Wokingham Local and M4 Modelling Assessment

Data Collection Report

March 2022

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Acronyms / Abbreviations

ANPR	Automatic Number Plate Recognition
ATC	Automatic Traffic Count
DfT	Department for Transport
HE	Homes England
MCC	Manual Classified Count
MCTC	Manual Classified Turning Count
NB	Northbound
PT	Public Transport
SB	Southbound
SRN	Strategic Road Network
VDM	Variable Demand Model
WSTM4	Wokingham Strategic Transport Model 4

Glossary

Drakewell	RBC and WBC traffic count database host
Inrix	Journey Time Data
Junction 10	Junction Traffic Model
LinSig	Junction Traffic Model
PTV- VISSIM	Microsimulation Traffic Model
PTV- VISUM	Strategic Traffic Model
Transyt	Junction Traffic Model
VisVap	Signal Controller within VISSIM
WebTRIS	National Highways Count Database
WSP	Transport Planning Consultant

1 Introduction

1.1 Overview

In March 2021 Wokingham Borough Council procured consultancy services to support decisions regarding plan making and the preparation of the Local Plan Update, which included a potential strategic scale development at Hall Farm and Four Valleys.

The land in the Hall Farm area which, alongside Hatch Farm and Four Valley, could provide in the order of 4,500 houses and 100,000sqm of additional employment floorspace in proximity to the Thames Valley Science and Innovation Park with the possibility of additional scenarios, which include a maximum of 200,000sqm of employment floorspace or a 1,000-bed hospital with reduced employment land quanta of 178,000sqm.

The areas where support is provided include:

- **Strategic Modelling** – utilising the existing Wokingham Strategic Transport Model (WSTM4), which is created within the PTV VISUM modelling package. Only the highway element will be utilised for this study. This will be used to understand the wider impacts of the proposed development and to feed into the VISSIM model.
- **Microsimulation Modelling** – A new PTV-VISSIM model will be developed. This incorporates the strategic highway network between junctions 10 and 11 of the M4, the A329(M) north of Winnersh Triangle to Jennett's Park Roundabout, Bracknell, as well as the B3270 to J11, the highway network immediately to the north and south of J11, Black Boy roundabout and part of the Eastern Relief Road at Shinfield. The VISSIM model will allow the interactions of vehicles between neighbouring junctions and at more complex junctions to be modelled more accurately. The model will be used to refine the strategic model assessment and to inform operational assessment.
- **Junction Models** – Existing and new standalone junction models will be used to inform the assessment using the microsimulation model (in this instance the main purpose of the junction models falling within the VISSIM model study area will be to optimise signal timings in forecast scenarios and therefore a proportionate approach will be applied to the development and/or validation of these models). The standalone junction models will also be used to assess individual junctions not covered by the VISSIM model at a more localised level. A greater effort will be put into validation of the local junction models, which fall outside of the Vissim model study area.

The overall approach to the assessment has been described within the "Wokingham Local and M4 Modelling Assessment – Homes England Study. Assessment Methodology", November 2021. This document summarises the data that has been collected to inform model refinement and development.

There is no historic data available to inform microsimulation or local junction model development and therefore following an initial review of the available data an extensive data collection exercise took place in November 2021 to address data availability.

1.2 Model Overview

This section provides a brief overview of the strategic, microsimulation and junction models that will be used in the assessment.

1.2.1 STRATEGIC MODEL

The existing WSTM4 highway model was developed by WSP on behalf of WBC using PTV's VISUM 17.01-04. The base year of the WSTM4 is 2015. The model was validated to TAG standards and was

reported in *'Wokingham Strategic Transport Model 4 (WSTM4) Local Model Validation Report, WSP, May 2018'*. A copy of the report can be downloaded from the WBC's website via https://www.wokingham.gov.uk/_resources/assets/attachment/full/0/276581.pdf

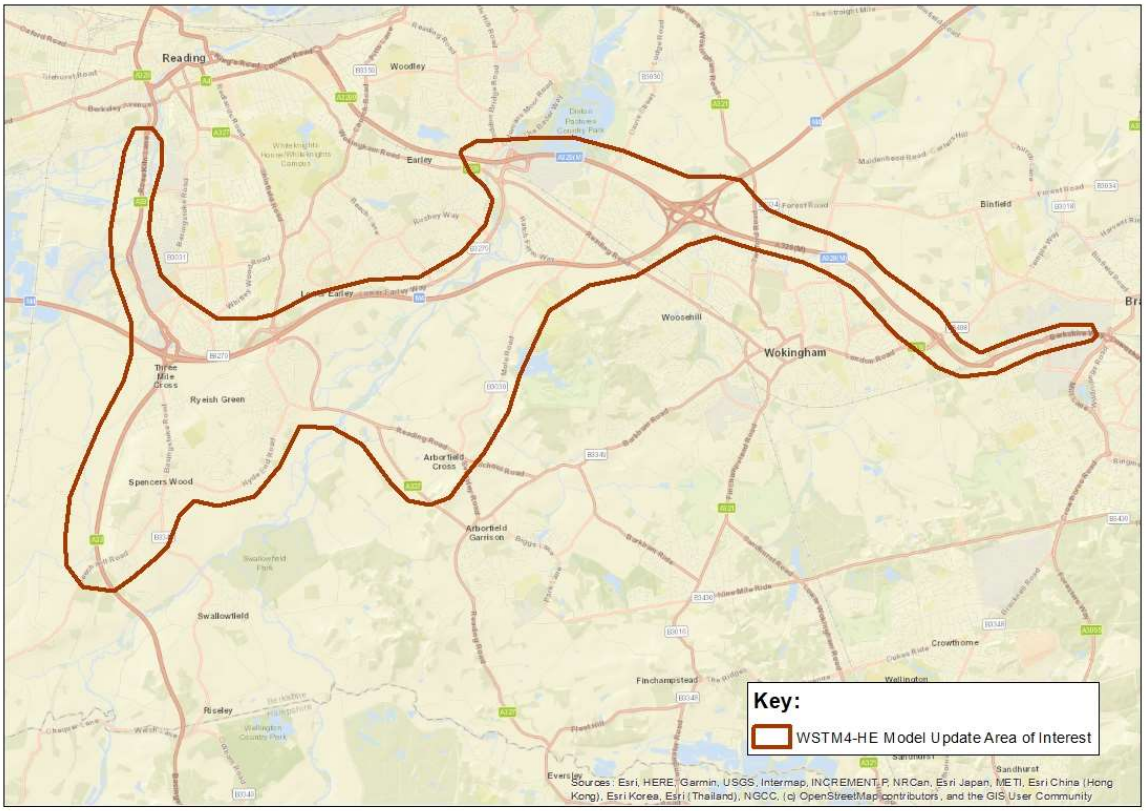
In order to support the assessment of the proposed development the WSTM4 model is undergoing a local update and a local revalidation exercise within the study area depicted in Figure 1-1. The updated model will be validated to 2021 base year; however, this is not a full update and is developed for the sole purpose of testing the proposed development and any associated mitigation and to feed into the VISSIM.

The model update will follow the appropriate guidance provided in DfT TAG Unit M3.1 'Highway Assignment Modelling', May 2020. The updated model that will be used in the assessment of the proposed development will be known as WSTM4-HE. The HE stands for Homes England assessment. The model will use the latest version of VISUM, version 22 to undertake the modelling.

Models will be developed for the existing AM and PM peaks only (0800-0900 and 1700-1800) and the five vehicle user classes will be maintained from WSTM4.

Analysis of the peak hour using 2021 November data at the strategic and local roads shows a variation across different sites with a large number having a peak hour slightly early that the WST4 peak hours, i.e. 0800-0900 and 1700-1800. However, the analysis also shows that the variation is low and is within 1-2%. The analysis has been presented within the "Wokingham Local and M4 Modelling Assessment. Peak Hour Analysis" technical note, which concluded that a proportionate approach of retaining the current modelled peak hour is acceptable with a warm-up and a cool down period used in the Vissim model.

Figure 1-1 Strategic Model – Area of Interest



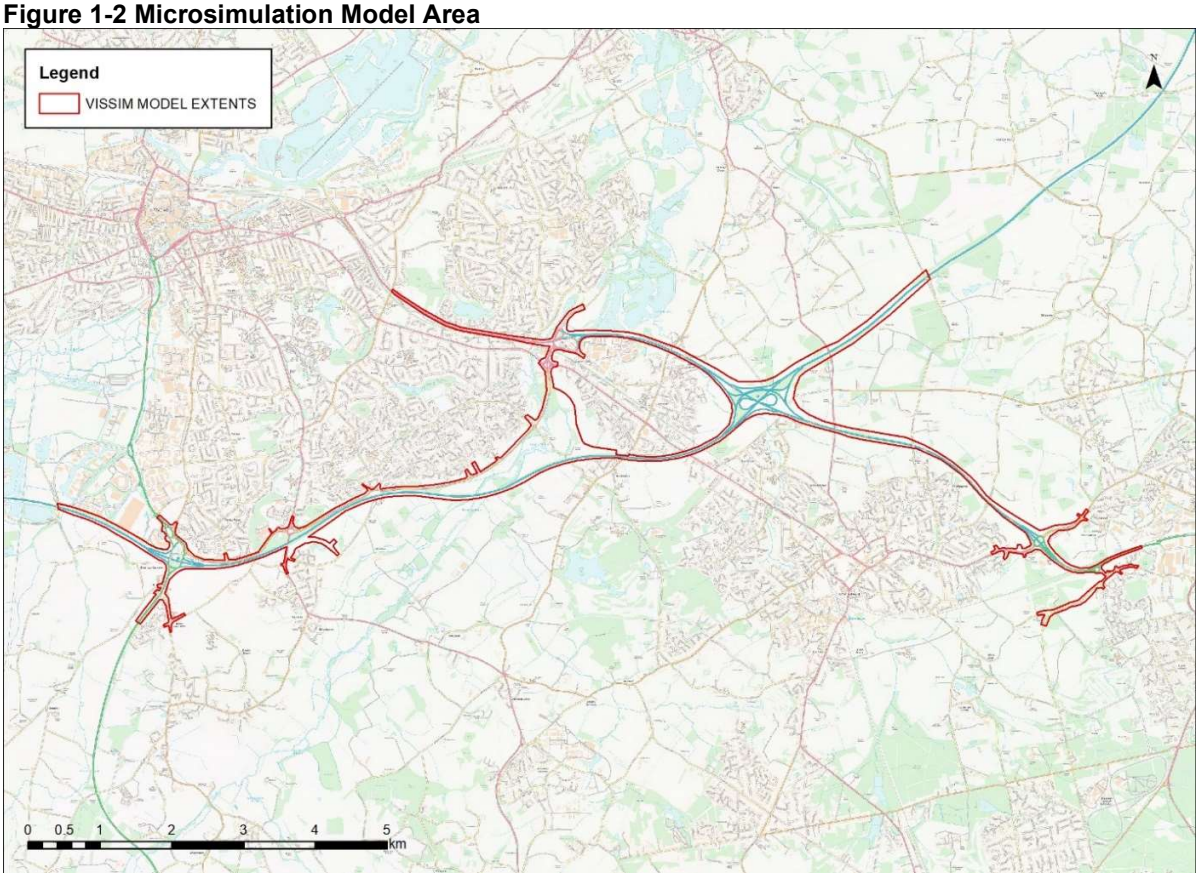
1.2.2 MICROSIMULATION MODEL

A new VISSIM model is being developed to allow the assessment of the proposed development at Hall Farm to be undertaken at a more localised level. This will utilise outputs from the VISUM model, which will account for any wider reassignment impacts across a wider area.

The VISSIM model will be used to test Reference Case (without development) and the scenario tests (with the development), along with testing highway impact.

The VISSIM model will be developed within VISSIM 2022 the latest version of the software. The model will be developed to understand the operation of the M4 and A329(M) junctions, as well as the Black Boy roundabout area.

Figure 1-2 Microsimulation Model Area



1.2.3 JUNCTION MODELLING

As well as the VISSIM model standalone junction models are being developed. The purpose of these is two-fold. Firstly, they will be used to inform the assessment in the VISSIM model, where signal timing optimisation may be required and secondly, they will be used to assess impacts and potential mitigation at the junctions, which fall outside of the VISSIM study area.

Dependent on the junction type the standalone junction models will be developed in Junctions 10, LinSig or Transyt.

Figure 1-3 Junctions included in Junction Modelling

1.2.4 REPORT STRUCTURE

In order to inform all three model types, a data collation and collection exercise has been undertaken. This examined existing data sources and through a gap analysis identified any new data requirements. This report provides detail on the gap analysis, data collation and collection that was undertaken to inform the development of the strategic, micro and local junction models.

Following this introduction, this report is presented with the following structure:

- Chapter 2 outlines proposed uses of data
- Chapter 3 outlines a review of available traffic data
- Chapter 4 outlines the signal data received
- Chapter 5 outlines commissioned traffic surveys

2 Intended Uses of Data in Model Development

2.1 Intended Uses of Data

This section summarises the proposed use of data in the models. The proposed data use was informed by TAG Unit M1.2, which identifies sources of transport data available to practitioners for developing transport models. Table 2-1 sets out a summary of the data sources.

Table 2-1 Data Sources and Uses

Data Type	Overview of Key Uses	Sources/Notes
Volumetric and classified link count data	Establish baseline network conditions including confirmation of peak hours. Used to inform model calibration, including matrix estimation, and validation of the VISUM and VISSIM models.	From existing databases such as Wokingham Borough Council, Reading Borough Council and WebTRIS database. Additional new data collection (Identified in Chapter 5)
Volumetric and classified junction turning data	To review the performance of the transport model at turn level for the VISUM and VISSIM models and to be used in development of base junction models	
Junction saturation flow and queue length data	To be used in Local Junction Model (LJM) validation.	New data collection
Journey time data	Model validation along selected routes within the VISUM model.	Though data is typically provided by DfT to local authorities free of charge, no data was available beyond March 2021 and therefore extra journey time data was purchased from INRIX (the supplier of the journey time data to DfT).
ANPR	Travel time data, O-D movements for the VISSIM model and junction models	Additional new data collection
Network/Supply side data	Traffic signal data, to provide signal timings for all models.	Signal data requested and supplied information to be reviewed.

2.2 Data Collection Period

DfT's TAG Unit M1.2 advises that data should typically be collected during a 'neutral', or representative, month avoiding holiday periods and school holidays. The guidance carries on saying that neutral periods are usually defined from March through to November (excluding August) and avoiding the weeks before/after Easter, the Thursday before and all of the week of a bank holiday, and the school holidays.

The data for this study has been collected for selected dates in November 2021 avoiding school holidays and any periods that might have been affected by Covid travel restrictions, and therefore the data collected can be considered representative of average Autumn 2021 travel conditions. However, it is acknowledged that 2021 travel patterns were generally affected by a sequence of Covid lockdowns, which started in March 2020 and therefore an adjustment for this will be made in forecasting.

3 Review of Available Traffic Data

3.1 Introduction

Before on-site data collection has been commissioned existing sources of traffic data within the area of interest were identified and reviewed:

- Traffic count data collected by Wokingham Borough Council and Reading Borough Council, obtained through their traffic count database (Drakewell)
- The National Highways Open Data source WebTRIS[1] includes ATC data on links and junctions on the Strategic Road Network (SRN)
- Junction signal data
- INRIX journey time data

3.2 Wokingham and Reading Borough Council Database

Wokingham and Reading Borough Council have a number of permanent count sites within the study area and keep a database of counts on a web-based database hosted by Drakewell.

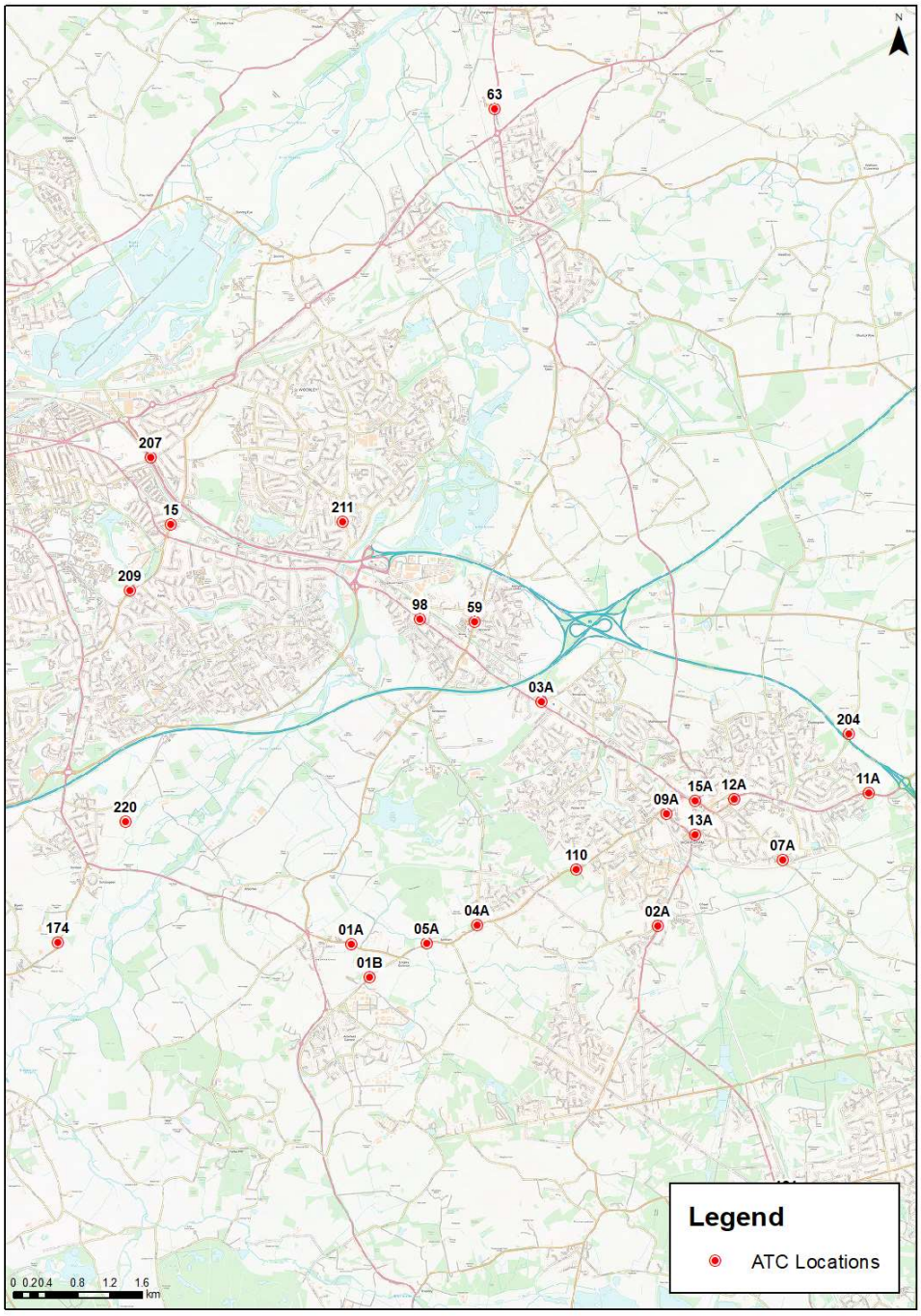
This was interrogated to identify any available counts within the study area. Traffic counts were extracted for a two-week window between 16th November – 25th November 2021. For completeness of the comparison, traffic count sites were then grouped by their road classes for both AM (0800 – 0900) and PM (1700 – 1800) peak periods. This identified a series of ATC sites where data was available either on a continuously monitored basis or on an ad-hoc basis.

The following maps show the Wokingham Borough Council permanent ATC locations of interest. It has been found that none of the Reading permanent ATC locations of interest were operational in Autumn 2021 and therefore these have been excluded from any further consideration. Where required, on-site ATC data was collected.

[1] https://webtris.highwaysengland.co.uk/

3 Review of Available Traffic Data

Figure 3-1 ATC Locations. Wokingham BC



There were a number of sites, which are not currently operational and historic data was also not available as they had not collected data for some time.

The ATC data was processed to remove any outliers, which were deemed unreliable data, based on standard deviation, the coefficient of variation of the flows and the vehicle classification provided in accordance with TAG UNIT M1.2 'Data Sources and Surveys', May 2020.

3 Review of Available Traffic Data

Cleaned ATC data was processed in order to derive the average weekday flow by taking the mean of Tuesday to Thursday counts. Flow profiles were checked to confirm that they are consistent with expected peak hours and that the tidal pattern of flows is seen if present.

This analysis (quality of flow data and availability of vehicle classification) enabled the creation of a value system ranging from 1 (unreliable) to 5 (reliable) in Table 3-1, and was used to remove any data sources which were deemed too unreliable for the purpose required within the modelling process. Where data was shown to have a score of 1 or 2, these were deemed unusable. A score of 3 or 4, data would be used with more care when used within the calibration and validation process and any issues reported within the Local Model Validation Report (LMVR). Typically, data which was given a score of 3 or 4 had good volumetric data, but over a shorter period of time or the quality of vehicle definitions was not so good. A score of 5 indicated that the data was acceptable for use and both volumetric data and vehicle classification data was shown to be good.

Table 3-1 Wokingham and Reading Borough Council ATC Data

Site ID	Location	Date	Quality
1A WB	School Road	Nov-21	1
1A EB	School Road	Nov-21	1
1B EB	Langley Common Road	Nov-21	1
1B WB	Langley Common Road	Nov-21	1
63 NB	A321 Wargrave Road, Twyford	Nov-21	5
63 SB	A321 Wargrave Road, Twyford	Nov-21	5
207 EB	Culver Lane, Earley	Nov-21	5
207 WB	Culver Lane, Earley	Nov-21	5
15 NB	B3350 Church Lane, Earley	Nov-21	5
15 SB	B3350 Church Lane, Earley	Nov-21	4
209 NE	B3350 Wilderness Road, Earley	Nov-21	3
209 SW	B3350 Wilderness Road, Earley	Nov-21	3
211 NB	Loddon Bridge Road, Earley	Nov-21	5
211 SB	Loddon Bridge Road, Earley	Nov-21	5
98 NW	A329 Reading Road, Winnersh	Nov-21	3
98 SE	A329 Reading Road, Winnersh	Nov-21	4
59 NB	B3030 Robin Hood Lane, Winnersh	Nov-21	1
59 SB	B3030 Robin Hood Lane, Winnersh	Nov-21	1
220 NB	A327 Eastern Relief Road, Shinfield	Nov-21	5
220 SB	A327 Eastern Relief Road, Shinfield	Nov-21	5
174 NB	B3349 Hyde End Road, Spencers Wood	Nov-21	1
174 SB	B3349 Hyde End Road, Spencers Wood	Nov-21	1
204 NE	Binfield Road, Wokingham	Nov-21	4
204 SW	Binfield Road, Wokingham	Nov-21	4
121 EB	A329 Kings Rd	Nov-21	5
121 WB	A329 Kings Rd	Nov-21	1 (bus lane)
3A NB	A329 Reading Road/Old Forest Rd	Nov-21	4
3A SB	A329 Reading Road/Old Forest Rd	Nov-21	4
4A NB	B3349 Barkham Road	Nov-21	4
4A SB	B3349 Barkham Road	Nov-21	4

Site ID	Location	Date	Quality
15A NE	A329 Broad Street	Nov-21	1
15A SW	A329 Broad Street	Nov-21	1
13A SW	A321 Denmark Street	Nov-21	4
12A SW	A329 Peach Street	Nov-21	2
9A NW	A321 Wellington Road, NW of Denmark Street	Nov-21	4
9A SE	A321 Wellington Road, NW of Denmark Street	Nov-21	4
2A NB	A321 Evendons Lane	Nov-21	4
2A SB	A321 Evendons Lane	Nov-21	4
7A NB	Waterloo Road/ Easthampstead Road	Nov-21	3
7A SB	Waterloo Road/ Easthampstead Road	Nov-21	3
11A EB	A329 London Road	Nov-21	4
11A WB	A329 London Road	Nov-21	3
4A EB	Barkham Road	Nov-21	4
4A WB	Barkham Road	Nov-21	4
110 EB	Barkham Road	Nov-21	1
110 WB	Barkham Road	Nov-21	1

Additional prior data within the months of October/September 2021 have been extracted for sites with poor data quality. Data sites with updated data from the months of October/September include site 15A,174, & site 59.

As there was no reliable data for site 121, 110, 4A, 1B and site 1A within the months preceding the November 2021 data collection, the data/sites could not be used.

It was also later discovered that permanent count site on the A33 was broken with no data available. This was therefore replaced by the ANPR Manual Classified Count, which collection is described in Chapter 5 of this document.

3.3 National Highways ATC Data (WebTRIS)

National Highways' WebTRIS database[2] was reviewed to identify count data on the Strategic Road Network (SRN), namely on the M4 Motorway. The M4 sections of interest within models are between Junctions 9 and 12. Count locations are shown on Figure 3-2 and Figure 3-3.

[2] https://webtris.highwaysengland.co.uk/

3 Review of Available Traffic Data

Figure 3-2 WebTRIS ATC Locations

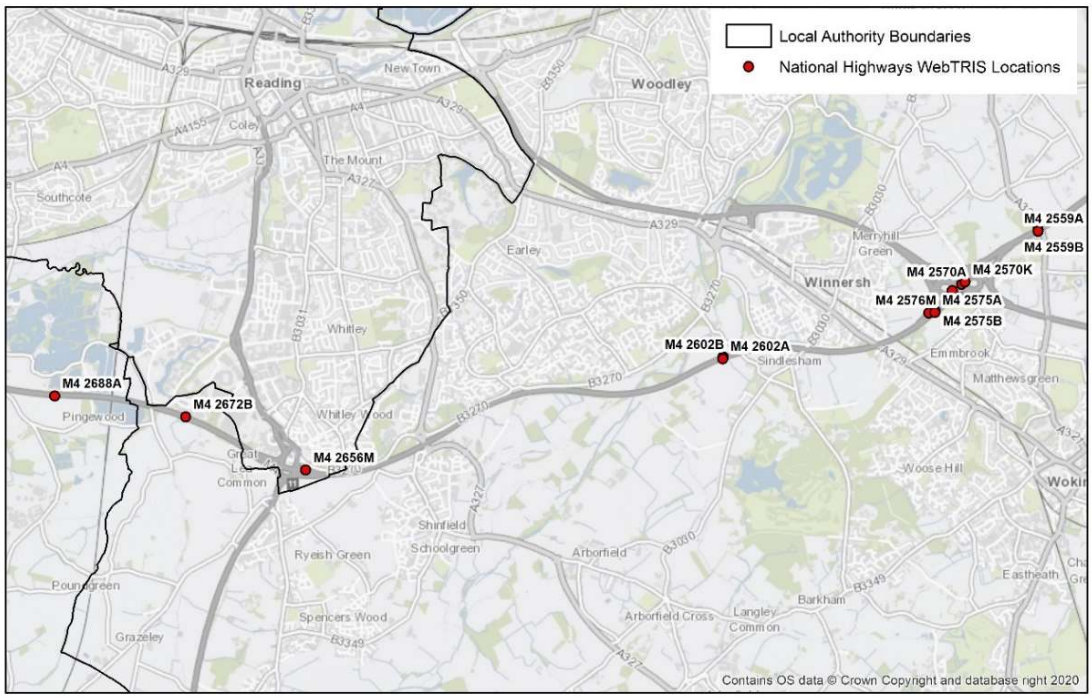
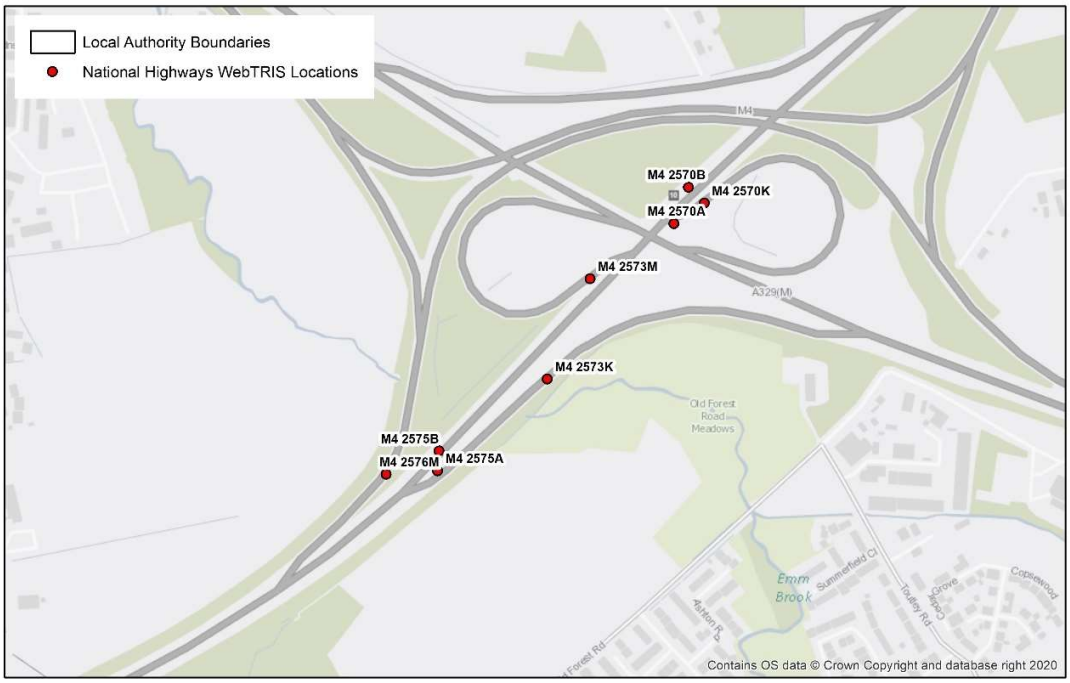


Figure 3-3 WebTRIS ATC Locations M4 Junction 10



Analysis of the WebTRIS ATC data was undertaken to provide information on trends and peak flows. Checks were made in order to remove any spurious data.

The ATC data was processed to remove any outliers following the same process as the Local Authority permanent site data.

Cleaned ATC data was processed in order to derive the average weekday flow by taking the mean of Tuesday to Thursday counts taken between the 15th November and 26th November 2021. Flow profiles have been checked to confirm they are consistent with expected peak hours and that a tidal flow of pattern is observed if present.

The result of the analysis including quality of flow data and availability of vehicle classification enabled the creation of a value system from 1 (unreliable data) to 5 (reliable data) as shown in Table 3-2. Where a score of 3 or 4 is given, the count data was still deemed to be suitable for use but would be used with more care during the calibration and validation process and any issues will be reported within the LMVR.

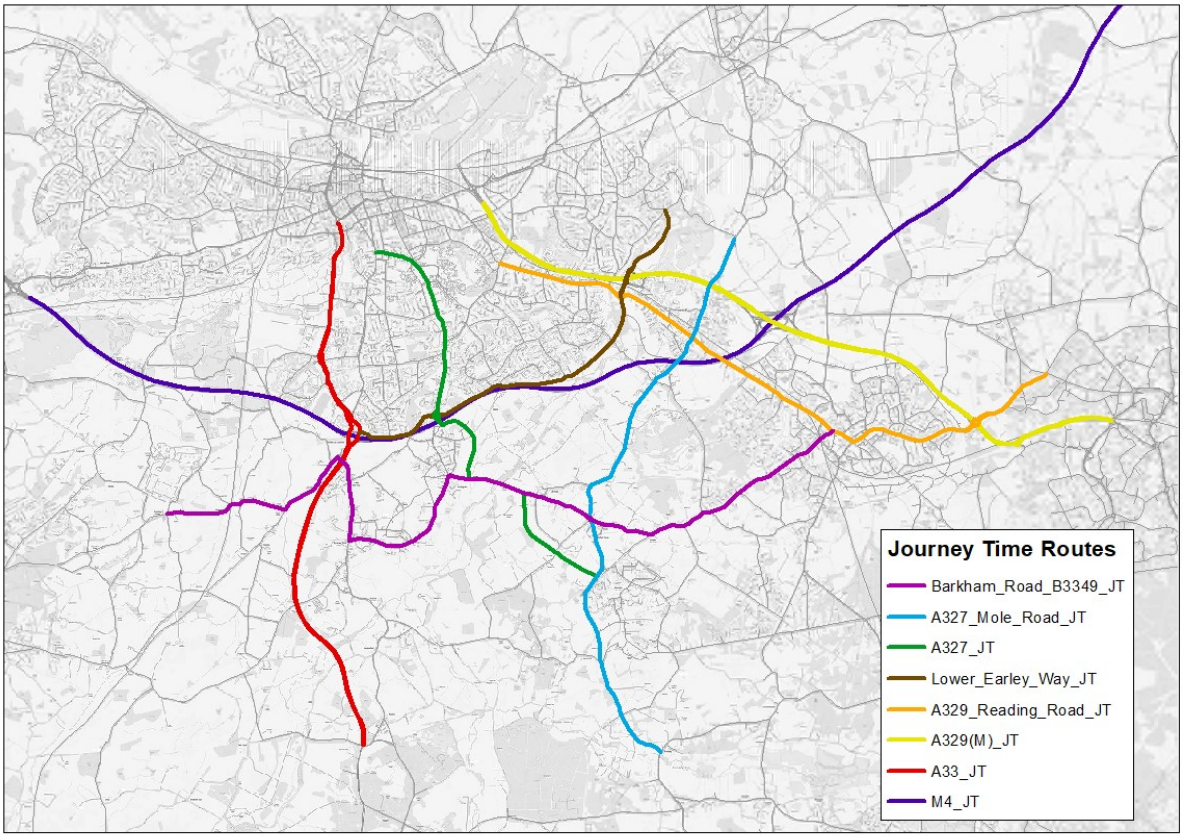
Table 3-2 WebTRIS ATC Locations Quality

Site ID	Location	Direction	Data	Quality
M4 2559B	Junction 9-10	Eastbound	Nov-21	4
M4 2602B	Junction 10-11	Eastbound	Nov-21	5
M4 2656M	Junction 11 M4 EB On Slip	Eastbound	Nov-21	4
M4 2573M	Junction 10 A329M NB to M4 EB On Slip	Eastbound	Nov-21	4
M4 2575B	Junction 10 EB Off Slip to A329	Eastbound	Nov-21	4
M4 2576L	Junction 10 M4 Off Slip to A329M (NB&SB)	Eastbound	Nov-21	4
M4 2570B	Junction 10 Mainline (between A329M On-Slips)	Eastbound	Nov-21	4
M4 2559A	Junction 9-10	Westbound	Nov-21	4
M4 2570A	Junction 10 EB Mainline after A329M Off slip	Westbound	Nov-21	4
M4 2570K	Junction 10 On Slip (From A329M SB)	Westbound	Nov-21	5
M4 2573K	Junction 10 On Slip (From A329M NB)	Westbound	Nov-21	3
M4 2575A	Junction 10 Mainline (between A329M On-Slips)	Westbound	Nov-21	4
M4 2602A	Junction 10-11	Westbound	Nov-21	4
M4 2672B	Junction 11-12	Eastbound	Nov-21	4
M4 2688A	Junction 11-12	Westbound	Nov-21	4

3.4 Journey Time Data

Travel time data is required to enable validation of modelled journey times within the strategic VISUM model. Journey time data for model update was sourced from INRIX covering 22nd November to 3rd December 2021 for the routes displayed in Figure 3-4. The journey time data was sourced for weekdays only in 1/5/15/60-minute intervals across each of the days. The data is provided from aggregated connected car data, which is used to provide real-time speeds on roads. The 8-9am and 5-6pm journey times were extracted from the data.

Figure 3-4 Journey Time Routes



Data was reviewed on receipt and journey time routes assembled based on aggregated link data. All data was extracted for the relevant time periods required for validation purposes and these were then checked. The journey times provided by INRIX were compared against the typical weekday journey times in google. The comparison of the data is presented in Table 3-2 and this shows that the journey times provided by INRIX align with those ranges provided in google maps.

This data will be used for journey time validation. Journey time route specifications have been defined as per guidance in Section 4.4 of TAG Unit M3.1.

Table 3-2 Data Checks against Google Travel Times

Route	Inrix Data 0800-0900	Inrix Data 1700-1800	Google Data 0800-0900	Google Data 1700-1800
A33_NB	13:28	12:27	12-24 mins	10-22 mins
A33_SB	13:02	15:40	10-22 mins	12-26 mins
M4_EB	17:45	17:59	16-22 mins	16-20 mins
M4_WB	17:56	17:41	16-20 mins	16-20 mins
A329M_SB	10:57	10:28	9-14 mins	9-14 mins
A329M_NB	09:51	10:45	9-12 mins	9-14 mins
A329_READING_RD_NB	22:23	20:06	18-45 mins	16-35 mins
A329_READING_RD_SB	24:26	22:12	18-40 mins	18-40 mins

3 Review of Available Traffic Data

Route	Inrix Data 0800-0900	Inrix Data 1700-1800	Google Data 0800-0900	Google Data 1700-1800
LOWER_EARLEY_EB	12:03	12:48	10-20 mins	10-20 mins
LOWER_EARLEY_WB	12:43	12:39	10-20 mins	10-18 mins
A327_ERR_NB	19:02	17:38	14-30 mins	12-28 mins
A327_ERR_SB	17:03	16:22	14-28 mins	12-26 mins
A327_MOLE_RD_NB	15:48	15:46	14-26 mins	14-20 mins
A327_MOLE_RD_SB	16:07	16:10	14-22 mins	14-22 mins
BARKHAM_RD_B3349_EB	20:15	19:29	16-30 mins	16-30 mins
BARKHAM_RD_B3349_WB	18:38	18:50	16-35 mins	16-30 mins

4 Signal Data

Traffic signal data in Reading was obtained from video footage of surveys that took place in November 2021 (see section 5) or provided by Wokingham Borough Council's signal consultants WSP or Bracknell BC. The data was extracted from on-site signal controllers during the week of the link flow survey. The data was then summarised to provide average signal timings for input into the VISSIM model using VisVap and the junction models. The signal data is also used to provide traffic signal timings within the VISUM and junction models.

Table 4-1 lists junctions for which signal data has been obtained.

Table 4-1 Signal Data Received

Signal Data At the following Locations	Local Authority
A33/Basingstoke Road North of J11 Junction 11	Reading
A33/Basingstoke Road South of J11 B3270/A327 Hallow Lane/Shinfield Road B3270/Hatch Farm Way B3270/Reading Road A3290/A329(M) A3290/Wharfedale Road Wharfedale Road/A329(M) Coppid Beech/A329(M) London Road/Oak Avenue London Road/St Annes Drive London Road/William Heelas Way London Road West Pedestrian Crossing Hollow Lane/Brookers Hill Eastern Relief Road/A327	Wokingham
Berkshire Way/Vigar Way London Road East Pedestrian Crossing London Road/Russell Chase/John Nike Way Peacock Lane Pedestrian Crossing	Bracknell Forest

5 Commissioned Traffic Surveys

5.1 Introduction

In October 2021, after undertaking the gap analysis to understand what data was still needed, Stantec commissioned Intelligent Data Collection Limited (IDC) to undertake the traffic surveys for the model development. The commission was split into two packages.

Package 1 included:

5 Commissioned Traffic Surveys

- Automatic Traffic Counts (ATCs) over a two-week period between Wednesday 17th November 2021 to Thursday 2nd December 2021.
- Manual Classified Turning Counts (MCTCs) over a 12-hour period (between 07:00 to 19:00) on Thursday 30th November 2021 including smaller ANPR cordons for more complicated junctions.
- Queue Length Surveys, Pedestrian Surveys and Saturation Flow Surveys undertaken during the MCTC survey.

A link to the Package 1 data collection site locations can be found here: https://www.google.com/maps/d/viewer?mid=1hE6l0NOs5TNV1hXMW316N9Q9gX5sOJQa&ll=51.41493069097007 4%2C-0.8570572114257757&z=13

Package 2 included:

- Automatic Number Plate Recognition (ANPR) for use for the development of the VISSIM model, over a 12-hour period (between 07:00 to 19:00) on Thursday 30th November 2021.
- Journey Time (JT) surveys were included within the ANPR survey.

With Package 2 data collection site locations here: https://www.google.com/maps/d/viewer?mid=1xm7-YdWqR6uHJyheuDetWi351XtE_dJQ&ll=51.43023943147518%2C-0.8886784047851704&z=13

Having received the data for both packages, a review of the data was undertaken. This was to identify which locations may have failed to collect data or were noted to underperform during the survey period. The review has identified a number of equipment failures, which are detailed in Appendix A. Each equipment failure or roadworks has been assigned a Red, Amber, Green status depending on their impact on the model development work and the effort that may be involved in addressing the issues through additional data manipulations.

5.2 ATC Data

ATC surveys were undertaken over a two-week period (14 days) from Wednesday 17th November 2021 to Thursday 2nd December 2021. The data survey company was able to discern and classify the ATC data into the following vehicle classes:

- Car
- LGV
- 2 Axled Rigid
- 3 Axled Rigid
- 4 Axled Rigid
- 5+ Axled Rigid
- Bus
- Cycle, and
- Motorcycle

Data was broken down into 15-minute time periods.

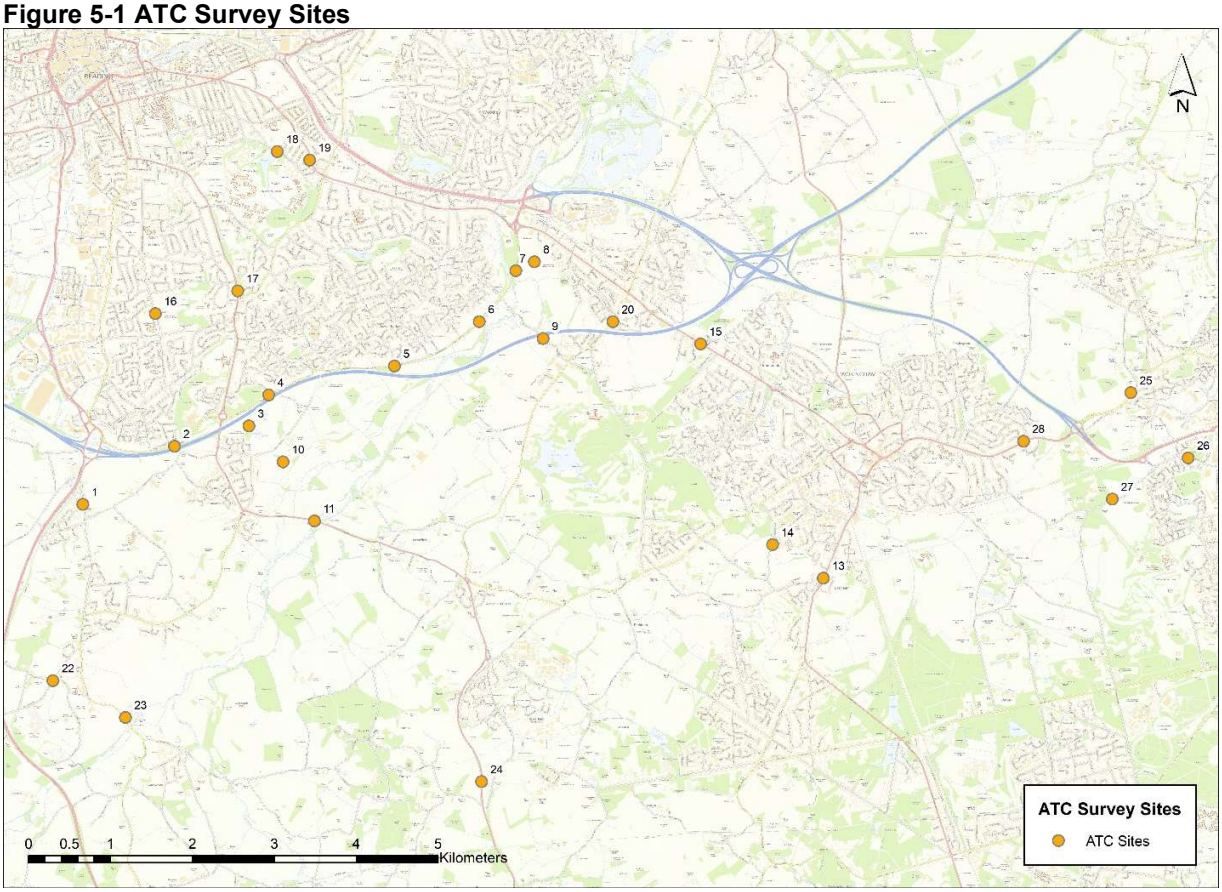
Table 5-1 provides details of the locations of the ATC surveys, whilst Figure 5-1 provides further detail on the exact locations.

Table 5-1 ATC Sites

ATC Site	Location	ATC Site	Location
1	Basingstoke Road	15	A329 Reading Road
2	B3270	16	Northumberland Avenue
3	A327 Eastern Relief Road	17	A327 Shinfield Road
4	B3270 Lower Earley Way West	18	Whiteknights Road
5	B3270 Lower Earley Way	19	A329 Wokingham Road
6	B3270 Lower Earley Way	20	B3030 King St Lane
7	B3270 Lower Earley Way North	22	Beech Hill Road
8	Hatch Farm Way	23	B3349 Basingstoke Road
9	Mill Lane	24	A327 Lodden Bridge
10	A327 Eastern Relief Road	25	B3408 London Road
11	A327 Arborfield Road	26	Peacock Lane
13	A321 Finchampstead Road	27	Peacock Lane
14	Blagrove Lane	28	A329 London Road

5 Commissioned Traffic Surveys

Figure 5-1 ATC Survey Sites



Checks were undertaken of the data for any outliers or spurious data. These checks indicated that all the data on review was sensible and there was no need to remove any outliers, over and above any data issues as highlighted in Appendix A. Table 5-2 summarises the peak hour flows across the ATC sites.

Table 5-2 ATC Peak Hour Flows

SITE ID	Location/ Description	AM Peak (8-9am)			PM Peak (5-6pm)		
		Car	LGV	HGV	Car	LGV	HGV
Site 1 NB	Basingstoke Road from Mitford Close	702	108	28	555	78	19
Site 1 SB	Basingstoke Road from Tabby Drive	547	16	12	659	32	7
Site 2 EB	B3270 from Whitley wood lane	899	94	23	1045	98	20
Site 2 WB	B3270 from Old Shinfield Road	1254	133	42	1017	99	22
Site 3 EB	A327 Eastern Relief Road, Shinfield	355	53	22	418	42	14
Site 3 WB	A327 Eastern Relief Road, Shinfield	493	68	30	431	49	14
Site 4 NE	B3270 Lower Earley Way West	1050	81	29	1150	63	21
Site 4 SW	B3270 Lower Earley Way West	1029	138	26	910	102	16
Site 5 EB	B3270 Lower Earley Way from Cutbush Lane	562	75	17	662	72	9
Site 5 WB	B3270 Lower Earley Way from Meldreth Way	746	89	23	682	70	13
Site 6 NE	B3270 Lower Earley Way from Barn Croft Dr.	740	91	27	687	84	12
Site 6 SW	B3270 Lower Earley Way from Mill Lane	702	86	25	773	85	16
Site 7 NB	B3270 Lower Earley Way North	957	145	25	867	102	16

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SITE ID	Location/ Description	AM Peak (8-9am)			PM Peak (5-6pm)		
		Car	LGV	HGV	Car	LGV	HGV
Site 7 SB	B3270 Lower Earley Way from Hatch Farm Way	965	57	30	1058	49	23
Site 8 NW	Hatch Farm Way	667	31	14	526	29	10
Site 8 SE	Hatch Farm Way	521	61	13	584	47	9
Site 9 NB	Mill Lane	383	70	10	316	44	7
Site 9 SB	Mill Lane	371	32	8	301	21	3
Site 10 NB	A327 Eastern Relief Road from Arborfield	401	77	37	331	50	15
Site 10 SB	A327 Eastern Relief Road from Cutbush Lane East	257	51	18	365	47	13
Site 11 EB	A327 Arborfield Road from A327 Observer way	500	62	19	508	41	12
Site 11 WB	A327 Arborfield Road from Observer Way	523	124	36	514	89	22
Site 13 NB	A321 Finchampstead Road	636	94	23	557	99	17
Site 13 SB	A321 Finchampstead Road	636	74	16	870	109	13
Site 14 NB	Balgrove Lane	57	4	1	38	5	2
Site 14 SB	Balgrove Lane	44	8	3	33	7	1
Site 15 NW	A329 Reading Road	785	77	19	662	53	17
Site 15 SE	A329 Reading Road	817	88	25	793	72	19
Site 16 NB	Northumberland Avenue	597	28	11	368	20	9
Site 16 SB	Northumberland Avenue	402	26	8	437	37	10
Site 17 NB	A327 Shinfield Road	435	32	12	354	28	9
Site 17 SB	A327 Shinfield Road	397	16	11	471	21	13
Site 18 NW	Whiteknights Road	556	21	10	256	14	6
Site 18 SE	Whiteknights Road	396	32	6	424	28	10
Site 19 NB	A329 Wokingham Road	327	39	14	295	27	11
Site 19 SB	A329 Wokingham Road	396	44	15	440	36	15
Site 20 NB	B3030 King St. Lane	350	36	12	369	29	5
Site 20 SB	B3030 King St. Lane	305	36	13	293	33	6
Site 22 NB	Beech Hill Road	121	17	6	113	13	2
Site 22 SB	Beech Hill Road	145	23	6	133	19	4
Site 23 NW	B3349 Basingstoke Road	323	57	18	340	43	12
Site 23 SE	B3349 Basingstoke Road	197	60	14	166	39	9
Site 24 NB	A327 Loddon Bridge	418	77	24	392	50	11
Site 24 SB	A327 Loddon Bridge	439	41	19	371	36	10
Site 25 NB	B3408 London Road	760	39	24	815	38	23
Site 25 SB	B3408 London Road	671	25	19	629	31	14
Site 26 EB	Peacock Lane	492	39	13	520	38	13
Site 26 WB	Peacock Lane	602	87	20	601	54	16
Site 27 NB	Peacock Lane from Easthampstead Park	592	111	22	547	87	13
Site 27 SB	Peacock Lane	538	114	25	624	106	12
Site 28 EB	A329 London Road	528	147	28	583	116	23
Site 28 WB	A329 London Road	486	93	23	613	120	14

5.3 MCTC, Queue and Saturation Flow Data

The Manual Classified Turning Counts (MCTC) and Queue surveys were undertaken for a 12-hour period (0700 to 1900) on Thursday 30th November 2021 and provided in 15-minute intervals. The data has been fully classified into the following vehicle classifications:

- Car
- LGV
- OGV1
- OGV2
- Bus/ Coach and PSV
- Motorcycles, and
- Cycles

Saturation flows were also calculated for the AM modelled peak hour between 08:00 and 09:00 and the PM peak between 17:00 and 18:00.

The locations of the MCTC surveys undertaken are set out in Table 5-3 and presented on Figure 5-2.

Table 5-3 MCTC Sites

MCC ID	Location	Junction Type	Queue Length	Saturation Flows
1	Junction 11	Signalised	✓	✓
2	Junction 10	Uncontrolled		
3	A33 Basingstoke Road/ Mereoak Lane	Signalised	✓	✓
4	Basingstoke Road/ Church Lane	Priority	✓	
5	Black Boy Gyratory	Signalised	✓	✓
6	Eastern Relief/ South Avenue Roundabout	Priority	✓	
7	South Avenue Roundabout	Priority	✓	
8	Eastern Relief Road / Arborfield Road Roundabout	Priority	✓	
9	A327 Reading Road / Observer Way	Priority	✓	
10	B3270/ Meldreth Way Roundabout	Priority	✓	
11	B3270/ Mill Lane / Rushey Way Roundabout	Priority	✓	
12	Hatch Farm Way/ B3270	Signalised	✓	✓
13	B3270/Reading Road/A3290	Signalised	✓	✓
14,15, 16	Combined A3290/Wharfdale Road | Wharfdale Road/A329M slips | A3290/A329M	Signalised	✓ ∗ affected by roadworks	
17	Reading Road / King St Lane / Robin Hood Ln Roundabout	Signalised	✓	✓
18	Mill Lane / Mole Rd Roundabout	Priority	✓	
19	B3270/ Cutbush Lane Double Roundabout	Priority	✓	
20	B3270 / Whitley Wood Lane	Priority		
21	Hollow Road / Brookers Hill	Signalised	✓	✓
22	Coppid Beech / A329 (M)	Signalised	✓	✓
23	London Road / Oak Avenue	Signalised	✓	✓
24	Jennett's Park Roundabout	Signalised	✓	✓
25	Peacock Lane / Vigar Way Roundabout	Priority	✓	
26	Peacock Lane / Osprey Avenue Roundabout	Priority	✓	
27	Peacock Lane / Sparrowhawk Way Roundabout	Priority	✓	
28	Peacock Lane / Waterloo Road	Priority	✓	

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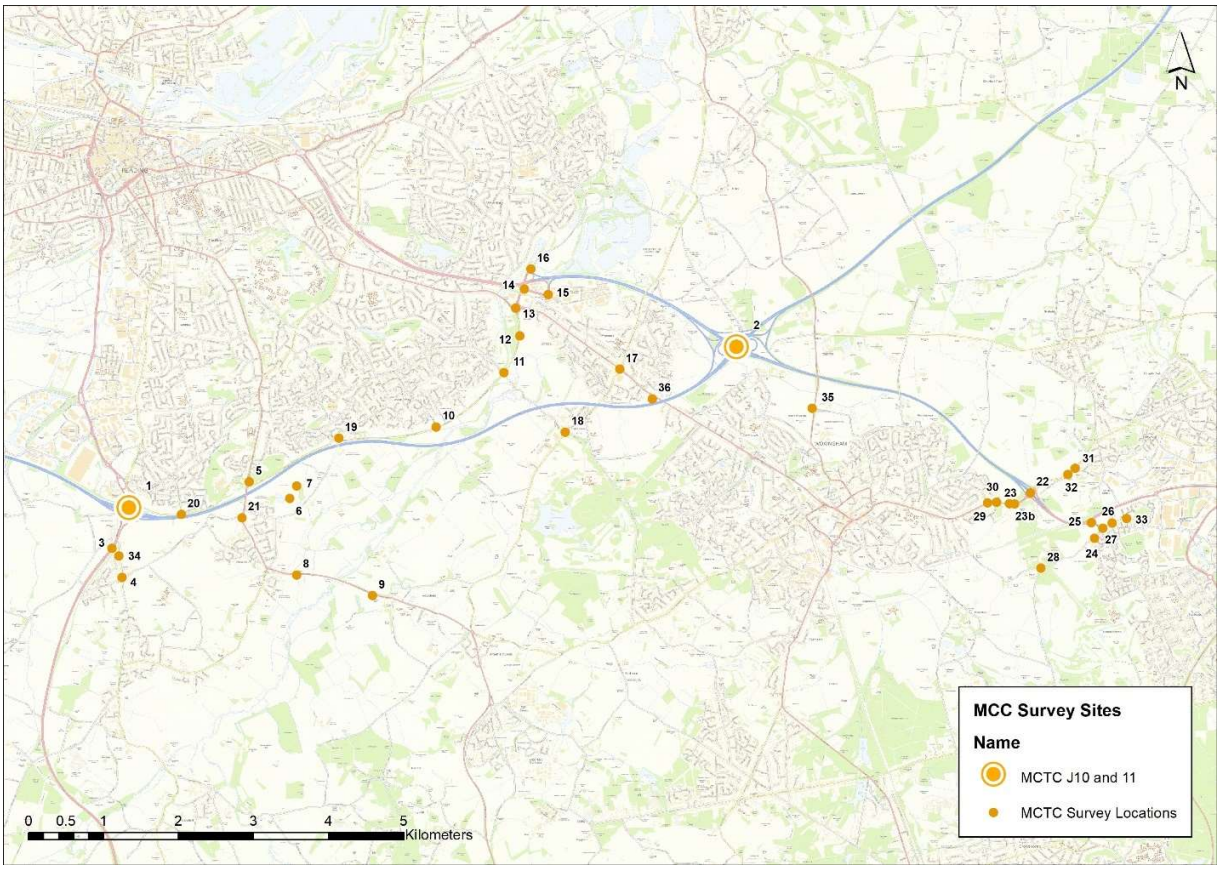
MCC ID	Location	Junction Type	Queue Length	Saturation Flows
29	A329 London Road / William Heelas Way	Signalised	✓	✓
30	A329 London Road / Plough Lane	Signalised	✓	✓
31	A329 London Road / Russell Chase / John Nike Way	Priority	✓	
32	London Road / Hubbard Road	Priority	✓	
33	Peacock Lane / Butler Drive	Signalised	✓	✓
34	Basingstoke Road / Tabby Drive	Signalised		✓
35	A321 Twyford Road / Bell Foundry Lane / Queens Road	Priority		
36	A329 Reading Road /Longdon Road	Priority		

Figure 5-2 MCTC Locations



5.4 Pedestrian Flows

Pedestrian crossing surveys were also undertaken on Tuesday 30th November to count pedestrians at pedestrian crossings within the extent of the Vissim model. Table 5-4 provides details of the survey locations.

Table 5-4 Pedestrian Survey Sites

MCC ID	Pedestrian ID	Location	MCC ID	Pedestrian ID	Location
1	1a, 1h	M4 Junction 11	22	22	Coppid Beech / A329 (M)
3	3	A33/Basingstoke Road	23	23	London Road/Oak Avenue
5	5a, 5b, 5c, 5d, 5g	B3270/A327 (Black Cat)	29	29	London Road/William Heelas Way
12	12	B3270/Hatch Farm Way	30	30	London Road/Plough Lane
13	13	B3270/Reading Road	31	31	London Road/Russell Chase/John Nike Way
14	14c2	A3290/Wharfedale Road	32	32	London Road/Hubbard Road
17	17	Reading Road/Robbin Hood Lane/Kind Street Lane	33	33	Peacock Lane/Butler Drive
21	21	Hallow Lane/Brookers Hill	34	34	Basingstoke Road/Tabby Drive

5.5 ANPR

ANPR surveys were undertaken for a 12-hour period between 07:00 to 19:00 on Thursday 30th November 2021. The ANPR surveys were undertaken at 51 locations as presented in Table 5-5 and illustrated in Figure 5-3.

The survey data has been provided in 15 -minute segments in a matrix format and the data has been fully classified into: Car, Taxi, LGV, OGV1, OGV2, OGV2, PSV, Motorcycles and Cycles.

Table 5-5 ANPR Survey Sites

ANPR ID	Location	ANPR ID	Location	ANPR ID	Location
1	A33 Basingstoke Rd	18	The Bader Way	35	A329 London Rd
2	B3031 Basingstoke Rd	19	Wharfedale Rd	36	Plough Ln
3	Whitley Wood Ln	20	M4	37	Oak Ave
4	B3270	21	Russell Chase	38	South Ave
5	No name	22	London Rd	39	Eastern Relief
6	A327 Shinfield Rd	23	John Nike Way	40	South Ave
7	Beeston Way	24	A329 Berkshire Way	41	Cutbush Ln
8	Cutbush Ln	25	No name	42	Hollow Ln
9	Meldreth Way	26	No name	43	Brookers Hill
10	Paddick Dr	27	Butler Dr	44	Church Ln
11	Barn Croft Dr	28	Peacock Ln	45	Basingstoke Rd
12	Rushey Way	29	Osprey Ave	46	Grazeley Rd
13	Mill Ln	30	Sparrowhawk Way	47	Tabby Dr
14	Hatch Farm Way	31	Old Wokingham Rd	48	A33
15	A329 Reading Rd	32	Waterloo Rd	49	M4
16	A329 Reading Rd	33	St Annes Dr	50	Reading International Business Park Southern Access

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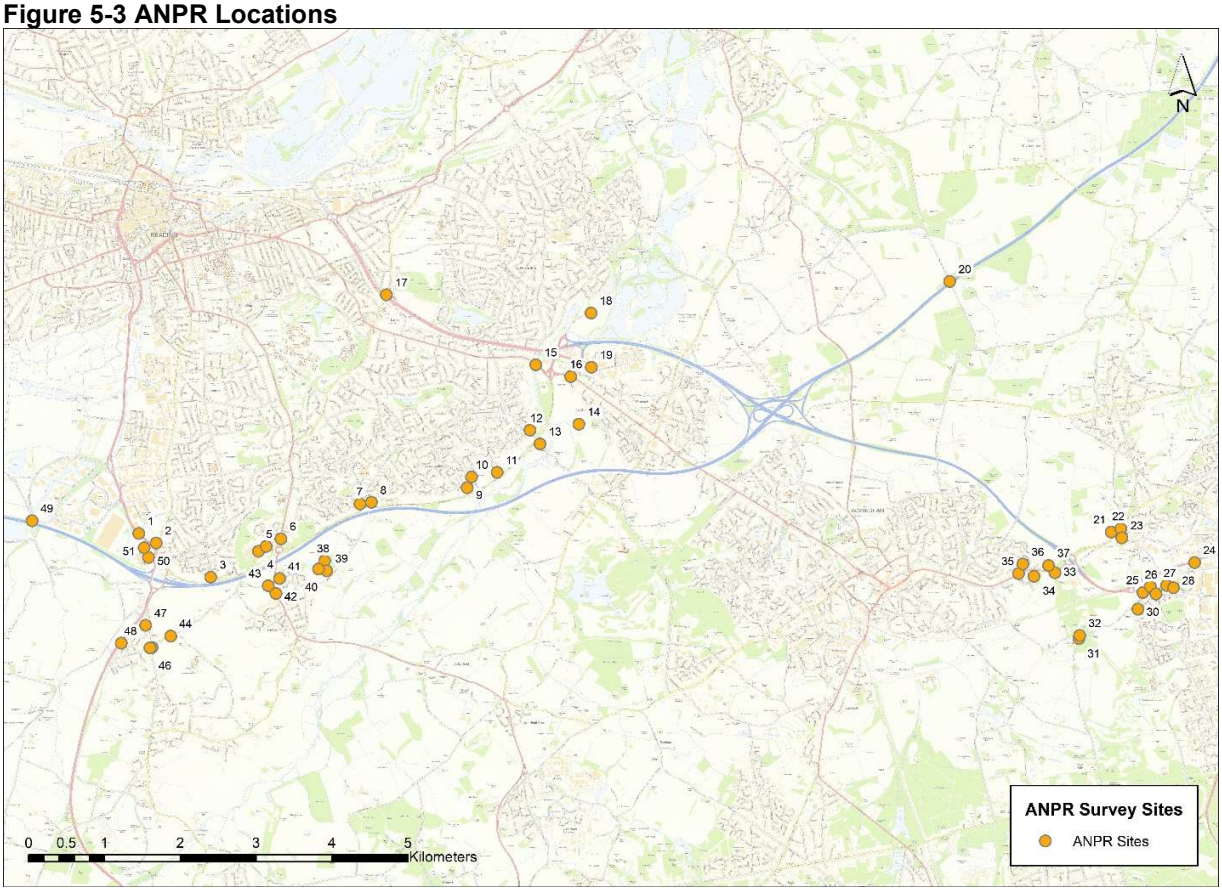
ANPR ID	Location	ANPR ID	Location	ANPR ID	Location
17	A3290	34	William Heelas Way	51	Reading International Business Park Northern Access

Figure 5-3 ANPR Locations



ANPR cameras may not be able to recognise number plates if they are obscured or unreadable and as such the capture rate may not be 100%. To understand the capture rate the ANPR collection has been supplemented by a manual count at each location. The capture rates are presented in Table 5-6 and are overall high and are around 80-90%. There are however instances (e.g. site 4 or site 33) when the observed capture rates fall to around 40%. In all instances where the ANPR camera cannot recognise 100% of the vehicles, the number of captured plates will be expanded to the total manual classified count.

Table 5-6 ANPR Survey Sites – Capture Rate

Site	MCC	Captured Plates	Capture Rate
1	37463	29983	80%
2	4685	4399	94%
3	-	6679	-
4	477	206	43%
5	2023	1845	91%

Site	MCC	Captured Plates	Capture Rate
6	-	10228	-
7	14648	11721	80%
8	2560	2400	94%
9	2883	2616	91%
10	699	602	86%

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Site	MCC	Captured Plates	Capture Rate
11	664	425	64%
12	10039	9266	92%
13	6568	5998	91%
14	12195	10735	88%
15	17455	16692	96%
16	15553	12925	83%
17	22717	14975	66%
18	10232	9093	89%
19	3900	3368	86%
20	70774	63540	90%
21	947	746	79%
22	15199	10703	70%
23	4038	3709	92%
24	33660	21412	64%
25	237	174	73%
26	543	464	85%
27	944	664	70%
28	10445	9969	95%
29	-	2235	-
30	3955	3566	90%

Site	MCC	Captured Plates	Capture Rate
31	11028	9975	90%
32	894	725	81%
33	464	174	38%
34	2621	2325	89%
35	16080	6815	42%
36	2825	2576	91%
37	-	3217	-
38	1109	627	57%
39	9885	8451	85%
40	901	812	90%
41	1871	1711	91%
42	8874	7947	90%
43	4923	2904	59%
44	5591	4991	89%
45	8272	7342	89%
46	1812	1685	93%
47	647	585	90%
48	33721	30799	91%
49	-	69811	-
51	1110	941	85%

APPENDICES

Appendix A Survey Equipment Failures/ Roadworks

ATC

ATC ID		Location	Site Issues	Significance
Site6		B3270 Lower Earley Way North	ATC tubes failed between 14:30 on 21st to 13:00 on 25th November	Moderate
Site11		A327 Arborfield Road	From the 29th November there appears to be road works until the end of the survey which distributed the ATC survey.	Slight
Site 18		Whiteknights Road	No data was recorded 11:00-15:00 on the 22nd November	Slight
Site 25		B3408 London Road	When compared to the local MCC, the BA ATC underperforms	Slight
Site 27		Peacock Lane	ATC tubes failed between 23rd November 15:45 - 30th November 09:00, causing a loss in data	Moderate
Site 28		A329 London Road	The ATC has some occasional underperformance	Slight

Sites 6 and 27 are identified to have a moderate issue with tubes failing during long periods of time, however, data will still be available for neutral days of the week prior or post the issue arising. The other site's classed as Slight do not impact on availability of data for the calibration and validation of the model.

MCTC

MCC ID	Location	Site Issues	Significance
9	A327 Reading Rd / Observer Way	Due to missing footage we are unable to process queues on Observers Way. Roadworks in progress at this site.	Moderate
14	The Bader Way	Due to limited view we can only see up to 5 vehicles in queue on The Bader Way. Saturation flows on A329(M) arm can only be processed for the AM peak. Roadworks in progress at this site.	Moderate
29	A329 London Rd / William Heelas Way	Due to missing footage we are unable to process saturation flows on William Heelas Way.	Moderate
31	A329 London Rd / Russell Chase / John Nike Way	Due to missing footage we are unable to process saturation flows on John Nike Way.	Moderate

MCC ID	Location	Site Issues	Significance
36	A329 Reading Rd/Longdon Rd	Due to missing footage we are unable to process queues on Reading Road North and London Rd.	Moderate
20	B3270 / Whitley Wood Ln	Footage for queues and turning counts is only available until 18:14 so we will be missing the last 45 mins.	Slight
35	A321 Twyford Rd / Bell Foundry Ln / Queens Rd	Due to missing footage we can only see up to 2 vehicles in queue on Twyford Rd North. However, there is barely any queuing according to footage.	Slight
30	A329 London Rd / Plough Ln	Due to missing footage we can only see up to 3 vehicles in queue on Plough Lane. However, there is barely any queuing according to footage.	Slight
35	A321 Twyford Rd / Queens Rd / Bell Foundry Ln	Due to missing footage we can only see queues up to 2 vehicles on Bell Foundry Lane. However, there is no queuing at this site.	Slight

ANPR

ANPR ID	Location	Site Issues	Significance
3	Whitley Wood Ln	The MCC fails throughout the day.	Severe
4	B3270	The OB ANPR underperforms throughout the day.	Moderate
5	No name Rd	The OB ANPR underperforms at 08:45.	Slight
6	Shinfield Rd	The MCC fails throughout the day.	Severe
11	Barn Croft Dr	The ANPR fails up to 10:18.	Severe for AM
17	A3290	The OB ANPR underperforms throughout the day.	Moderate
21	Russell Chase	The MCC fails from 07:00 to 11:28. The ANPR fails from 07:00 to 07:30, 09:42 to 11:25 and OB underperforms throughout the day.	Severe for AM
22	London Rd	The OB ANPR underperforms throughout the day.	Moderate
24	Berkshire Way	The IB ANPR underperforms from 08:30 to 08:45 and OB ANPR fails from 07:07 to 13:04.	Severe for AM
27	Butler Dr	The IB ANPR underperforms from 16:15 to 18:00.	Moderate for PM
29	Osprey Ave	The MCC fails throughout the day.	Severe
33	St Annes Dr	The IB ANPR underperforms throughout the day.	Moderate
35	London Rd	The ANPR underperforms throughout the day.	Moderate
37	Oak Ave	The MCC fails throughout the day.	Severe
38	South Ave	The IB ANPR underperforms throughout the day.	Moderate
43	Brookers Hill	The OB ANPR underperforms throughout the day.	Moderate

ANPR ID	Location	Site Issues	Significance
44	Church Ln	the MCC fails from 17:24 and ANPR from 17:15.	Severe for PM
49	M4	The MCC fails throughout the day.	Severe
50	RIBP Southern Access	The road was closed during the ANPR data collection and therefore no data was collected. All traffic used RIBP Northern Access instead (site 51).	Moderate

For the locations classed as 'Severe' or 'Moderate', there will be a need for further calculation or the use of the strategic model to 'infill' any gaps within the Vissim matrix. These will not, however, impact on the journey time elements of the validation as the strategic routes within the model have been captured.