A428 Black Cat to Caxton Gibbet

Traffic Data Collection Report

July 2016

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0	15/07/2016	Draft For Client Review	AJ	TB	SB
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Contents

1. Introduction

1.1 Model background

In March 2016 Jacobs were commissioned by Highways England to construct a strategic transport model of the A428 to enable detailed assessment of the proposed interventions announced in the Department for Transport's (DfT) Roads Investment Strategy (RIS) published in December 2014.

As part of the PCF Stage 0 process a review of available transport models was undertaken, it identified that the A14 Cambridge to Huntingdon SATURN model could be used provided additional work to extend the modelled area, improve or replace the zoning system and update the matrices to better represent traffic conditions in the vicinity of the A428. As such the A428 model makes use of information and link structure from the A14 where possible.

The main objectives for the model are to test the effectiveness of proposed improvements to the A428 between Black Cat roundabout and Caxton Gibbet.

Jacobs are assisting Highways England in progressing the A428 proposals through Stage 1 (Option Identification) and 2 (Option Selection) of the Project Control Framework (PCF).

1.2 Purpose of Report

To complete Stage 1 and progress the scheme proposals through further stages of the PCF process, one of the products required is a Traffic Data Collection Report (TDCR). The overarching purpose of the TDCR is to:

- Set out the need for traffic data taking into consideration the current PCF Stage and data required for subsequent stages, following the data requirements set out in the ASR.
- Collate, summarise and review available existing traffic data.
- Identify the need for additional survey data and its contribution to the traffic forecasts.
- Describe the survey and data cleaning, expansion and checking up to the point in which it transfers to the model building process.
- Summarise and discuss the outputs from the data collection and traffic surveys.

This report provides a detailed summary of the traffic surveys and data collected to inform the A428 Transport Model, including information on the survey sites and analysis of the data which was obtained.

1.3 Need for Traffic Data

The traffic data collated as part of this TDCR will be used to inform scheme development, design and appraisal of the proposed improvements to the A428. Existing and current data will be primarily used to model the proposed improvements and ascertain the value for money case of the improvements, however, in order to inform the design data is required to assess the required design standards to be applied from the DMRB and other highway design guidance.

Noise, air quality, water, heritage, landscape, wildlife and social and distributional impacts will be assessed using best practice as outlined in DMBR and WebTAG appraisal guidance, utilising outputs from the traffic model and future forecasts developed from the base year traffic data reported in this TDCR. Therefore, the data collection provides the basis for not only the design elements of the scheme, but also the wider economic and environmental appraisal.

The combined existing traffic data that has been collated from stakeholders and new survey data will be used to construct, calibrate and validate the 2016 base year model for the A428 improvement scheme. Using this as a base, future traffic growth forecasts and housing and employment development information will be collated to develop a future 'core' scenario, to the proposed opening year of the scheme and a design year 15 years hence. Additional sensitivity testing of the forecast models will be undertaken utilising variations of the growth

forecasts and similarly a qualitative assessment of the uncertainty log for the forecast development profiles. These will then be used to produce 'low' and 'high', or optimistic and pessimistic forecast growth scenarios pivoting from the 'core' scenario.

The developed forecast scenarios will then be used in the value for money assessment of the scheme, as outlined in guidance and feed into the economic, environmental assessment of the impact of the scheme in the future.

The extensive data collection exercise carried out to inform the model should enable much of the information gathered to be carried forward to later PCF stages, however some traffic count data gathered from existing sources may become out of date in future stages and would need to be updated. At each future PCF stage data sources will be reviewed to ascertain whether new data is available and any new data will also be exchanged with the regional modelling team.

1.4 Survey Programme

Data from a wide range of sources has been collected and used in the development of the A428 model. In addition to mobile phone and TrafficMaster data, obtained from Highways England and the DfT respectively, traffic surveys were commissioned and undertaken in April and May 2016 (avoiding bank and school holidays) to provide up to date observed data for the modelled area. The various types of traffic information utilised within the model include:

- Anonymised mobile phone data
- TrafficMaster origin-destination and journey time data
- Automatic traffic counts (ATC)
- Manual classified counts (MCC)
- Manual classified turning counts (MCTC)
- Automatic Number Plate Recognition (ANPR) survey
- Highways England TRIS data

1.5 Report Structure

The remainder of this document is set out as follows:

- Chapter 2 – Summary and Review of Existing Data
- Chapter 3 – Use of Available Processed Data and Models
- Chapter 4 – Specification and Execution of Surveys
- Chapter 5 – Final Volumetric Dataset
- Chapter 6 – Final Trip Dataset
- Chapter 7 – Journey Time Data
- Chapter 8 – GPS Origin-Destination Data
- Chapter 9 – Operational Data
- Chapter 10 - Suitability of Accumulated Database

2. Summary and Review of Existing Data

2.1 Introduction

This chapter summarises the existing available data to be used in the model build, calibration and validation. Whilst the input demand matrices have been constructed from mobile phone origin-destination data, as outlined Chapter 6, several existing data sources and newly commissioned surveys will be used in the calibration and validation of the base year model assignment.

2.2 Existing data sources and availability

2.2.1 Existing Traffic Models

A review of existing models within the proximity of the study area has been carried out with a view to analysing their potential use within the current study. Only one such model was identified, the A14 Cambridge to Huntingdon model. It has been observed that the A14 model has its own unique characteristics and relevance. While this model may not be usable in its present form, some components may still be retained and used for the present study. The suitability of this model for assessment of the A428 improvements is discussed in detail in Chapter 3.

2.2.2 Existing Traffic Data

Before undertaking the initial assessment of data requirements for the A428 model, existing data sources were identified through dialogue with stakeholders to identify previous and ongoing modelling work, surveys and information could be made available. The use of any data needs to be within the standards outlined in the highways England TAME advice note '*Roads Investment Strategy 1 – PCF Stage 1 Modelling Requirements'* (June 2015). This states that in relation to data quality factors:

- **Age of data**: Whilst WebTAG indicates that matrices with supporting survey data greater than six years should be the subject of extensive redevelopment work, this will be relaxed to 10 years.
- **Journey purposes**: Where data has been sourced without detail of journey purposes, a variety of methodologies are possible, proportionate to the time restrictions being faced. Under severe restrictions, the application of national average splits at a matrix level appropriate to the time of day (sourced from the WebTAG data book) could be considered. If time constraints are less severe, application of splits derived from extant models on an individual zonal (or collection of zone) basis would be preferable. Additional methodologies may be agreed with the relevant ACO.
- **'Big data'**: Although the final outputs from the national matrix project are unlikely to be available to the timescales required by schemes within PCF Stage 1 at the beginning of RIS1, early person-trip matrices sourced from the national matrix project may be available for schemes of particular importance. Otherwise, other available extant matrices based on big data, developed for other historic Highways England schemes or current Highways England or Local Authority schemes may be of use to individual schemes.

Relaxation of the above standards would therefore open up the opportunity to use historic data available from a number of stakeholders and recent projects undertaken in the vicinity of the proposed A428 improvements. Stakeholders approached and available sources of data from recent projects include:

- Highways England: Holders of the A14 Cambridge to Huntingdon model and associated data.
- Arcadis: Currently commissioned by Highways England to develop the South East Regional Transport Model (SERTM).

Additional data sources are also available from ATC sites operated by Highways England on the Strategic Road Network (SRN) as part of their TRIS database.

2.3 Existing data quality

Once potentially useful data sources were identified they were reviewed as to which, if any, existing data was suitable for use in the development of the A428 Model. The criteria to identify suitable data sources are outlined below.

The data quality criteria for ATC counts include:

- Data should be from April or May in 2016 or 2015 to align with data collected for the model development as outlined in Chapter 4.
- There should be at least one week's worth of continuous data, two week's preferable.
- Should be relevant to towns, villages or key routes that would be suitable for use as screenlines / cordons.

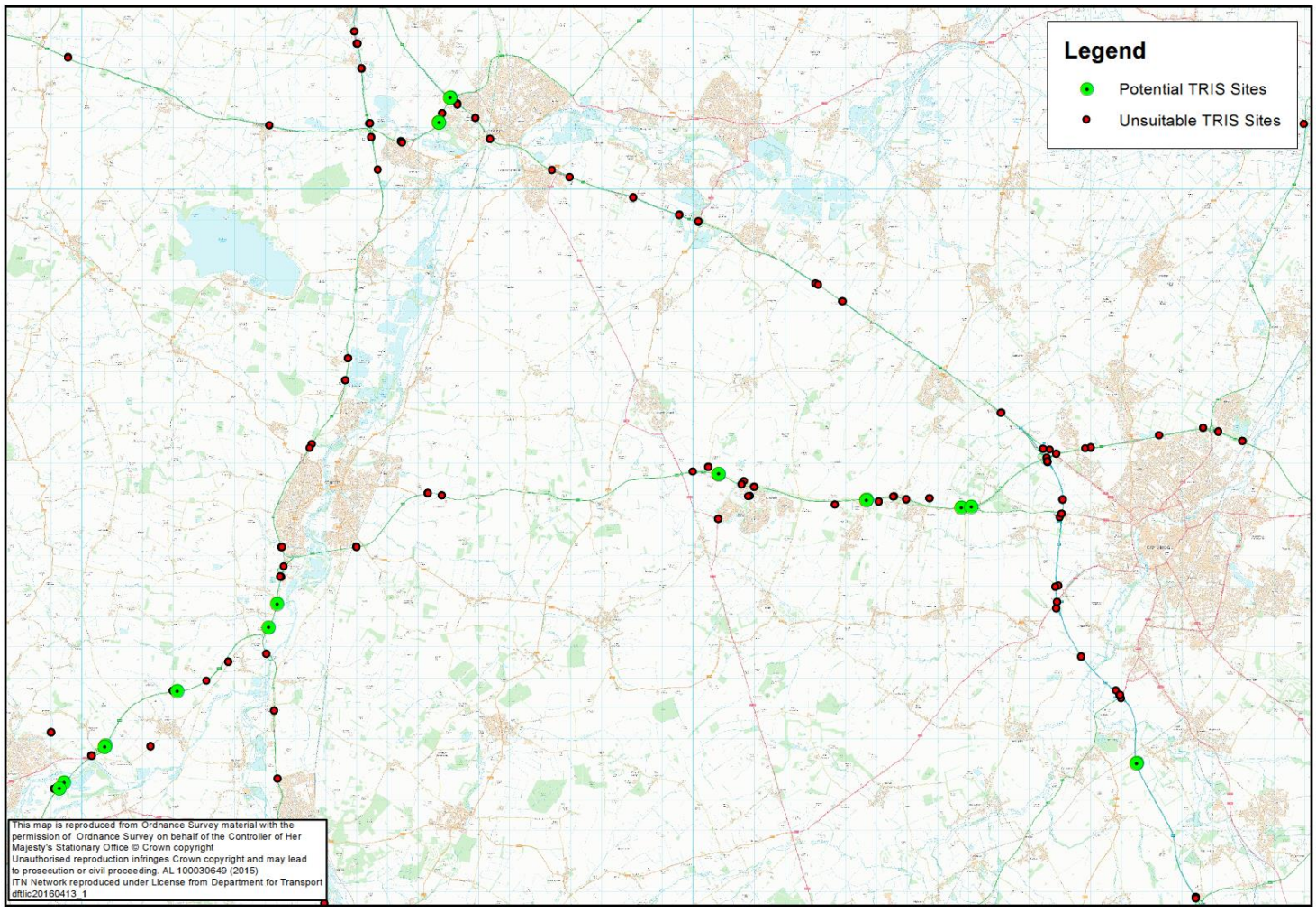
Given these criteria the only suitable ATCs identified are the Highways England TRIS sites located on the SRN, a large number of sites were identified, however, some sites did not have sufficient data in the periods identified or were not in locations suitable for use with our screenlines and as such were not used. The list of TRIS sites used is shown in **Table 2.1** and presented in **Figure 2.1.**

Table 2.1 : Selected TRIS Sites

Site and Location	X	Y
TAME Site 30360826 on link A1 northbound between A421 and A428	516386	256408
TAME Site 30360854 on link A14 eastbound between J22 and J23	521671	272167
TAME Site 30360855 on link A14 westbound between J23 and J22	521683	272158
TAME Site 30360861 on link M11 southbound between J11 and J10	544524	251200
TAME Site 30360862 on link M11 northbound between J10 and J11	544510	251198
TAME Site 30360868 on link A428 westbound between A1303 and A1198	530828	260647
TAME Site 30360869 on link A428 eastbound between A1198 and A1303	535670	259825
TAME Site 30360870 on link A428 westbound between A1303 and A1198	535669	259809
TMU Site 6823/1 on link A1 northbound between A6001 near Biggleswade (north) and A603	517721	247011
TMU Site 6822/1 on link A1 southbound between A603 and A6001 near Biggleswade (north)	517663	247321
TMU Site 6774/1 on link A14 spur (Huntingdon) southbound exit for A141	522059	272993
TMU Site 6774/2 on link A14 spur (Huntingdon) southbound within the A141 junction	522047	272975
TMU Site 6809/1 on link A421 northbound between A603 and A428	509402	250560
TMU Site 6810/1 on link A421 southbound between A428 and A603	509243	250368
TMU Site 6813/1 on link A1 southbound between A428 and A421	516089	255636
TMU Site 6818/2 on link A428 eastbound between A1303 and M11/A14	538764	259564
TMU Site 6819/2 on link A428 westbound between M11/A14 and A1303	539099	259593
TMU Site 7120/2 on A421 southbound within the A428 junction	510761	251783
TMU Site 7120/1 on A421 southbound exit for A428	510737	251721
TMU Site 7122/1 on A421 northbound between A428 and A1	513109	253550
TAME Site 30360867 on link A428 eastbound between A1198 and A1303	530828	260660
MIDAS site at A1M/9617A priority 1 on link 108005301	523357	236320
MIDAS site at A1M/9619B priority 1 on link 108010002	523312	236465
MIDAS site at A1M/2067A priority 1 on link 199046603	519033	276214
MIDAS site at A1M/2067B priority 1 on link 126046001	519054	276212
MIDAS site at A14M/7180A priority 1 on link 199046901	519814	276139

Site and Location	X	Y
MIDAS site at A14M/7181J priority 1 on link 199046201	519783	276153

Figure 2.1 : TRIS Sites in the Area



No existing Manual Classified Counts, Turning Data or RSI data was identified for use in the development of the A428 model. However, other previously gathered data, such as signal timings, will be suitable for use as outlined later in this report.

3. Use of available processed data and models

3.1 Introduction

The use of existing models and data within the detailed and wider model area was considered as part of PCF Stage 0. This chapter of the TDCR will outline:

- A review of existing models for testing the proposed scheme.
- Additional data collection that can be used in the study.
- Availability of Mobile Phone Demand Matrices.

3.2 Existing Model Review

A review of existing models within the proximity of the study area has been carried out with a view to analysing their potential use within the current study.

Two models have been identified in the vicinity of the scheme:

- The Cambridge to Huntingdon A14 Road Model (CHARM)
- The South East Regional Transport Model (SERTM)

It has been observed that each model has its own unique characteristics and relevance. These models may not be usable in their present form, some components may still be derived and used for the present study. These are discussed in more details below.

3.2.1 CHARM

The CHARM model was developed to support improvements to the A14 between Cambridge and Huntingdon. The model's study area broadly aligns with that which would be required to assess improvements to the A428, however, only Caxton Gibbet roundabout is included within the Area of Detailed Modelling (AODM) with the rest of the A428 route falling within the Fully Modelled Area (FMA) or External Area.

Given the area of the CHARM model broadly fits with the area of impact of the potential improvements to the A14 a review of the model's performance as outlined in the Local Model Validation Report (LMVR) in the vicinity of the A428 to assess the model's potential for use.

Link flows predicted by the traffic model were compared against link flows observed from traffic counts in line with WebTAG Unit M3.1 as part of the original model development and these were reviewed to assess the model's suitability. A review of the performance in the Inter-peak (IP) and PM-peak periods showed that the model was within or close to the GEH criteria set out WebTAG, however, the AM-Peak period showed poor validation.

One of the journey time routes presented within the LMVR was for the A428 between its junction with the A1 at Wyboston and its junction with the A14 at Girton. All journey times on this route meet WebTAG validation criteria except for westbound in the PM period. Although the model consistently predicts longer journey times than those observed, in the majority of cases the difference is less than 5%.

Overall the A14 SATURN model was established to have the following:

- A geographic area sufficiently large area, providing the area of detailed modelling (AODM) and FMA are expanded, to inform appraisal in all required locations.
- A base year of 2014, within the model age recommended by Highways England.

However, the use of the A14 model presents a number of risks, as summarised below:

- No detailed model coding of the whole network surrounding the scheme.

- No / limited traffic count or journey time validation along required modelled sections of the A421, A1 and A428.
- Zoning system is not sufficiently disaggregated in the vicinity of the scheme.

Upon consideration of the risks and advantages outlined above it was proposed that the A14 model should be used to assess improvements to the A428 between Black Cat and Caxton Gibbet following additional work to the model to extend the modelled area, improve or replace the zoning system and update the matrices to better represent traffic conditions in the vicinity of the A428.

3.2.2 SERTM

Arcadis are currently developing a new regional model for the South East of England on behalf of Highways England, this model will cover the entirety of the area of impact of any improvements to the A428 between Black Cat and Caxton Gibbet and as a new model will meet Highways England's requirements for age of data and base year.

However, the model is currently still in development and will not be available in time to meet the timescales required to progress improvements to the A428 and as such it will not be used. Information gathered or calculated as part of the model development, such as signal timings, can be used in the model as outlined later in this report.

3.3 Mobile Phone Dataset Availability

As part of the development of the A428 model mobile phone origin-destination data has been made available from Telefonica via Highways England, the same data is being used in the development of the SERTM model. This dataset is provided as a complete alternative to RSI information. It is purported to provide fully observed movements at a Census Middle Super Output Area disaggregation. The processes applied to the mobile phone data to enable assignment within the A428 model are detailed further in **Chapter 6**. This section details the specifics regarding how the dataset has been supplied.

3.3.1 Study Period

Mobile phone data has been obtained for Highways England as anonymised data which has been collected between 2nd March and 27th March 2015 as Monday to Friday averages. Data for each hour between 05:00 and 19:59 was segmented into in hourly matrices, while data for the remaining hours of 0:00 to 04:59 and 20:00 to 23:59 was aggregated into two separate matrices.

3.3.2 Types of trips included in the database

The data in the trip information system includes only motorised journeys aggregating rail, bus, goods vehicles and cars. Journeys are represented in the database as person trips, not vehicle trips.

3.3.3 Intra-zonal, inter-zonal, and external trips

The OD matrices provided as part of the interim trip information system are based on a national trip database in which the start and end point of every journey in mainland UK is assigned to an MSOA (England and Wales) or intermediate zone (Scotland). Based on this information, OD matrices that include all trips to and from the specified model zones are provided.

The data does not distinguish between internal and external zones for processing for the purposes of the interim trip information system and does not perform intersections of trips to specific study areas within the zoning system. All trips between all zone pairs provided by the user will be included in the OD matrices. The OD matrices also include intra-zonal trips.

3.3.4 Trips within the same MSOAs

The strength of the methodology is in the ability to accurately detect longer trips. One of the limitations of mobile phone event data is that it will not always capture very short trips. Therefore, the highest accuracy of the data supplied is for trips between different MSOAs, whereas the ability to detect trips within each MSOA is relatively lower. OD matrices delivered from the interim trip information system include all trips detected (both MSOA to MSOA and trips within the same MSOA). However, due to the limitations mentioned above, it is noted that intra-zonal and short distance inter-zonal trip data should be carefully reviewed and ideally cross-referenced with other data sources or methodologies before being used in the modelling process.

3.3.5 Structure of the origin – destination matrices and file naming conventions

Each CSV file provided includes a number at the end that indicates which trip start hour (or aggregated interval) it corresponds to. For each hourly matrix, each cell represents hourly weekday average trips in our sample.

For each interval matrix, each cell represents the sum of hourly weekday average trips across the interval in our sample.

The five trip purposes provided in the separate columns of the OD matrix CSV files are the following:

- hbw_outbound (home-based work outbound): work related trips starting from home
- hbw_inbound (home-based work inbound): work related trips ending at home
- hbo_outbound (home-based other outbound): non-work related trips starting from home
- hbo_inbound (home-based other inbound): non-work related trips ending at home
- nhb (not home based): trips that do not start nor end at home

4. Specification and Execution of Surveys

4.1 Introduction

Traffic count data is required for the A428 model in order to both adjust the base matrices and adjust the network parameters (calibration), as well as to provide independent comparisons of the model against observed traffic data (validation). Although mobile phone data has been used to develop the demand matrices that will be utilised within the A428 model, it is important that this data is used in conjunction with additional forms of data collection in order to verify and place confidence in the final demand values. It was decided that this additional data should be gathered in three ways:

- Automated Traffic Counts (ATC)
- Manual Classified Counts (MCC)
- Manual Classified Turning Counts (MCTC)
- Radar Surveys
- Automatic Number Plate Recognition Surveys (ANPR)

How this data was collected, analysed and used is outlined in the following sections.

4.2 Detail of surveys

Surveys were undertaken on behalf of Jacobs by Tracsis with surveys undertaken in two periods in April and May 2016. Normally surveys would be undertaken in neutral months (as described within WebTAG); however, due to time constraints for the A428 project counts were undertaken in April and May on dates that avoided the weeks following bank holidays. The active period for each survey varied depending upon its type as described below.

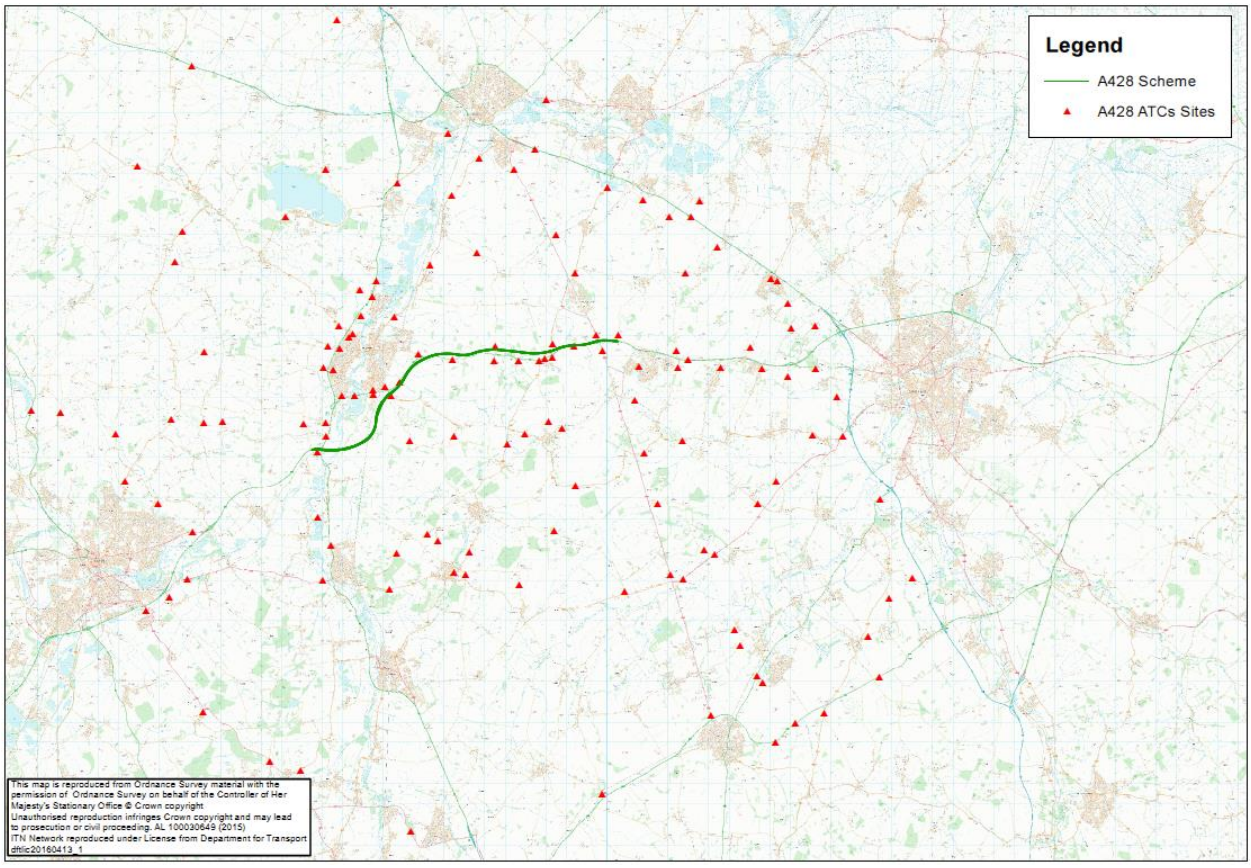
4.2.1 Automatic Traffic Counts

ATCs were undertaken continuously (24 hours) over a two-week period from either Friday 15th to Friday 29th April or Monday 9th to Sunday 22nd May, the differing periods were due to the presence of road works scheduled in the vicinity of counts that could have impacted the flow of traffic through any site. Each site monitored traffic flows in both directions and categorised vehicle types and vehicle speeds.

Originally 139 sites were identified for the placement of ATCs, however, 6 sites were identified that were unsuitable for the placement of pneumatic tube ATC given safety concerns due to the volume of high speed traffic, instead these 6 sites would require Radar surveys and are outlined in **section 4.2.4**. Therefore a total of 133 ATC surveys were undertaken.

The details of the ATC survey sites are summarised in Appendix A and locations are shown in **Figure 4.1**.

Figure 4.1 : A428 ATC locations



4.2.2 Manual Classified Counts

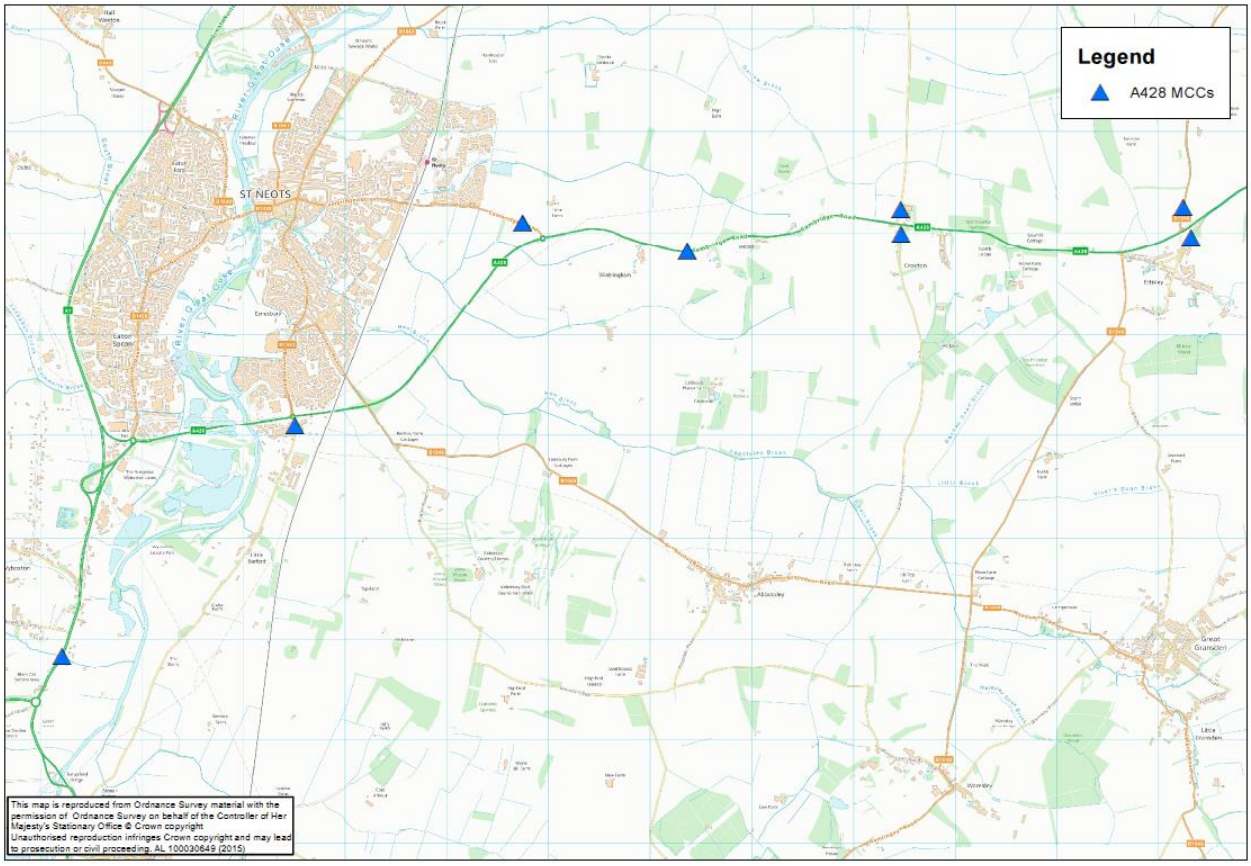
A total of 8 MCC surveys were undertaken, with 3 sites (MCC-01, MCC-03 and MCC-04) surveyed for three days from the 26th April to 28th April while the other sites were surveyed on the 26th April.

The surveyed hours for all MCCs were 07:00 to 19:00 with 15 minute intervals. The data was classified as follows:

- Cars/Taxis;
- Towing Car (caravan/trailer);
- LGV;
- OGV1;
- OGV2;
- Bus/Coach;
- Motorcycle;
- Pedal Cycle;
- Agricultural Vehicles; and
- Other

The locations of the MCC sites are shown in **Figure 4.2** and details of the survey sites are summarised in **Appendix B**.

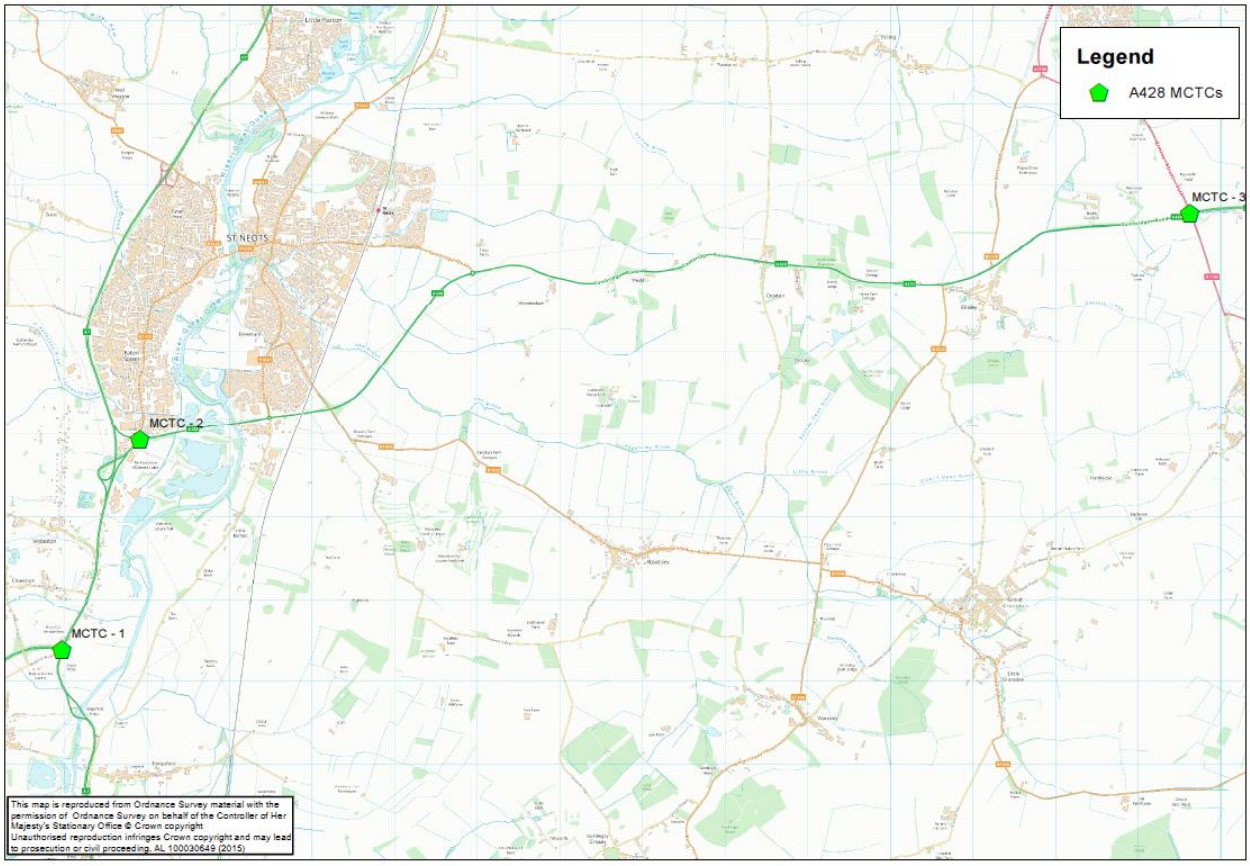
Figure 4.2 : A428 MCC locations



4.2.3 Manual Classified Turning Counts

A total of three MCTC surveys were carried out on the three major junction along the A428 route, at Black Cat roundabout, Wyboston interchange and Caxton Gibbet Roundabout, on the 26th April. The survey hours for the MCTCs were 07:00 to 19:00 with data presented in 15 minute intervals and classified in the same way as the MCCs. The locations of the MCTCs are shown in **Figure 4.3**. Details of the MCTC survey sites are summarised in **Appendix C**.

Figure 4.3 : A428 MCTC location



4.2.4 Radar Surveys

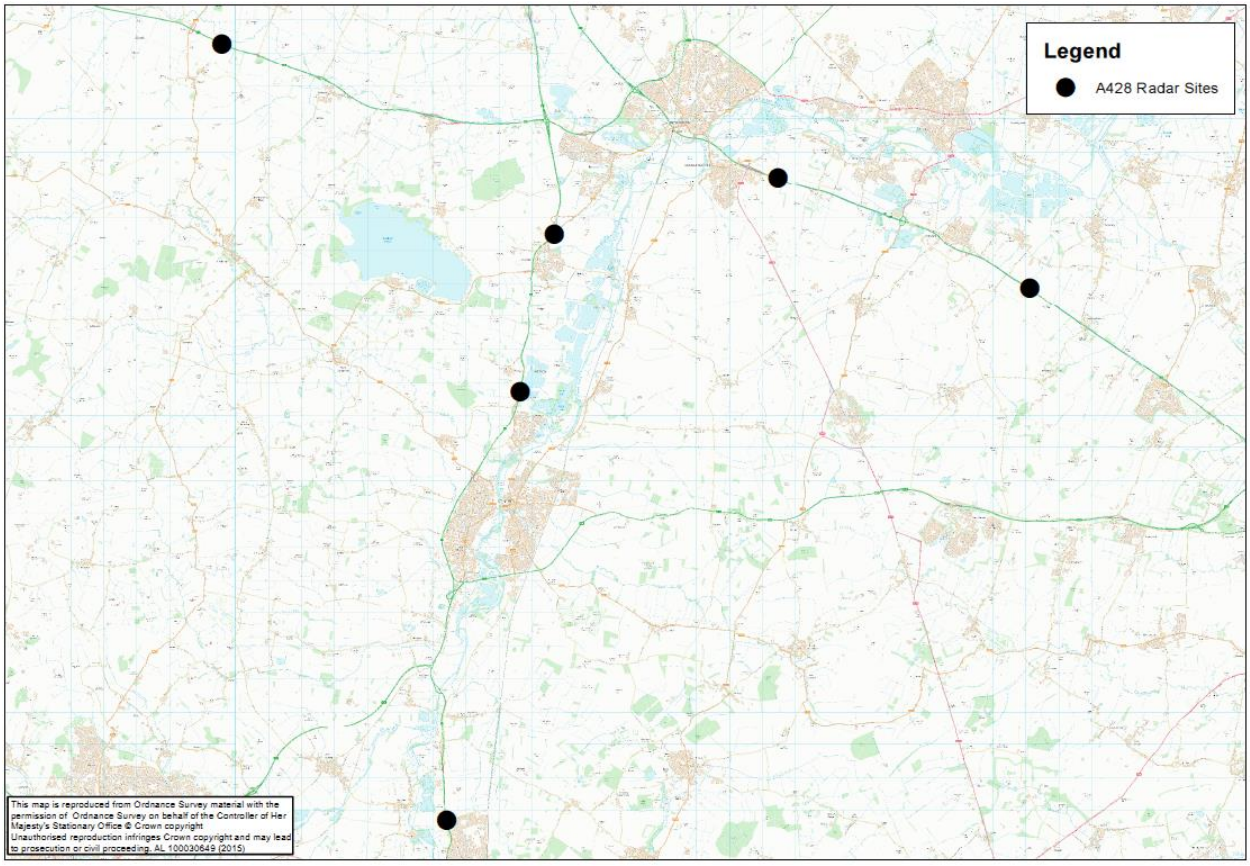
As mentioned in Section 4.2.1 a number of sites were considered unsafe for the use of pneumatic ATC tubes due to the high volume and speed of traffic and instead Radar counters positioned on street furniture were used instead. Similarly to ATC's, data collected using radars is bi-directional for speed (5 mph bins) and classification in 15min intervals. The radar units used in the survey have the following 4 classifications of length:

- < 5.2m
- 5.2m – 6.5m
- 6.5m – 11.5
- 11.5m >

Radar data can also provide 85%ile speed calculations.

Details of the Radar Survey Sites are summarised in **Appendix D** and the locations are shown in **Figure 4.4**.

Figure 4.4 : A428 Radar Survey Locations

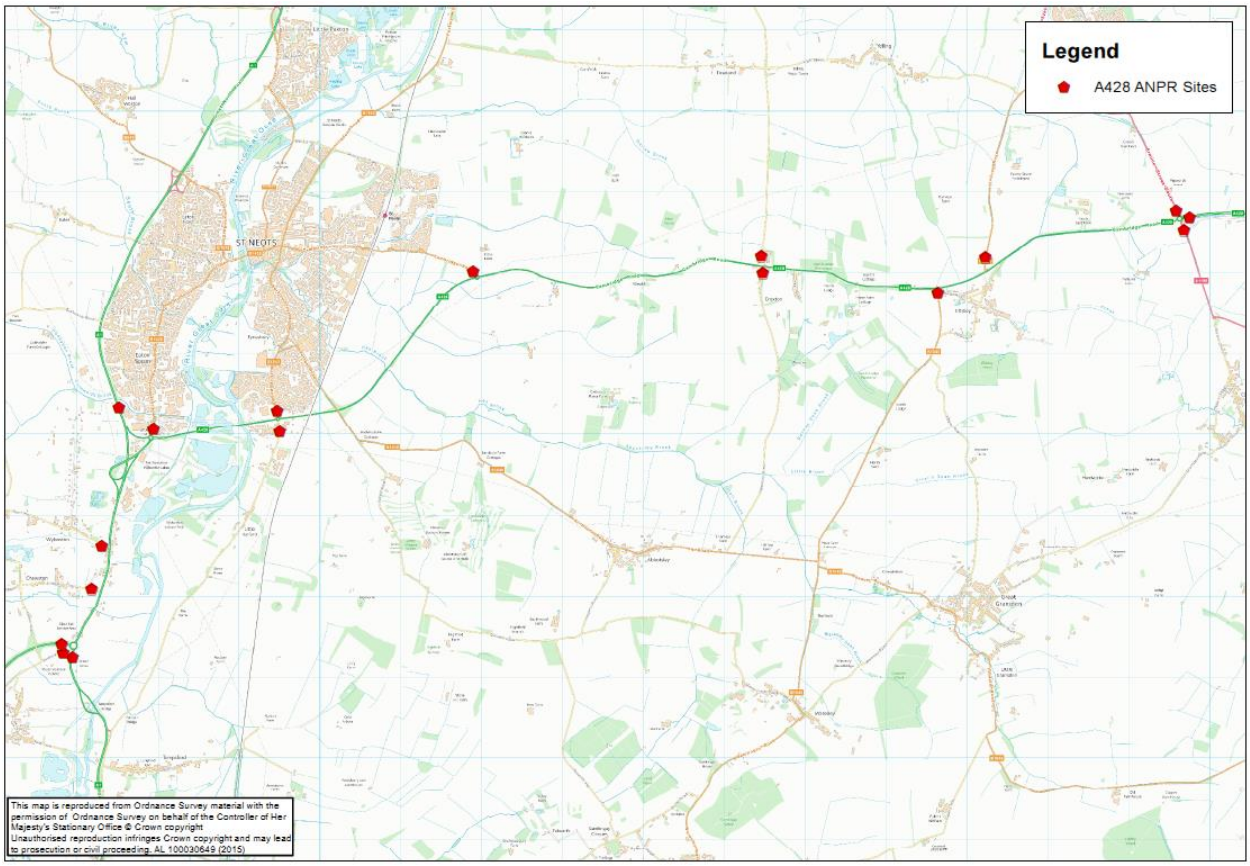


4.2.5 Automatic Number Plate Recognition

An ANPR survey was undertaken to help understand movements through the study area, this created a ring around the A1/A428 between Black Cat and Caxton Gibbet as shown in **Figure 4.5** to provide a matrix of movements along the corridor. This survey was also carried out on 26th April to allow the calculation of a capture rate reflecting the number of entries and exits captured by the survey.

Details of the ANPR Survey Sites are summarised in **Appendix E**.

Figure 4.5 : A428 ANPR locations



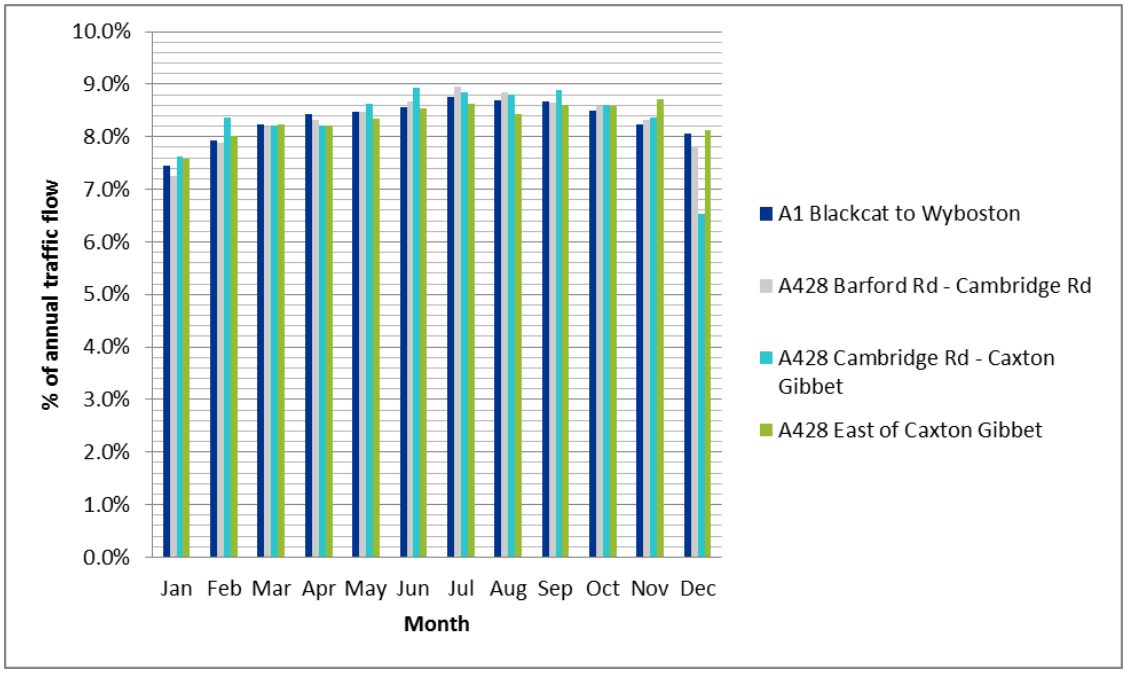
4.3 Representative Basis of Surveys

WebTAG Unit M1.2 specifies that traffic surveys should be carried out during neutral or representative months of the year, avoiding main and local holiday periods, local school holidays and other abnormal traffic periods. WebTAG describes April and May as neutral months excluding:

- The weeks before and after Easter if it falls in April
- May- excluding the Thursday before and all of the week of each bank holiday.

As such the surveys carried out above have been undertaken in April and May 2016, a period that WebTAG defines as neutral. Figure 4.6 presents the seasonality from long standing TRADS sites around the study area. This shows little difference in traffic flows between April and May and as such the suitability of this period.

Figure 4.6 : Traffic Seasonality



4.4 Outcome of Surveys

During the course of the ATC surveys issues were found at a handful of sites with data lost for varying amounts of time. Tracsis, the survey provider, monitored sites throughout to ensure there was limited loss of data, where significant data was lost timescales were extended to ensure a suitable number of days of data were retained. Following receipt of the survey data from Tracsis sites were reviewed to determine whether the loss of data would make a material difference, i.e. could an average working day still be generated, is the site in an integral model area etc.; this involved looking at the day to day variability of the data to identify where any sites experienced a narrow confidence bound, this is shown in more detail in **section 5.3.2** later in this report.

ANPR can occasionally miss number plates if obscured / unreadable and as such the capture rate falls below 100%, the ANPR survey carried out on 26th April 2016 was supported by MCC surveys at each entry / exit point, this allowed the estimation of the capture rate for inbound and outbound vehicles. Overall capture rates of 80.1% and 74.3% for inbound and outbound traffic were experienced for this survey, Tracsis ideally aim to achieve a capture rate of above 90%, however, this survey is largely being used to compare proportions rather than absolute figures and as such the slightly lower rate is not deemed to materially affect its ability to support model development.

4.5 Formulation of screenlines

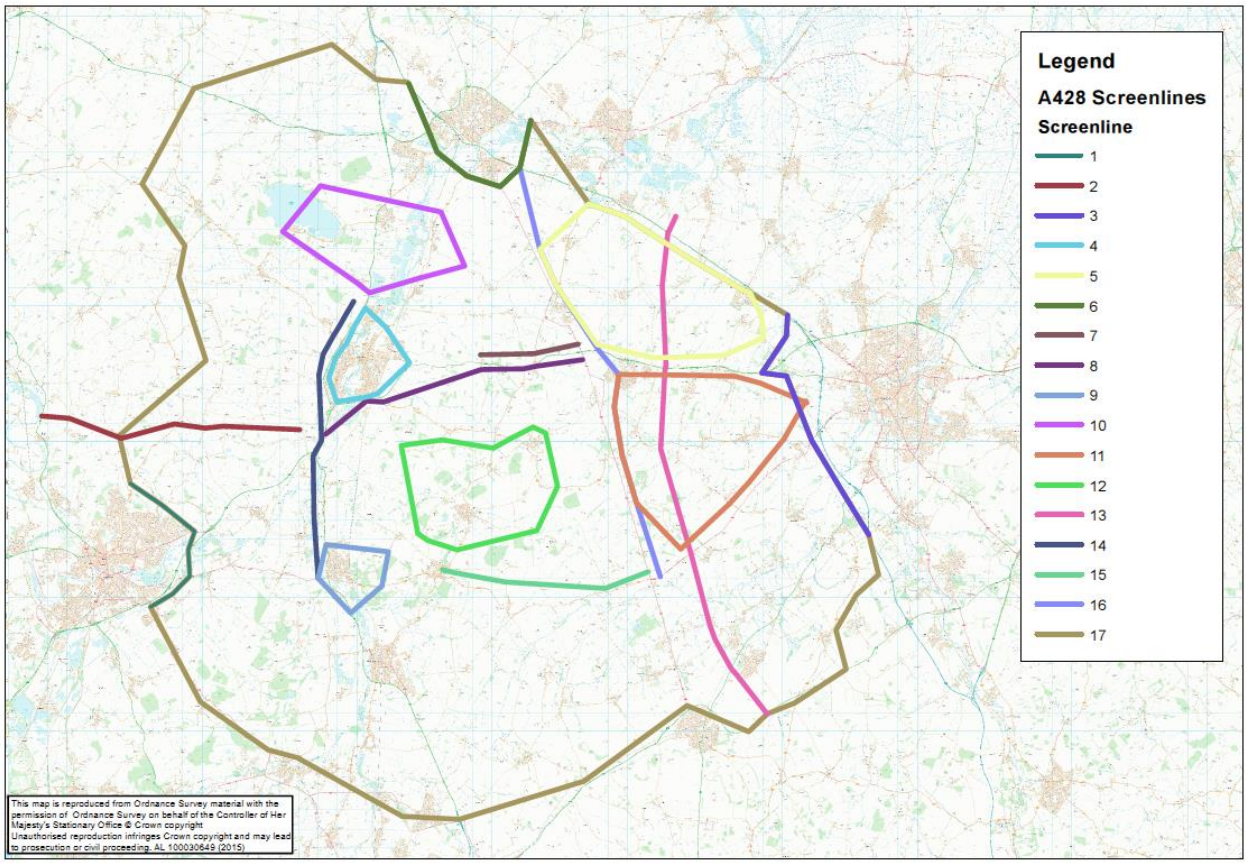
The new survey sites described above, combined with the Highways England TRIS sites identified in Chapter 2 have been used to produce screenlines and cordons for use in both the development of the model and calibration / validation.

The rationale behind the locations of the traffic surveys feeds into the formulation of the screenlines / cordons, as these are positioned to connect survey locations and establish aggregate movements within the model across key boundaries such as:

- In and out of key conurbations in the model (St Neots, Cambridge, Bedford etc.)
- Along key movement lines between conurbations and route corridors
- Around the fully modelled area
- In and out of groups of model zones/groups of zones

The placement of these screenlines is in keeping with the guidance set out in WebTAG. The screenline locations are illustrated in **Figure 4.7**.

Figure 4.7 : A428 Screenlines



5. Final Volumetric Dataset

This chapter analyses the ATC, Radar surveys and MCC data collected as part of the A428 model.

5.1 Analysis of Classified Count Data

A set of MCC surveys were conducted at 8 sites in April 2016 in order to capture and understand the nature of the traffic composition at these locations, of these, 3 sites were surveyed for 3 consecutive days and the remaining 5 were surveyed for 1 day. In addition 3 MCTC surveys were also undertaken for a single day in April 2016, the information from these surveys can also be examined in line with the MCC data.

Each survey was carried out using a video camera mounted at a suitable location. On completion of the survey all recorded media was analysed by TRACSIS, the data collection company undertaking the surveys. All video data is analysed at their head office and is overseen by their Quality manager,

Each analysis team consists of an experienced Analysis Supervisor and a team of analysts, all analysts are fully trained and are briefed on the requirements of the survey prior to beginning to review the footage. All analysis is randomly checked and any anomalies reconciled by the Analysis Supervisor with the Analyst. The Analysis Supervisor will receive the site report and recorded media from the site surveyors and ensure they have been labelled correctly and that all data is correctly and safely saved in an appropriate database Processing of the data will begin immediately and will run concurrently with the fieldwork to ensure the data is processed, checked and analysed in time for the agreed date,

All data has been entered into Excel reporting sheets and provided to Jacobs along with video footage following the completion of data collection. Video footage will be retained on TRACSIS server for 3 months before removal.

Due to the small sample size of the MCTC and MCC surveys no analysis of confidence intervals has been undertaken

A summary of the data is shown below in **Table 5.1**.

Table 5.1 : Classified Counts summary

Site Reference	Location	Duration	AM (07:15-08:15) total traffic (vehicles)	IP total traffic	PM (17:00-18:00) total traffic (vehicles)
MCC-01	A1 Near Black Cat Services	3	12985	21938	14113
MCC-02	Barford Road	1	1963	1777	1715
MCC-03	Cambridge Road	3	1716	2873	2309
MCC-04	A428	3	5360	8355	6184
MCC-05	Unclassified road north of Croxton	1	364	491	349
MCC-06	Abbotsley Road	1	71	109	67
MCC-07	B1040 St Ives Road	1	1366	1465	1142
MCC-08	Cambridge Road	1	426	316	379
MCTC-01	Black Cat Roundabout	1	14343	23779	14592
MCTC-02	Wyboston Interchange	1	9479	15700	10217
MCTC-03	Caxton Gibbet Roundabout	1	10011	13576	10711

During the production of the Stage 1 ASR TRIS sites across the area were used to identify the AM and PM Peak periods that will be used in the model. To investigate whether these classified sites exhibit similar flow

profiles a comparison will be made between the flow profiles for two TRIS sites used in identifying the AM and PM peak hours (**Figure 5.1**), the 8 MCCs (**Figure 5.2**) and the 3 MCTCs (**Figure 5.3**)

Figure 5.1 : TRIS Site Flow Profile

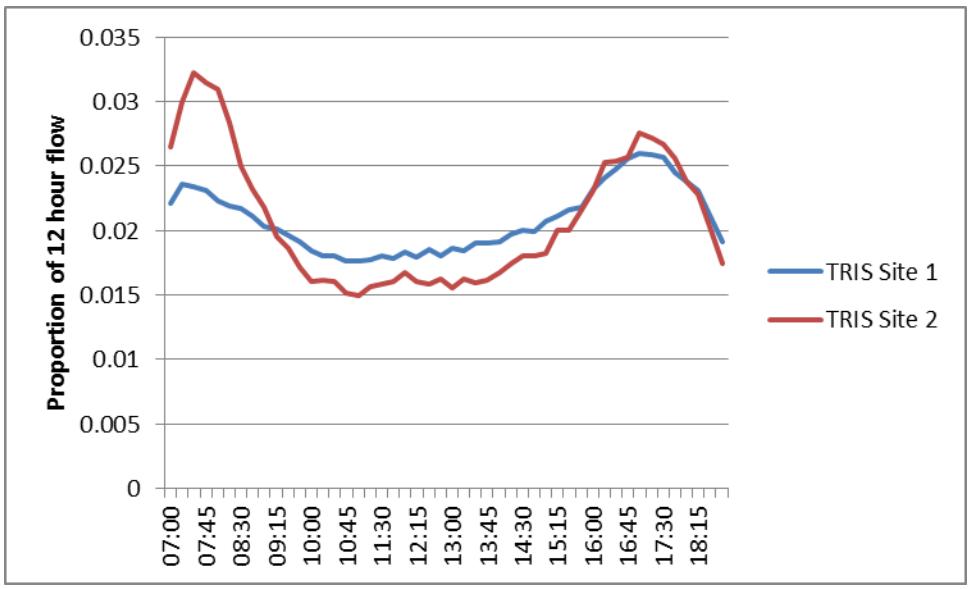


Figure 5.2 : MCC Flow Profiles

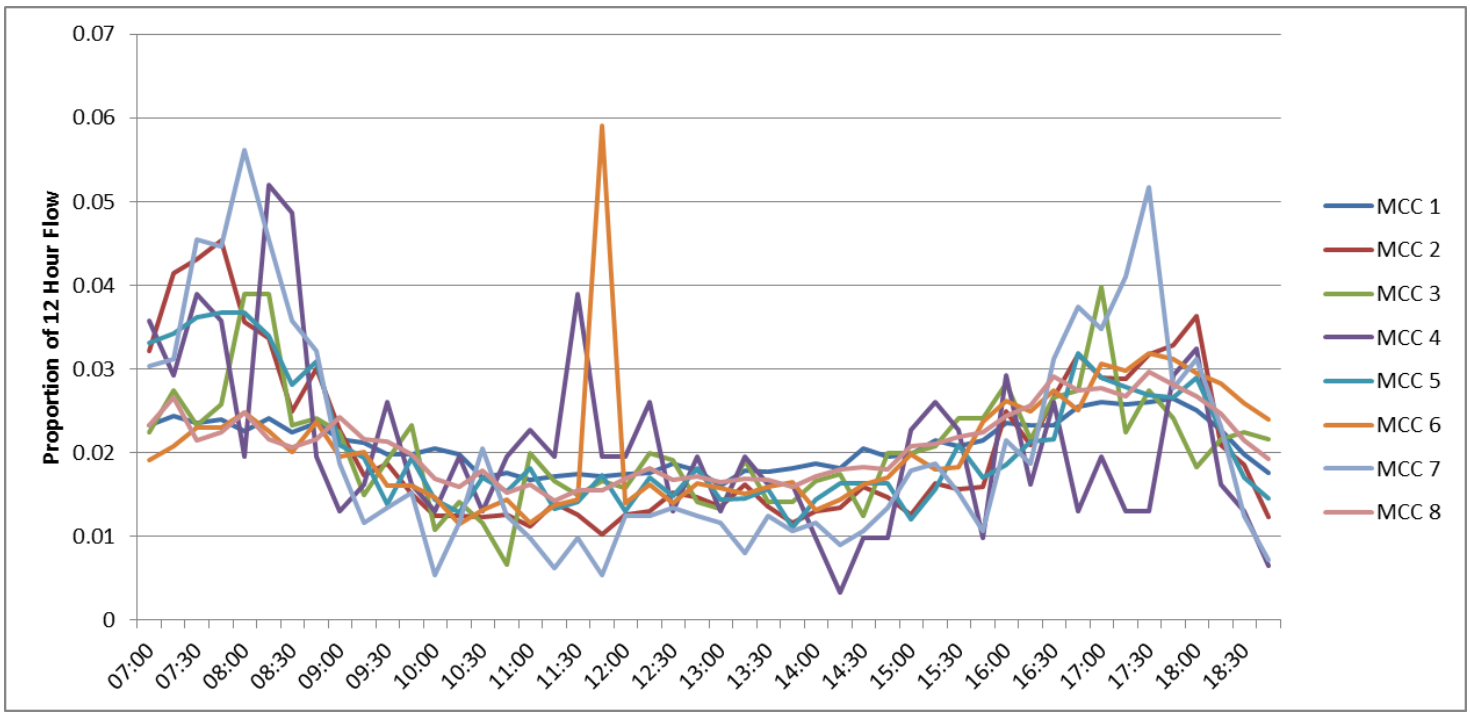
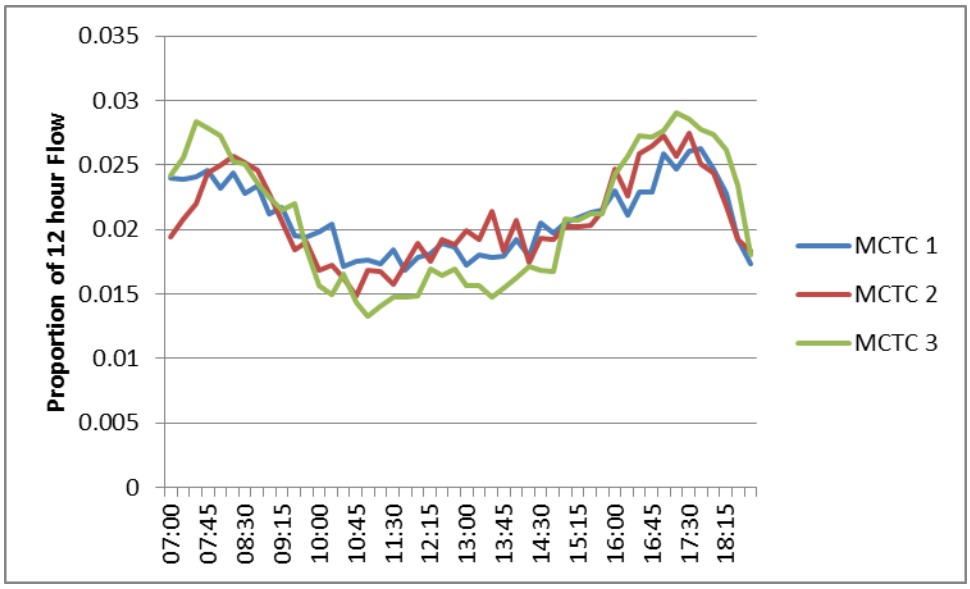


Figure 5.3 : MCTC Flow Profiles



The MCTCs show a good fit with the profiles from the TRIS sites while the MCCs are much more variable. The variability of the MCC profiles can be explained for a two key reasons:

- Some sites are on very low flow roads such that an increase of 5 or 6 vehicles in a period can significantly impact the profile
- There is a very small sample size in comparison to the TRIS data

The traffic composition at each of these sites has been analysed to see the proportion of vehicles in each period at each site, as shown in the tables below.

Table 5.2 : AM traffic composition

Site	Car	Car Towing	LGV	OGV1	OGV2	PSV	Motor-cycle	Pedal-cycle	Farm Vehicles	Other
MCC-01	71.6%	0.3%	16.1%	3.8%	7.8%	0.2%	0.2%	0.0%	0.0%	0.0%
MCC-02	83.4%	0.1%	13.2%	1.8%	0.8%	0.2%	0.3%	0.2%	0.1%	0.1%
MCC-03	83.0%	0.0%	11.4%	2.3%	1.8%	1.0%	0.3%	0.1%	0.0%	0.1%
MCC-04	74.1%	0.1%	14.4%	3.6%	6.8%	0.4%	0.4%	0.0%	0.0%	0.2%
MCC-05	79.5%	0.5%	13.8%	2.4%	2.4%	0.5%	0.6%	0.1%	0.1%	0.0%
MCC-06	87.7%	0.0%	9.4%	0.9%	0.5%	0.0%	0.0%	0.5%	0.9%	0.0%
MCC-07	79.2%	0.1%	13.3%	3.2%	3.6%	0.4%	0.1%	0.1%	0.0%	0.0%
MCC-08	87.8%	0.0%	9.4%	0.2%	0.7%	1.6%	0.0%	0.2%	0.0%	0.0%
MCTC-01	72.3%	0.2%	15.7%	4.2%	7.3%	0.2%	0.2%	0.0%	0.0%	0.0%
MCTC-02	77.0%	0.1%	13.7%	3.7%	5.0%	0.3%	0.2%	0.0%	0.0%	0.0%
MCTC-03	79.3%	0.1%	12.8%	2.6%	4.4%	0.3%	0.4%	0.0%	0.0%	0.0%

Table 5.3 : IP traffic composition

Site	Car	Car Towing	LGV	OGV1	OGV2	PSV	Motor-cycle	Pedal-cycle	Farm Vehicles	Other
MCC-01	67.5%	0.6%	17.2%	4.5%	9.7%	0.2%	0.3%	0.0%	0.0%	0.0%
MCC-02	75.7%	0.1%	18.5%	2.8%	1.9%	0.0%	0.2%	0.8%	0.0%	0.0%
MCC-03	80.6%	0.2%	13.6%	2.8%	1.5%	0.9%	0.2%	0.0%	0.0%	0.0%
MCC-04	69.6%	0.3%	16.2%	4.8%	8.2%	0.4%	0.3%	0.0%	0.0%	0.1%
MCC-05	67.1%	0.1%	20.2%	4.3%	4.5%	0.5%	0.5%	1.7%	0.6%	0.5%
MCC-06	73.8%	0.9%	15.5%	2.4%	0.9%	0.0%	0.9%	3.4%	1.5%	0.6%
MCC-07	68.3%	0.2%	18.8%	5.4%	6.8%	0.1%	0.3%	0.2%	0.0%	0.0%
MCC-08	83.5%	0.0%	11.7%	3.2%	0.3%	0.6%	0.0%	0.6%	0.0%	0.0%
MCTC-01	67.1%	0.3%	17.4%	5.1%	9.5%	0.3%	0.3%	0.0%	0.0%	0.0%
MCTC-02	73.8%	0.3%	15.7%	4.2%	5.4%	0.2%	0.3%	0.0%	0.0%	0.0%
MCTC-03	73.6%	0.3%	16.0%	3.5%	5.6%	0.5%	0.4%	0.0%	0.0%	0.0%

Table 5.4 : PM traffic composition

Site	Car	Car Towing	LGV	OGV1	OGV2	PSV	Motor-cycle	Pedal-cycle	Farm Vehicles	Other
MCC-01	80.1%	0.3%	12.8%	1.8%	4.6%	0.2%	0.2%	0.0%	0.0%	0.0%
MCC-02	85.8%	0.2%	12.7%	0.2%	0.3%	0.0%	0.5%	0.3%	0.0%	0.0%
MCC-03	88.6%	0.2%	8.9%	0.5%	0.5%	0.7%	0.6%	0.0%	0.0%	0.0%
MCC-04	83.6%	0.1%	11.1%	1.3%	2.8%	0.7%	0.4%	0.0%	0.0%	0.1%
MCC-05	86.1%	0.1%	11.6%	0.6%	0.9%	0.0%	0.4%	0.3%	0.1%	0.1%
MCC-06	85.6%	0.0%	9.4%	0.0%	0.0%	0.0%	0.5%	2.0%	2.5%	0.0%
MCC-07	84.0%	0.2%	12.5%	1.1%	1.2%	0.3%	0.5%	0.1%	0.2%	0.0%
MCC-08	88.1%	0.8%	9.8%	0.3%	0.0%	0.5%	0.5%	0.0%	0.0%	0.0%
MCTC-01	79.6%	0.2%	13.3%	2.0%	4.5%	0.2%	0.2%	0.0%	0.0%	0.0%
MCTC-02	84.3%	0.1%	11.4%	1.4%	2.1%	0.3%	0.3%	0.0%	0.0%	0.0%
MCTC-03	85.8%	0.1%	10.2%	0.9%	2.3%	0.3%	0.4%	0.0%	0.0%	0.0%

In terms of the OGV1, OGV2 and PSV categories in the tables above, these refer to the Other Goods Vehicle and Public Service Vehicle classes of commercial vehicles. Commercial vehicles are defined as those over 3.5 tonnes gross vehicle weight. **Figure 5.4** shows the classes of commercial vehicles and which category (PSV, OGV1 or OGV2) they fall into.

Figure 5.4 : Commercial vehicle classes and categories

Commercial vehicle (cv)	cv class*	cv category
	Buses and Coaches	PSV
	2-axle rigid	OGV1
	3-axle rigid	
	3-axle articulated	OGV2
	4-axle rigid	
	4-axle articulated	
	5-axle articulated	
	6 (or more) -axle articulated	

* Extracted from Table 2.1 of *DMRB Volume 7 Section 2 Part 1 - HD24/06 Traffic Assessment*

As a further confidence test of the traffic compositions reported in Tables 5.2-5.4, these compositions were compared to an independent national dataset. The dataset selected here was the DfT Average Annual Daily Flow data book. The AADF dataset contains information on the road name, start and end junction and X/Y coordinates for the count locations, as well as the average annual daily flow for that count site for eleven different vehicle classes. These vehicle classes can be seen in **Table 5.5.**

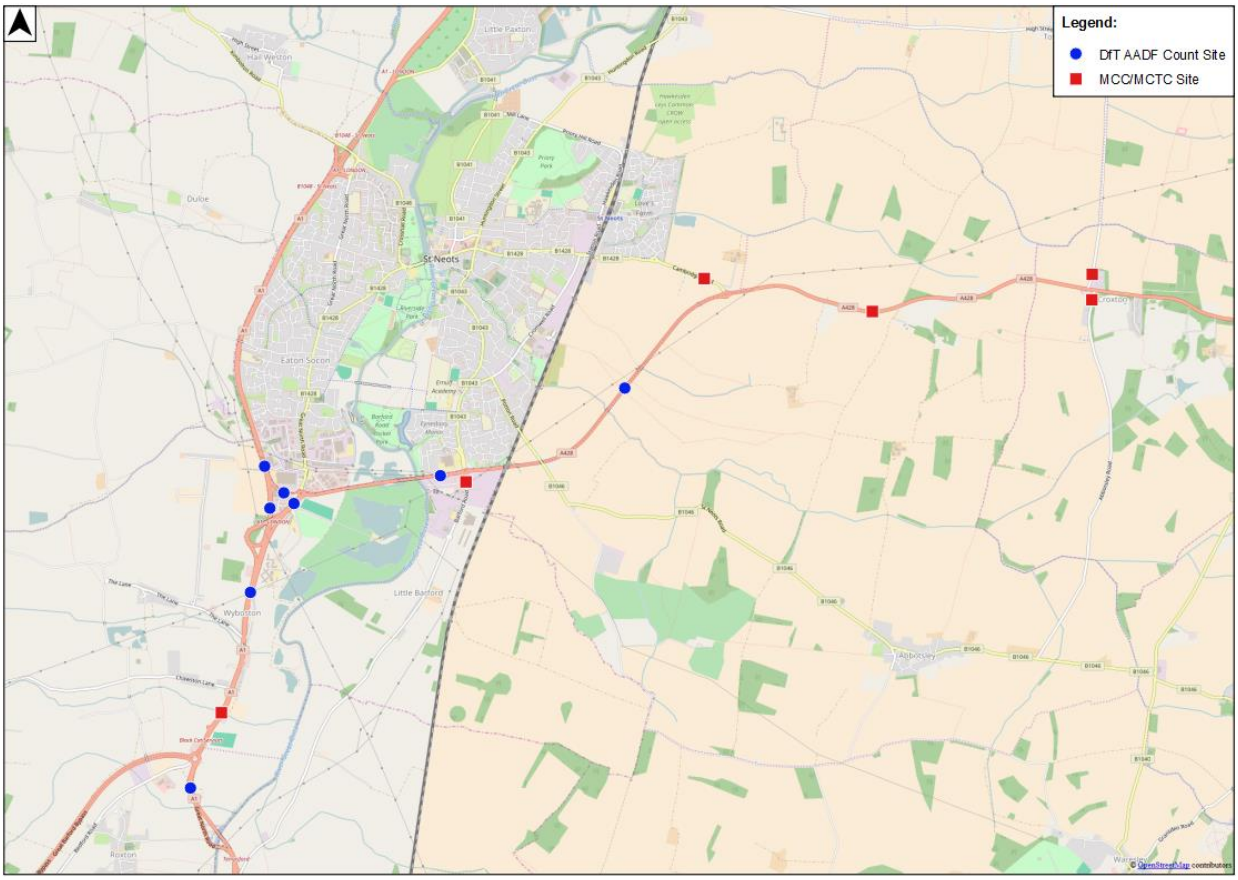
Table 5.5 : DfT AADF Vehicle Classes

	AADF Vehicle Class
1	Cars/Taxis
2	LGV
3	2 Axle Rigid HGV
4	3 Axle Rigid HGV
5	4 or 5 Axle Rigid HGV

	AADF Vehicle Class
6	3 or 4 Axle Articulated HGV
7	5 Axle Articulated HGV
8	6 or More Axle Articulated HGV
9	Buses/Coaches
10	Pedal Cycles
11	Motorcycles

In order to compare the observed MCC, MCTC data with independent data for a similar road type and location, a GIS sort was performed to include only those available AADF sites close by. These sites have been plotted and can be seen in **Figure 5.9**.

Figure 5.5 : MCC, MCTC and AADF Count Site Locations



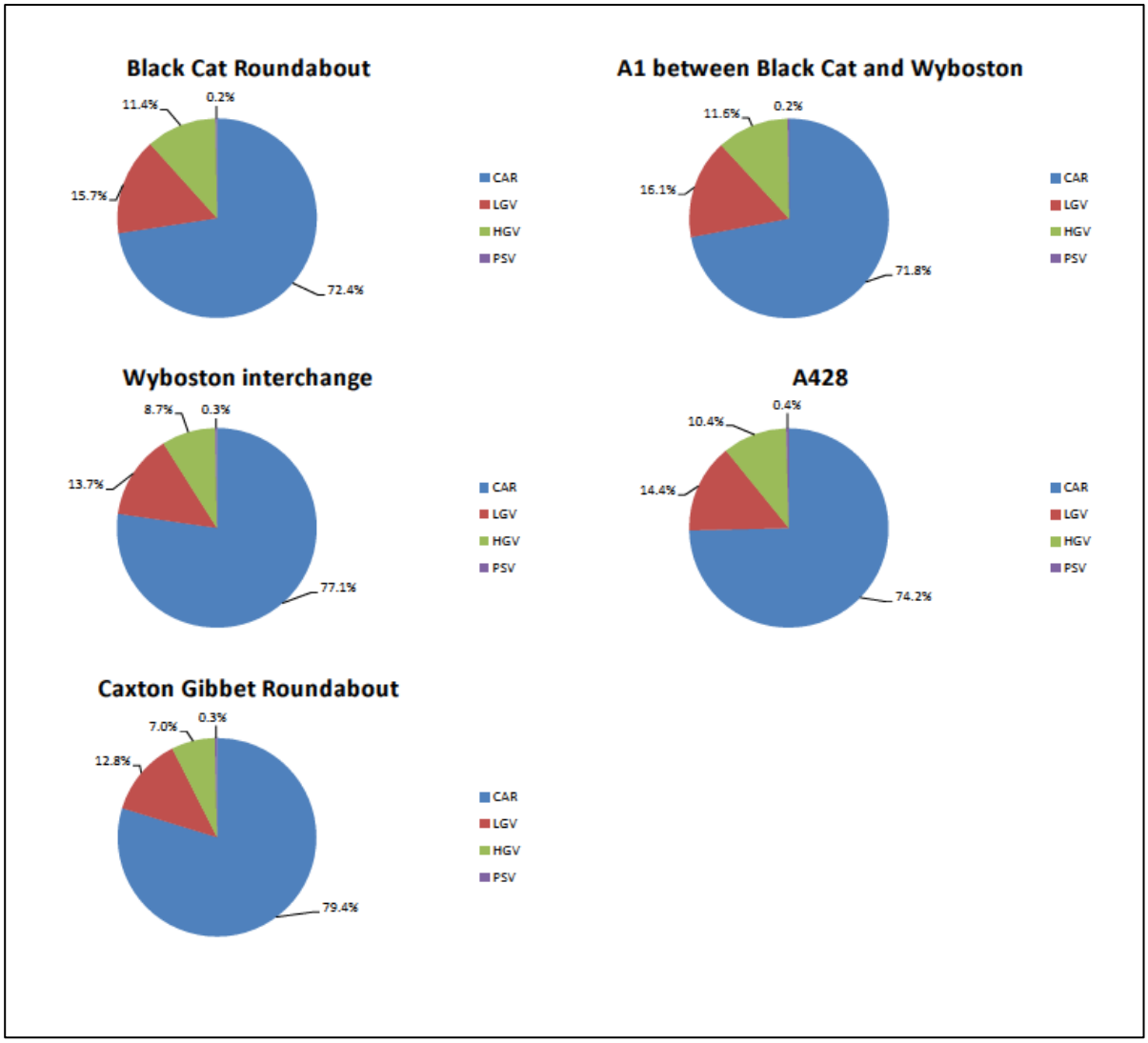
Following comparative analysis of these sites it was found that the observed MCC, MCTC compositions were indeed sensible and representative of typical traffic compositions for the area, with a maximum difference by vehicle class of <5%. These results can be seen in **Table 5.6**.

Table 5.6 : AADF vs MCC/MCTC Average Daily Traffic Composition by vehicle class

Mode	Car	LGV	OGV1	OGV2	PSV	Pedal Cycles	Motorcycles
AADF Daily Ave:	74.29%	15.35%	1.78%	1.51%	0.31%	0.01%	0.43%
MCC/MCTC Daily Ave:	79.22%	13.57%	2.48%	3.47%	0.36%	0.32%	0.33%
Difference:	**-4.93%**	**1.78%**	**-0.70%**	**-1.96%**	**-0.06%**	**-0.31%**	**0.10%**

Figure 5.6 below shows a graphical representation of how traffic proportions change along the route from Black Cat Roundabout to Caxton Gibbet. In general there appears to be a smaller proportion of HGVs and LGVs on the A428 than on the A1.

Figure 5.6 : Traffic Flow proportions between Black Cat and Caxton Gibbet roundabouts



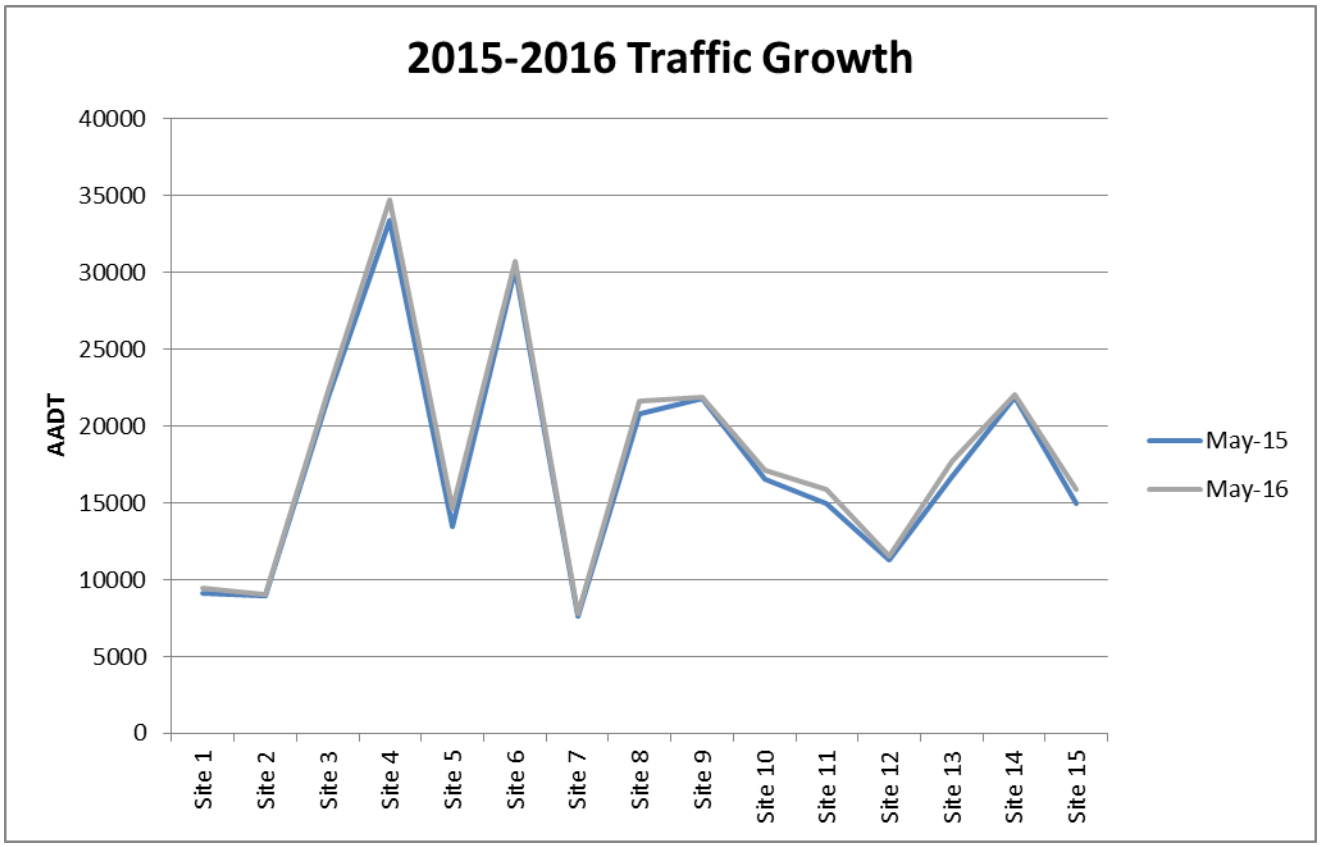
5.2 Factoring of Existing and Collected Count data

All of data collection for the model (as described in Chapter 4) was undertaken in neutral periods of April and May 2016 so no factoring was necessary. To accord with this Highways England TRIS data was downloaded for May 2016 where possible, however, due to data loss, or errors in the data a number of sites use April 2016 data instead, for two sites there was no available data from May 2015 onwards and as such April 2015 data was used.

While guidance states that one year old data is acceptable a review of traffic growth between 2015 and 2016 has been undertaken using 15 randomly selected TRIS Sites in the vicinity of the scheme to investigate the growth in traffic between May 2015 and May 2016 and identify whether data from 2016 will need to be factored for use in the model build.

Figure 5.7 shows the AADT observed at each site in May 2015 and May 2016, in general there is evidence of a small growth from 2015 to 2016 with an average increase of approximately 3.5%, as such any data from 2015 will be factored by this percentage increase in order to be consistent and comparable with 2016 data.

Figure 5.7 : Traffic Growth from 2015



5.3 Analysis of Automatic Traffic Count Data

5.3.1 Traffic Flows on the A1/A428 Route

A number of sites have been used to observe traffic flows along the A1 and A428 between Black Cat roundabout and Caxton Gibbet, the flows in each direction in the peak periods is shown in **Table 5.7** and **Table 5.8**.

Table 5.7 : Northbound / Eastbound Traffic flows between Black Cat and Caxton Gibbet

Site ID	Site Location	Direction	AM Peak (veh)	IP (veh)	PM Peak (veh)
TRADS – 8/9017	A1 between Black Cat and Wyboston Interchange	NB	2316	1967	2683
ATC-128	A428 between Wyboston and Barford Road	EB	1186	1007	1364
ATC-129	A428 between Barford Road and Cambridge Road	EB	608	637	829
ATC-130	A428 between Cambridge Road and Croxton	EB	875	754	987
ATC-131	A428 between Croxton and Eltisley	EB	900	749	974
ATC-132	A428 between B1040 junctions	EB	988	793	1018
ATC-133	A428 between St Ives road and Caxton Gibbet	EB	1021	687	828

Table 5.8 : Southbound / Westbound Traffic flows between Black Cat and Caxton Gibbet

Site ID	Site Location	Direction	AM Peak (veh)	IP (veh)	PM Peak (veh)
TRADS – 8/9017	A1 between Black Cat and Wyboston Interchange	SB	2193	1743	2312
ATC-128	A428 between Wyboston and Barford Road	WB	1173	1016	1332
ATC-129	A428 between Barford Road and Cambridge Road	WB	719	630	836
ATC-130	A428 between Cambridge Road and Croxton	WB	985	766	1159
ATC-131	A428 between Croxton and Eltisley	WB	972	759	1204
ATC-132	A428 between B1040 junctions	WB	1020	805	1291
ATC-133	A428 between St Ives road and Caxton Gibbet	WB	914	751	1216

It is clear that the section of the A428 between the Barford Road and Cambridge Road roundabouts bypassing St Neots is the least trafficked section of the route and as such it appears that St Neots is a major attractor/generator of traffic, this is backed up by ANPR data which shows that 64% of westbound traffic from East of St Neots travels to St Neots and 47% of eastbound traffic from west of St Neots travels to St Neots.

The sites also show that, in general, the route is busiest in the PM peak; this is most evident on the westbound sections of the A428 where on average flows are 22% higher than the AM peak.

5.3.2 Suitability for use

TRACIS uses Metrocount 5600 data loggers and rubber tubes installed with exact tube spacing and alignment to ensure perpendicular axel strike.

On completion of the survey all recorded files are documented and returned for analysis by TRACIS, All analysis is randomly checked and any anomalies reconciled by the Analysis Supervisor following a review of observed data. TRACSIS have produced summary reports providing he hourly flow profile for each site in each direction which have then been issued to Jacobs along with the data output files from each MetroCount site.

Following receipt of the data Jacobs have checked the volumes of traffic depending on road type and locality and we have removed data for Saturdays, Sundays and bank holidays. ATC sites can occasionally stop recording data for a number of reasons so it was important to ensure that zero flow periods were investigated to check whether the ATC was on a low flow road and therefore not anomalous or whether there was a failure to record data where we would otherwise expect to see traffic. Any anomalous data was removed from the data set for use in model development to give the most consistent baseline for traffic.

While ATC sites are in operation there is always the chance that sites could suffer data loss or that a link may have abnormally high/low flows due to external factors such as roadworks, incidents and major events (music, sport etc.). To investigate how suitable the variation in the data has been examined to identify any sites with consistently variable data over its collection period.

DMRB Volume 12, section 2 part 1 states that counts with 95% Confidence Intervals wider than ± 15% should not be used in calibration or validation. **Figure 5.8**, **Figure 5.9** and **Figure 5.10** below show sites which exceed this 15% limit in the AM, IP and PM periods respectively

Figure 5.8 : AM Count Performance

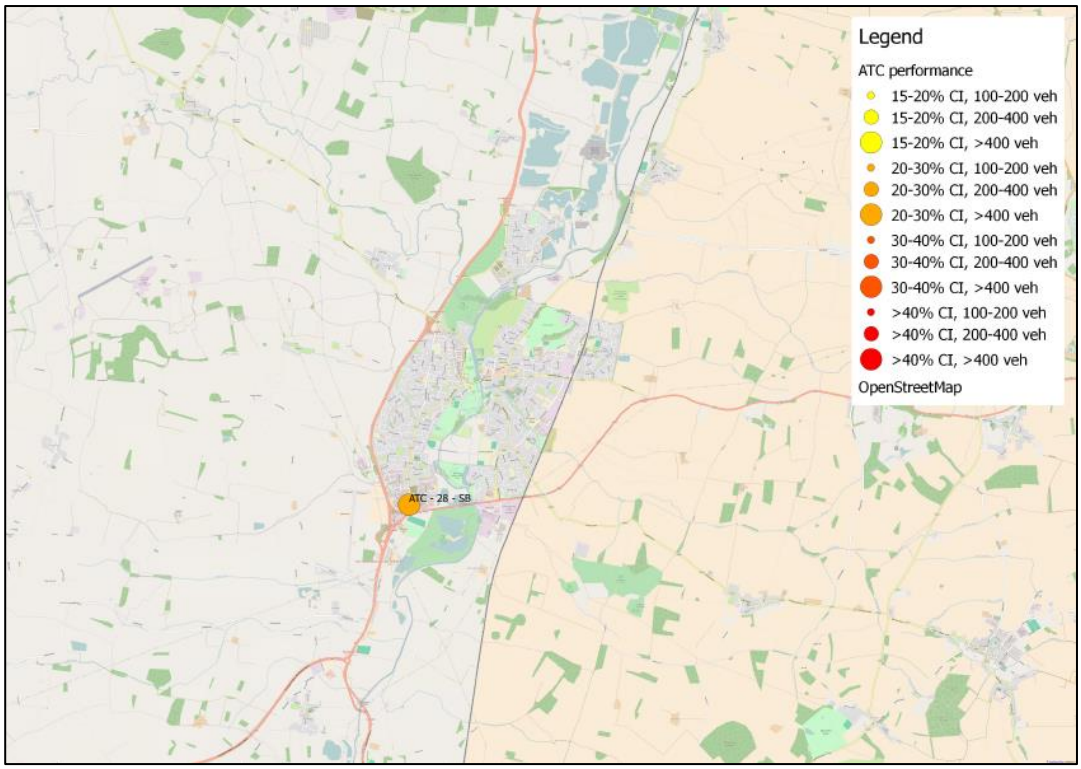


Figure 5.9 : IP Count Performance

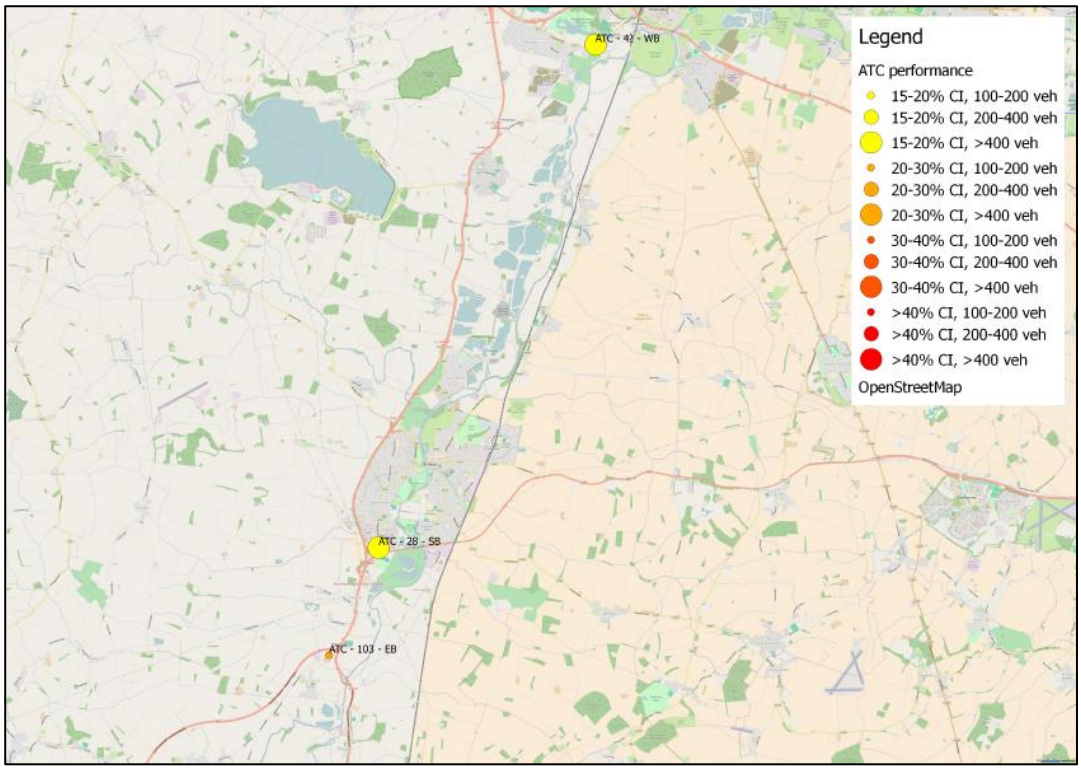
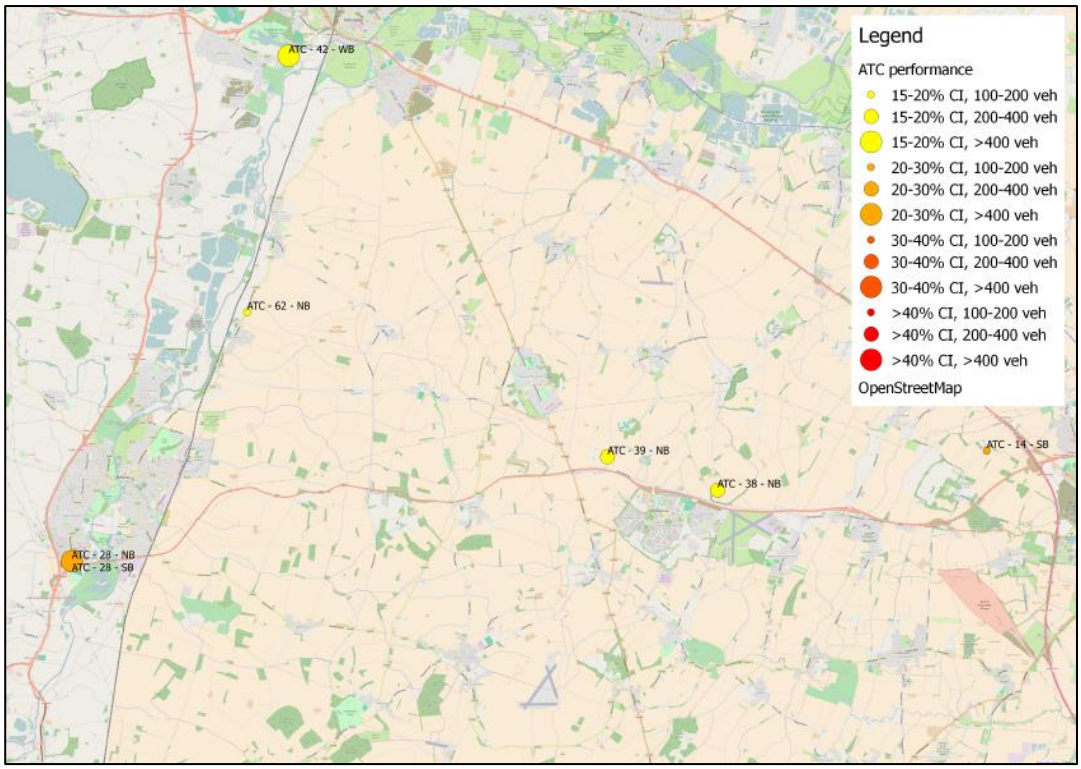


Figure 5.10 : PM Count Performance



Very few sites are highlighted as exceeding the guidance from DMRB and the majority of those that do show a low mean traffic flow (so small variation have a significant impact) or are further away from the scheme / not on a key route (ATC – 42 to the south of Huntingdon for example); however, ATC – 28 is shown to have a significant mean flow and to be on a key route (on a road accessing the current A428) and is highlighted as exceeding DMRB guidance in all 3 time periods, as such alternative data sources will be sought to replace this erroneous data if possible and will be noted through model development with a low confidence associated with this count site.

5.4 Summary of Traffic Conditions

In general strategic north-south routes in the study area, such as the A1 and M11, have the highest volume of traffic as they provide access to/from London followed closely by dual carriageway roads in the SRN such as the A14 and A428 which provide links between large population centres like Cambridge, Bedford and Milton Keynes and connections from these towns and cities to north-south links.

6. Final Trip dataset

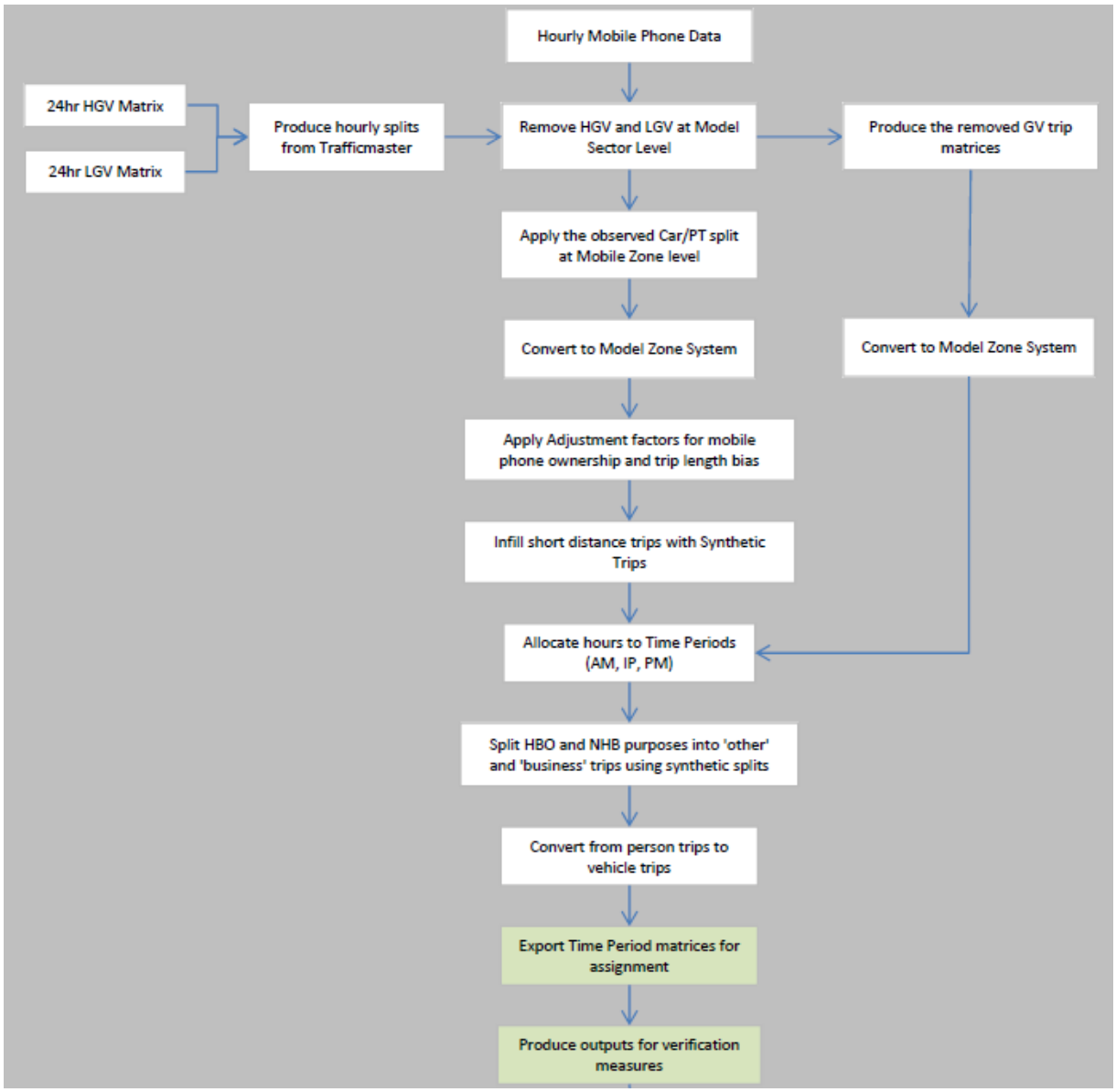
Full details of the methodology adopted to develop the final trip dataset for the A428 model is provided in the Model Specification Report (MSR) an appendix to the Appraisal Specification Report (ASR), below is an overview of the process, details of the verification of mobile phone data will be provided in the Local Model Validation Report (LMVR).

The core feature of demand for the development of the A428 model is the Highways England interim mobile phone data which is a comprehensive dataset covering travel movements for an average weekday; by time of day, journey purpose and direction, expanded based on market segment of home addresses. The methodology adopted to build the prior matrices integrates elements of both this data set and synthesised data in order to produce production/attraction (P/A) matrices that directly produce Origin-Destination (O-D) prior matrices for assignment and is summarised in **Figure 6.1**. Each step of the process is detailed later in this section.

Prior matrix development comprises of six main components:

- **Synthetic Trip Ends**: Using a combination of the 2011 Census, NTEM and employment databases to produce population and jobs data from which trip ends are derived for each modelled zone utilising Jacobs's JTREND program.
- **Synthetic Trip Distribution**: The distribution of the above trips using a gravity model to create synthetic P/A matrices where the mean trip length and trip length distribution will be calibrated to National Travel Survey (NTS) for the East of England.
- **Observed Matrix Development**: The pre-processing and verification of the South East Regional Model (SERM) raw mobile phone data. This process will account for the treatment of bias in the data set and remove public transport and goods vehicle trips from the dataset. This process will confirm the validity of the data set for use in the development of A428 prior matrices.
- **Prior Matrix Development**: The statistical merging of observed and synthetic models accounting for segmenting purpose, mode and time of day; the allocation of model time period and the conversion to vehicle and person matrices in both P/A and O-D formats.
- **Prior Matrix Validation**: The comparison of the above steps in line with guidance to assess the need for matrix estimation.
- **Prior Matrix Modification**: Where prior matrix validation does not match observed screenline flows within a set threshold, adjustments will be made where appropriate to tolerances identified within the verification of the observed matrices. The success of this stage determines the extent of matrix estimation required.

Figure 6.1 : Prior Matrix Development Procedure



The final output of the process will be a consistent set of P/A and O-D matrices that can be used in assignment and validation, whilst retaining the P/A format required for accurate trip forecasting and variable demand modelling.

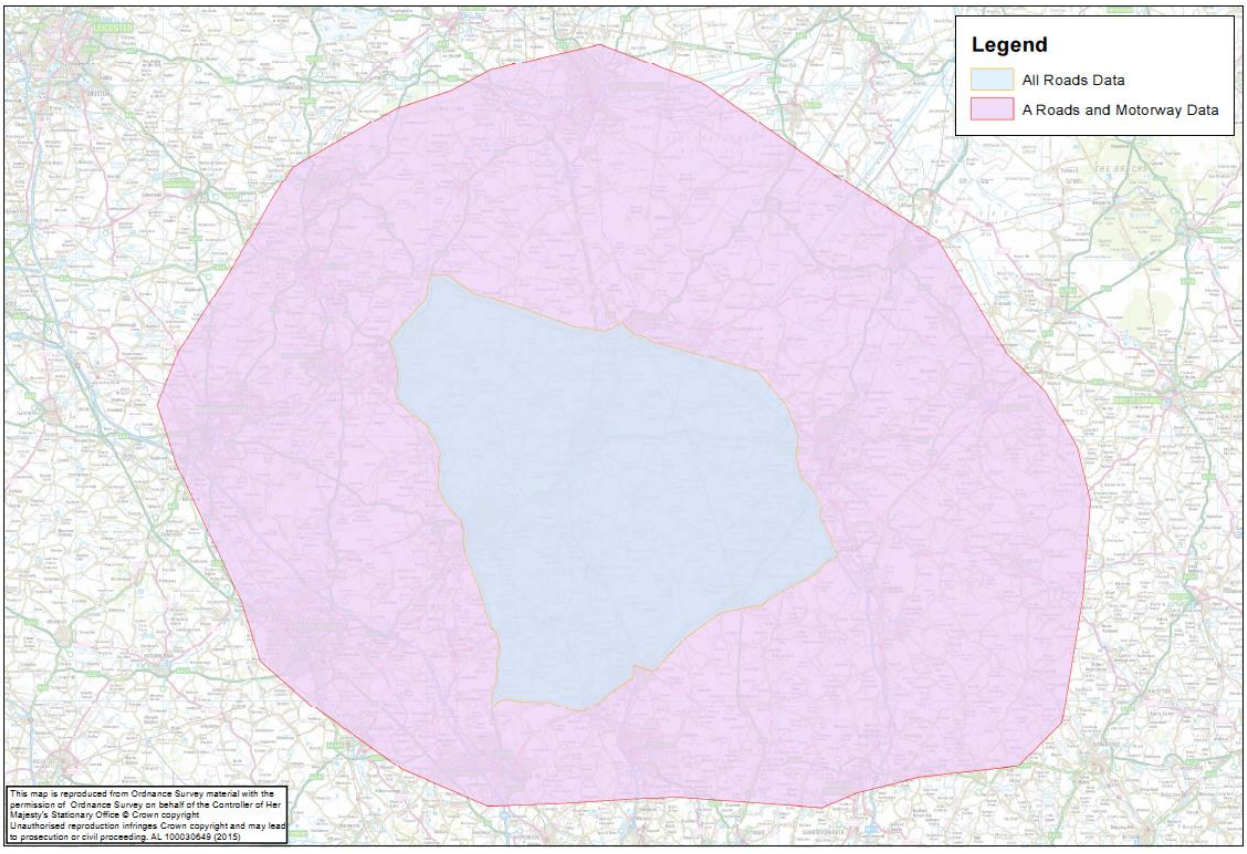
7. Journey Time Data

7.1 Introduction

Journey time data for calibration and validation has been obtained from the Department for Transport (DfT) under license with Highways England. The DfT holds TrafficMaster GPS data; this data is provided by the GPS systems fitted to commercial and private vehicles and tracks the location of each vehicle while they are turned on. This data is then mapped to Ordnance Survey (OS) Integrated Transport Network (ITN) links and aggregated for every ITN link by each 15 minute time period of the day, resulting in an average journey time and sample size for each link.

TrafficMaster data for April and May 2015 was provided for the areas shown in **Figure 7.1**, in the vicinity of the scheme data was requested for all road links while further away only information for A roads and motorways was requested. This data has not been verified by locally collected Moving Car Observer (MCO) data due to the size of the modelled area and the proportionate approach taken to data collection.

Figure 7.1 : TrafficMaster Request

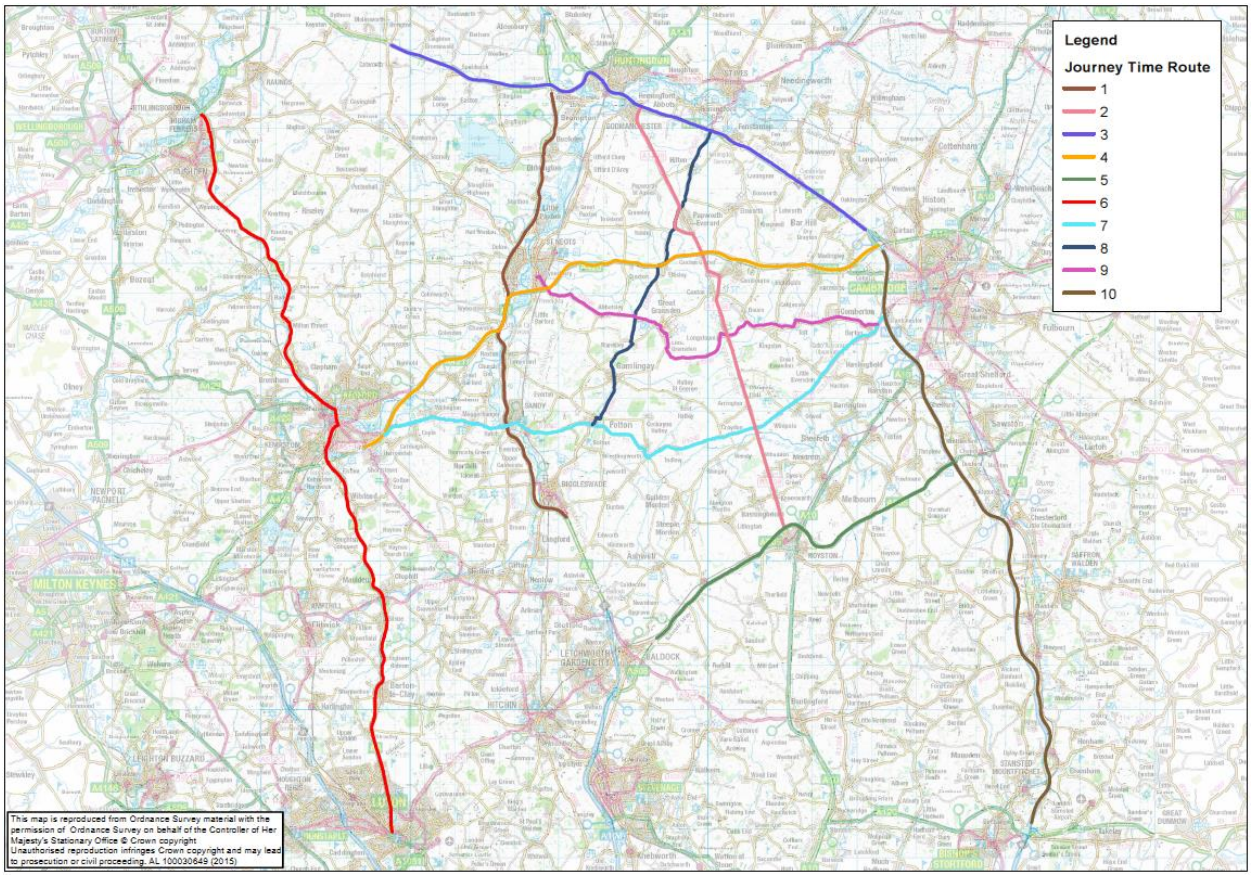


7.2 Journey time routes for validation

TrafficMaster data has been analysed for the validation of journey times along selected routes. A total of 10 routes have been selected which all lie within the simulation area. These routes have been selected as key routes in the ASR for east-west or north-south travel. Where possible these routes are between 3 and 15km long or are within 40 minutes journey time in line with WebTAG, however, due to the need to capture movements through key areas / along key corridors some routes are longer than others, to counter this each route has been broken up into sections.

The journey time validation routes are shown in **Figure 7.2**.

Figure 7.2 : Journey Time Routes



The following tables present the results of TrafficMaster journey times along the identified routes by direction for each peak period. The tables also include the calculated average speeds on the routes as a sense check.

Table 7.1 : AM average journey times

Route ID	Route Name	ITN Route Length (km)	AM		IP		PM	
			Average Time (minutes)	Average Speed (kmh)	Average Time (minutes)	Average Speed (kmh)	Average Time (minutes)	Average Speed (kmh)
Route 1_A	A1 NB	32.0	25.8	74.5	24.0	80.1	26.1	73.5
Route 1_B	A1 SB	31.9	30.8	62.1	22.5	85.0	23.7	80.8
Route 2_A	A1198 NB	31.6	27.6	68.6	27.2	69.7	30.4	62.3
Route 2_B	A1198 SB	31.6	35.9	52.8	27.8	68.2	28.1	67.4
Route 3_A	A14 WB	36.3	25.2	86.3	25.4	85.8	28.1	77.4
Route 3_B	A14 EB	36.4	40.3	54.2	25.6	85.5	25.6	85.3
Route 4_A	A421/A1/A428 EB	41.8	38.6	65.0	29.7	84.3	34.1	73.5
Route 4_B	A421/A1/A428 WB	42.4	35.3	71.9	29.9	85.0	32.3	78.7
Route 5_A	A505 EB	25.4	22.3	68.4	18.9	80.8	19.8	77.1
Route 5_B	A505 WB	25.4	19.7	77.4	19.1	80.0	19.7	77.2
Route 6_A	A6 NB	55.3	66.9	49.6	62.7	52.9	74.4	44.6
Route 6_B	A6 SB	54.9	70.1	47.0	59.7	55.2	67.0	49.1
Route 7_A	B1042/A603 EB	39.6	41.1	57.8	38.8	61.3	40.8	58.3

Route ID	Route Name	ITN Route Length (km)	AM		IP		PM	
			Average Time (minutes)	Average Speed (kmh)	Average Time (minutes)	Average Speed (kmh)	Average Time (minutes)	Average Speed (kmh)
Route 7_B	B1042/A603 WB	39.6	42.2	56.3	39.3	60.5	41.6	57.1
Route 8_A	B1040 NB	23.2	23.6	58.9	23.4	59.5	24.5	57.0
Route 8_B	B1040 SB	23.3	23.0	60.8	23.3	59.9	22.8	61.2
Route 9_A	B1046 EB	29.0	31.9	54.6	33.0	52.8	32.6	53.4
Route 9_B	B1046 WB	28.4	30.6	55.8	32.0	53.3	32.9	51.8
Route 10_A	M11 NB	42.5	24.9	102.4	25.1	101.7	26.4	96.4
Route 10_B	M11 SB	42.6	25.8	99.3	25.1	101.9	26.5	96.7

7.3 Suitability for use

TrafficMaster data has a large sample size covering the area, however, there is no guarantee that data on each link is of sufficient quality and consistency for use.

To investigate this we have analysed the TrafficMaster data on our routes to identify the sample size and the confidence interval for journey times. **Table 7.2** below presents the results of this analysis for car travel in the AM and PM peaks.

Table 7.2 : TrafficMaster Data Statistics

Route ID	Route Name	AM		PM	
		Sample Size	Confidence interval as a percentage of the mean	Sample Size	Confidence interval as a percentage of the mean
Route 1_A	A1 NB	71	4%	109	3%
Route 1_B	A1 SB	106	4%	80	4%
Route 2_A	A1198 NB	50	4%	24	6%
Route 2_B	A1198 SB	15	9%	27	5%
Route 3_A	A14 WB	86	3%	115	3%
Route 3_B	A14 EB	103	3%	91	3%
Route 4_A	A421/A1/A428 EB	57	4%	47	4%
Route 4_B	A421/A1/A428 WB	55	4%	61	4%
Route 5_A	A505 EB	47	6%	45	5%
Route 5_B	A505 WB	35	6%	52	5%
Route 6_A	A6 NB	37	2%	36	2%
Route 6_B	A6 SB	41	2%	47	2%
Route 7_A	B1042/A603 EB	26	4%	24	5%
Route 7_B	B1042/A603 WB	16	5%	28	4%
Route 8_A	B1040 NB	7	25%	5	17%
Route 8_B	B1040 SB	7	14%	17	8%
Route 9_A	B1046 EB	8	13%	3	41%
Route 9_B	B1046 WB	5	22%	5	22%
Route 10_A	M11 NB	118	3%	143	3%

Route ID	Route Name	AM		PM	
		Sample Size	Confidence interval as a percentage of the mean	Sample Size	Confidence interval as a percentage of the mean
Route 10_B	M11 SB	91	4%	103	4%

The higher the percentage value of confidence interval over mean the more inconsistent data is, this highlights that Routes 8 and 9 appear to less consistent than the other routes being considered. However, it is also clear that sample size is significantly lower on these local routes than others which can have significant impacts on the statistical analysis of the route.

Routes 8 and 9 are mainly local routes considered as alternatives to major strategic routes in the area and therefore a smaller sample size is expected when compared to routes such as the A1, M11, A428, A505, A6 etc. as fleet vehicles (the majority of vehicles equipped with TrafficMaster software) may not use these routes in favour of the strategic alternatives.

Overall, it is considered that the data is suitable for use.

7.4 Summary of Journey Time Data

Overall journey time differences across periods on each route appear to be similar with only few routes showing significant journey time changes between the peak periods and the inter-peak.

The A1 SB, A1198 SB and A14 EB routes all show significantly higher journey times in the AM peak than either the inter-peak or PM periods. For the A1 SB and A1198 SB route this can be explained by the need to queue at the Black Cat and Caxton Gibbet roundabouts; at the Black Cat roundabout the junction is signalised but the overwhelming proportion of traffic is travelling southbound through the junction towards London from both the A421 and A1, at the Caxton Gibbet Junction it is likely that traffic is struggling to enter the roundabout from the A1198 SB given the levels of flow on the A428 WB. The A14 is known to experience delays and the A14 Cambridge to Huntingdon improvement will aim to address this.

Journey time route 6 on the A6 shows a distinct swing between the AM and PM peaks in either direction with significant delay in the AM in the southbound direction (as traffic travels towards London) and in the PM in the northbound direction (as traffic leaves London). In addition the A6 route travels through Bedford and is therefore delayed by local urban traffic in each of the peaks.

Journey time route 4 (A421/A1/A428) in the eastbound direction sees significant delay from the IP in both the AM and PM periods; while in the westbound direction there is only a significant difference from IP journey times in the AM with a smaller difference in the PM period. This route goes through two junctions known to have significant delay, Black Cat and Caxton Gibbet roundabouts.

Two of the journey time routes identified have small sample sizes leading to a significant variability in observed journey times, however, these are local routes and this is not unexpected. On the whole the data is considered valid for use.

8. GPS origin – destination data

In addition to Journey Time data the DfT can provide the origin and destination data of trips in their TrafficMaster database. The TrafficMaster database is biased towards commercial vehicles and as such these records also provide the vehicle class for each trip as well as a starting LSOA, finishing LSOA and duration of trip.

Origin-Destination data has been received from the DfT for the same area as outlined in **Figure 7.1**, in addition to the origin and destination of each trip the DfT have added markers for trips that have used any key strategic routes in the study area.

This origin-destination data has been used to inform the identification of our Area of Detailed Modelling (AoDM) and Fully Modelled Area (FMA) through identification of key movements and corridors. It has also been used to help inform the development of the LGV trip matrices within the model.

9. Operational Data

The A428 model is primarily based on the OS ITN data provided by the DfT. It is also based on other standard static and dynamic mapping datasets such as OS Open Data Maps and the OS Open Roads layer. Accident data has also been obtained and compared against national averages.

9.1 Mapping Data

The model has made substantial use of a significant amount of GIS data in the form of ITN that was provided by the DfT, ITN is a GIS database that consists of layers of data associated with all types of road network in the UK. It comprises of data on various aspects of the road network as described in **Table 9.1**.

Table 9.1 : Description and use of ITN network in the model

Type of Data	Description	Utility in Model
Road Hierarchy	Motorways, A-Roads, B-roads and Minor roads	The road hierarchy and nature of the road has been used to establish the link types within the model and eventually assigned a speed-flow curve
Nature of the road/link	Single and Dual carriageway, Roundabout, Traffic island links	The road hierarchy and nature of the road has been used to establish the link types within model and eventually assigned a speed-flow curve
Link length	Length of the each individual segment	It has been directly used as a source of aggregated link lengths in the model after random checking
Classification	The classification of the road type and Strategic Road Network name	It helped identify the links relevant to the modelled road network and journey time routes

A specific study area was identified and defined within the full network and only this selected area was utilised in the model building. The initial data received from the DfT contained all roads but the model input required only strategic and main roads such as motorways, A, B and minor roads. It was therefore screened and filtered to retain only the important and pertinent road links. In the buffer area and the outskirts of the model are not included in the ITN network provided links were instead taken from the OS Open Road Layer or the CHARM SATURN model, combining these sources involved aggregation of links to cover important junctions and remove unnecessary detail.

Figure 9.1 depicts the extent of the acquired ITN data for the study area and **Figure 9.2** shows the road network for the model build.

Figure 9.1 : Received ITN network

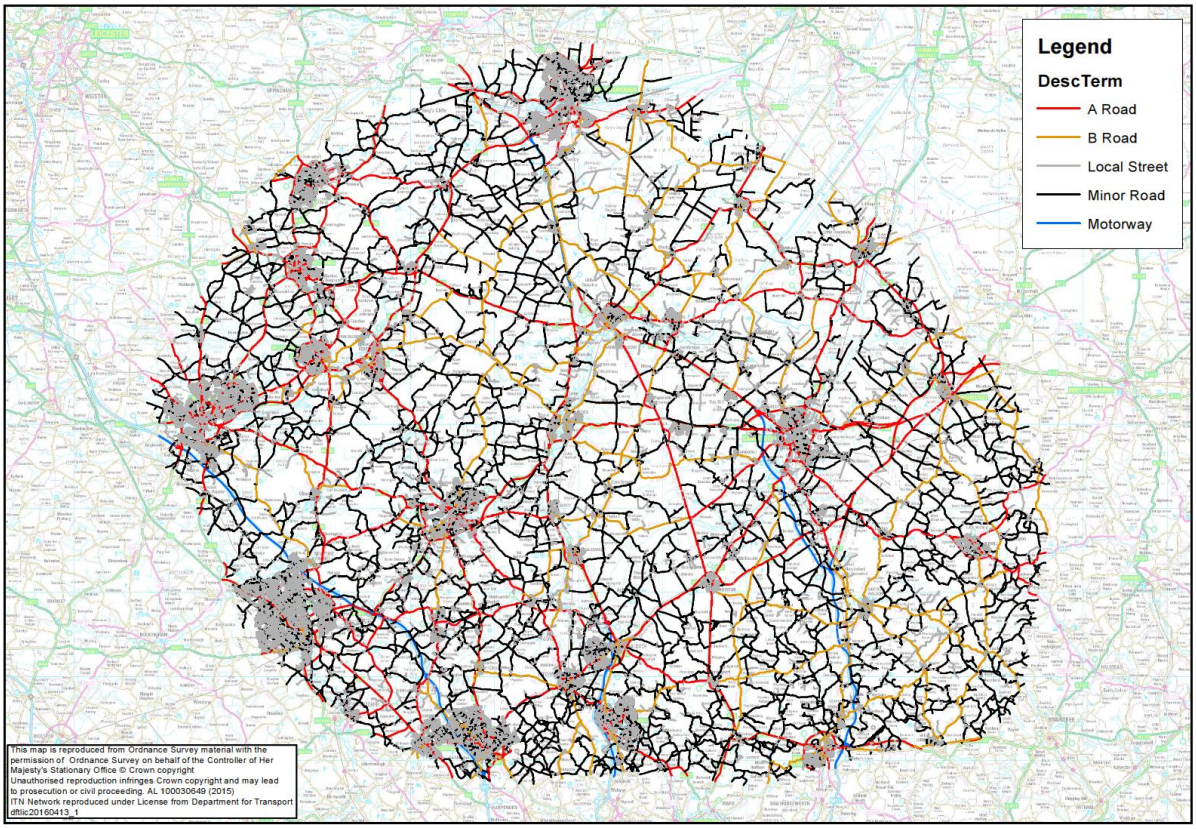
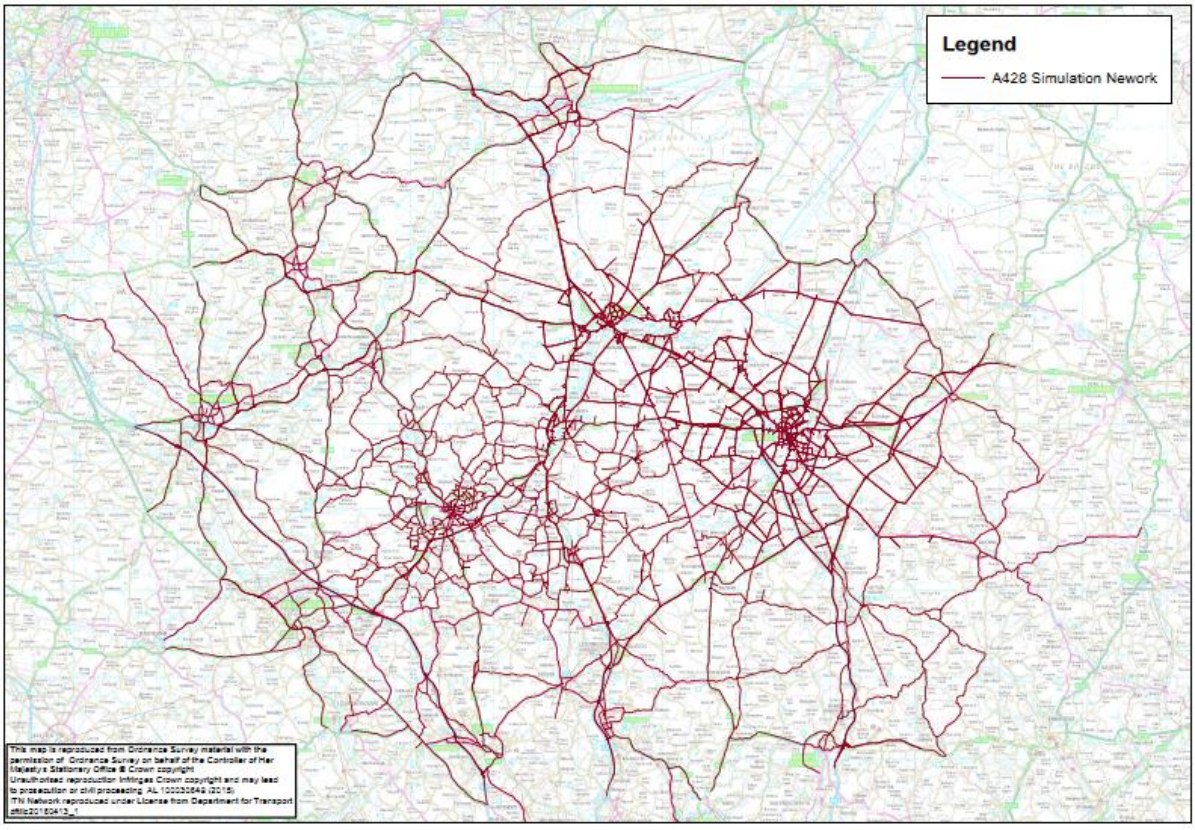


Figure 9.2 : A428 Simulation Network

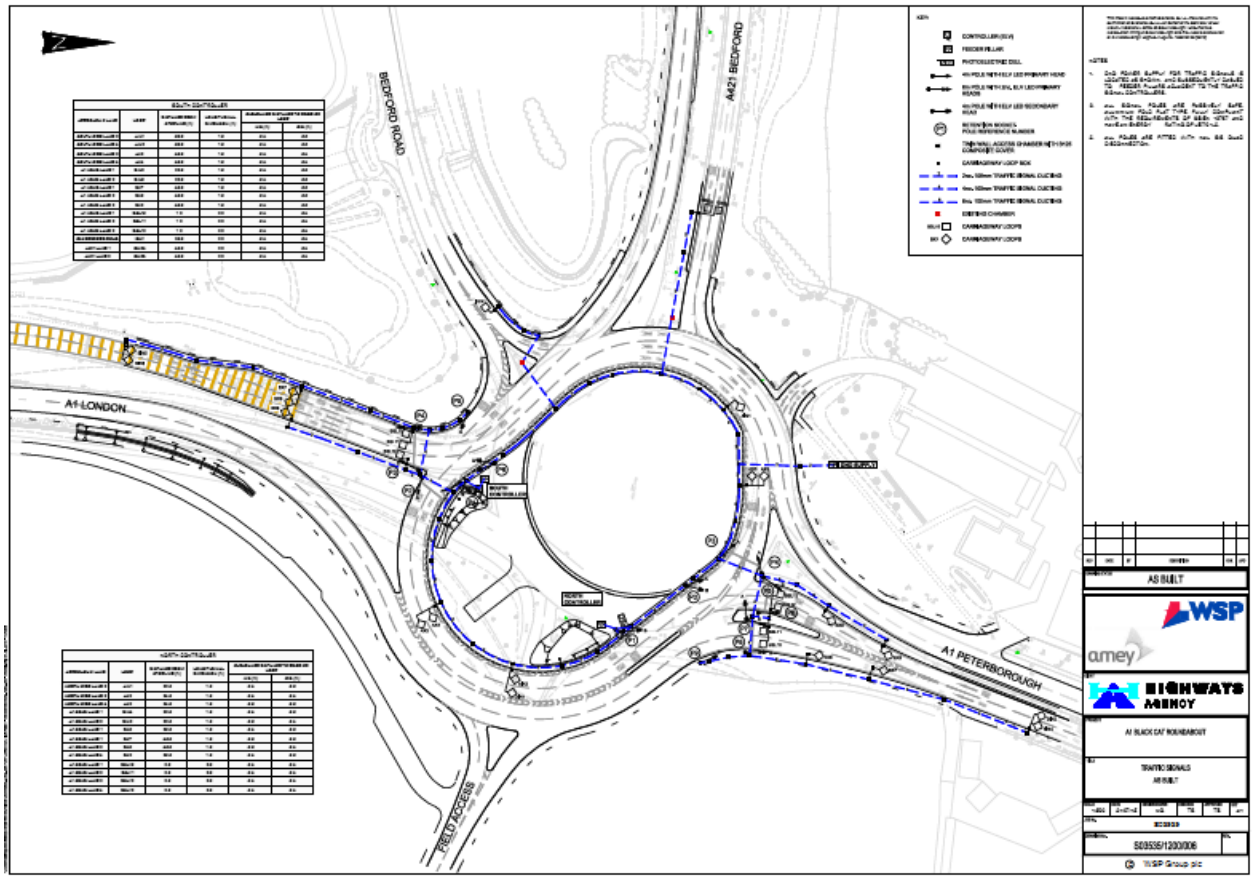


9.2 Signalised junctions

A number of signalised junctions have been identified in the AoDM, however, many of these signals have already been coded in other SATURN models (SERTM and CHARM), rather than coding these junctions as part of the A428 model the existing coding has been copied in.

However, this is not the case for the Black Cat Roundabout, this junction has recently been improved to a signalised junction as part of Highways England's Pinch Point Programme and as such the coding of the junction in CHARM is out of date, as the junction is a key feature of the A428 model, the new layout and signal timing data has been gathered from Amey, the Asset Support Contractor (ASC) in the area. **Figure 9.3** shows the as built layout of the junction.

Figure 9.3 : Black Cat Roundabout as built layout



9.3 Accident Data

At PCF Stage 0 STATS19 Collision data for the route was collected for the five year period 1st January 2010 to 31st December 2014. The assessment carried out at this stage considered the route in two sections, the A1 between Tempsford and Wyboston and the A428 between Wyboston and Caxton Gibbet and a comparison between the normal and observed rates of casualties and Killed or Seriously Injured (KSIs) per hundred million vehicle miles (hmvm). This analysis showed that over the 5 year period the A428 between Wyboston and Caxton Gibbet experienced a higher than expected rate of KSI collisions but had a lower casualty rate than would be expected while the A1 between Tempsford and Wyboston experienced a lower than expected KSI rate but had a significantly higher casualty rate than the national average. A summary of the results of this assessment is shown in **Table 9.2**.

Table 9.2 : PCF Stage 0 accident data summary

Section	Observed KSI rate (per hmvm)	Normal KSI rate (per hmvm)	Observed casualty rate (per hmvm)	Normal casualty rate (per hmvm)
A1 Tempsford to Wyboston	0.70	2.92	38.97	26.48
A428 Wyboston to Caxton Gibbet	6.93	6.58	41.33	42.22

Both the Black Cat and Caxton Gibbet roundabouts were highlighted as major collision clusters with 25 and 29 accidents observed respectively in the five year period.

To support the COBA-LT appraisal of the scheme STATS19 collision data will be collected across a much wider area than that considered at PCF Stage 0 to allow for analysis of changes in flow away from the A428.

9.4 Data Quality and Risk Mitigation

The data received from various sources has been checked for quality and accepted as fit for purpose. The credible sources such as DfT, Highways England, Ordnance Survey etc. are believed to be trustworthy and devoid of any deficiencies. Nevertheless sources such as local authorities, internet based journey planners, data from other consultants and previous reports were subjected to stringent checks.

10. Suitability of Accumulated Database

The data collected as part of the development of the A428 Model is deemed to be appropriate for inclusion in any updates to the mode subject to further sensitivity testing.

As outlined in **Section 5.3.2** an issue with the newly captured data for ATC – 28 (on the Great North Road between the A428 and Alpha Drive) has been discovered, further work will be undertaken to identify suitable replacement data or this site will be removed from analysis for the calibration and validation of the transport model.

No significant issues have been identified linked for the newly captured MCC, MCTC and ANPR data.

All count data will be made available in electronic file formats via CD in processed and raw formats.

As mentioned in Section 7.3, two journey time routes have very low sample sizes in comparison to the other route, this has led to the data for these two routes being more variable than for other routes. However, both routes are local roads and would be expected to have a small sample size and this is not considered to be an issue.

Appendix A. Automatic Traffic Counts

Site ID	Location	Locality	Easting	Northing
ATC - 1	B660 Bedford Road	Between the Junction with Graze Hill and the 30mph zone towards Wayside Farm Park	506275	253845
ATC - 2	Hookhams Lane	Between junction with Ravensden Rd/Wilden Rd and junction with Home Close	507906	252736
ATC - 3	A4280 St Neots Road	Between the Roundabout with Norse Road and the A421 Junction	509599	251366
ATC - 4	A603 Cambrdge Road	Between Junction with Meadow Lane and junction with Willington Road	509344	249048
ATC - 5	Bedford Road	Between A421 roundabout and Harrowden Lane	508453	248135
ATC - 6	The High Road	Between the A421 roundabout and Harrowden Lane	507301	247470
ATC - 7	A6	Between the New Road and The Ave (Bletsoe)	501673	257342
ATC - 8	Thurleigh Road	Between Coplowe Lane and Twinwoods Business Park	503103	257229
ATC - 9	Mill Road	Between Robins Folly and Graze Hill	505814	256185
ATC - 10	Kimbotton Road (B660)	Between Shrubbery Lane and New Road	508556	256890
ATC - 11	Wilden Road	Between New Road and Colesden Road	510157	256722
ATC - 12	Channels End Road	Between Mill Road Colesden Road	511075	256806
ATC - 13	Roxton Road	Between Homefield Road and The Lane	515057	256688
ATC - 14	The Avenue	Between the A14 and the junction with Dry Dryton Road	540236	261484
ATC - 15	A1303 St Neots Road	Between Cambridge American Cemetary and Junction with A428	540243	259410
ATC - 16	A603 Cambridge Road	Between Junction with the B1046 and M11 roundabout junction	541583	256088
ATC - 17	A10 Cambridge Road	Between M11 Junction and entrance to large employment site/sewage works	543417	252988
ATC - 18	Bushmead Road	Between Monarch Road and Nelson Road	516509	259321
ATC - 19	Duloe Road	Between Monarch Road and A1 Bridge Crossing	516834	260367
ATC - 20	Great North Road	Between Burwell Road and A1 roundabout exit	517303	260928
ATC - 21	B1048, Cross hall Road	Between Great North Road and Savile's Close	517490	261096
ATC - 22	B1041	Between A1 and Mill Ln	517871	261971
ATC - 23	B1041 Great North Road	Between Great North Road and unclassified road towards Hail Weston (Bridge crossing over the A1)	518443	262931
ATC - 24	B1043, Huntington Road	Between Priory Hill Road and Whitehouse Guesthouse	519518	261921
ATC - 25	B1428, Cambridge Road	Between A428 and Stone Hill	520717	260102
ATC - 26	B1046	Between Howitts Gardens and A428 bridge crossing	519070	258496
ATC - 27	Barford Road	Between A428 and Chapman Way Roundabout	518464	258316
ATC - 28	Great North Road	Between Alpha Drive roundabout and A428	516942	258083
ATC - 29	B1040 St Ives	Between A14 J26 and start of housing at Hilton	530011	268315

Site ID	Location	Locality	Easting	Northing
	Road/Potton Road			
ATC - 30	UC Road between Hilton Road, Conington Road and the A14	Between Conington Road and A14 Junction	531761	267686
ATC - 31	UC Road between Conington Road and A14	Between Conington Road/High Street junction and A14 Junction	533050	266884
ATC - 32	UC road between Cambridge Services junction and Boxworth	Between Manor Lane and Cambridge services roundabout	535414	265372
ATC - 33	Saxon Way	Between Gladeside and the roundabout for B1050/A14	538056	263815
ATC - 34	Crafts Way	Between Fox hollow and Acorn Avenue	538369	263723
ATC - 35	Oakington Road	Between A14 J30 and housing by Springhill Stables/Dry Dryton	538889	262596
ATC - 36	Dry Drayton Road/Madingley Road	Between Park Lane and the Avenue	539043	261394
ATC - 37	Scotland Road	Between A428 junction and 30mph sign at Dry Drayton	537048	260428
ATC - 38	UC Road between Knapwell and St Neots Road (becomes High Street in Knapwell)	Between Knapwell Wood Farm and junction with St Neots Road	533405	260299
ATC - 39	UC Road between st Neots Road And Elsworth (becomes Brockley Road in Elsworth)	Between St Neots Road and entrance to Avenue off Brockley Road	530544	261065
ATC - 40	B1040	Between Junction with A1198 and Rouges Lane	528404	264109
ATC - 41	Gravely Way	Between A1198 and Hilton	527476	265960
ATC - 42	B1514 Huntingdon Road	Between junction with 30mph sign and Bromholme Lane	522160	270988
ATC - 43	B1043	Between Berry Lane Offord Hill Farm	523689	269764
ATC - 44	A1198	Between junction with London Road and Kingbush Farm	525417	269208
ATC - 45	A1123 Huntingdon Road	Between roundabout with A141 and A1123/Huntingdon Road Junction	526995	272634
ATC - 46	UC Road North A428 at Croxton	Between junction with A428 and junction with High Street	524497	260507
ATC - 47	B1040 St Ives Road	Between Junction with the A428 and junction with High Street	527316	260601
ATC - 48	A1198 Ermine Street South	Between junction with the A428 and Island Inn	529456	261058
ATC - 49	Barford Road	Between Alington Road and A428 roundabout	518490	258121
ATC - 50	B1046	Between Bridge over A428 and junction with Potton Road	519360	258069
ATC - 51	Abbotsley Road	South of housing extending from A428 to B1046	524436	259750
ATC - 52	B1040	Between A428 and St Neots Road	526639	259789

Site ID	Location	Locality	Easting	Northing
ATC - 53	Cambridge Road	Between St Ives Road and end of 30mph zone	527290	259923
ATC - 54	A1198	South of A428 access road to Ermine Street Roundabout	529772	260265
ATC - 55	Everton Road/Sandy Road	Between Northern entrance to Hazel's Hall and start of 30mph zone at Everton	519637	250316
ATC - 56	B1042 Potton Road	Between junction with Swaden and Sabdy Defence Fuel Storage Depot	519295	248559
ATC - 57	A603	A603 between junction after bride of river Ivel and junction with UC road head south towards Hatch	516001	248958
ATC - 58	B661,	Between Perry and Dilligton (Great Staughton), opposite Agden Green Farm	514161	266880
ATC - 59	Breach Road	Between Church Road and Cedar Close	516139	269208
ATC - 60	B1043	Between Paddocks Chase and Berry Lane	522347	267897
ATC - 61	Offord Road	Between Duck End and Cotton lane	523581	265096
ATC - 62	B 1043, Paxton Road	Between Adam's lane and Offord D' Arcy Village	521262	264487
ATC - 63	School Lane	Between Monkfield Primary School and Quidditch Lane	531569	259488
ATC - 64	Broadway	Between entrance towards airfield and A428 bridge	533472	259466
ATC - 65	Highfields Road	Between 60mph sign before roundabout with St Neots Rd/Wellington Way and West Drive	535565	259460
ATC - 66	Cambridge Road	Between St Neots Road and Limes Road	537606	259398
ATC - 67	Long Road	Between St Neots Road and Jaggards Farm	538896	259033
ATC - 68	Grantchester Road	Between roundabout with A603 and sign that says Cotton where it changes to Brook street.	541301	258016
ATC - 69	B1046 Barton Road	Between Horizon Park and Barton	540104	256144
ATC - 70	Comberton Road	Between Cambridge Road and bridge over old train line	538312	253840
ATC - 71	Harlton Road	Between A603 Cambridge Road and High Street	537391	252757
ATC - 72	Orwell	Between A603 and entrance to Wimpole Estate	534771	250465
ATC - 73	Unnamed road east off A1198 towards Kingston Pastures Farm	Between A1198 and Kingston Pastures Farm	532468	252759
ATC - 74	B1046 Fox Road	Between A1198 and Start of 60mph limit	531820	255240
ATC - 75	Bourn Road/Caxton Road	Between Bourne Windmill & AJ+R Scramble & Sons	531363	257842
ATC - 76	Drewels Lane	Between Potton Road and Pitsdean Road	520282	255844
ATC - 77	Pitsdean Road	Between Blacksmith Lane and Dewels Lane	522467	256081
ATC - 78	B1040	Between B1046 and Manor Farm Road	525071	255671
ATC - 79	Meadow Road	Between Waresley Road and B1040	525949	256170
ATC - 80	Eltisley Road	Between Fox Street and B1040	527113	256776
ATC - 81	Caxton Road	Between Sand Road and Hardwicke Road	527767	256453
ATC - 82	B1046,	Between model farm and B1046-High Street	528422	253664
ATC - 83	Main Street	Between Baulk Lane and Bar Lane	527392	251407
ATC - 84	B1040, Gamlingay Road	Between Hatley Road and Potton Road	523208	250391
ATC - 85	The Heath	Between Alicatery of Everton and Everton Road	521670	250897

Site ID	Location	Locality	Easting	Northing
ATC - 86	Everton Road	Between Heath Road and Potton Road	521149	251264
ATC - 87	Swavesey Road	Between junction with Cambridge Road/Honey Hill and junction with Fen Drayton Road	534542	267625
ATC - 88	Elsworth Road	Between Junction With Connington Road and 30mph zone	533839	264124
ATC - 89	St Neots Road	Between junction with Broadway and Two Pots Farm	533975	259851
ATC - 90	B1046	Between junction with Gills Hill and junction with Bourn Road	533696	255841
ATC - 91	A603 Cambridge Road	Between junction with Orwell and Fisher's Lane	535291	250250
ATC - 92	Whaddon Road	Between Eternit Sports and Social Club and junction with Fenny Lane/Kneesworth Road	536267	246534
ATC - 93	Kneesworth Road	Between Wireless Station Park and junction with Five Acres	536548	245790
ATC - 94	A10	Between Junction with Royston Road and junction with Station Road	537362	244288
ATC - 95	Royston Road	Between Bury Lane and Back Lane	537630	243955
ATC - 96	A505	Between Heath Farm and the junction with New Road	539249	241938
ATC - 97	Local Road from A1 junction at Little Paxton to Hail Weston	Between Great North Road and 30mph zone at Ford End	517822	263266
ATC - 98	B645	Between junction with High Street A1 Junction	516801	261473
ATC - 99	Duloe Road	Between Start of National Speed Limit at small village and the A1	516247	260520
ATC - 100	Bushmead Road	Between junction with un named road connecting to Duloe Road and the A1	516035	259462
ATC - 101	The Lane	Between the A1 and Payne HE yard	516142	256722
ATC - 102	Chawston Lane	Between the A1 and Chawston Car Centre	516169	256092
ATC - 103	Bedford Road	Between Black Cat Roundabout and Roxton Road	515744	255284
ATC - 104	Tempsford Road	Between the A1 and junction with High street	515774	252107
ATC - 105	A1198 Ermine Way	Between the Junction with B1042 Cambridge Road and the 30mph limit in A1198	533108	249283
ATC - 106	Larkins Road	Between B1042 Cambridge Road and houses on east of Larkins Road	530850	248420
ATC - 107	High Street (Wrestlingworth)	Between B1042 Potton Road and Butchers Lane	525672	248749
ATC - 108	Sutton Road	Between Hatley Road and access to houses near Junction with B1042 Wrestlingworth Road	523018	249253
ATC - 109	B1040 Sun Street	Between B1042 Royston Street and Market Square	522463	249397
ATC - 110	A603 Cambridge Road	Between Junction with A1198 Ermine Way and local road called Cambridge Road too.	533715	249032
ATC - 111	Whittlesford Road	Between start of 60mph Zone at Newton and the Bridge over the M11.	545012	249120
ATC - 112	Brook Road	Between Fowlmere Road and Thriplow Farms	543865	248089
ATC - 113	Fowlmere Road	Between both 30mph limit signs at junction with Thriplow Road and close to Thriplow Farms Public Wehigbridge	542824	246204
ATC - 114	A505	Between Chrishall Road and Aweswim swimming centre	543386	244238

Site ID	Location	Locality	Easting	Northing
ATC - 115	B1368 Barley Road	Between New Road and 50mph speed limit sign	540683	242449
ATC - 116	A505	Between road widening approaching junction with Newmarket Road and lay-by area in the right side of the road.	538279	241005
ATC - 117	A1198 Old N Road	Between Junction with A505 and Highfield Farm	535106	242353
ATC - 118	Station Road	Between A505 and bridge over the railway.	529753	238451
ATC - 119	A507	Between Junction with Hitchin Road and Junction with Stotfold Road	520346	236624
ATC - 120	B658 Stanford Road	Between Junction with Lucas Way and Stanford Bury	514920	239664
ATC - 121	A600	Between Junction with Bedford Road and Sandy Lane / New Rowney Farm.	513400	240080
ATC - 122	Silver End Road	Between the junction with A600 High Road and Rocktree way	510121	242538
ATC - 123	St Neots Road	Between Little Staughton Road and Elm Farm	510184	260206
ATC - 124	Great Staughton Road	Between B660 and Little Staughton Road (New Farm)	508739	264631
ATC - 125	B660 Park Lane	Between Belford Borough welcome sign and Hatchet Lane	509087	266152
ATC - 126	North Road	Between un-named road at SJH Plant & Hammerton Road	516695	276573
ATC - 127	B645	Between access to Chesnut Farm and Tilbrook Mill	506887	269348
ATC - 128	A428	Between Great North Road/Wyboston junction and Barford Road Roundabout	517584	258048
ATC - 129	A428	Between Barford Road Roundabout and Cambridge Road roundabout	519780	258746
ATC - 130	A428	Between Cambridge Road and Abbotsley Road	522391	259825
ATC - 131	A428	Between Croxton and B1040 to the south of A428	525633	259788
ATC - 132	A428	Between B1040 south of A428 and B1040 north of A428	526918	259877
ATC - 133	A428	Between B1040 north of the A428 and Caxton Gibbet	528357	260511

Appendix B. Manual Classified Counts

Site ID	Location	Locality	Easting	Northing
MCC - 1	A1 Near black Cat Services	A1 between Black Cat Roundabout and Chawston Lane	516200	255831
MCC - 2	Barford Road	Between Alington Road and A428 roundabout	518497	258096
MCC - 3	Cambridge Road	Between roundabouts for A428 and Stone Hill	524461	260229
MCC - 4	A428	Between Cambridge Road roundabout and Croxton junction	524463	259985
MCC - 5	UC Road North A428 at Croxton	Between junction with A428 and entrance to Clearance footwear	527239	260250
MCC - 6	Abbotsley Road	Between A428 junction set of detached houses	520738	260096
MCC - 7	B1040 St Ives Road	Between A428 and group of houses on east of road.	527318	259951
MCC - 8	Cambridge Road	Between the Eltisley and the junction with the A428	522359	259821

Appendix C. Manual Classified Turning Counts

Site ID	Location	Easting	Northing
MCTC - 1	Black Cat Roundabout	515953	255381
MCTC - 2	Wyboston Interchange	516898	257930
MCTC - 3	Caxton Gibbet Roundabout	529626	260665

Appendix D. Radar Survey Sites

Site ID	Location	Locality	Easting	Northing
ATC - 134	A14	Between Junction with A1998/B1044 and junction with Ridgeway	526452	270207
ATC - 135	A1	Between Sandy and Brickgate Bridge/Temppsford Road/Church Street junction	516401	250688
ATC - 136	A1	Between junction with Great North Road at Little Paxton and junction with Lees Lane	518634	263719
ATC - 137	A1	Between junction with Silver Street and junction with Buckden Road	519664	268493
ATC - 138	A14	Between junction with Cambridge Road and Junction with Bucking Way Road	534114	266845
ATC - 139	A14	Between Junction with B660 and junction with Stanch Lane	509556	274291

Appendix E. Automatic Number Plate Recognition Sites

Site ID	Location	Locality	Easting	Northing
ANPR - 1	A1 (South of A421)	Between A421 roundabout and access to Kelpie Marine	515930	255260
ANPR - 2	A1 (south of A421)	Between A421 roundabout and the River Ouse	515930	255260
ANPR - 3	Bedford Road (West of Black Cat)	Between Black Cat roundabout and Roxton Garden Centre	515815	255308
ANPR - 4	Bedford Road (West of Black Cat)	Between Black Cat roundabout and Roxton Garden Centre	515815	255308
ANPR - 5	A421 (West of Black Cat)	Between Black Cat roundabout and Water End Junction	515795	255415
ANPR - 6	A421 (West of Black Cat)	Between Black Cat roundabout and Water End Junction	515795	255415
ANPR - 7	Chawston Lane (East of A1)	Between A1 and Chawston Lane Car Centre	516167	256096
ANPR - 8	Chawston Lane (East of A1)	Between A1 and Chawston Lane Car Centre	516167	256096
ANPR - 9	The Lane (East of A1)	Between the A1 and Payne H E	516293	256629
ANPR - 10	The Lane (East of A1)	Between the A1 and Payne H E	516293	256629
ANPR - 11	A1 (North of Wyboston Junction)	Between Wyboston Junction and junction with the B1048	516507	258340
ANPR - 12	A1 (North of Wyboston Junction)	Between Wyboston Junction and junction with the B1048	516507	258340
ANPR - 13	B1428 Great North Road (North of A428)	Between roundabout with A428 and Costa Coffee/KFC	516935	258080
ANPR - 14	B1428 Great North Road (North of A428)	Between roundabout with A428 and Costa Coffee/KFC	516935	258080
ANPR - 15	B1043 Barford Road (North of A428)	Between roundabout with A428 and roundabout with Chapman Way	518462	258297
ANPR - 16	B1043 Barford Road (North of A428)	Between roundabout with A428 and roundabout with Chapman Way	518462	258297
ANPR - 17	Barford Road (South of A428)	Between roundabout with A428 and junction with Alington Road	518495	258046
ANPR - 18	Barford Road (South of A428)	Between roundabout with A428 and junction with Alington Road	518495	258046
ANPR - 19	Cambridge Road (North of A428)	Between roundabout with A428 and roundabout with Stone Hill	520889	260024
ANPR - 20	Cambridge Road (North of A428)	Between roundabout with A428 and roundabout with Stone Hill	520889	260024
ANPR - 21	Unnamed road from Duck End /Graveley/Toseland (North of A428)	Between junction with A428 and Clearance Shoes	524451	260209
ANPR - 22	Unnamed road from	Between junction with A428 and Clearance Shoes	524451	260209

Site ID	Location	Locality	Easting	Northing
	Duck End /Graveley/Toseland (North of A428)			
ANPR - 23	Abbotsley Road (South of A428	Between Junction with A428 and group of houses south of Payphone and post-box	524471	260002
ANPR - 24	Abbotsley Road (South of A428	Between Junction with A428 and group of houses south of Payphone and post-box	524471	260002
ANPR - 25	B1040 (South of A428)	Between Junction with A428 and Junction with St Neots Road	526638	259761
ANPR - 26	B1040 (South of A428)	Between Junction with A428 and Junction with St Neots Road	526638	259761
ANPR - 27	B1040 St Ives Road (North of A428)	Between Junction with A428 and farm buildings east of B1040 north of A428	527204	259889
ANPR - 28	B1040 St Ives Road (North of A428)	Between Junction with A428 and farm buildings east of B1040 north of A428	527204	259889
ANPR - 29	Cambridge Road (South of A428)	Between the Eltisley and the junction with the A428	527229	260198
ANPR - 30	Cambridge Road (South of A428)	Between the Eltisley and the junction with the A428	527229	260198
ANPR - 31	A1198 Ermine Street (North of A428)	Between Caxton Gibbet Roundabout and the Island Inn	529584	260775
ANPR - 32	A1198 Ermine Street (North of A428)	Between Caxton Gibbet Roundabout and the Island Inn	529584	260775
ANPR - 33	A428 (East of Caxton Gibbet)	Between Caxton Gibbet Roundabout and Cambourne Road junction	529681	260536
ANPR - 34	A428 (East of Caxton Gibbet)	Between Caxton Gibbet Roundabout and Cambourne Road junction	529681	260536
ANPR - 35	A1198 (South of A428)	Between Caxton Gibbet Roundabout and dead end road east of A1198 junction	529752	260692
ANPR - 36	A1198 (South of A428)	Between Caxton Gibbet Roundabout and dead end road east of A1198 junction	529752	260692