could be prompted by the creation of an option for new road infrastructure to the west of the town (i.e. a bypass). The volume of traffic that would be re-assigned onto the bypass has been informed via the Bluetooth Origin – Destination data described in Section 2.

8.2 Route Options

8.2.1 Figure 8.1 shows the corridor through which options being considered for a western bypass. This figure is indicative only, and detailed route options are presented in Appendix Q.

Figure 8.1: Assessment Area for Ashbourne Bypass, western side



8.2.2 A western bypass would therefore likely attract existing trips routeing to / from the following origin – destination pairs:

- A515 (Buxton) to / from A52 (West);
- A515 (Buxton) to / from A515 (South);
- A515 (Buxton) to / from A52 (East); and
- B5035 to A52 (West) – *Routes 2 and 3 only*.

8.2.3 A western bypass would also likely cause trips from proposed development to the south of the town (e.g. on the Ashbourne Airfield) to re-route. Specifically, trips from this development seeking to route to Buxton would be more likely to take the longer route via the bypass than take the more congested route via Ashbourne town centre. A western bypass, however, is unlikely to attract trips heading to the Amber Valley or Matlock.

8.2.4 Diagrams showing the changes in trips that could be created by the introduction of the bypass are shown in Appendix R, with future year forecast diagrams (with western bypass, Routes 2 and 3) given in Appendix R.

8.3 Option Forecasting

8.3.1 **North Avenue:** It was noted in undertaking the re-assignment work that there appeared to be a large right-turn from the A515 (Buxton) into North Avenue, but that this movement did not appear to occur in reverse. During the AM peak hour, 118 trips were recorded turning right at this location; and 100 trips were recorded turning right in the PM peak hour. It is likely (though not confirmed) that these trips are routeing via *North Avenue – Dovehouse Green – Belle Vue Lane – Dark Lane* to avoid the longer route following the one-way system around the town centre. Note: there is a section of one-way operation at the Dark Lane – Mayfield Road junction which prohibits this route being used in reverse.

8.3.2 It has been assumed that all traffic routeing via North Avenue would divert onto the bypass in the diagrams given in Appendix R (although it is acknowledged that a small number would be routeing to / from residential property).

8.3.3 **Traffic Volumes on A515 (Buxton):** The traffic surveys described in the Baseline Conditions report identified 676 two-way trips on the A515 (Buxton) north of North Avenue in the AM peak hour, and 752 two-way trips at the same location in the PM peak hour.

8.3.4 The analysis contained in Appendix R suggests that 328 of these trips would be heading to the Park Road / Belper Road / Sturston Road / Derby Road junctions in the AM peak hour, and 297 trips would be routeing to the same junction in the PM peak hour. This equates to the removal of 21.7% of baseline trips from this junction in the AM peak hour, and 19.4% of baseline trips in the PM peak hour.

8.3.5 The key uncertainty described in the Baseline Conditions report was the volume of trips routeing to / from Ashbourne town centre. At present, the diagrams in Appendix R show the removal of 86% of trips from the A515 in the AM peak hour, and 84% of trips in the PM peak hour. If the number of trips on the A515 routeing to Ashbourne town centre is greater than currently estimated, then the proportion of trips removed from both the A515, and *Park Road / Belper Road / Sturston Road / Derby Road* junction, will be less than stated above. A Sensitivity Test is proposed later in this report to identify the impact of this on the forthcoming economic assessment.

8.4 Summary

8.4.1 Table 8.1 shows the traffic flows for key routes within Ashbourne from the baseline conditions report, and also for the future year forecast (in 2032, i.e. with full Local Plan growth) for both the ‘with’ and ‘without’ a western bypass scenario.

Table 8.1: Changes in Traffic Flows

Road	2017 Baseline		2032 Without Bypass		2032 With Bypass	
	AM	PM	AM	PM	AM	PM
A52 West	942	1,159	1,093	1,340	3,688	3,898
Mayfield Road	589	607	644	663	469	447
A52 North	2,056	2,586	2,260	2,833	3,821	4,457
A515 West	976	961	1,102	1,088	1,072	1,088
A52 South	1,602	2,061	1,897	2,412	2,765	3,582
A515 between J2/J4	1,785	2,114	1,899	2,236	1,274	1,601
Church Street West	376	371	431	427	374	311
Station Road	535	798	684	982	348	597
Church Street East	971	1,132	1,374	1,285	692	719
A515 between J4/J6	1,450	1,585	1,642	1,744	1,221	1,374
A52 East	982	1,209	1,255	1,506	1,533	1,506
Derby Road	1,675	1,751	2,941	3,069	2,610	2,845
Old Hill	85	144	85	144	85	144
A515 between J6/J10	590	618	1,435	1,079	460	447
A515 between J10/J8	1,160	1,340	1,689	1,816	752	756
Sturston Road	2,323	2,207	3,647	3,730	2,950	2,867
Belper Road	581	561	802	789	802	789
Park Road	1,682	1,429	2,676	2,611	1,980	1,748
Cokayne Avenue	701	542	1,113	966	1,113	966
St Johns Street	733	706	1,063	1,348	367	485
A515 between J8/J11	1,367	1,623	2,289	2,573	505	650
B5035 King Street	338	309	338	309	338	309
A515 between J11/J12	1,126	1,355	2,048	2,305	264	382
Windmill Lane	109	86	109	86	109	86
North Avenue	154	132	154	132	36	32
A515 North	676	752	1,137	1,227	362	398

9. Junction Performance

9.1 Overview

9.1.1 The purpose of this section is to describe the performance of junctions within the study area. Traffic flows have been entered into each junction model as has been calculated from Sections 7 and 8.

9.1.2 Note: the same junction models have been used here as were described in Section 2. Full capacity results are provided in the Appendices previously noted. In addition, two new junction models have also been developed to describe the junctions required at either end of the proposed western bypass. The southern junction on the A52 was identified in the Ashbourne Bypass Engineering Feasibility Study (Scott Wilson, 2010) as being a roundabout junction similar in size to the A52 / Mayfield Road junction. The northern junction on the A515 was identified in the same report as being a signalled junction with the main line being the A515 – Bypass route, with the A515 (Ashbourne) being the minor arm. As such, indicative models have been developed using ARCADY and LINSIG for these junctions, respectively.

9.2 Model Outputs

9.2.1 Tables 9.1 to 9.13 describe the operation of the junctions for the three scenarios for which traffic flows have been calculated; i.e. baseline, future year *without* western bypass and future year *with* western bypass.

Table 9.1: ARCADY Results for the A52 / Mayfield Road Junction – Highest RFC Only

Scenario	**AM Peak Hour**		**Interpeak Hour**		**PM Peak Hour**	
	RFC	**Q**	**RFC**	**Q**	**RFC**	**Q**
Baseline	0.40	0.67	0.30	0.42	0.44	0.77
Without Bypass	0.46	0.83	0.36	0.56	0.49	0.95
With Bypass	0.70	2.30	0.62	1.62	0.77	3.30
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

Table 9.2: ARCADY Results for the A52 / A515 Junction – Highest RFC Only

Scenario	**AM Peak Hour**		**Interpeak Hour**		**PM Peak Hour**	
	RFC	**Q**	**RFC**	**Q**	**RFC**	**Q**
Baseline	0.56	1.27	0.43	0.75	0.63	1.66
Without Bypass	0.63	1.69	0.49	0.96	0.7	2.28
With Bypass	0.82	4.42	0.71	2.39	0.96	14.77
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

Table 9.3: PICADY Results for the Church Street / Station Road Junction – Highest RFC Only

Scenario	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	**Q**	**RFC**	**Q**	**RFC**	**Q**
Baseline	0.32	0.47	0.36	0.57	0.46	0.84
Without Bypass	0.37	0.58	0.42	0.71	0.55	1.2
With Bypass	0.12	0.17	0.17	0.21	0.23	0.31
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

Table 9.4: PICADY Results for the A515 / Station Road junction – Highest RFC Only

Scenario	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	**Q**	**RFC**	**Q**	**RFC**	**Q**
Baseline	0.63	1.70	0.71	2.39	0.70	2.29
Without Bypass	0.77	3.18	0.80	3.76	0.79	3.54
With Bypass	0.50	0.97	0.57	1.33	0.56	1.25
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

Table 9.5: ARCADY Results for the A52 / Derby Road Junction – Highest RFC Only

Scenario	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	**Q**	**RFC**	**Q**	**RFC**	**Q**
Baseline	0.47	0.89	0.32	0.46	0.54	1.16
Without Bypass	0.70	2.31	0.48	0.93	0.76	3.07
With Bypass	0.91	8.38	0.59	1.43	0.89	7.05
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

Table 9.6: LINSIG Results for the A515 / Derby Road / Sturston Road / Old Hill – Overall Junction Performance

Scenario	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	PRC	**Delay**	**PRC**	**Delay**	**PRC**	**Delay**
Baseline	1.5%	25.19	14.4%	18.55	8.0%	23.77
Without Bypass	-71.1%	502.27	-46.1%	313.71	-62.3%	489.16
With Bypass	-25.8%	117.97	-3.9%	30.14	-25.3%	109.38
Notes: PRC = Percentage of Reserve Capacity. A measure of the overall "spare" capacity at a junction. Delay = Vehicle Delay in PCU/hrs.						

Table 9.7: LINSIG Results for the A515 / Church Street / St John Street – Overall Junction Performance

Scenario	**AM Peak Hour**		**Interpeak Hour**		**PM Peak Hour**	
	PRC	**Delay**	**PRC**	**Delay**	**PRC**	**Delay**
Baseline	78.0%	4.53	94.8%	4.17	57.7%	5.23
Without Bypass	-3.0%	18.93	24.1%	9.01	11.6%	11.29
With Bypass	162%	2.75	202.5%	2.34	160.9%	2.58
Notes: PRC = Percentage of Reserve Capacity. A measure of the overall "spare" capacity at a junction. Delay = Vehicle Delay in PCU/hrs.						

Table 9.8: PICADY Results for the A515 / St John Street junction – Highest RFC Only

Scenario	**AM Peak Hour**		**Interpeak Hour**		**PM Peak Hour**	
	RFC	**Delay**	**RFC**	**Delay**	**RFC**	**Delay**
Baseline	0.33	0.49	0.43	0.73	0.37	0.57
Without Bypass	0.6	1.48	0.72	2.46	0.86	5.41
With Bypass	0.00	0.00	0.15	0.18	0.12	0.14
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

Table 9.9: PICADY Results for the Cokayne Avenue / Park Road / St John Street junction – Highest RFC Only

Scenario	**AM Peak Hour**		**Interpeak Hour**		**PM Peak Hour**	
	RFC	**Delay**	**RFC**	**Delay**	**RFC**	**Delay**
Baseline	0.54	1.15	0.61	1.56	0.54	1.15
Without Bypass	0.83	4.44	0.94	9.38	1.11	34.34
With Bypass	0.25	0.33	0.26	0.35	0.28	0.39
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

Table 9.10: PICADY Results for the A515 / B5035 junction – Highest RFC Only

Scenario	**AM Peak Hour**		**Interpeak Hour**		**PM Peak Hour**	
	RFC	**Delay**	**RFC**	**Delay**	**RFC**	**Delay**
Baseline	0.28	0.56	0.14	0.21	0.24	0.52
Without Bypass	0.39	1.25	0.15	0.18	0.31	0.96
With Bypass	0.22	0.30	0.13	0.15	0.22	0.28
Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis						

Table 9.11: PICADY Results for the A515 / Windmill Lane / North Avenue junction – Highest RFC Only

Scenario	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	**Delay**	**RFC**	**Delay**	**RFC**	**Delay**
Baseline	0.29	0.59	0.17	0.33	0.26	0.52
Without Bypass	0.39	1.12	0.22	0.56	0.37	1.18
With Bypass	0.13	0.15	0.07	0.07	0.10	0.11

Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis

Table 9.12: ARCADY Results for the Southern Bypass junction with the A52

Scenario	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	RFC	**Delay**	**RFC**	**Delay**	**RFC**	**Delay**
With Bypass	0.54	1.16	0.52	1.09	0.69	2.17

Notes: RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis

Table 9.13: LINSIG Results for the Northern Bypass junction with the A515

Scenario	AM Peak Hour		Interpeak Hour		PM Peak Hour	
	PRC	**Delay**	**PRC**	**Delay**	**PRC**	**Delay**
With Bypass	94.4%	4.53	105.8%	3.71	68.5%	4.65

Notes: PRC = Percentage of Reserve Capacity. A measure of the overall "spare" capacity at a junction. Delay = Vehicle Delay in PCU/hrs.

9.2.2 Junction capacity results for the Northern and Southern junctions at the end of the bypass are provided in Appendices S and T, respectively.

9.3 Key Issues

9.3.1 The key issues identified by the junction capacity tests are that:

- the Derby Road / Sturston Road / Park Road / Belper Road junction will continue to operate at capacity in the future year with the western bypass in place. Although it will operate with far less delay than in the 'without bypass' scenario, the quantum of traffic added from Local Plan growth exceeds the number of baseline trips that would likely be removed with the construction of the bypass.
- Some mitigation is likely required at the A52 / A515 junction and the A52 / Derby Road junction once the western bypass is constructed, to mitigate for re-assigned traffic flow.
- Several town centre junctions would be relieved with the introduction of the western bypass.

9.4 Summary

9.4.1 Table 9.14 summarises the performance of the junctions outlined in Tables 9.1 to 9.13.

Table 9.14: Summary of Ashbourne Junction Performance

Junction		AM Peak Hour		Interpeak Hour		PM Peak Hour	
		RFC	Q	RFC	Q	RFC	Q
A52 / Mayfield Road	Baseline	0.40	0.67	0.30	0.42	0.44	0.77
	Without Bypass	0.46	0.83	0.36	0.56	0.49	0.95
	With Bypass	0.70	2.30	0.62	1.62	0.77	3.30
A52 / A515	Baseline	0.56	1.27	0.43	0.75	0.63	1.66
	Without Bypass	0.63	1.69	0.49	0.96	0.70	2.28
	With Bypass	0.82	4.42	0.71	2.39	0.96	14.77
Church Street / Station Road	Baseline	0.32	0.47	0.36	0.57	0.46	0.84
	Without Bypass	0.37	0.58	0.42	0.71	0.55	1.20
	With Bypass	0.12	0.17	0.17	0.21	0.23	0.31
A515 / Station Road	Baseline	0.63	1.70	0.71	2.39	0.70	2.29
	Without Bypass	0.77	3.18	0.80	3.76	0.79	3.54
	With Bypass	0.50	0.97	0.57	1.33	0.56	1.25
A52 / Derby Road	Baseline	0.47	0.89	0.32	0.46	0.54	1.16
	Without Bypass	0.70	2.31	0.48	0.93	0.76	3.07
	With Bypass	0.91	8.38	0.59	1.43	0.89	7.05
Junction		**PRC**	**Delay**	**PRC**	**Delay**	**PRC**	**Delay**
A515 / Derby Road / Sturston Road / Old Hill & Park Road / Sturston Road / Belper Road	Baseline	1.5%	25.19	14%	18.55	8%	23.77
	Without Bypass	-71.1%	502.27	-46.1%	313.71	-62.3%	489.16
	With Bypass	-25.8%	117.97	-3.9%	30.14	-25.3%	109.38
A515 / Church Street / St Johns Street	Baseline	78.0%	4.53	94.8%	4.17	57.7%	5.23
	Without Bypass	-3.0%	18.93	24.1%	9.01	11.6%	11.29
	With Bypass	162%	2.75	202.5%	2.34	160.9%	2.58
Junction		**RFC**	**Q**	**RFC**	**Q**	**RFC**	**Q**
A515 / St John Street	Baseline	0.33	0.49	0.43	0.73	0.37	0.57
	Without Bypass	0.60	1.48	0.72	2.46	0.86	5.41
	With Bypass	0.00	0.00	0.15	0.18	0.12	0.14
Cokayne Avenue / Park Road / St John Street	Baseline	0.54	1.15	0.61	1.56	0.54	1.15
	Without Bypass	0.83	4.44	0.94	9.38	1.11	34.34
	With Bypass	0.25	0.33	0.26	0.35	0.28	0.39
A515 / B5035 (King Street)	Baseline	0.28	0.56	0.14	0.21	0.24	0.52
	Without Bypass	0.39	1.25	0.15	0.18	0.31	0.96
	With Bypass	0.22	0.30	0.13	0.15	0.22	0.28
A515 / Windmill Lane / North Avenue	Baseline	0.29	0.59	0.17	0.33	0.26	0.52
	Without Bypass	0.39	1.12	0.22	0.56	0.37	1.18
	With Bypass	0.13	0.15	0.07	0.07	0.10	0.11
Southern Bypass / A52	With Bypass	0.54	1.16	0.52	1.09	0.69	2.17

Junction		PRC	Delay	PRC	Delay	PRC	Delay
Northern Bypass / A515	With Bypass	94.4%	4.53	105.8%	3.71	68.5%	4.65
Notes: PRC = Percentage of Reserve Capacity. A measure of the overall "spare" capacity at a junction. Delay = Vehicle Delay in PCU/hrs. RFC = Ratio of Flow to Capacity. A measure of the demand at the junction in relation to its ability to accommodate such flow, reported on a worst-arm basis. Q = Mean Maximum Vehicle Queue, reported on a 'worst arm' basis							

10. Option Generation & Sifting

10.1 Overview

10.1.1 The first approach to dealing with traffic congestion preferred by the Government is to encourage mode shift to sustainable modes of transport such as walking, cycling and public transport. It is noted, however, that many of the highway capacity issues would likely result from Local Plan development, which would be governed by Travel Plans as default as part of any planning consents. Stringent travel planning actions were also identified in the Local Plan Transport Evidence Base. As such, Table 10.1 provides a summary of the broad types of intervention that have been considered as part of this study at each individual junction, and wider traffic management schemes.

Table 10.1: Potential Option Intervention Matrix – Capacity Enhancement

	Existing Control of Individual Junctions			**Link Options**
	Priority e.g. T-Junctions	**Signals**	**Roundabouts**	
Options	Widen minor arm	Review signal timings	Increase entry widths	Provide additional lanes
	Provide right-turn harbourage	Review stage arrangement	Increase circulating carriageway	Accept congestion & prioritise users (i.e. public transport priority)
	Ban Movements	Stagger pedestrian provision	Provide bypass lanes	Improve pedestrian / cyclist provision
	Change priority	Ban Movements	Signalise roundabout	Traffic Circulation
	Convert to signals	Extend flares	Replace with signalled junction	Bypass
	Convert to roundabout	Provide additional lanes	Accept congestion & prioritise users (i.e. public transport priority)	
	Improve pedestrian / cyclist provision	Accept congestion & prioritise users (i.e. public transport priority)		
		Convert to roundabout		

10.2 Individual Junction Improvements

10.2.1 The 2009 Ashbourne traffic study identified little scope to improve individual junctions within the existing highway boundary. As such, many of the isolated junction upgrade options noted in Table 2.1 are not viable without land-take. Such land acquisition is further constrained by the historic nature of much of Ashbourne town centre. During 2016, however, AECOM produced a report for DCC which identified an option to improve the operation of the key Derby Road / Sturston Road signalled junction, which included land-take and demolition of property.

10.2.2 The 2016 AECOM report concluded that: "*A LINSIG model of the improved design requiring acquisition of property / land, road widening and banned traffic turning movements demonstrated that it would greatly improve the predicted 2030 performance of the Sturston Road junctions. However, unless the anticipated traffic flows for 2030 can be reduced in some way, the improved design will not provide practical reserve capacity and congestion management could be required during the peak commuter traffic periods*."

10.3 Enlargement of One-Way System

10.3.1 The traffic management system within Ashbourne already includes a small section of one-way operation, which manages trips through the most historic part of the town centre. At the time of the Ashbourne Traffic Study (Scott Wilson, 2009), a more significant one-way system was proposed during the consultation stage. The existing system is shown in Figure 10.1 and the proposed one-way system enlargement is shown in Figure 10.2 (which also included the signalisation of several additional junctions).

Figure 10.1: Existing One-Way System

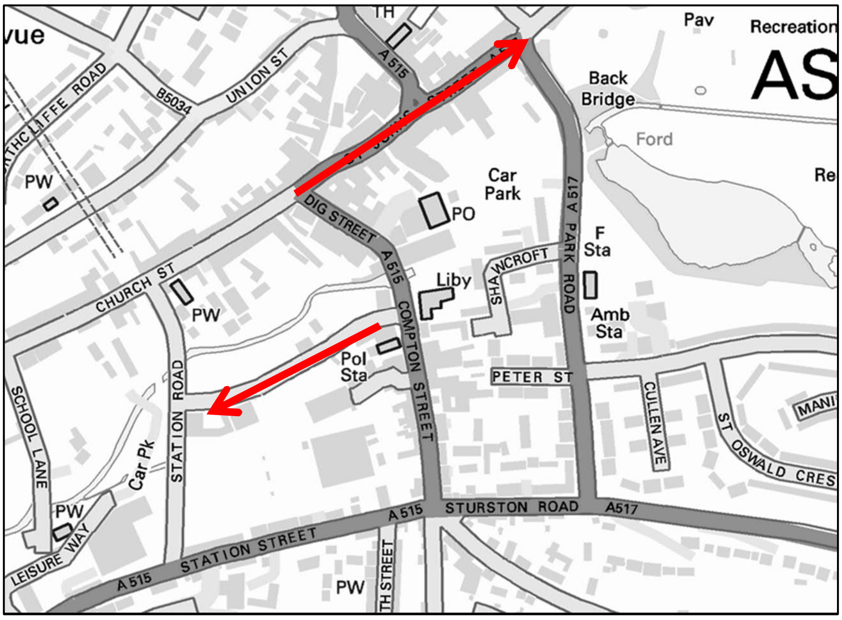
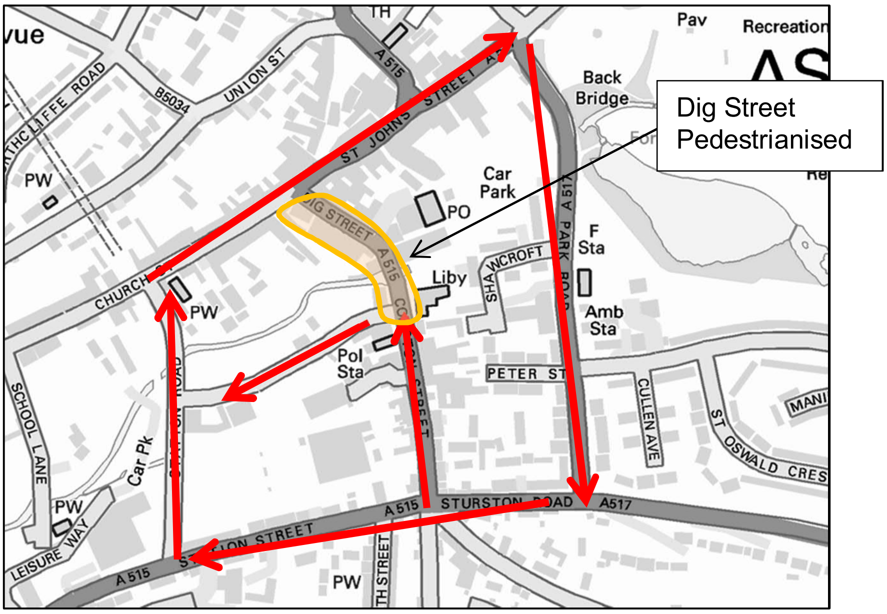


Figure 10.2: Enlarged One-Way System

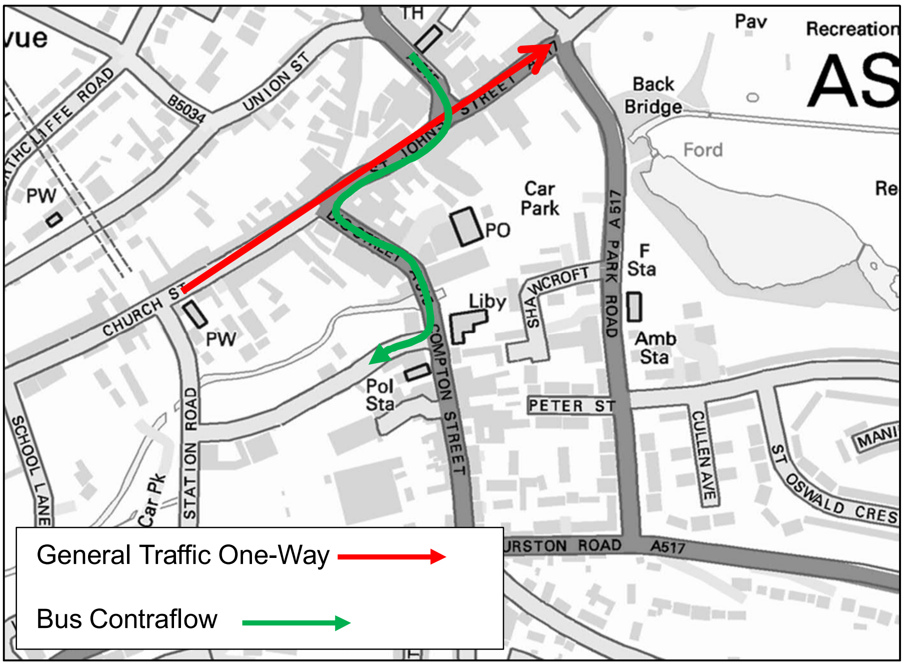


10.3.2 The one-way option was assessed in the Scott Wilson report using TRANSYT, and this work found that the enlarged one-way option would generate highway capacity improvements for the town centre network. This was principally due to the ability to remove opposing streams of traffic at key junctions and to increase the number of lanes for individual movements.

10.3.3 It was also shown, however, that the proposal would increase traffic volumes through the historic St. John's Street (given the reassignment of traffic from Park Road, and the lengthening of trip distances caused by the gyratory system) and would lead to longer journey times for the emergency services. Some congestion (although greatly reduced) would also remain at the Derby Road / Sturston Road junction. As such, this option was rejected following discussion with key stakeholders.

10.3.4 An additional sub-option considered was to introduce bus-priority from the A516 (north) to the bus station to avoid congestion on Park Road. This option was presented to prioritise users of public transport in a future scenario where congestion worsened. However, it was rejected as there was insufficient space on St. John's Street to allow a bus and an HGV to pass in an area of already constrained footway widths.

Figure 10.3: Bus Priority Option

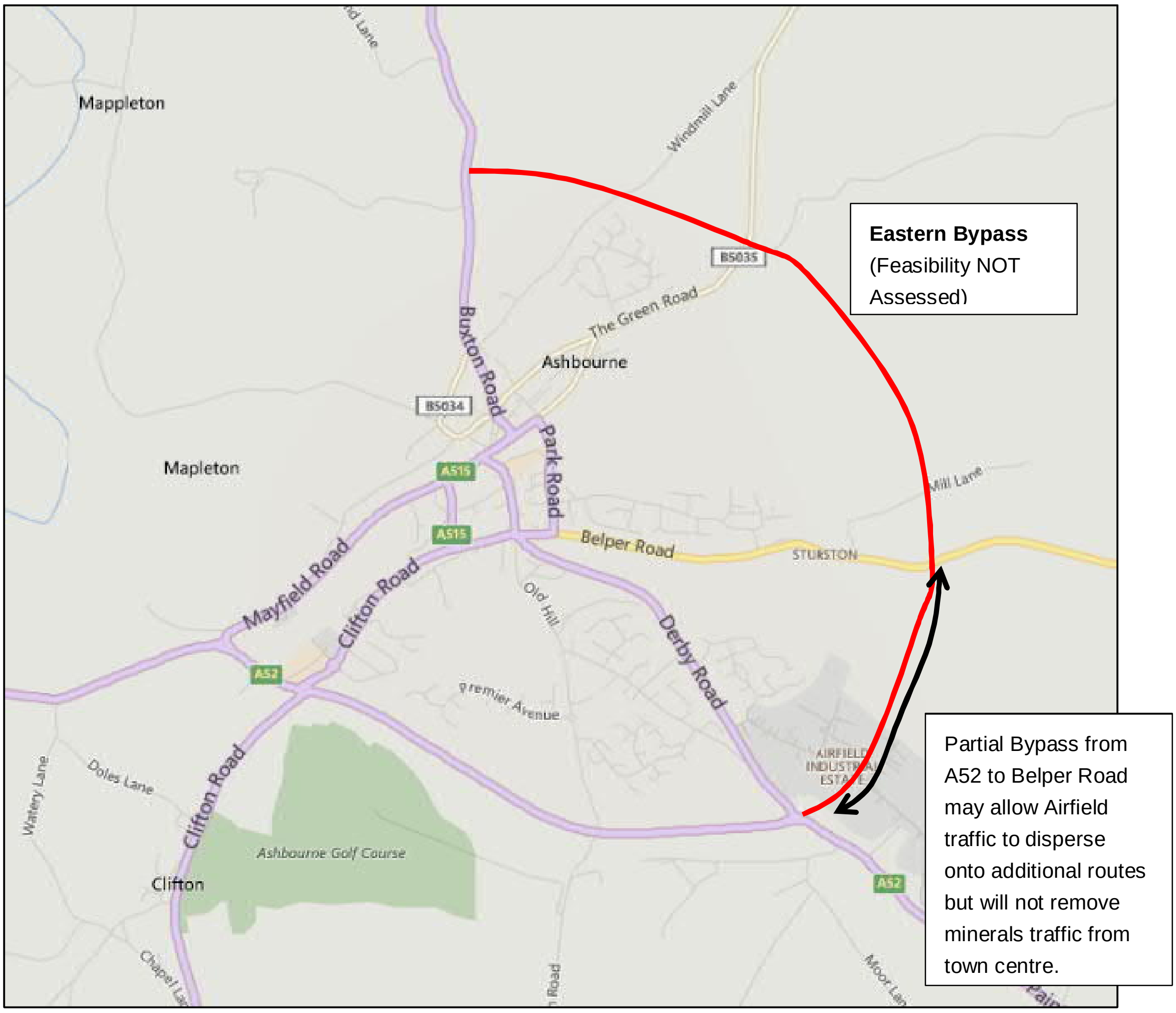


10.3.5 The 2009 Ashbourne traffic study is included as Appendix U.

10.4 Eastern Bypass

10.4.1 At the time of preparing the Transport Evidence Base (AECOM, December 2016) for the Derbyshire Dales Local Plan, it was identified that a bypass on the eastern side of Ashbourne may provide additional benefit to that on the western side by more directly serving the Ashbourne Airfield, and also allowing diversion of trips from Belper Road and Cockayne Avenue away from the town centre. An indicative alignment for this option is shown in Figure 10.4. Within this figure, a more modest scheme to allow airfield traffic to disperse onto Belper Road is also shown.

Figure 2.4: Ashbourne Bypass, Eastern Side (All Routes are indicative and illustrative, and do not represent scheme designs)



10.4.2 The Eastern Option has not been progressed, however, for the following reasons:

- Geographical constraints; including escarpment between airfield, and the A517 crosses rather than follows Henmore Brook and its flood zone;
- Topology; and
- Length of scheme compared to Western route (approximately twice as long).

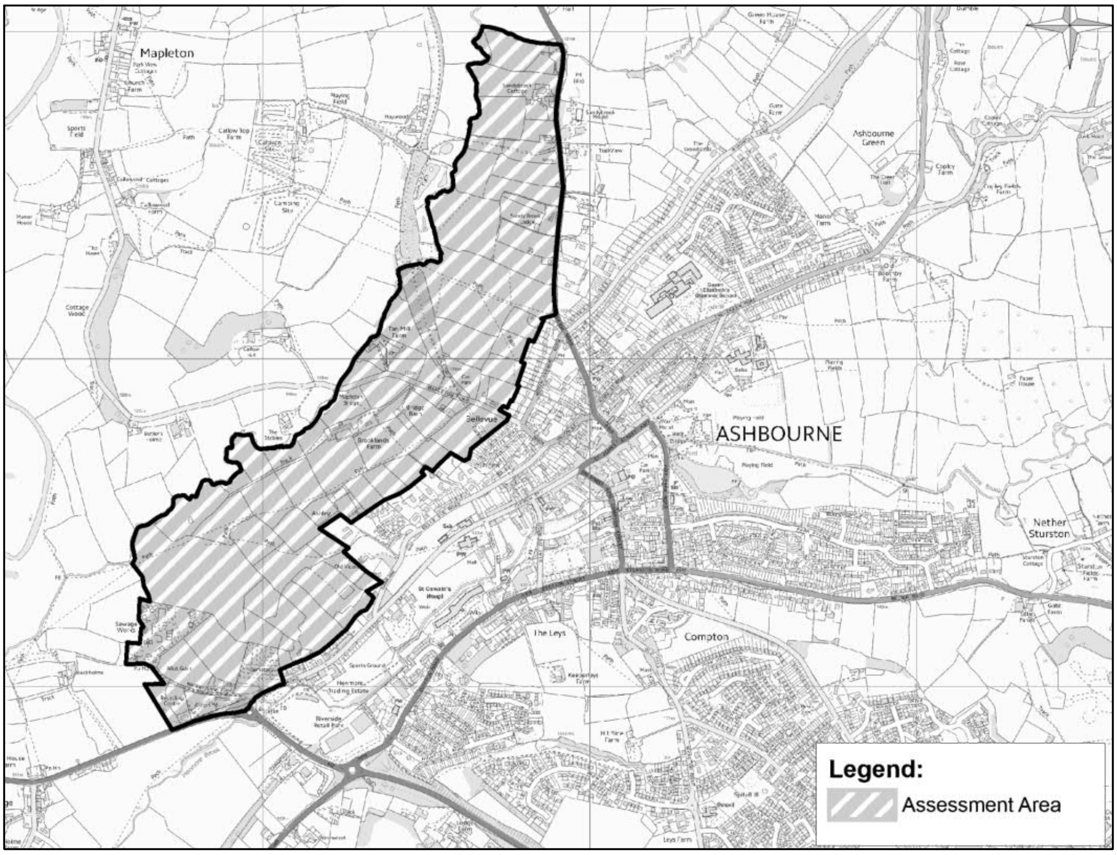
10.4.3 The additional costs of the eastern alignment are unlikely to outweigh the additional benefits of the bypass being on this side of the town. As such, it would not be a more attractive scheme in transport terms than a western alignment.

10.5 Western Bypass

10.5.1 In 2010, Scott Wilson Ltd. was commissioned by DCC to prepare an *Ashbourne Bypass Engineering Feasibility Study*. This study examined five potential alignments of a bypass to the west of the town, with three being determined as geometrically feasible.

10.5.2 The 2010 Scott Wilson report, including design drawings, are given as Appendix V. Figure 10.5 shows the corridor through which alignments were considered.

Figure 10.5: Assessment Area for Ashbourne Bypass, western side



10.6 Sifting of Options

10.6.1 Options to improve traffic flow within Ashbourne are summarised in Table 10.2.

Table 10.2: Ashbourne Options – Sifting of Options

Option	Source	Pros	Cons	Objectives Met?	Conclusion
Minor Junction Improvements	Ashbourne Traffic Study (SW, 2009)	• More efficient management of congestion	• Large scale congestion remains	• Reduce travel delays ✗ • Increase reliability ✗ • Remove HGVs from town centre ✗	• Taken forward as interim Local Transport Plan (LTP) schemes.
Enlarged One-Way System	Ashbourne Traffic Study (SW, 2009)	• Improves Capacity of key junctions	• Increases traffic flow through historic centre; • Impacts on emergency services; • Does not fully address congestion	• Reduce travel delays ✓ • Increase reliability ✗ • Remove HGVs from town centre ✗	• Option rejected in 2009 due to impact on emergency services and St. Johns Street.
Major Junction Improvement (Derby Road / Sturston Road)	2016 AECOM Report	• Improves Capacity of key junction	• Land Acquisition Costs • Does not fully address congestion	• Reduce travel delays ✓ • Increase reliability ✗ • Remove HGVs from town centre ✗	• No decision taken.
Eastern Bypass	Derbyshire Dales Local Plan – Transport Evidence Base (Draft)	• Removes some traffic from town centre.	• No geo-technical / design work conducted. • Longer length than Western Option	• Reduce travel delays ✓ • Increase reliability ✓ • Remove HGVs from town centre ✓	• Rejected during preparation of Derbyshire Dales Transport Evidence Base
Western Bypass	*Ashbourne Bypass Engineering Feasibility Study, SW, 2010*	• Removes some traffic from town centre.	• Land Acquisition / Construction Costs • Uncertain BCR	• Reduce travel delays ✓ • Increase reliability ✓ • Remove HGVs from town centre ✓	• No decision taken.

10.6.2 Following the Sifting step, the DfT Appraisal Process requires the *Development and Assessment of Potential Options* (Step 7). The options recommended for further assessment are the potential to upgrade the Derby Road / Sturston Road junction via localised land acquisition and demolition, and the construction of a Western Bypass.

11. Summary and Way Forward

11.1.1 AECOM was commissioned by Derbyshire County Council (DCC) to prepare a study into the impacts, causes and potential solutions to travel delays within Ashbourne.

11.1.2 This Stage 1 report follows the DfT Appraisal Guidance up to Stage 1, Step 6 (Option Sifting). Given development proposed in the Local Plan, there is likely to be a worsening of delays –particularly at the A515 / Derby Road / Sturston Road / Old Hill & Park Road / Sturston Road / Belper Road junctions in the period to 2032.

11.1.3 AECOM is now under instruction from DCC to develop a Business Case. In order to take this further, a DfT compliant traffic model will be required. Much of the data contained in this report will be required for the development of this model, including the baseline traffic flows. Growth assumptions would need to be re-confirmed in liaison with DCC and Derbyshire Dales District Council (the local planning authority).

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