Spalding Transport Strategy

Working Paper 5: Assessment of Short-listed Options

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Contents

1 Introduction

1.1 Spalding Transport Strategy

Lincolnshire County Council's Highways Alliance has been jointly appointed by the County Council and South Holland District Council to develop a new transport strategy for the town of Spalding.

The Transport Strategy will provide an overall approach to the development and provision of transport and access for the town and surrounding area. The Strategy will address existing issues and will also support the emerging proposals for significant growth in the town.

1.2 Working Paper 5: Assessment of Short-listed Options

Working Paper 4 involved an option sifting process which took a long list of possible transport interventions which might be included in the transport strategy and reduced this to a short-list based on a set of deliverability and risk criteria. At this stage of the work each measure was given a score, with a total of 62 measures making up the final shortlist.

Working Paper 5 involves assessing these measures to determine their effectiveness in mitigating the impact of transport growth in Spalding. Each modelling scenario will be assessed against the 10 strategy objectives set out in Working Paper 1. The assessment adopted a two-fold approach to this task:

- Stage 1: Evidence gathering – a list of case studies and best practice was compiled of locations where similar measures to those proposed in the short list have been adopted. Particular focus was placed on the outcome of these schemes and where available information on modal shift has been presented. This evidence will be used to support assumptions on the effectiveness of proposed measures.

- Stage 2 Modelling – The Spalding SATURN model - which has previously been employed in the Early Assessment and Sifting Tool (EAST) assessment of the Spalding Western Relief Road (SWRR) – was adapted to assess the proposed transport strategy measures and their impact on the highway network. A range of measures were packaged and tested in various modelling scenarios. Outputs from these assessments include network performance indicators, change in flow and delay and the performance of critical junctions.

1.3 Structure of the Working Paper

This Working Paper, following on from this introduction, reviews the methodology as well as the modelling results in section 3. Next steps are set out in section 4.

2 Option Assessment

2.1 Introduction

As part of Working Paper 4 a shortlist of 62 measures were identified as options which could be potentially assessed as part of the development of the transport strategy. Each measure was given a score based on deliverability and risk criteria and following this a small number of options were eliminated. This stage of the work seeks to evaluate and identify the degree to which the proposed measures will mitigate the impact of traffic growth in the future year scenarios. Given the number of measures it would be infeasible to attempt to assess each individually, so measures have been grouped into packages. These packages are explained in section 2.3 of this working paper.

2.2 Option Review

This section provides an overview of the proposed measures and how these have been grouped into scenarios which will be tested using the Spalding SATURN model.

For the purposes of modelling, measures can be broadly divided into two categories:

- **Highway network:** Measures which alter the highway network and can therefore be modelled by modifying the SATURN highway network eg. SWRR, traffic signal optimisation etc.

- **Demand:** Measures which are aimed at affecting modal shift and demand management including options such as Smarter Choices, which will be included as part of all the Do Something tests. As there is no variable demand response available in the Spalding model, these measures will need to be reflected in the modelling using adjustments to the demand matrices which are applied before assignment. The adjustments will be based on a set of assumptions derived from similar case studies. Examples of measures where this methodology will apply include personalised travel planning and improvements to Into Town bus services.

In addition to the measures which are to be tested, differing levels of development were also tested.

The **Do Minimum** scenario provides a baseline scenario which Do Something scenarios should be compared against. It includes only network and development changes which are considered to be committed i.e. It has already been built, is in the process of being built or has received planning consent.

Do Something 1, 2, 3 and 4 assume the same level of development as the Do Minimum scenario with no growth in demand between the scenarios. These scenarios are designed to test smaller network interventions in Spalding Town Centre. The benefits of these measures will be evaluated by comparing the model

outputs to the Do Minimum. The main network change being tested in each scenario is summarised below:

- Do Something 1 – Signal optimisation of town centre signals.
- Do Something 2 – Closure of Swan Street between A151 and Sainsbury's goods access to all traffic except buses.
- Do Something 3 – New vehicular bridge over the railway line linking Park Road and Kings Road.
- Do Something 4 – Do Something 1 and 2 measures combined – signal optimisation and closure of Swan Street between A151 and Sainsbury's goods access to all traffic except buses.

Do Something 4, 5a and 5b focus on testing different development growth scenarios and how effective SWRR is in relieving congestion within Spalding Town Centre. The same network is used for all of these scenarios including full SWRR, town centre signal optimisation, closure of Swan Street between A151 and Sainsbury's goods access to all traffic except buses. For assessment purposes an assumed route for a western relief road has been modelled to link Spalding Common in the south to Spalding Road in the north. The actual alignment of a future relief road would be dependent on local land use and the needs of the emerging local plan.

Within this sub-sector of scenarios, Do Something 4 will act as a baseline as it contains only committed development. Do Something 5a will add extra houses in 2036, with further dwellings added to Do Something 5b:

- Do Something 4 developments – as assumptions in Do Something 1 – 3.
- Do Something 5a developments – North of Vernatt's Drain housing development with 3,750 additional dwellings in 2036.
- Do Something 5b developments – Housing development between Holland Park and Vernatt's Drain housing with 3,750 additional dwellings in 2036.

Demand management and modal shift measures (including Smarter Choices) are applied to all Do Something scenarios as it is assumed these measures will be implemented regardless of other factors.

Table 2-1 summarises the composition of each scenario tested as part of the Transport Strategy Development.

2.3 Modelling

The Spalding SATURN highway model used previously on the EAST assessment work consists of AM (0800-0900) and PM (1700-1800) peak hour models for 2018 and 2033. Scenarios were developed to assess the benefits of different phases of SWRR. The testing undertaken for the development of the Transport Strategy builds on this work with a focus on testing mitigating measures to reduce the transport impacts of housing growth assumptions contained in the Local Plan - preferred option document (May 2013).

The 2033 model year has been updated to 2036 to align model years with those used in the emerging South East Lincolnshire Local Plan. The other model year – 2018 – will be maintained.

As described in the previous section for modelling purposes each measure can be categorised as either affecting the network (supply) or demand.

Network

Network measures will be tested through modifications to the SATURN network.

Demand

Measures which are aimed at reducing demand for car trips such as Smarter Choices and improvements to public transport will be modelled by manipulating the SATURN demand matrices. The SATURN matrices only contain vehicle trips; therefore where a measure is aimed at encouraging non-car usage this must be reflected in a corresponding drop in car trips.

Rather than try to attribute a defined decrease in car use to every individual measure, we propose to package similar measures which when combined could realistically affect modal shift. Using this approach, 6 packages targeting specific land use types, areas of Spalding or modes were identified and case studies were gathered to provide an evidence base for the reductions applied. The packages are as follows:

- Schools;
- Town Centre cycle and pedestrian improvements;
- New development sites;
- Major employment sites;
- Into Town bus service improvements; and
- Rail and inter-urban bus service improvements.

There are no public transport matrices or demand model available for the Spalding model, active mode and public transport measures will therefore only be reflected in the modelling by their impact on car demand. A comparative study approach will be adopted which uses evidence from case studies and benchmarking to derive forecasts for modal shift from car.

TAG Unit A5.1: Active Mode Appraisal – DfT 2014 contains guidance on using the comparative method for forecasting, it advises

"The least complex and costly approach to estimating future levels of cycling and walking is through comparisons with similar schemes. Larger proposals are likely to have greater demand changes and afford better potential for comparison with existing schemes. Examples could include river crossings or the creation of other significant links in a network that reduce time and distance, or comprehensive urban centre networks that significantly change the balance between motor traffic and walking and cycling generalised costs."

Reductions to car demand will be applied based on the origin and destination of the trip and the distance of the trip. So for example school travel planning reductions will only be applied to model zones which contain a school and only in the morning peak when a large number of trips would be made to and from a school. Similarly where a walking measure is proposed reductions to car trips will only be applied to journeys of less than 3km, as it is unrealistic to assume trips over greater distances would switch to active modes.

A more detailed description of the modelling methodology and assumptions are included in a technical note included as Appendix A

2.4 Case Studies

The methodology for adjusting model demand as described above adopts a comparative approach which requires evidence from case studies to determine a realistic level of modal shift from vehicle modes. Evidence of existing schemes and best practice was collected from a range of sources and monitoring exercises.

These case studies are presented in the form of measure cards which are included as Appendix B at the end of this working paper.

3 Modelling Results

3.1 Introduction

This section of the report presents results from the modelling exercise. The exercise aims to draw together findings from a range of SATURN outputs to present an assessment of which measures potentially provide the greatest benefit, if existing transport proposals will meet the needs of increased development growth assumptions contained within scenario 5b and what if any further remedial measures are necessary to mitigate the impacts of growth.

A list of outputs which will be presented are listed below, these will initially give a broad overview of network performance and the relative benefits of each scenario, subsequent outputs will highlight specific areas of the network or junctions which are forecast to suffer stress in the future.

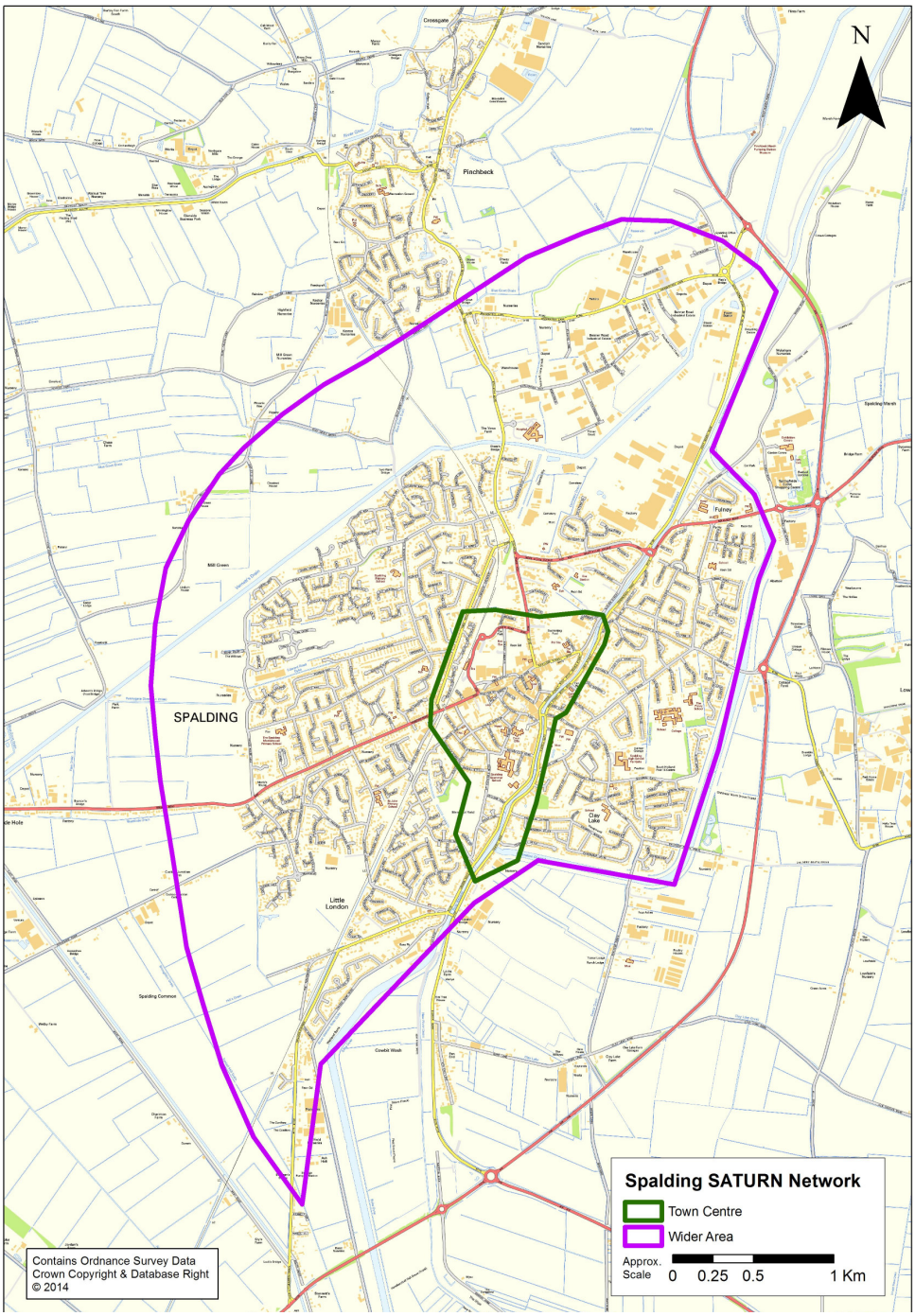
- Wider network indicators
- Flow difference plots;
- Journey time routes;
- Junction performance
- Individual junction performance;
- Destination trip totals (used as a proxy to car parking demand).

The outputs are discussed in sections 3.2 to 3.8

3.2 Wider network indicators

Wider network indicators are used to give an overview of overall highway network performance for each model test. As part of this analysis indicators are presented at two geographical levels – town centre and wider area - as mapped in Figure 3-1.

Figure 3-1 Map of Town Centre and Wider Area



The Town Centre area covers the central core of Spalding and will be useful when gauging the impact of measures within the town centre (DS1 – DS3) and the impact of the full SWRR scheme in removing traffic from the town centre (DS4, DS5a and DS5b).

The wider area includes SWRR and will be particularly useful when trying to assess the impact of the relief road.

3.2.1 *Total Delay (PCU Hours)*

Total delay provides a measure of all delay on the highway network. This is calculated by summing the total delay of all vehicles within the study area and expressed in PCU (passenger car unit) hours. The higher the total the more delays motorists are suffering as the result of congestion.

Figure 3-2 Total Delay (PCU hours) – AM Peak

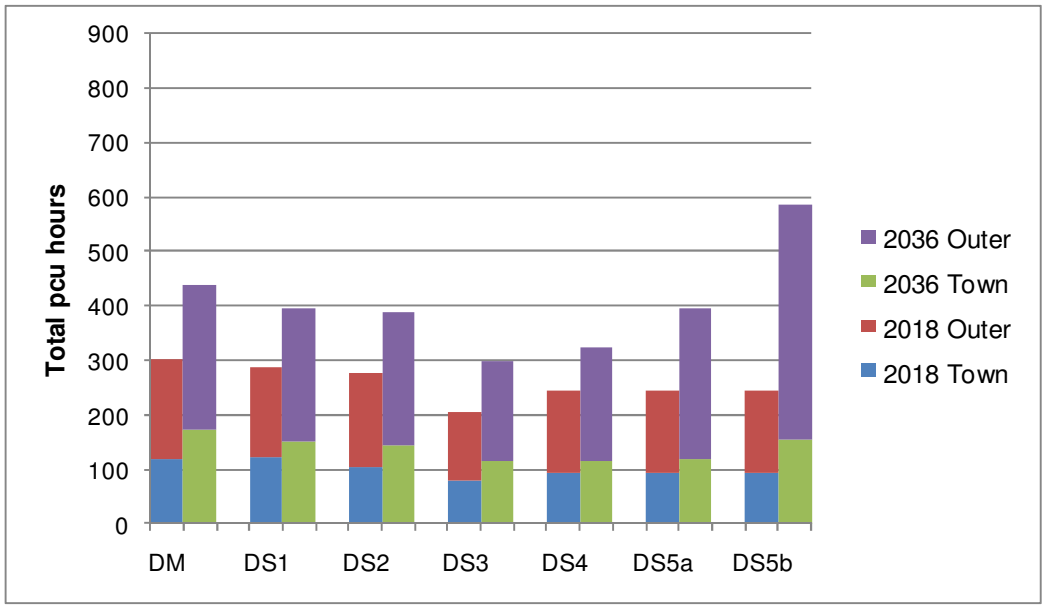
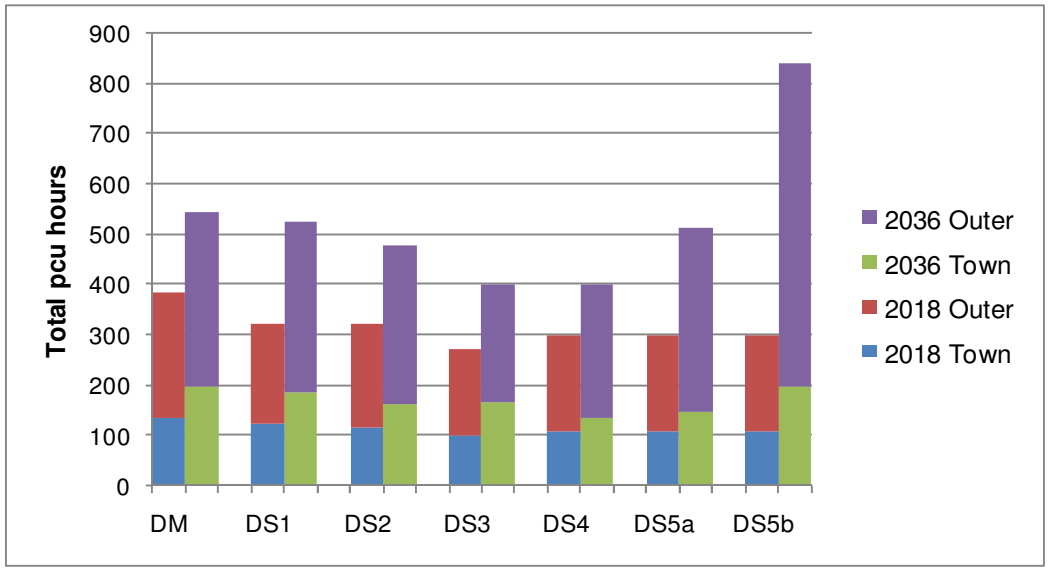


Figure 3-3 Total Delay (PCU hours) - PM Peak



Key Findings highlighted in figures 3-2 and 3-3 include:

- Total delays are higher in the PM peak than AM peak.

- Do Something 3 and 4 have the lowest total delay, in both the Town Centre and outer areas. This suggests the inclusion of the new bridge over the railway is effective in relieving delay at the existing level crossings. The combined impact of signal optimisation and Swan Street closure are shown to bring positive benefits in Do Something 4.

- With the exception of Do Something 5b, all scenarios show a decrease in total delay against the Do Minimum.

- The additional development between Holland Park and Vernatt's leads to a large increase in delay in the outer area in Do Something 5b with total delay in DS5b almost twice the level of DS4. However it should also be remembered that demand has also increased significantly in this area and therefore on average each vehicle might experience the same level of delay, it is just there are more vehicles. Further analysis will be carried out in this report to assess whether this delay is indicative of highway network operational problems.

3.3 Average Speed (kph)

Average vehicle speed in the study area expressed in kilometres per hour. Lower average speeds will lead to increased journey times.

Table 3-1 2018 Average Speed (kph)

	DM		DS1		DS2		DS3		DS4		DS5a		DS5b	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Town Centre	33.7	33.0	33.8	33.3	34.1	33.7	34.2	33.1	34.0	33.6	34.0	33.6	34.0	33.6
Wider	37.5	36.5	37.7	37.1	37.8	37.1	38.1	37.1	39.3	38.6	39.3	38.6	39.3	38.6
% Change from DM Town Centre	n/a	n/a	0.3%	1.1%	1.3%	2.2%	1.6%	0.6%	1.1%	2.0%	1.1%	2.0%	1.1%	2.0%
% Change from DM Wider	n/a	n/a	0.5%	1.6%	0.7%	1.7%	1.6%	1.7%	4.9%	5.8%	4.9%	5.8%	4.9%	5.8%

Table 3-2 2036 Average Speed (kph)

	DM		DS1		DS2		DS3		DS4		DS5a		DS5b	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Town Centre	33.3	32.5	33.6	32.7	34.0	33.1	34.0	32.6	34.0	33.4	33.9	33.1	33.8	32.5
Wider	37.3	36.4	37.6	36.5	37.7	36.8	38.0	37.0	40.1	39.6	40.8	40.3	40.3	39.0
% Change from	n/a	n/a	0.8%	0.5%	2.0%	1.9%	2.1%	0.2%	2.1%	2.7%	1.8%	2.0%	1.5%	0.1%

DM Town Centre														
% Change from DM Wider	n/a	n/a	0.7%	0.3%	1.0%	1.1%	1.7%	1.6%	7.5%	8.8%	9.3%	10.8%	8.0%	7.2%

Key Findings highlighted in tables 3-1 and 3-2 include:

- Average speeds in all Do Something scenarios and time periods are higher than in the comparative Do Minimum scenario. For the town centre area these increases range between 0 and 2%. In the wider area, average speeds are much higher for DS4, 5a and 5b. This increase can be attributed to the SWRR which falls within the wider area and provides a fast alternative route to existing traffic. This increases the average speed although it should be noted this does not necessarily equate to a reduction in journey times, average trip distance could also increase.

- By drawing through trips from the Town Centre, average speeds within the Town Centre also increase.

- Average speeds are typically higher in 2018 than in 2036. This is the result of higher demand in 2036 which will lead to increased congestion and delay and hence lower average speeds.

- Do Something 1 shows the lowest overall increase in average speed, although the rises are higher in the PM peak suggesting there is slightly more scope for signal optimisation bringing benefits in this time period.

- Do Something 4, 5a and 5b have the same average speeds in 2018, this is because the growth assumptions used in 2018 are the same for all scenarios, but DS4, 5a and 5b include the full SWRR which is a significant new piece of infrastructure.

3.4 V/C – volume / capacity ratio

V/C is used as an indicator of congestion at a junction. Junctions which experience volumes of traffic approaching their capacity level, typically a V/C of greater than 85% will begin to experience increased delay and are likely to be effected by operational constraints.

V/C percentages at junctions falling within the defined areas of the Town Centre and Wider area are summarised below. Within SATURN a V/C ratio is calculated for each permitted turn at a junction. However in this instance a single V/C value has been calculated for each junction, the value used is the maximum V/C at the junction or the turning movement with the highest V/C value. The maximum value is used because an average value can be skewed by turns with lower V/C and does not take

into account tidal flow, where for example movements into the town centre might be higher in the morning peak hour than later on in the day. In operational terms, if any movement at a junction is approaching capacity, the junction will suffer capacity issues.

Tables 3-3 to 3-6 contain details of V/C for 2018 and 2036 for the Town Centre and Wider area.

Table 3-3 2018 Town Centre Junction V/C

	DM		DS1		DS2		DS3		DS4		DS5a		DS5b	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Number of junctions with V/C <85%	106	103	106	105	106	104	104	100	108	105	108	105	108	105
Number of junctions with V/C 85-100%	2	2	2	1	2	3	3	2	0	2	0	2	0	2
Number of junctions with V/C >=100%	3	6	3	5	3	4	4	9	3	4	3	4	3	4
Average V/C	22.1	24.8	21.1	23.0	21.8	23.9	24.9	27.6	19.9	22.7	19.9	22.7	19.9	22.7
Median V/C	14.9	18.5	14.4	16.8	15.2	17.2	17.1	19.4	14.3	17.1	14.3	17.1	14.3	17.1

Table 3-4 2018 AM Wider Area Junction V/C

	DM		DS1		DS2		DS3		DS4		DS5a		DS5b	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Number of junctions with V/C <85%	333	327	333	332	334	331	334	328	337	331	337	331	337	331
Number of junctions with V/C 85-100%	6	5	7	3	6	4	4	2	2	5	2	5	2	5
Number of junctions with V/C >=100%	5	12	4	9	4	9	6	14	5	8	5	8	5	8
Average V/C	19.3	20.3	18.4	18.7	18.6	19.1	19.3	19.8	17.7	18.5	17.7	18.5	17.7	18.5
Median V/C	11.1	12.2	10.3	11.3	10.9	11.5	11.6	12.8	10.8	11.7	10.8	11.7	10.8	11.7

Table 3-5 2036 PM Town Centre Junction V/C

	DM		DS1		DS2		DS3		DS4		DS5a		DS5b	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Number of junctions with V/C <85%	103	101	104	102	104	102	101	99	105	103	105	103	104	100
Number of junctions with V/C 85-100%	2	0	2	3	2	1	5	1	3	4	2	2	1	3
Number of junctions with V/C >=100%	6	10	5	6	5	8	5	11	3	4	4	6	6	8
Average V/C	27.1	29.9	25.1	27.1	25.3	28.4	28.0	31.0	23.5	25.5	24.3	26.8	27.7	28.5
Median V/C	20.5	21.3	17.9	20.4	18.1	21.1	19.4	23.7	16.5	18.6	17.7	19.8	21.9	20.4

Table 3-6 2036 PM Wider Area Junction V/C

	DM		DS1		DS2		DS3		DS4		DS5a		DS5b	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Number of junctions with V/C <85%	325	321	326	321	326	324	324	320	332	327	326	323	322	312
Number of junctions with V/C 85-100%	9	5	8	8	8	5	12	7	7	7	10	8	10	9
Number of junctions with V/C >=100%	10	18	10	15	10	15	8	17	5	10	8	13	12	23
Average V/C	23.1	24.3	22.3	23.3	22.2	23.5	22.8	24.1	21.5	22.6	23.8	25.3	26.4	27.9
Median V/C	14.5	15.9	13.7	14.7	14.5	15.4	15.3	16.1	12.7	14.6	14.9	16.3	15.5	18.8

The Key Findings, highlighted in tables 3-3 to 3-6 include:

- A relatively small number of junctions in Spalding are approaching or exceed capacity.
- Average and median V/C is lowest in DS1 suggesting signal optimisation is working in reducing congestion and delay.

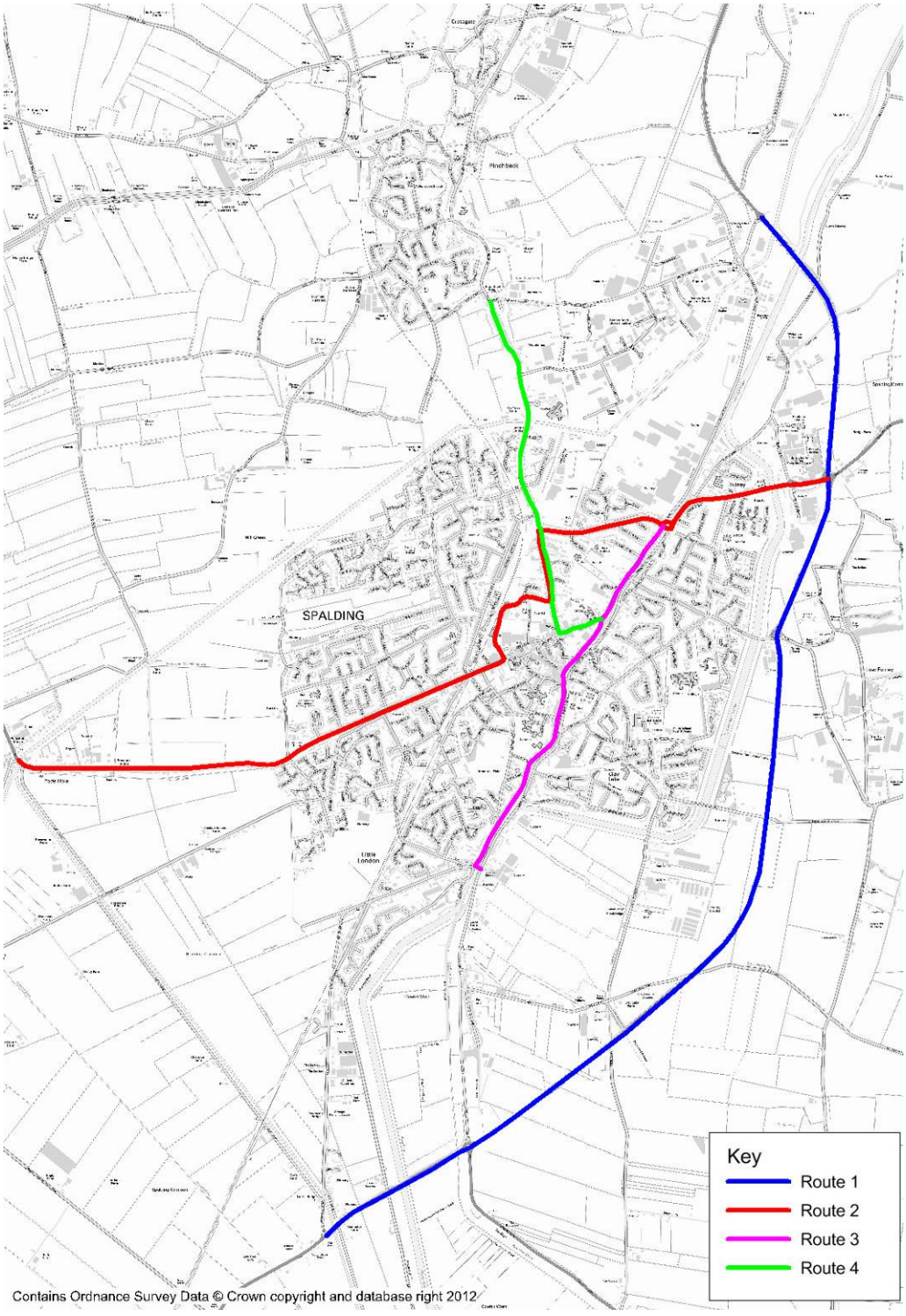
- Do Something 3 generally appears to perform worst on this measure, with more junctions falling in the 'over-capacity' category. This is most pronounced in the town centre suggesting that the inclusion of the new road bridge might be causing some re-routeing of traffic in the town centre, causing increased congestion in some locations.

- Although DS5a and DS5b have much higher levels of total car trips (due to additional housing development), the number of junctions which experience capacity constraints is not noticeably higher than other scenarios. The exception to this pattern is DS5b in the wider area which sees an increase in the number of junctions with V/C greater than 100% in 2036 than in other scenarios. This is consistent with the total delay figures which also showed a large increase in traffic delays in the wider area in 2036.

3.5 Journey Time Routes

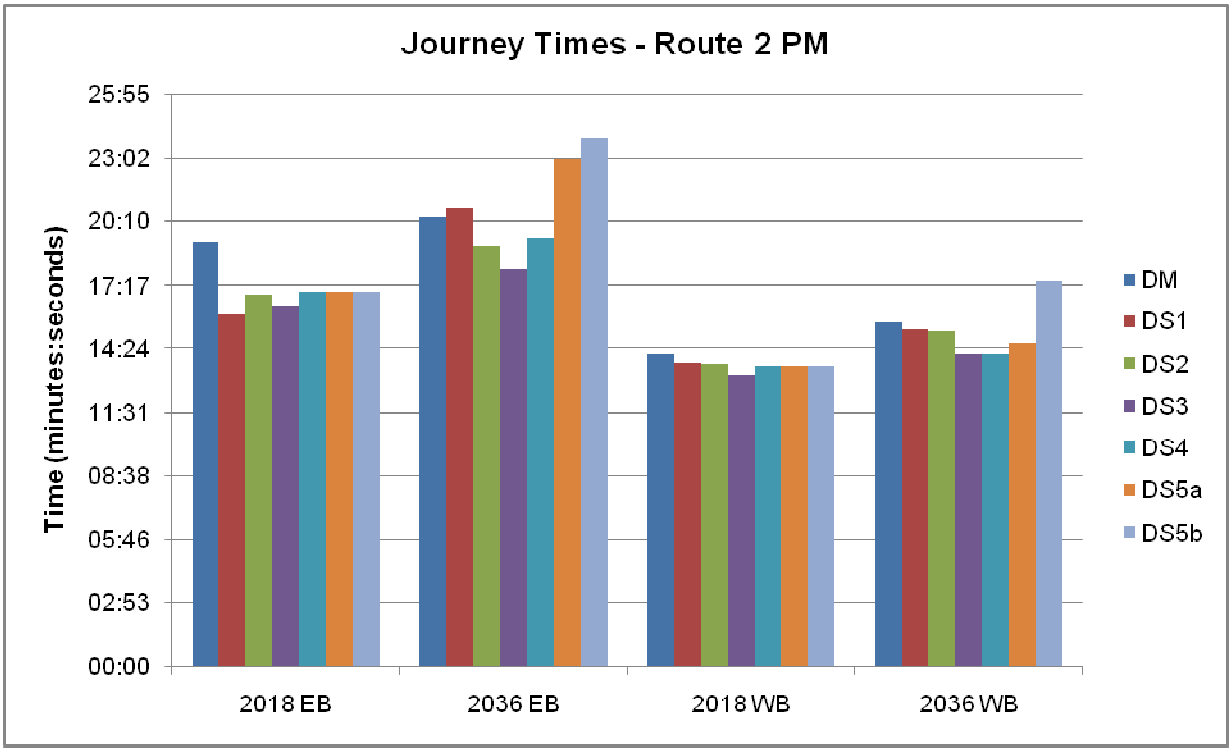
As part of the EAST assessment journey time summaries were presented for the routes mapped in Figure 3-4. This process has been repeated for this piece of work with results presented in the graphs below.

Figure 3-4 Map of journey time routes



A full set of journey time graphs are included within Appendix C. An example of these graphs is shown in Figure 3-5. Route 2 in the PM has been used to illustrate journey times graphs because it shows a change in journey time between scenarios whereas other routes are virtually unchanged across different scenarios.

Figure 3-5 Journey time Route 2 - PM Peak



Key Findings:

- Journey times vary by only small amounts between scenarios in 2018, this is due to growth levels in 2018 being consistent across all scenarios. The measures introduced also appear to have little impact on journey time. The only exception to this is Route 2 eastbound in the PM peak which shows improvements in journey time of between 2 and 3 minutes over the DM scenario.

- Route 1 – Capacity improvements to the A16 / A151 and A16 / B1180 roundabouts and decreased flow on the A16 result in journey time reductions of around 30 seconds on Route 1 southbound in the PM peak in 2036.

- Route 2 – Route 2 serves as an east-west link across the town centre and experiences a reduction in journey time for DS1 to DS4. DS3, which includes the new road bridge over the railway generally shows the largest reduction in journey time, the decrease in journey time is the result of shorter average queues at the level crossing on Winsover Road. In 2036 DS5b is considerably slower than all other scenarios. This is the result of localised delay at the Bourne Road / Monks House Lane / Broadway junction caused by the large increase in traffic originating from the proposed development between Holland Park and Vernatts Drain.

- Route 3 – Journey times for route 3 vary little between the scenarios except for 2036 northbound in the AM peak. Increased flow on Double Street and Albion Street leads to more delay on this section of the route.

- Route 4 – Times on route 4 do not change significantly between scenarios with the exception of DS5b. In particular the AM peak southbound and PM peak northbound. These are the result of delays forming on Pinchbeck Road, at the junction with West Elloe Avenue in the morning and with SWRR in the PM peak.

3.6 Mode Shift

The next section presents a summary of highway demand in Spalding town after the reductions based on the 6 packages described in section 2.3 of this note have been applied. A set of matrices (AM and PM) must be created for each growth scenario:

- 2018 DS1 – used for all 2018 scenarios as assumed development does not vary between scenarios.

- 2036 DS1 – used for DS1, DS2, DS3 and DS4.

- 2036 DS5a – used for DS5a (includes North of Vernatts Drain)

- 2036 DS5b – used for DS5b (includes North of Vernatts Drain and development between Holland Park and Vernatts Drain)

Table 3-7 Vehicle trips in Spalding

	2018 DS1		2036 DS1		2036 DS5a		2036 DS5b	
	AM	PM	AM	PM	AM	PM	AM	PM
Before mode shift	6,031	6,552	7,262	7,928	8,885	9,825	10,534	11,650
Mode shift reduction	5,843	6,408	7,056	7,772	8,617	9,603	10,193	11,197
Difference	-188	-144	-206	-156	-268	-222	-341	-453
% Change	-3.1%	-2.2%	-2.8%	-2.0%	-3.0%	-2.3%	-3.2%	-3.9%

Table 3-8 breaks down the reductions into mode shift packages.

Table 3-8 Percentage change in car demand by package and scenario

	School	Town Centre	New development	Employment	IntoTown bus	Inter-urban PT
2018 DS1 AM	-0.5%	-0.7%	-0.1%	-0.1%	-0.1%	-2.5%
2018 DS1 PM	n/a	-0.8%	-0.1%	-0.1%	-0.1%	-2.6%
2036 DS1 AM	-0.4%	-0.7%	-0.2%	-0.1%	-0.1%	-2.6%
2036 DS1 PM	n/a	-0.8%	-0.1%	-0.1%	-0.1%	-2.7%
2036 DS5a AM	-0.4%	-0.6%	-0.5%	-0.1%	0.0%	-2.7%
2036 DS5a PM	n/a	-0.7%	-0.5%	-0.1%	-0.1%	-2.6%
2036 DS5b AM	-0.3%	-0.5%	-0.8%	-0.1%	0.0%	-2.7%
2036 DS5b PM	n/a	-1.4%	-0.8%	-0.1%	0.0%	-2.7%

It should be noted that:

- the figures in table 3-8 include trips outside Spalding and not just those which start and end in Spalding as in Table .
- The exact percentage decrease for each package will vary depending on the order in which the packages are applied.
- Inter-urban public transport (primarily rail) appears as the most effective means of reducing car trips. It should be noted that this package assumes a significant increase in rail services with a doubling of frequency to Peterborough in the peak periods as well as new services (for the AM and PM peak) to Lincoln via Sleaford. The large number of new development trips destined for Peterborough in particular mean this inter-urban public transport shows a large decrease in car trips.

- On the other hand any switch to Into Town bus services is probably under-estimated. This calculation is reliant on the existing modal share, as detailed information was not available a share of around 2% was assumed based on the census figure for the whole of Spalding. In all likelihood the bus mode share within the area served by Into Town is higher than this.

Key Findings

- The change in the number of car trips varies by scenario and time period from a 2% to 3.9% reduction in Spalding. Although this does not seem a large shift across the whole of Spalding, it should be remembered that certain model zones will experience greater shifts, for example model zones containing schools.

- The AM peak generally sees a larger reduction in car trips because of the application of school targeted measures for the start of the school day.

- Reductions are largest in DS5b. This is due to the increased housing development level which equates to larger reductions for the development targeted package and the town centre.

3.7 Flow Difference Plots

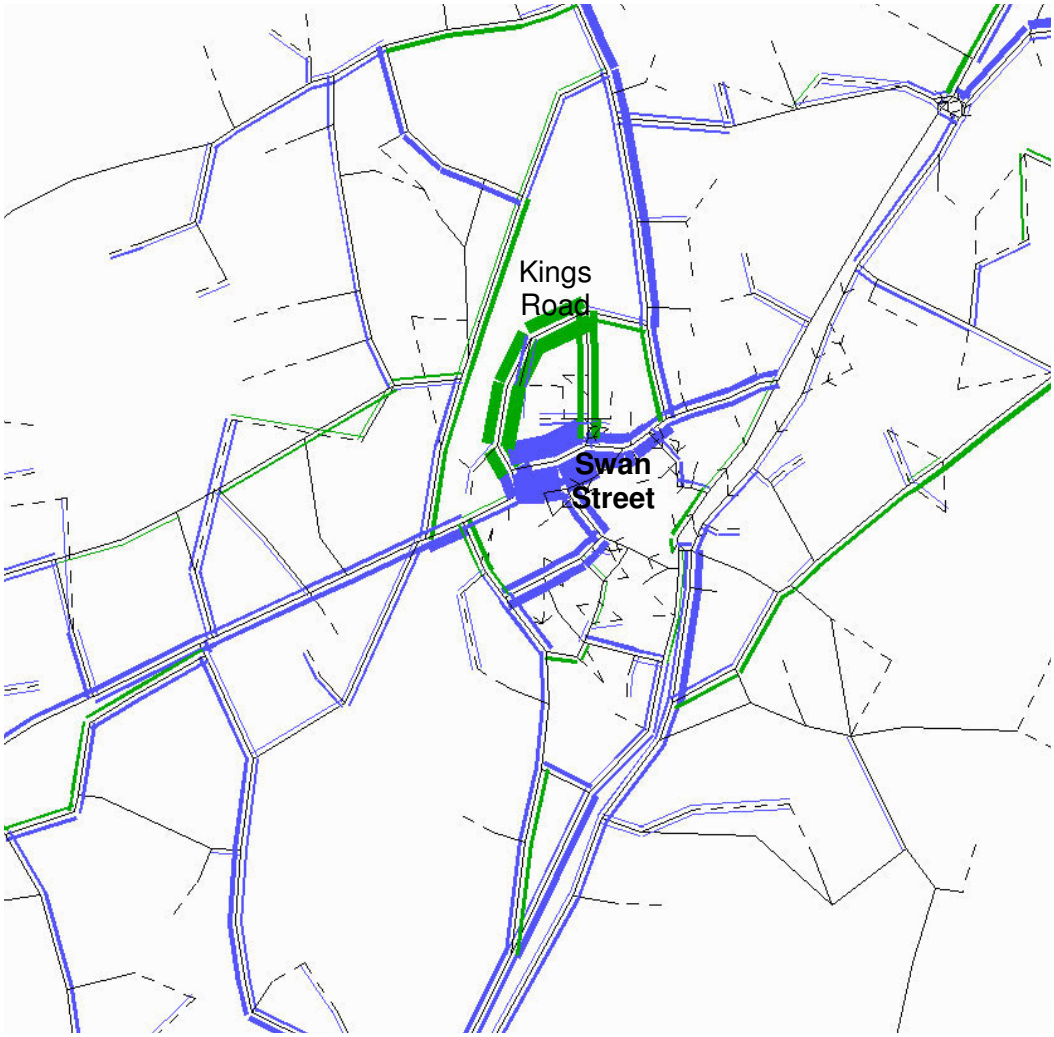
The next section of reporting includes flow difference plots which provide a useful means of comparing traffic flows between model scenarios, this can help in identifying re-routeing which occurs as the result of interventions. Where very large increases in flow occur it might be the result of re-routeing or traffic growth from additional housing development (5a and 5B). Figures have been presented for scenarios where a notable change in flow occurs.

All comparisons are for 2036 and use the Do Minimum as a baseline. The level of change is indicated using proportional bandwidth, green indicates an increase in flow in the Do Something, blue is a decrease in flow between DM and DS.

Do Something 2

Figure 3-**6** shows a comparison between DM and DS2.

Figure 3-6 Flow Difference - 2036 DS2 – DM PM



Key Findings

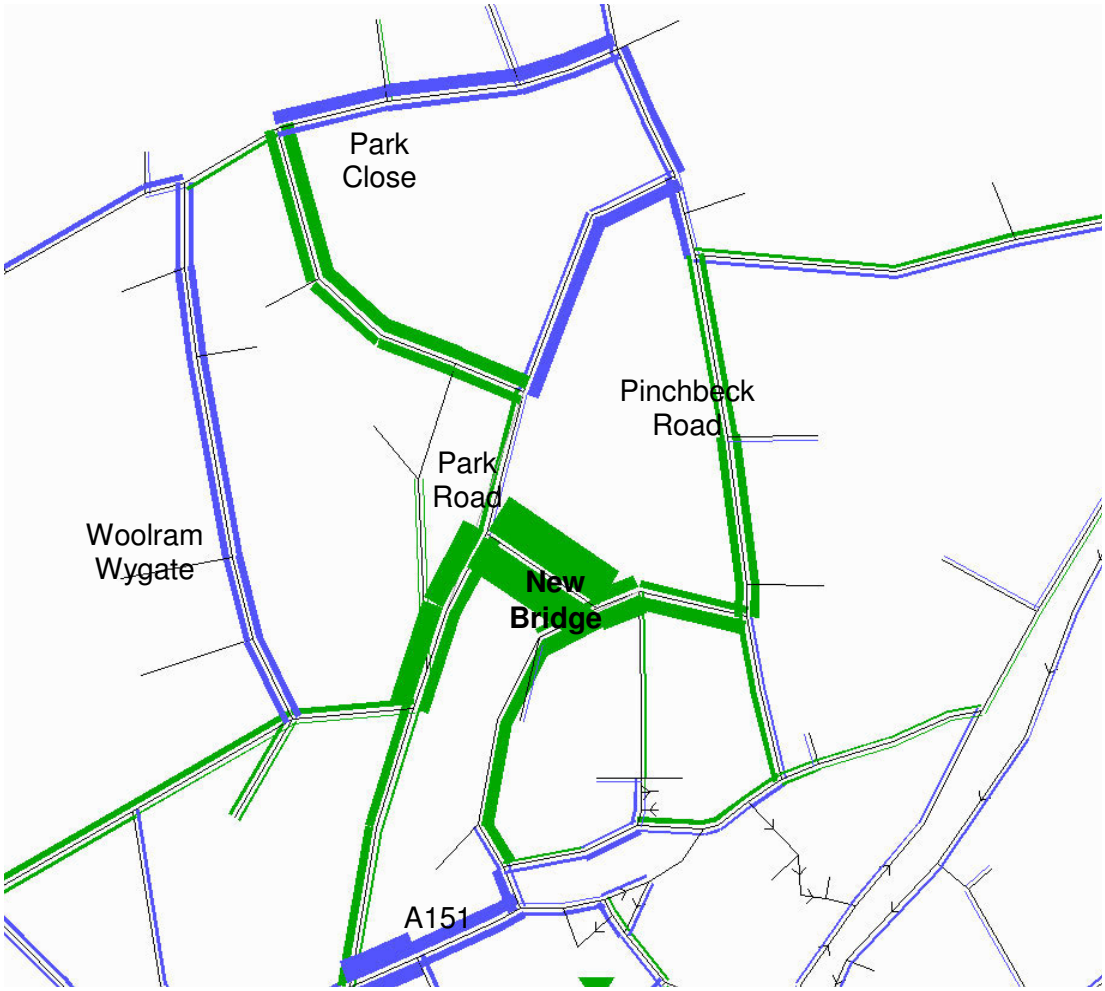
- The closure of Swan Street in Do Something 2 is clearly marked by the thick blue bands. East to west and west to east movements must find an alternative route to Swan Street with the figure showing this traffic routeing via Kings Road and Winfrey Avenue.

- DS 2 has slightly lower overall demand than DM because of the modal shift packages which were applied to all DS scenarios. This helps to explain the rest of the network which generally shows small decreases (blue) in flow.

Do Something 3

Figure 3-7 shows a comparison between DM and DS3.

Figure 3-7 Flow Difference 2036 DS3 - DM AM



Key findings

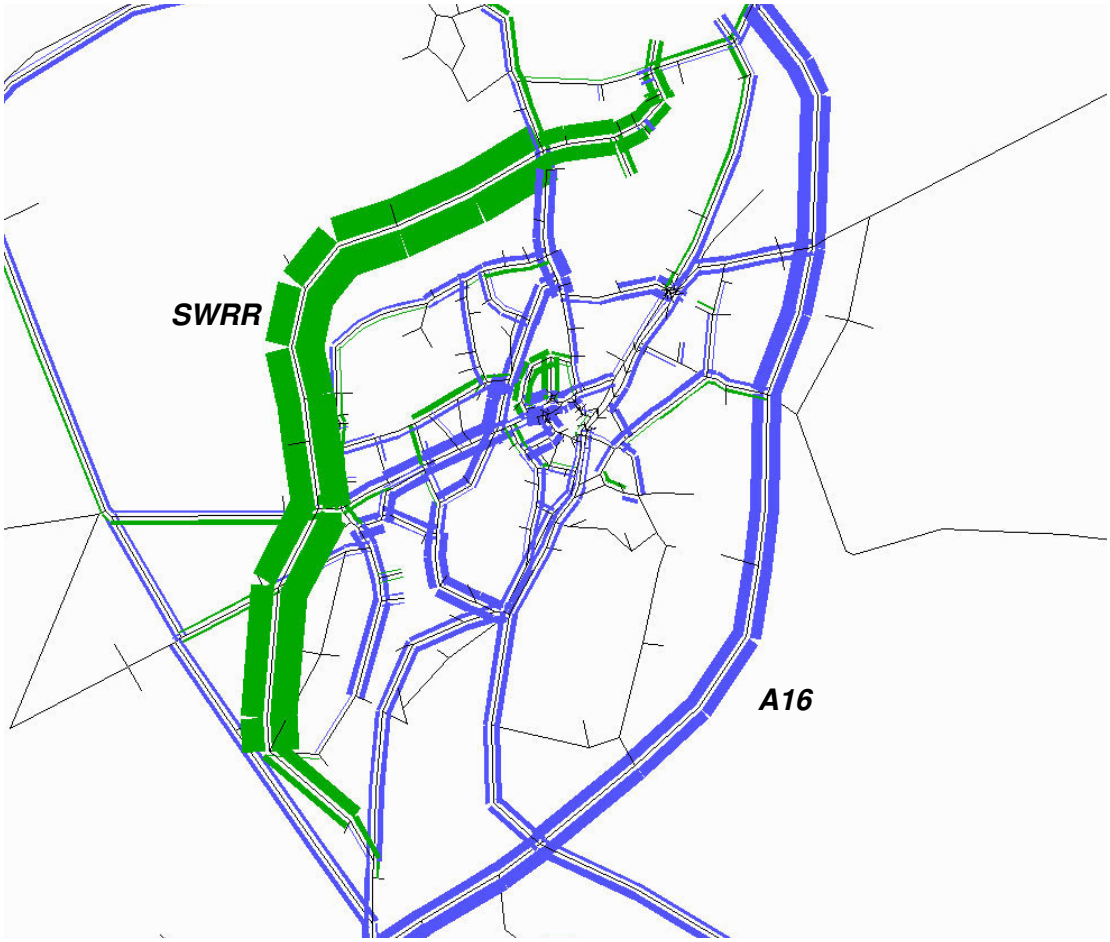
- The new road bridge is forecast to carry in the region of 800 vehicles in the AM peak in each direction by 2036.
- This leads to local re-routeing of traffic with large decreases in flows at level crossings including Park Road, Woolram Wygate and most notably Winsover Road.
- As a result of this re-routeing some local roads are expected to see large increases in flow including Park Close, Park Road between Winsover Road and Park Close and Kings Road.

- Some other local roads see decreases in flow, including Woolram Wygate and the B1156 (Park Road and Pinchbeck Road) between the proposed bridge and Woolram Wygate.

Do Something 4

Figure 3-8 shows a comparison between DM and DS4.

Figure 3-8 Flow Difference 2036 DS4 – DM PM



Key Findings

- Traffic flows on the A16 and on other routes which pass through the town including the B1173 and A151 are forecast to see decreases in the levels of traffic. This suggests SWRR is effective at relieving congestion in the town centre.

- Although not visible on this plan, the inclusion of the closure of Swan Street leads to increases in flow on Kings Road and Winfrey Avenue as traffic eastbound traffic from Winsover Road is forced to find alternative routes.

Do Something 5b

Figure 3-9 and 3-10 and show a comparison between DM and DS4.

Figure 3-9 Flow Difference 2036 DS5b – DM PM Wider Area

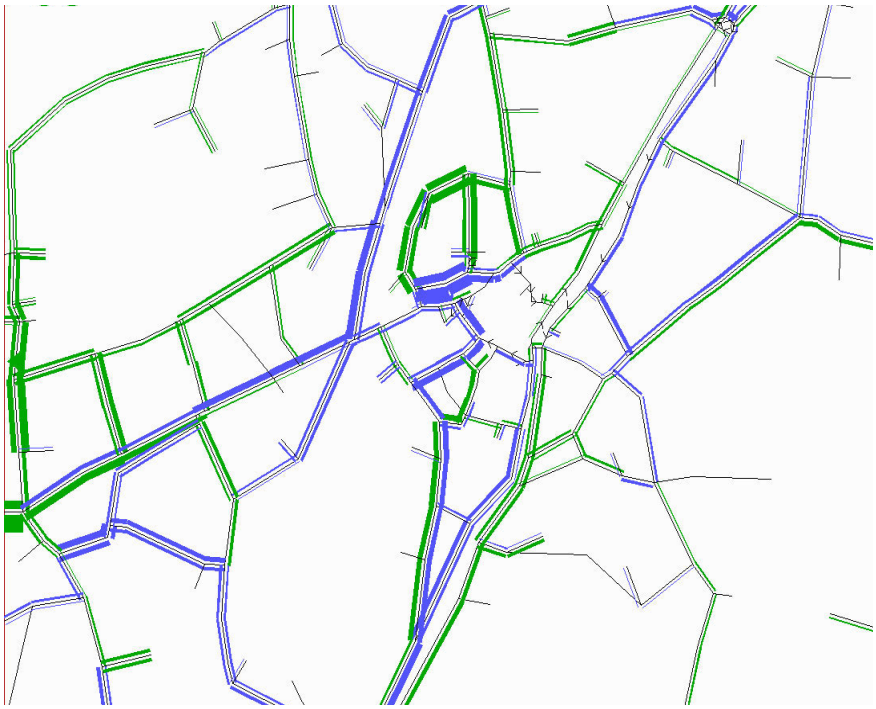


Figure 3-10 Flow Difference 2036 DS5b – DM PM Town Centre

Figure 3-11 looks at the difference between flows in DS5b and DS4. DS4 has been used as a comparator because it has a similar level of demand as DM but includes the fully opened SWRR.

Figure 3-11 Flow Difference 2036 DS5b – DS4 PM Wider Area

Key Findings

- The alignment of SWRR can be clearly seen in Figure 3-9 with over 1,000 vehicles in both directions using the route. This largely seems to be the result of development trips from North of Vernatts Drain and land between Holland Park and Vernatts Drain developments, although there also seems to be some traffic diverting from existing and potentially alternative routes including the A16 and A151/B1356. Figure 3-11 illustrates the true extent of the additional development trips with very large increases on SWRR and flow increases on the majority of network links.

- This level of increase could potentially cause operational issues in the future if increased levels of traffic exceed the capacity of existing infrastructure. This is investigated in the next section.

3.8 Delay Comparison

The last section of the report described the flow increases as a result of development around SWRR in DS5b 2036. This section looks at how this might impact the local network. Comparisons are this time drawn with the change in delay between the DS4 and DS5b networks. The change in seconds in annotated with green indicating an increase in delay and can be seen in figures 3-12 and 3-13.

Figure 3-12 Change in delay DS5b - DS4 - 2036 AM (seconds)

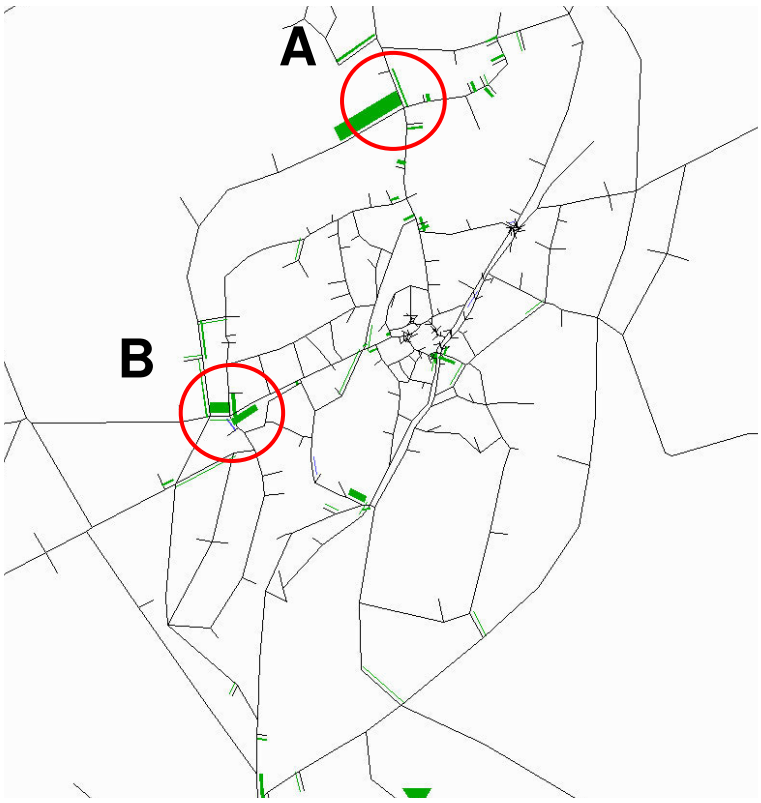
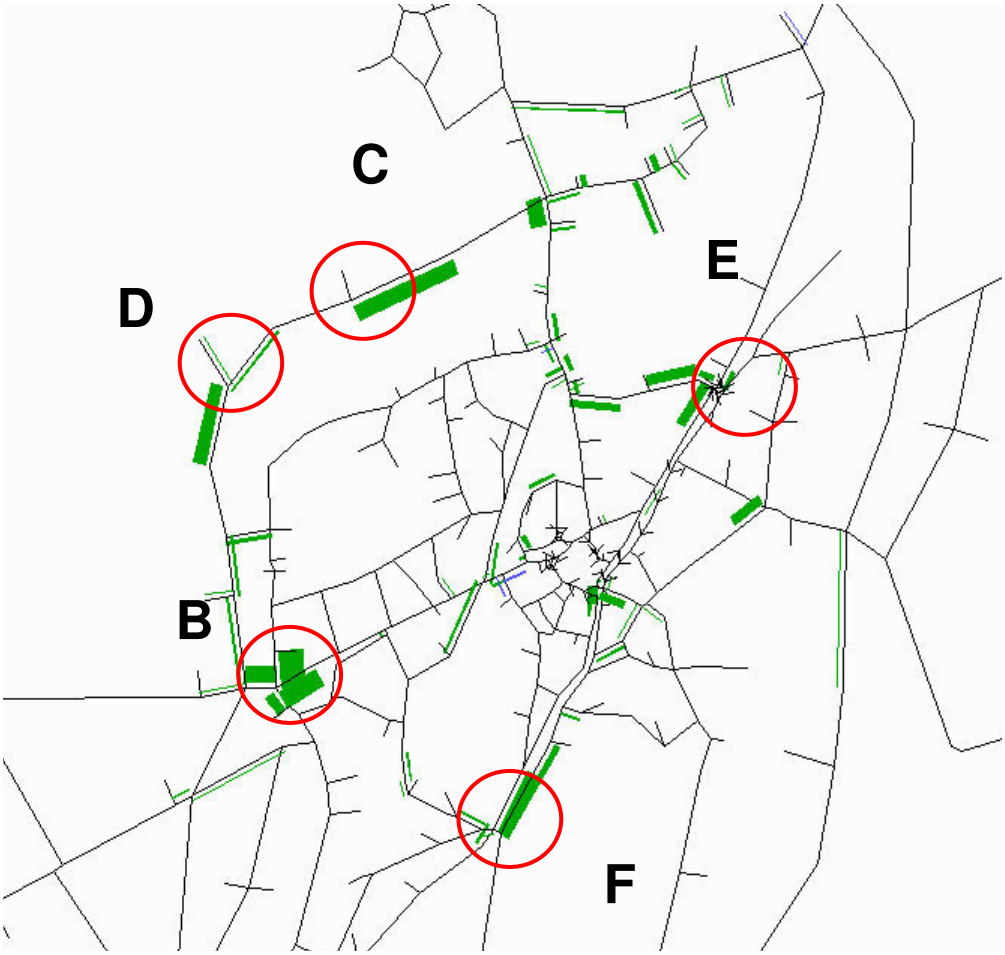


Figure 3-13 Change in delay DS5b – DS4 – 2036 PM (seconds)



A number of junctions are highlighted in figure 3-12 and 3-13. These all exhibit increases in delay of more than 1 minute:

- A – SWRR approach to junction with Pinchbeck Road (AM).
- B – All arms of Bourne Road / Broadway / Monk House Lane junction (AM and PM peak). This junction is severely congested in DS5 as a result of this being the first junction that development traffic arrives after leaving SWRR on the main route into Spalding.
- C and D – roundabouts on SWRR providing access to the development north of Vernatts Drain. Capacity might need to be increased in these locations if the development between Vernatts Drain and Holland Park is also built.
- E – Delays on approaches to the A151 West Elloe Avenue / B1173 junction / Albion Street / W Marsh Road (PM peak).
- F – Little London Bridge – approaches from the west.

In order to accommodate the growth proposed in scenario 5b additional remedial measures may need to be considered at these locations and included in the final strategy.

3.9 Delay at Level Crossings

Delays at levels crossings in Spalding are seen as one of the most important traffic issues in the town. Level crossings in the model have been coded on the assumption that in the future there will be 6 trains per hour passing through Spalding (3 in either direction), which will equate to 15 minutes of barrier downtime per hour.

Table 3-9 and Table 3-10 present traffic delay data extracted from the SATURN model for each scenario in 2018 and 2036. Cells highlighted in green experience a decrease in delay when compared to the Do Minimum, cells in red show an increase in delay. Delay from the 2010 base year model is also included in this table as a point of reference, it should be remembered in 2010 the assumed barrier down time at level crossings is 5 minutes in the hour as opposed to 15 minutes in the future years.

Table 3-9 2018 Average delay in seconds per vehicle at level crossings in hourly peak periods

	AM								PM							
	Base	**DM**	**DS1**	**DS2**	**DS3**	**DS4**	**DS5a**	**DS5b**	**Base**	**DM**	**DS1**	**DS2**	**DS3**	**DS4**	**DS5a**	**DS5b**
Woolram Wygate																
WB	**17**	**135**	135	134	126	133	133	133	**16**	**157**	155	157	148	151	151	151
EB	**14**	**180**	178	177	154	171	171	171	**15**	**142**	142	142	136	139	139	139
B1356 Park Road																
WB	**15**	**129**	128	132	117	128	128	128	**15**	**142**	140	141	129	135	135	135
EB	**14**	**136**	135	136	122	128	128	128	**14**	**127**	128	128	119	123	123	123
Winsover Road																
WB	**17**	**149**	148	144	124	142	142	142	**21**	**175**	174	170	134	168	168	168
EB	**21**	**181**	175	173	136	165	165	165	**17**	**146**	150	146	127	144	144	144
Hawthorn Bank																
NB	**15**	**138**	136	136	131	130	130	130	**16**	**150**	145	145	138	134	134	134
SB	**16**	**146**	144	144	137	134	134	134	**15**	**142**	136	139	129	130	130	130
South Drove																
NB	**14**	**119**	119	119	119	119	119	119	**14**	**120**	120	120	120	120	120	120
SB	**14**	**120**	120	120	120	120	120	120	**14**	**119**	119	119	119	119	119	119

Table 3-10 2036 level crossing delay (seconds)

	AM								PM							
	Base	DM	DS1	DS2	DS3	DS4	DS5a	DS5b	Base	DM	DS1	DS2	DS3	DS4	DS5a	DS5b
Woolram Wygate																
WB	**17**	**140**	139	139	130	137	138	138	**16**	**151**	151	155	149	159	150	153
EB	**14**	**216**	221	206	170	185	192	202	**15**	**151**	151	151	143	143	146	150
B1356 Park Road																
WB	**15**	**135**	135	140	117	129	129	130	**15**	**158**	156	157	135	144	150	151
EB	**14**	**137**	131	138	134	129	126	131	**14**	**131**	131	131	118	124	122	123
Winsover Road																
WB	**17**	**154**	153	146	128	145	145	159	**21**	**199**	197	184	145	177	180	190
EB	**21**	**214**	198	198	146	181	184	196	**17**	**154**	152	152	134	145	144	150
Hawthorn Bank																
NB	**15**	**142**	140	141	134	131	131	134	**16**	**159**	151	155	150	143	153	151
SB	**16**	**142**	143	142	140	140	142	134	**15**	**146**	144	144	134	131	131	141
South Drove																
NB	**14**	**122**	122	122	122	118	118	118	**14**	**124**	123	123	123	118	118	118
SB	**14**	**123**	123	123	122	118	118	118	**14**	**123**	122	122	122	118	118	118

Key Findings

- Generally there are only small changes in delay across the scenarios. Delay decreases by a few seconds at most of the locations in the Do Something scenarios. This small decrease can be attributed in most cases to the reduction in traffic as the result of modal shift away from car (Smarter Choices / PT / demand management measures).

- Do Something 3 is the only scenario which exhibits any significant decrease in delay at level crossings, this shows that the inclusion of a new vehicular bridge crossing the railway would reduce delay at the level crossings. The Park Road and Winsover Road crossings show decreases in delay of up to a minute.

- It appears the SWRR is successful in diverting cross-town trips from the centre because despite large increases in the total number of car trips in Do Something 5 scenarios, delay does not increase at level crossings.

3.10 Junction Performance

The previous EAST assessments highlighted a number of junctions which forecasts suggest will experience congestion in the future. The performance of these junctions plus a list highlighted by Lincolnshire County Council has been assessed in more detail in this section of the report. The junctions are:

- A16 / B1180 roundabout;

- A16 / A151 roundabout;
- High Bridge Junction;
- Park Road / Winsover Road;
- Park Road / Pinchbeck Road;
- Winsover Road / St Thomas Road; and
- A151 West Elloe Avenue / B1173 junction / Albion Street / W Marsh Road.

The assessment again employs the V/C ratio to evaluate junction performance. A time graphs have been prepared for each junction showing an average of V/C weighted by vehicular flow for each junction and the maximum V/C value.

The results of this assessment are shown in Figure 3-14 to

Figure 3-20. Once again junctions with a V/C percentage of greater than 85% are considered as approaching capacity and to avoid excessive congestion and delay in the future further mitigation measures should be considered. When assessing these graphs it should be remembered that some junctions are shown to be congested in the Do Minimum scenario and indeed they might be congested in the present day. Therefore congestion and delay should not automatically be attributed to the proposed schemes or housing growth, unless the situation is shown to worsen in the Do Something scenario.

In addition to V/C. Appendix C also includes graphs showing total delay for each junction.

Figure 3-14 A16/B1180 V/C – 2036

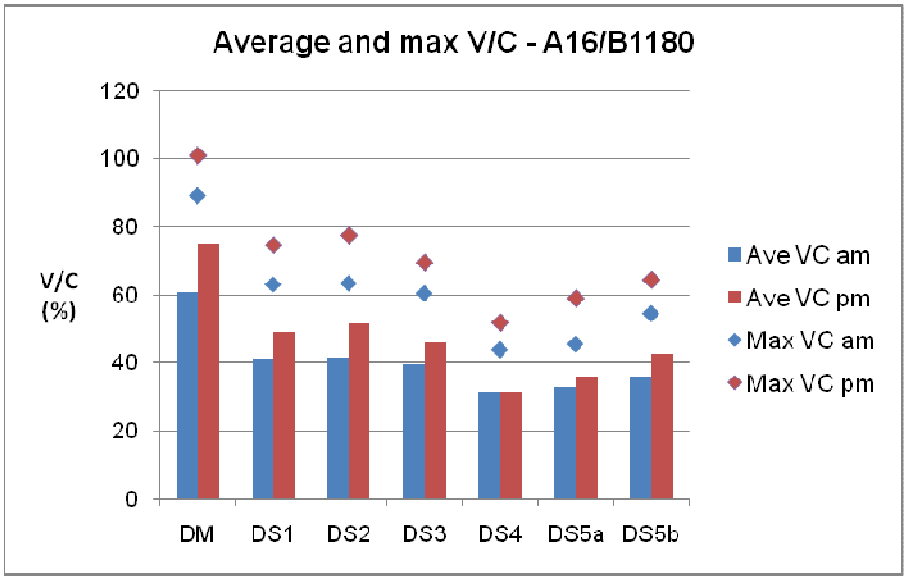


Figure 3-15 A16/A151 V/C – 2036

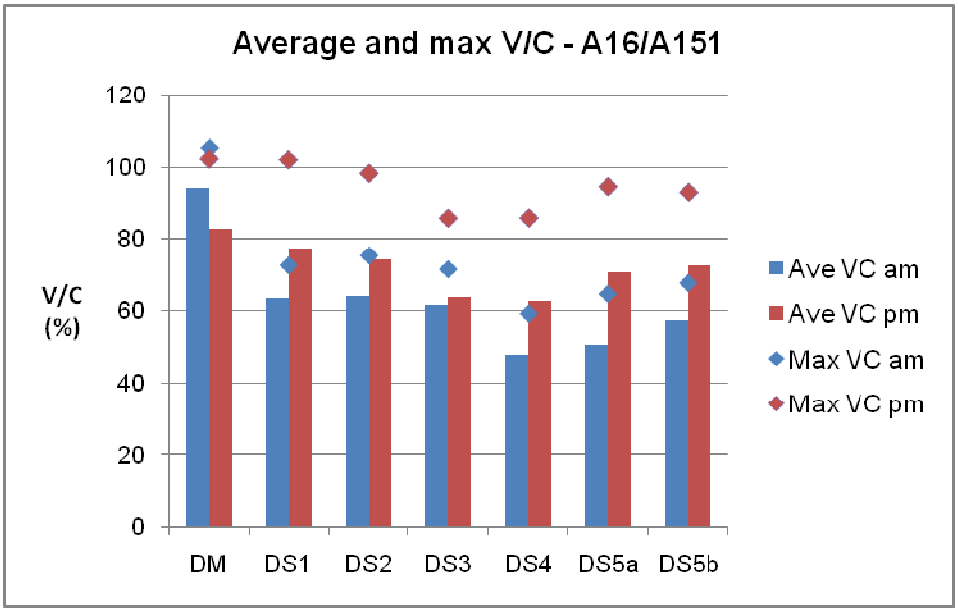


Figure 3-16 High Bridge Junction V/C – 2036

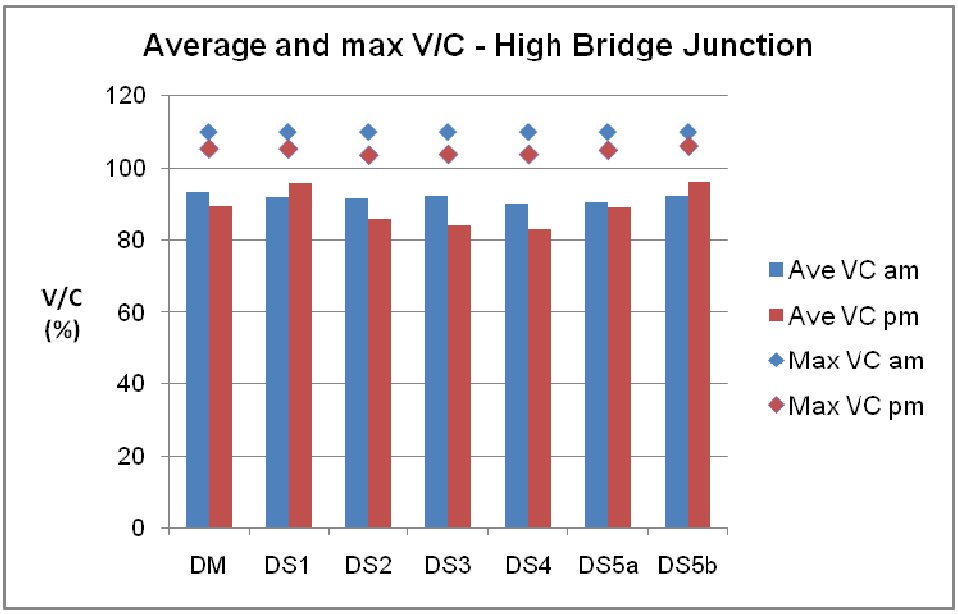


Figure 3-17 Park Road / Winsover Road V/C – 2036

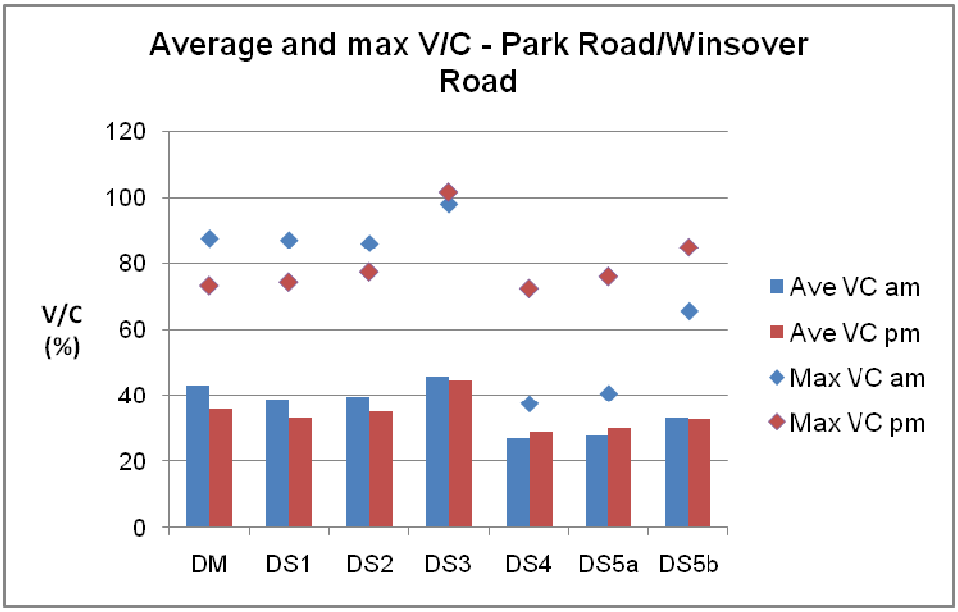


Figure 3-18 Park Road / Pinchbeck Road – 2036

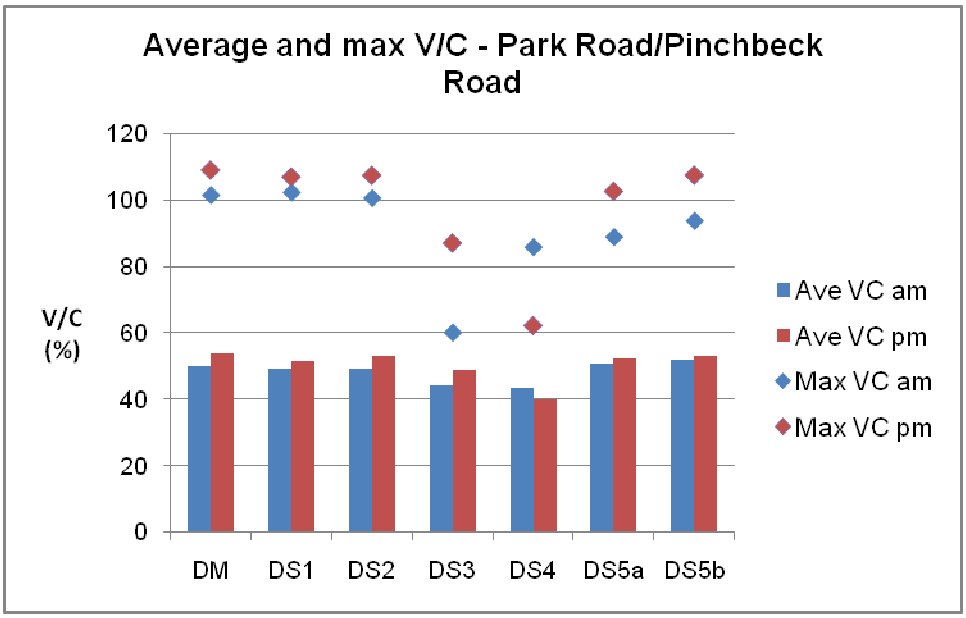


Figure 3-19 Winsover Road / St Thomas Road – 2036

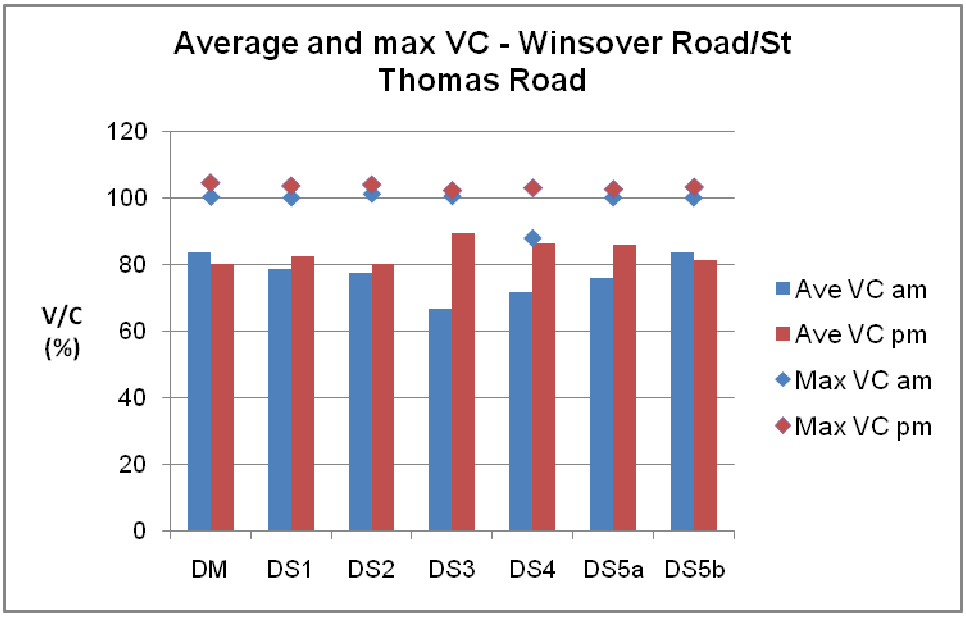
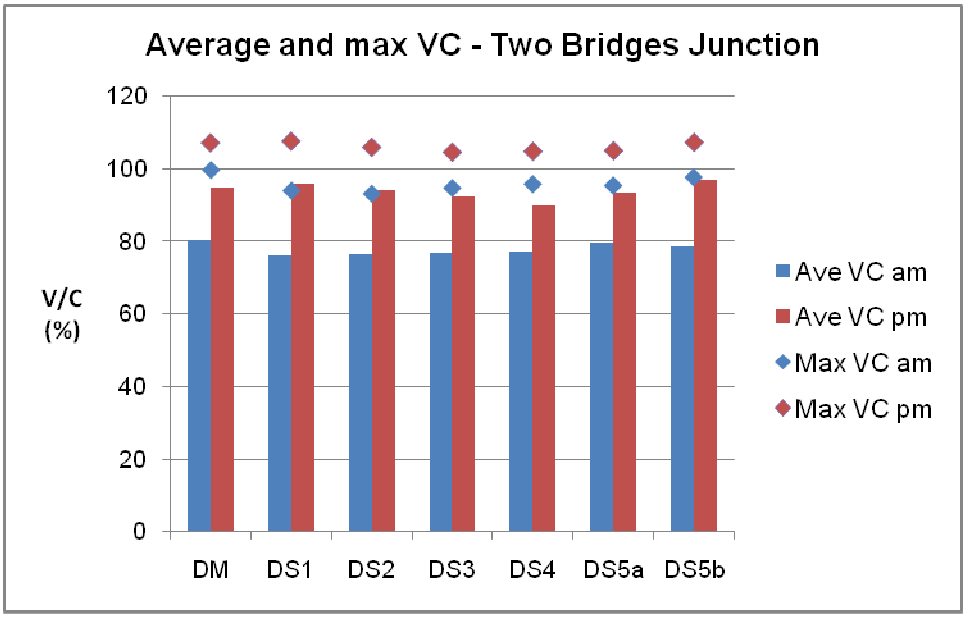


Figure 3-20 A151 West Elloe Avenue / B1173 junction / Albion Street / W Marsh Road – 2036



Key findings

- All junctions are shown to have at least one turn (max V/C value) with a V/C over 85% in one of the time periods in 2036 DM.
- No junction is shown to worsen significantly when the Do Something measures are included, instead the vast majority remain stable or see slight decreases in V/C.
- The improvements made to the A16 roundabouts are shown to bring reductions in V/C (Figure 3-14 and 3-15).
- Junctions where the average V/C exceeds 85% across all junction arms and maximum V/C is over 100% cause the greatest concern. Junctions which fall into this category are:
    - High Bridge Junction;
    - Winsover Road / St Thomas Road;
    - A151 West Elloe Avenue / B1173 junction / Albion Street / W Marsh Road

  Further mitigation may need to be considered in these locations and should be considered in the final strategy.
- With the exception of the A16 / B1180 junction (which has capacity improvements in all DS scenarios), all junctions have maximum V/C of more than 85% for at least one turn. In some cases these might be mitigated through minor interventions such as changes to signal timings, in other cases more substantial measures may be required.

3.11 Parking

A parking model and detailed baseline data is not available in Spalding which makes estimating the demand for car parking difficult. Furthermore, it is not possible to accurately say whether the existing level of public car parking provision in the town centre will be sufficient for future needs.

Therefore as a proxy to car parking demand the total number of modelled car trips to town centre zones is presented for each scenario. This process involves calculating car trips which have a destination end in the town centre. Using this as a proxy for public car parking demand assumes a linear relationship between total number of car trips and demand for public car parking spaces, in reality the situation is likely to be more complicated than this. Table 3-11 presents the baseline total modelled trips for 2010, with the percentage increase presented for all other 2036 AM peak scenarios.

Table 3-11 2036 Town Centre Trip Ends

	2010 Base	DM	DS1	DS2	DS3	DS4	DS5a	DS5b
AM	5,948	20%	15%	15%	15%	15%	21%	27%

Car trips into the town centre rise by up to 27% over the level modelled in the 2010 base year. If this is viewed as a proxy for car parking demand it suggests 27% more spaces will be required to accommodate the level of demand in DS5b above the level in 2010. As existing occupancy levels are unknown it is impossible to say whether further provision is required to accommodate these levels of demand. In order to this with confidence a separate car parking study would be required, in which the first stage is a data collection programme to establish current occupancy levels.

3.12 Summary

The outputs contained in the previous section covered in depth the outcomes of each model scenario. A summary of each scenario is presented below and each scenario is then rated against the 10 objectives which were set out at the inception of this project in Working Paper 1.

3.12.1 Summary of Scenarios

A brief summary of the findings for each scenario is presented below:

- DS1 – the smallest change from the DM of any of the scenarios. A combination of signal optimisation and reduction in car trips as the result of modal shift packages will see small improvements to the number of junctions approaching or at capacity, journey times are forecast to improve and average vehicle speed increases by a small amount.

- DS2 – The closure of Swan Street is designed to improve transport accessibility for non-car users through a new bus station and improved cycle and walk links. It might therefore be reasonable to assume that this would be detrimental to motorists. However with the inclusion of mode shift packages it appears that any detrimental impact to motorist has been mitigated by reduced overall traffic levels. The impact of local re-routeing with increased car trips on Kings Road and Winfrey Avenue would need to be considered, not only for motorists but for other users of the area.

- DS3 – The positive and negative impacts are more obvious in DS3. Some indicators show clear improvements to road users when a new bridge is built crossing the railway and linking Kings Road and Park Road. DS3 has the lowest level of total delay and highest average speeds of any scenario. There are also decreases in delays at existing level crossings, in particular Winsover Road with this measure.

  However the opening of the bridge will also have significant effects in the local area with increased traffic on Park Close, Park Road between Winsover

Road and Park Close and Kings Road. This impacts a small number of junctions with increased congestion which is reflected in the V/C summaries in section 3.2.4. The impact is also evident at the Park Road / Winsover Road junction which sees higher V/Cs and delay in this scenario.

The pros and cons of implementing this measure would need to be carefully weighed against one another.

- DS4 – A combination of closing Swan Street to traffic and signal optimisation, as well as the full opening of SWRR, this scenario also assumes only committed growth. Generally the network performs best by most measures for this scenario, however it should be remembered the inclusion of all measures without significant housing growth is probably not realistic. This scenario is most useful as a comparator to the 2 Do Something 5 scenarios.

- DS5a – This scenario assumes a level of growth consistent with that tested as part of the EAST assessments. The highway network is generally shown to cope satisfactorily with this level of growth. In comparison with DM, the impacts appear to have no detriment; this is the result of SWRR which is effective in drawing through traffic from the town centre.

- DS5b – This scenario assumes the highest level of growth with the inclusion of the development between Holland Park and Vernatts Drain. On some indicators the network appears to perform satisfactorily with this level of growth, however there are signs of strain in certain locations. A number of junctions were highlighted in the report where further assessment and possibly remedial work would be required to mitigate the impact. The SWRR proposals, which will serve as the primary access route may also need to be developed further to take into consideration the large number of additional car trips forecast when this growth is included. Further work and refinement of the model may be needed to evaluate these impacts more fully.

3.12.2 Transport Strategy Objectives

Working Paper 1 set out 10 objectives which the Transport Strategy should aspire to meet. These were then refined and updated in Working paper 2 leaving us with 8 objectives. Each model scenario has been rated against each objective and given a rating of low, medium or high depending on how well it meets the needs of each objective. High means the scenario meets the objective very well, low means the scenario is poorly aligned with the objective.

The objectives as set out in Working Paper 1 are listed in *Table 3-*12. The assessment is contained in Table 3-13.

Table 3-12 Spalding Transport Strategy Objectives

Ref:	Objectives
SP1	To support the sustainable economic growth of South East Lincolnshire through transport improvements. Supporting the South East Lincolnshire Local Plan and the Lincolnshire Local Transport Plan
SP2	To ensure transport infrastructure meets the needs of existing and proposed developments
SP3	To address town centre congestion by creating an efficient transport network
SP4	To encourage the use of alternative travel modes by improving the quality of journey experience
SP5	To improve connectivity and maximise accessibility by improving travel options, especially for those without access to a private car
SP6	To improve the quality of life for residents by improving air quality and reducing noise levels by removing unnecessary traffic
SP7	To reduce the number and severity of road accidents by reducing the potential for conflict
SP8	To improve the attractiveness and liveability of Spalding for residents, workers and visitors by creating a safe, attractive and accessible environment and encouraging healthy travel and lifestyles

Table 3-13 Spalding Transport Strategy Objectives and Evaluation of Scenarios

Ref:	DS1	DS2	DS3	DS4	DS5a	DS5b
SP1	**Low –** Phase 1 of SWRR and minimum housing growth forecast.	**Low –** Phase 1 of SWRR and minimum housing growth forecast.	**Low –** Phase 1 of SWRR and minimum housing growth forecast.	**Low –** Assumes full SWRR and low housing growth.	**Med –** Assumes full SWRR and medium housing growth.	**High –** Assumes full SWRR and housing growth.
SP2	**Low –** Phase 1 of SWRR is sufficient for this level of growth but does not enable the delivery of further housing developments.	**Low –** Phase 1 of SWRR is sufficient for this level of growth but does not enable the delivery of further housing developments.	**Med –** New bridge improves connectivity for east-west journeys and in the town.	**Med –** Full SWRR meets the needs of the proposed growth for this scenario. However the full SWRR is not necessarily needed if this level of growth is assumed.	**High –** Full SWRR meets the needs of the proposed growth for this scenario	**Med –** Full SWRR goes some way to meeting the needs of the proposed growth for this scenario. Consideration should be given to further measures which might be needed if this high level of growth is progressed.
SP3	**Med –** signal optimisation and modal shift measures bring small benefits across the town centre network.	**Med –** Modal shift measures bring small benefits across the town centre. Closure of Swan Street and a new bus station should bring benefits for pedestrians and bus users.	**High –** Provision of new bridge across the railway, provides improved east-west links and reduces delay at level crossings.	**High –** Full SWRR is effective at drawing through traffic from the town centre, leading to reduced congestion at level crossings and junctions.	**Med –** Full SWRR is effective at drawing through-traffic from the town centre.	**Low –** Additional traffic from developments is likely to cause additional congestion issues which are not fully mitigated by the existing proposals.
SP4	**Low –** Includes improvements to bus and rail services as part of modal shift measures.	**High –** Modal shift measures will reduce dependency on car travel. Closure of Swan Street and a new bus station which should reduce severance in the town centre bringing improvements for bus users and pedestrians.	**Med –** Includes improvements to bus and rail services as part of modal shift measures.	**Med –** Includes improvements to bus and rail services as part of modal shift measures.	**Med –** Includes improvements to bus and rail services as part of modal shift measures.	**Med –** Includes improvements to bus and rail services as part of modal shift measures.

Ref:	DS1	DS2	DS3	DS4	DS5a	DS5b
SP5	**Med –** Modal shift measures encourage the use of alternative modes other than car.	**High –** Modal shift measures encourage the use of alternative modes other than car. The closure of Swan Street except to buses will make bus travel more attractive and improve connectivity for non-car users.	**Med –** Modal shift measures encourage the use of alternative modes other than car.	**Med –** Modal shift measures encourage the use of alternative modes other than car.	**Med –** Modal shift measures encourage the use of alternative modes other than car.	**Med –** Modal shift measures encourage the use of alternative modes other than car.
SP6	**Low –** This scenario does not include measures to remove traffic from the central and residential areas of Spalding. Signal optimisation can potentially reduce carbon emissions by reducing delay at junctions, however this needs to be offset against any increase in journey length. Modal shift measures will encourage use of alternative modes to car.	**Low –** This scenario does not include measures to remove traffic from the central and residential areas of Spalding. Closure of Swan Street should make walking and bus travel more attractive by improving connectivity and the environment. This needs to be offset against car trips which can no longer use Swan Street and will need to divert to a less direct route. Modal shift measures will encourage use of alternative modes to car.	**Low –** This scenario does not include measures to remove traffic from the central and residential areas of Spalding. New road bridge is likely to have a neutral impact on carbon emissions. Modal shift measures will encourage use of alternative modes to car.	**High –** Full SWRR removes car trips from the town centre and residential areas. Full SWRR is likely to have a neutral impact on carbon emissions. Modal shift measures will encourage use of alternative modes to car.	**High –** Full SWRR removes car trips from the town centre and residential areas. Full SWRR is likely to have a neutral impact on carbon emissions. Modal shift measures will encourage use of alternative modes to car.	**Med –** Full SWRR removes car trips from the town centre and residential areas. However the volume of additional traffic in this scenario will lead to increased traffic flow across the study area. Full SWRR is likely to have a neutral impact on carbon emissions. Modal shift measures will encourage use of alternative modes to car
SP7	**Med -** Signal optimisation can potentially improve safety by reducing the risks that drivers take eg. Reduced jumping of red lights.	**Med -** Closure of Swan Street to vehicles except buses should make that part of town a safer environment for pedestrians and reduce severance.	**Low –** New bridge will cause some local re-routeing of traffic although unlikely to reduce conflict with pedestrians / cyclists.	**High –** Traffic diverted from the town centre by inclusion of full SWRR reducing conflict between pedestrians / cyclists and motorists.	**High –** Traffic diverted from the town centre by inclusion of full SWRR reducing conflict between pedestrians / cyclists and motorists.	**Med –** Traffic diverted from the town centre by inclusion of full SWRR, however further work needed to fully mitigate the impacts of increased development traffic.

Ref:	DS1	DS2	DS3	DS4	DS5a	DS5b
SP8	High – Modal shift measures encourage a safe, attractive and accessible environment and encourage healthy travel and lifestyles.	High – Modal shift measures encourage a safe, attractive and accessible environment and encourage healthy travel and lifestyles.	High – Modal shift measures encourage a safe, attractive and accessible environment and encourage healthy travel and lifestyles.	High – Modal shift measures encourage a safe, attractive and accessible environment and encourage healthy travel and lifestyles.	High – Modal shift measures encourage a safe, attractive and accessible environment and encourage healthy travel and lifestyles.	Med – Modal shift measures encourage a safe, attractive and accessible environment and encourage healthy travel and lifestyles. Further consideration should be given to how the level of growth in this scenario is managed for the benefit of all Spalding residents.

4 Transport Strategy Packages

4.1 Introduction

A series of packages for inclusion within the Transport Strategy have been developed by grouping options together, these packages are set out below. These options are defined as either short (1-3 years), medium (3-10 years) or long-term (10+ years).

Bus Measures	Timeframe	Description
Increase peak frequency of Into Town Bus services	Ongoing in line with new development	Increase headway of Into Town buses to 15mins in the peak periods to encourage local community journeys to be made by bus. Any increase in frequency would be targeted at new development and would be linked to the growth of Spalding. Services would need to be commercially viable or funded through developer contribution.
Increase coverage of Into Town Bus services	Ongoing in line with new development	Increase coverage of Into Town bus services to serve new development to the west and north of the town. Possible extensions to better serve Enterprise Industrial Park and Johnson Hospital. Services would need to be commercially viable or funded through developer contribution.
Enable buses to access the town centre	Short-term	Review existing TRO on Market Street to allow buses (as well as cyclists) access in order to improve access to public transport within the town centre core.
Relocate Bus Station to Swan Street	Medium term	Relocate bus station to a location closer to the town centre core with a more legible and safer pedestrian route. This combines with the option to close Swan Street which is covered in the modelling scenarios. This relocation could also include the development of a cycle hub (see separate measure).
Improve Bus Waiting Facilities	Short to medium term	Provide shelters, seating, raised access kerbs at all bus stops, where there is space to accommodate, to improve access to bus services for all.

Rail Options	Timeframe	Description
Lobby Rail industry in line with proposals included in the Lincolnshire Rail Strategy.	Medium to long-term	Lobbying of the rail industry should occur on a country-wide basis and follow a consistent as set out in the framework in the Lincolnshire Rail Strategy. Measures specific to Spalding could include: • Sunday services;

Rail Options	Timeframe	Description
		• Increased frequency to Peterborough • Extension of line operating hours to Sleaford and Lobby rail industry with a view to increasing frequency of rail services to Peterborough in order to improve options for commuting by sustainable means as an alternative to the car and provide more choice for leisure
Provide/Enhance a bus/rail interchange at the rail station	Short-term	Enhance bus waiting facilities at the railway station and increase frequency or adjust bus timings to compliment train service departure/arrival times.

Cycling and Walking Infrastructure Options	Timeframe	Description
Maximise potential of existing cycling infrastructure by 'filling in gaps'	Short-term	Public consultation recognised the improvements to cycling but felt there were gaps which let down the network. Where gaps exist (particularly in the town centre) these should be filled in, destination signing and maps in the town centre could also aid this further. Routes should be viewed as a network rather than a series of individual routes.
Downgrade some streets in the town centre to improve quality of space for pedestrians and cyclists	Short-term	Review directional signing provision with a view to encouraging traffic to circulate with more efficiency within the town centre. Encourage increased use of A16 (particularly by HGVs from industrial area in the north) and improved car park directional signing.
Improve pedestrian and cycle links across the town centre	Short-term	Particular attention to be given to cycle & pedestrian link between rail & bus station and town centre core in order to encourage more trips into town by alternatives to the car. There was a feeling from consultation that the network was not very well 'joined up', Also improvements to infrastructure e.g. advanced stop lines.
Enhance railway crossing provision for cyclists and pedestrians	Short-term	Re-designate, re-design, re-open or build new bridges across railway line for use by cyclists & pedestrians e.g. bridge at Winsover Road level crossing other options to be explored.
DDA Audit	Short-term	Conduct a review of the town centre in terms of improving accessibility for all in Spalding.
Provide pedestrian/cyclist crossing facilities at key junctions	Medium-term	Introduce toucan crossings and other facilities at known junctions with accident clusters to improve safety for vulnerable road users e.g. Wardentree Ln/Market Way corridor, Swan Street/Westlode Street corridor, Sheep Market, Stonegate.

Cycling and Walking Infrastructure Options	Timeframe	Description
Enhance and change status of existing PROW at Coronation Channel for use by cyclists	Medium-term	Enhance and change status of the PROW (Public Right of Way) running adjacent to Coronation Channel to the east of the town centre. To enhance the off road cycle route provision in Spalding for commuter/school journeys/leisure use e.g. surfacing, lighting etc.
Town Centre Cycle Hub located at new Swan Street bus station	Medium-term	Provide enhanced cycle facilities e.g. provide lockers, shower facilities information point, etc at a relocated bus station.

School Travel Options	Timeframe	Description
Development of a School Transport Strategy	Short-term	Develop a Transport Strategy focussed on school travel modal choice with more robust implementation of School Travel Plans and educational initiatives.
Continued/Accelerated rollout of Bikeability to schools	Short-term	Accelerated drive in roll out of Bikeability and associated initiatives to Spalding schools to encourage more pupils to cycle to school.

Spalding Western Relief Road	Timeframe	Description
SWRR Phase 1	Short to medium-term	Spalding Western Relief Road first phase of the relief road, between the Holland Park development, which includes 2,250 new homes, and up to the B1172 Littleworth Drove and Hills drain.
Completed SWRR – Extend Proposal for SWRR to connect with B1356 in the north	Medium to long-term	To negate issues with traffic from the relief road joining existing congested route at Spalding Road.

Smarter Travel Options	Timeframe	Description
Increased publicity campaigns for use of public transport	Ongoing as new development sites open	Introduction of publicity campaigns and initiatives to raise the profile of public transport and its benefits within Spalding and to encourage its use. This could also include partnerships with operators and promotions such as “try for free” weeks
Targeted travel planning including personalised travel planning for	Ongoing as new development sites open	Tailored to the needs/attitudes of particular segments within the target population with solutions focused upon engaging with those most amenable to change.

Smarter Travel Options	Timeframe	Description
residential properties, all major employers and education establishments		
Develop a Business Travel Zone for Spalding	Medium-term	Provide improved travel planning support for businesses in Spalding to encourage sustainable travel to work through dedicated resources, publicity campaigns/initiatives and incentives. (Enhanced 'Access Lincs').

New Development Options	Timeframe	Description
Safeguard sustainable transport options for new large developments	Ongoing as part of planning process	Develop robust transport proposals for large scale developments in Spalding to provide and safeguard sustainable transport options for new development areas.
Pedestrian/Cycle links incorporated into design of new developments	Ongoing as part of planning process	Ensure safe and secure pedestrian/cycle links are designed into new residential developments in Spalding; connecting to routes into town centre.
Encourage sustainable travel in new developments	Ongoing as new development sites open	Provide starter pack for all new houses highlighting benefits of sustainable travel. Pack could also include discounted bike loans or bike shop discounts, bus fares or 'Try The Bus' initiatives.

Traffic Management and Car Parking Options	Timeframe	Description
20mph Zones around schools	Short -term	A county-wide review of 20 mph policy is currently underway. A number of schools in Spalding already have 20mph limits, further educational locations could be added, improving road safety for all road users.
Car Parking Review / Strategy	Short to medium-term	**Review on-street parking tolerances** Review on street parking behaviours in the town centre and on key radial routes. Reduce the impact of congestion and improve the safety of vulnerable road users at key points on these routes by prohibiting or limiting on-street parking where viable. E.g. Bourne Road, Winsover Road, St Thomas' Road, The Crescent and Church Street. Enhance enforcement operations. **Review town centre car parking provision** Review town centre off-street car parking provision with a view to increasing the provision in line with anticipated population growth in the future.

Traffic Management and Car Parking Options	Timeframe	Description
Directional Signing Review	Short-term	Improve signing of car parks. Extensive resigning has already taken place to remove goods vehicle traffic from the town centre and encourage use of the A16.

Junction Improvements and Road Safety Option	Timeframe	Description
Increase capacity at A16/A151	Medium-term	Review junctions of A16 with A151 to provide additional capacity.
Increase capacity at A16/B1180	Medium-term	Review junctions of A16 with B1180 to provide additional capacity.
Review/optimise traffic signals within the town centre	Short-term	Review operation of traffic signals at key locations / junctions across the town, with the aim of improving the flow of traffic through the town centre whilst providing safe routes for pedestrians.
Winsover Road/St Thomas Road junction review	Short-term	Amend layout of Winsover Rd/ St Thomas' Rd junction by removing signals and introducing an alternative junction layout.
Introduce left turn filter at recently improved West Elloe Ave/Pinchbeck Road junction	Short-term	To improve operation of junction for vehicles travelling south from West Elloe Avenue.
Introduce MOVA network at signalised junctions within the town centre	Short to medium-term	Introduce MOVA network for junctions across the town, with the aim of improving the flow of traffic through the town centre. *Microprocessor Optimised Vehicle Actuation. It is a well established strategy for the control of traffic light signals at isolated junctions - i.e. junctions that are uncoordinated with any neighbouring signals.*
Safety review of Double Bridge roundabout junction	Short-term	Conduct a safety review at Double bridge/roundabout at West Elloe Ave and Commercial Road with a view to improving safety for all road users at this location.
Safety review of Winsover Road corridor	Short-term	Conduct a safety review of Winsover Road corridor into the town centre with a view to improving safety for all road users at this location.
Safety review of other key locations within Spalding	Short-term	Conduct safety reviews at: - Albion Street/ Double Street junction, - Park Road/Pinchbeck Road, - and, Hawthorne Bank (Winsover Rd end and Little London end) with a view to improving safety for all road users at these

Junction Improvements and Road Safety Option	Timeframe	Description
		locations.
Safety review of Little London Bridge	Short-term	Conduct a safety review of Little London Bridge with a view to improving safety for all road users at this location.

4.2 Longer term options

The following table presents aspirational, longer-term options that are not included in the packages. The options below need further development and agreement with other stakeholders on funding, feasibility and deliverability.

Longer Term Options	Commentary
Enhance inter-urban bus service provision during peak times	Whilst stronger inter-urban bus links are very desirable and should form part of a wider integrated transport network, it is recognised that funding for subsidising such services is presently in short supply. The provision of such improvements should, however, remain an aspiration.
Increase frequency of Into Town bus services throughout the operating day	The packages outlined above include the provision of higher frequency Into Town bus services during the peak period. While funding may be available for such an improvement (through developer contributions), funding for increased frequency over a longer period is unlikely to be available.
Enhance Spalding rail station and environment to county standard	Improvements to the rail station require discussions with Network Rail and the operator and a funding source would need to be identified. It is not clear at this time whether improvements to the wider environment will deliver increases in rail patronage.
Provide footbridge over the rail line at Winsover Road or at Railway station	Provide footbridge over rail line to counter anticipated increased down time of level crossing for pedestrians and cyclists.
Town centre car parking facility to the west of the railway line	Investigate the possibility of providing a town centre car parking facility west of the railway line to negate the need for negotiating level crossings. Possible locations could include: adjacent to footbridge over railway line between Park Road and Kings Road, land near footbridge on St John's Road. It should be noted that these example locations are within residential locations and would be likely to require third party land.
Littleworth Drove Station	The Littleworth Station Group have an aspiration to reopen the Littleworth Railway Station at Deeping St Nicholas.

4.3 Rejected Options

A series of options are currently awaiting a decision and others have been rejected. These are set out below:

Rejected Options	Reasons
Enhance cycle link between Pinchbeck Road and Enterprise Industrial Estate	Enterprise Industrial Estate is already linked to the Town Centre by a cycleway.
Provide Park & Ride facility for rail station on Park Road	Insufficient space to provide car park in this location.
Remove traffic signals at High Bridge Junction	Highly congested location including narrow bridge which could potentially present safety concerns if signals are removed.
Introduction of a strategy for deliveries in the retail core	Unlikely to bring sufficient benefits in line with the strategy objectives.
Review Community Transport Provision	This would need to be a countywide review.
Car Park Guidance System	Spalding is not large enough to require a system and as such this is not viewed to deliver value for money.
Smart parking charges	This would have little impact on supporting Transport Strategy objectives.
Home Deliveries	Not a scheme to be led by the County Council or District Council.
Employment Area Cycle Hub	The central employment area is difficult to define which means the hub may not cater for a large enough number of people to be viable or effective.
Review of Parking Standards	This would need to be done on a county-wide or district-wide basis.
Park & Cycle	There would not be sufficient demand to make this option feasible given the size of Spalding.
Temporary Park & Ride Facilities	Park & ride is not justified in a town of Spalding's size.
Implement a telephone-based car park payment system	This would have little impact on supporting Transport Strategy objectives.
Increase town centre parking	Various improvements aimed at cyclists have been made in Spalding in recent years including cycle stands within the town centre. There is little demand for further parking in the long-term.
Improve cycle links	The Environment Agency has expressed that anything other than repairs to the

Rejected Options	Reasons
between Cowbit and Spalding	pedestrian route on Barrier Bank would not be accepted, making any Spalding to Cowbit cycle route very difficult to deliver.
Provide vehicular bridge over railway line	Constructing a vehicular bridge over the railway line connecting the town centre with residential areas to the west of the railway e.g. connecting Park Road with Kings Road was investigated as a way of countering anticipated increased down time of level crossing for all road users. However this option is not being taken any further as there would be many issues with delivery including engineering, cost, the impact on the local highway network and the need for demolition with the impact this would have on local residents.

5 Next Steps

The next steps of this project will involve forming a draft transport strategy from the findings so far. The findings from the option sifting and shortlisting process undertaken in Working Paper 4 will be reviewed again to take into account the findings of this working paper and how these might change deliverability and risk. Any further measures which might be required to mitigate the remedial impacts of the increased growth assumptions contained in scenario 5b can also be discussed at this forum.

The next stage of the commission will be the development of the final draft Transport Strategy for Spalding.

Two documents will be produced as the final output:

- A short, outward-facing summary document presenting the main aspects of the new Spalding Transport Strategy
- A longer, technical document which will combine the main elements of the working papers produced over the course of the commission.

The short document will broadly follow the following structure:

- Introduction – including process and methodology
- Aim and Objectives
- Background – a summary of the evidence gathering and analysis stage
- Issues and Opportunities – a summary of the issues and opportunities identified
- Transport Strategy – a summary of the overall strategy including each individual transport improvement. Information on the agreed final packages will be included in this section.
- Delivery, Programme and Monitoring – the programme will identify each measure against short, medium and long term timescales up to 2031.

The longer, technical document, while combining the working papers from earlier stages of the commission will also include 'pathways to delivery' for each measure.

The final draft documents will include a section on monitoring the implementation and success of the strategy. To support monitoring, the outcomes identified previously will need to be measurable with a realistic and practicable approach to monitoring developed.

Drafts of the two final report / documents will be provided to the steering group for comment. Based on those comments we will produce appropriate material for a series of public consultation events to be held in the South Holland Centre between the 12th and 14th June.

Appendix A – Modelling methodology note

TECHNICAL NOTE

Project:	Spalding Transport Strategy	**Date:**	31/03/14
		TN Ref:	001
Subject:	Modelling Smarter Choices and Modal Shift		
Author:	Joe Charlesworth	**Project Ref:**	10583111
Reviewed:	Abdul Ali		

Overview

This note presents a summary of the proposed methodology for modelling Smarter Choices and other measures will impact modal shift in the Spalding SATURN model. Evidence and best practice was reviewed and a methodology was devised to modify SATURN matrices to reflect the predicted reduction in car usage.

Introduction

This note presents a summary of the proposed approach to modelling changes to highway demand based on the measures proposed in the Spalding Transport Strategy. These measures include highway changes coded directly into the SATURN model and Smarter Choices, as well as improvements to public transport modes which are not directly modelled in the SATURN model. In the previous EAST assessments networks and demand matrices were built for the AM and PM peak hours for the following scenarios:

- **Do Minimum (DM) scenario:** This scenario assesses the likely Do Minimum situation in the opening year (2018) and design year (2036); it includes:
    - Increased level crossing barrier downtimes based on 3 trains per direction per hour (15 minutes downtime per hour);
    - The Wygate Park/Hayfields housing development with 465 dwellings in 2018 and 808 dwellings in 2036; and
    - Phase 1 of the SWRR, which includes the bridge over the railway line and consists of a single carriageway with a design speed of 50mph;
    - A roundabout at the junction with Spalding Common and at the northern end of Phase 1;
    - The Holland Park housing development with 299 dwellings in 2018 and 2,250 dwellings in 2036

- **Do Something (DS1) scenario:** The DS1 scenario combines the DM scenario with the following:
    - ***Introduction of SCOOT to all traffic signals in town centre***
    - ***Package of smarter choices interventions.***
    - **Capacity improvements on the A16 (at its junction with the A151 and the B1180)**

- **Do Something (DS2) scenario:** The DS2 scenario combines the DM scenario with the following:
    - ***Closure of Swan Street to all vehicles except buses***
    - ***Package of smarter choices interventions***
    - **Capacity improvements on the A16 (at its junction with the A151 and the B1180)**

- **Do Something (DS3) scenario:** The DS3 scenario combines the DM scenario with the following:
    - ***Vehicular bridge over the rail line***
    - ***Package of smarter choices interventions***
    - **Capacity improvements on the A16 (at its junction with the A151 and the B1180)**

- **Do Something (DS4) scenario:** The DS4 scenario combines the DM scenario with the full SWRR scheme. It includes:
    - The full SWRR, with a bridge over Vernatt's Drain and the railway line, designed to the same standards as Phase 1;
    - Roundabouts at Bourne Road, Spalding Road and at two points along the link north of Vernatt's Drain to provide access to potential future housing development;
    - A left in/left out junction arrangement at Horseshoe Road;
    - No other developments; and
    - No other network changes.
    - ***Package of smarter choices interventions.***
    - ***Introduction of SCOOT to all traffic signals in town centre***
    - ***Closure of Swan Street to all vehicles except buses***
    - **Capacity improvements on the A16 (at its junction with the A151 and the B1180)**

- **Do Something (DS5a) scenario:** The DS5a scenario combines DS4 with the future housing growth identified within the SELLP, it includes:

    - The development of a new housing development north of Vernatt's Drain with no dwellings in 2018 and 3,750 dwellings in 2036. Accessed from the roundabouts provided along the link north of Vernatt's Drain; and
    - No other network changes.
    - ***Package of smarter choices interventions.***
    - ***Introduction of SCOOT to all traffic signals in town centre***
    - ***Closure of Swan Street to all vehicles except buses***
    - **Capacity improvements on the A16 (at its junction with the A151 and the B1180)**

- **Do Something (DS5b) scenario:** The DS5b scenario combines DS5a with the additional housing growth identified within the SELLP, it includes:

    - The development of a new housing development north of Vernatt's Drain with no dwellings in 2018 and 3,750 dwellings in 2036. Accessed from the roundabouts provided along the link north of Vernatt's Drain; and
    - No other network changes.
    - **Development of 3,750 dwellings in 2036 at site between Vernatt's Drain and Holland Park.**
    - ***Package of smarter choices interventions.***
    - ***Introduction of SCOOT to all traffic signals in town centre***
    - ***Closure of Swan Street to all vehicles except buses***
    - **Capacity improvements on the A16 (at its junction with the A151 and the B1180)**

More than 60 measures are identified in the transport proposals, some of which are designed to reduce delay and congestion in Spalding for car users and others which aim to make alternative modes more attractive encouraging a mode shift to more sustainable modes. To make the modelling more manageable the measures were first divided into those which could be modelled directly in the highway model, - specifically those measures which involved changes to the road network - and measures which are aimed at reducing demand for car trips such as Smarter Choices and improvements to public transport. These measures will be modelled by manipulating the SATURN matrices and are summarised in this note. **8 new matrices** will be created as a result of these changes:

- DS1 2018 AM and PM – used in DS1, DS2, DS3 and DS4 2018
- DS1 2036 AM and PM – used in DS1, DS2, DS3 and DS4 2036.
- DS5a 2036 AM and PM – used in DS5a 2036
- DS5b 2036 AM and PM – used in DS5b 2036

Rather than try to attribute a defined decrease in car use to every measure, we propose to package similar measures which when combined could realistically affect modal shift. Using this approach, 6 packages targeting specific land use types, areas of Spalding or modes were identified and case studies were gathered to provide an evidence base for the reductions applied. The packages are as follows:

- School;
- Town Centre cycle and pedestrian improvements;
- New development sites;
- Major employment sites;
- Into Town bus service improvements; and
- Rail and inter-urban bus service improvements.

Changes to the highway network (new bridge across the railway and A16 roundabout capacity changes) are not covered in this note, instead they will be modelled by making changes to the SATURN network.

Best Practice

There are no public transport matrices or demand model available for the Spalding model, active mode and public transport measures will therefore only be reflected in the modelling by their impact on car demand. A comparative study approach will be adopted which uses evidence from case studies and benchmarking to derive forecasts for modal shift from car.

TAG Unit A5.1: Active Mode Appraisal – DfT 2014 contains guidance on using the comparative method for forecasting, it advises

"The least complex and costly approach to estimating future levels of cycling and walking is through comparisons with similar schemes. Larger proposals are likely to have greater demand changes and afford better potential for comparison with existing schemes. Examples could include river crossings or the creation of other significant links in a network that reduce time and distance, or comprehensive urban centre networks that significantly change the balance between motor traffic and walking and cycling generalised costs."

Information from case studies and monitoring programmes have been collated and are summarised under each of the packages

Methodology by package

The following section presents the measures which are included in each package, a brief summary of evidence from case studies to support the proposed methodology, a list of assumptions and how these will be applied in modelling.

Schools

<u>Proposed measures:</u>

- Development of School Transport Strategy including School Travel Plans.
- Continued roll-out of Bikeability to Schools.

<u>Evidence of modal shift:</u>

- Research from Sustainable Travel Towns.
- Guidance published in TAG Unit M5.2: Modelling Smarter Choices summarises

"For school travel plans, the sample reviewed by Möser and Bamberg could be divided into a small group of six best-practice schools where a lot had been achieved, and the rest, where the impacts were marginal, perhaps due to the lack of intensity of application or coordination with the 'hard' measures involved (in those cases the 'hard' measures were 'Yellow' buses). This means that the average increase in the number of non-car trips of 7%, or the implied reduction in the number of car trips of 10%, would have under-estimated the best-practice examples, but over-estimated the others in the school travel sample."

Key assumptions:

- The implementation of the above measures will lead to a 10% reduction in the number of car trips to schools.
- This reduction will only be applied to trips of less than 3km as it is unrealistic to expect large numbers of trips greater than this distance to transfer to active modes.
- This reduction will only be applied in the AM peak model, which coincides with the beginning of the normal school day. The PM peak (1700-1800) is unlikely to be affected by these measures as the normal school day typically finishes before this period.
- There are no model zones with more than 1 school.
- Secondary schools have dedicated zones. Primary schools fall within zones that also contain other land uses, it is assumed 50% of trips to and from these zones are associated with the primary school and therefore the reduction in the these zones will be 5% (50% of 10%).
- Where trips occur between a zone with a primary school and a secondary school a reduction of 5% will be applied at the primary school end of the trip. This represents the residents of the zone travelling to the secondary school. 5% and not 10% is used because it is assumed only half of trips associated with primary school zones are for purposes other than trips to the primary school itself. As it is assumed there are no residents in secondary school zones there are no car trips removed to represent commute and educational trips beginning in the secondary school zones. The reductions applied to school zones are summarised in the table below:

Table 0-1 School travel planning matrix reductions

	Non-school zone	Primary school zone	Secondary school zone
Non-school zone	0%	5%	10%
Primary school zone	5%	0	5%
Secondary school	10%	5%	0%

zone			

This package is specifically targeted at schools. For modelling purposes it is necessary to ensure that only school trips are reduced. The first stage in modelling therefore involves identifying model zones in which schools are situated using GIS plots of schools and the zone plan. This process shows the 3 secondary schools in Spalding each have their own model zone so the 10% reduction in destination trips can be applied straight to these zones. Primary schools do not have their dedicated zones and instead share with other land use types, typically housing. If the 10% reduction is applied to primary school zones it will overestimate the impact of this package as the reductions will also be applied to trips to other land use types. For primary school zones we have assumed half of all trips to and from these zones are associated with the school and applied a 5% reduction to total trips to and from these zones.

Town centre cycle and pedestrian improvements

Proposed measures:

- Enhance railway crossing provision for cyclists & pedestrians
- DDA Audit
- Provide pedestrian / cyclist crossing facilities at key junctions
- Provide footbridge over rail line at Winsover Road
- Increase town centre cycle parking
- Improve pedestrian and cycle links across the town centre
- Provide new cycle links to key destinations within Spalding
- Town centre cycle hub
- Winsover Road/ St Thomas' Road Junction review
- Downgrade some streets in the town centre to improve quality of space for pedestrians and cyclists

Evidence of modal shift:

Darlington Sustainable Travel Town - Monitoring from automatic traffic counter data suggests that traffic across the whole of Darlington (including traffic in peripheral locations) was 2.4-3.2% lower at the end than at the beginning of the Sustainable Travel Town period, with the lower figure pre-dating the economic downturn. The automatic traffic counter data also suggest that there were larger reductions in the more central part of the town, perhaps in the order of 6%.

Willow Bridge, St Neots

- 73% of people using the route said it had increased their level of daily activity.
- The scheme makes the journey to schools in the area a lot safer for pupils and has provided easier access to the industrial areas on both sides of the river. As a result the number of people walking and cycling to get to school and work is now much higher.
- 232,000 trips made on the route in 2012.

- 33% of trips could have been made by car.
- 66% increase in cycle trips recorded in the peak commuting periods.

Key assumptions:

- Increased accessibility, improved safety, security and environment will make walking and cycling a more attractive option for trips in and around the town centre and result in a modal shift away from short car trips.
- This will lead to a 10% drop in the number of car trips which both originate and terminate within a 1 kilometre radius of the town centre.

Modelling methodology

Zones which fall within a 1km buffer of the town centre were identified and SATURN matrices were manipulated. A reduction of 10% was applied to vehicle trip demand between these zones in both the AM and PM peak periods.

New development

Proposed measures:

- Encourage Sustainable travel in new developments including personalised travel planning.
- Pedestrian/cycle links incorporated into design of new developments and design best practice followed.

Evidence of modal shift:

Travel Smart – Bristol

There were high levels of community participation. 91% of households responded to the initial contact and 69% of these actually took part. Interim results demonstrate:

- 6% increase in walking trips (per person per year)
- 51% increase in cycling trips and 18% increase in usage of public transport
- 10% reduction in car-driver journeys.

Travel Smart – Gloucester

There were high levels of community participation. 93% of households responded to the initial contact and 62% of these actually took part. Interim results demonstrate:

- a 12% increase in walking trips (per person per year)
- 35% increase in cycling trips and 18% increase in usage of public transport
- 9% reduction in car-driver journeys across Quedgeley.

Key assumptions:

- The original trip rates used in EAST assessment modelling for developments were calculated based on average sites without any particular emphasis on sustainable modes or encouraging residents to use their cars less.
- By encouraging sustainable travel the trip rate used to calculate external car trips can be reduced by 10%.
- By providing community facilities as part of the development (schools, surgeries, local shops etc.) there will be less need for residents to travel outside the development for these services, the number of external trips will therefore be lower.
- Mode shift away from car will only occur on trips of less than 3km.

Modelling methodology

A reduction of 10% was applied to the demand matrices for all trips to and from new development zones which were less than 3km based on distance skims from the SATURN Do Minimum scenario.

Major employment sites

Proposed measures:

- Employment area cycle hub
- Develop a Business Travel Zone for Spalding

Evidence of modal shift:

Smarter Choices: Changing the way we travel – Cairns, Sloman, Newson, Anable, Kirkbride and Goodwin (2004)

In their research Cairns et al (2004) found that of the 20 workplace Travel Plans they looked at the average reduction in commuting by car was 18%, with plans that included parking management averaging a 24% reduction. Where there was no car parking management element the average reduction in car commuters achieved was 10%.

They also found that Travel Planning efforts co-ordinated by Local Authorities tended to be focused on the largest employers in the area which is seen to give the best return with finite resources. Typically only between 30 and 100 organisations had been targeted although these could although typically this covered between 10 and 30 percent of those employed within the district.

TAG Unit M5.2: Modelling Smarter Choices states “for workplace travel plans, the effects are the combined effects of both ‘soft’ and associated ‘hard’ measures (e.g.

public transport improvements and parking measures). The analysis suggests that workplace travel plans would increase the overall non-car mode share by 12 percentage points. Given the base mode share, this implies an increase in the number of non-car trips by 34%, or a reduction in the number of car trips by 18% on the assumption that the total number of trips stays unchanged."

Key assumptions:

- Smarter Choices measures will be targeted at large employers / major employment sites that are likely to have large numbers of movements during the AM and PM peak hours.
- For the purposes of modelling, the zones containing Johnson Hospital, South Holland Council Offices and Springfield Outlet Shopping will be targeted for these measures. Industrial sites were not included in the modelling as these are more likely to have employees working shift patterns and therefore more likely to be making their journeys to work in an off peak period which is not covered by the modelling.
- Car trips to and from these sites can be reduced by 10%.

Modelling methodology

A 10% reduction is applied to all trips to and from zones of less than 3km in which the aforementioned employers are located.

Into Town bus service improvements

Proposed measures:

- Increase peak period frequency of Into Town bus services
- Increase frequency of Into Town bus services throughout the operating day
- Increase coverage of Into Town Bus Service
- Increased Publicity Campaigns for Use of Public Transport

Evidence of modal shift:

Devon Culm Valley Connect (Devon County Council, 2006)

Monitoring of the introduction of a doubling of frequency on existing elements and extensions into new areas showed that 36% of passengers had previously used a car or motorcycle to make the journey.

The Demand for Public Transport: A practical Guide – 2004

When service levels change they influence the level of demand for public transport. In general, all other things being equal, an increase in service levels will increase patronage, whilst a decrease in service levels will reduce patronage. The size and

direction of the change in demand following a change in service levels can be expressed in terms of service elasticity.

For example, if the service elasticity of bus demand with respect to service frequency is 0.4, and all service frequencies were to increase by 10% we would expect patronage to increase by 4%. The service elasticity is therefore a measure of the sensitivity of bus passengers to service levels.

In general terms TRL (2004) reports a short run (1-2 years) service frequency elasticity with respect to bus of around 0.4 and a long run (12-15 years) elasticity of 0.7.

Key assumptions:

- IntoTown services will double from half-hourly to every 15 minutes in the peak periods.
- By doubling the frequency of IntoTown services patronage will increase by 40%. This assumes a service interval elasticity of 0.4 (TRL, 2004)
- The existing mode share of bus in Spalding relative to car is 2% based on 2011 Census data. This will be used to factor from car trips to bus.
- One-third of new trips by bus will switch from car (Currie and Willis - Effective ways to grow urban bus markets – a synthesis of evidence, 2008).

Modelling methodology

The first stage involves defining a catchment area of zones which can be reasonably served by the IntoTown service. In order to do this a buffer of 400 metres was created around the existing route with any model zone centroid falling within this buffer being included in the catchment area.

Existing Into Town bus usage was then estimated from the car matrices by calculating the number of trips between zones in the catchment area and applying a factor based on the mode share data from the 2011 Census.

Estimated new bus demand was calculated by multiplying the service interval elasticity (0.4) and the shift from car to bus factor (0.33). These bus trips were subtracted from the car matrices.

Rail and inter-urban bus service improvements

Proposed measures:

- Provide park and ride facility for rail station on Park Road
- Increased Publicity Campaigns for Use of Public Transport
- Lobby for improved rail services to Peterborough and Lincoln
- Lobby for rail services for Spalding to be provided on Sundays

- Enhance Spalding rail station and environment around to county standard

Evidence of modal shift:

Paulley et al. – The demand for public transport: The effects of fares, quality of service, income and car ownership, 2006

"A number of studies have estimated the elasticity of bus demand with respect to vehicle kilometres…this is approximately 0.4 in the short run and 0.7 in the long run. For rail services the short run elasticity is somewhat greater (about 0.75), but this is based on only three measurements and no long run elasticity appears to have been estimated."

Key assumptions:

- An additional service to/from Peterborough is provided in the peak hour periods.
- A new service to/from Sleaford and Lincoln is provided in the AM and PM peaks. Presently this service only operates in the inter-peak period between 0900 and 1700.
- Inter-urban bus services to Kings Lynn and Boston will be doubled in frequency.
- In corridors served by rail, public transport holds a modal share of 32% in the Redwing line corridor – 24% rail and 8% bus (Lincolnshire Rail Strategy page 12).
- Car occupancy on these corridors is 1.2 persons and therefore each public transport trip is equivalent to 0.833 car trips.
- Service interval elasticities are 0.4 for inter-urban bus services and 0.75 for rail services (Paulley et al. – The demand for public transport: The effects of fares, quality of service, income and car ownership, 2006)
- One-third of the switch to inter-urban bus services will be from car, 90% of new rail journeys will previously have been car trips.

Modelling methodology

A catchment area of zones served by rail or inter-urban bus was defined. This includes Spalding, Peterborough (rail), Sleaford (rail), Boston (bus), Kings Lynn (bus) and Lincoln (rail).

Existing rail / inter-urban bus usage was then estimated from the car matrices by calculating the number of trips between zones in the catchment area and applying a factor based on the mode share data from the Lincolnshire Rail Strategy. The ratio of PT to car trips is converted to equivalent car units by car occupancy (1.2).

Estimated bus demand was then calculated by multiplying the service interval elasticity and the shift from car to PT factors. These PT trips were subtracted from the car matrices.

Impacts on Demand

This section of the note summarises the changes to matrix totals when the above methodology is applied to the SATURN highway matrices used in previous

modelling. The difference is presented as both an absolute figure and a percentage difference.

The table below presents the cumulative impact on the matrices when all demand management packages are applied.

Table 0-2 Comparison of highway matrix totals - before and after demand packages

	2018 DS1		2036 DS1		2036 DS5a		2036 DS5b	
	AM	PM	AM	PM	AM	PM	AM	PM
Before	12683	12858	14766	15107	16821	17421	18876	19734
After	12182	12385	14177	14550	16110	16743	18036	18770
Difference	-501	-473	-589	-557	-711	-677	-840	-965
% Change	-4.0%	-3.7%	-4.0%	-3.7%	-4.2%	-3.9%	-4.5%	-4.9%

Table 2 shows a reduction of around 4% in all scenarios when all packages are applied. The targeted nature of measures means that certain zones within the model will experience far greater reductions in car trips than zones with no targeted measures.

The table below presents the percentage change in car demand for each package and scenario.

Table 0-3 Percentage change in car demand by package and scenario

	School	Town Centre	New development	Employment	IntoTown bus	Inter-urban PT
2018 DS1 AM	-0.5%	-0.7%	-0.1%	-0.1%	-0.1%	-2.5%
2018 DS1 PM	n/a	-0.8%	-0.1%	-0.1%	-0.1%	-2.6%
2036 DS1 AM	-0.4%	-0.7%	-0.2%	-0.1%	-0.1%	-2.6%
2036 DS1 PM	n/a	-0.8%	-0.1%	-0.1%	-0.1%	-2.7%
2036 DS5a AM	-0.4%	-0.6%	-0.5%	-0.1%	0.0%	-2.7%
2036 DS5a PM	n/a	-0.7%	-0.5%	-0.1%	-0.1%	-2.6%

2036 DS5b AM	-0.3%	-0.5%	-0.8%	-0.1%	0.0%	-2.7%
2036 DS5b PM	n/a	-1.4%	-0.8%	-0.1%	0.0%	-2.7%

Appendix B – Measure Cards

Spalding Transport Strategy

Menu of Measures – Cycling and Walking

March 2014

Prepared by:

Mouchel

Contents

Enhance Existing Cycle Network

CW1

Description of Measure: Provide a more comprehensive cycle network in Spalding by connecting existing cycle routes where feasible e.g. linking residential areas in the north west of Spalding to town centre and existing cycle routes in the east

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice / effectiveness of the measure on mode shift:

Empirical evidence: The National Cycle Network (NCN) 2008 Monitoring Report is able to demonstrate that the benefit to cost ratio for this sustainable transport network is almost 40:1 based on the DfT's guidance on evaluating transport. The Report adds that the Network is encouraging people to take up or start cycling again; 6% of cyclists nationally said they are new to or returning to cycling, at the survey point in Greenwich this was recorded to be as high as 22% with 62% saying that they intended to cycle more often in the future. On the network as a whole, 9% of walking and cycling trips were as part of a longer journey combining bus and rail services.
DfT Local Transport Note 2/08 'Cycle Infrastructure Design' October 2008. This design guide brings together and updates guidance previously available in different Local transport notes and other guidance and thereby making it easier for LA's to decide on what provisions are required to encourage more people to cycle.

Sustrans Connect2, a £50m Big Lottery grant awarded after winning a public vote demonstrates that people want more sustainable travel choices. The 79 individual project's aim is to connect communities by creating spaces for people to enjoy, routes that people choose to walk and cycle to school, work, the shops and for pleasure. A new Greenway Design Guide has been published by Sustrans which highlights best practice and the design details needed to create the best walking and cycling environment.

Results from the first three years (2005 – 2008) of the DfT's Cycling Towns Demonstration Programme showed:

- An average increase in cycling across all six towns of 27%
- The increase is the result of more people starting to cycle, or returning to cycling again, not just the result of cyclists using their bikes for more trips
- Cycling to school has more than doubled where towns invested most in children
- Cycling investment generates town-wide increases in physical activity
- These results were not found in comparable towns
- This growth matches the cycling growth rates in London
- Investment in cycling pays back at least 3:1

Cycling England was closed down as a public body in 2011 and further monitoring data on these studies is not currently available.

"An evidence review for Bristol City Council concluded that small scale and targeted interventions can deliver even higher BCRs, averaging 19:1 for walking and cycling interventions…Small scale and targeted investment, focused where there is the greatest potential for change (e.g. key routes and access to schools) represents very high value for money, although it may only deliver relatively modest improvements in overall absolute cycling levels." *PTEG / Sustrans: Cycling in the City Regions – April 2011*

Implementation in modelling:

A modelling exercise undertaken by the PTEG (Passenger Transport Executive Group) and Sustrans into the potential impact of step changes in the delivery of interventions to support and promote cycling in the PTE areas suggested that:
"Improvements to cycle routes, provision of cycling facilities in workplaces and financial incentives to cycle to work can all substantially increase cycling's mode share. Across the six PTE areas, route improvements could increase cycling's mode share for work trips up to around 3.4% from its 2% average level, with annual benefits valued at up to £2.6 million. That represents almost a doubling of cycling trips. The provision of indoor parking and showers alone could increase the percentage cycling to work to 2.7%, and a £1 per day incentive to cycle to work could result in 2.9% cycling mode share, with annual benefits valued at around £1 million and £1.6 million, respectively."

Reduction applied to car demand to reflect modal shift away from car. Any reduction should be reflective of empirical evidence collected as part of post-implementation monitoring as summarised as above. The reduction could vary depending on trip length and/or origin / destination (to reflect targeting of measures to certain residential and employment sites). This modelling approach is explained further in the *DfT's TAG Unit A5.1 Active Mode Appraisal*, specifically *section 2.2 Approach 1: Comparative Study.*

Improve Pedestrian and Cycle Links Across the Town Centre

CW2

Description of Measure: Particular attention to be given to cycle & pedestrian links between rail & bus station and town centre core in order to encourage more trips into town by alternatives to the car. Also improvements to infrastructure e.g. advanced stop lines etc.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice / effectiveness of the measure on mode shift:

Sustrans Connect2, a £50m Big Lottery grant awarded after winning a public vote demonstrates that people want more sustainable travel choices. The 79 individual project's aim to connect communities by creating spaces for people to enjoy, routes that people choose to walk and cycle to school, work, the shops and for pleasure. A new Greenway Design Guide has been published by Sustrans which highlights best practice and the design details needed to create the best walking and cycling environment.

Darlington Sustainable Travel Town

As part of the Sustainable Travel Town Initiative Darlington (population: 99,000) adopted a programme of town centre improvements for pedestrians and cyclists known as the 'Pedestrian Heart'. Measures included:

- 100 extra cycle parking spaces;
- 11 Toucan crossings to improve access to the town centre crossing the inner ring road;
- An audit of routes into the town centre which led to minor improvements to infrastructure.
- The development of 7 radial routes into the town centre.

Monitoring from automatic traffic counter data suggests that traffic across the whole of Darlington (including traffic in peripheral locations) was 2.4-3.2% lower at the end than at the beginning of the Sustainable Travel Town period, with the lower figure pre-dating the economic downturn. The automatic traffic counter data also suggest that there were larger reductions in the more central part of the town, perhaps in the order of 6%. Traffic approaching the perimeter was roughly stable, though this followed a period of growth.

In addition to these pedestrian improvements Darlington was also designated a Cycling Demonstration Town. In the monitoring period between 2005 and 2008, cycle usage increased by 57% according to automatic counters. The baseline modal split for cycling was 1%.

Results from the first three years (2005 – 2008) of the DfT's Cycling Towns Demonstration Programme showed:

- An average increase in cycling across all six towns of 27%
- The increase is the result of more people starting to cycle, or returning to cycling again, not just the result of cyclists using their bikes for more trips
- Cycling to school has more than doubled where towns invested most in children
- Cycling investment generates town-wide increases in physical activity
- These results were not found in comparable towns
- This growth matches the cycling growth rates in London
- Investment in cycling pays back at least 3:1

Cycling England was closed down as a public body in 2011 and further monitoring data on these studies is not currently available.

Bristol
"An evidence review for Bristol City Council concluded that small scale and targeted interventions can deliver even higher BCRs, averaging 19:1 for walking and cycling interventions…Small scale and targeted investment, focused where there is the greatest potential for change (e.g. key routes and access to schools) represents very high value for money, although it may only deliver relatively modest improvements in overall absolute cycling levels." *PTEG / Sustrans: Cycling in the City Regions – April 2011*

Halifax Historic Centre Project
TRO used to designate the historic town centre as a restricted area. High quality paving materials were used, a 20mph speed limit introduced and signage limited.

- Traffic speeds fell; 85th percentile speeds in Market Street from 17mph to 15mph and in Commercial Street from 22mph to 18mph.
- Pedestrian activity rose 17% on Market Street and 59% on Commercial Street between 1998 and 2002.
- Traffic flows fell by 28%, although there is still some abuse by unauthorised vehicles in Market Street.

Den Bosch, Netherlands – Campaign for Better Transport
Den Bosch is a town of 150,000 inhabitants divided by a railway line. Bridges and other crossing facilities to connect the two sides of the city are limited. The line had created a dichotomy, with half of the city growing prosperous while the other half fell into a decline. In other words, there really was a 'wrong side of the tracks' for people living in Den Bosch.

Providing integrated bus, taxi and parking facilities was an important part of the partnership development approach at Den Bosch, as was the enhancement of cycle storage services. Other important elements to help passengers on the move were real-time information systems, ticket vending machines and commercial retail facilities on platforms. Den Bosch station had the potential to boost local prosperity, so an early decision was taken to broaden the existing walkway over the railway line to twice the required width to create a clear pedestrian 'connection' between the two sides of the city. This encouraged people to use the station as a crossing point, which made the area more attractive for real estate development.

This structured approach at Den Bosch has revitalised the station and the surrounding region; as a direct result of the new station facilities, passenger numbers increased by 35%. Passengers are enjoying improved accessibility and transfer facilities, and satisfaction has increased.

Implementation in modelling:

Reduction applied to car demand to reflect modal shift away from car. Any reduction should be reflective of empirical evidence collected as part of post-implementation monitoring as summarised as above. The reduction could vary depending on trip length and/or origin / destination (to reflect targeting of measures to certain residential and employment sites). This modelling approach is explained further in the *DfT's TAG Unit A5.1 Active Mode Appraisal*, specifically *section 2.2 Approach 1: Comparative Study.*

Provide new cycle links to key destinations in Spalding

CW3

Description of Measure: Provide cycling facilities on routes to key destinations (e.g. cycle lanes, signalised crossings) within the town such and between the town centre and secondary schools (to the south east of town).

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice / effectiveness of the measure on mode shift:

Similar measures were introduced as part of the Cycling Town Programme:

The first three years of the Cycling Town programme in Brighton and Hove focused on four main priorities: a Cycle Freeway Network, a large-scale Personalised Travel Planning programme, Bikeability training for school pupils and a range of infrastructure improvements, including the radical redesign of some streets.
The programme is building further on these four priorities during 2008-11. Brighton and Hove City Council declared 2009 to be the Year of Walking and Cycling, with £3.5 million committed for active travel measures through the Local Transport Plan. This will assist in the creation of a coordinated network of Cycle Freeways, as well as training and promotional campaigns. Amongst Brighton and Hove's targets for its Cycling Town are to deliver a 5% year-on-year growth in cycle usage on existing sections of the network against a 2003 baseline.

In Darlington 1,200 spaces for bicycles were installed at schools, cycle training and promotion was also used in schools which saw an increase of 12% across all schools in the number of pupils cycling (mode share: 2.6% to 2.9%).

Derby focused on the education of school children but also invested in several site specific schemes. Cyclists to schools and workplaces also benefited from the development of a 25 mile orbital route. Although this was primarily aimed at leisure cyclists, it provided useful linkages for commuters and school pupils. The combined measures saw an increase of 50% across all schools in the number of pupils cycling (mode share: 1.6% to 2.4%).

Pedestrian and Cycle Signage Review

CW4

Description of Measure: Undertake a review of all way-finding signage within the study area as a whole to enhance the visibility of and use of cycle/pedestrian routes in Spalding.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice: Exeter Cycling Guide and Map (Cycle Demonstration Town) and Bristol Cycling City.

Evidence of best practice / effectiveness of the measure on mode shift:
Exeter already had a network of around 50km of cycle routes when it was given Cycling Demonstration Town status in 2005, but Devon CC created a further 16km in its first 18 months as a Cycling Town. Exeter exceeded its target of a 19% increase in average daily cycle trips, reaching 25% in 2007. 9% of employees cycled to work in the City during 2008 with no increase in the rate of cycling casualties.

Infrastructure priorities for 2008-11 include extending the cycle routes of the city, creating secure parking facilities at schools, surgeries and health centres, information and facilities at the University and Colleges plus the train stations.

Improve cycle links between Cowbit and Spalding

CW5

Description of Measure: Provide safe cycling facilities on the link between Cowbit and Spalding with particular focus on Barrier Bank/ Cowbit Road corridor.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice

Bristol and Bath Railway Path
The Bristol and Bath Railway Path is built on disused railway land and links the centres of the two cities. It was originally built over the period 1978-84, partly by volunteers, 2.5m wide and surfaced with limestone dust.

Reallocation of Road Space for Cyclists, Hull
The project involved the reallocation of road space from motor vehicles to cyclists, by introducing on-road cycle lanes on a large number of roads in Hull. The total length of new cycle lanes covered initially was 24km, over seven separate routes.

Effectiveness of the measure on mode shift:

Bristol and Bath Railway Path
Almost 20 years after its completion, usage of the path continues to grow:

- The cycle counter at Railway Passage, Bristol, showed cyclist usage rose from 1,022 / day in 2002 to 1,107 in 2003; this is in addition to walking journeys
- At Devon Rd, Bristol, cycle trips rose from 290,000 per annum to 380,000 and pedestrians from 80,000 to 120,000.
- However, there are over 75 access points to the route along its length, and many journeys are relatively short. The total usage of this route is estimated to approach two million journeys per annum.

Reallocation of Road Space for Cyclists, Hull

- Increased cycle flows. Of the six sites monitored, one increased cycling by 138%, three by between 20% and 30%, and two were unchanged.
- 45% reduction in cycle casualties.
- 11% reduction in pedestrian casualties.

Implementation in modelling
Reduction applied to car demand between Spalding and Cowbit to reflect modal shift away from car. Any reduction should be reflective of empirical evidence collected as part of post-implementation monitoring as summarised as above. This modelling approach is explained further in the *DfT's TAG Unit A5.1 Active Mode Appraisal*, specifically *section 2.2 Approach 1: Comparative Study.*

Pedestrian / cycle links incorporated into design of new development — CW6

Description of Measure: Ensure safe and secure pedestrian/cycle links are designed into new residential developments in Spalding; connecting to routes into town centre.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice:

National Planning Framework

Effectiveness of the measure on mode shift:

National Planning Policy Framework

"Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people. Therefore, developments should be located and designed where practical to:

- accommodate the efficient delivery of goods and supplies;
- give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;
- create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians, avoiding street clutter and where appropriate establishing home zones;
- incorporate facilities for charging plug-in and other ultra-low emission vehicles; and
- consider the needs of people with disabilities by all modes of transport."

Enhance cycle link between Pinchbeck Road and Enterprise Industrial Estate

CW7

Description of Measure:
Enhance this off road cycle route e.g. widening useable width, improved surfacing, provide lighting in order to create a more attractive route for cyclists and pedestrians to use all year round.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

Bristol and Bath Railway Path
The Bristol and Bath Railway Path is built on disused railway land and links the centres of the two cities. It was originally built over the period 1978-84, partly by volunteers, 2.5m wide and surfaced with limestone dust.

Effectiveness of the measure on mode shift:

Bristol and Bath Railway Path
Almost 20 years after its completion, usage of the path continues to grow:

- The cycle counter at Railway Passage, Bristol, showed cyclist usage rose from 1,022 / day in 2002 to 1,107 in 2003; this is in addition to walking journeys
- At Devon Rd, Bristol, cycle trips rose from 290,000 per annum to 380,000 and pedestrians from 80,000 to 120,000.
- However, there are over 75 access points to the route along its length, and many journeys are relatively short. The total usage of this route is estimated to approach two million journeys per annum.

Implementation in modelling
Reduction applied to car demand to between Spalding and Cowbit to reflect modal shift away from car. Any reduction should be reflective of empirical evidence collected as part of post-implementation monitoring as summarised as above. This modelling approach is explained further in the *DfT's TAG Unit A5.1 Active Mode Appraisal*, specifically *section 2.2 Approach 1: Comparative Study.*

Enhance railway crossing provision for cyclists & pedestrians

CW8

Description of Measure:
Re-designate, re-design, re-open or build new bridges across railway line for use by cyclists & pedestrians, e.g. bridge at Winsover Road level crossing and other options to be explored.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice:

Glasgow – 'The bridge to everywhere' – Sustrans case study
The key features of the scheme are:

- Completion of a 1960's designed bridge to link the route into the city centre with 1.8m high railings
- 2km of segregated 2-way cycleway
- Installation of a traffic control system to accommodate pedestrians, cyclists and vehicles – each with their own phase
- Installation of a variety of crossing types – toucan, sensor activated single user crossings, uncontrolled crossings with set back give way markings
- Provision of a route that closes a gap in the cycling and walking network from the Forth and Clyde Canal in the north of the city with the River Clyde which runs through the centre of Glasgow.

The route services three schools, a local station and numerous businesses, and provides a safe direct route which can be linked into by surrounding quiet, residential streets.

Diglis Bridge, Worcester – Sustrans case study
The River Severn splits Worcester into two. Before this project there were only two places for pedestrians and cyclists to cross the river, one of which is shared with all of the traffic converging on the city's only road bridge.
Worcester City Council had a desire to improve the riverside within the city centre, whilst Worcestershire County Council had a desire to create a new network of routes that would allow people to get around town on bikes or on foot on a daily basis.
This bridge provides improved 'permeability' for active travellers who now have three opportunities to cross the river (motorists have just the one!), but crucially, by being located towards the south of the city centre, and connecting with new or improved paths alongside the river, a greenway loop has been created, right at the heart of the city.

Willow Bridge, St Neots
St. Neots, Eaton Socon and Eynesbury were separated by the River Great Ouse and its flood plain. The journey to school for students at Ernulf Academy was difficult and indirect. There is also a large supermarket in Eynesbury used by many people from Eaton Socon – the difficulty of crossing the river for school and for shopping made many people choose to drive for their daily journeys, creating congestion and road danger.

The new walking and cycling routes have connected the two communities across the River Great Ouse. Willow Bridge is a new bridge spanning 385 metres across the floodplain, far enough for it to remain open in case of serious flooding. Its approaches have gentle gradients to allow easy access for people with disabilities, and are lit for 24-hour use. New paths link the bridge to nearby residential areas, giving local people improved access across the entire area.

Effectiveness of the measure on mode shift:

Diglis Bridge, Worcester – Sustrans case study
Before it was built, surveys showed we could expect approximately 31,000 trips annually to pass the site for the bridge, repeat surveys after the bridge was built show this figure has leapt to 465,000.

Willow Bridge, St Neots

- 73% of people using the route said it had increased their level of daily activity.
- The scheme makes the journey to schools in the area a lot safer for pupils and has provided easier access to the industrial areas on both sides of the river. As a result the number of people walking and cycling to get to school and work is now much higher.
- 232,000 trips made on the route in 2012.
- 33% of trips could have been made by car.
- 66% increase in cycle trips recorded in the peak commuting periods.

Implementation in modelling

It can be included as part of a package of car demand management proposals which will see a reduction in car demand for affected zones.

DDA Review

CW9

Description of Measure:
Conduct a review of the town centre in terms of improving accessibility for all in Spalding.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

Darlington Sustainable Travel Towns
An audit of walking routes into the town centre was conducted by the environmental group Living Streets. This lead to improvements, as did an assessment of dropped-kerb routes, made in partnership with Darlington Association on Disability. From summer 2005 to summer 2007, construction was underway for the Pedestrian Heart public realm project, which introduced new public spaces and public art initiatives spread over 1.7ha in the centre of the town.

City of York Road User Hierachy
A hierarchy of road users was developed with pedestrians and people with disabilities appearing at the top of the list. This hierarchy was used to guide the implementation of local transport policy and the underlying basis for encouraging sustainable modes through the Local Plan. Specific initiatives within York which illustrate application of the road hierarchy include the Footstreet Scheme in the city centre, Park and Ride, city cycle network, and area-wide traffic calming schemes, including 20mph zones.

Effectiveness of the measure on mode shift:
As a targeted measure the DDA review is aimed at making access easier for disabled people. It could be effective in bringing mode shift across all users as part of a package of measures aimed at improving access for sustainable modes in the town centre

Implementation in modelling
Could be included as part of a package of measures which make the town centre more attractive to all pedestrians and cyclists. This will be in the form of a reduction to car demand within the town centre.

Provide pedestrian/cyclist crossing facilities at key junctions

CW10

Description of Measure:
Introduce toucan crossings and other facilities at known junctions with accident clusters to improve safety for vulnerable road users e.g. Wardentree Lane/Market Way corridor, Swan Street/Westlode Street corridor, Sheep Market, Stonegate.

Timescale for Implementation: 4-10 years

Cost and possible funding sources: £500k-£1m

Effectiveness of the measure on mode shift:
No evidence available

Implementation in modelling
Pedestrian crossings / junction improvements could be included in the SATURN highway network if it is believed they will impact capacity for road vehicles or journey times.

Provide footbridge over railway at Winsover Road

CW11

Description of Measure:
Provide footbridge over rail line to counter anticipated increased down time of level crossing for pedestrians and cyclists.

Timescale for Implementation: 4-10 years

Cost and possible funding sources: £500k-£1m

Evidence of best practice:

Glasgow – 'The bridge to everywhere' – Sustrans case study
The key features of the scheme are:

- Completion of a 1960's designed bridge to link the route into the city centre with 1.8m high railings
- 2km of segregated 2-way cycleway
- Installation of a traffic control system to accommodate pedestrians, cyclists and vehicles – each with their own phase
- Installation of a variety of crossing types – toucan, sensor activated single user crossings, uncontrolled crossings with set back give way markings
- Provision of a route that closes a gap in the cycling and walking network from the Forth and Clyde Canal in the north of the city with the River Clyde which runs through the centre of Glasgow.

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Diglis Bridge, Worcester – Sustrans case study
The River Severn splits Worcester into two. Before this project there were only two places for pedestrians and cyclists to cross the river, one of which is shared with all of the traffic converging on the city's only road bridge.
Worcester City Council had a desire to improve the riverside within the city centre, whilst Worcestershire County Council had a desire to create a new network of routes that would allow people to get around town on bikes or on foot on a daily basis.
This bridge provides improved 'permeability' for active travellers who now have three opportunities to cross the river (motorists have just the one!), but crucially, by being located towards the south of the city centre, and connecting with new or improved paths alongside the river, a greenway loop has been created, right at the heart of the city.

Willow Bridge, St Neots
St. Neots, Eaton Socon and Eynesbury were separated by the River Great Ouse and its flood plain. The journey to school for students at Ernulf Academy was difficult and indirect. There is also a large supermarket in Eynesbury used by many people from Eaton Socon – the difficulty of crossing the river for school and for shopping made many people choose to drive for their daily journeys, creating congestion and road danger.

The new walking and cycling routes have connected the two communities across the River Great Ouse. Willow Bridge is a new bridge spanning 385 metres across the floodplain, far enough for it to remain open in case of serious flooding. Its approaches have gentle gradients to allow easy access for people with disabilities, and are lit for 24-hour use. New paths link the bridge to nearby residential areas, giving local people improved access across the entire area.

Effectiveness of the measure on mode shift:

Diglis Bridge, Worcester – Sustrans case study

Before it was built, surveys showed we could expect approximately 31,000 trips annually to pass the site for the bridge, repeat surveys after the bridge was built show this figure has leapt to 465,000.

Willow Bridge, St Neots

- 73% of people using the route said it had increased their level of daily activity.
- The scheme makes the journey to schools in the area a lot safer for pupils and has provided easier access to the industrial areas on both side of the river. As a result the number of people walking and cycling to get to school and work is now much higher.
- 232,000 trips made on the route in 2012.
- 33% of trips could have been made by car.
- 66% increase in cycle trips recorded in the peak commuting periods.

Implementation in modelling

It can be included as part of a package of car demand management proposals which will see a reduction in car demand for affected zones.

Increase Town Centre Cycle Parking

CW12

Description of Measure:
Provide/enhance cycle parking provision within the town centre

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

Chichester Cycle Parking Standards - The Cycle Parking Standard was first introduced by Chichester District Council in 1996. It was realised that progress in developing a Chichester cycle network needed to be matched by ensuring new development provided for secure cycle storage, to facilitate everyday cycle use.
The 1999 Chichester District Local Plan set a standard of one cycle space per unit; the District also published detailed guidance on secure, undercover cycle parking for residential developments. Local Plan Policy states that planning permission will be refused unless developments comply with the cycle parking standard and accommodate the provision of the Chichester cycle network.
The recently revised West Sussex County-wide Parking Standards adopted an increased standard of two cycle spaces per unit.

Effectiveness of the measure on mode shift:

Unlikely to have any effect as a single measure but should be seen as a vital complimentary measure to other hard and soft cycling measures.

Implementation in modelling

Reduction in matrix totals for city centre zones to reflect increased attractiveness of cycling. This would be part of a package of measures targeting the city centre and encouraging cycling.

Enhance and change status of existing PROW at Coronation Channel for use by cyclists

CW13

Description of Measure:
Enhance and change status of the PROW (Public Right of Way) running adjacent to Coronation Channel to the east of the town centre. To enhance the off road cycle route provision in Spalding for commuter/school journeys/leisure use, e.g. surfacing, lighting etc.

Timescale for Implementation: 4-10 years

Cost and possible funding sources: £100k-500k

Evidence of best practice:

Lincoln to Skellingthorpe Traffic-free path – Encouraging Walking and Cyling, DfT 2004
Part of Route 64 of the National Cycle Network, a railway path from the Notts village of Harby, runs east through the large dormitory village of Skellingthorpe. The A46 trunk road severed this route. Construction of ramps on the trunk road embankments has enabled the live Lincoln – Gainsborough railway and Fosdyke canal to be crossed in safety, using a corridor adjacent to the existing trunk road bridge.

Spen Valley Greenway - Encouraging Walking and Cyling, DfT 2004
This is an 11km traffic-free path on disused railway corridor between Bradford and Dewsbury. The line was purchased by Sustrans in 1998 and re-opened to the public for walking, cycling and horse riding in 2000, after completion of a 2.5m wide tarmac path with new access points, public art and landscaping. Development and maintenance monitored by a group of local individuals and organisations including Spenborough Civic Society, British Horse Society, Railway Heritage Society, Spen Valley Guardian newspaper, West Yorkshire Police, Sustrans, Kirklees Council and local MPs.

Cambridge Jubilee Cycleway - Encouraging Walking and Cyling, DfT 2004
This is a 2.6km new traffic-free route and 0.4km of cycleway on existing estate roads. A 65m long jetty into the river Cam was constructed to allow walkers, cyclists and wheelchair users to pass under the Cambridge to Kings Lynn railway line. In addition, two bridges were built to span the ditches on the commons.
The route provides access to Ditton Meadows as well as forming part of a longer distance route.

Effectiveness of the measure on mode shift:

Lincoln to Skellingthorpe Traffic-free path – Encouraging Walking and Cyling, DfT 2004
Bridging the railway and canal, and bypassing the major road, produced a dramatic rise in usage of the traffic-free route. A cycle counter was in place prior to these works, to give baseline data.
The new link opened in June 2003:

- July-December 2001, 2,025 cycle trips
- July-December 2002, 2,330
- July-December 2003, 9,170.

Cambridge Jubilee Cycleway - Encouraging Walking and Cyling, DfT 2004

- 1,800 cycle trips per day in October 2002, three months after the new route was opened
- Wheelchair access now possible to attractive riverside area which was previously only reached by unsurfaced paths and stepped bridge.

Implementation in modelling

Reduction in matrix totals for city centre zones to reflect increased attractiveness of cycling. This would be part of a package of measures targeting the city centre and encouraging cycling.

Town Centre Cycle Hub

CW14

Description of Measure: Provide enhanced cycle facilities e.g. provide lockers, shower facilities information point, etc at a town centre location such as the rail station or South Holland Centre.

Timescale for Implementation: 4-10 years

Cost and possible funding sources: £500k-£1m

Evidence of best practice:

Manchester Cycle Hubs
Transport for Greater Manchester currently operates cycle hubs in Manchester City Centre and at locations in the neighbouring towns of Bury and Ashton under Lyne. Facilities at district locations include indoor secure cycle parking and at the City Centre location premium membership gives access to showers, changing facilities and lockers. Further locations are planned at both district level and at other major employment locations.

Grimsby Cycle Hub
In 2003 a cycle hub opened at Grimsby Railway Station in a partnership between Cycle Lincs, North East Lincolnshire Council and Balfour Beatty. The facility offers secure parking, showers and lockers and bicycle repair. Annual memberships are available or the customers can choose to pay for it on a daily basis.

Effectiveness of the measure on mode shift:

Implementation in modelling

Reduction in matrix totals for city centre zones to reflect increased attractiveness of cycling. This would be part of a package of measures targeting the city centre and encouraging cycling.

Employment Area Cycle Hub

CW15

Description of Measure:
Provide enhanced cycle facilities (hub) at the Enterprise Industrial Estate e.g. provide facilities such as lockers, shower facilities and secure parking etc to encourage more journeys to work by cycle.

Timescale for Implementation: 4-10 years

Cost and possible funding sources: £500k-£1m

Evidence of best practice:

Bristol Royal Infirmary Cycle Centre - Encouraging Walking and Cyling, DfT 2004
Royal United Bristol Healthcare Trust improved on-site cycling facilities at the BRI for staff and the public by providing:

- indoor secure caged cycle parking, with stands
- swipe-card entry system for registered Cycle Centre users
- showers
- lockers
- clothes-drying space
- cycle mileage allowance of 40p per mile for business
- information to staff about safe routes into and between Bristol healthcare sites – leaflets provided at staff induction, and intranet information
- cycle parking stands for public use across BRI sites.

GlaxoSmithKline Bike Miles - Encouraging Walking and Cyling, DfT 2004
The features and incentives introduced include:

- Bike Miles scheme: each day those arriving by bike are given a £1 voucher redeemable at a bike shop, and the company absorbs all National Insurance and tax costs
- access for staff to professional bike maintenance services during work time
- cycle parking located in a prime position
- state of the art changing facilities
- Guide to Safer Cycling produced for staff
- Bicycle User Group established.

Effectiveness of the measure on mode shift:

Bristol Royal Infirmary Cycle Centre - Encouraging Walking and Cyling, DfT 2004

- Doubling in number of staff cycling to work since Cycle Centre initiated – from 2.5% to 5.1% of all UBHT staff.
- Cycle Centre caters for 100, now 217 registered users.

GlaxoSmithKline Bike Miles - Encouraging Walking and Cyling, DfT 2004

- Cycling, predicted before occupation of the building at 50 cyclists a day, is now around 90 cyclists a day.
- The number of registered cyclists (who may cycle at some time) rose from initial 50 to over 300.

Implementation in modelling

Reduction in matrix totals for city centre zones to reflect increased attractiveness of cycling. This would be part of a package of measures targeting the city centre and encouraging cycling.

Spalding Transport Strategy

Menu of Measures – Freight

March 2014

Prepared by:

Mouchel

Contents

Introduction of a strategy for deliveries in the retail core

F1

Description of Measure:
This is a long term future proposal following to manage deliveries within the town centre core with potential to restrict vehicular access during the day to improve the pedestrian environment within the retail core.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

Department for Transport – Freight Best Practice: Local Authority Freight Management Guide

Managing deliveries in East Grinstead

West Sussex County Council developed an effective traffic calming scheme in conjunction with measures to facilitate deliveries in the town of East Grinstead. The A22 is a busy primary route that passes through the centre of the town. After a long-standing proposal for a relief road had not been progressed, a decision was taken to implement a scheme to help prevent 'rat running' in the absence of the relief road.

In developing a restricted access 20 mph scheme, one option considered was to implement delivery restrictions (before 10am and after 4pm). The preferred scheme involved construction of new loading bays to address delivery problems, and restrictions were not implemented as it was considered that they could worsen congestion problems.

This approach was identified in close consultation with a partnership which included local businesses, delivery companies and the public. A steering group was also set up to oversee the effective running of the scheme. A haulage company is represented on the steering group.

The City of York road user hierarchy
In 1990 York Council introduced a road user hierarchy to guide implementation of their transport policy. This gave priority to road users in the following order:

- Pedestrians;
- people with disabilities;
- cyclists;
- public transport passengers;
- commercial/business vehicles;
- requiring access;
- coach-borne shoppers;
- coach-borne visitors;
- car-borne long-stay commuters; and
- visitors.

Effectiveness of the measure on mode shift:

These measures alone are unlikely to have an impact on modal share. However if implemented as part of a package of measures to improve town centre facilities for pedestrians and cyclists it could prove effective in encouraging more sustainable modes.

Implementation in modelling:
These cannot be implemented in the modelling.

Home Deliveries

F2

Description of Measure:

Encourage local retailers to jointly provide a home delivery service.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100-500k

Evidence of best practice:

Department for Transport – Freight Best Practice: Home Delivery meeting the needs of customers and the environment

Royal Mail Nottingham – involved the trial of alternative re-delivery methods, utilising technology and the Post Office branch network. A reduction in car mileage was observed as the result of post offices often being closer and / or more accessible to the customer than sorting offices. This led to mode shift and a reduction in the overall trip distance.
The estimated reduction in private vehicle miles of up to 8,000 per year has significant environmental benefits if it can be extrapolated nationally.

Transport impacts of local collection/delivery points - McCleod, Cherrett and Song, 2006

"The parameter values for each of these factors will vary according to local circumstances. In the Winchester case study example, with a depot 13.3km away from the centre of the delivery area and five CDPs available, the modelled results suggested that customer mileage could be reduced by over 80%. The impact on the carrier was estimated to be small, there being a trade-off between the need to visit the CDPs and the need for redeliveries.

The results are highly sensitive to the parameter values assumed in the analysis. The most favourable case for the CDP method occurs when 1) the carrier's depot is far away from the collection area and not in a convenient location to allow the trip to be combined with another trip, 2) significant numbers of people walk to their local collection point, and 3) where there are many first-time home delivery failures. Best-case and worst-case scenarios for the use of CDPs (Table 3) give an indication of the wide range of results that might occur in practice. It can be seen that under the most favourable circumstances for the CDP method, assuming a first-time failure rate of 30%, the customer distance savings from using local CDPs over travelling to the carrier's depot (30km away) were substantial (97% reduction in collection mileage)."

Effectiveness of the measure on mode shift:
This measure could potentially be very effective in reducing the number of car trips to retail locations in Spalding, however an increase in LGV trips would also be expected. The efficiency of the logistical system used to implement the scheme will be crucial in how effective it is as a measure to reduce car trips, as will be the number of retailers signed up to the service. Similar case studies are difficult to find which makes putting a figure on the reduction in car trips very difficult.

Implementation in modelling:
This measure will be difficult to include as part of the modelling for the reasons above and the fact goods vehicles are not explicitly modelled in the SATURN model. There is a lack of empirical evidence from case studies to justify any mode shift assumptions. It is therefore assumed in the modelling that any impacts on mode share will be neutral.

Spalding Transport Strategy

Menu of Measures – Highways and Transport

March 2014

Prepared by:

Mouchel

Contents

Directional Signing Review

HW1

Description of Measure: Review directional signing provision with a view to encouraging traffic to circulate with more efficiency within the town centre. Encourage increased use of A16 (particularly by HGVs from industrial area in the north) and improved car park directional signing.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:
TSRGD 2002 (Traffic Signs Regulations and General Directions)

Traffic Signs Manual

Traffic Signs Policy Paper: Signing the way – October 2011

Effectiveness of the measure on mode shift:

This measure is not specifically designed to affect mode change, however if the review takes place in tandem with cycle and walking measures it should be possible to divert traffic from streets identified as important cycle or pedestrian links. In doing this a more attractive and safer environment for pedestrians and cyclists will be created, encouraging growth of these modes.

Implementation in modelling:
Bans to turning movements, changes to priority or one-way streets can be explicitly modelled in the SATURN model. It is not possible to specify 'preferred routes' in the model, although it may be possible to make preferred routes more attractive relative to others by adjusting parameters such as free-flow speeds and saturation flows.

Downgrade some streets in town centre to improve quality of space for pedestrians and cyclists

HW3

Description of Measure: Consider further pedestrianisation or use of shared surface treatment to reduce accidents on the main routes through the town centre

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice:

Manual for Streets - 2007
Manual for Streets 2 – 2010

Local Transport Notice 1/11 – Shared Space:

- "For shared space, a design speed of no more than 20 mph is desirable, and preferably less than 15 mph.
- Pedestrians should be in a position to choose whether they interact with vehicles in shared space.
- The availability of comfort space and adequate seating is of benefit to all disabled people.
- The reduced impact of motor vehicles often found in a shared space environment is attractive to cyclists.
- Successful shared space streets need not involve the use of costly or bespoke materials. Careful and sensitive design is more likely to contribute to successful operation. There are many examples of shared space schemes that work well using inexpensive materials."

Poynton Shared Space – Sustrans Case Study
Poynton is a Cheshire village with a population of 16,000, situated on the southern fringe of the Greater Manchester Conurbation. The historic focus of the village is Fountain Place, a crossroads at the junction of the London Road (A523), Chester Road (A5149) and Park Lane. Fountain Place was a busy signal controlled junction and the village civic and commercial centre has moved eastwards to Park Lane.

Park Lane and Fountain Place also have an important movement function, for both vehicles and pedestrians. Park Lane is the main route into Poynton from the east and carries flows of 10,500 vehicles per day. Much of this is local traffic and there are no practical alternative routes at present to divert. Fountain Place is the junction of Park Lane, the A523 London Road and the A5149 Chester Road, carrying turning flows of some 27,000 vehicles per day including 6% HGVs.

Long-standing proposals for a Poynton bypass would not be progressed in the foreseeable future, so the streetscape enhancements proposed needed to accommodate existing traffic patterns, both on Park Lane and through Fountain Place

The design identified five locations for gateways to highlight the transition from highway, with its predominant movement function, to the village centre, where other activities and functions are equally important.

The design for Fountain Place replaced the existing traffic signal control and strongly defined arrangement of footways and carriageway with a design based on shared space principles, comprising two distinct but interconnected circular spaces. In view of the heavy traffic flows, paving materials and low kerbs were used to define the areas for traffic circulation as a guide for drivers and other users, but these physical clues are subtle and also emphasize the pedestrian desire lines through the space.

Effectiveness of the measure on mode shift:

Table from DfT Shared Space Project – Stage 1

Location	Casualty Reduction (%)	Other Benefits
Crewe	21	2-3 mph reduction in average speed
Hull	24 (21 in cycle casualties)	48% increase in cycle flows 16% reduction in NO2 levels
Manchester	30	Number of cyclists more than doubled during peak hours Bus passengers numbers up 9% on both weekdays and weekends
Norwich	60 (despite the increased night time activity)	5-7 mph traffic speed reduction
Oxford	36 (almost 50% reduction in KSIs)	30% increase in the number of cyclists on the Cowley Road 10% reduction in the number of cars using the route
Liverpool	57 (slight casualties) 65 (pedestrian casualties)	Significant increase in formal crossing movements Number of informal crossings has either increased or remained static where formal provision available
Leamington Spa		14% reduction in average speed
St. Albans	50 (in first 12 months of opening)	
Southwark	42.5 (in first 6 months of opening)	
Wandsworth		16% reduction in average traffic speed

Implementation in modelling:

Changes to the highway network can be made such as reductions in speed and capacities to represent the impacts of shared space on vehicles. This should have the effect of making these less attractive as route choices causing traffic to re-route away from these locations.

20 mph Zones

HW4

Description of Measure:
Introduction of mandatory 20mph speed limits/zones on key routes within the town centre and around schools including, e.g. Park Road, Double Street and The Crescent to improve safety of all road users in Spalding.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

DfT Circular 01/2006

DfT Road Safety Research Report - Review of 20 mph Zone and Limit Implementation in England

Effectiveness of the measure on mode shift:

Interim Evaluation of the Implementation of 20 mph Speed Limits in Portsmouth, 2010

- Average speed at 223 monitored sites dropped from 19.8 mph to 18.5 mph upon implementation of 20 mph zones. 35 sites dropped from an average speed >20 mph to an average <20mph. 17 sites went from below 20mph to above.

- "Traffic cordon counts in Portsmouth also indicate an average reduction in traffic of about 3%. This suggests traffic has not re-routed systematically from the roads subject to 20 mph limits to the main roads on the cordon."

- Total accident number decreased by 21%, although KSI (Killed, seriously injured) increased by 8%.

- "The survey suggests that the introduction of the 20mph Speed Limit scheme made little difference to the majority of respondents in the amount they travelled by their chosen mode. Encouragingly the level of pedestrian travel, pedal cyclist travel and public transport usage had increased for a small number of respondents."

- "8% of drivers in the qualitative survey reported that they drive less or a lot less since the installation of the scheme. This is supported by the census data which shows that on 20mph roads between 2007 and 2009, 15% fewer pupils travelled to school by car or van, this is in comparison to just a 5% reduction on roads without a 20mph limit. 7% of respondents in the qualitative survey answered that they walk more frequently to school or college. The census data showed that on 20mph roads, there was an increase of only 3% in the number of pupils who walk or cycle to school between 2007 and 2009. Interestingly the increase in pupils walking or cycling to school on roads that are not covered by 20mph limits was greater at 8%."

Implementation in modelling:
20 mph zones can be relatively easily represented in the model by reducing free flow speeds to below 32 km/h (20 mph). On links where speed reductions are applied you would expect to see a reduction in flow as these routes become less attractive to cars.

Review junction operation/configuration for A16/A151
Review junction operation/configuration for A16/B1180

HW5&6

Description of Measure:
HW5: Review junctions of A16 with A151 to provide additional capacity
HW6: Review junctions of A16 with B1180 to provide additional capacity

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice:
DMRB Volume 6 Section 2 Part 3 – TD16/07 – Geometric design of roundabouts

Effectiveness of the measure on mode shift:

This measure is unlikely to have any significant impact of mode share.

Implementation in modelling:

Any proposed changes to capacity could be incorporated within the SATURN network model to assess any wider strategic highway impacts. A full operational assessment of either junction should be made in ARCADY (if the junctions remain as roundabouts).

Review/optimise traffic signals within the town centre

HW7

Description of Measure:
Review operation of traffic signals at key locations / junctions across the town, with the aim of improving the flow of traffic through the town centre whilst providing safe routes for pedestrians.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

A number of approaches could be adopted in delivering improved signal optimisation at junctions in Spalding, the methodology adopted is likely to reflect the existing signal equipment and the extent of any other changes made to junction layouts and the wider network.

Updated fixed time – where fixed time signals are in place these can be reviewed to optimise timings to forecast flows.

TfL Smoothing Traffic
After reviewing 2,000 of the 6,000 traffic signals in London and changing timings where necessary, the percentage of traffic which had cleared a junction in the first green phase had increased from 53.36% to 61.62% in the morning peak. For pedestrians 92.30% could easily clear the kerb during the first green man phase against 91.64% prior to the changes.

MOVA – this is an adaptive traffic control system used at standalone or small linked junctions. The system adapts to current traffic levels from cycle-to-cycle but can lead to over saturation downstream due to a lack of co-ordination to other signals in close proximity.

SCOOT UTC – www.scoot-utc.com

“Early results showed that SCOOT achieved an average saving in delay of about 12% when compared with up-to-date TRANSYT fixed-time plans. This result was important because TRANSYT is used worldwide and known to set a high standard on which other traffic responsive systems have failed consistently to improve.

Research by Bell and Bretherton (1986) suggests that SCOOT is likely to achieve an extra 3% reduction in delay for every year that a fixed-time plan "ages". Further, the effects of incidents have been excluded from many of the survey results to ensure statistical validity.”

Traffic Advisory Leaflet 4/95: The “SCOOT” Urban Traffic Control System

“The benefits of SCOOT compared to alternative methods of control have been well documented. Journey time surveys in Worcester and Southampton found that SCOOT control reduced delays substantially compared with vehicle actuated (i.e. non co-ordinated) signal operation. Typical delay reductions were 23% in Worcester and 30% in Southampton.

Comparisons of the benefits of SCOOT, with good fixed time plans, showed reductions in delays to vehicles of 12% in Glasgow and 27% at Folsehill Road in Coventry.”

Effectiveness of the measure on mode shift:

The measure is specifically aimed at improving the efficiency of the highway network whilst also enabling other proposals which seek to improve the pedestrian / cyclist environment. If the measure was to be introduced as a standalone element it might be reasonable to assume some switch to car as delay and journey times reduce for these modes. However as this measure will be introduced in

tandem with pedestrian improvements it is viewed as a complimentary measure which will optimise traffic signals for the town centre proposals, rather than simply updating based on existing arrangements. The measure is therefore expected to have a neutral impact on mode share.

Implementation in modelling:
SATURN includes a signal optimisation feature employing a choice of algorithms which can be applied to all signalised junctions or a sub-set. This process should lead to better optimised green times and more efficient network operation. However measures also need to be taken to avoid 'over-optimisation' whereby routeings with heavy flows are given a disproportionate level of green time, this in turn leads to flows increasing even more on these routes because of the increased capacity, to the detriment of more minor links which can suffer unrealistically low levels of green time. A degree of engineering judgement needs to be applied when checking the outcomes of signal optimisation.

Safety Review of Little London Bridge
Safety Review of Double Bridge Roundabout Junction
Safety Review of other key locations around Spalding
Safety Review of Winsover Road Corridor

HW8, 9, 10 & 11

Description of Measure:

- Conduct a safety review of Little London Bridge with a view to improving safety for all road users at this location
- Conduct a safety review at Double Bridge/roundabout at West Elloe Ave and Commercial Road with a view to improving safety for all road users at this location
- Conduct safety reviews at:
  - Albion Street/ Double Street junction,
  - Park Road/Pinchbeck Road,

  and, Hawthorne Bank (Winsover Rd end and Little London end)
  with a view to improving safety for all road users at these locations
- Conduct a safety review of Winsover Road corridor into the town centre with a view to improving safety for all road users at this location

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:
Road Safety Good Practice Guide – DfT, 2006
Road Safety Audit – The Chartered Institute of Highways and Transportation, 2008

Effectiveness of the measure on mode shift:

DfT Road Safety Research and Statistical Reports

This measure is unlikely to have any significant impact of mode share, although improvements to pedestrians and cyclists at major junctions may make these modes more attractive.

Implementation in modelling:
Any changes that impact on highway capacity or speeds could be incorporated into the SATURN network.

Review on-street car parking tolerances

HW13

Description of Measure:
Review on street parking behaviours in the town centre and on key radial routes. Reduce the impact of congestion and improve the safety of vulnerable road users at key points on these routes by prohibiting or limiting on-street parking where viable. E.g. Bourne Road, Winsover Road, St Thomas' Road, The Crescent and Church Street. Enhance enforcement operations.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Effectiveness of the measure on mode shift:

This measure is likely to have a neutral impact on the numbers of cars on Sleaford's roads. On the one hand, travel by car could become more attractive if journey times speed up as the result of reduced congestion however some other motorists may be find driving less attractive if parking becomes less convenient. This is particularly likely to be the case if existing on-street parking is free but they would have to pay to use an off-street car park and / or the location of off-street car parks are not as convenient as on-street.

Leeds Institute for Transport Studies - Why change parking regulations and access/egress arrangements - http://www.konsult.leeds.ac.uk/private/level2/instruments/instrument039/l2_039b.htm

In general, allowing on-street parking on a major arterial will decrease capacity and increase delays and accidents due to the physical occupation of the space, manoeuvres, pedestrians appearing in between vehicles and other activities associated with parking (Hobbs, 1979). The capacity reduction factors for adjacent lanes resulting from parking manoeuvres are given in the Highway Capacity Manual (TRB, 2000). For example, on average 20 manoeuvres reduces capacity by 20% on one lane, 11% on two lanes and 7% on three lane roads.

Implementation in modelling:
Where road capacity increases as a result of a reduction of on-street parking this could be reflected in the SATURN model.

Amend layout of Winsover Road/St Thomas Road junction by removing signals and introducing an alternative junction layout
Remove traffic signals at High Bridge Junction

HW14/18

Description of Measure:
HW14 - Amend layout of Winsover Rd/ St Thomas' Rd junction by removing signals and introducing an alternative junction layout.
HW18 - Remove traffic signals at High Bridge junction to improve operation.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:
Transport for London – Smoothing Traffic Flow
Since 2009, 2,000 of the 6,000 traffic signals maintained by TfL have been reviewed. The review aimed to 'smooth' traffic flow. This doesn't necessarily mean improving journey times but primarily aims to improve predictability and reliability. The review considered signal timings but also looked at whether signals were actually needed in all current locations. The point was made that many signals had been in place for 20 years or more and as traffic conditions change over time some signals may no longer be required.

Effectiveness of the measure on mode shift:
The removal of signals is unlikely to have a significant impact on mode share.

Implementation in modelling:
Model networks will need to be updated to remove signals.

Introduce MOVA network at signalised junctions around the town centre

HW16

Description of Measure:
Introduce MOVA network for junctions across the town, with the aim of improving the flow of traffic through the town centre. Microprocessor Optimised Vehicle Actuation. It is a well established strategy for the control of traffic light signals at isolated junctions - i.e. junctions that are uncoordinated with any neighbouring signals.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice:

MOVA – adaptive traffic control system used at standalone or small linked junctions. The system adapts to current traffic levels from cycle-to-cycle but can lead to over saturation downstream due to a lack of co-ordination with other signals in close proximity.

Effectiveness of the measure on mode shift:

The measure is specifically aimed at improving the efficiency of the highway network whilst also enabling other proposals which seek to improve the pedestrian / cyclist environment. If the measure was to be introduced as a standalone element it might be reasonable to assume some switch to car as delay and journey times reduce for these modes. However as this measure will be introduced in tandem with pedestrian improvements it is viewed as a complimentary measure which will optimise traffic signals for the town centre proposals, rather than simply updating based on existing arrangements. The measure is therefore expected to have a neutral impact on mode share.

Implementation in modelling:
SATURN includes a signal optimisation feature employing a choice of algorithms which can be applied to all signalised junctions or a sub-set. This process should lead to better optimised green times and more efficient network operation. However measures also need to be taken to avoid 'over-optimisation' whereby routeings with heavy flows are given a disproportionate level of green time, this in turn leads to flows increasing even more on these routes because of the increased capacity, to the detriment of more minor links which can suffer unrealistically low levels of green time. A degree of engineering judgement needs to be applied when checking the outcomes of signal optimisation.

Spalding Transport Strategy

Menu of Measures – Parking

March 2014

Prepared by:

Mouchel

Contents

Town centre car parking facility to the west of railway line

P1

Description of Measure: Investigate the possibility of providing a town centre car parking facility west of the railway line to negate the need for negotiating level crossings. Possible locations could include: adjacent to footbridge over railway line between Park Road and Kings Road, land near footbridge on St John's Road. It should be noted that these example locations are within residential locations and would be likely to require third party land.

Timescale for Implementation: 4-6 years

Cost and possible funding sources: £500k-1m

Effectiveness of the measure on mode shift:

This measure is designed to offset the increased inconvenience of having to cross the railway line to park if coming from the west of Spalding. This could potentially become a more serious issue when the number of level crossing closures per hour increase to accommodate increased freight / passenger services. The success of this measure may depend on the exact location and the quality of the walking route provided to link the new car park with the town centre on the east side of the railway.

Implementation in modelling:
Car demand within the matrices would need to be altered so that trips to zones representing existing car parks are reallocated to a zone at the location of the new car park. The decision on the number of trips to be reallocated could be achieved through car park entry / exit surveys conducted at each of the car parks which are to be closed. This approach does not constitute a parking model and as such there is no car park choice or length of stay element.

Review town centre car parking provision

P2

Description of Measure: Review town centre off-street car parking provision with a view to increasing the provision in line with anticipated population growth in the future.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

National Planning Policy Framework

"Local authorities should seek to improve the quality of parking in town centres so that it is convenient, safe and secure, including appropriate provision for motorcycles. They should set appropriate parking charges that do not undermine the vitality of town centres. Parking enforcement should be proportionate."

Implementation in modelling:
Car demand within the matrices would need to be manipulated so that trips to zones representing existing car parks are reallocated to a zone at the location of the new car park. The decision on the number of trips to be reallocated could be achieved through car park entry / exit surveys conducted at each of the car parks which are to be closed. This approach does not constitute a parking model and as such there is no car park choice or length of stay element.

Car park guidance system

P3

Description of Measure: Introduce VMS (Variable Message Signs) indicating number of spaces available at car parks serving the town centre.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice:

Southampton installed VMS in the 1990s and the conclusions from studies into the impacts showed:

"It appears from the results of the interview surveys and the car park occupancy surveys that demand for parking does not yet exceed supply, even at peak periods such as the Boat Show and the pre-Christmas Saturday shopping. The majority of drivers do not usually need parking guidance information, but they think it is necessary, perhaps to assist them at certain times when there are fewer spaces available. This is because 80-86% of drivers decided to park in the car park (where they were interviewed) before they set off from their home and 85-96% of drivers found it 'easy' or 'very easy' to find a parking space. At a point in the future when demand outstrips supply, the signs are expected, in theory, to have much more benefit." (EUROSCOPE, 1999)

"An EU Project, CONVERGE (2000) estimated the environmental impacts of the introduction of citywide dot-matrix PGI signs in Southampton. These estimates were based on differences in the 'before' and 'after' times spent searching and queuing for parking spaces and other information such as, speed related emission factors from the HBEFA manual on emission factors, idling emission factors from the MODEM emissions model and fleet composition data. It was estimated that these reductions could be 6% and 15% of the fuel consumption and pollutant emissions for a 10km and 3km trip respectively during the periods of high demand (Converge-D3.3.1, 2000)."

Effectiveness of the measure on mode shift:
Introduction of VMS is not expected to have any discernible impact on mode shares.

Implementation in modelling:
The introduction of a VMS system for car parks is likely to lead some reduction in wasted car mileage in the town centre when implemented. However the SATURN model requires the final destination zone (car park) to be specified and that motorists will always follow the minimum cost path (the cheapest route).

Introduce Smart Parking Charges

P4

Description of Measure:
This involves a review of parking charges, alongside the introduction of a telephone-based payment system, to identify and implement parking charges to encourage use of low emission vehicles and travel outside of peak hours.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100-500k

Evidence of best practice / Effectiveness of the measure on mode shift:
This technology is still at a relatively early stage of development and has not been implemented widely. There has been insufficient monitoring of similar schemes.

Implementation in modelling:

Not possible to model with the existing SATURN model.

Review of Parking Standards

P5

Description of Measure: Review parking standards as part of a Lincolnshire-wide review

Evidence of best practice:

Lincolnshire County Council is currently reworking its parking standards following the adoption of the National Planning Policy Framework. This guidance supersedes that previously set out in PPG13.

National Planning Policy Framework
The framework advises

"39: If setting local parking standards for residential and non-residential development, local planning authorities should take into account:

- the accessibility of the development;
- the type, mix and use of development;
- the availability of and opportunities for public transport;
- local car ownership levels; and
- an overall need to reduce the use of high-emission vehicles.

40: Local authorities should seek to improve the quality of parking in town centres so that it is convenient, safe and secure, including appropriate provision for motorcycles. They should set appropriate parking charges that do not undermine the vitality of town centres. Parking enforcement should be proportionate.

41: Local planning authorities should identify and protect where there is robust evidence, sites and routes which could be critical in developing infrastructure to widen transport choice."

Effectiveness of the measure on mode shift:

The standards which are adopted locally for cars could have a very large bearing on mode choice in the future and particularly at new developments or where there is a change of use. If parking standards increase the level of permitted spaces above that set out in previous guidance it is possible car mode share will increase in line with the availability of parking spaces. If standards are drawn up with an emphasis on reducing car use and encouraging other modes then you would expect to see a shift away from the car.
The new national guidance gives greater scope for local interpretation and therefore it is difficult to say at this stage what the impacts will be on mode share.

Implementation in modelling:
Until local parking standards are set, it is not possible to reflect any impact in the modelling. When these standards are known it might be possible to incorporate the availability of car parking into car trip rates for major new developments.

Spalding Transport Strategy

Menu of Measures – Public Transport

March 2014

Prepared by:

Mouchel

Contents

Ref.	Measure
PT1	Increase headway of Into Town buses to 15mins in the peak periods to encourage local community journeys to be made by bus
PT2	Increase headway of Into Town buses to 15mins throughout the operating day
PT3	Increase coverage of Into Town bus services to better serve the Enterprise industrial estate at key times and improve public transport connectivity to Johnson Hospital
PT4	Develop robust transport proposals for large scale developments in Spalding to provide and safeguard sustainable transport options for new development areas
PT5	Relocate bus station to a location closer to the town centre core with a more legible and safer pedestrian route
PT6	Refurbish footbridge at the rail station and provide pedestrian access to station from Park Road (west of rail line)
PT7	Lobby rail industry with a view to increasing frequency of rail services to Peterborough in order to improve options for commuting by sustainable means as an alternative to the car
PT8	Lobby rail industry with a view to increasing rail services to provide more choice for inter-urban/commuter journeys
PT9	Improved park and ride facility, improve cycle/pedestrian links to and from, review signing to and from for traffic and pedestrians/cyclists, complimenting changes made in 2011 by East Midlands Trains
PT10	Review and/or improve where possible the Community Transport provision and Call Connect service in the Spalding area with a view to catering sustainable and attractive transport options for the elderly/isolated population within Spalding and surrounding settlements
PT11	Enhance bus waiting facilities at the railway station and increase frequency or adjust bus timings to compliment train service departure/arrival times
PT12	Provide more frequent inter-urban bus services e.g. to Peterborough at peak times to provide an alternative to car travel for commuter journeys
PT13	Provide shelters, seating, raised access kerbs at all bus stops, where there is space to accommodate, to improve access to bus services for all. Cannot be modelled
PT14	Review existing TRO on Market Street to allow buses (as well as cyclists) access in order to improve access to public transport within the town centre core. Could be included as change to the SATURN network.

Increase peak frequency of Into Town bus services

PT1

Description of Measure: Increase headway of Into Town buses to 15mins in the peak periods to encourage local community journeys to be made by bus.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice:

Devon Culm Valley Connect (Devon County Council, 2006)
Monitoring of the introduction of a doubling of frequency on existing elements and extensions into new areas showed that **36%** of passengers had previously used a car or motorcycle to make the journey.

Typically, an increase in frequency from 4 buses an hour to 6 buses an hour could increase demand by 20 per cent (Eddington Report (2007).

"TAS concluded (TAS Partnership, 2002) that UK experience has shown that: Improvements to bus frequency demonstrate the greatest proportional and absolute growth in bus use. Typical frequency increases (20–30%) can be expected to deliver patronage gains at around half of the level of service increase. However, typically these will not be financially viable unless bus resources are available at marginal cost to provide these improvements (or possibly if smaller vehicles can be used).

An increase in use in the range 10–25% can be secured by optimising frequencies within existing resources, providing reasonable levels of traffic priority and developing effective information and marketing strategy. At this level around one-third of the new passengers may be expected to have transferred from the car. This growth cannot normally be achieved on a fully commercial basis, although financial contributions can normally be restricted to capital investment."

The Demand for Public Transport: A practical Guide – 2004

Effectiveness of the measure on mode shift:

The Demand for Public Transport: A practical Guide – 2004
When service levels change they influence the level of demand for public transport. In general, all other things being equal, an increase in service levels will increase patronage, whilst a decrease in service levels will reduce patronage. The size and direction of the change in demand following a change in service levels can be expressed in terms of service elasticity.

For example, if the service elasticity of bus demand with respect to service frequency is 0.4 and all service frequencies were to increase by 10% we would expect patronage to increase by 4%. The service elasticity is therefore a measure of the sensitivity of bus passengers to service levels.

In general terms TRL (2004) reports a short run (1-2 years) service frequency elasticity with respect to bus of around 0.4 and a long run (12-15 years) elasticity of 0.7.

Implementation in modelling:
Mode share derived from the 2011 census travel to work data show 182 people (1.3% mode share) using bus in the Spalding area to travel to work. Based on the TAS report a doubling of frequency (every 30 minutes to every 15 minutes, 100% increase) could lead to a significant increase in patronage, although to assume the percentage increase will be equivalent to half the level of service increase seems ambitious. A more realistic figure would be 30-40% increase in passenger numbers

with a third of these passengers being former car drivers this might be equivalent to around 20 less cars in the AM peak.

A reduction to car matrices can be applied to reflect a shift from car to bus. This should be focused on zones served by the Into Town bus services.

Increase frequency of Into Town bus services throughout the operating day

PT2

Description of Measure: Increase headway of Into Town buses to 15mins throughout the operating day.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice:

Devon Culm Valley Connect (Devon County Council, 2006)
Monitoring of the introduction of a doubling of frequency on existing elements and extensions into new areas showed that **36%** of passengers had previously used a car or motorcycle to make the journey.

Typically, an increase in frequency from 4 buses an hour to 6 buses an hour could increase demand by 20 per cent (Eddington Report (2007).

"TAS concluded (TAS Partnership, 2002) that UK experience has shown that: Improvements to bus frequency demonstrate the greatest proportional and absolute growth in bus use. Typical frequency increases (20–30%) can be expected to deliver patronage gains at around half of the level of service increase. However, typically these will not be financially viable unless bus resources are available at marginal cost to provide these improvements (or possibly if smaller vehicles can be used).

An increase in use in the range 10–25% can be secured by optimising frequencies within existing resources, providing reasonable levels of traffic priority and developing effective information and marketing strategy. At this level around one-third of the new passengers may be expected to have transferred from car. This growth cannot normally be achieved on a fully commercial basis, although financial contributions can normally be restricted to capital investment."

Effectiveness of the measure on mode shift:
Mode share derived from the 2011 census travel to work data show 182 people (1.3% mode share) using bus in the Spalding area to travel to work. Based on the TAS report a doubling of frequency (every 30 minutes to every 15 minutes, 100% increase) could lead to a significant increase in patronage, although to assume the percentage increase will be equivalent to half the level of service increase seems ambitious. A more realistic figure would be 40% increase in passenger numbers with a third of these passengers being former car drivers this might be equivalent to around 20 less cars in the AM peak.

The Demand for Public Transport: A practical Guide – 2004
When service levels change they influence the level of demand for public transport. In general, all other things being equal, an increase in service levels will increase patronage, whilst a decrease in service levels will reduce patronage. The size and direction of the change in demand following a change in service levels can be expressed in terms of service elasticity.

For example, if the service elasticity of bus demand with respect to service frequency is 0.4 and all service frequencies were to increase by 10% we would expect patronage to increase by 4%. The service elasticity is therefore a measure of the sensitivity of bus passengers to service levels.

In general terms TRL (2004) reports a short run (1-2 years) service frequency elasticity with respect to bus of around 0.4 and a long run (12-15 years) elasticity of 0.7.

Implementation in modelling:
Mode share derived from the 2011 census travel to work data show 182 people (1.3% mode share) using bus in the Spalding area to travel to work. Based on the TAS report a doubling of frequency (every 30 minutes to every 15 minutes, 100% increase) could lead to a significant increase in patronage, although to assume the percentage increase will be equivalent to half the level of service increase seems ambitious. A more realistic figure would be 30-40% increase in passenger numbers with a third of these passengers being former car drivers this might be equivalent to around 20 less cars in the AM peak.

A reduction to car matrices can be applied to reflect a shift from car to bus. This should be focused on zones served by the Into Town bus services.

Increase coverage of Into Town Bus Service

PT3

Description of Measure: Increase coverage of Into Town bus services to better serve the Enterprise Industrial Estate at key times and improve public transport connectivity to Johnson Hospital.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100k-500k

Evidence of best practice:
Devon Culm Valley Connect (Devon County Council, 2006)
Monitoring of the introduction of a doubling of frequency on existing elements and extensions into new areas showed that **36%** of passengers had previously used a car or motorcycle to make the journey.

Effectiveness of the measure on mode shift:

An increase in coverage of the Into Town bus services should see an increase in bus mode share providing the service is properly marketed and reliable.

Implementation in modelling:
Any increase in coverage of Into Town Bus services can be reflected in the modelling by reducing car demand in line with the overall bus share at zones which will be served by the increased services.

Safeguard sustainable transport options for new large developments

PT4

Description of Measure: Develop robust transport proposals for large scale developments in Spalding to provide and safeguard sustainable transport options for new development areas

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

Funding and planning conditions – developer contributions, Section 106, CIF (Community Infrastructure Levy).

Manual for Streets 2

Masterplanning Checklist for Sustainable Transport in New Developments – Campaign for Better Transport, 2008

Thriving Cities: Integrated land use and transport planning – PTEG, 2011

Implementation in modelling:
A reduction in the total number of car trips to and from new development zones will be applied in the model, reflecting a lower car trip rate for journeys originating in new developments.

Relocate Bus Station to Swan Street
Provide/enhance a bus/rail interchange at the rail station

PT5 & PT11

Description of Measure:

Relocate bus station to a location closer to the town centre core with a more legible and safer pedestrian route.

Enhance bus waiting facilities at the railway station and increase frequency or adjust bus timings to compliment train service departure/arrival times.

Evidence of best practice:

Campaign for Better Transport – Fixing the Link: Making good the walking route from station to town centre

There is good evidence that having a station provides strong economic benefits for a town, research also suggests that poor quality stations and links mean that many towns are missing out on the potential benefits from their station. Improving stations and their links to towns, and thus the arrival experience of travellers, could boost spending in town centres by up to twice as much compared to those arriving in a poor quality environment.

A methodology for appraising the link between town centre and station was developed in the Netherlands which could be applied in the UK. The route is evaluated based on four criteria: liveliness, human scale, legibility and safety and comfort. This method is used to identify measures to improve the connectivity and how such improvements might be funded.

Campaign for Better – Local Rail Partnerships

How local partnerships can deliver improved access to stations, emphasising the need for a range of organisations need to co-operate e.g. Rail operator, local authority, developers, the local community etc. Examples cited include Ramsgate Interchange, Dover Priory Station, Taunton Interchange and Burscough Bridge Interchange.

Effectiveness of the measure on mode shift:

Campaign for Better – Local Rail Partnerships

Burscough Bridge Interchange – A 14% increase in usage at Burscough Bridge Railway Station in the first year after completion of the scheme.

Refurbish footbridge at the rail station and provide pedestrian access to station from Park Road

PT6

Description of Measure:
Refurbish footbridge at the rail station and provide pedestrian access to station from Park Road (west of rail line).

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100-500k

Evidence of best practice:

LSTF Access to Stations Bid
The Access to Stations programme is a portfolio of specifically tailored projects around 20 stations, which address local barriers to increase walking and cycling access. The bid was led by Bedford Borough Council and Sustrans but included station improvements at locations in seven other Local Authorities. The bid aimed to achieve a modal shift from car to walking and cycling by improving access and facilities at railway stations, in turn reducing congestion in the neighbouring area, encouraging economic growth, reducing pollution and safety for all road users.

Den Bosch, Netherlands – Campaign for Better Transport
Den Bosch is a town of 150,000 inhabitants divided by a railway line. Bridges and other crossing facilities to connect the two sides of the city are limited. The line had created a dichotomy, with half of the city growing prosperous while the other half fell into a decline. In other words, there really was a 'wrong side of the tracks' for people living in Den Bosch.

Providing integrated bus, taxi and parking facilities was an important part of the partnership development approach at Den Bosch, as was the enhancement of cycle storage services. Other important elements to help passengers on the move were real-time information systems, ticket vending machines and commercial retail facilities on platforms. Den Bosch station had the potential to boost local prosperity, so an early decision was taken to broaden the existing walkway over the railway line to twice the required width to create a clear pedestrian 'connection' between the two sides of the city. This encouraged people to use the station as a crossing point, which made the area more attractive for real estate development.

Effectiveness of the measure on mode shift:

LSTF Access to Stations Bid
- Although half the nation owns a bicycle and 60% live within a 15-minute ride of a station, just 2% of passengers use their bike to access the rail network.
- Nearly a third of rail users, and nearly half of those who drove and parked at the station, would like to use an alternative means of travel to or from the station, and over 11% of rail users questioned said they would like to cycle to and from the station.
- Cycle parking on crowded forecourts uses up around one tenth the space per rail user as car parking.
- At Cycling England "Bike N Ride" stations, 79% of journeys to the stations were less than 8 km, showing the potential for attracting new passengers through investments in cycle routes, parking, signage and information.

Den Bosch, Netherlands – Campaign for Better Transport

This structured approach at Den Bosch has revitalised the station and the surrounding region. Passenger numbers increased by 35% as a direct result of the new station facilities, Passengers are enjoying improved accessibility and transfer facilities, and satisfaction has increased.

Lobby for improved rail services to Peterborough and Lincoln
Lobby for rail services for Spalding to be provided on Sundays

PT7&8

Description of Measure:
PT7 - Lobby rail industry with a view to increasing frequency of rail services to Peterborough in order to improve options for commuting by sustainable means as an alternative to the car.
PT8 - Lobby rail industry with a view to increasing rail services to provide more choice for inter-urban/commuter journeys.

Evidence of best practice: Increased service frequency across the east of Scotland rail network. A forecast 5% shift from car to rail was predicted.

Paulley et al. – The demand for public transport: The effects of fares, quality of service, income and car ownership, 2006.

"A number of studies have estimated the elasticity of bus demand with respect to vehicle kilometres…this is approximately 0.4 in the short run and 0.7 in the long run. For rail services the short run elasticity is somewhat greater (about 0.75), but this is based on only three measurements and no long run elasticity appears to have been estimated."

Implementation in modelling:

Elasticities could be applied to existing mode share from census data. Trips to which these would apply would be based on the geographic origin and destination of the trip. These new public transport trips will be subtracted from the existing vehicle matrices.

Improved Park & Ride for Railway Station on Park Road

PT9

Description of Measure: Following refurbishment and opening of pedestrian access to rail station from Park Road, construct car parking facility accessed from Park Road (on land between Jubilee Close and Truro Way).

Timescale for Implementation: 4-10 years

Cost and possible funding sources: £100-500k

Effectiveness of the measure on mode shift:

Lelant Saltings Station
Lelant Saltings station on the St. Ives branch line accounts for two-thirds of all use (434,000 trips) on the line. A significant factor behind this is the 200 space park and ride site that was designed to reduce the number of car visitors to the popular tourist destination of St. Ives. A 33% increase of journeys on the line was measured in the five year period from 2002 to 2007.

Review Community Transport Provision

PT10

Description of Measure: Review and/or improve where possible the Community Transport provision and Call Connect service in the Spalding area with a view to catering sustainable and attractive transport options for the elderly/isolated population within Spalding and surrounding settlements.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100-500k

Evidence of best practice:

Community transport schemes in Gloucestershire are working together to form a social enterprise (funding from SWRDA) to help them extend the services they provide and move away from traditional grant funding. This is a shift away from grant funding for the voluntary and community sector. The new enterprise will be able to respond to a wide range of passenger transport and related requirements both within and outside the County," he said. "It will aim to provide high quality services - and use any funds these activities generate to support the development of community-based transport throughout Gloucestershire."

Ealing Community Transport (ECT) in Cheshire has been awarded the National award of 'Best Urban CT Scheme' by the Community Transport Association UK (November 2008) by the award relates to ECT's door to door Plusbus service in the Chester, Ellesmere Port and Neston areas. Within its first year of operation, ECT transformed the delivery of this service. Introduced in October 2007, it achieved a 39% increase in the number of passenger trips in its first year of operation.

PT12

Increase frequency of inter-urban bus services during peak times

Description of Measure: Provide more frequent inter-urban bus services e.g. to Peterborough at peak times to provide an alternative to car travel for commuter journeys.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £100-500k

Evidence of best practice:

Cairns, Sloman, Newson, Anable, Kirkbride and Goodwin (2004)

"Stagecoach ran a marketing campaign to encourage increased bus use on a poor performing, low frequency bus route in Perth with a profile of aged owner-occupiers with high car dependency. Marketing was accompanied by service improvements: frequency doubled, low floor buses were introduced, fares were simplified and the council introduced bus priority measures and new bus shelters. The marketing included launch publicity, door-to-door interviews with potential customers, the offer of free trips, and promotions such as children's competitions and pensioners' lunches.

This was followed by a telephone-based direct marketing campaign targeted at nonusers. Passenger growth was 56% over the first two years, and on course to be 63% over three years. There was evidence of modal shift from car to bus."

Implementation in modelling:

Reduction in car trips between Spalding and Peterborough based on existing mode shares and elasticities.

Spalding Transport Strategy

Menu of Measures – Smarter Choices

March 2014

Prepared by:

Mouchel

Contents

Development of a School Transport Strategy

SC1

Description of Measure: Develop a Transport Strategy focused on school travel modal choice with more robust implementation of School Travel Plans and educational initiatives

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:
Travelling to School: a good practice guide – covers a whole range of measures and initiatives including:

- Walking and cycling – walking buses, cycle trains, school crossing patrols, training etc.
- Encouraging bus use;
- Car sharing;
- Transport provision for children with special educational needs;
- Sustainable travel and road safety – within and beyond the curriculum;
- School travel plans and accessibility planning.

Research from the Sustainable Travel Towns

Joseph Leckie Community Technology College, Walsall
Safer routes to school and road safety are themes within the Year 7 PSHE programme every year. Achievements include:

• Speed surveys completed by pupils were used to justify a reduction of the speed limit on a local road from 40mph to 30mph
• Pupils were consulted on exactly where they wanted a toucan crossing to be positioned, and chose cycle storage for themselves. They have also presented their ideas for improvement to school governors and the local neighbourhood committee.
• Cyclist training on routes to school and a free cycle loan scheme set up in school
• new cycling and walking routes to school, including the toucan crossing, cycle lanes and advanced stop lines
• Improvements to a narrow bridge and link to the NCN route
• Environmental improvements in a local park to address personal safety concerns

- Nearly 200 pupils use the new path into school and over 100 use the new toucan crossing. Surveys have shown that all pupils cross at the crossing and none to either side of it, demonstrating the value of effective consultation with young people.
- Traffic speeds on the main road at the crossing point have been reduced by at least 10mph and there have been no reported accidents since the installation of the crossing.

Effectiveness of the measure on mode shift:
Guidance published in TAG Unit M5.2 states
"For school travel plans, the sample reviewed by Möser and Bamberg could be divided into a small group of six best-practice schools where a lot had been achieved, and the rest, where the impacts were marginal, perhaps due to the lack of intensity of application or coordination with the 'hard' measures involved (in those cases the 'hard' measures were 'Yellow' buses). This means that the average increase in the number of non-car trips of 7%, or the implied reduction in the number of car trips of 10%, would have under-estimated the best-practice examples, but over-estimated the others in the school travel sample."

Implementation in modelling:
Location of schools will be required in order to ascertain the zones and demand which will be affected by School Travel Plans. Reductions to the vehicle matrices will be applied to reflect the expected mode shift based on evidence from case studies.

These measures are only likely to impact the AM peak period which coincides with the beginning of the school day and the time at which pupils will be travelling. The impact of these measures in the PM peak is likely to be negligible as the school day finishes earlier than the evening peak period, we therefore do not propose to model this measure in the PM peak time period.

Increased publicity campaigns for use of public transport

SC2

Description of Measure: Introduction of publicity campaigns and initiatives to raise the profile of public transport and its benefits within Spalding and to encourage its use.

Timescale for Implementation: 1-3 year

Cost and possible funding sources: £0-100k

Effectiveness of the measure on mode shift:

TAG Unit M5.2 states "for targeted marketing, the analysis suggests that predominantly information and promotional campaigns would increase the overall non-car mode share by 5 percentage points. Given the base mode share, this implies an increase in the number of non-car trips by 14%, or a reduction in the number of car trips by 8%."

Implementation in modelling:
Could be included in modelling as part of overall modal shift as the result of improved public transport services.

Continued/Accelerated rollout of Bikeability to schools

SC3

Description of Measure:

Accelerated drive in rolling out of Bikeability and associated initiatives to Spalding schools to encourage more pupils to cycle to school.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

Bikeability received the most significant investment for measures targeted at schools and young people as part of the Cycling Towns initiative and was used by all 12 towns "reflecting its central position in each strategy, and helping to tackle the barriers noted above about lack of training, and potential lack of confidence amongst parents and carers about their child cycling to school."

Cycling Town Programme
In Darlington 1,200 spaces for bicycles were installed at schools, cycle training and promotion was also used in schools which saw an increase of 12% across all schools in the number of pupils cycling (mode share: 2.6% to 2.9%).

Derby focused on education of school children but also invested in several site specific schemes. Cyclists to schools and workplaces also benefited from the development of a 25 mile orbital route. Although this was primarily aimed at leisure cyclists, it provided useful linkages for commuters and school pupils. The combined measures saw an increase of 50% across all schools in the number of pupils cycling (mode share: 1.6% to 2.4%).

Encourage sustainable travel in new developments

SC4

Description of Measure: Provide starter pack for all new houses highlighting benefits of sustainable travel. Pack could also include discounted bike loans or bike shop discounts, bus fares or 'Try the Bus' initiatives

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

Best Practice in Urban Extensions and New Settlements – Communities and Local Government

Dickens Heath, Solihull

- 1,672 units approved, of different sizes, types and tenures in a green belt location;
- Two-form-entry primary school; and
- Village centre accommodating shops, businesses, a library, a medical centre, a church and homes.

The creation of a village centre and village square, with short walking distances between different uses and activities, encourages pedestrian movements and thus significantly reduces the number of car movements made by residents within the village. Although it is also acknowledged the development is a product of its time which “while being walking- and cycling-friendly, is still road dominated, and as a result residential areas appear bounded by busy through-routes as opposed to permeable links to the commercial core.”

Newcastle Great Park

485 acre – 2,500 dwelling mixed-use development

- funding to the sum of £20,000 per annum for ten years for a green transport co-ordinator;
- a contribution of £300,000 to the City Council to create a real-time information system at bus stops and on board vehicles;
- free travel to employees at the business park;
- no property to be more than 400 metres from a bus stop;
- a sum of £840,000 provided to ensure that transport operators buy in to running services from the start of development;
- all vehicles to have distinctive NGP branding and be fully wheelchair accessible;
- funding of £180,000 provided for the installation and maintenance of automated bus gates;
- provision of a secure 1,000-space park-and-ride car park, enabling higher-frequency public transport to be provided;
- £1.2 million to be spent on providing and improving off-site cycle facilities;
- any new occupier of NGP to be entitled to a discount of up to 50 per cent on the cost of a new cycle through a nominated supplier; and
- safe routes to schools linking all the residential areas.

Effectiveness of the measure on mode shift:

The greatest impact on mode share is likely to be for trips internal to the development. For example if pedestrian and cycling facilities are well thought through at the design stage and form an integral component to the overall development it will be much easier to maximise the potential for these modes. External trips by more sustainable modes are more likely to be dependent on the provision of public transport services. These services need to operate from the opening of the site, be well

marketed (possibly including personalised travel planning) and be maintained at a reasonable level of service for an extended period in order to build up patronage and maintain the confidence of users.

Eco-town guidance says a modal share of 50% non-car modes should be targeted for trips originating in an eco-town. Although this figure would be very high for any new development in Spalding – efforts should be made to maximise the non-car share.

Implementation in modelling:

Smarter Choices and sustainable modes will need to be reflected in trip rates used for the generation of trips from the new developments. If particular Smarter Choices methods are proposed for a site or if it has unique characteristics which might lead to a higher uptake of sustainable modes then a reduced car trip rate will be applied.

Develop a business travel zone for Spalding

SC5

Description of Measure:

Provide improved travel planning support for businesses in Spalding to encourage sustainable travel to work through dedicated resources, publicity campaigns/initiatives and incentives. (Enhanced 'Access Lincs').

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

Smarter Choices: Changing the way we travel – Cairns, Sloman, Newson, Anable, Kirkbride and Goodwin (2004)

Effectiveness of the measure on mode shift:

The effectiveness of Travel Planning is determined by a number of factors:

- Location;
- Availability of parking and inclusion of parking management measures alongside Travel Plans;
- Availability of alternative modes (hard infrastructure);
- Commitment of the company targeted;
- Availability of fiscal incentives;
- There is some evidence to suggest 'clustering' of Travel Plans can deliver favourable results particularly for smaller organisations which might not have resources of larger companies to promote Travel Plans.

In their research Cairns et al (2004) found that of the 20 workplace Travel Plans they looked at the average reduction in commuting by car was 18%, with plans that included parking management averaging a 24% reduction. Where there was no car parking management element the average reduction in car commuters achieved was 10%.

They also found that Travel Planning efforts co-ordinated by Local Authorities tended to be focused on the largest employers in the area which is seen to give the best return with finite resources. Typically only between 30 and 100 organisations had been targeted although these could typically cover between 10 and 30 percent of those employed within the district.

TAG Unit 5.2 states
"For workplace travel plans, the effects are the combined effects of both 'soft' and associated 'hard' measures (e.g. public transport improvements and parking measures). The analysis suggests that workplace travel plans would increase the overall non-car mode share by 12 percentage points. Given the base mode share, this implies an increase in the number of non-car trips by 34%, or a reduction in the number of car trips by 18% on the assumption that the total number of trips stays unchanged."

Workplace Travel Planning – resulted in an 18% reduction in car trips.

Implementation in modelling:

Reductions to be applied to destination trips in the AM peak and origin end in PM peak to reflect peak flow of employment trips. These reductions in trips will only be applied to model zones within the Travel Plan area. The percentage reduction needs to consider the makeup of the zone and what proportion of demand is the result of the employment site targeted with Travel Planning.

Targeted travel planning including personalised travel planning for residential properties, major employers and education establishments

SC6

Description of Measure:
These are tailored to the needs/attitudes of particular segments within the target population with solutions focused upon engaging with those most amenable to change.

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

Travel Smart – Bristol

There were high levels of community participation. 91% of households responded to the initial contact and 69% of these actually took part. Interim results demonstrate:

- 6% increase in walking trips (per person per year)
- 51% increase in cycling trips and 18% increase in usage of public transport
- 10% reduction in car-driver journeys.

Travel Smart – Gloucester
There were high levels of community participation. 93% of households responded to the initial contact and 62% of these actually took part. Interim results demonstrate:

- a 12% increase in walking trips (per person per year)
- 35% increase in cycling trips and 18% increase in usage of public transport
- 9% reduction in car-driver journeys across Quedgeley.

Implementation in modelling:
Reductions to the number of vehicle trips to and from new development sites would be applied to reflect a shift to more sustainable modes.

‘Try for free’ Public Transport Campaign

SC7

Description of Measure:
Work with public transport operators to encourage use by offering free journeys to residents and employees (e.g. free return rail ticket from Spalding to another Lincolnshire Station or free day pass on Into Town Service).

Timescale for Implementation: 1-3 years

Cost and possible funding sources: £0-100k

Evidence of best practice:

Smarter Choices: Changing the way we travel – Cairns, Sloman, Newson, Anable, Kirkbride and Goodwin (2004)

Effectiveness of the measure on mode shift:

“Red Route 9 was launched in February 2003, and runs between Aylesbury town centre and Stoke Mandeville Hospital. Red Route 9 buses have a distinctive livery and branding, which includes information about the route and the words ‘every 10 minutes’ on the side of the bus. The council produced a glossy timetable booklet, which was intended to look inspirational and ‘like a Mercedes advert’. This and a personal letter from the council’s chairman of transportation was sent to all 5,000 people living within 500 metres of the route, encouraging them to try the service. The council was planning to send a one week free ‘trial’ ticket to people who had not yet tried the service.

The marketing on Red Route 9 was preceded by a number of infrastructure improvements: a bus lane (or ‘red carpet into town’) introduced in 2001, which cost £2.5 million; individual signs at bus stops, with a bus stop name, timetable and route map; new shelters and seats; and Kassel kerbs. There have been some problems with the public transport infrastructure - in particular, at the time of the interview, real-time information screens had been out of action for the past two years.

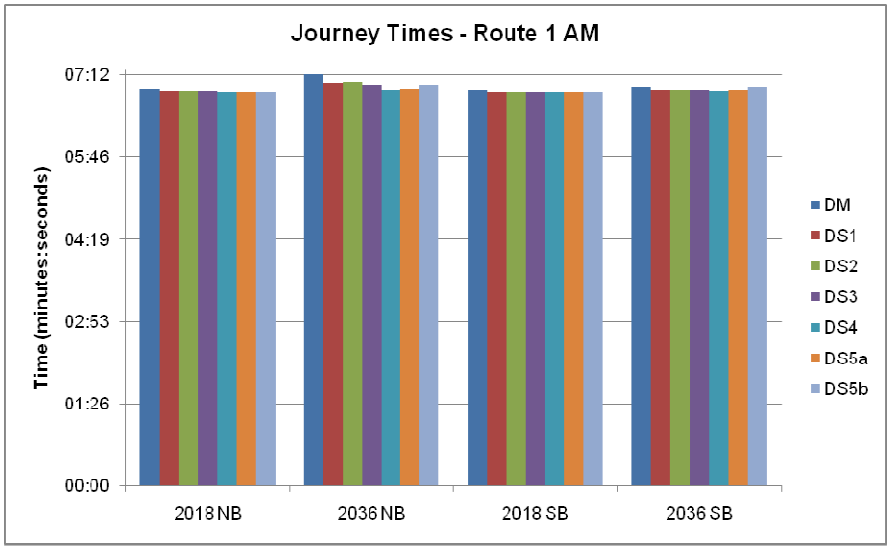
Patronage on Red Route 9 did not significantly increase after the new infrastructure improvements were put in, but in the two months after the marketing work, the number of bus passengers went up by 28%. Figures for December 2003 indicated an overall patronage increase of 42%. As in Perth, this suggests that promotion and marketing can greatly increase the effectiveness of conventional public transport infrastructure improvements.”

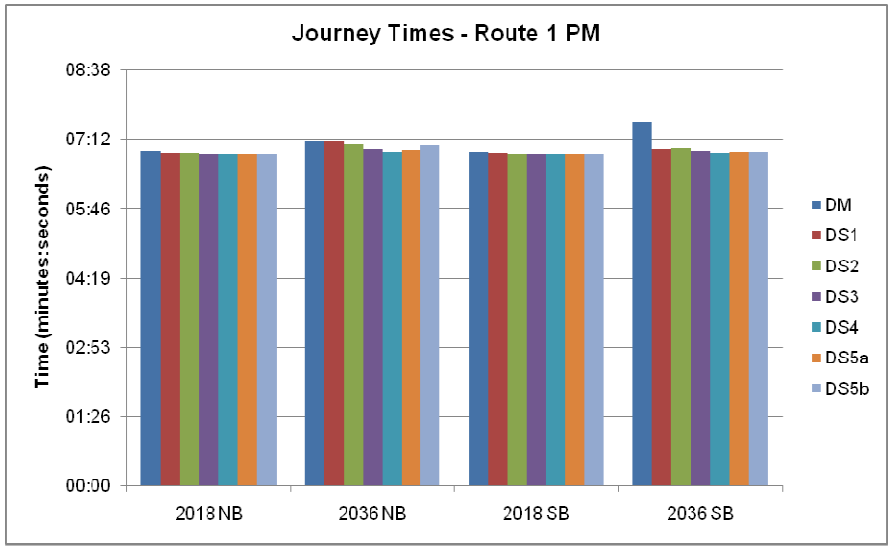
Implementation in modelling:

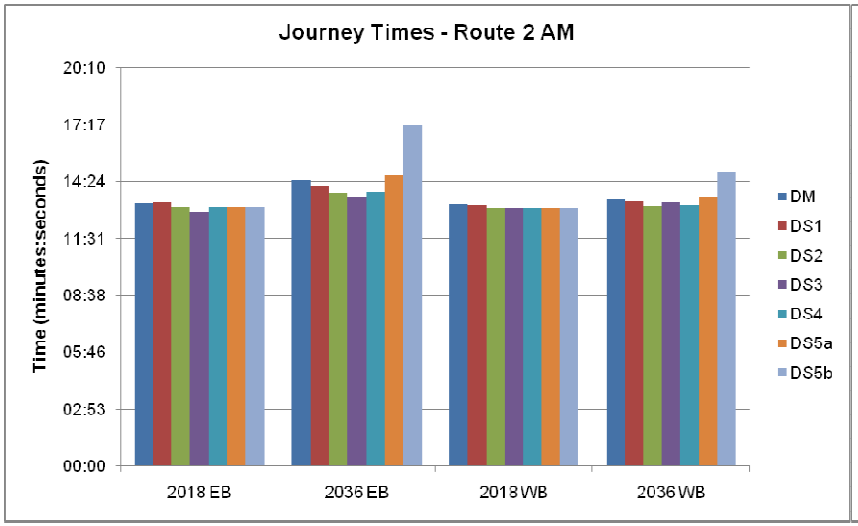
Reductions to car demand applied as part of package of public transport measures.

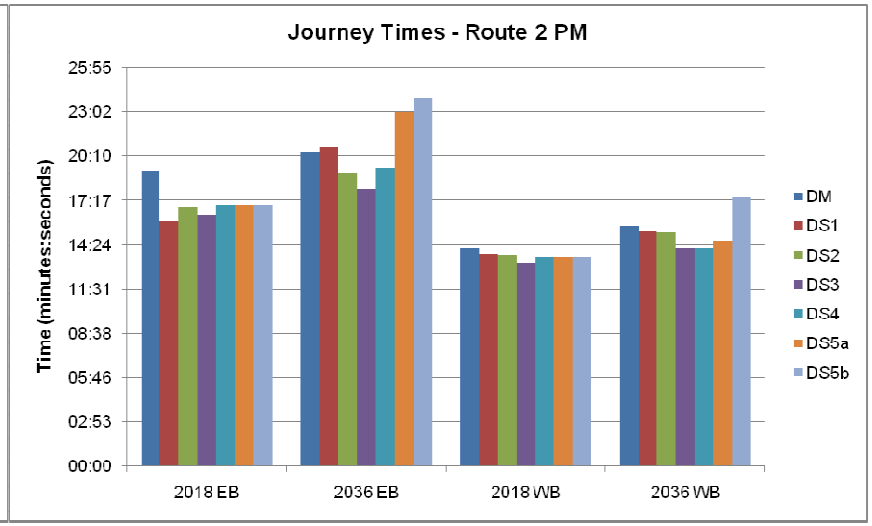
Appendix C – Model Outputs

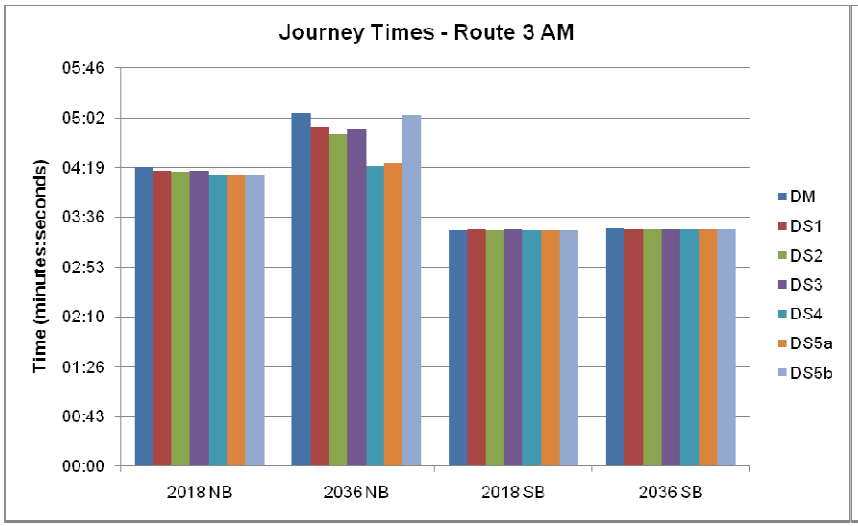
Journey time graphs

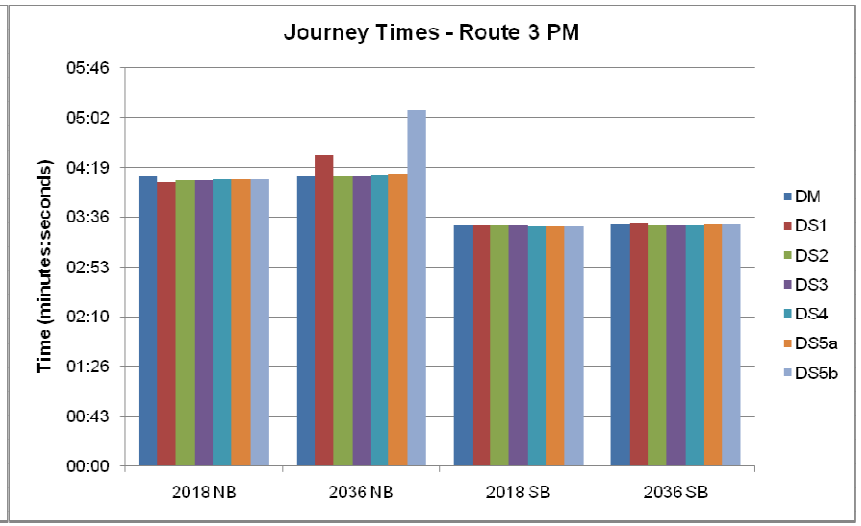





Journey Times - Route 2 AM
Time (minutes:seconds)
20:10
17:17
14:24
11:31
08:38
05:46
02:53
00:00
2018 EB
2036 EB
2018 WB
2036 WB
DM
DS1
DS2
DS3
DS4
DS5a
DS5b


Journey Times - Route 2 PM
Time (minutes:seconds)
25:55
23:02
20:10
17:17
14:24
11:31
08:38
05:46
02:53
00:00
2018 EB
2036 EB
2018 WB
2036 WB
DM
DS1
DS2
DS3
DS4
DS5a
DS5b


Journey Times - Route 3 AM
Time (minutes:seconds)
05:46
05:02
04:19
03:36
02:53
02:10
01:26
00:43
00:00
2018 NB
2036 NB
2018 SB
2036 SB
DM
DS1
DS2
DS3
DS4
DS5a
DS5b


Journey Times - Route 3 PM
Time (minutes:seconds)
05:46
05:02
04:19
03:36
02:53
02:10
01:26
00:43
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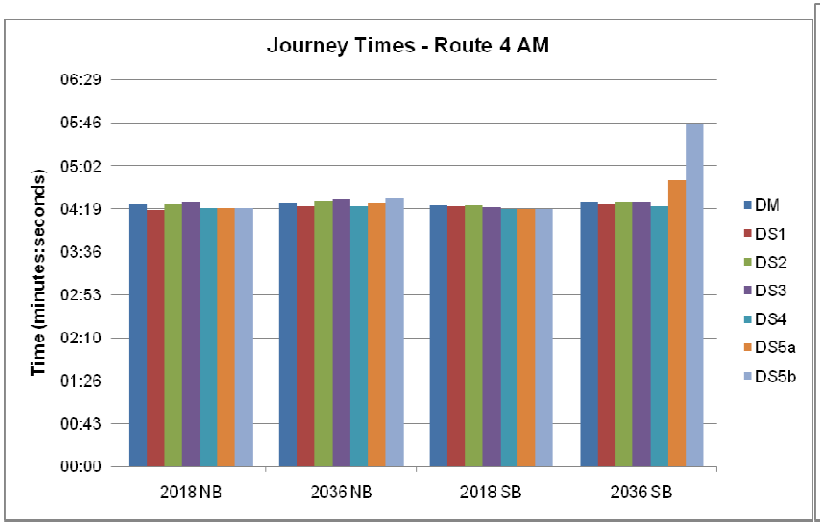
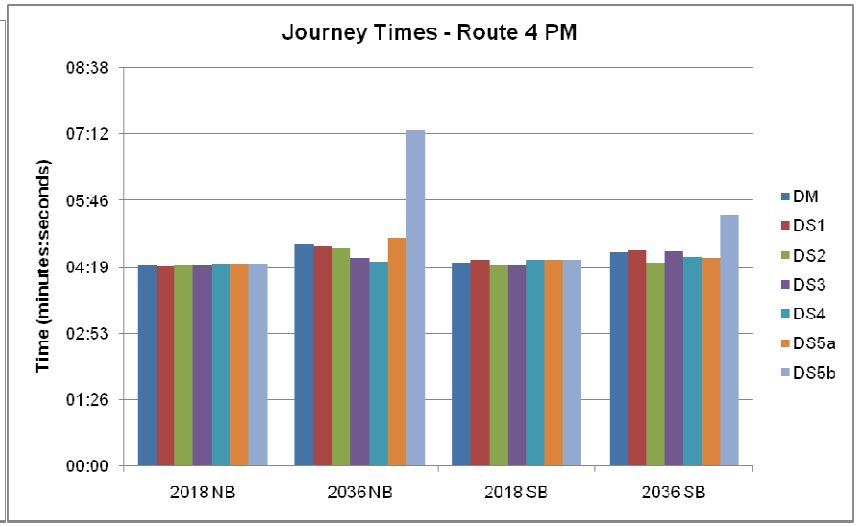
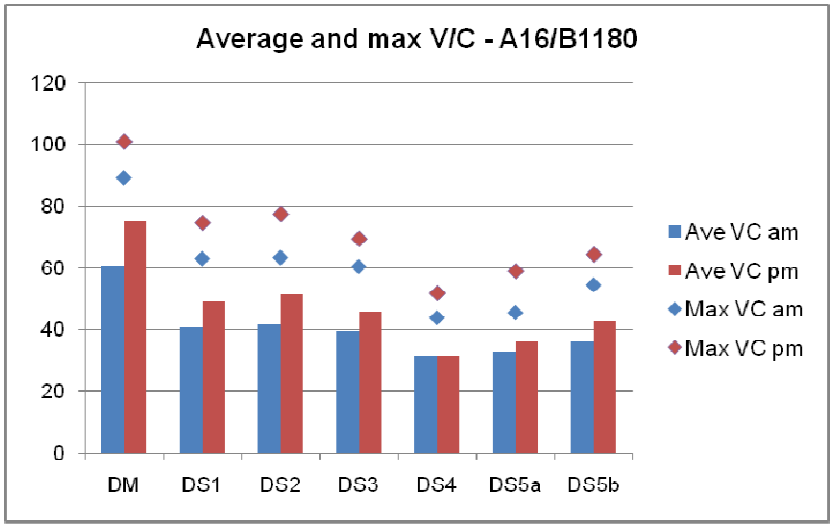
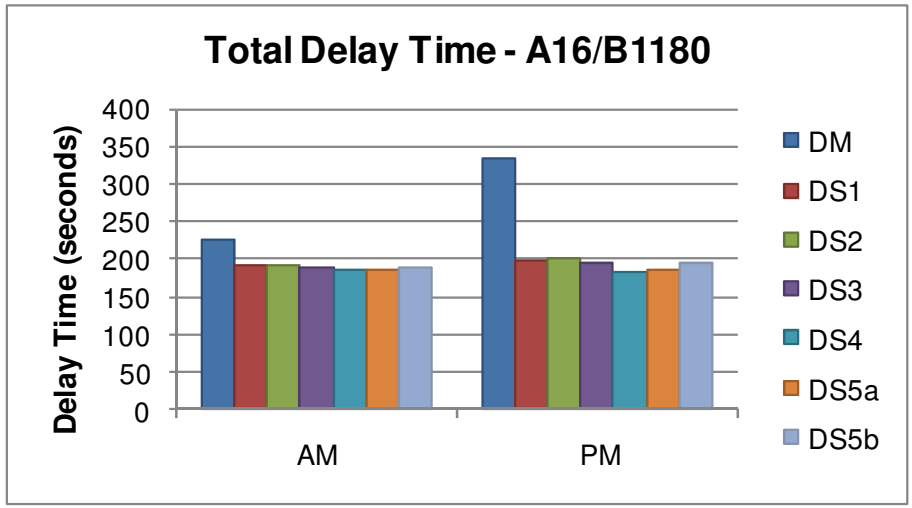
2018 SB
2036 SB
DM
DS1
DS2
DS3
DS4
DS5a
DS5b

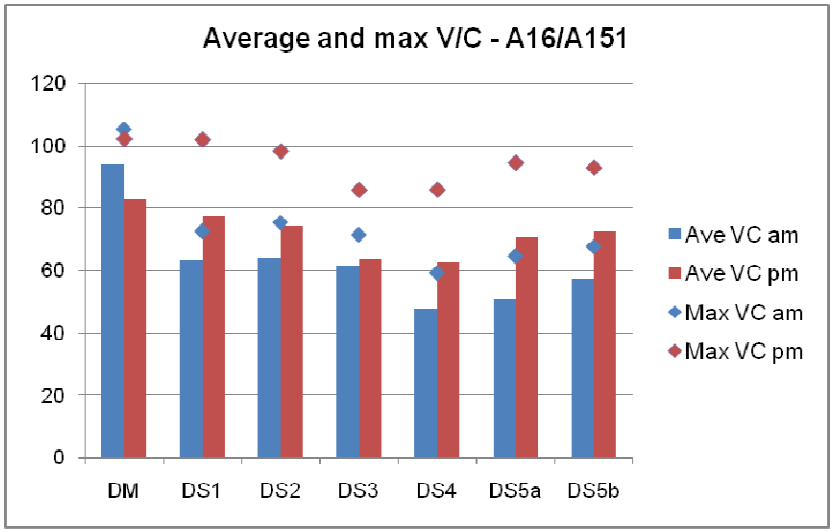


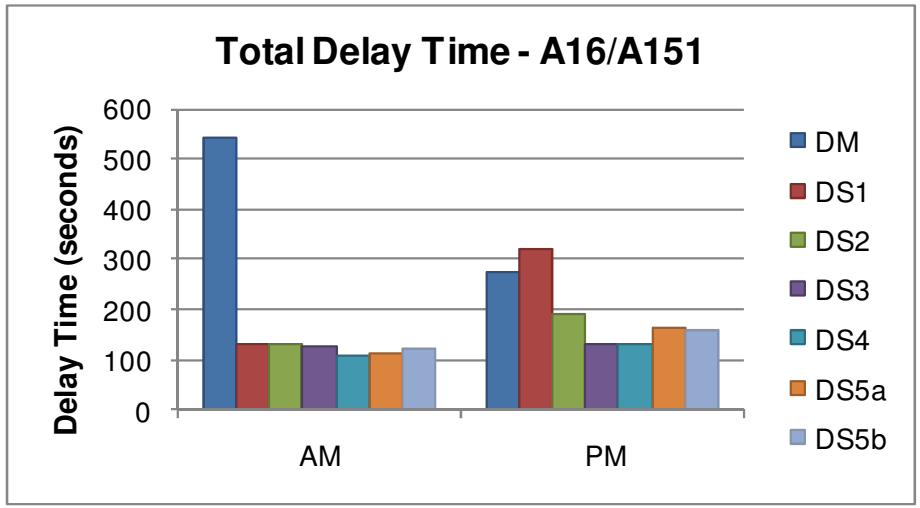


Junction Performance – V/C and delay


Average and max V/C - A16/B1180
120
100
80
60
40
20
0
DM
DS1
DS2
DS3
DS4
DS5a
DS5b
Ave VC am
Ave VC pm
Max VC am
Max VC pm


Total Delay Time - A16/B1180
Delay Time (seconds)
400
350
300
250
200
150
100
50
0
AM
PM
DM
DS1
DS2
DS3
DS4
DS5a
DS5b


Average and max V/C - A16/A151
120
100
80
60
40
20
0
DM
DS1
DS2
DS3
DS4
DS5a
DS5b
Ave VC am
Ave VC pm
Max VC am
Max VC pm


Total Delay Time - A16/A151
Delay Time (seconds)
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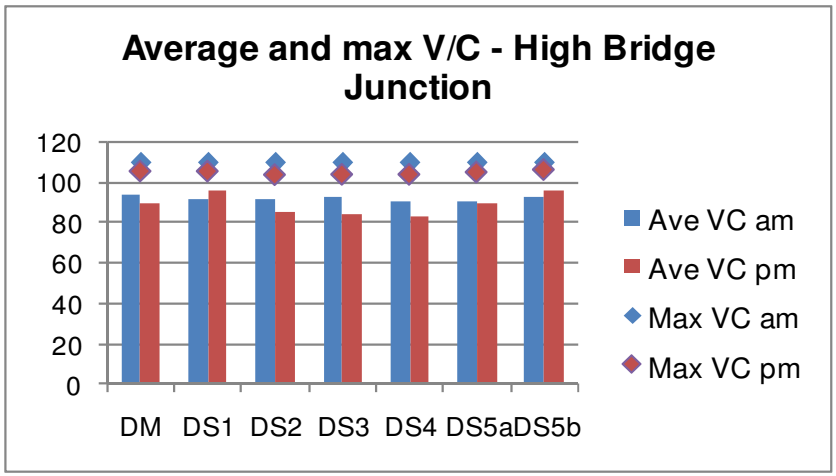
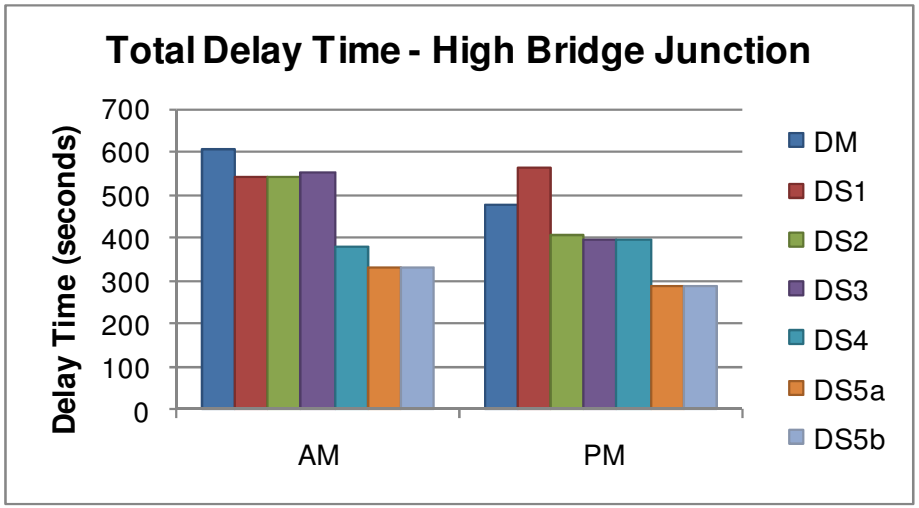
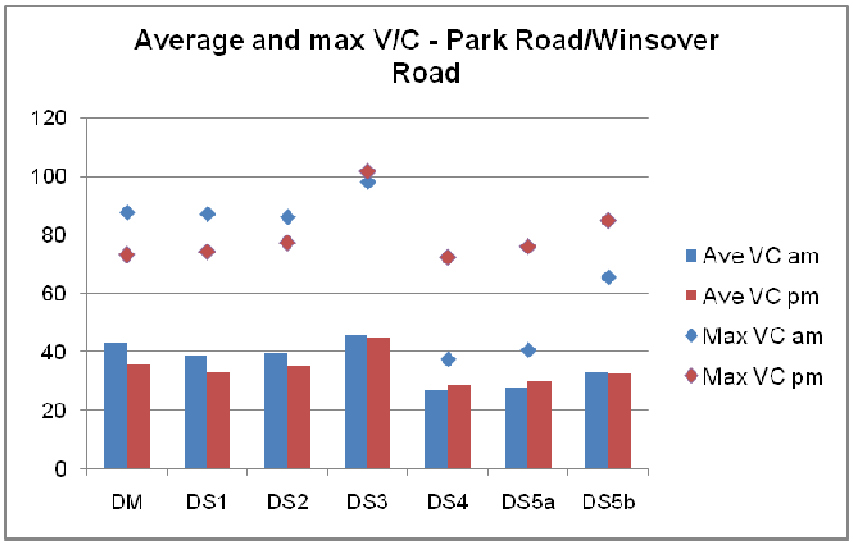
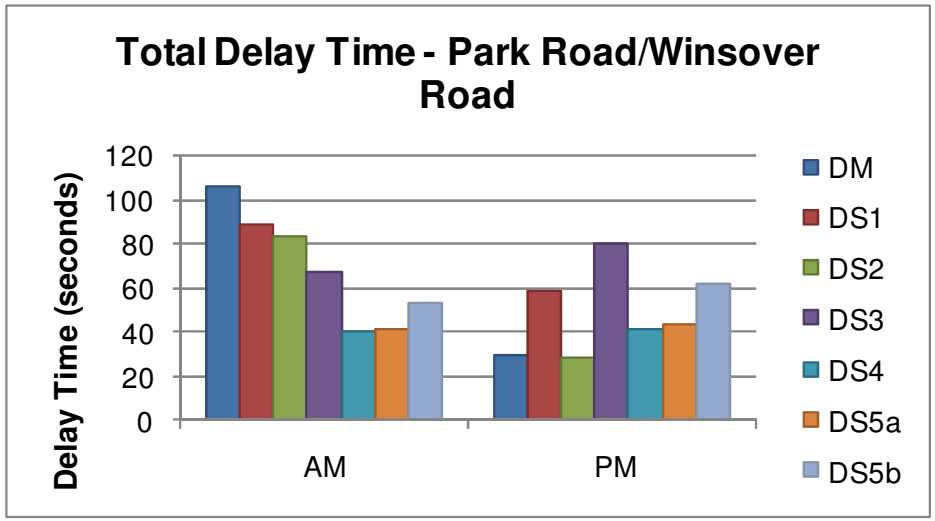
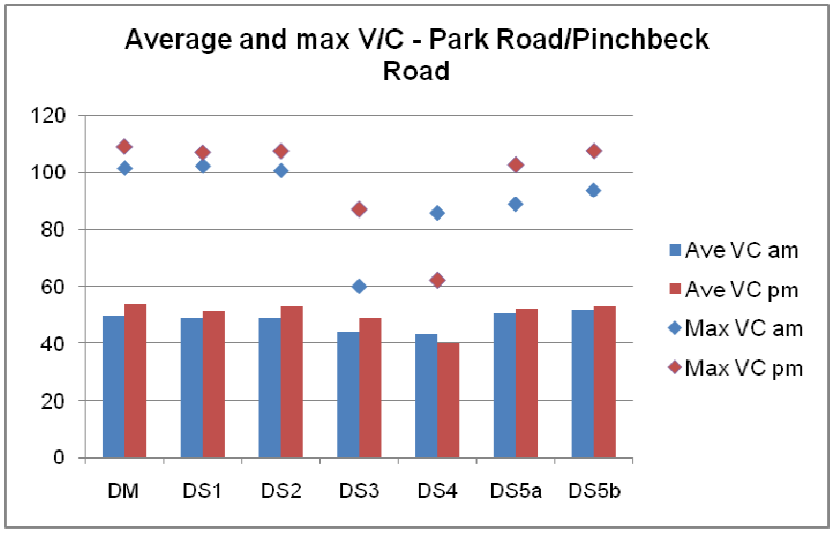
500
400
300
200
100
0
AM
PM
DM
DS1
DS2
DS3
DS4
DS5a
DS5b

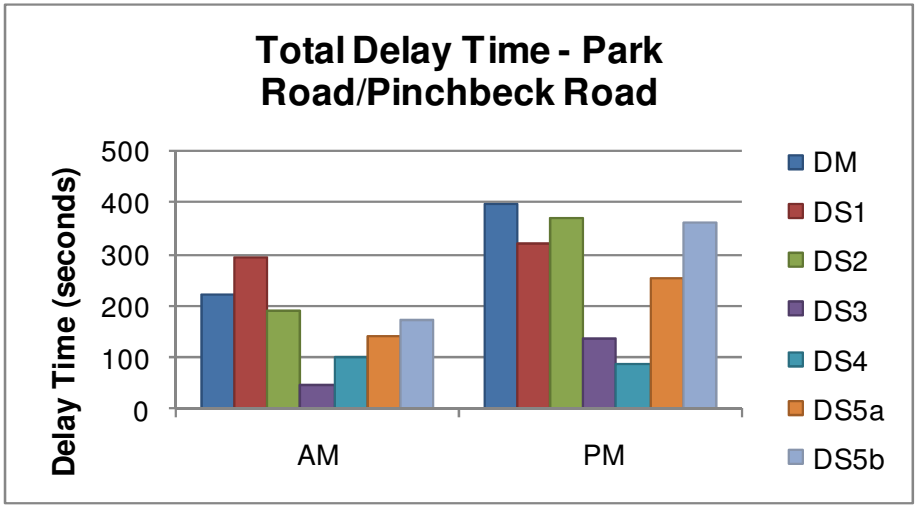

Average and max V/C - High Bridge Junction
120
100
80
60
40
20
0
DM
DS1
DS2
DS3
DS4
DS5a
DS5b
Ave VC am
Ave VC pm
Max VC am
Max VC pm

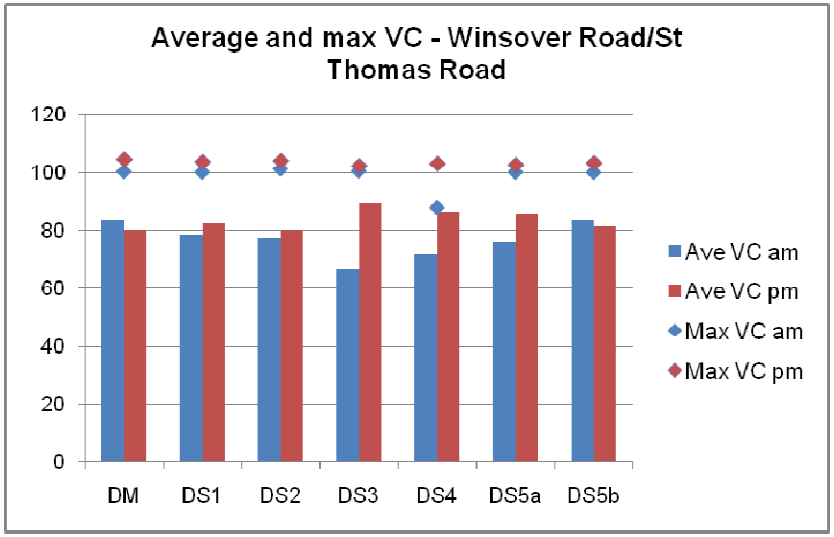

Total Delay Time - High Bridge Junction
Delay Time (seconds)
700
600
500
400
300
200
100
0
AM
PM
DM
DS1
DS2
DS3
DS4
DS5a
DS5b

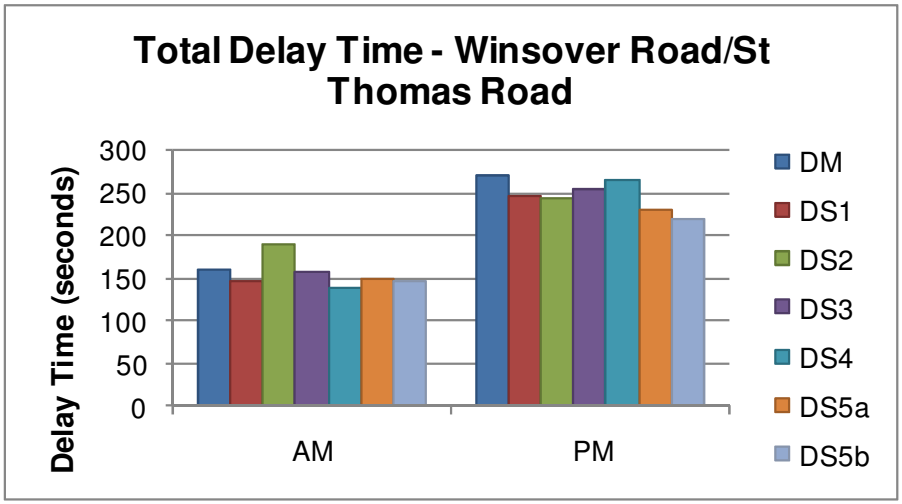

Average and max V/C - Park Road/Winsover Road
120
100
80
60
40
20
0
DM
DS1
DS2
DS3
DS4
DS5a
DS5b
Ave VC am
Ave VC pm
Max VC am
Max VC pm


Total Delay Time - Park Road/Winsover Road
Delay Time (seconds)
120
100
80
60
40
20
0
AM
PM
DM
DS1
DS2
DS3
DS4
DS5a
DS5b


Average and max V/C - Park Road/Pinchbeck Road
120
100
80
60
40
20
0
DM
DS1
DS2
DS3
DS4
DS5a
DS5b
Ave VC am
Ave VC pm
Max VC am
Max VC pm


Total Delay Time - Park Road/Pinchbeck Road
Delay Time (seconds)
500
400
300
200
100
0
AM
PM
DM
DS1
DS2
DS3
DS4
DS5a
DS5b


Average and max VC - Winsover Road/St Thomas Road
120
100
80
60
40
20
0
DM
DS1
DS2
DS3
DS4
DS5a
DS5b
Ave VC am
Ave VC pm
Max VC am
Max VC pm


Total Delay Time - Winsover Road/St Thomas Road
Delay Time (seconds)
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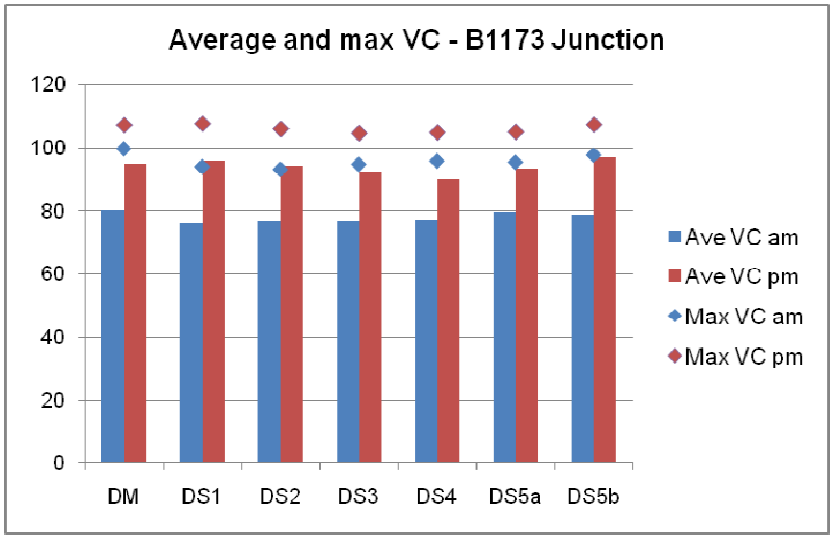
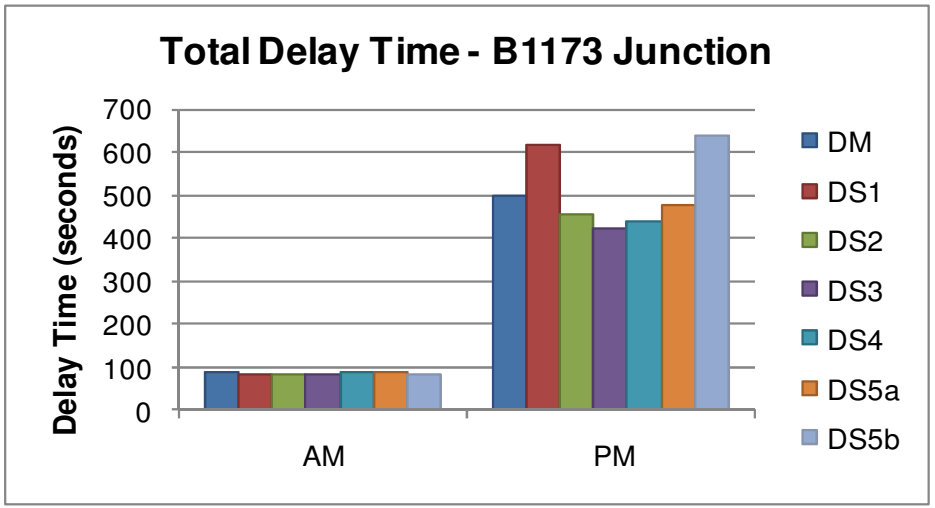
250
200
150
100
50
0
AM
PM
DM
DS1
DS2
DS3
DS4
DS5a
DS5b


Average and max VC - B1173 Junction
120
100
80
60
40
20
0
DM
DS1
DS2
DS3
DS4
DS5a
DS5b
Ave VC am
Ave VC pm
Max VC am
Max VC pm


Total Delay Time - B1173 Junction
Delay Time (seconds)
700
600
500
400
300
200
100
0
AM
PM
DM
DS1
DS2
DS3
DS4
DS5a
DS5b

We have used our reasonable endeavours to provide information that is correct and accurate and have discussed above the reasonable conclusions that can be reached on the basis of the information available. Having issued the range of conclusions it is for the client to decide how to proceed with this project.