WSP

Norfolk County Council
LONG STRATTON BYPASS
Data Collection Report

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 70039894
OUR REF. NO. 70039894

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Contents

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1. INTRODUCTION

1.1. INTRODUCTION

1.1.1. Norfolk County Council (NCC) has commissioned WSP to support the delivery of a Department for Transport (DfT) compliant Outline Business Case (OBC) for the Long Stratton Bypass (LSB) Scheme, a new road around the existing Long Stratton settlement encouraging traffic using the A140 to avoid travelling through the town.

1.1.2. This report provides a summary of the traffic data collected to support the business case for a proposed bypass near Long Stratton, Norfolk. The traffic data was collected to aid the development of the Long Stratton Transport Model (LSTM) using the Suffolk County Transport Model (SCTM) as a basis. SCTM is a model developed for Suffolk County Council (SCC) for their scheme appraisal forecast modelling.

1.1.3. The data collection was undertaken in accordance with the DfT's guidance and the results of this exercise are discussed in the document.

1.2. DATA COLLECTION METHODS

1.2.1. The following data collection methods were employed as part of the surveys:

- Highways Manual Classified Counts (MCC)
- Highways Automatic Traffic Counts (ATC)

1.2.2. Each of these methods is described in more details in the following Chapter 2 of this report.

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2. HIGHWAY DATA

2.1. WHAT WAS COMMISSIONED

2.1.1. NCC has commissioned WSP to support the delivery of a DfT compliant OBC for the LSB Scheme, a new road around the existing Long Stratton settlement encouraging traffic using the A140 to avoid travelling through the town.

2.1.2. In June 2018 WSP commissioned Nationwide Data Collection (NDC) to undertake a comprehensive traffic survey collection process of key highway links and junctions in and around Long Stratton, Norfolk. These surveys were designed to complement the existing traffic data already available, to provide a complete set of observed traffic counts in the Long Stratton area. This data will be used to ensure that the traffic model represents the observed data accurately. **Table 2-1** shows the total number of surveys undertaken for each survey type.

Table 2-1:   **Survey Summary**

Survey Type	Number of Surveys
Manual Classified Counts (MCCs)	2
Automatic Traffic Counts (ATCs)	23

2.2. DATA COLLECTION TECHNIQUES

2.2.1. Details of the two data collection techniques used are provided in this section.

MANUAL CLASSIFIED COUNTS (MCCS)

2.2.2. MCCs were undertaken at the following junctions:

- Site 1 – A140 Norwich Road / B1134 Tivetshall Road / Station Road
- Site 2 – A140 / A47

2.2.3. The surveys were carried out on Wednesday 13th June 2018; survey hours were between 07:00 to 19:00. All information was collected in fifteen-minute intervals. MCC location plan can be found in separate document - **Appendix A** and the details of the observed movements are given in separate document - **Appendix B**.

2.2.4. Vehicles were classified into the following categories:

- Cars (CAR);
- Taxi (TAXI);
- Light Goods Vehicles (LGV);
- Other Goods Vehicles type 1 (OGV1);
- Other Goods Vehicles type 2 (OGV2);
- Public Service Vehicle (PSV);
- Motorcycles (MCL); and
- Pedal Cycles (PCL).

2.2.5. A detailed description of the vehicles included in each category is included in separate document - **Appendix C**. The results of the classified turning counts are included in separate document - **Appendix D**.

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AUTOMATIC TRAFFIC COUNTS (ATCS)

2.2.6. The ATCs location plan is shown in separate document - Appendix A. The ATCs were installed at the locations shown in **Table 2-2**.

Table 2-2: Commissioned ATCs undertaken by NDC

Site	Location	OSGR
1	A140, attached to sign post	TM 21599 99328
2	A140, attached to camera sign	TG 22144 03300
3	B1113, attached to post	TG 19793 02077
4	B1113, attached to telepole	TM 16648 98483
5	Wymondham Road, attached to camera sign	TG 14912 00070
6	The Street, attached to 30mph sign	TM 15106 97499
7	Bunwell Street, attached to 30mph sign	TM 12486 93438
8	The Turnpike, attached to telepole	TM 10794 90981
9	A140, attached to telepole	TM 18023 85962
10	Hardwick Road, attached to sign post	TM 23396 88989
11	The Street, attached to telepole	TM 23093 93652
12	Broaden Lane, attached to Hempnall sign	TM 23724 95063
13	Spring Lane, attached to bend sign	TM 24968 92611
14	Stoke Road, attached to 40mph sign	TG 23549 03873
15	A140, attached to armco	TM 16037 80460
16	B1134, attached to bend sign	TM 17360 87497
17	Tivitshall Road, attached to bend sign	TM 18923 86538
18	Short Green, attached to fence	TM 10562 85988
19	A146, attached to deer sign	TG 30086 02998
20	B1332, attached to telepole	TG 27868 01026
21	B1527, attached to telepole	TM 27162 93913
22	B1332, attached to 50mph sign	TM 31789 92512
23	A11, attached to - armco	TG 16119 03619

2.2.7. At each location the ATC tube were placed for a period of two weeks, from Friday 15th June 2018, in order to allow an average weeks' worth of data to be extracted reliably. The resulting data files have been analysed to produce speed and class data at hourly intervals.

2.2.8. One week of data was captured at ATC Site 23, as high volumes of traffic coupled with high speeds caused breakages in the tubes. The site was not re-installed due to health and safety concerns associated with working on a high speed road.

2.2.9. The weather was recorded as dry and bright throughout the survey period and there were no incidents or accidents likely to affect the survey results.

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2.2.10. Details of the validation checks carried out on the data are included in separate document - **Appendix E**.

2.2.11. For each site and week, the counts are averaged and 5 day and 7 day total vehicle volumes averages calculated. For the peak hours data was average for Monday-Thursday. Any days with unreliable count data (e.g. ATC tubes are broken returning zero counts) are excluded from the average. Two-way daily profile charts and as well as 5 and 7 day averages by vehicle category are shown in separate document - **Appendix F**.

2.2.12. The MCC surveys were undertaken on 13th June 2018, which falls outside the period in which the ATC surveys were recorded. To determine the validity of the MCC survey results, all the ATC survey sites in close proximity to the MCC sites 1 and 2 were identified to observe any variations between the results across Monday to Thursday. The ATC sites 2, 9, 14, 16 and 17 have been identified. The AM and PM peak data recordings across Monday to Thursday for each site show less than 2% variation. As a result, the MCC surveys are deemed valid.

2.3. EXISTING DATA

2.3.1. County wide survey data was commissioned in April 2016 as part of the SCTM update and a number of these surveys were located within the Long Stratton Study Area. All survey data that fell within the LSTM Study Area boundary was brought into the calibration and validation process and statistics.

2.3.2. Additional observed data was commissioned by Cannon – a consultant working for the Long Stratton Developer on the Transport Assessment – and undertaken by Advanced Transport Research in 2015, was supplied to WSP to support the Long Stratton Bypass strategic assessment. Cannon have provided WSP their Traffic Data Analysis Report that is included in separate document - **Appendix G**.

2.3.3. Survey locations, undertaken as part of the county wide collection in 2016 or supplied from Cannon and undertaken in 2015, alongside those commissioned for the purpose of the LSTM are shown in **Figure 2-1**. All count data within the Long Stratton study area went through a detailed calibration and validation process specifically for the local model validation relevant to Long Stratton.

2.3.4. **Table 2-3** identifies which surveys were commissioned as part of the original SCTM model build; the surveys were undertaken in January 2015, August 2015 and April 2016. A factor, specific to the local authority, was extracted from NTEM 7.2 in order to adjust the counts to 2016.

Table 2-3:   LSTM Counts undertaken for SCTM development

Site Ref	Date	Data Type	Location	Direction
58	April 16	ATC	Harleston B1116 Harleston Road	Northbound / Southbound
67	April 16	ATC	Stuston A143 Old Bury Road	Eastbound / Westbound
69	April 16	ATC	Redgrave B1113	Northbound / Southbound
196	April 16	ATC	Bungay A144 Broad Street	Northbound / Southbound

Site Ref	Date	Data Type	Location	Direction
197	April 16	ATC	Bungay Beccles Road	Eastbound / Westbound
198	April 16	ATC	Bungay Flixton Road	Northbound / Southbound
199	April 16	ATC	Bungay A144 St John's Road	Northbound / Southbound
200	April 16	ATC	Bungay Flixton Road	Eastbound / Westbound
201	April 16	ATC	Bungay Watch House Hill	Eastbound / Westbound
202	April 16	ATC	Bungay A144	Eastbound / Westbound
220	April 16	ATC	Scole A140 Scole Bridge	Northbound / Southbound
A11 TMU	April 16	TRADS	A11 TMU Site 6360/1 On Link A11 Between A1075 And B111	Northbound / Southbound
Y056	April 16	ATC	North Of B1077 Stuston	Northbound / Southbound
2	Aug 15	MCC	Ipswich Road South	Eastbound / Westbound
3	Aug 15	MCC	The Street North	Northbound / Southbound
3	Aug 15	MCC	The Street South	Northbound / Southbound
4	Aug 15	MCC	Norwich Road	Northbound / Southbound
4	Aug 15	MCC	Hill Farm Road	Eastbound / Westbound
4	Aug 15	MCC	The Street	Northbound / Southbound
5	Aug 15	MCC	Hill Farm Road	Eastbound / Westbound
8	Aug 15	MCC	Markshall Farm Road	Eastbound / Westbound
8	Aug 15	MCC	A140 Ipswich Road South	Northbound / Southbound
Site 1	Jan 15	ATC	A140	Northbound / Southbound
Site 2	Jan 15	ATC	A140	Northbound / Southbound
Site 3	Jan 15	ATC	B1113	Northbound / Southbound
Site 4	Jan 15	ATC	B1113	Northbound / Southbound
Site 5	Jan 15	ATC	Wymondham Road	Eastbound / Westbound
Site 6	Jan 15	ATC	The Street	Eastbound / Westbound

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Site Ref	Date	Data Type	Location	Direction
Site 7	Jan 15	ATC	Bunwell Street	Eastbound / Westbound
Site 8	Jan 15	ATC	The Turnpike	Eastbound / Westbound
Site 9	Jan 15	ATC	A140	Northbound / Southbound
Site 10	Jan 15	ATC	Hardwick Road	Northbound / Southbound
Site 11	Jan 15	ATC	The Street	Northbound / Southbound
Site 12	Jan 15	ATC	Broaden Lane	Northbound / Southbound
Site 13	Jan 15	ATC	Spring Lane	Northbound / Southbound
Site 14	Jan 15	ATC	Stoke Road	Northbound / Southbound
Site 15	Jan 15	ATC	A140	Northbound / Southbound
Site 16	Jan 15	ATC	B1134	Northbound / Southbound
Site 17	Jan 15	ATC	Tivitshall Road	Northbound / Southbound
Site 18	Jan 15	ATC	Short Green	Northbound / Southbound
Site 19	Jan 15	ATC	A146	Northbound / Southbound
Site 20	Jan 15	ATC	B1332	Northbound / Southbound
Site 21	Jan 15	ATC	B1527	Eastbound / Westbound
Site 22	Jan 15	ATC	B1332	Northbound / Southbound
Site 23	Jan 15	ATC	A11	Eastbound / Westbound
Site 1	Jan 15	ATC	Ipswich Road	Northbound / Southbound
Site 2	Jan 15	ATC	Hall Lane	Eastbound / Westbound
Site 3	Jan 15	ATC	Flowerpot Lane East of Manor	Eastbound / Westbound
Site 4	Jan 15	ATC	Flowerpot Lane West of Manor	Eastbound / Westbound
Site 6	Jan 15	ATC	Swan Lane East of Chequers	Eastbound / Westbound
Site 7	Jan 15	ATC	Swan Lane East of Manor	Northbound / Southbound

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Site Ref	Date	Data Type	Location	Direction
Site 8	Jan 15	ATC	Norwich Road South of Church Lane [30M]	Northbound / Southbound
Site 9	Jan 15	ATC	Church Lane	Eastbound / Westbound
Site 10	Jan 15	ATC	Norwich Road North of Church Lane [50M]	Northbound / Southbound
Site 11	Jan 15	ATC	Norwich Road North of B1527	Northbound / Southbound
Site 12	Jan 15	ATC	B1135	Northbound / Southbound
Site 13	Jan 15	ATC	B1527	Eastbound / Westbound

Figure 2-1:   LSTM ATC Data

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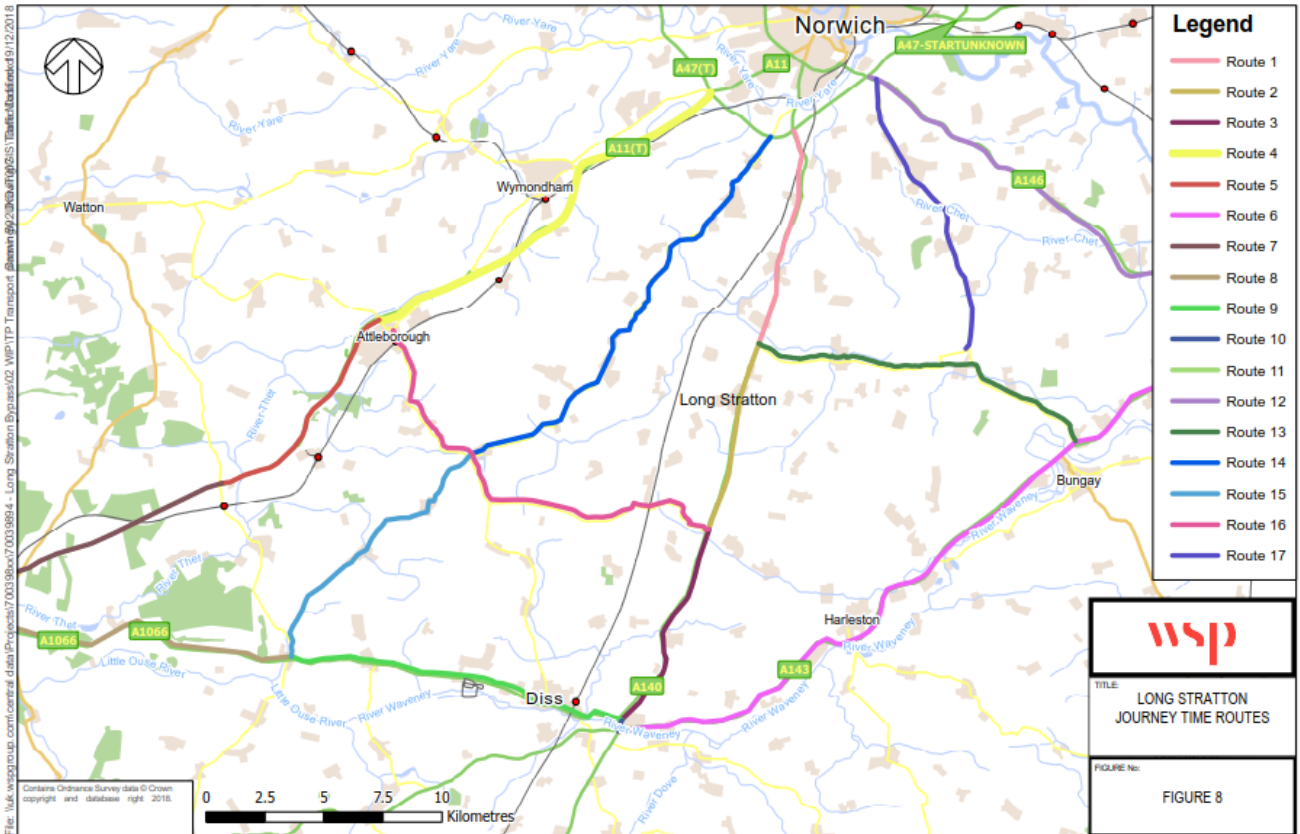Project No.: 70039894 | Our Ref No.: 70039894
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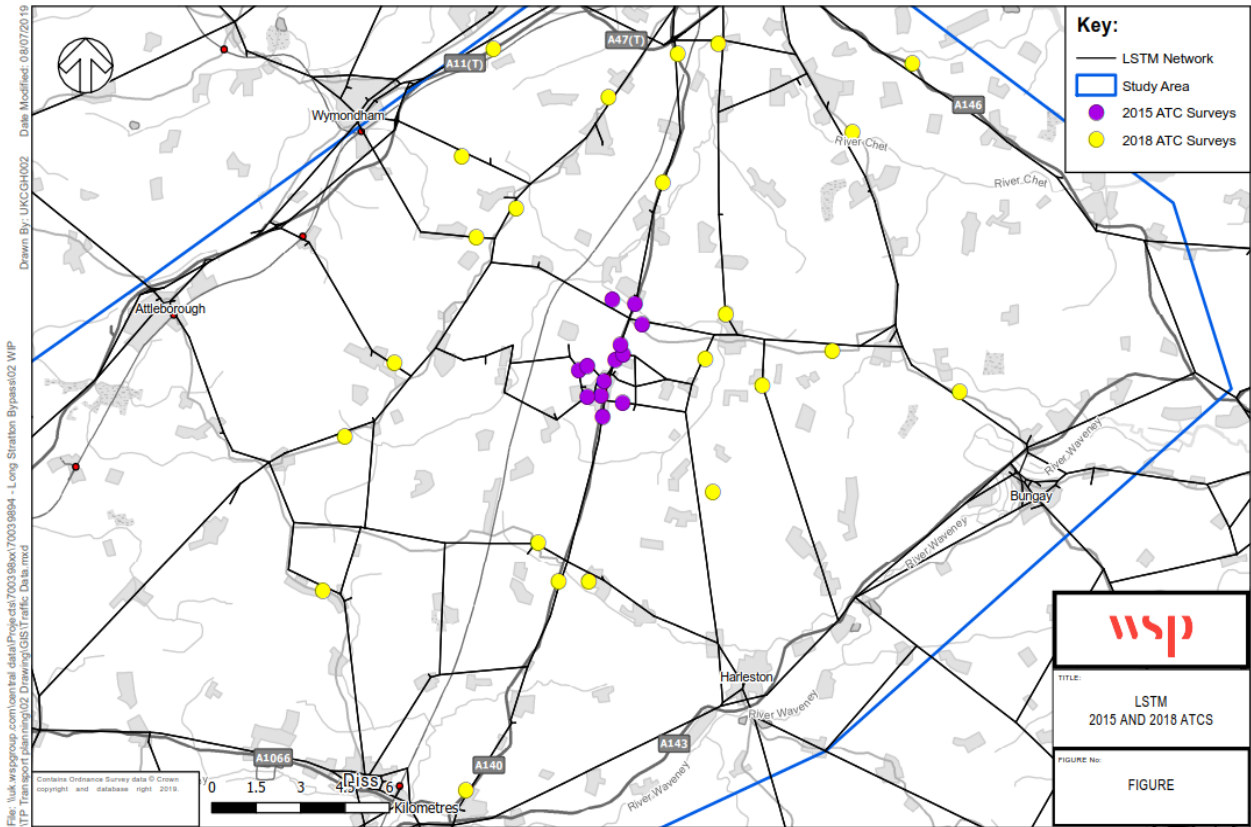
3. JOURNEY TIME DATA

3.1. JOURNEY TIME DATA

3.1.1. Journey time data was provided by NCC derived from INRIX Highways Analyst. There 17 routes in total, these are shown in Figure 3-1 and will be used for validation purposes.

Figure 3-1:   Journey Time Routes

3.1.2. A summary of the observed journey time for the 17 routes are shown in **Table 3-1.**

Route 2 Detailed Analysis

3.1.3. In December 2019 / January 2020, WSP undertook journey time analysis along the A140, through Long Stratton, and more specifically Route 2 within the LSTM model. The purpose of this analysis was to thoroughly investigate the various data sources available to collect observed journey times and compare them to determine the most appropriate source for observed data within the LSTM validation exercise. The data sources discussed included INRIX Analytics, Google, WSP site visit, moving car observations undertaken by Cannon within their Transport Assessment and survey data commissioned by NCC. A detailed technical note was written to discuss WSP's findings and this can be found in separate document - **Appendix H**.

3.1.4. The Long Stratton Journey Time analysis Technical Note, included in separate document - **Appendix H**, notes that whilst INRIX data from June 2016 was used in the validation and development of the LSTM model, information for all years 2015 to 2019 was extracted for comparison and variability analysis. Following a review of the LSTM validation performance along Route 2 (A140 through Long Stratton) and despite the route meeting TAG criteria in both direction,

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in all three time periods (AM, IP and PM), it was deemed appropriate that INRIX data was extracted at the most segregated and finite detail level to ensure that the LSTM was accurate reflecting delays at the correct junctions along the routes entirety. As part of this process, the journey time variability was considered, and data extracted for Route 2 between 2015-2019 was compared and a review determined that journey times had remained relatively consistent; any fluctuations were able to be accredited to the construction period of the Hempnall Crossroads north of the scheme during 2019. Outliers were also removed when processing INRIX data for use in route validation.

3.1.5.   The study into observed journey times demonstrated that INRIX data is the most appropriate means for data collection due to its accurate presentation of travel patterns both during a particular day, across the study month and over numerous recent years.

3.1.6.   As a result of the detailed research, WSP re-extracted INRIX data along Route 2 in the smallest observed segments that the software allows; this meant that not only could we ensure that the overall route modelled time closely matched the observed, we could also ensure that the model matched the observed time at specific timing points along the A140 as often as possible. By having frequent timing points along the A140 route, WSP were able to ensure that the model reflected key points of delay or congestion along the route; most notably this was observed to occur at junctions with Hall Lane, Flowerpot Lane, Swan Lane and the pedestrian crossing just north of Swan Lane. The delays were caused by signalised junctions and queueing that occurred here; the council offices were also accredited to generating a large number of AM peak arrivals and PM departures which causes delay at A140 / Swan Lane with right turning vehicles queueing back along the A140 SB in the AM peak as reflected in the INRIX data and shown by the significantly reduced average speeds observed along these links. These observations and supporting delays and reductions in speed demonstrated by the INRIX data, were supported by the client's knowledge of the local area.

3.1.7.   The validation statistics for route 2, along with the other routes, is discussed in more detail in the LMVR January 2021.

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Table 3-1:   Observed Journey Time (seconds)

Route	AM peak	Inter peak	PM peak
1 -SB	507	488	569
1 - NB	528	485	486
2 - SB	646	488	564
2 - NB	628	493	587
3 - SB	413	412	399
3 - NB	410	415	401
4 - SB	645	645	631
4 - NB	799	665	741
5 - SB	348	346	331
5 - NB	372	364	349
6 - EB	1435	1436	1401
6 - WB	1387	1380	1363
7 - SB	510	479	459
7 - NB	454	451	428
8 - EB	838	842	822
8 - WB	914	869	860
9 - EB	1003	1058	1075
9 - WB	1005	1081	1098
10 - SB	29	29	31
10 - NB	30	30	29
11 - SB	225	225	223
11 - NB	222	220	216
12 - SB	788	786	839
12 - NB	849	814	833
13 - EB	962	968	951
13 - WB	927	927	927
14 - NB	1278	1291	1298
14 - SB	1325	1345	1310
15 - NB	929	954	825
15 - SB	977	996	902
16 - EB	1282	1323	1270
16 - WB	1307	1343	1307
17 - SB	870	868	959
17 - NB	888	802	811

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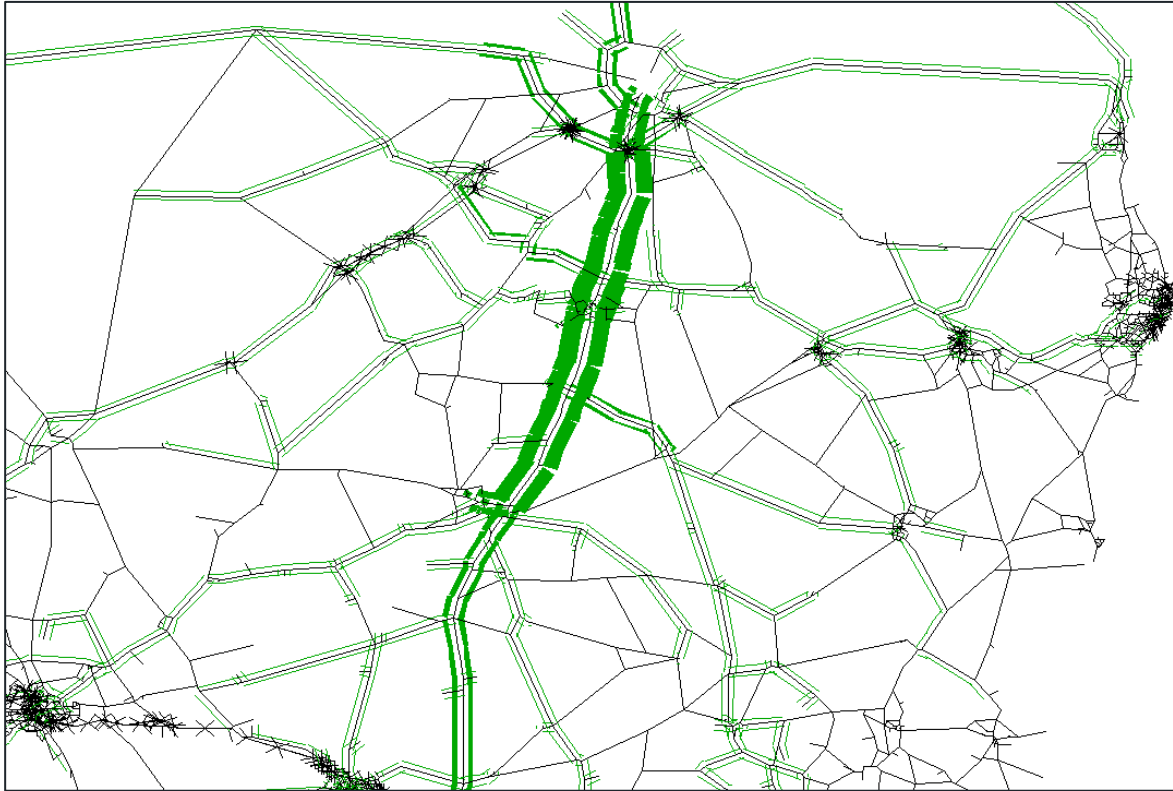January 2021
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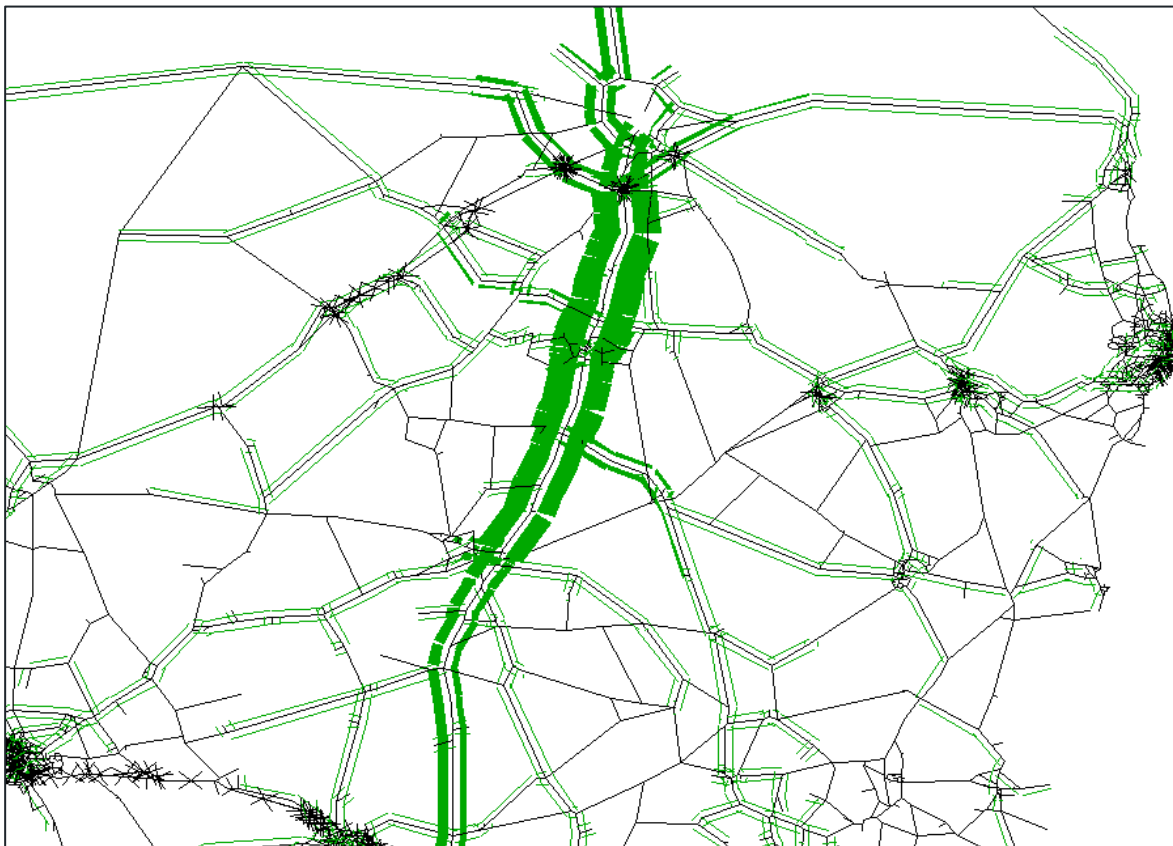# 4. EXISTING TRAFFIC FLOWS

4.1. A140 DESIRE LINE DIAGRAMS

4.1.1. As part of the DfT requirements for a Data Collection Report an understanding of where traffic is wanting to travel from around key areas of the highway network are required. Select link analysis within the 2016 SCTM of traffic within Long Stratton were undertaken to show the key routes traffic are taking who are travelling through the area.

4.1.2. **Figure 4-1** to **Figure 4-3** show the A140 desire diagrams taken from the 2016 SCTM illustrating the movements using or travelling through Long Stratton.
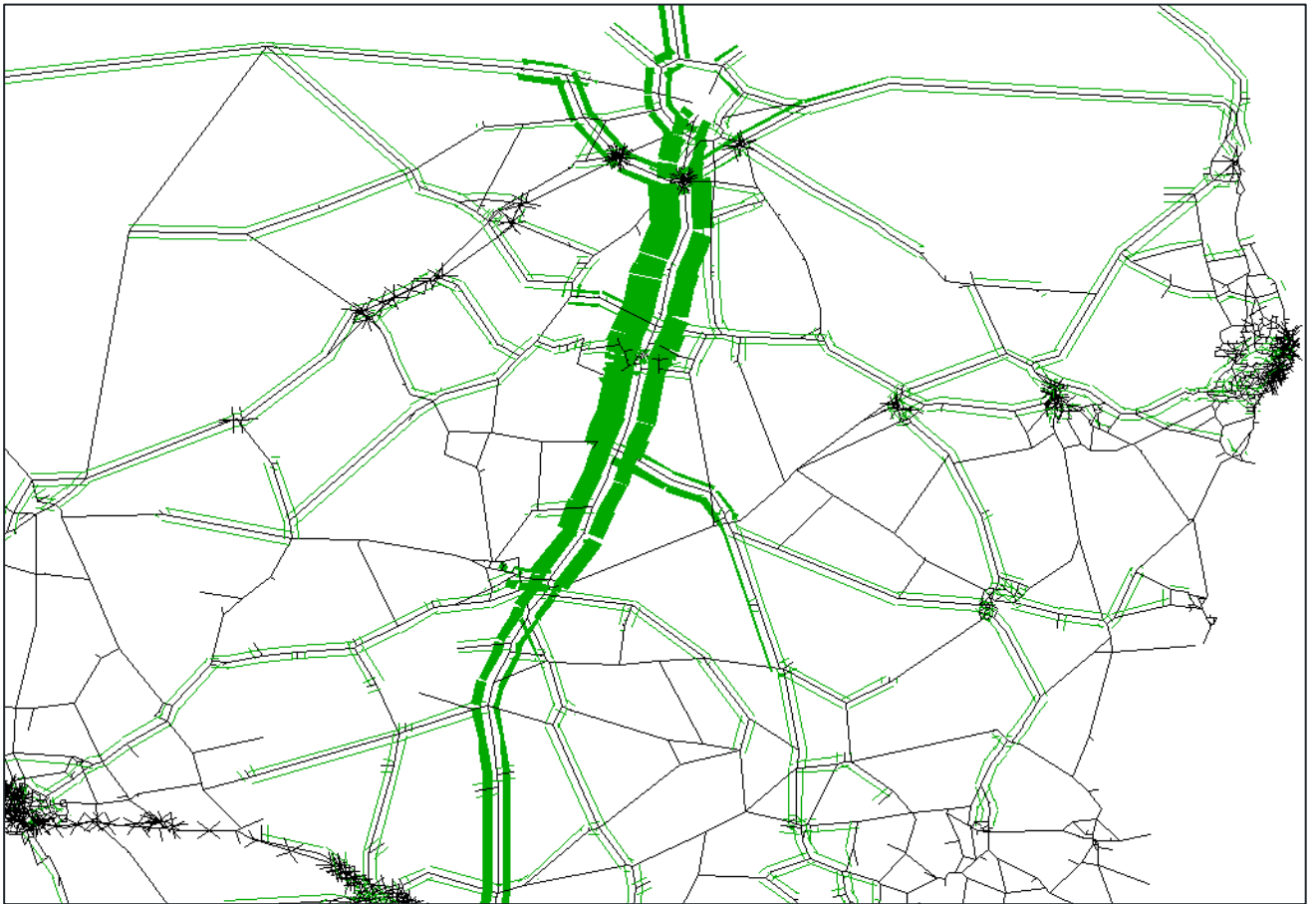
Figure 4-1:   **AM Peak Desire Line Diagrams**

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Figure 4-2:   Inter Peak Desire Line Diagrams

Figure 4-3   PM Peak Desire Line Diagrams

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4.2. BASE YEAR FLOWS

4.2.1. To show the existing traffic flows in the scheme area, 2016 Base year flows for the scheme area and the relevant corridors around it have been plotted for all time periods. The maps showing the flows are provided in separate document - **Appendix I**.

4.3. MOBILE PHONE DATA

4.3.1.1. Mobile phone data was not used for the development of the LSTM the Suffolk County Transport Model (SCTM) was used as a basis for this model and mobile phone data was used in the development of SCTM. As part of the Lake Lothing Third Crossing business case the mobile phone data collection was reviewed by the DfT and within separate document – **Appendix J,** we have provided the Telefonica Report and Lake Lothing Third Crossing LMVR which contains details about the mobile phone data collection for the SCTM.

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