



Wokingham Local and M4 Modelling Assessment

**M4 and A329M VISSIM Microsimulation
Local Model Validation Report**

On behalf of **Wokingham Borough Council**



**WOKINGHAM
BOROUGH COUNCIL**

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Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address: Caversham Bridge House, Waterman Place, Reading, Berkshire RG1 8DN
T: +44 (0)118 950 0761 E: PBA.Reading@stantec.com

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	Name	Position	Signature	Date
Prepared by:	Dave Cope	Associate Transport Modeller		12/12/2022
Reviewed by:	Nadia Lyubimova	Director		12/12/2022
Approved by:	Nadia Lyubimova	Director		12/12/2022
For and on behalf of Stantec UK Limited				

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Appendix A	Model Link Flow Validation Results
Appendix B	Turning Flow Validation Results
Appendix C	Journey Time Route Plots
Appendix D	Journey Time Validation Results

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Acronyms and Abbreviations

VISSIM	V erkehr I n S tädten - S IMulationsmodell (German for "Traffic in cities - simulation model")
LMVR	Local Model Validation
JT	Journey Time
GEH Statistic	Geoffrey E. Havers Statistic
	$GEH = \sqrt{\frac{2(M - C)^2}{M + C}}$
	Where M is the modelled hourly traffic volume and C is the real-world hourly traffic count
MOVA/PC MOVA	Microprocessor Optimised Vehicle Actuation
HS2	High Speed 2
ATC	Automatic Traffic Counter
MCTC	Manual Classified Turning Count
LGV	Light Goods Vehicle
HGV	Heavy Goods Vehicle

1 Project Overview

1.1 Introduction

- 1.1.1 In 2021 Stantec was appointed by Wokingham Borough Council (WBC) and Homes England (HE) to support the preparation of the Local Plan Update (LPU). In addition to a number of smaller residential sites around the Borough, the assessment includes a major development option known as Hall Farm / Loddon Valley (Hall Farm, Hatch Farm and Four Valleys Development) and South Wokingham extension. This study is informed by a comprehensive modelling exercise, which is being undertaken using up to date information. This will support the study in identifying the impacts of the proposed development to inform a mitigation strategy.
- 1.1.2 The transport impacts of the development are informed by a three – tier modelling approach comprising:
 - i. Wokingham Strategic Transport Model 4 (WSTM4) in VISUM
 - ii. A VISSIM microsimulation model, which comprises a section of the M4 between J11 and J10, the A329M between Coppid Beech and Winnersh and Lower Early Way, which run parallel to the M4
 - iii. Individual Local Junction Models (LJMs)
- 1.1.3 The models will interact in a way that outputs from the VISUM model will be required to inform the VISSIM and LJMs. The junction models will be used to inform the development of the VISUM and VISSIM models, in providing traffic signal data where applicable.
- 1.1.4 The overall approach to the assessment has been described within the “Wokingham Local and M4 Modelling Assessment – Homes England Study. Assessment Methodology”, November 2021.
- 1.1.5 This report describes development and validation of the VISSIM model.
- 1.1.6 The model has been developed using the appropriate modelling DfT Transport Analysis Guidance (TAG) and TfL’s Microsimulation (VMAP) processes.

2 Data Collection

2.1.1 In October 2021, Stantec commissioned Intelligent Data Collection Limited (IDC) to undertake the traffic surveys for the model development. The commission was split into two packages.

2.1.2 **Package 1** included:

- 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.

2.1.3 **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.

2.1.4 A data collection report has also been issued to WBC which outlines further information about what and where data was collected.

2.1.5 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 and to identify how important this was to the development of the transport models. Further information is included within the Data Collection report.

2.1.6 The traffic data used in the development of the model has includes:

- ANPR data for the development of the base matrices
- ATCs for link flow validation purposes
- MCTC for turning flow validation purposes
- Journey Time information for validation
- Pedestrian surveys for pedestrian VISWalk input into the model at associated junctions and pedestrian crossings

3 Model Development

3.1 Extent of the Model

3.1.1 The VISSIM model covers the section of the M4 between J11 and J10, the A329M between Coppid Beech and Winnersh. The model also includes Lower Early Way, which runs parallel to the M4. The modelled area is graphically shown in Figure 3.1.

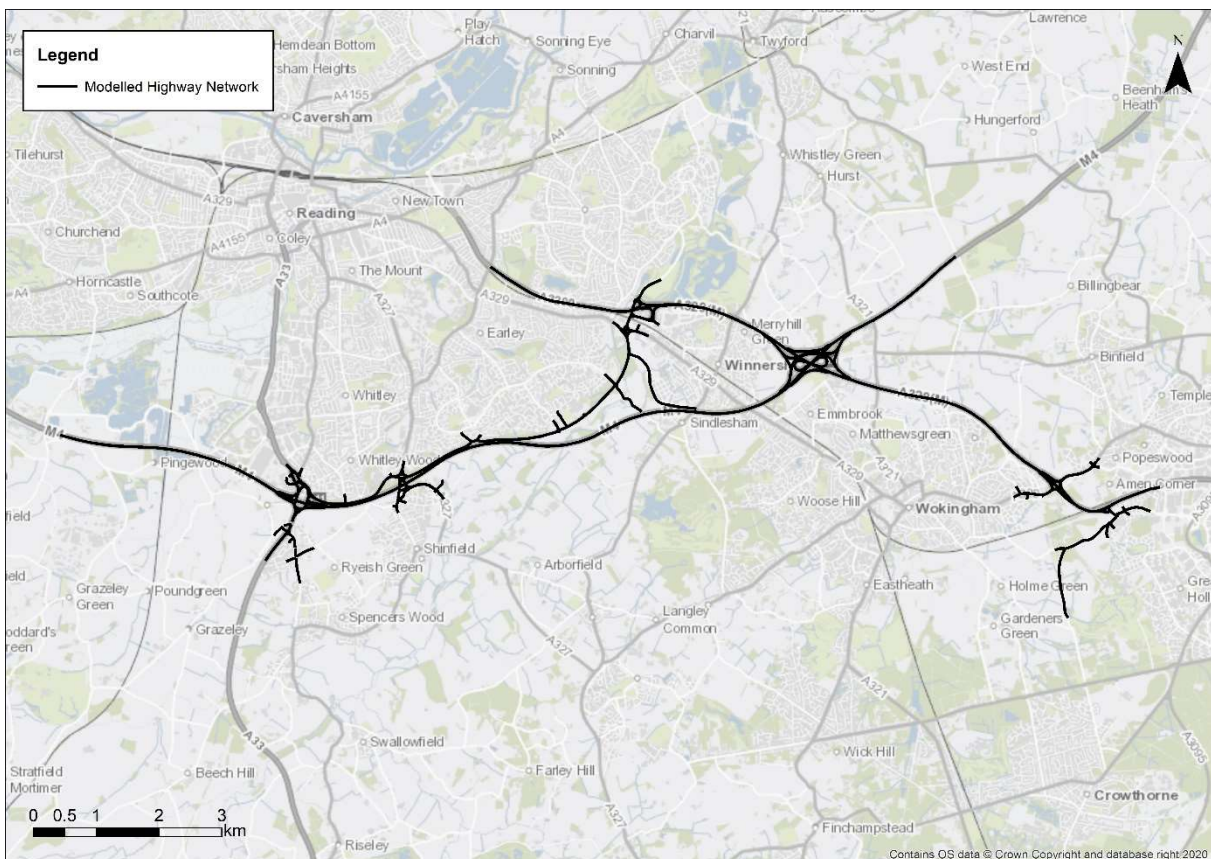


Figure 3.1 Extent of the Wokingham VISSIM Model

3.2 Software Version

3.2.1 The Wokingham Junction 10 to 11 VISSIM model has been developed using PTV VISSIM 2022 (SP3).

3.2.2 VISSIM is an industry recognised transport modelling software which is ideal for the testing and assessment of highway schemes to identify strengths and limitations of alterations of junctions along a corridor. It also allows the user and client team to easily view, interpret and gain a good understanding of a scheme or a change of a network through 3D visualisation and spatially orientated view.

3.3 Zone Structure

3.3.1 The model consists of fifty-one zones as summarised in Table 3.1 and illustrated in Figure 3.2. The locations of the ANPR survey have been used to define the zone structure of the model.

Table 3.1 Zone Descriptions

Zone ID	Description	Zone ID	Description
1	Basingstoke Road North	27	Butler Drive
2	B3031	28	Peacock Lane
3	Whitley Wood Lane	29	Osprey Avenue
4	Whitley Wood Lane (Shinfield Park)	30	Sparrowhawk Way
5	Whitley Wood Lane (B3270)	31	Old Wokingham Road
6	A327	32	Waterloo Road
7	Beeaston Way	33	St Annes Drive
8	Cutbush Lane	34	William Heelas Way
9	Meldreth Way	35	London Road A329 (West)
10	Paddick Drive	36	Plough Lane
11	Barn Croft Drive	37	Oak Avenue
12	Rushey Way	38	South Avenue
13	Mill Lane	39	Eastern Relief Road
14	Hatch Farm Way	40	Hawthorn
15	Reading Road A329 West	41	Catbush Lane
16	Reading Road A329 East	42	Hallow Lane
17	A3290 (at overbridge of B3350)	43	Brookers Hill
18	The Bader Way	44	Church Lane
19	Wharfedale Road	45	Basingstoke Road
20	M4 East (at overbridge of The Straight Mile)	46	Grazeley Road
21	Russell Chase	47	Tabby Drive
22	London Road East (B3408)	48	A33 South
23	John Nike Way	49	M4 West (at overbridge of Kybes Lane)
24	Berkshire Way	50	REP Southern Access/Egress
25	Webster Close (West)	51	REP Northern Access/Egress
26	Webster Close (East)		

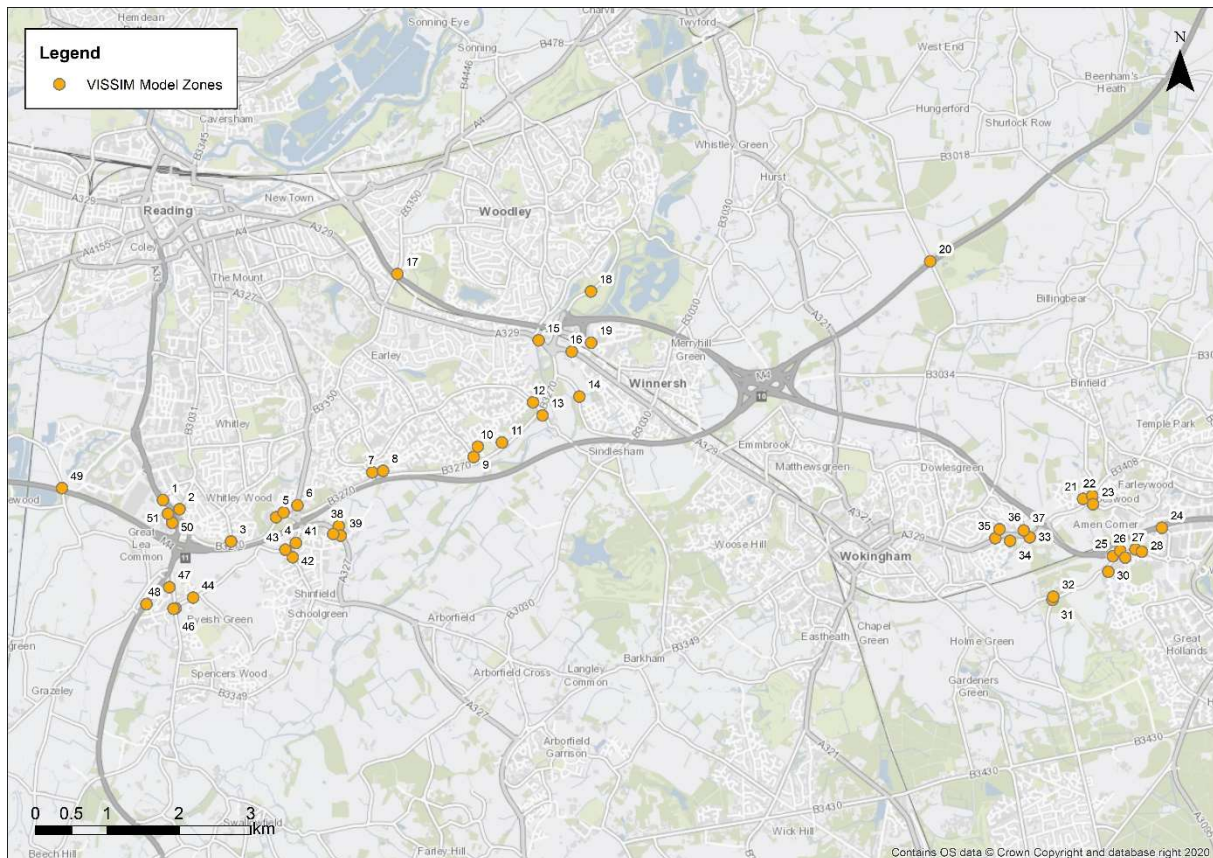


Figure 3.2 Wokingham VISSIM Model Zones

3.4 Network

3.4.1 The network was developed using 25cm aerial photography obtained from Getmapping from 2019, MCTC survey videos and signal time survey observations. Objects including links and connectors, reduced speed areas, priority rules, conflict areas and data collection points were coded into the model to replicate on site conditions and locations of the traffic surveys.

3.4.2 At the time of the surveys there were a number of major roadworks happening within the local study area that impacted upon the observed data collection and therefore these roadworks were coded within the base year model:

- M4 junction 3 to 10 Smart Motorways – minor lane closures and reduced speed limits in place
- Wharfdale Road/A329, Winnersh Triangle – Temporary speed limits and lane closures
- Waterloo Road, closure of road due to SWDR construction

3.5 Modelled Public Transport Services

3.5.1 Vehicle Class 3 was coded using static bus routes based on their fixed timetables (November 2021). A total of eleven and twelve bus services were incorporated within the network during the AM and PM peak period models. These are listed in Table 3.2.

Table 3.2 Coded Public Transport

Service No	Route Origin	Route Destination	No of services AM (08:00- 09:00)	No of services PM (17:00- 18:00)
151/ 151A	Winnersh Triangle P&R	Central Reading	1	2
19b	Lower Earley	Central Reading	1	2
600	Mere oak P&R	Central Reading	8	8
3	Wokingham	Reading Station	4	7
4	Bracknell Bus Station	Central Reading	3	3
X4	Bracknell Bus Station	Central Reading	2	4
500	Winnersh Triangle P&R	Central Reading	4	3
7	Fleet	Reading Station	1	1
8	Spencer Wood	Reading Station	4	5
9	Spencer Wood	Reading Station	2	1
93	Shinfield Park	Bohunt School	-	1
X3	Shinfield Park (Wood PLC)	Reading Station	1	1

3.6 Modelled Signal Timings

3.6.1 There are a number of methods of coding traffic signals within VISSIM, the three core examples include:

- Fixed Timing - where the associated green times do not alter during the modelled period.
- Limited variable signal timing using VISVAP - where minimum and maximum signal lengths are used alongside the coding of detectors within the model to identify associated demand allowing the model to adjust the green time accordingly.
- The use of external software such as PC MOVA or SCOOT allowing for a more detailed modelling of a particular signal controlled junction.

3.6.2 The Wokingham area model includes 21 signalised junctions, and due to the number of junctions and understanding how they operate, it was concluded that VISVAP would provide the most suitable and time effective method of signal control. The signal locations along with their operation type are presented in Figure 3.3 and listed in Table 3.3.

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Figure 3.3 Signal locations

Table 3.3 Signal locations and operation type

ID	Location	Operation Type	ID	Location	Operation Type
1	A33/Basingstoke Road North	Variable Demand	12	London Road/Oak Avenue	Variable Demand
2	A33/Basingstoke Road South	Variable Demand	13	Berkshire Way / Vigar Way	Variable Demand
3	J11	Variable Demand	14	Eastern Relief Road/A327	Variable Demand
4	B3270/A327	Variable Demand	15	Hallow Lane/Brookers Hill	Variable Demand
5	Hallow Lane/Shinfield Road	Variable Demand	16	London Road/St Annes Drive	Variable Demand
6	B3270/Hatch Farm Way	Variable Demand	17	London Road/William Heelas Way	Variable Demand
7	B3270/Reading Road	Variable Demand	18	London Road West Pedestrian Crossing	Variable Demand
8	A3290/A329(M)	Variable Demand	19	London Road East Pedestrian Crossing	Variable Demand
9	A3290/Wharfedale Road	Variable Demand	20	London Road/Russell Chase/John Nike Way	Variable Demand
10	Wharfedale Road/A329 (M)	Variable Demand	21	Peacock Lane Pedestrian Crossing	Variable Demand
11	Coppid Beach / A329 (M)	Variable Demand			

3.7 Pedestrian Crossings

3.7.1 Pedestrian crossings were modelled at nineteen signalised junctions on their static routes. Figure 3.4 and Table 3.4 detail the pedestrian crossing locations.

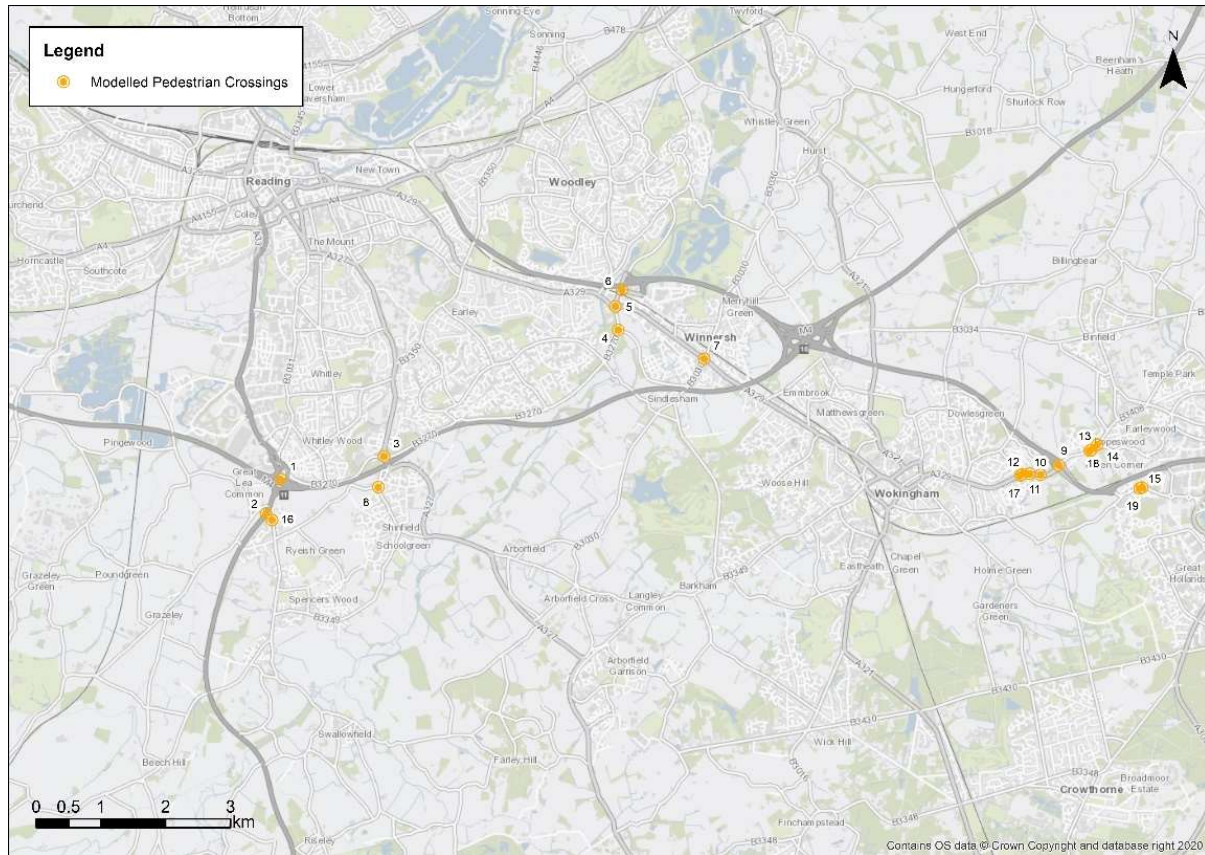


Figure 3.4 Pedestrian crossing locations

Table 3.4 Pedestrian crossing locations

Pedestrian ID	Location
1	Junction 11
2	A33 Basingstoke Road
3	Black Boy Gyrotary
4	Hatch Farm Junction
5	Showcase Rbt
6	A3290 Wharfdale Road
7	Winnersh Crossroads
8	Brookers Hill/Hallow Lane
9	A329(M)/London Road
10	Oak Avenue/London Road
11	London Road / William Heelas Way
12	London Road / Plough Lane
13	London Road / Hubbard Road
14	London Road/ Russell Chase / John Nike Way
15	Peacock Lane / Butler Drive
16	Basingstoke Road/Tabby Drive
17	London Road West Pedestrian Crossing
18	London Road East Pedestrian Crossing
19	Peacock Lane Pedestrian Crossing

3.8 Time Period

- 3.8.1 The model represents November 2021 travel conditions. The modelled peak periods are:
- AM peak - 08:00 to 09:00
 - PM peak - 17:00 to 18:00
- 3.8.2 Both peak periods include a 30-minute 'warm up' and 'cool down' periods, which allow sufficient vehicles to enter the network prior to the recording of the peak hours. However, these time periods are not used in the validation or further analysis of the network operation.

3.9 Vehicle Classification

- 3.9.1 Both peak period matrices have been input into the model using 15-minute segments for three user classes as outlined below.
- Vehicle Class 1 - Cars
 - Vehicle Class 2 - LGV
 - Vehicle Class 3 – HGV
- 3.9.2 Public Transport have been coded as specific routes within the model. As outlined within section 3.5.
- 3.9.3 Note that the traffic data collection indicates low cyclist and motorcyclist flows, hence not included in the model calibration and validation. No allowances for these user classes have been made within the model.

3.10 Matrix Development

- 3.10.1 To develop the matrices for the 2021 base year model, the ANPR data has been the primary location of data. The 51 ANPR locations have formed the corresponding zones of the network. The data was split into 15-minute intervals by the user classes as outlined within the sections above.
- 3.10.2 During the traffic survey review process, it was identified that there were a number of locations within the ANPR data that showed low match rates, when compared to the manual classified count undertaken as part of the review of the ANPR survey. As a result, the matrices have been through a matrix estimation process (ME) to uplift trip ends to the traffic counts thus providing a more accurate base matrix for the AM and PM peak periods.

3.11 Traffic Assignment Method

- 3.11.1 There are two methods of assigning traffic within VISSIM:
- The first, fixed routing, is where specific routes within the model are coded between the origin and demand zones and a distribution is applied based on observed data, alongside the fixed routes, vehicle inputs are coded to provide associated demand for each origin within the network. This type of assignment is usually used for less complicated networks with limited route choice, and
 - Dynamic Assignment, in this assignment an Origin/Destination (OD) matrix is applied, and the model makes its own decision of where traffic routes to get from an origin to a destination.

- 3.11.2 Due to the scale, network complexity and route choice, the Wokingham Junction 10 to 11 model has used the Dynamic Assignment method of assignment.

4 Model Calibration

4.1 Model Calibration Overview

- 4.1.1 Prior to the validation of the model, the comparison between observed data and modelled data, the calibration of the model was undertaken. This process is used to check the general operation of the model, vehicle behaviour and interaction within the network.
- 4.1.2 The network was developed in VISSIM 2022 (SP3) software using 25cm aerial photography obtained from Getmapping from 2019 (the most recent available data - it was noted that highway schemes have been completed since then, and checks have been undertaken to make sure the network is representative of current conditions), MCTC survey videos and signal time survey observations. Objects including links and connectors, reduced speed areas, priority rules, conflict areas and data collection points were coded into the model to replicate on site conditions and locations of the traffic surveys.
- 4.1.3 As part of the model calibration the following elements have been reviewed:
- Network links and connections
 - Reduced speed areas
 - Priority rules
 - Queue lengths
- 4.1.4 Each of these aspects is now considered in turn.

4.2 Links and Connectors

- 4.2.1 The 'look back' distances on connectors have been coded so that vehicles are in the correct lane prior to the junction. It has been checked that link attributes match on street conditions in terms of the numbers of lanes, speed and turning movements. Additional changes to the network have also been undertaken during the validation and calibration process to replicate observed traffic behaviour. All static network changes have been made within both peak hours.

4.3 Reduced Speed Areas

- 4.3.1 The areas where vehicles decelerate in speed (e.g. approaches to roundabouts, junctions and intersections as well as curves along the network and narrow road widths) were coded and subsequently adjusted to provide realistic representation of the observed conditions. Reduced speed areas also assist in the validation of journey time routes within the model to better replicate average speeds within the network.

4.4 Priority Rules

- 4.4.1 A range of parameters must be coded within VISSIM to set an adequate gap acceptance for vehicles to enter a junction. Priority rules are coded within VISSIM to replicate priority give way junctions, this includes the coding of a stop line and an associated conflict marker, with lookback distances and time gaps set as per the VISSIM manual. Associated priority rules have been coded for light vehicles and heavy vehicles separately.

4.5 Queue Lengths

- 4.5.1 To measure queue lengths within the model, queue counters have been coded at every give way or signal stop location within the model. Queue lengths are not used in the validation of the model; they do, however, provide an indication of how a model is performing and if any changes are required at the junctions within it.

5 Model Convergence

5.1 Model Convergence Overview

- 5.1.1 Prior to running of the model for validation purposes, the VISSIM model has first to be converged. This process includes running of the model multiple times to balance the volumes and travel times between the OD zones.
- 5.1.2 The criteria for checking of the acceptability of model convergence is set out in Figure 5.1, this follows the TfL modelling guidance.

The MAE will deem convergence to have been achieved when the following criteria have been met over the modelled peak period:

- 95% of all path traffic volumes change by less than 5% for at least four consecutive iterations; and
- 95% of travel times on all paths change by less than 20% for at least four consecutive iterations.

Figure 5.1 TfL Model Convergence Criteria

- 5.1.3 Once the model has been converged the recording of the model outputs and runs can progress including the validation of the model.

5.2 Model Convergence Statistics

- 5.2.1 The model convergence statistics are provided within Figure 5.2 to Figure 5.5 below for the AM and PM peak periods, whereas Table 5.1 provides detail on the convergence of the final model runs.

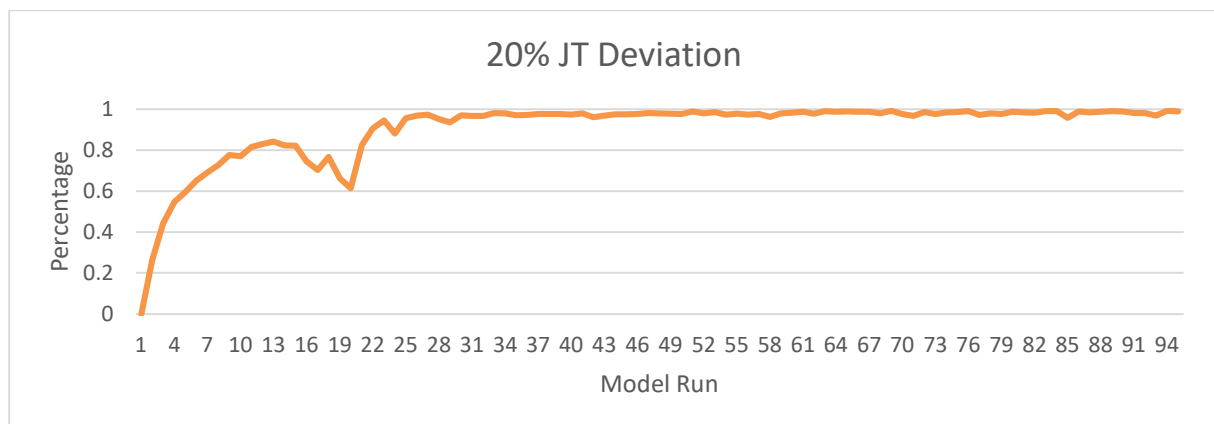


Figure 5.2 AM Peak Traffic Volume Convergence

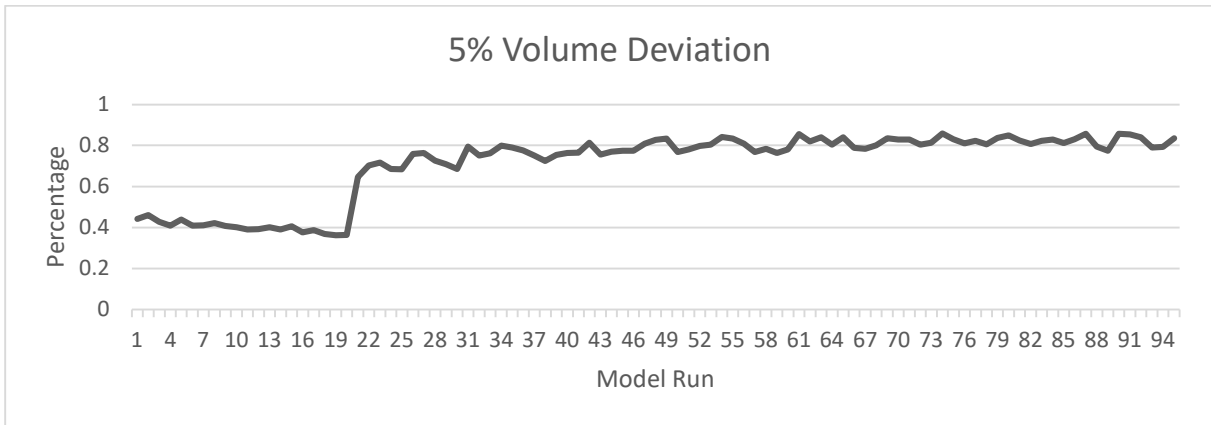


Figure 5.3 AM Peak Travel Time Convergence

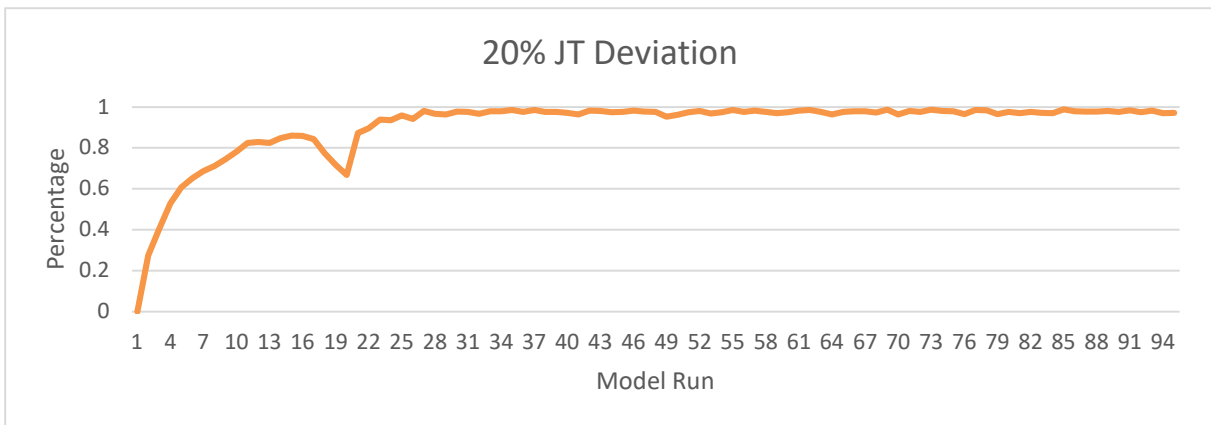


Figure 5.4 PM Peak Traffic Volume Convergence

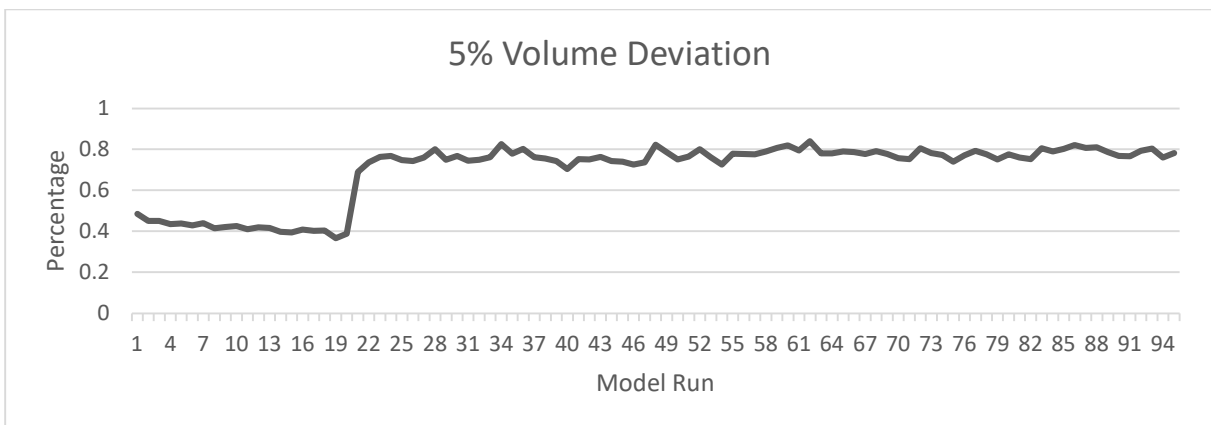


Figure 5.5 PM Peak Traffic Volume Convergence

Table 5.1 Final Four Consecutive Run Convergence Statistics

Peak Period	Run	Travel Time	Volume Deviation
AM	92	0.98	0.84
	93	0.97	0.79
	94	0.99	0.79
	95	0.99	0.83
PM	130	0.98	0.82
	131	0.99	0.86
	132	0.99	0.81
	133	0.97	0.82

- 5.2.2 The Travel Time convergence is significantly above the 95% criterion set out in Figure 5.1.
- 5.2.3 The second of the criteria, however, is not met in either peak with the models converging to a level of 83% and 82% for the AM and PM peak period.
- 5.2.4 A review of the VISSIM .cva files, which contain the convergence criteria, identified that the levels of convergence are relatively stable between the runs for both the AM and PM peak periods. With the variance in the volume deviation for both peak periods being ~0.05 and with the travel time convergence being consecutively above the 0.95% for five iterations it has been concluded that the model convergence is 'the best it is going to get'.
- 5.2.5 Furthermore, due to the length of time it takes to run each model run, the associated number of iterations undertaken and the review of traffic validation we deem that the level of convergence is appropriate. However, to limit the variance between each model run for the collection of the validation statistics, the models have been run for 20 iterations with +1 random seed each run, starting at a seed value of 43.

6 Model Validation

6.1 Model Random Seed

6.1.1 Random seed function provides realistic representation of the varying traffic conditions. Vehicle randomisation is modelled to generate vehicles with varying driver characteristics, in a random, non-linear basis within the stochastic model. The number of random vehicles loaded equals the total vehicle volume of every time period. To achieve unbiased and robust results of the randomisation process, AM and PM models run twenty iterations with the random seed increasing by one per run. The average results for both AM and PM runs were used for the calibration and validation process.

6.2 Validation Statistics

6.2.1 The base model is validated by comparing the observed surveyed flows with modelled flows. This includes comparing the model to independent link counts (ATC), turning counts (MCTC) and JT routes. The model has been run over twenty iterations, with each iteration producing slightly different results, which is reflective of the random nature of traffic behaviour within a highway network.

6.2.2 The average of these iterations over the peak period has been used to inform the suitability of the model.

6.2.3 DfT Transport Appraisal Guidance (TAG) sets out model validation criteria, which is used to understand how well the model represents route choice and fits traffic observations. This sets out a desired minimum level which should be aimed for, however there may be situations where not meeting the criteria may be acceptable and this would require explanation.

6.2.4 Table 6.1 provides a summary of the TAG link and turning flow validation criteria and acceptability guidelines. TAG acknowledges that these two measures are broadly consistent and link flows that meet either criterion should be regarded as satisfactory.

Table 6.1 DfT TAG Flow Validation Criteria Guidelines

Criteria	Description of Criteria	Acceptability Guideline
1 Flow Criteria	Individual flows within 100 vph of counts for flows less than 700 vph	>85% of cases
	Individual flows within 15% of counts for flows from 700 to 2,700 vph	>85% of cases
	Individual flows within 400 vph of counts for flows more than 2,700 vph	>85% of cases
2 GEH Criteria	GEH < 5 for individual flows	>85% of cases

6.2.5 For journey time validation, the validation criteria, which is detailed in Table 6.2, is the percentage difference between modelled and observed journey times.

Table 6.2 Journey Time Validation Criterion and Acceptability Guideline

Criteria	Description of Criteria	Acceptability Guideline
	Modelled Times along routes should be within 15% of surveyed times (or 1 minute, if higher than 15%)	>85% of routes

6.2.6 Using TAG guidance, the following validation for link, turning counts and journey times were achieved.

6.3 Link Flow Validation

6.3.1 Table 6.3 and Table 6.4 provide a summary of the link flow validation statistics for the GEH and link flow criteria for both peak periods. Appendix A provides results for individual links.

Table 6.3 Link Flow Validation Statistics, AM Peak

Peak Period	GEH Criterion				Flow Criterion				GEH or Flow Criteria			
	Cars	LGV	HGV	Total	Cars	LGV	HGV	Total	Cars	LGV	HGV	Total
Number of Links that meet TAG criteria	21	19	20	20	20	22	22	20	21	22	22	20
Number of Links that do not meet TAG criteria	1	3	2	2	2	0	0	2	1	0	0	2
AM	95%	86%	91%	91%	91%	100%	100%	91%	95%	100%	100%	91%

Table 6.4 Link Flow Validation Statistics, PM Peak

Peak Period	GEH Criterion				Flow Criterion				GEH or Flow Criteria			
	Cars	LGV	HGV	Total	Cars	LGV	HGV	Total	Cars	LGV	HGV	Total
Number of Links that meet TAG criteria	19	20	18	19	19	22	22	19	19	22	22	19
Number of Links that do not meet TAG criteria	3	2	4	3	3	0	0	3	3	0	0	3
PM	86%	91%	82%	86%	86%	100%	100%	86%	86%	100%	100%	86%

6.3.2 As shown within the tables the model validation criteria are met for the AM and PM peak periods.

6.3.3 In the PM peak HGV validation falls slightly short of the GEH criteria. However, the validation of the model against the flow criteria is met and therefore is acceptable.

6.4 Turning Flow Validation

6.4.1 Table 6.5 and Table 6.6 provide a summary of the turning flow validation statistics for each peak period. Appendix B details outputs further. The movements, which meet DfT's criteria are labelled as 'Pass' and those, which do not meet the criteria are labelled as 'Fail'. There is no requirement to achieve 100% pass rate as explained in Table 6.1, which requires the criteria to be met in more than 85% cases.

Table 6.5 Turning Flow Validation Statistics, AM Peak

Peak Period	GEH Criterion				Flow Criterion				GEH or Flow Criteria			
	Cars	LGV	HGV	Total	Cars	LGV	HGV	Total	Cars	LGV	HGV	Total
Number of Links that meet TAG criteria	312	310	305	306	277	286	287	278	318	325	327	318
Number of Links that do not meet TAG criteria	15	17	22	21	10	2	0	12	9	2	0	9
AM	95%	95%	93%	94%	97%	99%	100%	96%	97%	99%	100%	97%

Table 6.6 Turning Flow Validation Statistics, PM Peak

Peak Period	GEH Criterion				Flow Criterion				GEH or Flow Criteria			
	Cars	LGV	HGV	Total	Cars	LGV	HGV	Total	Cars	LGV	HGV	Total
Number of Links that meet TAG criteria	304	319	304	303	271	287	287	268	312	327	327	313
Number of Links that do not meet TAG criteria	23	8	23	24	16	0	0	20	15	0	0	14
PM	93%	98%	93%	93%	94%	100%	100%	93%	95%	100%	100%	96%

6.4.2 The results show that in both peak periods the model meets both GEH and Flow criteria with 97% of turning counts in the AM and 96% of turning counts in the PM meeting one of the criteria.

6.5 Journey Time Validation

6.5.1 Table 6.7 provides a summary of the journey time validation statistics for both peak periods. The routes which meet DfT's criteria are labelled as 'Pass' and those, which do not meet the criteria are labelled as 'Fail'. Appendix C and Appendix D details the routes and results further. There is no requirement to achieve 100% pass rate as explained in Table 6.2, which requires more than 85% of routes to meet the criteria.

Table 6.7 Journey Time Validation Statistics

Journey Time	Pass	Fail	% Pass
AM (08:00 to 09:00)	17	1	94%
PM (17:00 to 18:00)	16	2	89%

6.5.2 The results show that both the AM and PM peak period models validate against available journey time data, demonstrating the model accurately represents travel times through the model.

6.5.3 The routes that do not meet the criteria include:

- Route 12 (A33 North to M4 West) in the AM, which runs approximately 1:15 minutes too fast (4:36 observed vs 3:21 modelled)
- Route 5 (A33 to Beeston Way) in the PM, which runs 1:05 too slow in the model (5:47 observed vs 6:52 modelled)

- Route 7 (Beeston Way to Bader Way) in the PM, which runs 2:55 too fast (11:04 observed vs 8:09 modelled)

6.5.4 Route 7 passes through the temporary road works at Winnersh Triangle. However, due to the roadworks being included within the model and being removed in all forecast models, this route is not of a concern but will be further reviewed during the development of the forecast models.

6.6 Network Performance

6.6.1 In addition to the validation results presented above, some additional network performance statistics are provided which can be further used to assess the impact of forecast models and scheme impacts.

6.6.2 Table 6.8 presents the network statistics for both the AM and PM peak hour. It shows that the AM peak despite carrying less traffic is slightly busier in comparison with the PM peak.

Table 6.8 Network Statistics

Time Period	Average Delay (Seconds)	Average Stops	Average Speed (mph)	Total Distance (miles)	Total Travel Time (hrs)	Total Vehicles (vehicles)	Latent Demand (vehicles)
AM	79	3	38	31	34	3276	7
PM	72	2	39	31	33	3302	1

6.7 Summary

6.7.1 Overall, through the outputs presented above, the base model demonstrates that the validation of link flow, turning flow and journey time is good and meets TAG criteria and thus provides a good replication of the observed traffic conditions during November 2021.

7 Model Suitability and Conclusion

7.1 Overview

- 7.1.1 Stantec have been commissioned by Wokingham Borough Council to develop a base VISSIM model for the assessment of Local Plan Update proposed development. This report has outlined the development of the base model, the network extent, data used and the calibration and validation of the 2021 Base Year model for the AM and PM peak periods.
- 7.1.2 The modelled network covers the highway network of the M4 at the north of Wokingham, from Junction 10 until just beyond Junction 11, A329(M) until just before Doncastle Roundabout, London Road to the west and east of Coppid Beach/ A329 (M) Junction and A33 to the north and south of J10.
- 7.1.3 The base model represents a neutral weekday in a neutral month with a base year of 2021. The peak periods are as follows, both peak periods include a 30-minute 'warm up' and 'cool down' period, which allows sufficient vehicles to enter the network prior to the recording of the peak hours.
- AM peak - 08:00 to 09:00
 - PM peak - 17:00 to 18:00

7.2 Validation

- 7.2.1 The model validation for link flows, turning flows and journey times is shown to be accepted for both the AM and PM peak periods.
- 7.2.2 For link flow validation, all criteria are met for the AM peak period, with only the PM peak HGV flows not achieving the 85% of GEH, although overall the link flow validation is acceptable.
- 7.2.3 For turning flow validation in both peak periods the model meets TAG criteria with 97% of turning counts matching either GEH or Flow criteria in the AM peak. Whilst in the PM this is 96%.
- 7.2.4 For journey time validation, the model outputs show that both the AM and PM peak period models validate against available journey time data, demonstrating the model accurately represents travel times through the model.
- 7.2.5 The calibration and validation of the model demonstrates that the model replicates observed traffic conditions within the study area well and the models are considered fit for purpose to assess forecast traffic conditions.

Appendix A Model Link Flow Validation Results

Wokingham Local and M4 Modelling Assessment
M4 and A329M VISSIM Microsimulation LMVR

AM Link Flow Validation																															
Location	VISSIM Site	Direction	Observed				Modelled				Diff				% Diff				GEH				Flows				TAG criterion GEH or FLOW				
			Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	
Basingstoke Road	1	NB	701	107	27	835	768	69	11	848	67	-38	-16	13	10%	-36%	-27%	2%	2.5	4.1	3.7	0.4	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
	2	SB	545	15	9	569	387	53	7	447	-158	38	-2	-122	-29%	24%	-21%	-21%	7.3	6.5	0.7	5.4	Fail	Pass	Pass	Pass	Fail	Fail	Pass	Pass	
B3270	3	EB	1250	131	42	1423	1232	163	58	1453	-18	32	16	30	-1%	24%	38%	2%	0.5	2.6	2.3	0.8	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
	4	WB	901	94	24	1019	926	123	64	1113	25	29	40	94	3%	31%	172%	9%	0.8	2.8	6.1	2.9	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
A327 Eastern Relief Road	5	EB	423	59	25	507	491	35	21	547	68	-24	-4	40	16%	-40%	-17%	8%	3.2	3.4	0.9	1.8	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
	6	WB	304	46	19	368	280	58	16	354	-24	12	-3	-14	-8%	27%	-14%	-4%	1.4	1.7	0.6	0.7	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
B3270 Lower Earley Way West	7	EB	1023	138	26	1187	1103	147	42	1292	80	9	16	105	8%	7%	59%	9%	2.4	0.8	2.7	3.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
	8	WB	1050	81	28	1160	995	94	50	1139	-55	13	22	-21	-5%	15%	79%	-2%	1.7	1.3	3.5	0.6	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
B3270 Lower Earley Way	9	EB	639	77	20	735	762	112	41	915	123	35	21	180	19%	46%	109%	24%	4.6	3.6	3.9	6.3	Fail	Pass	Pass	Fail	Pass	Pass	Pass	Fail	
	10	WB	481	64	14	560	529	70	46	645	48	6	32	85	10%	9%	225%	15%	2.1	0.7	5.8	3.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
B3270 Lower Earley Way North	13	NB	961	56	30	1047	999	153	44	1196	38	97	14	149	4%	173%	46%	14%	1.2	9.5	2.3	4.4	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
	14	SB	954	144	25	1123	890	182	46	1118	-64	38	21	-5	-7%	26%	84%	0%	2.1	3.0	3.5	0.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
Hatch Farm Way	15	NB	667	31	13	711	594	31	6	631	-73	0	-7	-80	-11%	1%	-55%	-11%	2.9	0.1	2.3	3.1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
	16	SB	521	62	13	596	487	48	2	537	-34	-14	-11	-59	-6%	-22%	-85%	-10%	1.5	1.9	4.1	2.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
Mill Lane	17	NB	380	70	9	459	384	115	1	500	4	45	-8	41	1%	65%	-89%	9%	0.2	4.7	3.5	1.9	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
	18	SB	373	33	7	412	381	28	1	410	8	-5	-6	-2	2%	-14%	-85%	-1%	0.4	0.8	3.0	0.1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
A327 Eastern Relief Road	19	NB	383	73	35	491	453	34	20	507	70	-39	-15	16	18%	-54%	-43%	3%	3.4	5.4	2.8	0.7	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
	20	SB	247	49	17	313	218	43	14	275	-29	-6	-3	-38	-12%	-12%	-20%	-12%	1.9	0.9	0.9	2.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
Peacock Lane	23	NB	514	76	17	606	532	77	6	615	18	1	-11	9	4%	2%	-64%	1%	0.8	0.1	3.2	0.3	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
	24	SB	424	32	13	468	462	41	5	508	38	9	-8	40	9%	27%	-60%	8%	1.8	1.4	2.6	1.8	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
M4	140	EB	3438	371	189	3998	3328	448	229	4005	-110	77	40	7	-3%	21%	21%	0%	1.9	3.8	2.8	0.1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
	141	WB	2888	353	169	3410	2916	406	113	3435	28	53	-56	25	1%	15%	-33%	1%	0.5	2.7	4.7	0.4	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
															GEH				Flows				VebTAG criterion GEH or FLOW								
															Lights	LGV	HGV	Total	Lights	LGV	HGV	Total	Lights	LGV	HGV	Total	Lights	LGV	HGV	Total	
															Pass	21	19	20	20	20	22	22	20	21	22	22	20	21	22	22	20
															Fail	1	3	2	2	2	0	2	1	0	0	2	1	0	0	2	
															%Pass	95%	86%	91%	91%	91%	100%	100%	91%	95%	100%	100%	91%	95%	100%	91%	

PM Link Flow Validation																														
Location	VISSIM Site	Direction	Observed				Modelled				Diff				% Diff				GEH				Flows				TAG criterion GEH or FLOW			
			Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total
Basingstoke Road	1	NB	550	78	19	647	574	55	2	631	24	-23	-17	-16	4%	-30%	-89%	-2%	1.0	2.8	5.2	0.6	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	2	SB	662	31	4	698	665	58	1	724	3	27	-3	26	0%	86%	-77%	4%	0.1	4.0	2.1	1.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
B3270	3	EB	1042	98	18	1158	1003	156	39	1198	-39	58	21	40	-4%	59%	113%	3%	1.2	5.2	3.9	1.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	4	WB	1011	98	23	1132	1017	100	43	1160	6	2	20	28	1%	2%	91%	3%	0.2	0.2	3.6	0.8	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
A327 Eastern Relief Road	5	EB	417	42	14	473	362	43	1	406	-55	1	-13	-67	-13%	3%	-93%	-14%	2.8	0.2	4.7	3.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	6	WB	429	49	13	491	384	50	8	442	-45	1	-5	-49	-10%	2%	-40%	-10%	2.2	0.1	1.6	2.3	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
B3270 Lower Earley Way West	7	EB	1159	63	20	1242	1000	136	40	1176	-159	73	20	-66	-14%	115%	101%	-5%	4.8	7.3	3.7	1.9	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	8	WB	910	102	15	1026	1006	79	47	1132	96	-23	32	106	11%	-23%	219%	10%	3.1	2.4	5.8	3.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
B3270 Lower Earley Way	9	EB	661	72	8	741	676	117	38	831	15	45	30	90	2%	62%	384%	12%	0.6	4.6	6.3	3.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	10	WB	683	70	13	766	516	61	43	620	-167	-9	30	-146	-24%	-13%	234%	-19%	6.8	1.1	5.7	5.6	Fail	Pass	Pass	Fail	Fail	Pass	Pass	Fail
B3270 Lower Earley Way North	13	NB	865	106	16	987	901	136	39	1076	36	30	23	89	4%	29%	150%	9%	1.2	2.8	4.5	2.8	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	14	SB	1062	50	22	1134	765	91	46	902	-297	41	24	-232	-28%	83%	105%	-20%	9.8	4.9	4.0	7.3	Fail	Pass	Pass	Fail	Fail	Pass	Pass	Fail
Hatch Farm Way	15	NB	527	29	7	564	440	53	11	504	-87	24	4	-60	-17%	80%	57%	-11%	4.0	3.7	1.3	2.6	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	16	SB	585	47	7	640	586	47	3	636	1	0	-4	-4	0%	-1%	-57%	-1%	0.0	0.1	1.8	0.1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Mill Lane	17	NB	316	45	6	367	368	36	0	404	52	-9	-6	37	16%	-20%	-100%	10%	2.8	1.4	3.5	1.9	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	18	SB	301	21	2	324	235	25	0	260	-66	4	-2	-64	-22%	18%	-100%	-20%	4.0	0.8	1.9	3.8	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
A327 Eastern Relief Road	19	NB	291	43	13	347	312	34	1	347	21	-9	-12	0	7%	-21%	-92%	0%	1.2	1.5	4.5	0.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	20	SB	319	41	12	372	382	45	8	435	63	4	-4	63	20%	9%	-32%	17%	3.4	0.6	1.2	3.1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Peacock Lane	23	NB	450	30	10	490	571	49	5	625	121	19	-5	135	27%	64%	-51%	28%	5.4	3.0	1.9	5.7	Fail	Pass	Pass	Fail	Fail	Pass	Pass	Fail
	24	SB	544	43	14	602	533	81	1	615	-11	38	-13	13	-2%	87%	-93%	2%	0.5	4.8	4.8	0.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
M4	140	EB	3424	242	225	3891	3593	263	195	4051	169	21	-30	160	5%	9%	-13%	4%	2.9	1.3	2.1	2.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	141	WB	3331	285	154	3770	3294	29																						

Appendix B Turning Flow Validation Results

Wokingham Local and M4 Modelling Assessment
M4 and A329M VISSIM Microsimulation LMVR

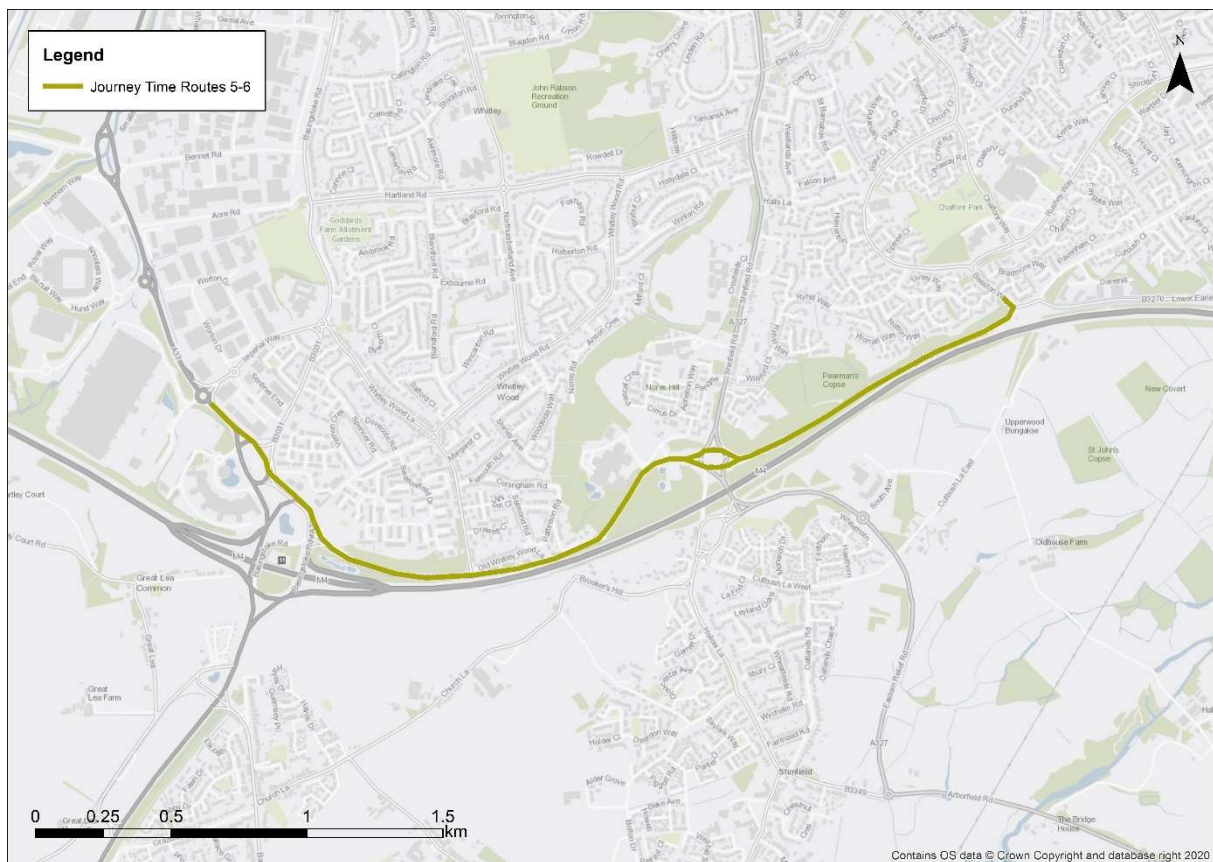
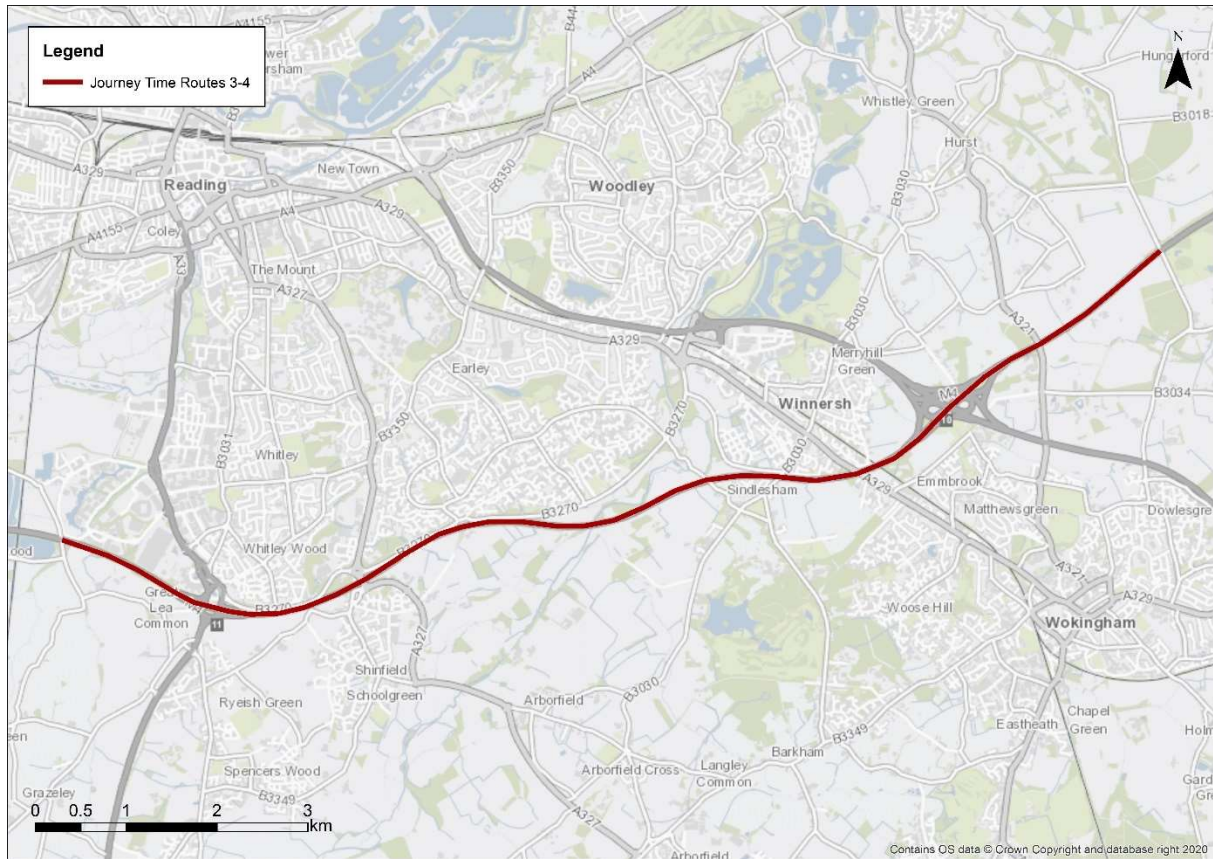
VISSIM Site ID	MCTC Location	Movement	AM TURNING FLOW VALIDATION																																		
			Observed				Modelled				Difference				% Difference				GEH				TAG Flow Criterion				TAG GEH or Flow Criterion										
			Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total							
1	M4 J11	A_A	6	0	0	6	0	0	0	0	0	0	0	-6	0	0	-6	-100%	0%	0%	-100%	3.4	0.0	0.0	3.4	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass				
		A_B	5	4	0	9	1	0	1	2	-4	-4	1	-7	-80%	-100%	0%	-78%	2.3	2.9	1.4	3.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass			
		A_C	165	32	0	197	170	15	12	197	5	-17	12	0	3%	-53%	0%	0%	0.4	3.5	4.9	0.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass			
		A_D	163	0	16	169	230	38	10	278	77	38	-6	109	50%	0%	-37%	64%	5.5	8.7	1.6	7.3	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Fail	Pass			
		A_E	342	87	9	438	315	50	8	373	-27	-37	-1	-65	-8%	-42%	-13%	-15%	1.5	4.4	0.4	3.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass			
		A_F	290	106	11	406	281	64	6	351	-9	-42	-5	-55	-3%	-40%	-43%	-14%	0.5	4.5	1.6	2.8	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass			
		A_G	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0.0	0.0	0.0	0.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass			
		A_H	54	5	0	59	41	0	0	41	-13	-5	0	-18	-24%	-100%	0%	-30%	1.9	3.1	0.0	2.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
		B_A	4	1	0	4	0	0	0	0	-4	-1	0	-4	-100%	-100%	0%	-100%	2.6	1.4	0.0	3.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
		B_B	0	1	0	1	0	0	0	0	-1	0	-1	0	-100%	0%	-100%	0%	0.0	1.5	0.0	1.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
		B_C	14	3	0	18	18	4	1	23	4	1	1	5	25%	23%	0%	30%	0.9	0.4	1.4	1.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
		B_D	86	53	9	147	84	15	3	102	-2	-38	-6	-45	-2%	-71%	-67%	-31%	0.2	6.5	2.5	4.1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
		B_E	166	18	2	186	163	20	1	184	-3	2	-1	-2	-2%	10%	-43%	-1%	0.3	0.4	0.6	0.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
		B_F	66	14	2	83	60	13	2	75	-6	-1	0	-8	-10%	-9%	-1%	-9%	0.8	0.4	0.0	0.9	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
		B_G	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0.0	0.0	0.0	0.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
		B_H	1	0	0	1	0	0	0	0	-1	0	0	-1	-100%	0%	0%	-100%	1.4	0.0	0.0	1.4	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		C_A	394	27	7	428	366	29	17	412	-28	2	10	-7	-7%	7%	143%	-4%	1.4	0.3	2.9	0.8	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
		C_B	2	0	0	2	7	0	0	7	5	0	0	5	205%	0%	0%	205%	2.2	0.0	0.0	2.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		C_C	1	0	0	1	0	0	0	0	-1	0	0	-1	-100%	0%	0%	-100%	1.6	0.0	0.0	1.6	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		C_D	132	40	3	174	94	14	6	114	-38	-26	3	-60	-25%	-65%	109%	-35%	3.5	5.0	1.5	5.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		C_E	242	21	7	270	255	60	8	323	13	39	1	53	5%	190%	19%	20%	0.8	6.2	0.5	3.1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		C_F	270	43	8	321	260	47	27	334	-10	4	19	13	-4%	9%	252%	4%	0.6	0.6	4.6	0.7	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		C_G	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0.0	0.0	0.0	0.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		C_H	26	0	0	26	3	0	0	3	-23	0	0	-23	-89%	0%	0%	-89%	6.1	0.0	0.0	6.1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		D_A	565	128	38	730	562	68	15	645	-3	-60	-23	-85	-1%	-47%	-60%	-12%	0.1	6.0	4.4	3.3	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		D_B	31	4	5	40	31	1	2	34	0	-3	-3	-6	0%	-77%	-57%	-15%	0.0	2.1	1.4	1.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		D_C	48	10	1	59	80	13	2	95	32	3	1	36	65%	29%	210%	61%	4.0	0.9	1.2	4.1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		D_D	4	3	3	10	0	0	0	0	-4	-3	-3	-10	-100%	-100%	-100%	-100%	2.8	2.6	2.4	4.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		D_E	413	121	51	585	417	262	11	690	4	141	-40	105	1%	116%	-79%	18%	0.2	10.2	7.2	4.2	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Pass	Pass		
		D_G	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0.0	0.0	0.0	0.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		D_H	12	1	0	13	5	0	0	5	-7	-1	0	-8	-59%	-100%	0%	-62%	2.4	1.4	0.0	2.7	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
		E_A	892	127	22	1041	852	91	20	963	-40	-36	-2	-78	-4%	-29%	-10%	-8%	1.3	3.5	0.5	2.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
		E_B	21	5	3	29	37	6	0	43	16	1	-3	14	75%	23%	-100%	46%	2.9	0.5	2.6	2.3	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
		E_C	216	42	1	259	209	43	2	254	-7	1	1	-5	-3%	42%	42%	-2%	0.5	0.1	0.5	0.3	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
		E_D	529	157	21	707	521	161	12	694	-8	4	-9	-13	-1%	2%	-44%	-2%	0.3	0.3	2.3	0.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
		E_E	3	2	0	5	0	0	0	0	-3	-2	0	-5	-100%	-100%	0%	-100%	2.5	1.9	0.0	3.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
		E_F	395	69	6	469	395	42	15	452	0	-27	9	-17	0%	-39%	164%	-4%	0.0	3.6	2.9	0.8	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
		E_G	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0.0	0.0	0.0	0.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
		E_H	15	0	0	15	2	0	0	2	-13	0	0	-13	-86%	0%	0%	-86%	4.4	0.0	0.0	4.4	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
		F_A	437	54	66	557	503	149	47	699	66	95	-19	141	15%	176%	-29%	25%	3.0	9.4	2.5	5.6	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
F_B	32	12	0	45	24	5	2	31	-8	-7	2	-14	-26%	-60%	0%	-31%	1.6	2.5	2.0	2.2	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
F_C	253	63	21	337	268	44	49	361	15	-19	28	24	6%	-31%	134%	7%	1.0	2.7	4.7	1.3	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
F_E	240	124	0	364	258	172	14	444	18	48	14	80	8%	39%	0%	22%	1.2	3.9	5.3	4.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
F_F	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0.0	0.0	0.0	0.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
F_G	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0.0	0.0	0.0	0.0	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
F_H	12	0	0	12	3	0	0	3	-9	0	0	-9	-75%	0%	0%	-75%	3.3	0.0	0.0	3.3	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
H_A	18	3	0	21	47	3	1	51	29	0	1	30	155%	1%	6368%	138%	5.0	0.0	1.4	4.9	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass		
H_B	2	0	0	2	3	3	0	6	1	3	0	4	44%	0%	-100%	182%	0.6	2.4	0.3	1.9	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
H_C	5	0	0	5	23	0	1	24	18	0	1	19	394%	0%	20308%	415%	4.9	0.0	1.4	5.1	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
H_D	1	0	0	1	11	3	1	15	10	3	1	13	645%	0%	2152%	886%	3.8	2.4	1.3	4.7	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
H_E	11	0	0	11	6	1	0	7	-5	1	0	-4	-44%	0%	-100%	-35%	1.6	1.4	0.3	1.3	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
H_F	0	0	0	0	9	3	1	13																													

Appendix C Journey Time Route Plots

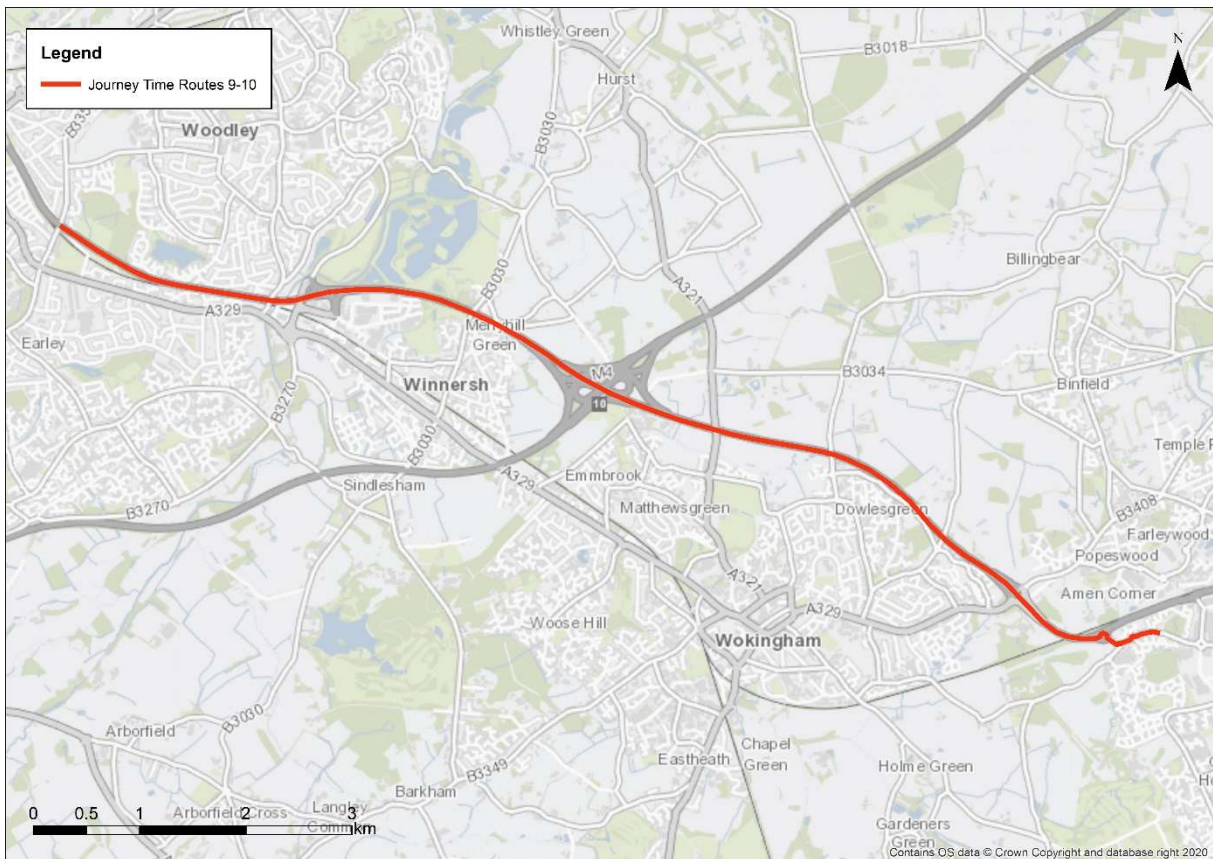
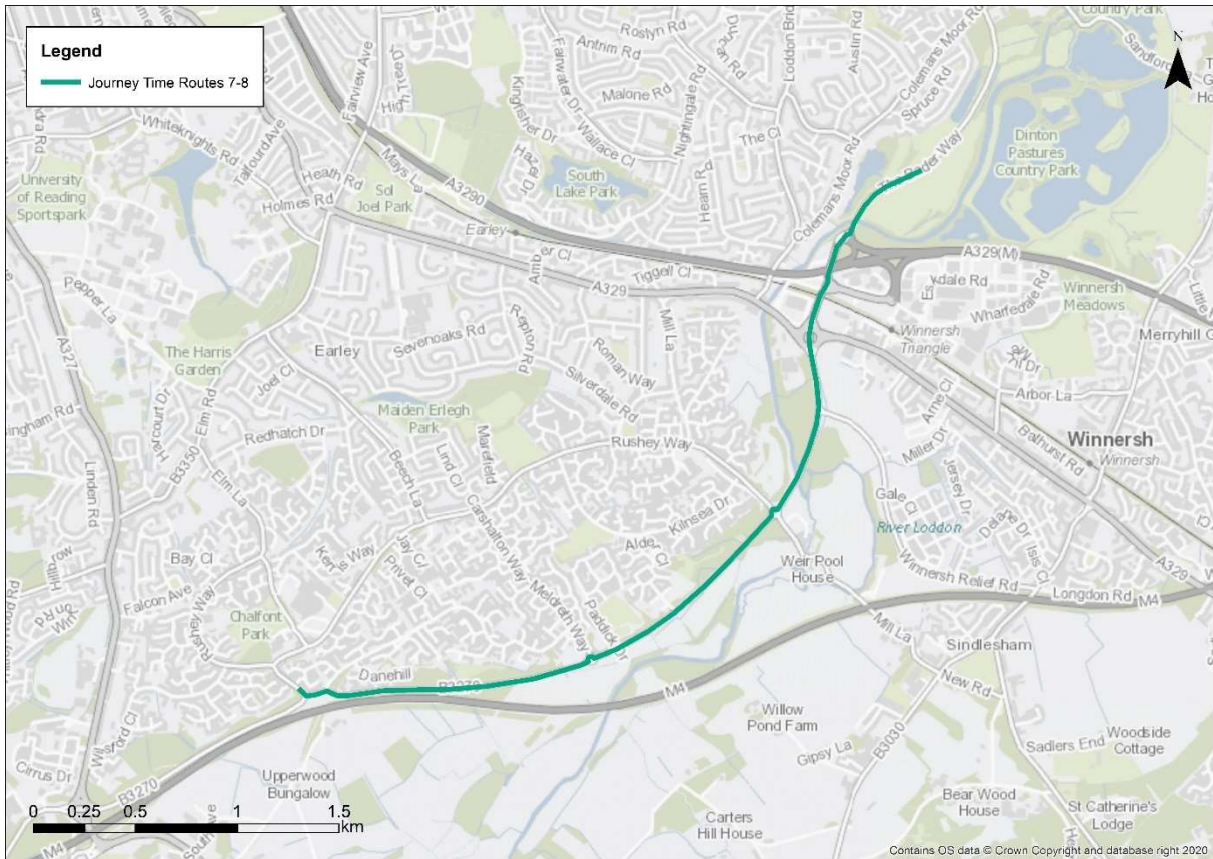


Wokingham Local and M4 Modelling Assessment

M4 and A329M VISSIM Microsimulation LMVR



Wokingham Local and M4 Modelling Assessment
M4 and A329M VISSIM Microsimulation LMVR



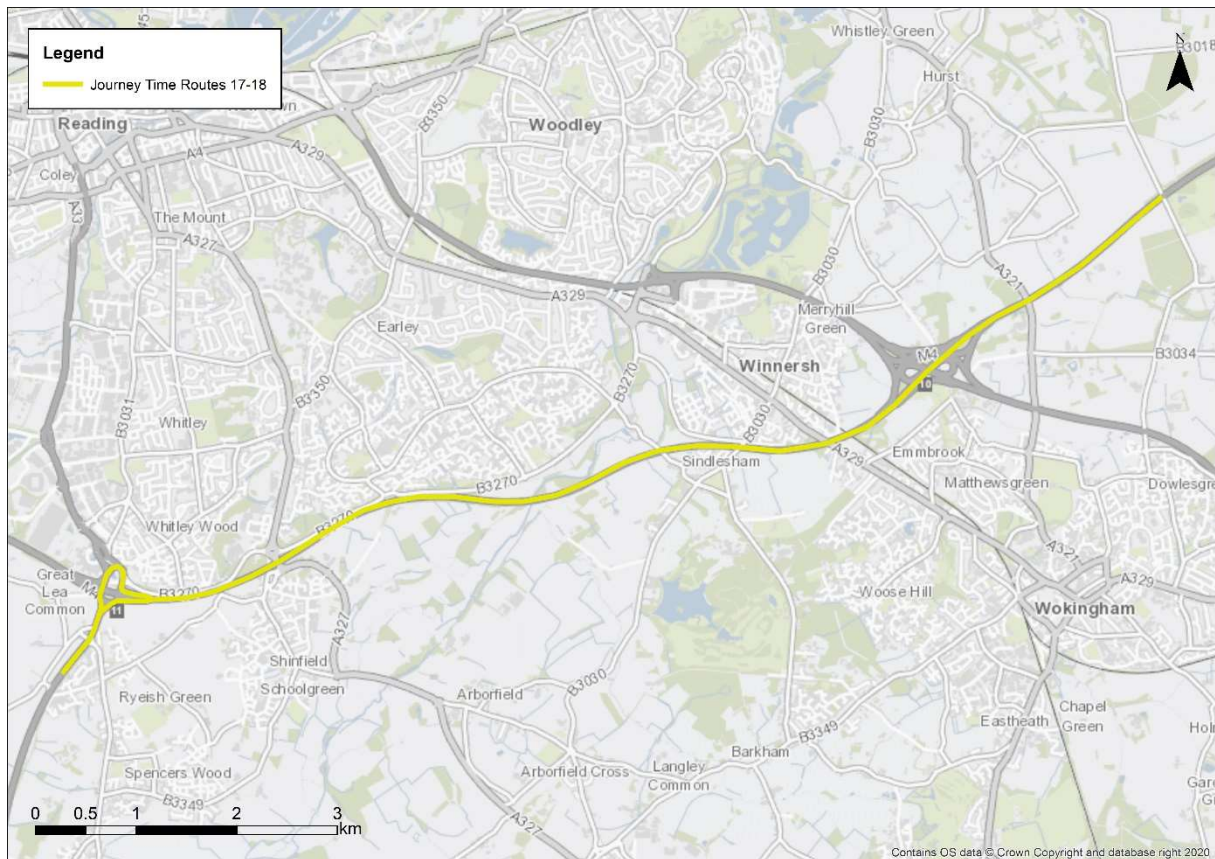
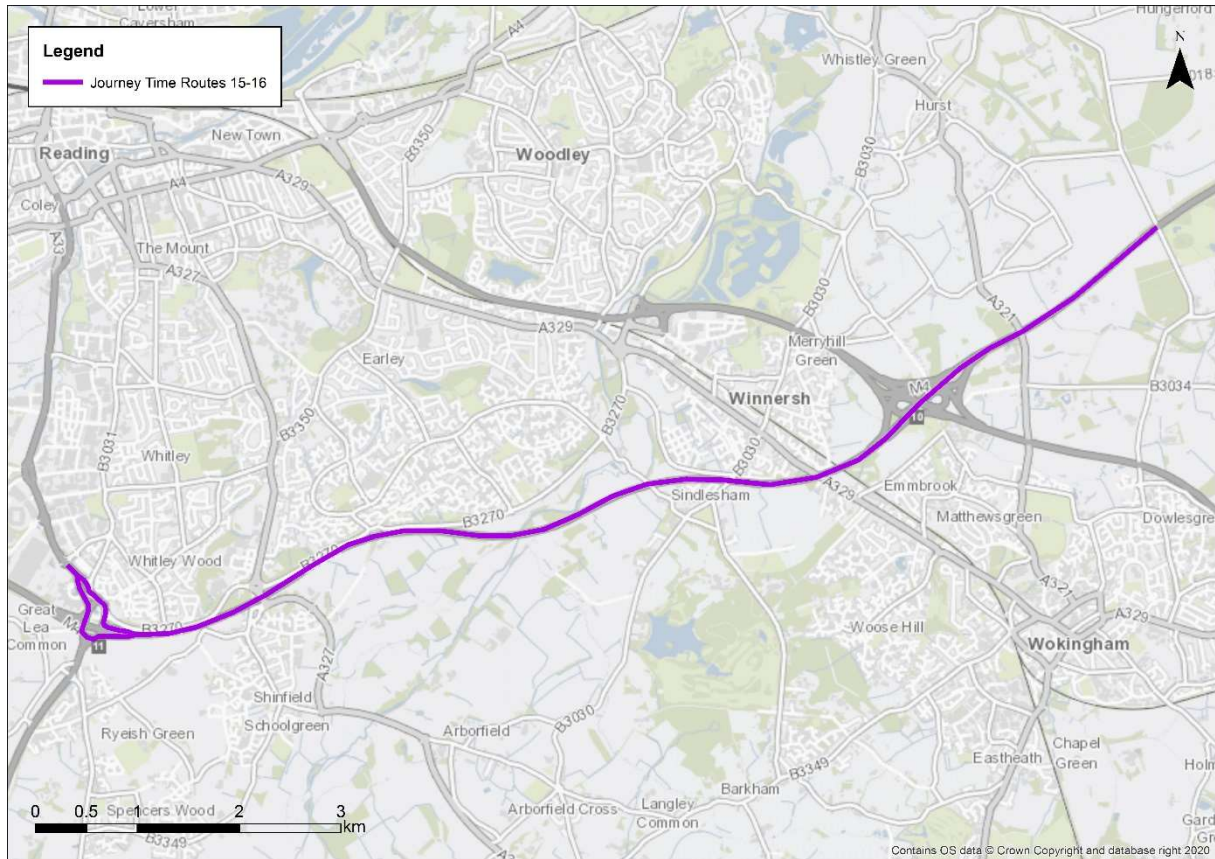
Wokingham Local and M4 Modelling Assessment

M4 and A329M VISSIM Microsimulation LMVR



Wokingham Local and M4 Modelling Assessment

M4 and A329M VISSIM Microsimulation LMVR



Appendix D Journey Time Validation Results

AM Journey Time Validation						
VISSIM ID	Route	Observed Time	Modelled Time	Difference (mins)	Difference %	DMRB
1	A33 Basingstoke Road - SB	03:59	03:48	-00:00:11	-5%	Pass
2	A33 Basingstoke Road - NB	03:16	03:15	-00:00:01	-1%	Pass
3	M4 - EB	08:38	08:27	-00:00:11	-2%	Pass
4	M4 - WB	08:33	08:01	-00:00:32	-6%	Pass
5	A33 to Beeston Way	06:55	06:27	-00:00:28	-7%	Pass
6	Beeston Way to A33	08:26	08:14	-00:00:12	-2%	Pass
7	Beeston Way to Bader Way	09:31	09:38	00:00:07	1%	Pass
8	Bader Way to Beeston Way	09:34	09:08	-00:00:26	-4%	Pass
9	A329M to Peacock Lane	07:58	08:10	00:00:12	3%	Pass
10	Peacock Lane to A329M	07:47	08:25	00:00:38	8%	Pass
11	M4 West to A33 North	03:44	02:49	-00:00:55	-25%	Pass
12	A33 North to M4 West	04:36	03:21	-00:01:15	-27%	Fail
13	M4 West to A33 South	04:34	05:31	00:00:57	21%	Pass
14	A33 South to M4 West	02:49	03:03	00:00:14	9%	Pass
15	M4 East to A33 North	10:02	09:15	-00:00:47	-8%	Pass
16	A33 North to M4 East	10:02	09:47	-00:00:15	-2%	Pass
17	M4 East to A33 South	09:14	09:59	00:00:45	8%	Pass
18	A33 South to M4 East	10:50	12:01	00:01:11	11%	Pass

Pass	17
Fail	1
%Pass	94%

PM Journey Time Validation						
VELTIMEMEASUREMENT		Observed Time	Modelled Time	Difference (mins)	Difference %	DMRB
1	A33 Basingstoke Road - SB	03:13	04:03	00:00:50	26%	Pass
2	A33 Basingstoke Road - NB	02:50	03:24	00:00:34	20%	Pass
3	M4 - EB	08:44	08:13	-00:00:31	-6%	Pass
4	M4 - WB	08:39	07:56	-00:00:43	-8%	Pass
5	A33 to Beeston Way	05:47	06:52	00:01:05	19%	Fail
6	Beeston Way to A33	06:40	07:16	00:00:36	9%	Pass
7	Beeston Way to Bader Way	11:04	08:09	-00:02:55	-26%	Fail
8	Bader Way to Beeston Way	07:32	08:01	00:00:29	6%	Pass
9	A329M to Peacock Lane	08:28	08:29	00:00:01	0%	Pass
10	Peacock Lane to A329M	08:33	08:29	-00:00:04	-1%	Pass
11	M4 West to A33 North	02:55	02:37	-00:00:18	-10%	Pass
12	A33 North to M4 West	03:53	04:08	00:00:15	6%	Pass
13	M4 West to A33 South	05:18	05:41	00:00:23	7%	Pass
14	A33 South to M4 West	03:02	02:58	-00:00:04	-2%	Pass
15	M4 East to A33 North	09:37	09:47	00:00:10	2%	Pass
16	A33 North to M4 East	09:05	10:12	00:01:07	12%	Pass
17	M4 East to A33 South	09:31	09:28	-00:00:03	0%	Pass
18	A33 South to M4 East	10:51	11:29	00:00:38	6%	Pass

Pass	16
Fail	2
%Pass	89%

Pass – VISSIM location meets TAG criterion, Fail - VISSIM location does not meet TAG criterion.

