

TECHNICAL NOTE



M42 J7A-J10

VISSIM LOCAL MODEL VALIDATION REPORT

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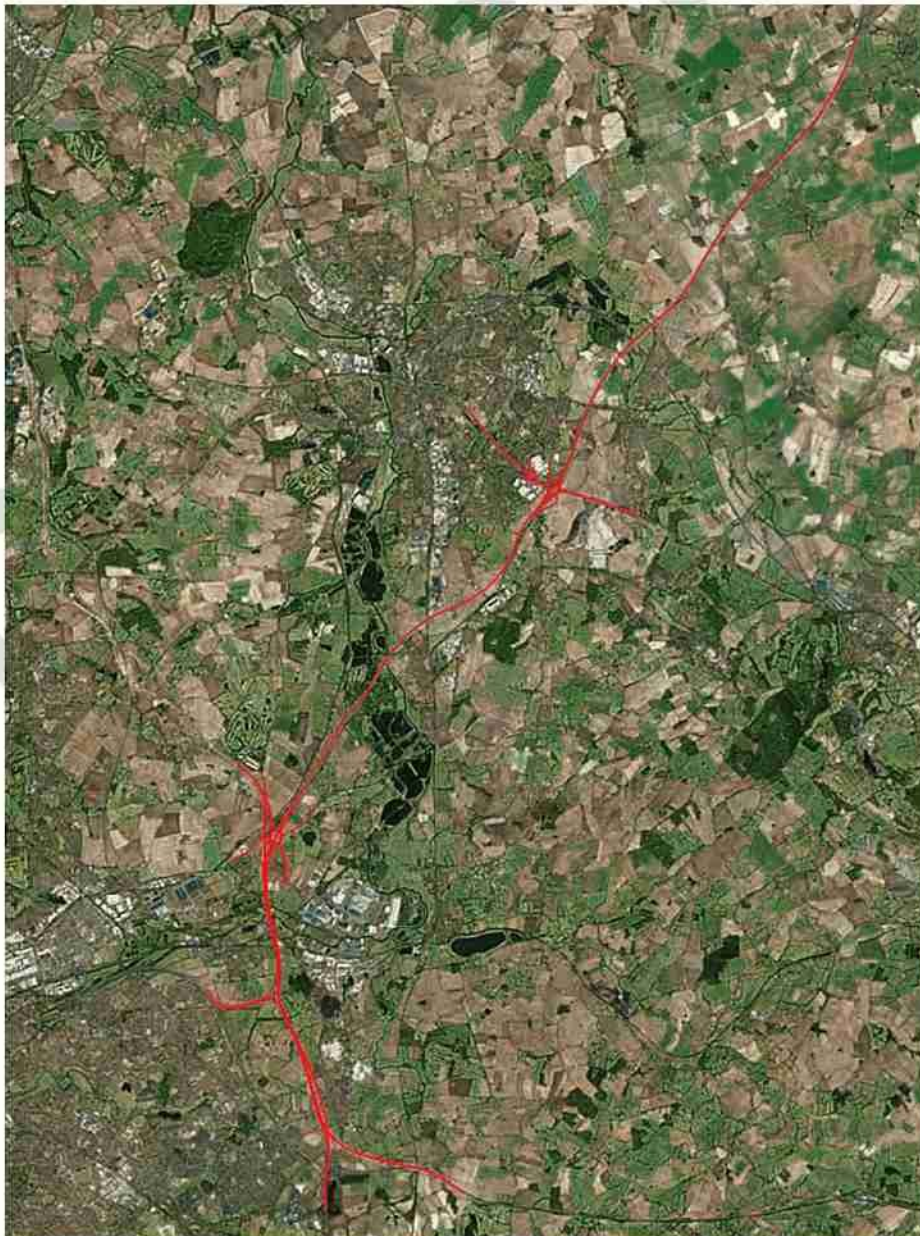


1. INTRODUCTION

1.1 Project Overview

- 1.1.1 SYSTRA has been commissioned by Highways England to produce a VISSIM model of M42 J7A-J10 area for a congestion study of the mainline.
- 1.1.2 The model year will be 2016 as this is the best source of available data as it is before the commencement of the Oldbury Viaduct works which significantly affect traffic conditions around the motorway box.
- 1.1.3 The model area is shown by the red line in Figure 1 below.

Figure 1. Model extent



1.2 Report Background

1.2.1 This document provides commentary on the development of the M42 J7A-J10 VISSIM microsimulation model and reports on the development, calibration and validation of the model.

1.2.2 Within this document we have set out the following topics:

- Model inputs;
- Methodology; and
- Model calibration / validation analysis.

1.3 Background to the Modelling

1.3.1 The model was built and assigned using the microsimulation package VISSIM, version 11.00-07.

The model encompasses the M42 J7a-J10 area and includes the following junctions;

- M42 Junction 7A;
- M42 Junction 8;
- M42 Junction 9;
- M42 Junction 10;
- Pennine Way Roundabout;
- Watling Street (W) Roundabout;
- M42 / M6 Toll;
- M6 Toll / Kingsbury Rd Roundabout;

1.3.2 Table 1 below presents the modelled time periods, calculated from TRIS traffic flow data and agreed with Highways England. All three models have a warm up and cool down period of 30 minutes which gives the model run time of 2 hours. The focus of the model evaluation is the peak hours within the model run, as shown in Table 1.

Table 1. Modelled Periods

Period	Pre-Peak	Peak	Post-Peak
AM	07:00 – 07:30	07:30 – 08:30	08:30 – 09:00
IP	12:30 – 13:00	13:00 – 14:00	14:00 – 14:30
PM	15:45 – 16:15	16:15 - 17:15	17:15 – 17:45

1.3.3 The VISSIM model has been developed to replicate, as far as feasible, the multi-modal interactions between M42 J7A-J10, including:

- Cars;
- Light Goods Vehicles (LGVs); and
- Heavy Goods Vehicles (HGVs)

- 1.3.4 The following Local Model Validation Report (LMVR) provides an overview of the VISSIM model development and demonstrates the model's "fit for purpose" status in accordance with WebTAG and Highways England modelling standards.
- 1.3.5 The model has been created to represent base conditions for the 2016 Base Year and will be used for a congestion study of the corridor.

1.4 Report Structure

- 1.4.1 The structure of the report is as follows:

- Section 1 – introduces the purpose of the report and modelling commissioned;
- Section 2 – provides an overview of the VISSIM modelling approach and development;
- Section 3 – details the results of the model calibration;
- Section 4 – details the results of the model validation; and
- Section 5 – summarises and concludes the report.

2. METHODOLOGY

2.1 Model Inputs

- 2.1.1 This section of the document provides commentary of how the inputs to the model were derived.

2.2 Digital Background Modelling

- 2.2.1 VISSIM provides Bing global mapping as standard. The model was created by overlaying links onto the mapping and matching them as accurately as possible.

2.3 Matrices

- 2.3.1 Prior matrices were developed using Highways England's TIS mobile network data to give information on the origin and destination of trips on the corridor. MCC and TRIS link counts were used to disaggregate zones and control origin and destination totals. Following this matrix estimation was carried out using all turning counts and link flows such that the matrices calibrated well. Hourly matrices were developed for lights and heavy vehicles for the following time periods:

- AM Peak Period 07:30 to 08:30;
- IP Period 13:00 to 14:00; and
- PM Peak Period 16:15 to 17:15.

- 2.3.2 Tables 2 – 4 below show that matrix estimation was undertaken without skewing the matrices, as the regression statistics for changes from the prior to final matrices compared well to WebTAG guidelines.

Table 2. R-squared Regression Statistic

	AM		IP		PM		Measure
	Lights	Heavies	Lights	Heavies	Lights	Heavies	
OD Cells	1.00	0.98	0.98	0.97	0.97	0.93	>0.95
Origin Totals	1.00	1.00	0.99	1.00	1.00	1.00	>0.98
Destination Totals	1.00	0.99	0.99	0.99	1.00	0.99	>0.98

Table 3. Slope Regression Statistic

	AM		IP		PM		Measure
	Lights	Heavies	Lights	Heavies	Lights	Heavies	
OD Cells	0.99	0.97	1.00	0.94	0.95	0.98	>0.98 and <1.02
Origin Totals	0.99	0.99	1.01	0.94	0.96	1.01	>0.99 and <1.01
Destination Totals	0.99	0.97	0.95	0.92	0.98	0.98	>0.99 and <1.01

Table 4. Intercept Regression Statistic

	AM		IP		PM		Measure
	Lights	Heavies	Lights	Heavies	Lights	Heavies	
OD Cells	1.71	0.29	-1.25	0.19	2.04	0.07	Near to zero
Origin Totals	30.37	0.77	-37.21	2.41	27.13	-2.84	Near to zero
Destination Totals	29.11	4.47	21.69	7.05	6.47	2.02	Near to zero

- 2.3.3 Table 5 and Figures 2-4 show the trip length distributions for the matrices before and after matrix estimation. They also indicate that the matrices were not skewed by matrix estimations – however it shows that the heavy matrices did change more than the lights. This is not surprising because the classification of turning flows used in matrix estimation will be more accurate than those in the WebTRIS link data.

Table 5. Trip Length Distribution

Peak	Measure	Prior Lights	Post Lights	Difference	Prior Heavies	Post Heavies	Difference
AM	Average	10803	11016	2%	13152	13335	1%
	St dev	8359	8445	1%	9086	6901	-24%
IP	Average	11006	10801	-2%	13919	14293	3%
	St dev	8635	8486	-2%	9651	6658	-31%
PM	Average	11204	11206	0%	13618	13468	-1%
	St dev	8686	8667	0%	9215	6860	-26%

Figure 2. AM Trip Distribution

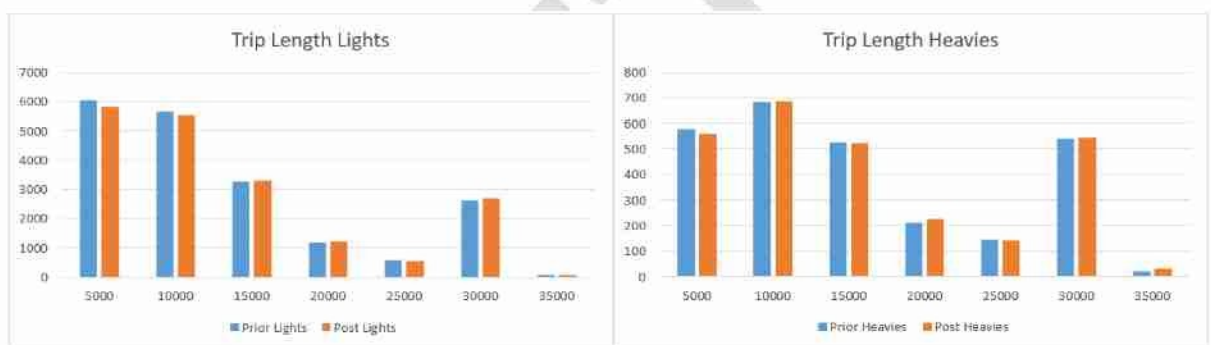


Figure 3. IP Trip Distribution

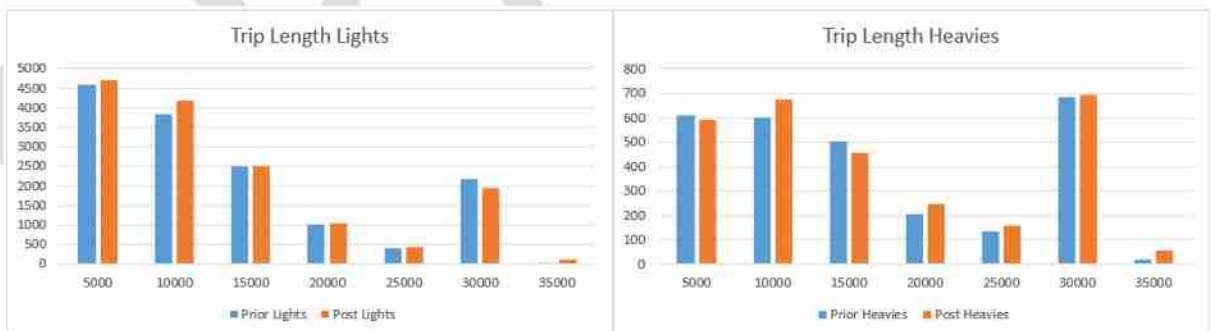
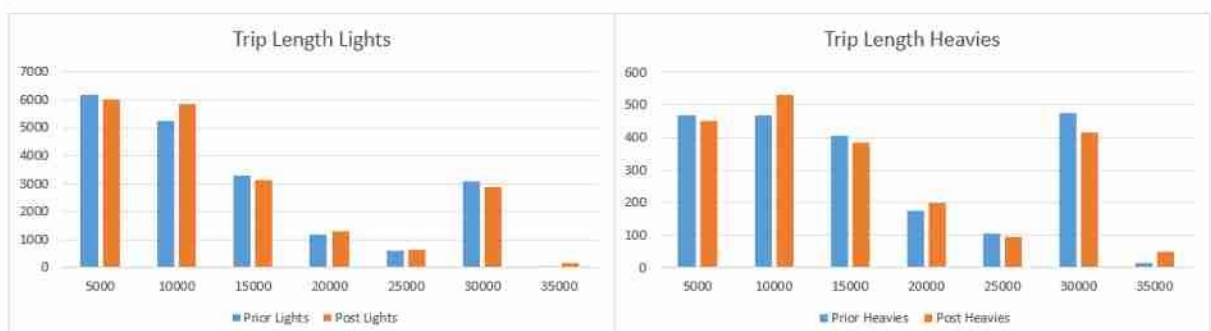


Figure 4. PM Trip Distribution



- 2.3.4 Using TRIS motorway link flows, these peak hour matrices were profiled to 15 minute matrices which spanned the peak hours, pre-peak and post-peak, to more accurately reflect the entry times of traffic into the model area. These profiles can be seen in Table 6.

Table 6. 15 Minute Profiles

	AM		IP		PM	
	Lights	Heavies	Lights	Heavies	Lights	Heavies
Pre-Peak 1	22%	30%	24%	25%	22%	31%
Pre-Peak 2	24%	28%	24%	25%	23%	29%
Peak1	25%	26%	24%	25%	24%	28%
Peak2	25%	25%	25%	25%	25%	26%
Peak3	25%	25%	25%	25%	25%	24%
Peak4	25%	25%	26%	25%	26%	22%
Post-Peak1	24%	24%	26%	25%	25%	21%
Post-Peak2	23%	24%	26%	25%	24%	20%

- 2.3.5 The Lights matrix was assigned in VISSIM between cars and LGVs, and the Heavy matrices between OGV1 and OGV2, using factors calculated from the MCC surveys. The proportions calculated were as follows:

- 2.3.6 Light vehicle proportions:

- AM Peak - 83% Car, 17% LGV
- Inter Peak – 81% Car, 19% LGV
- PM Peak – 86% Car, 14% LGV

- 2.3.7 Heavy vehicle proportions:

- AM Peak - 35% OGV1, 65% OGV2
- Inter Peak – 32% OGV1, 68% OGV2
- PM Peak – 28% OGV1, 72% OGV2

2.4 Traffic Data Collection

- 2.4.1 Existing traffic data was utilised for the construction of this model because of the Oldbury viaduct works which are affecting the whole of the motorway box. Therefore a 2016 model was built using data which included:

- WebTRIS link flows;
- M42 J9 MCC data from 21st June 2017 collected by Warwickshire County Council (WCC);
- M42 J10 MCC collected on 16th June 2016 by WCC;
- TIS mobile network origin-destination data;
- TrafficMaster travel time data for J9 and 10 local roads (supplied by WCC);
- TRIS journey time data for 2016 for the M42 main carriageway and slips;

Manual Classification Counts (MCC)

2.4.2 MCC data was collected and used for matrix calibration. Counts were undertaken at the five junction locations below on Thursday 16th June 2016 and Wednesday 21st June 2017:

- M42 Junction 9 / Lichfield Road / Kingsbury Road;
- M6 Toll / Kingsbury Road;
- M42 Junction 10 / A5 / Trinity Road / Green Lane;
- A5 / Pennine Way northern roundabout; and
- A5 / Watling Street (W) roundabout;

Turn Flows

2.4.3 Turn flows were extracted from TRIS data as part of the calibration exercise for Tuesdays, Wednesdays and Thursdays for the neutral months between April – November in 2016 at the locations below:

- M6 Southbound Off Slip to M42 NB and SB;
- M42 J8 Southbound to M6 Northbound;
- M42 J9 Southbound Mainline and Off-slip;
- M42 J9 Northbound Mainline and Off-slip;
- M42 J10 Southbound Mainline and Off-slip;
- M42 J10 Northbound Mainline and Off-slip;
- M42 /M6 Toll;
- M42 J7A Northbound;
- A5 Westbound Mainline and Off-Slip;
- A5 Eastbound Pennine Way Mainline and Off-slip.

Link Flows

2.4.4 Link flows were also extracted from TRIS data and used in calibration and validation. Where possible link flows were kept out of calibration so that some link flow validation could be presented.

Journey Time Routes

2.4.5 Journey time information was extracted from TRIS data for Tuesdays, Wednesdays and Thursdays of neutral months between April – November in 2016.

2.4.6 TrafficMaster was supplied by WCC for local roads and the same time periods.

2.4.7 The data was analysed and presented for twenty-two routes to cover all routes in the modelled area. The data has been used in model validation.

TIS Data

- 2.4.8 81 route matrices were extracted from the TIS mobile network data, based on 60 weekdays data between April – November in 2016 to provide origin and destination information for the distribution of trips in the traffic demand matrices.

Queue Length Data

- 2.4.9 No queue length data was available for the study, but given that journey time data was available for the whole model extent this was sufficient. Queue length validation is not required by WebTAG.

2.5 Signalised Junctions

- 2.5.1 There are two signalised junctions within the modelled area.

- M42 Junction 9 / Lichfield Road / Kingsbury Road; and
- M42 J10 / A5 / Trinity Road / Green Lane.

- 2.5.2 These actually run as MOVA on ground but were modelled as fixed time in VISSIM to give stability to the model and to co-ordinate the different controllers within the junctions.

2.6 Public Transport

- 2.6.1 There were no bus stops within the modelled area, and no buses ran during the peak hour so buses weren't included in the model.

2.7 Model assignment

- 2.7.1 Although this is a corridor model so contains no route choice, the models were run using dynamic assignment.

3. MODEL CALIBRATION

3.1 Introduction

- 3.1.1 Model calibration is the process of adjusting the key model parameters so that these parameters reflect an appropriate proxy to the observed traffic conditions. These parameters include:

- Demand volume adjustments;
- Network parameter adjustments, including:
 - Gap acceptance at junctions;
 - Vehicle speeds including signed restrictions and speed reductions on bends / approaches to junctions;
 - Speed distributions;
 - Lane allocations and restrictions;
 - Lane change decision distances;
 - Traffic signal control and timings.

- 3.1.2 VISSIM runs each model utilising a set of stochastically distributed random numbers, known as the random seed. This affects vehicle behaviour including the speed at which individual vehicles drive, the arrival rates of vehicles (within the defined fifteen minute periods) and can have an impact of some random seeds appearing to have more aggressive drives in than others. As per best practice this model was run for ten random seeds starting at 42 with an increment of 1 (to 51).

3.2 Calibration Criteria

- 3.2.1 Flow calibration is a process whereby modelled flow outputs are compared and calibrated to match observed traffic flows throughout the network. In this instance this refers to link and turning counts.
- 3.2.2 WebTAG Unit M.3.1, provides the guidance on the acceptable criteria when comparing modelled link flows against observed counts. For this assessment the criteria has also been applied for the turning movement calibration, as required in TAG Unit M3.1 – Highway Assignment Modelling.
- 3.2.3 The Geoffrey E. Havers (GEH) statistic is a standard way of comparing the observed and modelled flows. The GEH value is similar to a chi-squared test and also incorporates both relative and absolute errors in order to give an overall measure of the accuracy of the modelled flow.
- 3.2.4 The GEH statistic has the benefit of removing bias that exists when comparing flows of different magnitudes using percentages, such that a difference of 10 in a flow of 100 vehicles per hour (vph) is less significant than a difference of 100 in a flow of 1000 vph.
- 3.2.5 The GEH statistic is calculated by:
- $$GEH = \sqrt{\frac{(M - C)^2}{(M + C) / 2}}$$
- 3.2.6 Where GEH = GEH statistic, M = modelled flow & C = Observed flow.
- 3.2.7 The target for GEH is < 5.
- 3.2.8 Furthermore, the absolute difference is also examined between observed and modelled flows.
- 3.2.9 WebTAG also provides a guidance for the observed vehicles per hour (vph):
- For observed flows 700 - 2,700 vph, modelled flow within 15% of observed flow;
 - For observed flows < 700 vph, modelled flow within 100 vph of observed flow; and
 - For observed flows >2,700 vph, modelled flow within 400 vph of observed flow.
- 3.2.10 The WebTAG guidelines indicate that **85%** of modelled hourly flows should pass either the GEH or the absolute flow guideline.

3.3 Turn Flow Calibration Statistics

- 3.3.1 Table 7 below summarises the turn flow comparisons for all traffic flows and compares them against the DMRB criteria. The results indicate that the DMRB criteria for all vehicle classes have been fully satisfied in both the AM, IP and PM Peak periods and therefore the turn flows are compliant with the DRMB acceptability criteria (>85%).

Table 7. Turn Flow Calibration

	Absolute	GEH	WebTAG	
	%	%	%, Either	Flows Test
AM				
Lights	100	100	100	Pass
Heavies	100	100	100	Pass
Total Vehicles	100	100	100	Pass
IP				
Lights	96	95	96	Pass
Heavies	100	100	100	Pass
Total Vehicles	96	96	97	Pass
PM				
Lights	96	91	97	Pass
Heavies	100	100	100	Pass
Total Vehicles	95	90	96	Pass

- 3.3.2 Analysis of the calibration criteria indicates that a good level of calibration has been achieved. Full turn flow calibration results can be seen in Appendix A.

3.4 Link Flow Calibration Statistics

- 3.4.1 Table 8 summarises the link flow comparisons for all traffic flows and compares them against the DMRB criteria.

Table 8. Link Flow Calibration

	Absolute	GEH	WebTAG	
	%	%	%, Either	Flows Test
AM				
Lights	100	100	100	Pass
Heavies	100	100	100	Pass
Total Vehicles	100	100	100	Pass
IP				
Lights	89	95	95	Pass
Heavies	100	100	100	Pass
Total Vehicles	100	95	100	Pass
PM				
Lights	95	95	95	Pass
Heavies	100	100	100	Pass
Total Vehicles	100	95	100	Pass

- 3.4.2 The results indicate that the WebTAG guidelines for model calibration have been fully satisfied in all three time periods.



4. MODEL VALIDATION

4.1 Introduction

- 4.1.1 Model validation is the process of comparing the model performance against a set of data which is independent of the model calibration process. The validation process is designed to demonstrate that the model is capable of simulating traffic conditions which are representative of the actual conditions, based on the performance observations.
- 4.1.2 DfT TAG M3.1 guidelines clearly set out the requirement for the model to be independently validated against a set of data, which is not included in the calibration process, including a set which is representative of the network conditions.
- 4.1.3 The following data sets have been identified for the validation of the models:
- Link flows;
 - Journey times.
- 4.1.4 The following section provides a summary of the validation results based on the above data set.
- 4.1.5 In the context of the journey time validation, DfT TAG M3.1 Table 3 specifies that **85%** of the observed routes should be within the following criteria:
- Modelled times along the route should be within 15% of the surveyed time (or 1 minute, if higher).
- 4.1.6 The remainder of this section provides a summary of the outcome of the model validation process. Full validation results can be seen in Appendix A.

4.2 Link Flow Validation Statistics

4.2.1 Table 9 below presents the link flow validation results. The WebTAG requirement is the same as that required for link flow calibration.

4.2.2 These results indicate that model validation meets the required criteria.

Table 9. Link Flow Validation

	Absolute	GEH	WebTAG	
	%	%	%, Either	Flows Test
AM				
Lights	100	100	100	Pass
Heavies	91	91	91	Pass
Total Vehicles	100	100	100	Pass
IP				
Lights	100	100	100	Pass
Heavies	100	91	100	Pass
Total Vehicles	100	100	100	Pass
PM				
Lights	100	100	100	Pass
Heavies	100	100	100	Pass
Total Vehicles	100	100	100	Pass

4.3 Travel Time Validation Statistics

4.3.1 010 - 12 below present the journey time comparisons. The WebTAG requirement is that the modelled and observed journey times are within 15% (or 60 seconds for journey time sections longer than 3km.)

4.3.2 The tables show that in the AM period, only for one route the modelled journey time does not satisfy this criteria (but only fails by 1%) and in both IP and PM periods the modelled journey times satisfy this criteria for all routes.

4.3.3 These results indicate that the model has been successfully validated.

4.3.4 The main location of mainline congestion observed in the 2016 base year models is as follows. To give some perspective on the future years issues that might be forecast the observed conditions (from Google maps) have been noted:

- AM Peak;
 - In 2016 there was little congestion observed on the southbound corridor, although it should be noted that weaving movements are heavy and there are signs that capacity is nearing at the merge between the M42 southbound and the M6;
 - It should be noted that under current conditions (2019) there is southbound congestion along the whole corridor due to heavy weaving. Flow is much higher than in 2016 possibly due to redistribution from the Oldbury Viaduct works. This indicates that the network is close to capacity;

- Inter Peak;
 - No specific issues
- PM Peak;
 - There is slow moving traffic northbound where the weave to stay on the M42 northbound at the M6 Toll diverge causes congestion in 2016
 - It should be noted that under current conditions (2019) there is observed congestion on the M42 northbound carriageway due to higher flows and heavy weaving at the J9 northbound merge, the weave to stay on the M42 at the M6 Toll exit and at the J8 northbound merge.

Table 10. AM Journey Time Validation

Route	Route Name	AM Peak				
		Observed (s)	Modelled (s)	Difference	% Difference	Pass / Fail
1	M42 SB	1246	1150	-97	-8%	Pass
2	M42 NB	1020	1141	121	12%	Pass
3	M6 West to M42 SB	258	235	-22	-9%	Pass
4	M6 West to M6 Toll NB	175	193	18	10%	Pass
5	M42 SB to M6 West	1102	1040	-63	-6%	Pass
6	M6 East to M6 Toll NB	187	208	22	12%	Pass
7	M6 Toll SB to M6 East	425	404	-21	-5%	Pass
8	M42 SB to Watling Street	566	524	-42	-7%	Pass
9	Watling Street to A5	204	191	-13	-7%	Pass
10	Watling Street to Lichfield Road SB	621	532	-89	-14%	Pass
11	Lichfield Road to A5	695	765	70	10%	Pass
12	A5 to Watling Street	449	433	-16	-4%	Pass
13	A5 to M42 NB	762	808	46	6%	Pass
14	Kingsbury Road East to M42 SB	511	427	-84	-16%	Fail
15	M42 NB to Kingsbury Road East	441	462	21	5%	Pass
16	Kingsbury Road West to M42 SB	602	584	-17	-3%	Pass
17	M42 NB to Kingsbury Road West	350	376	26	7%	Pass
18	Kingsbury Road East to Kingsbury Road West	255	244	-11	-4%	Pass
19	Kingsbury Road West to Kingsbury Road East	259	227	-33	-13%	Pass
20	Lichfield Road North to Lichfield Road South	383	350	-33	-9%	Pass
21	Lichfield Road South to Lichfield Road North	202	198	-4	-2%	Pass
22	M42 NB to M6 J4	89	82	-7	-8%	Pass

Table 11. IP Journey Time Validation

Route	Route Name	IP Peak				
		Observed (s)	Modelled (s)	Difference	% Difference	Pass / Fail
1	M42 SB	1023	1113	90	9%	Pass
2	M42 NB	1024	1148	124	12%	Pass
3	M6 West to M42 SB	211	227	15	7%	Pass
4	M6 West to M6 Toll NB	178	194	16	9%	Pass
5	M42 SB to M6 West	935	1013	78	8%	Pass
6	M6 East to M6 Toll NB	192	209	18	9%	Pass
7	M6 Toll SB to M6 East	379	393	14	4%	Pass
8	M42 SB to Watling Street	473	510	38	8%	Pass
9	Watling Street to A5	197	184	-13	-7%	Pass
10	Watling Street to Lichfield Road SB	508	513	5	1%	Pass
11	Lichfield Road to A5	528	568	40	8%	Pass
12	A5 to Watling Street	235	188	-47	-20%	Pass
13	A5 to M42 NB	551	571	20	4%	Pass
14	Kingsbury Road East to M42 SB	401	383	-17	-4%	Pass
15	M42 NB to Kingsbury Road East	402	442	40	10%	Pass
16	Kingsbury Road West to M42 SB	457	504	46	10%	Pass
17	M42 NB to Kingsbury Road West	349	379	30	9%	Pass
18	Kingsbury Road East to Kingsbury Road West	210	197	-13	-6%	Pass
19	Kingsbury Road West to Kingsbury Road East	194	201	6	3%	Pass
20	Lichfield Road North to Lichfield Road South	158	148	-10	-7%	Pass
21	Lichfield Road South to Lichfield Road North	170	161	-9	-5%	Pass
22	M42 NB to M6 J4	88	82	-6	-7%	Pass

Table 12. PM Journey Time Validation

Route	Route Name	PM Peak				
		Observed (s)	Modelled (s)	Difference	% Difference	Pass / Fail
1	M42 SB	1054	1124	70	7%	Pass
2	M42 NB	1153	1161	8	1%	Pass
3	M6 West to M42 SB	216	228	12	5%	Pass
4	M6 West to M6 Toll NB	190	204	15	8%	Pass
5	M42 SB to M6 West	961	1020	59	6%	Pass
6	M6 East to M6 Toll NB	206	217	11	5%	Pass
7	M6 Toll SB to M6 East	372	394	23	6%	Pass
8	M42 SB to Watling Street	480	513	33	7%	Pass
9	Watling Street to A5	214	208	-6	-3%	Pass
10	Watling Street to Lichfield Road SB	546	514	-32	-6%	Pass
11	Lichfield Road to A5	593	577	-15	-3%	Pass
12	A5 to Watling Street	304	248	-56	-18%	Pass
13	A5 to M42 NB	635	627	-8	-1%	Pass
14	Kingsbury Road East to M42 SB	422	384	-39	-9%	Pass
15	M42 NB to Kingsbury Road East	480	480	1	0%	Pass
16	Kingsbury Road West to M42 SB	510	505	-6	-1%	Pass
17	M42 NB to Kingsbury Road West	419	401	-18	-4%	Pass
18	Kingsbury Road East to Kingsbury Road West	241	239	-2	-1%	Pass
19	Kingsbury Road West to Kingsbury Road East	230	215	-15	-7%	Pass
20	Lichfield Road North to Lichfield Road South	187	160	-28	-15%	Pass
21	Lichfield Road South to Lichfield Road North	216	210	-6	-3%	Pass
22	M42 NB to M6 J4	93	83	-10	-11%	Pass

4.4 Locations of Queueing

4.4.1 As surveying queue lengths on site contains a large element of subjectivity, and the variation of this is large from day to day, WebTAG does not recommend validating to queue lengths. However sensibility checks have been done to make sure that the model contains queues in the expected locations.

4.4.2 The main locations of queues in the AM peak are:

- M42 Junction 9 / Lichfield Road / Kingsbury Road roundabout;
 - On Lichfield Road North;
 - Kingsbury Road East;
- M42 Junction 10 / A5 / Trinity Road / Green Lane roundabout; and
 - On Wilnecote Bypass (A5);

4.4.3 The main locations of queues in the PM peak are:

- M42 Junction 9 / Lichfield Road / Kingsbury Road roundabout;
 - On Lichfield Road South;

4.4.4 There are no major queues in the IP peak in the model.

5. SUMMARY

- 5.1.1 The model has been developed for a base year of 2016, in accordance with Highways England and Department for Transport modelling guidelines, principally TAG Unit M3.1 and Highways England Guidelines for Microsimulation Modelling.
- 5.1.2 The base year of 2016 was developed because of major road works currently in place at the Oldbury viaduct which are affecting road conditions around the West Midlands motorway network. Thus using existing data from before these works began was more appropriate.
- 5.1.3 The creation of the VISSIM model aligns with modelling best practice and throughout the development process, several checks and internal reviews was undertaken to ensure the model aligns with the required industry standards.
- 5.1.4 It is considered that the information presented throughout this document demonstrates that the model has been developed in accordance with the current guidance and is representative of the observed network conditions.
- 5.1.5 It is recommended that the model is suitable for use in forecasting for the congestion study of the M42 corridor.



APPROVAL

Version	Name		Position	Date	Modifications
1	Author		Assistant Transport Modeller	01/08/2019	First Draft
	Checked by		Senior Transport Modeller	05/08/2019	
	Approved by		Associate	20/08/2019	
2	Author		Assistant Transport Modeller	29/10/2019	Inclusion of TPG Comments
	Checked by		Senior Transport Modeller	29/10/2019	
	Approved by		Associate	29/10/2019	

