

# Sleaford Regeneration Area Modelling

**Traffic Modelling Report – Inter-Peak Model**



March 2016

## Document Control Sheet

Project Title	Sleaford Regeneration Area Modelling
Report Title	Traffic Modelling Report – Inter-Peak Model
Revision	B
Status	Final
Control Date	14/03/2016

### Record of Issue

Issue	Status	Author	Date	Check	Date	Authorised	Date
A	Draft	NSS	03/03/2016	PR	03/03/2016	PR	03/03/2016
B	Final	NSS	14/03/2016	PR	14/03/2016	PR	14/03/2016

### Distribution

Organisation	Contact	Copies
Lincolnshire County Council	Lee Rowley	Electronic
North Kesteven District Council	Deborah Roberts	

*This Report is presented to Lincolnshire County Council in respect of Sleaford Regeneration Area Modelling and may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this Report.*

*Notwithstanding anything to the contrary contained in the Report, Mouchel Limited working as Lincolnshire County Council Highways Alliance is obliged to exercise reasonable skill, care and diligence in the performance of the services required by Lincolnshire County Council and Mouchel Limited shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.*

*This Lincolnshire County Council Highways Alliance Report has been prepared by Mouchel Limited. No individual is personally liable in connection with the preparation of this Report. By receiving this Report and acting on it, the client or any other person accepts that no individual is personally liable whether in contract, tort, for breach of statutory duty or otherwise.*

## Contents

<b>1</b>	<b>Introduction.....</b>	<b>1</b>
<b>2</b>	<b>Methodology .....</b>	<b>2</b>
<b>3</b>	<b>Proposed and Committed Developments .....</b>	<b>8</b>
<b>4</b>	<b>Highway Impacts .....</b>	<b>11</b>
<b>5</b>	<b>Summary and Conclusions.....</b>	<b>15</b>

### Appendices

**Appendix A – Summary of Network Changes**

**Appendix B – Correspondence from Network Rail**

**Appendix C – TRICS Outputs for Proposed Development**

**Appendix D – Traffic Flow Diagrams**

## Table of Figures

Figure 2-1 – Journey Time Routes.....	7
Figure 3-1 – Location of Developments .....	8

## Tables

Table 2-1 – Growth Factors Summary – Inter-Peak Hour .....	3
Table 3-1 – Indicative Alternative Development on Tesco – Vehicle Trip Generation.....	9
Table 3-2 – Committed/Proposed Development – Vehicle Trip Generation.....	10
Table 4-1 – Network Performance – Inter-Peak Hour – 2022.....	11
Table 4-2 – Network Performance – Reference Case AM & PM Peak Hour – 2022.....	11
Table 4-3 – Journey Time – Inter Peak (mm:ss) – 2022.....	13
Table 5-1 – Network Performance Percentage Change – Inter Peak – 2022 .....	15
Table 5-2 – Network Statistic Comparison – Inter peak Peak – 2022.....	16
Table 5-3 – Comparison of results between Inter-Peak and AM and PM Peak for Options 9a &9b.....	17

# 1 Introduction

## 1.1 Background

Mouchel Consulting, working as part of Lincolnshire County Council Highways Alliance, has been appointed by the County Council (LCC) and North Kesteven District Council (NKDC) to undertake traffic modelling using Sleaford Traffic Model to help gain an understanding of various access strategies for the Sleaford Regeneration Area following the withdrawal of proposals for a new Tesco development.

## 1.2 Purpose of the Report

The purpose of this report is to present the findings of supplementary traffic modelling undertaken to investigate the potential traffic impacts of pedestrianizing Southgate during the period between the AM and PM peak hours (the 'Inter-peak' period).

A previous report, *Sleaford Regeneration Area Modelling – Traffic Modelling Report (October 2015)*, presented the findings of the main traffic modelling exercise which assessed various access strategies discussed during a meeting on 6<sup>th</sup> March 2015 between representatives from LCC and NKDC and contained in the subsequently provided brief.

## 1.3 Structure of the Report

Following on from this introduction, Section 2 describes the methodology and tools used to undertake the traffic modelling. Section 3 outlines the details of the proposed developments and changes to the highway network assessed through this modelling study. Section 4 describes the outputs from the traffic modelling in terms of the impact of the developments and changes on the highway network as a whole and on specific junctions. Finally, Section 5 presents a summary of the report and conclusions.

## 2 Methodology

### 2.1 Traffic Impact

The potential traffic impact of the various strategies can only be robustly assessed through the comparison of highway network operation before and after the implementation of the measures and the associated developments. This comparison can only be made through the use of traffic modelling at both a strategic and local level. For the purposes of this assessment, the Sleaford Traffic Model has been used to assess the traffic impact on the highway network as a whole within Sleaford and the immediately surrounding area.

It should be noted that no engineering assessment has been undertaken for the options being considered.

### 2.2 Traffic Model

The current base model for AM and PM peak hour for Sleaford, used in this commission, was developed in 2013 and was validated to observed traffic flows for the same year. Mouchel was commissioned to develop an Inter-peak (IP) model which can be used to assess the Inter-peak hours for the scenarios listed in section 2.4.

### 2.3 Traffic Forecasting

Demand matrices for the forecasting models have been derived by merging the background traffic matrices with the development traffic matrices.

TEMPRO growth factors have been applied to the calibrated base year matrices at the origin-destination level to create background traffic matrices.

Development trip matrices have been developed by estimating trip generation of developments by land use and applying trip distributions from a set of donor zones with similar land uses. The development trips information was procured from earlier studies submitted to LCC as part of the impact assessment of the South East Sleaford Regeneration Route (SESRR) phase 1 and 2 and other developments.

The model development process considers one forecast year scenario (2022) for the Inter-peak hour assessment. The 2022 forecast traffic levels were estimated by applying growth factors to the 2013 base model matrices. These growth factors were derived from the Department for Transport's TEMPRO program (Trip End Model Presentation Program) Version 6.2.

The overall traffic growth between the 2013 base year and 2022 forecast year in the Inter-peak hour model has been capped to TEMPRO (dataset 6.2). The growth factors summarised in the following table below (split by region and trip purpose) were used to derive the overall TEMPRO growth.

Table 2-1 – Growth Factors Summary – Inter-Peak Hour

Trip Purpose	Region	Inter Peak Hour			
		Origin		Destination	
Commuter Home Based and Non-Home Based	GB	1.059	5.90%	1.059	5.90%
	Lincs	1.0415	4.15%	1.0424	4.24%
	Sleaford	1.0515	5.15%	1.0515	5.15%
Other Employers Business and Non-Home Based	GB	1.1125	11.25%	1.1125	11.25%
	Lincs	1.1169	11.69%	1.1166	11.66%
	Sleaford	1.1267	12.67%	1.1264	12.64%
All Other Home Based and Non-Home Based	GB	1.0695	6.95%	1.0695	6.95%
	Lincs	1.049	4.90%	1.0485	4.85%
	Sleaford	1.0577	5.77%	1.0579	5.79%

Source: TEMPRO 6.2

The overall levels of traffic growth for between 2013 and 2022 generated by TEMRO for the IP hour was 7.6%.

The traffic forecasts do not make any adjustments for potential mode shift as a result of transport policy interventions. Furthermore, it has been assumed that the full forecast increases in traffic will occur in the peak periods and no account of the potential for peak spreading has been taken (peak spreading occurs when drivers alter their travel patterns to avoid the congested peak hours resulting in traffic growth occurring outside of the peaks and the peak periods therefore lengthening in time).

## 2.4 Assessment Methodology

The assessment considers one forecast year – 2022 for the Inter-peak hour assessments. The assessment of the Sleaford Regeneration Area options can be split in into the following three parts:

### 2.4.1 Part A – Reference Case Scenarios

The Reference Case (Do-minimum) represents the future situation which includes all the trips from the committed and proposed developments along with their associated highway improvements. This scenario provides the assumed future situation without any of the options implemented and enable the ‘with options’ (Do-Something) scenarios to be assessed against the scenario when none of the options have been implemented.

Reference Case include the following committed/proposed developments along with their associated highway improvements.

- King Edward Street



- Holdingham and alterations to A15/A17 (Holdingham Roundabout)
- Bass Maltings
- Sleaford South (Handley Chase)
- Sleaford West
- Grantham Road (both residential and employment)
- Pride Parkway
- Albourne development – alternative proposals for the Tesco site

Reference Case include the following changes to the existing highway network associated with the committed developments:

- Holdingham Roundabout Improvements
- Mareham Lane/Maltings Way traffic signals
- Carre Street traffic signals
- New four arm roundabout on Grantham Road associated with development either side of Grantham Road
- New four arm roundabout on A15 associated with the Sleaford West development
- Network changes associated with Sleaford South Development (site access)
- Proposed changes to the downtimes for railway crossings on South Gate and King Edward Street.

#### 2.4.2 *Do-Something Test Scenarios*

The following options, assessed for the Inter-peak hour, constitute the Do-Something test scenarios (see Appendix A for diagrammatic representations of these options:

- Do-Something Option 9a – No Link Road (SESRR Phase 1) over railway. Access to Bass Maltings development via Mareham Lane. South Gate level crossing remains open. South Gate is pedestrianised between South Gate and Water Gate. Access to Jermyn Street maintained with South Gate operating as a two-way 'access only' link between Boston Road and Jermyn Street.
- Do-Something Option 9b – No Link Road (SESRR Phase 1) over railway. Access to Bass Maltings development via Mareham Lane. South Gate level

crossing remains open. South Gate is pedestrianised between South Gate and East Gate. Access to Jermyn Street maintained with South Gate operating as a two-way 'access only' link between Boston Road and Jermyn Street.

The Do-Something (DS) scenarios include all the committed/proposed developments along with their associated highway changes.

It should also be noted that a number of the individual elements included in the various scenarios could have significant impacts on the local highway network if implemented alone. Therefore, caution should be used when reviewing the outputs of the following analysis and in attributing impacts to any one of the component elements of the various scenarios.

#### 2.4.3 *Level Crossing Downtimes*

The Sleaford Traffic Base Model utilises level crossing downtime data from surveys undertaken in 2013. Network Rail has plans to change the level crossings at South Gate and King Edward Street from manual to automatic barriers and has provided the future estimated downtimes for both level crossings to allow for the options in this study to be appropriately modelled for the future situation.

Network Rail estimates that the downtime will increase to 5 minutes for eastbound trains and to around 3.5 minutes for westbound trains. For simplicity, the average future downtime in both directions has been calculated and used in the traffic modelling. An average downtime of 4.25 minutes per train has been used in the various modelling scenarios.

Network Rail has stated that, as a worst case, it estimates that a total of nine trains will pass through the level crossings per hour (both directions combined). The total downtime is applied pro rata to a 100second signal cycle.

These changes in crossing downtimes represent a very significant increase in delays and amount to the two crossings being closed for over 38 minutes in every hour. However, Network Rail has indicated that this is likely to be a worst case.

A summary of the information provided by Network Rail is included in Appendix B

## 2.5 **Assessment of Highways impact**

The average Inter-peak hour for a typical weekday have been assessed using the following model outputs:

- Overall Network Performance Statistics;
- Traffic Flows;
- Journey Time data

- Junction delay

#### 2.5.1 Overall Traffic Model Network Performance Statistics

The indicators of overall network performances are as follows:

- Total Travel Time – Total journey time of all vehicles during the modelled period;
- Transient Queuing – Queues that occur at junctions operating within their designed capacity; for example vehicles stopping momentarily at a give-way line or during one traffic signal cycle;
- Over-Capacity Queuing – Queues that occur due to there being more traffic than there is network capacity to deal with; for example traffic can then be held for more than one cycle at a traffic signal junction;
- Total Trips on Network – The total number of vehicles on the network modelled in detail.

#### 2.5.2 Traffic Flows

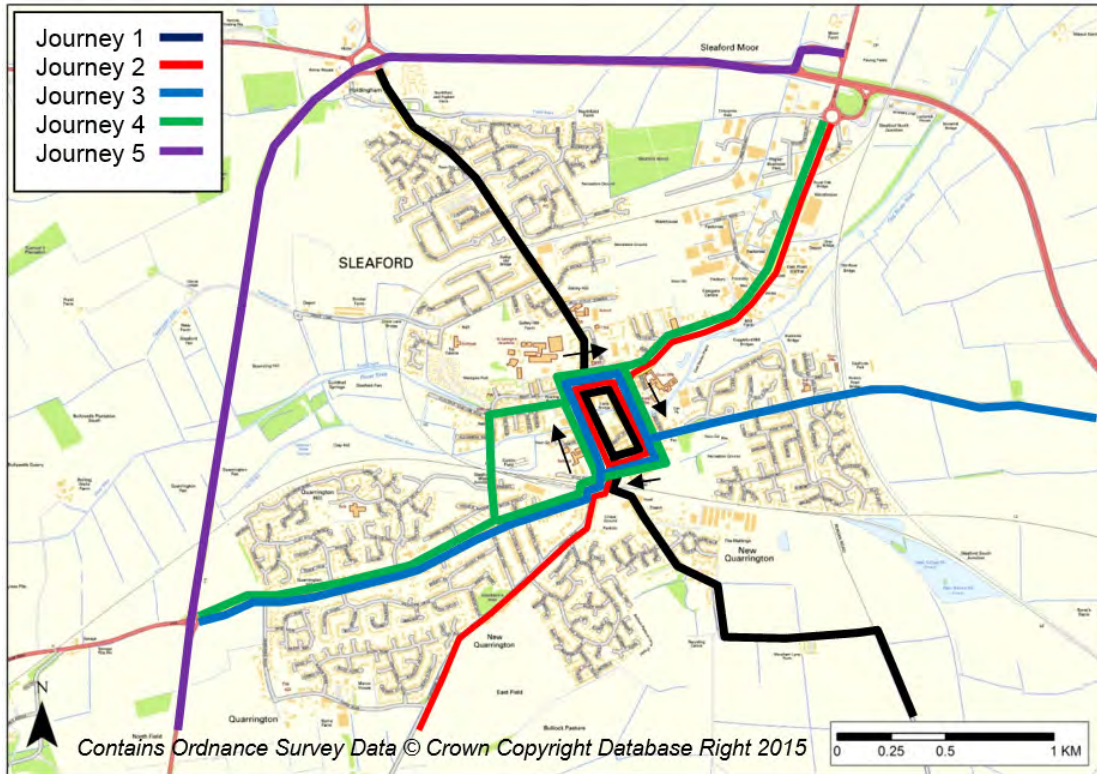
Traffic flow diagrams from the traffic model are presented in Appendix D, showing traffic flows for the town centre for all the scenarios for both the AM and PM peaks.

#### 2.5.3 Journey Times

Five journey time routes were developed for the purposes of validating the SATURN Base Model. These have been used to compare the different scenarios in terms of their impact on journey times through the highway network but do not represent all journey options available.

The five journey time routes are shown on Figure 2-1 below.

Figure 2-1 – Journey Time Routes



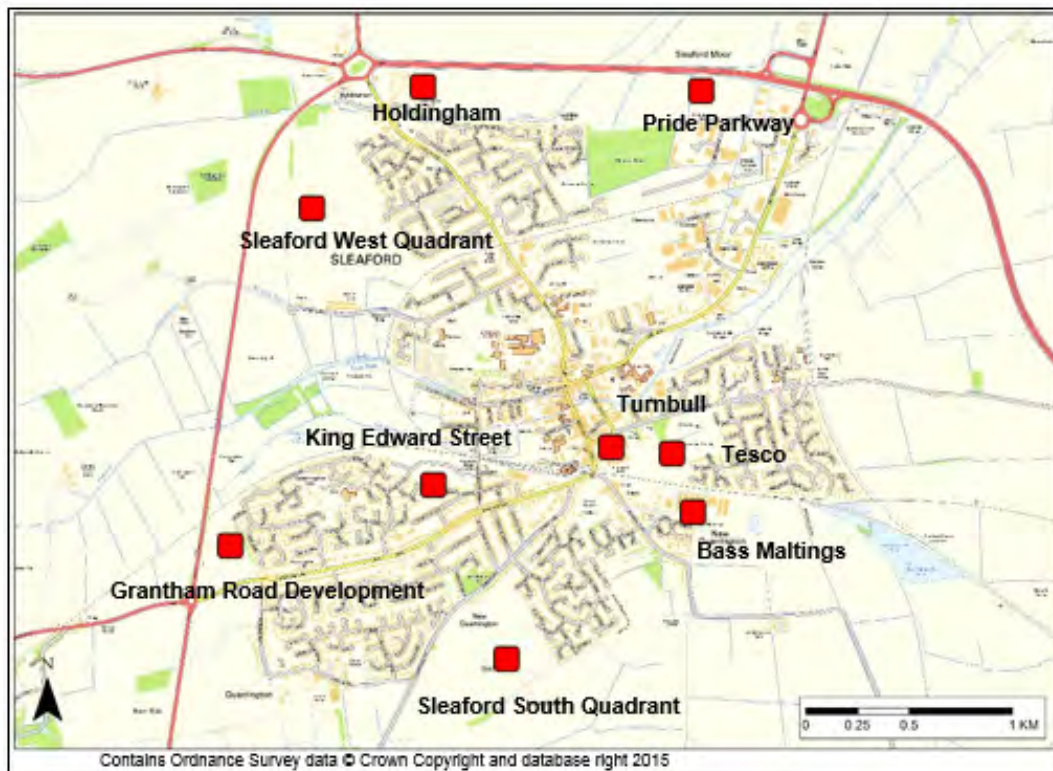
## 3 Proposed and Committed Developments

### 3.1 Background

Following the decision of Tesco not to pursue its consented development in Sleaford, Tesco has suggested that another proposal could provide an alternative for the future development of the site. The site in question currently remains in the ownership of Tesco.

Figure 3-1 below shows the locations of the various committed and proposed developments.

Figure 3-1 – Location of Developments



### 3.2 Description of Proposed Development

A potential alternative option to the consented Tesco scheme has been suggested and this has been used as the basis upon which to calculate vehicle trip generation for the site. The development quantum set out below has been used as the basis to assess vehicular trip generation for the Tesco site:

- Retail (non-food) approx. 57,500ft<sup>2</sup>;
- Drive through restaurant
- Retirement Homes (approx. 36-40);
- Residential developments (high density houses or flats);

- Family pub /restaurant; and,
- possibility of development shops with flats above (approx. 15-20,000ft<sup>2</sup>);

Access to the Tesco site will be taken from the SESRR or Boston Road and may potentially involve re-alignment of the northern section of the SESRR where it forms a junction with Boston Road. As no indicative plans showing the potential realignment are available, this has not been taken into account in the current model runs and would have only limited impact on the outputs from the model. It is understood that the potential realignment may hinder the development of SESRR Phase 2.

The number of vehicular trips expected to be generated by the potential alternative option for developing the Tesco site is based on analysis using the TRICS database and is shown in the table below. Appendix C shows the detailed TRICS assessment reports.

Table 3-1 – Indicative Alternative Development on Tesco – Vehicle Trip Generation

Development	Land Use	Trip Generation (PCUs per Hour)		
		Inter Peak Vehicle Trips		
		In	Out	Total
Retirement homes	Residential	3	4	7
Flats (privately owned)	Residential	3	3	6
Retail Park (non-food)	Residential	26	26	52
Drive-thru restaurant	Restaurant	31	31	62
Public House	Restaurant	8	7	15

### 3.3 Committed and Proposed Developments

The following committed and proposed developments are included for all the assessment scenarios.

- Holdingham and alterations to A15/A17 (Holdingham Roundabout)
- Bass Maltings
- Sleaford South (Handley Chase)
- Sleaford West
- Grantham Road (both residential and employment)
- Pride Parkway
- King Edward Street

The trips rates for these committed/proposed developments have been obtained from previous work undertaken to assess the SESRR scheme and are summarised below.

*Table 3-2 – Committed/Proposed Development – Vehicle Trip Generation*

Development Site	Inter peak		
	In	Out	Total
Holdingham	70	69	139
Bass Maltings	118	109	227
Sleaford South (Handley Chase)	359	344	703
Sleaford West	434	426	860
Grantham Road	124	130	254
Pride Parkway	123	132	255
King Edward Street	25	24	49
<b>Total</b>	<b>1,253</b>	<b>1,234</b>	<b>2,487</b>

These trips have been accounted for when calculating the traffic growth in the Sleaford model while ensuring that the total number of trips in the forecast matrices does not exceed the overall TEMPRO growth forecast.

In addition to the above developments, consideration was given to any proposals for the current Turnbull’s site on South Gate. No specific details of any future land use proposals have been provided by or on behalf of Turnbull. However, it has been indicated that any future development of the site is likely to have less traffic impact than the current use. It has therefore been assumed, for the purposes of the modelling, that the current land use, and therefore trip generation already included in the base model, represents a worst case for the traffic generation of the site and no amendments have been made in the Reference or Do-Something scenarios.

## 4 Highway Impacts

This section summarises the outputs from the modelling of Reference Case and Options 9a and 9b.

The statistics in this section compare the modelling results for each option to Reference Case and figures highlighted in green denote an improvement in performance and red a worsening of performance.

### 4.1 Overall Traffic Model Network Performance Statistics

Table 4-1 below summarises the overall network performance statistics as generated by the model for each option for the Inter-peak peak hour in year 2022. Of primary interest in this table are the figures for over-capacity queuing which indicate the amount of time spent by traffic queuing at junctions operating above their capacity. It can be seen that pedestrianisation of Southgate would significantly increase total travel distance, travel time and over-capacity queuing.

Table 4-1 – Network Performance – Inter-Peak Hour – 2022

Scenario	Total Distance Travelled (pcu km)	Total Travel Time (pcu hr)	Transient Queueing (pcu hr)	Over Capacity Queueing (pcu hr)	% Change in Over Capacity Queueing
Reference Case	36,311.30	850.50	205.1	44.8	-
Option 9a	38,818.00	972.90	218.9	108.2	141%
Option 9b	39,629.90	1,091.00	215.9	205.2	358%

Note: The data contained in the table are presented as passenger car units (pcus) as per the industry standard methodology. The data contained in the table refer to the simulated time periods only.

However, as can be seen in the Table 4-2 below, the general performance of the road network in the inter-peak period is better than either the AM or PM peak hours. The inter-peak period continues to operate better than the AM and PM peak hours even with the implementation of either Options 9a or 9b.

Table 4-2 – Network Performance – Reference Case AM & PM Peak Hour – 2022

Scenario	Total Distance Travelled (pcu km)	Total Travel Time (pcu hr)	Transient Queueing (pcu hr)	Over Capacity Queueing (pcu hr)	Total Trips on Network (pcu)
AM peak hour	46,903.8	1,519.7	393.1	293.6	69,577.5
PM peak hour	45,163.3	1,470.2	392.9	258.4	67,876.1

### 4.2 Changes in Traffic Flows

Traffic flow diagrams from the traffic model are presented in Appendix D, showing traffic flows for the town centre for all the scenarios for both the AM and PM peaks.



### 4.3 Journey Times

Journey times for selected routes across Sleaford have been compared between the Reference Case and Do-Something Scenarios. The five routes are shown on Figure 2-1 in Section 2 above. For the majority of the journeys made on these routes, drivers will have a choice of routes with the A15/A17 bypass being a realistic alternative in many cases.

In the case of Option 9a, due to the pedestrianisation of Southgate, the journey time routes for northbound traffic within the town use the King Edward Street/Castle Causeway corridor. For Option 9b, not northbound route will be available within the town, therefore, journey times have not been measured. The routes of journeys southbound through the town are unaffected by pedestrianisation of Southgate in either Option 9a or 9b.

A number of the routes show considerable increases in journey times between the options and the Reference Cases, resulting from greater journey distance, greater delays at some existing junctions and the need to pass through a number of new junctions, each of which will individually cause some delay.

The following table compares the journey times for Reference Case with the various option scenarios assessed as part of the LCC assessment options, for the Inter-peak. Times highlighted in red show worsening of performance compared to Reference Case.

With the exception of Journey 5, the routes used in this analysis pass through the town centre, either via South Gate or King Edward Street level crossings. Option 9b will result in changes to the highway network that prevent routes passing through the town centre in the northbound direction across the level crossings; these routes have therefore been discounted from the analysis for Option 9b.

Table 4-3 – Journey Time – Inter Peak (mm:ss) – 2022

Route	Dir	Scenarios					
		Ref Case AM	Ref Case PM	Ref Case IP	9a	9b	
1	Mareham Lane to Holdingham Roundabout	SE – N	22:49	20:22	14:12	20:40 <sup>1</sup>	N/A
	Holdingham Roundabout to Mareham Lane	N – SE	24:09	28:34	17:17	24:10	26:54
2	London Road/Gorse Lane to East Road/Pride Parkway	S – NE	22:16	17:48	13:20	18:05 <sup>1</sup>	N/A
	East Road/Pride Parkway to London Road/Gorse Lane	NE – S	18:26	21:05	13:46	17:17	18:32
3	A15/Grantham Road to A17/Boston Road	W – E	23:15	19:47	14:59	19:10 <sup>1</sup>	N/A
	A17/Boston Road to A15/Grantham Road	E – W	13:46	17:05	12:04	16:04	17:39
4	A15/Grantham Road to East Road/Pride Parkway (Via King Edward Street)	W – NE	21:20	18:13	12:38	17:26 <sup>1</sup>	N/A
	East Road/Pride Parkway to A15/Grantham Road	NE – W	15:24	20:13	12:45	16:29	18:03
5	A15/London Road to A17/East Road (Via A15 and A17)	SW – NE	07:18	07:14	06:20	06:37	07:08
	A17/East Road to A15/London Road (Via A17 and A15)	NE – SW	05:36	11:49	04:43	06:08	06:22
Average Percentage Change						33%	N/A

<sup>1</sup> Journeys diverted onto King Edward Street/Castle Causeway corridor

Note: Red shading denotes a worsening of performance

Options 9a and 9b show that pedestrianisation would increase journey times on all routes and Option 9a generates an average increase in journey times on the analysed routes of 33%. However, in some cases journey times will remain lower than for the AM and PM peak reference cases.

#### 4.4 Junction Operation

Appendix E presents information on the forecast operation of a selection of junctions in and around Sleaford and compares the Reference Cases to the Do-Something Scenarios. The data presented for each junction shows the comparison of traffic flow to capacity for each turning movement. A number of over 85 indicates that the turning movement is reaching its capacity and congestion will start to occur. At over 100, the movement will be at its practical capacity.

This analysis shows that whilst the Do-Something scenarios operate less well than the Inter-peak Reference Case, in many cases they have better performance than either the AM or PM peak Reference Cases. However, the Do-Something scenarios

would result in improvements being required at some junctions including Holdingham Roundabout and the Sleaford Western Quadrant/A15 junction.

## 5 Summary and Conclusions

### 5.1 Summary

Mouchel Consulting, working as part of Lincolnshire County Council Highways Alliance, has been appointed by North Kesteven District Council (NKDC) to undertake traffic modelling using Sleaford Traffic Model to help gain an understanding of various access strategies for the Sleaford Regeneration Area following the withdrawal of proposals for a new Tesco development.

The assessment considers a forecast year of 2022 for the AM and PM peak hours. As part of the assessments in addition to the Reference Case, two options for implementing pedestrianisation of Southgate during the Inter-peak period. All options were compared with Reference Case.

In the assessments, the development trips for the Tesco site have been generated using the development quantum for the potential alternative proposals for the site. It should be noted that Tesco continues to own the site and ultimately, the development proposals will be promoted by them.

### 5.2 Summary of Results

The SATURN model for Sleaford predicts that the total travel distance, total travel time, transient and over-capacity queuing will vary depending on the nature of the interventions for each scenario.

Tables 7-1 below shows the change in various network parameters between each scenario and the Reference Case for the Inter-peak hours. Of particular interest are the figures for over-capacity queuing.

Table 5-1 – Network Performance Percentage Change – Inter Peak – 2022

Scenario	Total Distance Travelled (pcu km)	Total Travel Time (pcu hr)	Transient Queueing (pcu hr)	Over Capacity Queueing (pcu hr)
Option 9a	6.90%	14.39%	6.73%	141.52%
Option 9b	9.14%	28.28%	5.27%	358.04%

Options 9a and 9b show very significant deteriorations of network performance resulting from the closure of South Gate to traffic between Boston Road and Water Gate, and Boston Road and East Gate respectively. The implementation of 9b would mean that it would not be possible to travel northbound through the town centre, resulting in all traffic having to use the A15 and A17 bypasses.

### 5.3 Conclusion

The traffic analysis undertaken assesses not only the impact of the increased length of railway crossing closures (assessed as a worst case) but the combined impact of other network interventions shown in Appendix A and the bringing forward of a range of land use developments.

The results of the analysis should therefore be taken as providing an insight, in traffic terms, into the combined potential impacts of all of these highway network changes and developments and not of any individual element alone. Caution should therefore be used in attributing impacts to any individual element of the various scenarios.

Based on the network and journey time statistics, the following Tables 5-1 summarise the operation of the options assessed for the Inter-peak hour compared to the Reference Case. For the purposes of this comparison, changes of between -5.00% and 5.00% have been categorised as slight, changes of between -5.00% and -10.00% and between 5.00% and 10.00% have been categorised as moderate and greater than either plus or minus 10.00% have been categorised as large. The overall result of the comparison has been assessed based primarily on over-capacity queuing and journey time routes assessment with the other indicators given less prominence.

The rating system has been developed for this report and can be used a guide to the level of impact of that each option will have and is a broad aid to understanding and decision-making. The ratings are not related to the ‘severity’ test set out in the National Planning Policy Framework.

Table 5-2 – Network Statistic Comparison – Inter peak Peak – 2022

Option	Total Travel distance	Total Travel times	Transient Queuing	Over Capacity Queuing	Journey Time	Overall
Option 9a	Moderate Adverse	Large Adverse	Moderate Adverse	Large Adverse	Large Adverse	Large Adverse
Option 9b	Moderate Adverse	Large Adverse	Moderate Adverse	Large Adverse	Large Adverse	Large Adverse

Table 5-1 above, shows that for the Inter-peak hour, when compared to the reference case, the pedestrianisation of Southgate between Eastgate and Jermyn Street has adverse impact on the network compared with the pedestrianisation of Southgate between Watergate and Jermyn Street.

Overall the result of the analysis shows the following conclusion for each option:

- Option 9a – Large Adverse
- Option 9b – Large Adverse

The above analysis is based on the impact of the options on the Inter-peak hour, however, it is also worth reviewing the performance of the options compared to the AM and PM peak reference case hours. As can be seen below, in all measurements of performance the options implemented during the Inter-peak hours would perform better (i.e. having lower distance travelled, travel time, transient queuing and over-capacity queuing) than the AM and PM peak hour reference cases.

Table 5-3 – Comparison of results between Inter-Peak and AM and PM Peak for Options 9a & 9b

Scenario	Total Distance Travelled (pcu km)	Total Travel Time (pcu hr)	Transient Queueing (pcu hr)	Over Capacity Queueing (pcu hr)
AM Peak Hour Option 9a	-20%	-41%	-51%	-68%
AM Peak Hour Option 9b	-21%	-46%	-55%	-75%
PM Peak Hour Option 9a	-18%	-34%	-52%	-40%
PM Peak Hour Option 9b	-19%	-39%	-56%	-53%

It should also be noted that investigation of junction operation has shown that the implementation of the Do-Something scenarios would generate worse performance than the Inter-peak Reference Case. However, operation would in most cases be better than the AM and PM Peak Reference Cases but some junction improvements would still be required.

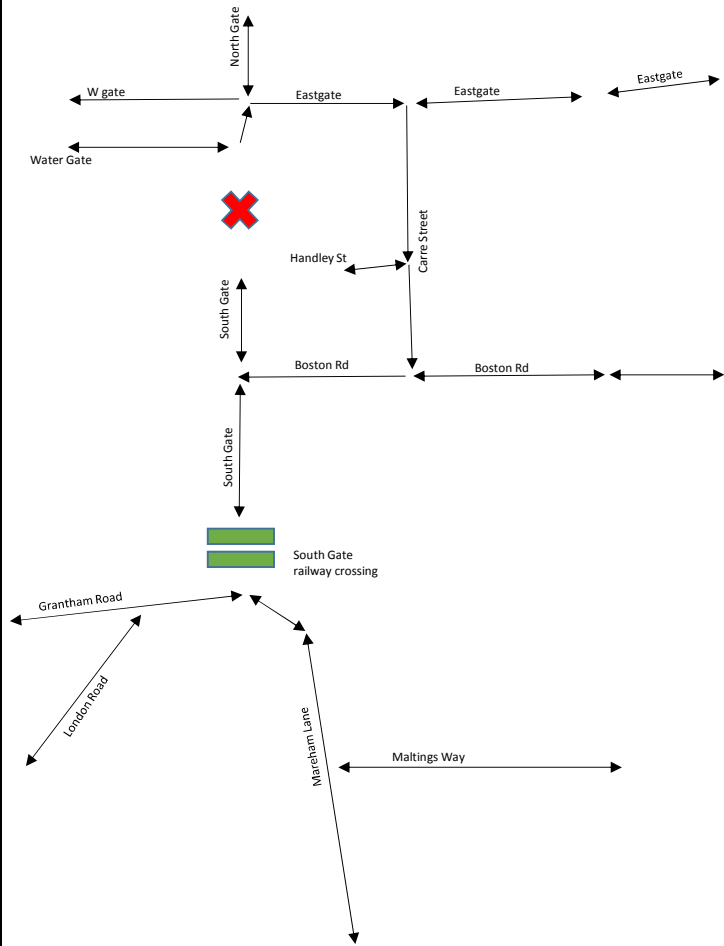
It should be noted that the Reference Case against which the Do-Something options have been compared, represent scenarios with worse network operation and journey times than currently experienced. This is not only due to projected traffic growth (both background and from development) but also due to the increased level crossing closures.

In reviewing the outputs from the above analysis, consideration should be given to the extent to which options generate improvements to that significantly worsened situation.

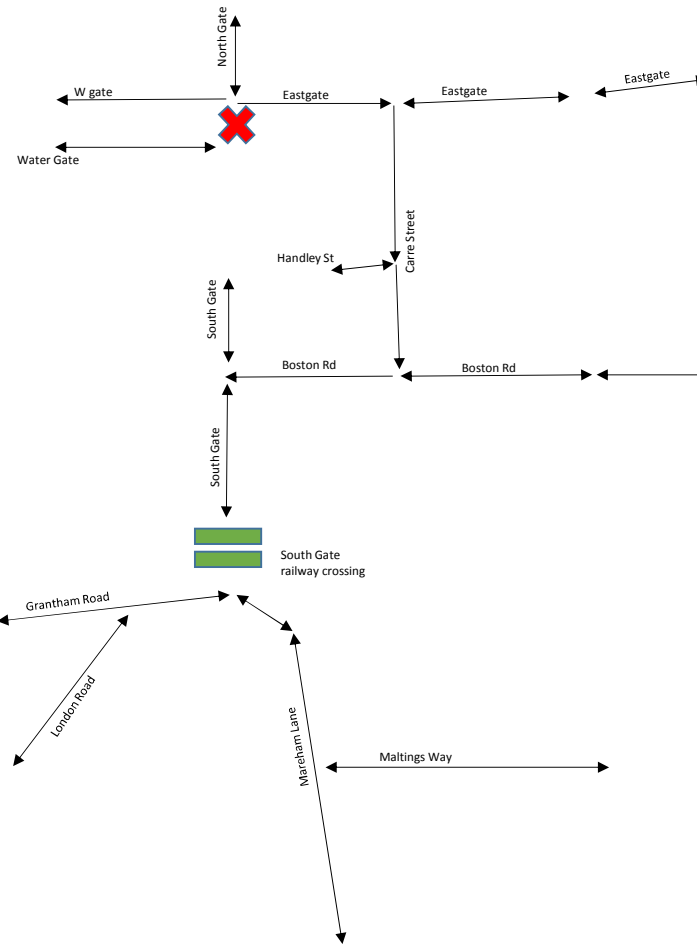
*We have used our reasonable endeavours to provide information that is correct and accurate and have discussed above the reasonable conclusions that can be reached on the basis of the information available. Having issued the range of conclusions it is for the client to decide how to proceed with this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

## Appendix A – Summary of Network Changes

Option 9A



Option 9B



KEY

Existing Highway Network (retained)

Change in Highway Network

Restriction on Highway Network



## Appendix B – Correspondence from Network Rail

## Appendix B – Summary of correspondence from Network Rail

Network Rail, in their email dated 21<sup>st</sup> May, 2015, summarised the following changes proposed at the railway signal crossings in Sleaford.

1. It is proposed to convert the Sleaford east crossing (Southgate) from manual control barrier to obstacle detection to be achieved by upgrading it to a laser controlled crossing, triggered by the approach of the train. He further explained that such an arrangement is complicated due to the proximity of the crossing to the railway station as it requires that at least two signals are cleared following the lowering of the barriers.
2. The current barrier downtime is around 2.5/3 minutes for all trains which is expected to increase to around 5 minutes for eastbound trains and 3 minutes 30 seconds for westbound trains.
3. Theoretically, the absolute number of trains which could be run through both the crossing per hour in both directions is 18; 4 trains per hour (tph) on Skegness route and 12tph on Peterborough route. He further expressed that it is highly unlikely that this capacity of will be reached as currently only 20 trains travel on the Peterborough route and 30 on the Skegness route, in additional to 4 freight trains; which is an average of 3.6 tph as opposed to a worst case of 18 tph.
4. Network Rail expressed that for modelling purposes it may be prudent to model a worst case of 9 tph as it is not expected that re-franchising or upsurges in freight traffic will lead to use the theoretical capacity of the network. The doubling of train services from current would yield approximately 5.2 tph.

Mouchel, in their email dated 21<sup>st</sup> May, 2015, requested further clarification on the proposals for railway crossing on King Edward Street and whether 4tph constitutes of 2 tph in both direction?

Network Rail, in their reply dated 21<sup>st</sup> May, 2015, confirmed that 4tph constitutes of 2 tph in both directions the railway crossing on King Edward Street will also be upgraded to obstacle detection system similar to the crossing on Southgate with similar downtimes. He further explained that minor modification to the crossing (yellow box markings and better signage) are also proposed as part of the improvements.

Network Rail also provided the following information regarding Option 8 in their e-mail of 9<sup>th</sup> October 2015:

*“There are two issues – firstly is the actual cost of the work, and secondly is the operational impacts on the timetable.*

*We have an example of a curve recently constructed at Todmorden (2013) so is quite realistic in terms of possible costs – 350 yds came out at just under £10 million but that did include a lot of re-signalling work, track renewal and a new footbridge – but even stripping out a number of items and if it was timed to be in the same window as the re-signalling, we are still talking around £6 million or so (and this does not include the cost of purchase of the land in question) for one curve alone – and of course two would be needed in this instance. A curve from the Sleaford avoiding line onto the Lincoln line would also necessitate the re-grading of East Road and a second bridge (because the curvature would otherwise be too sharp for a freight train) and so would probably exceed £6 million. Costs in excess of £12 million dwarf the cost of automation of the crossing (around £1.5 million). This is currently programmed for 2019.*

*The second issue relates to operational matters and capacity. Currently a passenger train takes on average 4 minutes to pass from Sleaford West to Sleaford North junction, along a length of single track. Using the two new curves a Skegness train, assuming it had clear signals, would take on average an additional 10 minutes from leaving the station to regain its former route east of the avoiding line. A Lincoln – Peterborough train would take a similar time, along with further dwell time at the station as the driver & guard change ends. This length eats into the capacity available, exacerbated by the passage of freight trains over the avoiding line itself so the risk of perturbation increases significantly. This also reduces the dwell time at the terminals which in some cases could require a further unit in order to work the same level of service. A further issue is the length of time for a freight train to traverse the curves, which would also be longer, with increased risk of disruption to the timetable especially given the gradients required for the curves – which in turn also has a disbenefit in terms of noise from flange squeal and if a freight train is either stopped or stalls on the curves themselves.*

*All in all we consider the likely benefits to be gained from closure of the crossing using this solution are significantly outweighed by the costs of the proposed curves and the disbenefits it presents to the timetabling of trains and impact on the network. Bridging the railway in the vicinity of Sleaford East is by far a better and effective solution to solving the problem of congestion in the vicinity of the crossing.”*

## Appendix C – TRICS reports – Proposed Development

Calculation Reference: AUDIT-305903-160303-0332

## TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL  
 Category : C - FLATS PRIVATELY OWNED  
 VEHICLES

Selected regions and areas:

03	SOUTH WEST	
	BR BRISTOL CITY	1 days
	DC DORSET	1 days
04	EAST ANGLIA	
	CA CAMBRIDGESHIRE	1 days
	SF SUFFOLK	1 days
05	EAST MIDLANDS	
	DS DERBYSHIRE	1 days
	NR NORTHAMPTONSHIRE	1 days
06	WEST MIDLANDS	
	ST STAFFORDSHIRE	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE	
	RI EAST RIDING OF YORKSHIRE	1 days
09	NORTH	
	CB CUMBRIA	3 days
	TV TEES VALLEY	2 days

This section displays the number of survey days per TRICS® sub-region in the selected set

## Filtering Stage 2 selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Number of dwellings  
 Actual Range: 8 to 102 (units: )  
 Range Selected by User: 8 to 215 (units: )

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/07 to 18/12/14

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	3 days
Tuesday	2 days
Wednesday	4 days
Thursday	2 days
Friday	2 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	13 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaken using machines.

Selected Locations:

Town Centre	1
Suburban Area (PPS6 Out of Centre)	10
Edge of Town	2

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Filtering Stage 3 selection:

Use Class:

C3 13 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

10,001 to 15,000	5 days
15,001 to 20,000	1 days
20,001 to 25,000	3 days
25,001 to 50,000	4 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

5,001 to 25,000	1 days
25,001 to 50,000	1 days
50,001 to 75,000	4 days
75,001 to 100,000	1 days
125,001 to 250,000	2 days
250,001 to 500,000	4 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	2 days
1.1 to 1.5	11 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

No 13 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

LIST OF SITES relevant to selection parameters

1	BR-03-C-01 CLARENCE ROAD	FLATS & TERRACED		BRISTOL CITY
	BRISTOL Suburban Area (PPS6 Out of Centre) Residential Zone Total Number of dwellings: 102 Survey date: MONDAY 09/11/09			
2	CA-03-C-02 WESTFIELD ROAD	BLOCK OF FLATS		CAMBRIDGESHIRE Survey Type: MANUAL
	NETHERTON PETERBOROUGH Suburban Area (PPS6 Out of Centre) No Sub Category Total Number of dwellings: 44 Survey date: TUESDAY 18/10/11			
3	CB-03-C-01 KING STREET	BLOCK OF FLATS		CUMBRIA Survey Type: MANUAL
	CARLISLE Town Centre Built-Up Zone Total Number of dwellings: 40 Survey date: THURSDAY 12/06/14			
4	CB-03-C-02 BRIDGE LANE	BLOCK OF FLATS		CUMBRIA Survey Type: MANUAL
	PENRITH Edge of Town No Sub Category Total Number of dwellings: 35 Survey date: WEDNESDAY 11/06/14			
5	CB-03-C-03 LOUND STREET	FLATS & BUNGALOWS		CUMBRIA Survey Type: MANUAL
	KENDAL Suburban Area (PPS6 Out of Centre) Residential Zone Total Number of dwellings: 33 Survey date: MONDAY 09/06/14			
6	DC-03-C-02 PALM COURT	FLATS IN BLOCKS		DORSET Survey Type: MANUAL
	SPA ROAD WEYMOUTH Suburban Area (PPS6 Out of Centre) Residential Zone Total Number of dwellings: 14 Survey date: FRIDAY 28/03/14			
7	DS-03-C-01 DRAGE STREET	BLOCK OF FLATS		DERBYSHIRE Survey Type: MANUAL
	LITTLE CHESTER DERBY Suburban Area (PPS6 Out of Centre) No Sub Category Total Number of dwellings: 8 Survey date: THURSDAY 25/06/09			
8	NR-03-C-01 ROCKINGHAM ROAD	BLOCK OF FLATS		NORTHAMPTONSHIRE Survey Type: MANUAL
	CORBY Suburban Area (PPS6 Out of Centre) Residential Zone Total Number of dwellings: 20 Survey date: FRIDAY 21/11/08			

LIST OF SITES relevant to selection parameters (Cont.)

9	RI-03-C-01	FLATS		EAST RIDING OF YORKSHIRE
	465 PRIORY ROAD			
	HULL			
	Edge of Town			
	Residential Zone			
	Total Number of dwellings:		20	
	Survey date: TUESDAY		13/05/14	Survey Type: MANUAL
10	SF-03-C-03	BLOCKS OF FLATS		SUFFOLK
	TOLLGATE LANE			
	BURY ST EDMUNDS			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:		30	
	Survey date: WEDNESDAY		03/12/14	Survey Type: MANUAL
11	ST-03-C-01	BLOCKS OF FLATS		STAFFORDSHIRE
	ETRURIA COURT			
	HUMBERT ROAD			
	STOKE-ON-TRENT			
	Suburban Area (PPS6 Out of Centre)			
	No Sub Category			
	Total Number of dwellings:		33	
	Survey date: WEDNESDAY		26/11/08	Survey Type: MANUAL
12	TV-03-C-01	APARTMENTS BLOCKS		TEES VALLEY
	OXFORD ROAD			
	LINTHORPE			
	MIDDLESBROUGH			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:		85	
	Survey date: MONDAY		06/10/08	Survey Type: MANUAL
13	TV-03-C-02	FLATS		TEES VALLEY
	ACKLAM ROAD			
	LINTHORPE			
	MIDDLESBROUGH			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:		85	
	Survey date: WEDNESDAY		29/06/11	Survey Type: MANUAL

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.



TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED  
VEHICLES

Calculation factor: 1 DWELLS

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	13	42	0.049	13	42	0.151	13	42	0.200
08:00 - 09:00	13	42	0.084	13	42	0.260	13	42	0.344
09:00 - 10:00	13	42	0.084	13	42	0.106	13	42	0.190
10:00 - 11:00	13	42	0.071	13	42	0.098	13	42	0.169
11:00 - 12:00	13	42	0.084	13	42	0.093	13	42	0.177
12:00 - 13:00	13	42	0.093	13	42	0.098	13	42	0.191
13:00 - 14:00	13	42	0.106	13	42	0.100	13	42	0.206
14:00 - 15:00	13	42	0.104	13	42	0.126	13	42	0.230
15:00 - 16:00	13	42	0.126	13	42	0.093	13	42	0.219
16:00 - 17:00	13	42	0.157	13	42	0.091	13	42	0.248
17:00 - 18:00	13	42	0.304	13	42	0.151	13	42	0.455
18:00 - 19:00	13	42	0.199	13	42	0.164	13	42	0.363
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
<b>Total Rates:</b>			1.461			1.531			2.992

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is:  $COUNT/TRP*FACT$ . Trip rates are then rounded to 3 decimal places.

#### Parameter summary

Trip rate parameter range selected: 8 - 102 (units: )  
 Survey date date range: 01/01/07 - 18/12/14  
 Number of weekdays (Monday-Friday): 13  
 Number of Saturdays: 0  
 Number of Sundays: 0  
 Surveys manually removed from selection: 1

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are shown. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

Calculation Reference: AUDIT-305903-160303-0319

## TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 05 - HEALTH  
 Category : F - CARE HOME (ELDERLY RESIDENTIAL)  
 VEHICLES

Selected regions and areas:

03	SOUTH WEST	
	DC DORSET	1 days
05	EAST MIDLANDS	
	DS DERBYSHIRE	1 days
06	WEST MIDLANDS	
	WK WARWICKSHIRE	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE	
	NY NORTH YORKSHIRE	1 days
08	NORTH WEST	
	CH CHESHIRE	1 days
	GM GREATER MANCHESTER	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

## Filtering Stage 2 selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Number of residents  
 Actual Range: 30 to 88 (units: )  
 Range Selected by User: 26 to 180 (units: )

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/07 to 21/10/14

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	1 days
Tuesday	1 days
Wednesday	2 days
Thursday	1 days
Friday	1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	6 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaken using machines.

Selected Locations:

Suburban Area (PPS6 Out of Centre)	4
Edge of Town	1
Neighbourhood Centre (PPS6 Local Centre)	1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone	5
Village	1

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out

Filtering Stage 3 selection:

Use Class:

C2 6 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

1,000 or Less	1 days
5,001 to 10,000	2 days
10,001 to 15,000	1 days
25,001 to 50,000	2 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

5,001 to 25,000	1 days
75,001 to 100,000	1 days
100,001 to 125,000	1 days
250,001 to 500,000	3 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	1 days
1.1 to 1.5	5 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

No 6 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

LIST OF SITES relevant to selection parameters

1	CH-05-F-01 CREWE ROAD HASLINGTON NEAR CREWE Neighbourhood Centre (PPS6 Local Centre) Village	NURSING HOME	88 17/10/08	CHESHIRE	Survey Type: MANUAL
2	DC-05-F-02 WHARNCLIFFE ROAD BOSCOMBE BOURNEMOUTH Suburban Area (PPS6 Out of Centre) Residential Zone	NURSING HOME	43 16/07/08	DORSET	Survey Type: MANUAL
3	DS-05-F-01 29 VILLAGE STREET  DERBY Suburban Area (PPS6 Out of Centre) Residential Zone	NURSING HOME	70 21/10/14	DERBYSHIRE	Survey Type: MANUAL
4	GM-05-F-03 HALIFAX ROAD  ROCHDALE Edge of Town Residential Zone	NURSING HOME	30 29/05/13	GREATER MANCHESTER	Survey Type: MANUAL
5	NY-05-F-01 HARROGATE ROAD  RIPON Suburban Area (PPS6 Out of Centre) Residential Zone	NURSING HOME	38 22/09/08	NORTH YORKSHIRE	Survey Type: MANUAL
6	WK-05-F-01 CLARENDON SQUARE  LEAMINGTON SPA Suburban Area (PPS6 Out of Centre) Residential Zone	NURSING HOME	32 25/10/12	WARWICKSHIRE	Survey Type: MANUAL

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

TRIP RATE for Land Use 05 - HEALTH/F - CARE HOME (ELDERLY RESIDENTIAL)

VEHICLES

Calculation factor: 1 RESIDE

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. RESIDE	Trip Rate	No. Days	Ave. RESIDE	Trip Rate	No. Days	Ave. RESIDE	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	50	0.083	6	50	0.047	6	50	0.130
08:00 - 09:00	6	50	0.086	6	50	0.080	6	50	0.166
09:00 - 10:00	6	50	0.060	6	50	0.017	6	50	0.077
10:00 - 11:00	6	50	0.070	6	50	0.063	6	50	0.133
11:00 - 12:00	6	50	0.053	6	50	0.086	6	50	0.139
12:00 - 13:00	6	50	0.043	6	50	0.037	6	50	0.080
13:00 - 14:00	6	50	0.086	6	50	0.053	6	50	0.139
14:00 - 15:00	6	50	0.116	6	50	0.113	6	50	0.229
15:00 - 16:00	6	50	0.066	6	50	0.113	6	50	0.179
16:00 - 17:00	6	50	0.073	6	50	0.073	6	50	0.146
17:00 - 18:00	6	50	0.050	6	50	0.076	6	50	0.126
18:00 - 19:00	6	50	0.047	6	50	0.070	6	50	0.117
19:00 - 20:00	5	43	0.066	5	43	0.056	5	43	0.122
20:00 - 21:00	4	43	0.018	4	43	0.059	4	43	0.077
21:00 - 22:00	1	38	0.026	1	38	0.026	1	38	0.052
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.943			0.969			1.912

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is:  $COUNT/TRP*FACT$ . Trip rates are then rounded to 3 decimal places.

#### Parameter summary

Trip rate parameter range selected:	30 - 88 (units: )
Survey date date range:	01/01/07 - 21/10/14
Number of weekdays (Monday-Friday):	6
Number of Saturdays:	0
Number of Sundays:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are shown. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

## TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 07 - LEISURE  
 Category : Q - COMMUNITY CENTRE  
 VEHICLES

Selected regions and areas:

04	EAST ANGLIA	
	CA CAMBRIDGESHIRE	1 days
06	WEST MIDLANDS	
	SH SHROPSHIRE	1 days
09	NORTH	
	DH DURHAM	1 days
	TV TEES VALLEY	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

## Filtering Stage 2 selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter:	Site area
Actual Range:	0.04 to 0.28 (units: hect)
Range Selected by User:	0.04 to 2.50 (units: hect)

Public Transport Provision:

Selection by:	Include all surveys
---------------	---------------------

Date Range:	01/01/07 to 09/05/14
-------------	----------------------

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	1 days
Wednesday	1 days
Thursday	1 days
Friday	1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	4 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaken using machines.

Selected Locations:

Suburban Area (PPS6 Out of Centre)	2
Edge of Town	1
Neighbourhood Centre (PPS6 Local Centre)	1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone	2
Village	1
No Sub Category	1

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Filtering Stage 3 selection:

Use Class:

D2 4 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

5,001 to 10,000 2 days

15,001 to 20,000 1 days

25,001 to 50,000 1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

5,001 to 25,000 1 days

75,001 to 100,000 1 days

100,001 to 125,000 1 days

125,001 to 250,000 1 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0 2 days

1.1 to 1.5 1 days

1.6 to 2.0 1 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

No 4 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

LIST OF SITES relevant to selection parameters

1	CA-07-Q-01 HIGH STREET	COMMUNITY CENTRE		CAMBRIDGESHIRE
	COTTENHAM Neighbourhood Centre (PPS6 Local Centre) Village			
	Total Site area:		0.04 hect	
	Survey date:	MONDAY	15/10/12	Survey Type: MANUAL
2	DH-07-Q-01 JUTLAND ROAD	COM. CENTRE		DURHAM
	HARTLEPOOL Suburban Area (PPS6 Out of Centre) No Sub Category			
	Total Site area:		0.13 hect	
	Survey date:	FRIDAY	28/09/07	Survey Type: MANUAL
3	SH-07-Q-01 SOUTHGATE SUTTON HILL TELFORD	COMMUNITY CENTRE		SHROPSHIRE
	Edge of Town Residential Zone			
	Total Site area:		0.15 hect	
	Survey date:	THURSDAY	24/10/13	Survey Type: MANUAL
4	TV-07-Q-01 FULBECK ROAD	COM. CENTRE		TEES VALLEY
	MIDDLESBROUGH Suburban Area (PPS6 Out of Centre) Residential Zone			
	Total Site area:		0.28 hect	
	Survey date:	WEDNESDAY	26/09/07	Survey Type: MANUAL

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.



TRIP RATE for Land Use 07 - LEISURE/Q - COMMUNITY CENTRE  
VEHICLES

Calculation factor: 1 hect

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. AREA	Trip Rate	No. Days	Ave. AREA	Trip Rate	No. Days	Ave. AREA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00									
08:00 - 09:00	4	0.15	13.333	4	0.15	8.333	4	0.15	21.666
09:00 - 10:00	4	0.15	28.333	4	0.15	13.333	4	0.15	41.666
10:00 - 11:00	4	0.15	15.000	4	0.15	18.333	4	0.15	33.333
11:00 - 12:00	4	0.15	18.333	4	0.15	20.000	4	0.15	38.333
12:00 - 13:00	3	0.11	53.125	3	0.11	84.375	3	0.11	137.500
13:00 - 14:00	3	0.11	31.250	3	0.11	34.375	3	0.11	65.625
14:00 - 15:00	3	0.11	21.875	3	0.11	15.625	3	0.11	37.500
15:00 - 16:00	3	0.11	53.125	3	0.11	31.250	3	0.11	84.375
16:00 - 17:00	3	0.11	9.375	3	0.11	34.375	3	0.11	43.750
17:00 - 18:00	3	0.11	21.875	3	0.11	15.625	3	0.11	37.500
18:00 - 19:00	3	0.11	37.500	3	0.11	6.250	3	0.11	43.750
19:00 - 20:00	3	0.11	6.250	3	0.11	12.500	3	0.11	18.750
20:00 - 21:00	3	0.11	3.125	3	0.11	31.250	3	0.11	34.375
21:00 - 22:00	3	0.11	0.000	3	0.11	0.000	3	0.11	0.000
22:00 - 23:00									
23:00 - 24:00									
<b>Total Rates:</b>			<b>312.499</b>			<b>325.624</b>			<b>638.123</b>

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is:  $COUNT/TRP*FACT$ . Trip rates are then rounded to 3 decimal places.

#### Parameter summary

Trip rate parameter range selected: 0.04 to 0.28 (units: hect)  
 Survey date range: 01/01/07 - 09/05/14  
 Number of weekdays (Monday-Friday): 4  
 Number of Saturdays: 0  
 Number of Sundays: 0  
 Surveys manually removed from selection: 0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are shown. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

Calculation Reference: AUDIT-305903-160303-0339

## TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 05 - HEALTH  
 Category : G - GP SURGERIES  
 VEHICLES

Selected regions and areas:

04	EAST ANGLIA	
	NF NORFOLK	1 days
05	EAST MIDLANDS	
	LE LEICESTERSHIRE	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE	
	NO NORTH LINCOLNSHIRE	1 days
08	NORTH WEST	
	CH CHESHIRE	1 days
09	NORTH	
	TV TEES VALLEY	1 days
	TW TYNE & WEAR	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

## Filtering Stage 2 selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Gross floor area  
 Actual Range: 200 to 800 (units: sqm)  
 Range Selected by User: 200 to 995 (units: sqm)

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/07 to 30/10/14

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	1 days
Tuesday	1 days
Thursday	2 days
Friday	2 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	6 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaken using machines.

Selected Locations:

Suburban Area (PPS6 Out of Centre)	2
Edge of Town	3
Neighbourhood Centre (PPS6 Local Centre)	1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone	6
------------------	---

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Filtering Stage 3 selection:

Use Class:

D1	6 days
----	--------

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

10,001 to 15,000	1 days
15,001 to 20,000	1 days
20,001 to 25,000	2 days
25,001 to 50,000	2 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

75,001 to 100,000	1 days
100,001 to 125,000	2 days
125,001 to 250,000	1 days
250,001 to 500,000	2 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.5 or Less	1 days
0.6 to 1.0	3 days
1.1 to 1.5	2 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

Not Known	1 days
No	5 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

LIST OF SITES relevant to selection parameters

1	CH-05-G-03	GP SURGERY		CESHIRE
	HEATH LANE			
	BOUGHTON HEATH			
	CHESTER			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Gross floor area:		800 sqm	
	Survey date:	TUESDAY	29/05/12	Survey Type: MANUAL
2	LE-05-G-01	GP SURGERY		LEICESTERSHIRE
	GLEN ROAD			
	OADBY			
	LEICESTER			
	Edge of Town			
	Residential Zone			
	Total Gross floor area:		550 sqm	
	Survey date:	THURSDAY	30/10/14	Survey Type: MANUAL
3	NF-05-G-01	GP SURGERY		NORFOLK
	TRINITY STREET			
	NORWICH			
	Neighbourhood Centre (PPS6 Local Centre)			
	Residential Zone			
	Total Gross floor area:		375 sqm	
	Survey date:	MONDAY	21/05/07	Survey Type: MANUAL
4	NO-05-G-02	GP SURGERY		NORTH LINCOLNSHIRE
	FERRY ROAD WEST			
	SCUNTHORPE			
	Edge of Town			
	Residential Zone			
	Total Gross floor area:		350 sqm	
	Survey date:	THURSDAY	17/09/09	Survey Type: MANUAL
5	TV-05-G-01	GP SURGERY		TEES VALLEY
	EARLSFERRY ROAD			
	HARTLEPOOL			
	Edge of Town			
	Residential Zone			
	Total Gross floor area:		200 sqm	
	Survey date:	FRIDAY	07/09/07	Survey Type: MANUAL
6	TW-05-G-01	GP SURGERY		TYNE & WEAR
	DURHAM ROAD			
	SUNDERLAND			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Gross floor area:		600 sqm	
	Survey date:	FRIDAY	30/11/12	Survey Type: MANUAL

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

TRIP RATE for Land Use 05 - HEALTH/G - GP SURGERIES  
VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	479	1.183	6	479	0.417	6	479	1.600
08:00 - 09:00	6	479	4.000	6	479	2.226	6	479	6.226
09:00 - 10:00	6	479	4.765	6	479	3.896	6	479	8.661
10:00 - 11:00	6	479	4.904	6	479	4.696	6	479	9.600
11:00 - 12:00	6	479	3.443	6	479	4.626	6	479	8.069
12:00 - 13:00	6	479	2.504	6	479	3.270	6	479	5.774
13:00 - 14:00	6	479	1.809	6	479	1.809	6	479	3.618
14:00 - 15:00	6	479	4.070	6	479	3.304	6	479	7.374
15:00 - 16:00	6	479	3.339	6	479	3.374	6	479	6.713
16:00 - 17:00	6	479	2.817	6	479	3.861	6	479	6.678
17:00 - 18:00	6	479	0.765	6	479	1.426	6	479	2.191
18:00 - 19:00	6	479	0.209	6	479	0.974	6	479	1.183
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
<b>Total Rates:</b>			<b>33.808</b>			<b>33.879</b>			<b>67.687</b>

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is:  $COUNT/TRP*FACT$ . Trip rates are then rounded to 3 decimal places.

## Parameter summary

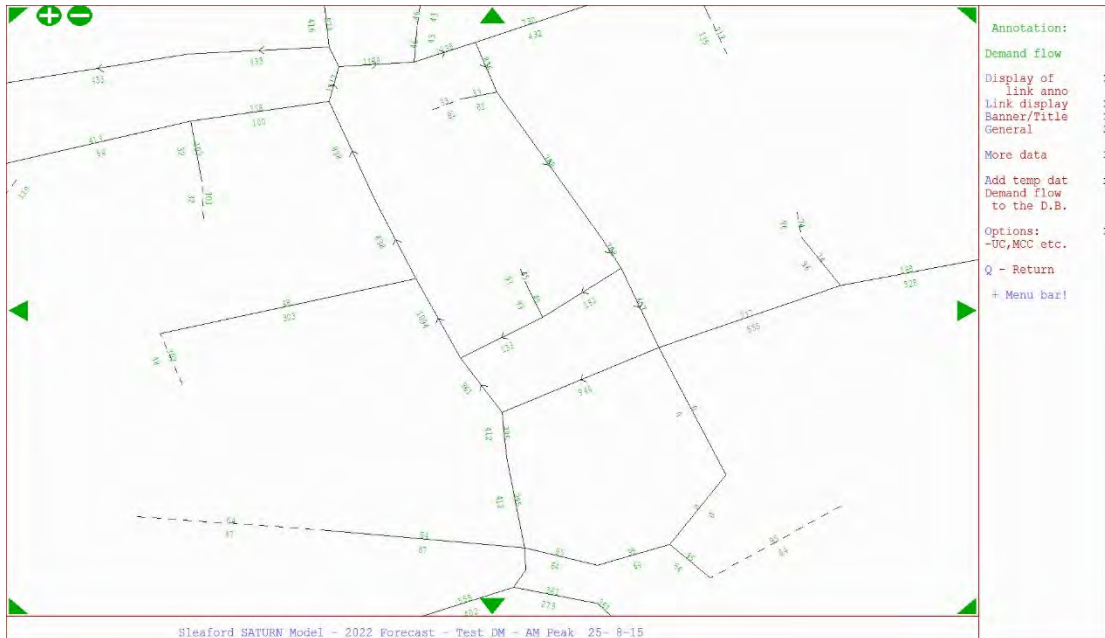
Trip rate parameter range selected:	200 - 800 (units: sqm)
Survey date date range:	01/01/07 - 30/10/14
Number of weekdays (Monday-Friday):	6
Number of Saturdays:	0
Number of Sundays:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are shown. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

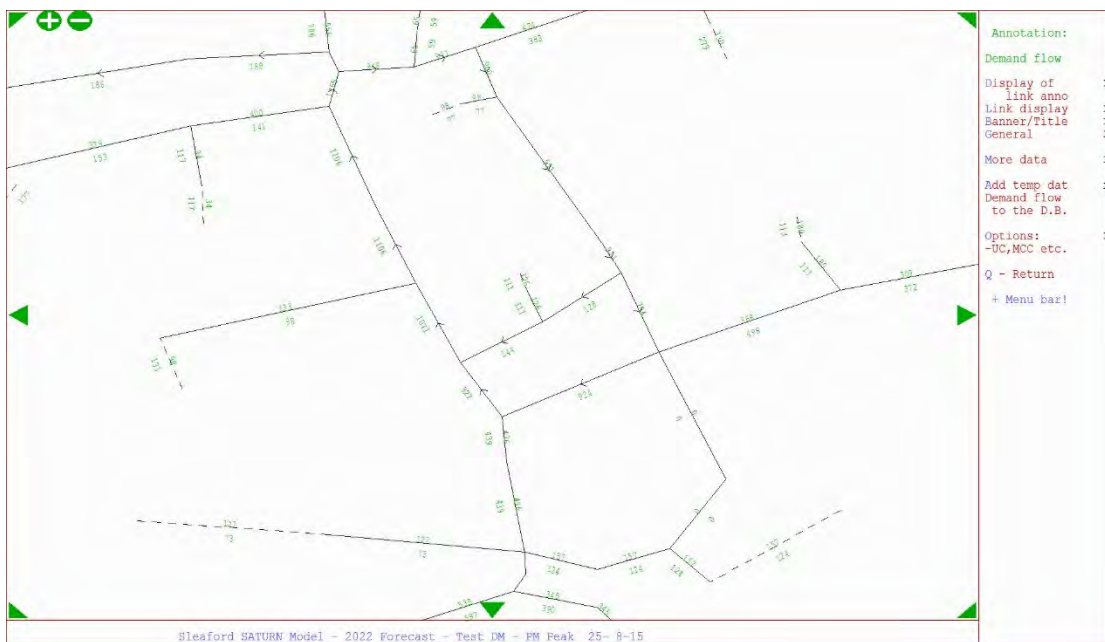
## Appendix D – Flow Diagrams

## Appendix D – Network Flow Diagrams

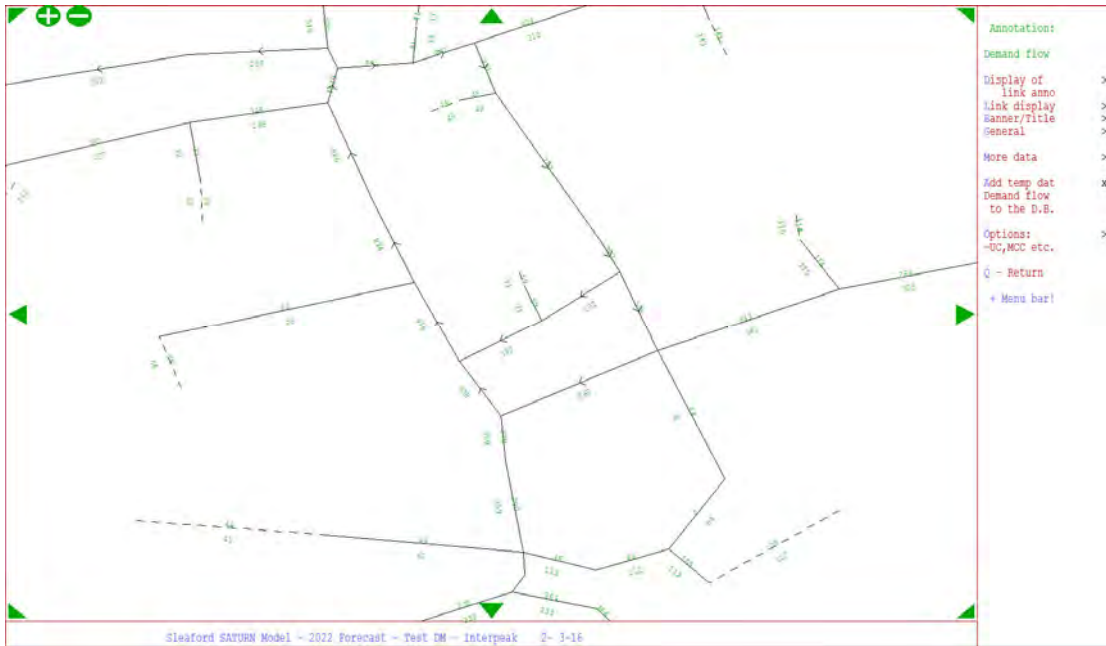
### Reference Case A 2022 AM



### Reference Case A 2022 PM

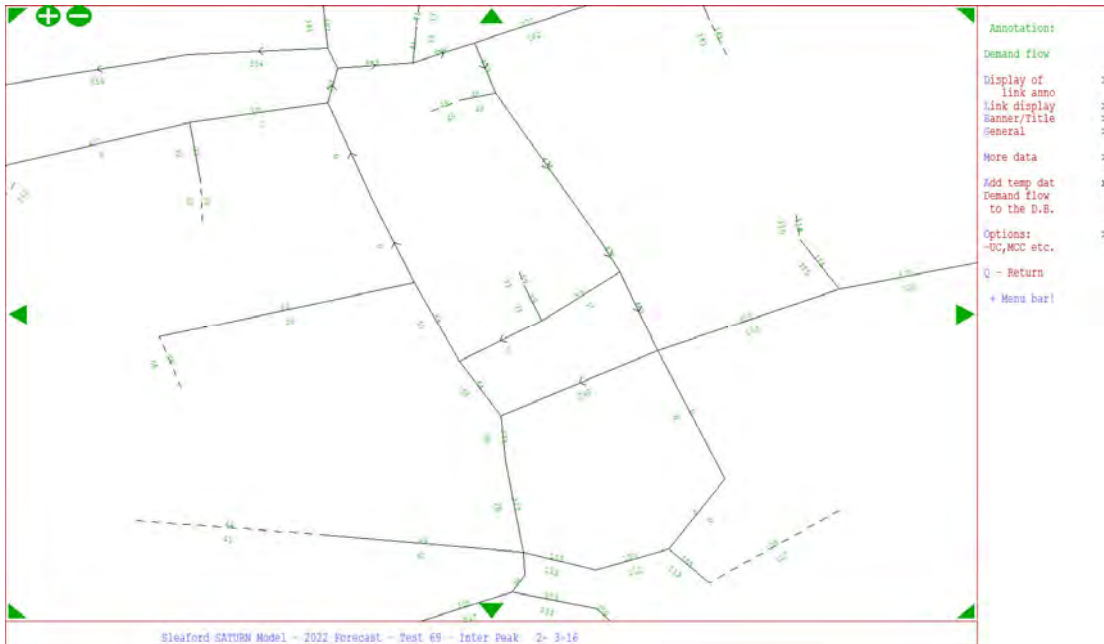


Reference Case A 2022 IP

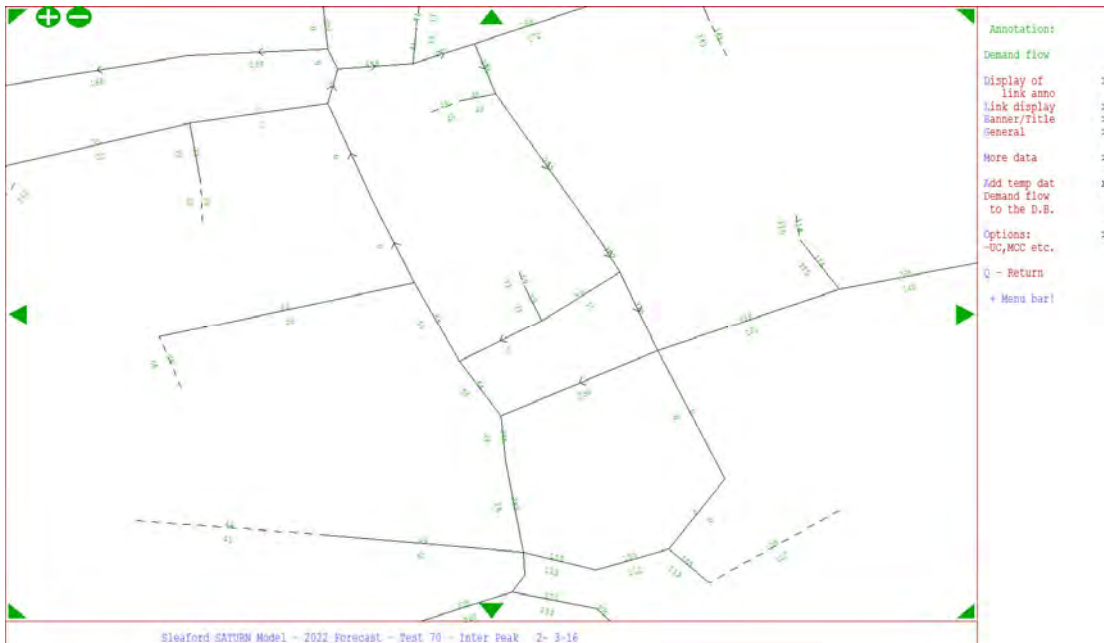




LCC Option 9a 2022 IP



LCC Option 9b 2022 IP



## Appendix E – Junction Operation Summary

AM Peak 08:00-09:00  
 Inter Peak 10:00-16:00  
 PM Peak 17:00-18:00

Junction Description	Arm From	Arm To	Reference Case			Option 9A	Option 9B
			AM peak hr	PM peak hr	Inter peak hour	Inter peak hour	Inter peak hour
<b>J1</b> Grantham Road/King Edward Street							
Grantham Road W	Arm A	Arm B	37	33	30	27	30
		Arm C	33	43	23	25	33
King Edward St	Arm B	Arm A	43	70	37	46	77
		Arm C	17	42	20	27	27
Grantham Road E	Arm C	Arm A	40	34	21	33	35
		Arm B	24	15	19	37	28
<b>J2</b> Eastgate/Carre Street							
Eastgate W	Arm A	Arm B	76	43	44	29	19
		Arm C	51	64	62	40	27
Eastgate E	Arm B	Arm A	0	0	0	0	0
		Arm C	82	69	61	31	33
Carre Street	Arm C	Arm A	0	0	0	0	0
		Arm B	0	0	0	0	0
<b>J3</b> Mareham Lane/Maltings Way							
Mareham Lane N	Arm A	Arm B	62	71	51	46	45
		Arm C	30	72	42	44	46
		Arm D	15	70	39	38	37
Malting Way	Arm B	Arm A	39	21	40	40	40
		Arm C	8	5	6	6	6
		Arm D	0	0	1	1	1
Mareham Lane S	Arm C	Arm A	60	36	37	41	41
		Arm B	31	8	18	27	27
		Arm D	0	0	0	0	0
Access Road	Arm D	Arm A	0	0	1	0	0
		Arm B	0	0	0	0	0
		Arm C	0	0	0	0	0
<b>J4</b> Boston Road/Southgate							
Boston Road E	Arm A	Arm B	22	24	17	30	31
		Arm C	30	26	15	6	5
Southgate S	Arm B	Arm A	0	0	0	0	0
		Arm C	31	35	30	2	2
Southgate N	Arm C	Arm A	0	0	0	0	0
		Arm B	0	0	0	6	6
<b>J5</b> Southgate/Watergate							
Southgate S	Arm A	Arm B	23	67	33	0	0
		Arm C	65	92	68	0	0
Watergate	Arm B	Arm A	0	0	0	0	0
		Arm C	65	84	66	55	0
Southgate N	Arm C	Arm A	0	0	0	0	0
		Arm B	0	0	0	0	0
<b>J6</b> Southgate/Northgate/Eastgate							
Southgate S	Arm A	Arm B	30	44	30	7	0
		Arm C	32	35	32	15	0
Northgate	Arm B	Arm A	0	0	0	0	0
		Arm C	79	54	53	35	34
Eastgate	Arm C	Arm A	0	0	0	0	0
		Arm B	0	0	0	0	0
<b>J7</b> Grantham Road/Mareham Lane/Southgate							
Grantham Road	Arm A	Arm B	36	29	23	10	10
		Arm C	29	31	19	24	24
Southgate	Arm B	Arm A	30	29	36	44	44
		Arm C	19	6	14	6	5
Mareham Lane	Arm C	Arm A	32	89	20	37	37
		Arm B	15	40	23	2	2
<b>J8</b> Carre Street/Boston Road							
Boston Road	Arm A	Arm B	0	0	10	0	0
		Arm C	75	67	52	15	16
		Arm D	0	0	0	0	0
Aldion Terrace	Arm B	Arm A	0	0	0	0	0
		Arm C	0	0	0	0	0
		Arm D	0	0	0	0	0
Southgate	Arm C	Arm A	0	0	0	0	0
		Arm B	0	0	0	0	0
		Arm D	0	0	0	0	0
Carre Street	Arm D	Arm A	52	90	85	78	58
		Arm B	0	0	39	0	0
		Arm C	93	104	62	34	32

Junction Description	Arm From	Arm To	Reference Case			Option 9A	Option 9B
			AM peak hr	PM peak hr	Inter peak hour	Inter peak hour	Inter peak hour
<b>J9 Boston Road/SESSR</b>							
Boston Road E	Arm A	Arm B	0	0	0	0	0
		Arm C	14	27	23	28	23
SESRR N	Arm B	Arm A	0	0	0	0	0
		Arm C	0	0	0	0	0
		Arm D	0	0	0	0	0
Boston Road W	Arm C	Arm A	47	33	27	9	13
		Arm B	0	0	0	0	0
		Arm D	0	0	0	0	0
SESRR S	Arm D	Arm A	0	0	0	0	0
		Arm B	0	0	0	0	0
		Arm C	0	0	0	0	0
<b>J10 London Road/Grantham Road</b>							
Grantham Road E	Arm A	Arm B	14	25	13	11	10
		Arm C	26	36	22	40	40
London Road	Arm B	Arm A	54	55	41	16	18
		Arm C	0	0	0	0	0
Grantham Road W	Arm C	Arm A	31	29	18	22	22
		Arm B	0	0	0	0	0
<b>J11 London Road/North Site Access</b>							
London Road N	Arm A	Arm B	14	20	4	4	6
		Arm C	13	9	9	8	8
North Site Access	Arm B	Arm A	73	38	41	34	34
		Arm C	16	24	21	24	23
London Road S	Arm C	Arm A	6	13	9	7	7
		Arm B	4	20	15	12	10
<b>J12 London Road/South Site Access</b>							
London Road N	Arm A	Arm B	0	0	0	0	0
		Arm C	12	5	6	5	6
South Site Access	Arm B	Arm A	0	0	0	0	0
		Arm C	11	5	5	5	5
London Road S	Arm C	Arm A	4	13	7	6	7
		Arm B	3	6	9	11	11
<b>J13 Town Road/London Road</b>							
London Road S	Arm A	Arm B	1	2	1	1	1
		Arm C	3	10	6	5	5
Town Road	Arm B	Arm A	6	2	2	2	2
		Arm C	12	39	31	26	21
London Road N	Arm C	Arm A	11	6	6	5	6
		Arm B	17	31	26	29	27
<b>J14 Northfield Road/Grantham Road</b>							
Grantham Road E	Arm A	Arm B	4	3	2	2	4
		Arm C	77	50	33	52	75
Northfield Road	Arm B	Arm A	10	1	3	2	2
		Arm C	86	55	38	58	80
Grantham Road W	Arm C	Arm A	50	85	49	52	62
		Arm B	45	86	55	63	77
<b>J15 A15/Silk Willoughby</b>							
A15 N	Arm A	Arm B	1	5	1	1	1
		Arm C	17	20	12	12	11
Silk Willoughby	Arm B	Arm A	5	1	2	4	4
		Arm C	29	17	16	14	14
A15 S	Arm C	Arm A	22	21	23	25	23
		Arm B	12	27	31	32	31
<b>J16 Grantham Road/ A15 Roundabout</b>							
Grantham Road E	Arm A	All	82	75	44	63	81
A15 S	Arm B	All	37	28	21	27	34
Grantham Road W	Arm C	All	51	60	34	44	57
A15 N	Arm D	All	83	87	64	66	72
<b>J17 Holdingham Roundabout</b>							
A17 E	Arm A	All	100	110	81	103	104
Lincoln Road	Arm B	All	107	92	58	40	41
A15 S	Arm C	All	100	100	73	92	100
A17 W	Arm D	All	109	103	59	72	86
A15 N	Arm E	All	110	108	102	105	107
<b>J18 SWQ / A15 Roundabout</b>							
A15 N	Arm A	All	91	100	68	69	73
SWQ Access	Arm B	All	66	48	34	34	34
A15 S	Arm C	All	90	93	67	87	100