

Watford SATURN Model - Croxley Cordon

Local Model Validation Report

Report

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Prepared for:
Hertfordshire County Council
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1 Introduction

Background

- 1.1 The Watford SATURN model was last updated in 2007 and represents a Base Year 2006¹ for each of the AM, PM and average Interpeak hours. The model was originally produced as part of the South West Hertfordshire Transportation Study (SWHTS) undertaken in 1995.
- 1.2 The 2007 update included a large scale data collection exercise incorporating some 14 automatic traffic counts, 14 manual junction turning counts and 9 new roadside interview surveys (RSIs) forming a cordon around the town centre. The 9 RSI sites were located as follows:

■ Hempstead Road (Langley Way)	Southbound	Tue 18/7/06
■ St Albans Road (Bushey Mill Lane)	Southbound	Tue 18/7/06
■ Stephenson Way	Northbound	Wed 19/7/06
■ London Road (Aldenham Road)	Westbound	Thu 13/7/06
■ Oxhey Lane(Watford Heath)	Northbound	Thu 13/7/06
■ Brookdene Avenue (Hampermill Lane)	Northbound	Wed 12/7/06
■ Hampermill Lane (Brookdene Avenue)	Eastbound	Wed 12/7/06
■ Tolpits Lane (Croxley View)	Eastbound	Tue 11/7/06

- 1.3 In addition, data was made available for 14 count sites associated with the Health Campus proposals and extensive data from the Highways Agency database was sourced for relevant sections of the M25 and M1, along with some sections of the A41 and A405.
- 1.4 When updating the previous matrices, “observed” trips were developed from the RSIs and these were combined and used to overwrite corresponding cells in the initial matrix. Before adding the newly observed site details, all trips passing through the survey screenline were blanked out, to avoid the resulting matrix containing trip patterns from the prior matrix that were no longer observed.

Current Model Update

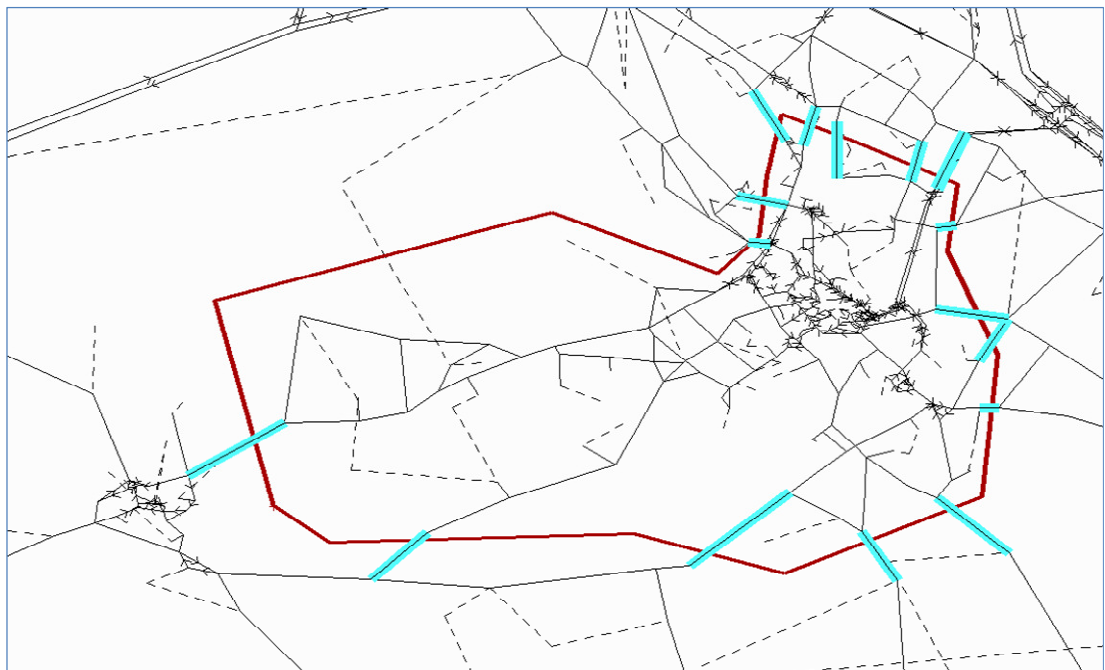
- 1.5 Since the 2007 update, the software has been updated and a number of more detailed coding checks are now included which has resulted in a need to update the model for compatibility with SATURN version 10.9.22. At the same time, the

¹ Watford SATURN Model Update - Local Model Validation Report - Morning Peak, Inter Peak and Evening Peak (SDG October 2007)

opportunity has been taken to improve model convergence through use of more recent parameters introduced by the software.

- 1.6 The need to upgrade the Watford SATURN model is twofold. First, a Transport Assessment of the impact of the Croxley Rail Link proposals is required to support the planning process for the scheme and it has been acknowledged that the peak period validation of the existing model was poor in the vicinity of the scheme proposals. An upgrade to the model will also provide more reliable highways inputs to the appraisal process, and address previously raised concerns over the use of the existing model in earlier scheme appraisals.
- 1.7 It was agreed with the model owners, Hertfordshire County Council, that any upgrade would be undertaken using available traffic data collected since 2007, and that no additional data collection would be required.
- 1.8 It was further agreed that although the model will be used to provide inputs to the scheme appraisal, the upgrade should focus on the area most likely to be impacted by the Croxley Rail Link proposals, and should be extended to include Watford Junction station and the town centre. The agreed cordon area is shown in Figure 1.1.

FIGURE 1.1 CORDON AREA



- 1.9 Use of the most recent traffic data has enabled the Base Year to be updated to 2010.

Inter Peak

- 1.10 The upgrade has focused on the AM and PM peak hour models to support the requirement for a Transport Assessment of the Croxley Rail Link scheme. The previous model validation exercise demonstrated that the interpeak model validated well and there is therefore not the same need to update the interpeak model for the appraisal work.
- 1.11 However, it is recognised that any changes to the peak hour models, in terms of network coding or zone definitions, should be incorporated into the interpeak model to ensure that this satisfactory level of validation is not 'lost'. This process is described in Section 6 of the report.

Existing Model

- 1.12 The initial cordon model is prepared for each of the AM (08:00-09:00) and PM (17:00-18:00) peak hour periods. The cordon area can be summarised as follows:
- 46 internal zones
 - 17 external zones
 - 159 nodes;
 - 30 Traffic Signals
 - 13 Roundabouts
 - 99 priority T-junctions
 - 17 dummy nodes
 - 435 simulation links

The Wider Model Area

- 1.13 It is important that any network/zone changes made within the cordon area during the update can be 'back fitted' to the wider strategic model at a later date. To maintain the link between the two models, a record has been made of the external (to the cordon) origins and destinations using each of the 17 cordon crossing links. It will be assumed that these origin-destination proportions will be unchanged from any update work carried out within the cordon.
- 1.14 The need to maintain the link between the updated cordon model area and the wider model area is to ensure that improvements made to the validity of the model, in the areas around the Croxley Rail Link, are fully reflected in the latest round of scheme appraisal.

Report Structure

- 1.15 Following this introductory section, the remainder of the Local Model Validation Report is structured as follows:
- Section 2 A description of existing sources;

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- Section 3 A summary of changes to the model network within the cordon area;
- Section 4 A summary of changes to the model matrices within the cordon area, and model calibration;
- Section 5 Model validation results;
- Section 6 Inter Peak calibration; and
- Section 7 Conclusions.

2 Data Sources

Existing data

2.1 Hertfordshire County Council (HCC) has made the following data available, and each is discussed in turn below.

- Automatic Traffic Count Data (13 sites) - HCC, 2010
- Recent Watford Met Survey Data - Steer Davies Gleave, 2010
- Rickmansworth Road Turning Counts (5 junctions) - Hyder, 2008
- Miscellaneous data contained within Transport Assessments (3 sites)

2.2 Although traffic levels in Watford have varied year on year, the net change in peak hour flows has been negligible in recent years, as supported by figures presented by the Watford Congestion Task Group². As such, when using the above data, no growth in peak hour flow has been applied and the Base Year for the updated model is 2010.

Automatic Traffic Count Data

2.3 HCC maintains automatic traffic counting locations across Watford. There are thirteen counting locations within the cordon model area, and data has been provided for a week in April 2010, where available. The automatic count site locations are shown in Figure 2.1 and summarised below.

- | | |
|-----------------------------------|--|
| ■ Site 361: Wighenhall Road | w/c Mon 19 th April 2010 |
| ■ Site 378: Stephenson Way | w/c Mon 19 th April 2010 |
| ■ Site 423: Whippendell Road | w/c Mon 19 th April 2010 |
| ■ Site 424: A4145 Vicarage Road | w/c Mon 19 th April 2010 |
| ■ Sites 781-784: Town Centre Loop | w/c Mon 19 th April 2010 |
| ■ Site 785: Beechen Grove | w/c Mon 26 th April 2010 |
| ■ Site 786: A412 St Albans Road | w/c Wed 24 th November 2010 |
| ■ Site 788: Pinner Road | w/c Mon 26 th April 2010 |
| ■ Site 789: Aldenham Road | w/c Mon 26 th April 2010 |
| ■ Site 791 Eastbury Road | w/c Mon 26 th April 2010 |

Watford Metropolitan Station Survey Data

2.4 For the Croxley Rail Link scheme, Steer Davies Gleave carried out a survey at Watford Metropolitan Line station, to gain an understanding of passenger travel characteristics.

² Watford Congestion Task Group, Traffic Signal Installations and Yearly Change in Traffic Volume (Dwg No. M/736130/152/A6)

- 2.5 Interviews, and counts, of passengers arriving and leaving Watford Metropolitan line station were undertaken from 15th June to 1st July 2010, during a period of 'normal' demand. The observed number of car trips, to and from Watford Metropolitan Station during the weekday peak hours, is summarised below. These figures include both drivers parking at the station, and kiss and ride.

TABLE 2.1 CAR TRIPS - WATFORD METROPOLITAN STATION

	Arrivals	Departures
Morning Peak	42	42
Evening Peak	42	46

2.6 Where passengers were surveyed, a record of their origin postcode was made, and this has been used to distribute those car trips onto the network, and hence for inclusion in the demand matrices.

Rickmansworth Road Turning Counts

2.7 As part of their integrated demand management (IDM) study looking at access to and from the M25, Hyder carried out a number of turning counts at junctions along Rickmansworth Road in July 2008

2.8 The IDM study has provided turning counts, AM and PM peak, for the following junctions within the cordon.

- A412 Rickmansworth Road/The Green (node 3014)
- A412 Rickmansworth Road/Baldwins Lane (node 3016)
- A412 Rickmansworth Road/Ascot Road (node 3019)
- Ascot Road/Whippendell Road (node 3020)
- A412 Rickmansworth Road/Met Station Approach/Queens Avenue (node 6047)

Miscellaneous Transport Assessments

2.9 HCC has also provided extracts from Transport Assessment report for 3 sites, where traffic count data has been collected in support of the assessment at junctions within the cordon area. The name of the development, the date of the surveys, and the junctions in question are summarised below.

- Residential Development, Three Rivers Valley (Sep 2009)
 - Aldenham Road/Three Valleys Way/Vale Road junction
- Cassio Campus Sixth Form Centre (May 2008)
 - St Albans Road/Station Road/Langley Road junction (AM peak only)
- Walton Road, Bushey (Jun 2007)
 - Bushey Hall Road/Bendysh Road junction

2.10 A summary of the automatic traffic count data and the junction turning counts is provided in Appendix A.

Journey Time Data

- 2.11 HCC has also provided a summary of Trafficmaster data for the two main competing routes between Rickmansworth and the town centre; along Rickmansworth Road or along Tolpits Lane/Vicarage Road. These routes are shown as replication of HCC's own diagrams in the figures below. This journey time data has been used for model calibration.
- 2.12 The data contains an average time and speed over the course of a year (2009) for each section of route.
- 2.13 A copy of the journey time data provided is included in Appendix B.

FIGURE 2.2 JOURNEY TIME ROUTE - RICKMANSWORTH ROAD

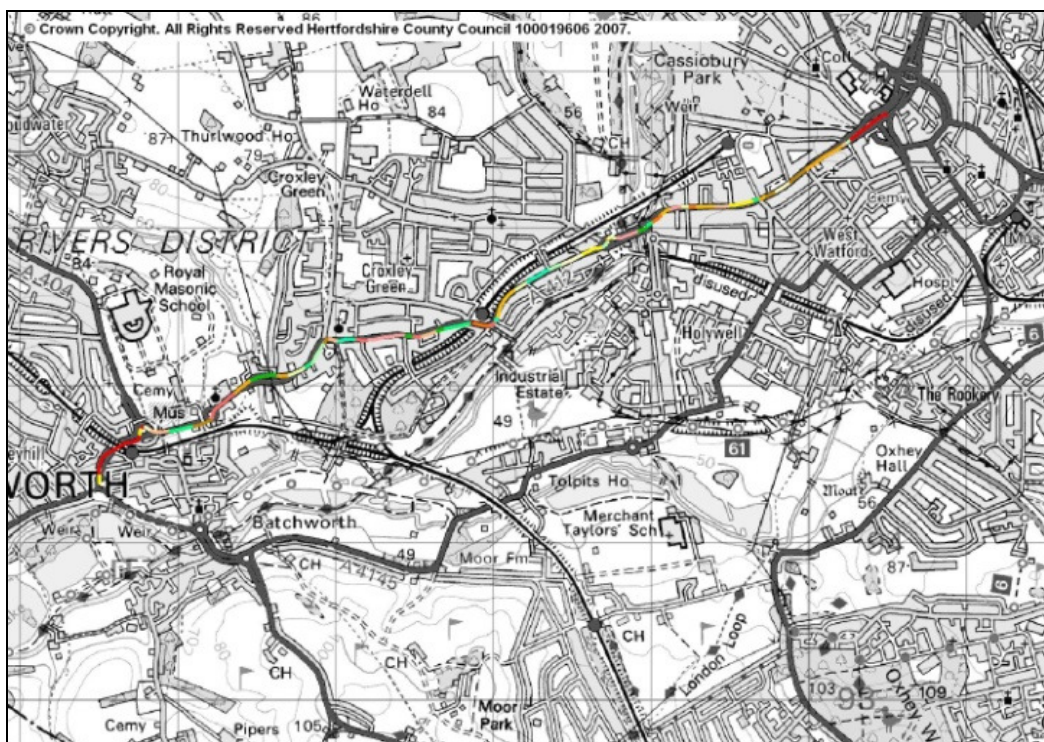
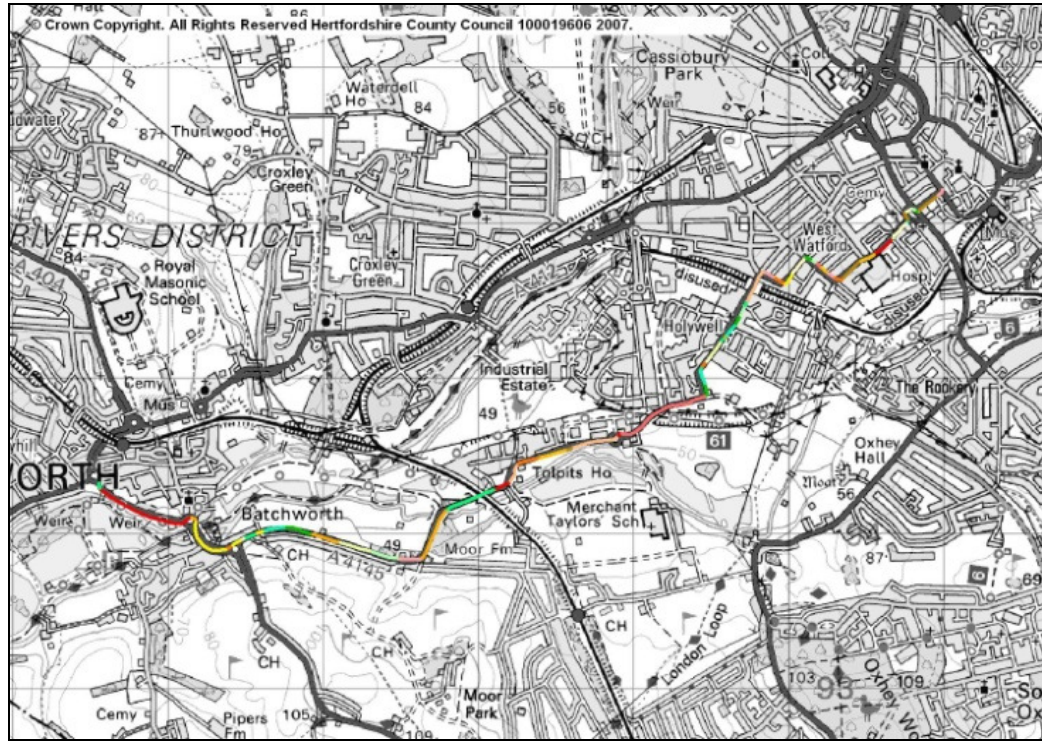


FIGURE 2.3 JOURNEY TIME ROUTE - TOLPITS LANE/VICARAGE ROAD



Model Validation Flows

2.14 Much of the count data is used for matrix calibration, as described in Section 4. However, a total of 20 independent counts (2-way *10) have been set aside for independent link flow validation. These have been chosen to form three screenlines:

- SL1: Ascot Rd / Whippendell Rd / Rickmansworth Rd (east of Ascot Rd)
- SL2: Met Station App / Rickmansworth Rd (east of Station App) / Whippendell Rd / Vicarage Rd (east of Harwoods Rd)
- SL3: Wiggenhall Rd / Lower High St / Aldenham Rd

2.15 The flows for each validation link, along with the corresponding SATURN nodes, are provided in Table 2.2 below.

TABLE 2.2 VALIDATION LINK FLOWS

SL	Link	A-node	B-node	AM Count	PM Count
	<u>Screenline 1</u>				
Eastbound	Ascot Road	93020	3020	506	1109
	Whippendell Road	6096	3020	714	761
	Rickmansworth Road	6047	3019	852	794
Westbound	Ascot Road	3020	93020	1466	377
	Whippendell Road	3020	6096	637	598
	Rickmansworth Road	3019	6047	830	916
	<u>Screenline 2</u>				
Eastbound	Met Station Approach	6047	9028	26	65
	Rickmansworth Road	6047	6079	1080	1058
	Whippendell Road	6049	6078	423	387
	Vicarage Road	6050	6098	590	662
Westbound	Met Station Approach	9028	6047	130	52
	Rickmansworth Road	6079	6047	940	858
	Whippendell Road	6078	6049	360	382
	Vicarage Road	6098	6050	999	823
	<u>Screenline 3</u>				
Northbound	Wiggenhall Road	4027	7000	658	569
	Lower High Street	6030	6084	1043	980
	Aldenham Road	6031	4031	432	395
Southbound	Wiggenhall Road	7000	4027	591	982
	Lower High Street	6084	6030	761	992
	Aldenham Road	4031	6031	420	437

3 Network Updates

Highway Links

- 3.1 A thorough review of network coding for the cordon area has been undertaken and relatively minor coding changes have been made, such as revisions to turn priority markers and to link speeds to better reflect observed journey times along Rickmansworth Road and Tolpits Lane.
- 3.2 The most significant changes to the structure of the network are summarised below:
- Harwoods Road made one-way between Vicarage Road and Whippendell Road.
 - Connection from Euston Rd to the junction of Whippendell Road/Queens Avenue has been stopped up.
 - Traffic signal control added to the junction of Rickmansworth Road/Metropolitan Station Approach.
 - The junction of Rickmansworth Road/Gade Avenue is added, west of the Metropolitan Station Approach junction.
- 3.3 Having a cordon that cuts across from St Albans Road to Imperial Way, to the south of Balmoral Road, resulted in a situation whereby a direct route from the Imperial Way/Colonial Way area to St Albans Road was not available. For many trips between this area and other points within the cordon, St Albans Road would provide the most logical route and, as such, a dummy link (with restricted capacity) has been introduced to accommodate those movements.

Zoning

- 3.4 At the cordon stage, it was necessary to 'cut' the connection to zone 302 representing the area around Chandler's Cross which in the wider model connects to both Baldwins Lane and Hempstead Road. The zone has been split into two, with 302 continuing to feed Hempstead Road and a new zone, 303, created to feed the cordon area via Baldwins Lane. As above, any changes to zoning need to be reflected in future uses of the wider strategic model.
- 3.5 Other changes made to zones and their connectors in cordon area are summarised as follows:
- New zone added (305) to represent Watford Metropolitan Station, with trip ends derived from 2010 surveys
- 3.6 In addition, a revision of zone connections has also been undertaken, particularly in the Croxley Green area (zones 331 and 332) and for zones connecting directly to Rickmansworth Road and/or Tolpits Lane. Two zones (322 and 333) were previously connected *between* Rickmansworth Road and Tolpits Lane, despite no physical connections between the two routes. These have now been separated such that development to the south of Rickmansworth Lane is now catered for by zone 333 and development to the north of Tolpits Lane by zone 322.

4 Matrix Calibration

Methodology

- 4.1 The initial matrices emerging from the cordon exercise contained 23301 and 24879 trips in the AM and PM peak respectively. These include trips to, from and through the cordon area.
- 4.2 These matrices were assigned to the updated cordon network and assigned flows compared to available count data for 2010, including turning flows where available. At this stage the comparison excluded independent data set aside for later validation.
- 4.3 It became clear that many assigned flows were in excess of observed values and that matrix calibration would be required to improve the fit of assigned flows to observed.
- 4.4 Where possible, calibration of modelled flows to link/turn counts has been dealt with manually alongside the network calibration stage outlined in Section 3. However, matrix estimation (SATPIJA/SATME2) has been used to attempt to improve the match against some 85 counts. Trips into and out of the Watford Metropolitan station zone have been ‘frozen’ during the matrix estimation exercise.
- 4.5 The following table provides a comparison of trip matrix totals before and after the recalibration to a 2010 Base Year for each of the AM and PM peaks.

TABLE 4.1 TOTAL TRIP MATRICES

	AM peak	PM Peak
Pre-calibration	23301	24879
Post-calibration	20140	21941
% difference	-14%	-12%

- 4.6 As shown, despite having upgraded the model to a 2010 base, both the AM and PM matrices for the cordon area have reduced in size. Given that the 2006 Base Year model validation generally indicated that model flows were higher than observed, this is not an unexpected result.
- 4.7 The resulting matrices are assigned to the network against the 85 counts available, a mix of link and turning counts, and some 86% of links have assigned flows within DMRB guidelines (see Section 5) in the AM peak and 85% in the PM peak.
- 4.8 Plots of modelled against observed calibration counts for the AM and PM peak are provided in Figures 4.1 and 4.2 respectively. Modelled flows correlate well with observed flows, with an r-squared value of 0.95 for each of the AM and PM peak.

FIGURE 4.1 CALIBRATION PLOT FOR AM PEAK

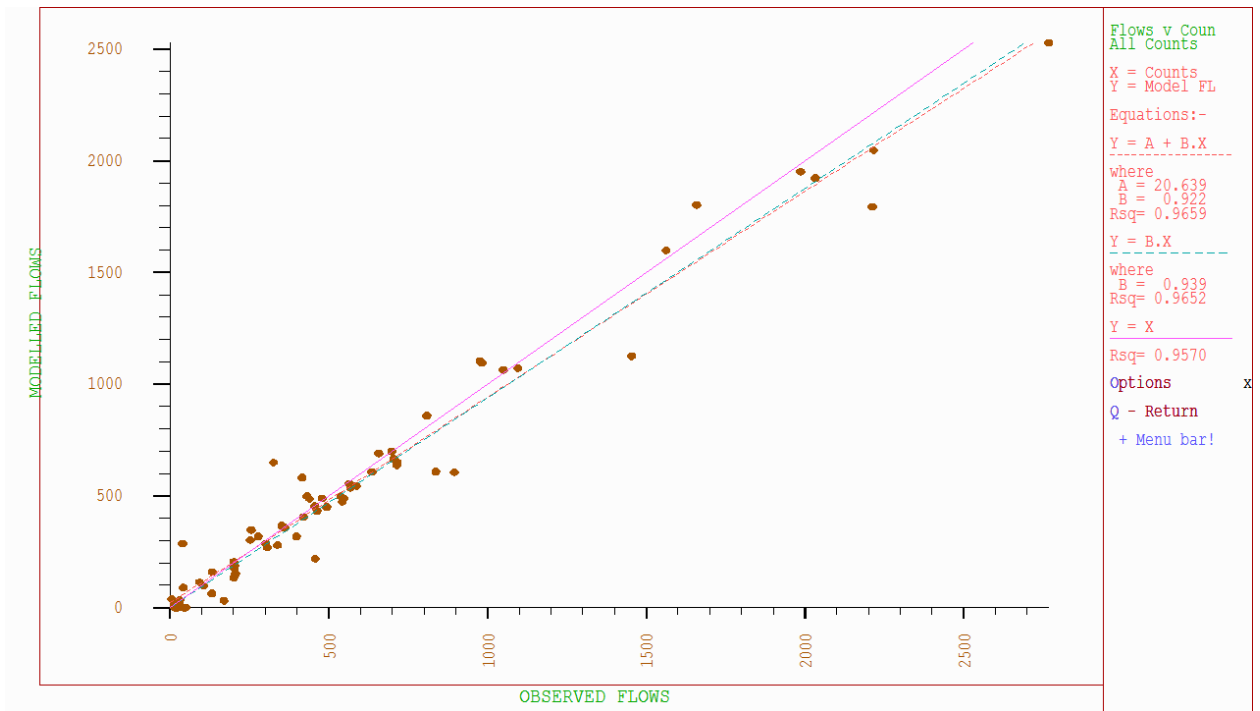
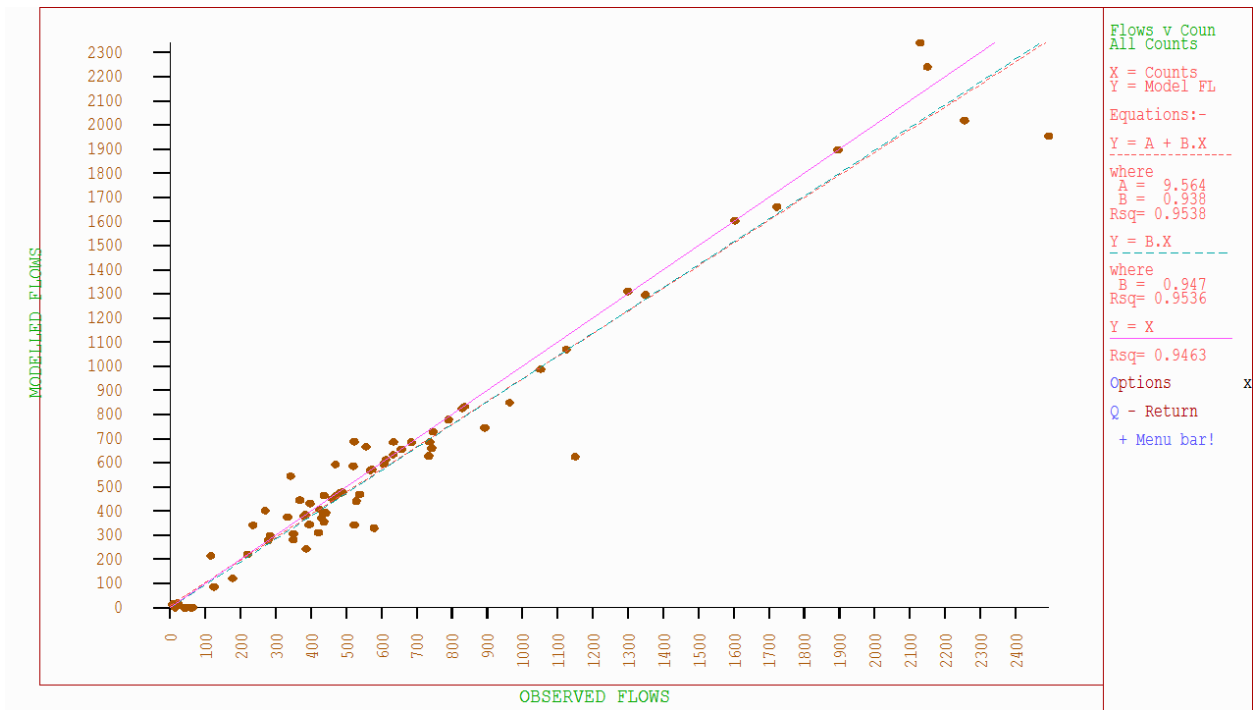


FIGURE 4.2 CALIBRATION PLOT FOR PM PEAK



Journey time calibration

4.9 Inbound journey time data was made available for the AM peak modelled period along the following routes;

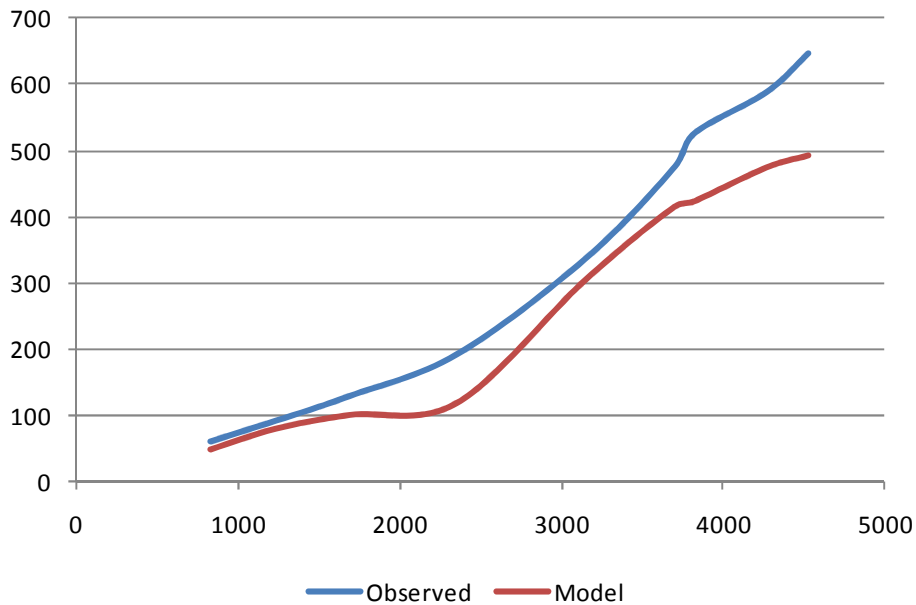
- i) A4125 Sandy Lane/Hamperhill Lane (Route 1)
- ii) A4008 Oxhey Lane (Route 2)
- iii) Tolpits Lane/Vicarage Road (Route 3)
- iv) Rickmansworth Road (Route 4)
- v) Hempstead Road (Route 5)
- vi) A4008 Stephenson Way (Route 7)
- vii) B1462 Aldenham Road (Route 8)
- viii) A411 London Road (Route 9)

4.10 Additionally, PM journey time data was made available for the PM peak modelled period for routes 3 and 4.

4.11 All the journey time data has been to update model calibration and, as such, no independent journey time data is available for validation.

1.1 Route 1 extends 4.527kilometres between B542 The Woods and Lower High Street. **Error! Reference source not found.** illustrates the difference between observed and modelled journey times in the AM peak period.

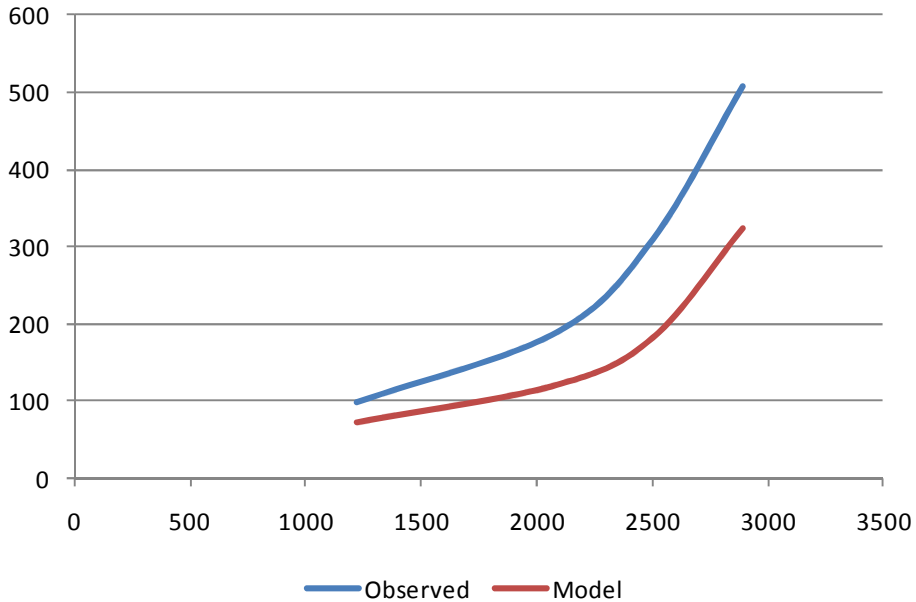
FIGURE 4.3 ROUTE 1 - AM PEAK JOURNEY TIME CALIBRATION



1.2 **Error! Reference source not found.** demonstrates that the model slightly underestimates delay along Eastbury Road towards Bushey Arches.

- 1.3 Route 2 extends 2.892kilometres between B542 Little Oxhey Lane and Aldenham Road. **Error! Reference source not found.** illustrates the difference between observed and modelled journey times in the AM peak period.

FIGURE 4.4 ROUTE 2 - AM PEAK JOURNEY TIME CALIBRATION



- 1.4 **Error! Reference source not found.** demonstrates that the model slightly underestimates delay along this route but maintains a comparable journey time.
- 4.12 Route 3 extends 3.846km between Moor Lane Crossing and Exchange Road. Figure 4.5 and Figure 4.6 demonstrate the difference between observed and modelled journey times along Tolpits Lane/Vicarage Road in the AM and PM peak respectively.
- 4.13 In both peak hours, the model underestimates delay slightly on the approach to the town centre, although overall journey time calibration is closest in the PM peak.

FIGURE 4.5 ROUTE 3 -AM PEAK JOURNEY TIME CALIBRATION

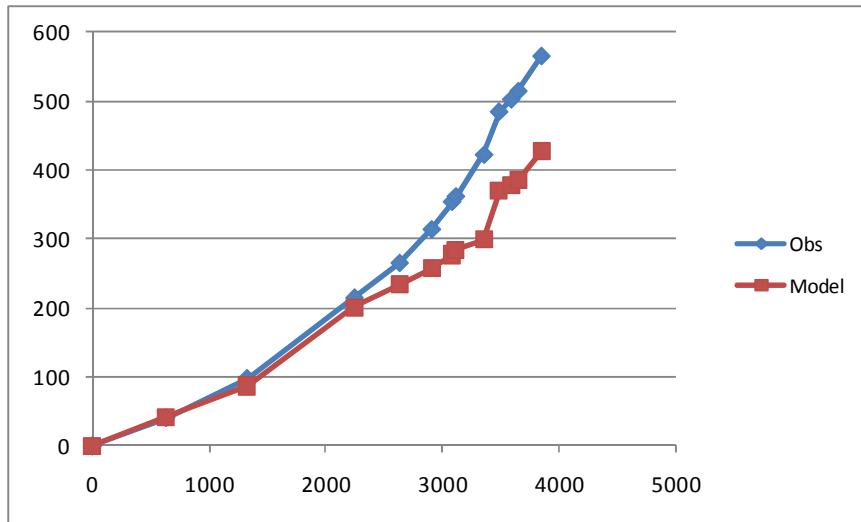
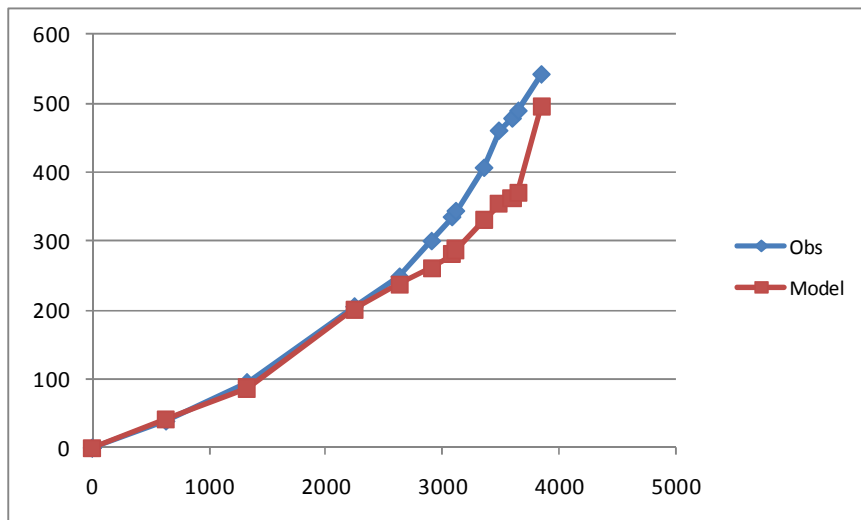


FIGURE 4.6 ROUTE 3 - PM PEAK JOURNEY TIME CALIBRATION



4.14 Route 4 extends 4.035km between All Saints Lane and Cassio Road. Figure 4.7 and Figure 4.8 demonstrate the difference between observed and modelled journey times along Rickmansworth Road in the AM and PM peak respectively.

4.15 Again, the model underestimates delay slightly on approach to the town centre with overall journey time calibration closest in the PM peak.

FIGURE 4.7 ROUTE 4 - AM PEAK JOURNEY TIME CALIBRATION

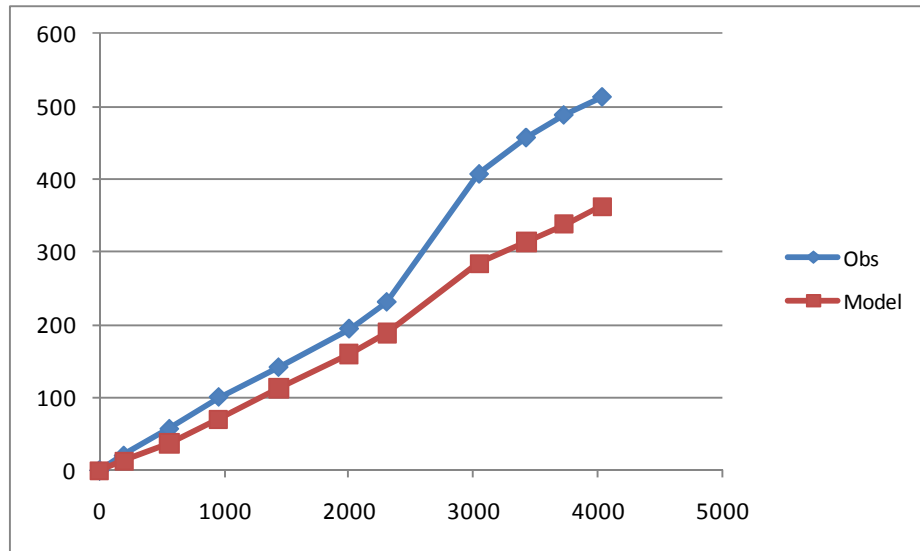
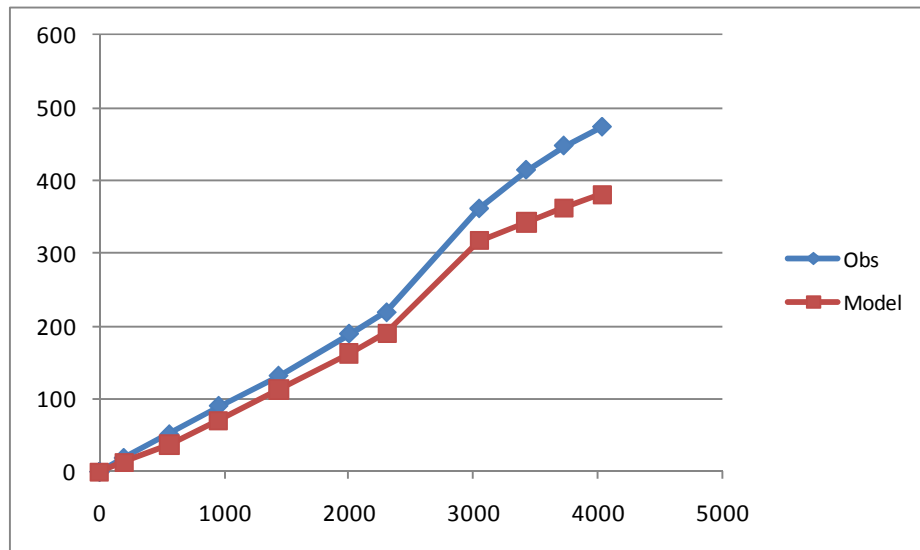
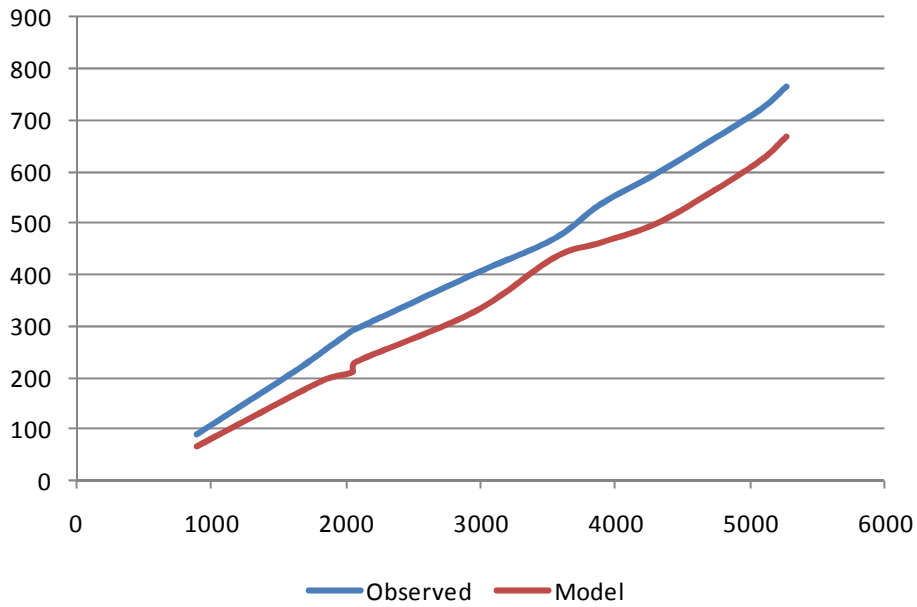


FIGURE 4.8 ROUTE 4 - PM PEAK JOURNEY TIME CALIBRATION



1.5 Route 5 extends 5.264kilometres between the M25 and St Albans Road. Figure 4.9 illustrates the difference between observed and modelled journey times in the AM peak period.

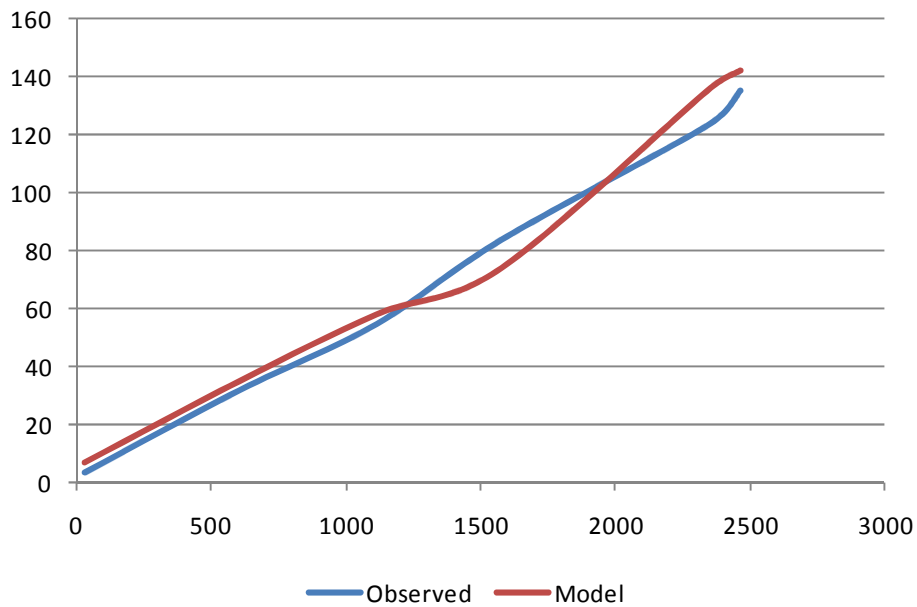
FIGURE 4.9 ROUTE 5 - AM PEAK JOURNEY TIME CALIBRATION



1.6 Figure 4.9 demonstrates that the model slightly underestimates delay along this route however the modelled journey times remain close to the observed values.

1.7 Route 7 extends 2.465kilometres between the A41 and Waterfields Way. Figure 4.10 illustrates the difference between observed and modelled journey times in the AM peak period.

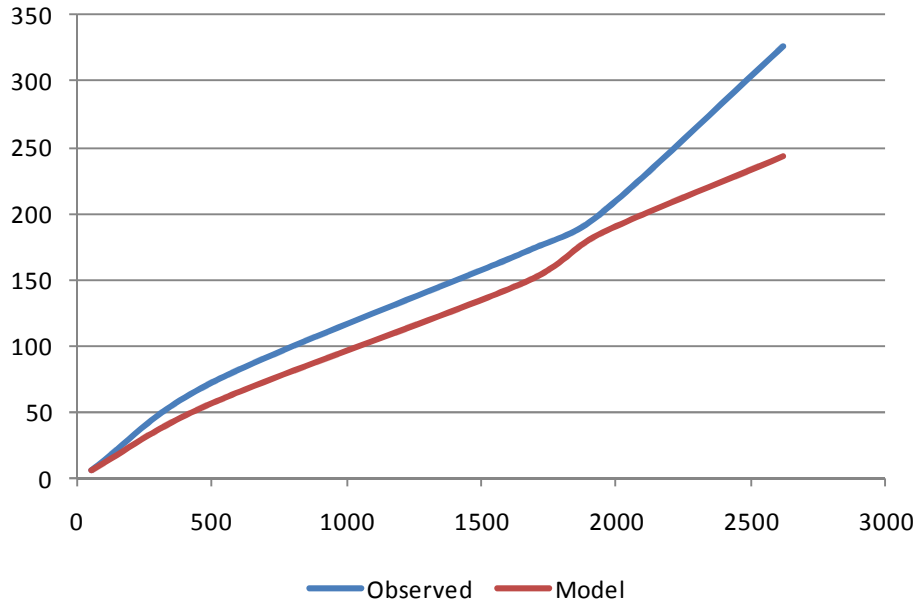
FIGURE 4.10 ROUTE 7 - AM PEAK JOURNEY TIME CALIBRATION



1.8 Figure 4.10 demonstrates that the modelled journey times closely match the observed values.

- 1.9 Route 8 extends 2.616kilometres between the A41 and Chalk Hill. Figure 4.11 illustrates the difference between observed and modelled journey times in the AM peak period.

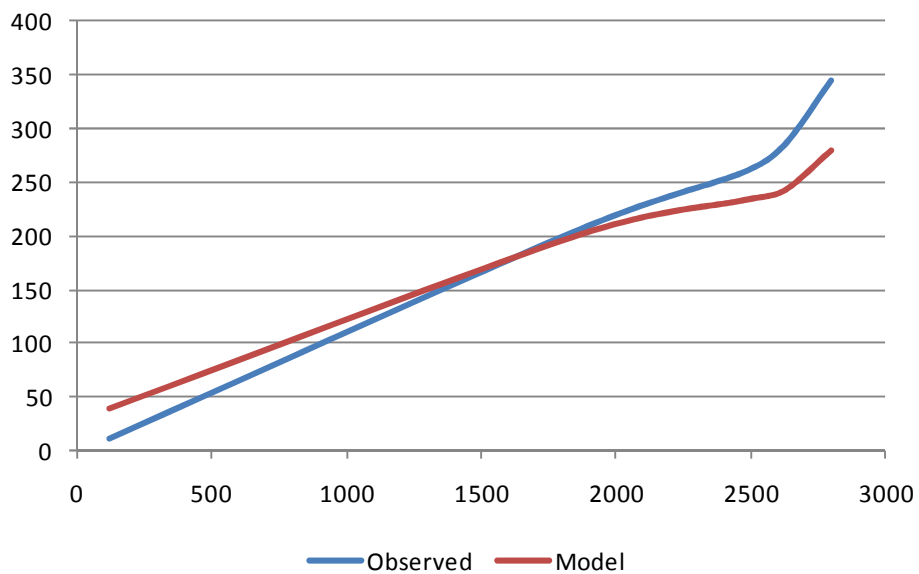
FIGURE 4.11 ROUTE 8 - AM PEAK JOURNEY TIME CALIBRATION



- 1.10 Figure 4.11 demonstrates that the modelled journey times closely match the observed values except toward Bushey Arches where the model slightly underestimates delay.

- 1.11 Route 9 extends 2.795kilometres between Elsetree Road and Aldenham Road. Figure 4.12 illustrates the difference between observed and modelled journey times in the AM peak period.

FIGURE 4.12 ROUTE 9 - AM PEAK JOURNEY TIME CALIBRATION



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1.12 Figure 4.12 demonstrates that overall, the modelled journey times closely match the observed values. It is noted that at the start of the route delay is slightly overestimated and at the end of the route delay is slightly underestimated.

1.13

5 Model Validation - AM and PM Peak

Validation Criteria

- 5.1 Model validation has been evaluated against guidance in Design Manual for Roads and Bridges (DMRB) Volume 12 which includes 'assignment validation acceptability guidelines' for highway traffic models. These acceptability guidelines are summarised in Table 5.1 below.

TABLE 5.1 MODEL VALIDATION GUIDELINES

Criteria and Measures	Acceptability Guideline
Assigned hourly flows compared with observed flows	
1 Individual flows within 100 for flows <700vph	>85%
2 Individual flows within 15% for flows 700-2,700vph	>85%
3 Individual flows within 400 for flows >2,700vph	>85%
4 Total screenline flows (normally >5 links) to be within 5%	All (or nearly all) screenlines
GEH statistic:	
Individual flows: GEH<5	>85%
Screenline totals: GEH<4	All (or nearly all) screenlines

- 5.2 The GEH statistic is a measurement derived to overcome the inability of either the absolute difference or relative difference to cope satisfactorily over a wide range of observed flows. For example, an absolute difference of 100 vehicles would be considered a big difference if both observed and modelled flows are in the order of 10vph, but would be unimportant for flows of several thousand. Equally, a 10% error in 100 vehicles would not be a concern but a 10% error in 3000 may mean the difference between requiring an extra lane or not.

Flow Validation

- 5.3 The updated validation exercise has focused on making best use of available data to improve the model. Along with the 85 link and turn flows used to recalibrate the demand matrices, a further 20 links counts have been retained as independent data against which flow validation is evaluated, as outlined in Section 2.
- 5.4 Table 5.2 provides a summary of the model validation work for the morning peak. Observed link flows and the corresponding modelled flows are provided along with details of the absolute differences, percentage differences and the geh value. Some 90% of assigned flows are within geh<5 of observed, with links closest to the existing and new Croxley rail stations (Screenline 1) providing the closest overall fit.

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TABLE 5.2 AM PEAK MODEL FLOW VALIDATION

Link	A	B	Count	Model	abs	%	geh
Screenline 1 - Eastbound							
Ascot Road	3020	93020	1466	1302	-164	-11.2%	4.4
Whippendell Road	3020	6096	637	766	129	20.3%	4.9
Rickmansworth Road	3019	6047	830	916	86	10.4%	2.9
			2933	2984	51	1.7%	0.9
Screenline 1 - Westbound							
Ascot Road	93020	3020	506	446	-60	-11.9%	2.8
Whippendell Road	6096	3020	714	651	-63	-8.8%	2.4
Rickmansworth Road	6047	3019	852	742	-110	-12.9%	3.9
			2072	1839	-233	-11.2%	5.3
Screenline 2 - Eastbound							
Met Station Approach	6047	9028	26	47	21	80.8%	3.5
Rickmansworth Road	6047	6079	1080	989	-91	-8.4%	2.8
Whippendell Road	6049	6078	423	435	12	2.8%	0.6
Vicarage Road	6050	6098	590	644	54	9.2%	2.2
			2119	2115	-4	-0.2%	0.1
Screenline 2 - Westbound							
Met Station Approach	9028	6047	130	97	-33	-25.4%	3.1
Rickmansworth Road	6079	6047	940	805	-135	-14.4%	4.6
Whippendell Road	6078	6049	460	655	195	42.4%	8.3
Vicarage Road	6098	6050	999	1044	45	4.5%	1.4
			2529	2601	72	2.8%	1.4
Screenline 3 - Northbound							
Wiggenhall Road	4027	7000	658	972	314	47.7%	11.0
Lower High Street	6030	6084	1043	1153	110	10.5%	3.3
Aldenham Road	6031	4031	432	489	57	13.2%	2.7
			2133	2614	481	22.6%	9.9
Screenline 3 - Southbound							
Wiggenhall Road	7000	4027	591	684	93	15.7%	3.7
Lower High Street	6084	6030	761	803	42	5.5%	1.5
Aldenham Road	4031	6031	420	412	-8	-1.9%	0.4
			1772	1899	127	7.2%	3.0

5.5 Similarly, Table 5.3 provides a summary of the model validation work for the evening peak. 85% of assigned flows are within $geh < 5$ of observed, with again links closest to the existing and new Croxley rail stations providing the closest overall fit.

TABLE 5.3 PM PEAK MODEL FLOW VALIDATION

Link	A	B	Count	Model	abs	%	geh
Screenline 1 - Eastbound							
Ascot Road	3020	93020	377	378	1	0.3%	0.1
Whippendell Road	3020	6096	598	605	7	1.2%	0.3
Rickmansworth Road	3019	6047	916	800	-116	-12.7%	4.0
			1891	1783	-108	-5.7%	2.5
Screenline 1 - Westbound							
Ascot Road	93020	3020	1109	1078	-31	-2.8%	0.9
Whippendell Road	6096	3020	761	639	-122	-16.0%	4.6
Rickmansworth Road	6047	3019	794	835	41	5.2%	1.4
			2664	2552	-112	-4.2%	2.2
Screenline 2 - Eastbound							
Met Station Approach	6047	9028	65	33	-32	-49.2%	4.6
Rickmansworth Road	6047	6079	1058	1044	-14	-1.3%	0.4
Whippendell Road	6049	6078	387	307	-80	-20.7%	4.3
Vicarage Road	6050	6098	662	911	249	37.6%	8.9
			2172	2295	123	5.7%	2.6
Screenline 2 - Westbound							
Met Station Approach	9028	6047	52	72	20	38.5%	2.5
Rickmansworth Road	6079	6047	858	818	-40	-4.7%	1.4
Whippendell Road	6078	6049	403	406	3	0.7%	0.1
Vicarage Road	6098	6050	823	924	101	12.3%	3.4
			2136	2220	84	3.9%	1.8
Screenline 3 - Northbound							
Wiggenhall Road	4027	7000	569	732	163	28.6%	6.4
Lower High Street	6030	6084	980	1036	56	5.7%	1.8
Aldenham Road	6031	4031	434	395	-39	-9.0%	1.9
			1983	2163	180	9.1%	4.0
Screenline 3 - Southbound							
Wiggenhall Road	7000	4027	982	1125	143	14.6%	4.4
Lower High Street	6084	6030	992	1280	288	29.0%	8.5
Aldenham Road	4031	6031	437	464	27	6.2%	1.3
			2411	2869	128	5.3%	8.9

Convergence

5.6 Both the AM and PM peak models converge well, as shown in Table 5.4.

TABLE 5.4 MODEL CONVERGENCE SUMMARY

Convergence Criteria	AM Peak	PM Peak
No. of Iterations	48	51
%FLOWS <5%	98.8%	98.8%
%TURNS <5%	97.3%	99.0%
Delta %	0.051	0.040
GAP%	0.070	0.060

Note: Values for Delta and GAP should be as low as possible, ideally less than 0.1%.

6 Inter Peak Model

- 6.1 As indicated earlier the previous model validation exercise demonstrated that the interpeak model validated well³. Although the interpeak model is required for the appraisal work, the upgrade has concentrated on the busiest time periods covered by the AM and PM peak hour models to support the requirement for a Transport Assessment of the Croxley Rail Link scheme, given that impacts will be greatest during these time periods.
- 6.2 However, it is recognised that any changes to the peak hour models, in terms of network coding or zone definitions, should be incorporated into the interpeak model to ensure that this satisfactory level of validation is maintained, and the process for this is described below.
- 6.3 Incorporating the changes made to the cordon area, and updating the model for use with SATURN 10.9.22, indicated that some recalibration of demand was necessary to ensure that the interpeak model continued to provide comparable results in terms of flow calibration across the network.
- 6.4 Only relatively minor adjustments to demand has been required and this has been carried out through manual matrix adjustments, such as seeking to identify cells with unrealistically high values, without recourse to matrix estimation.
- 6.5 The relatively small changes to the interpeak matrix can be demonstrated through comparison of the size of the matrices before , and after, the recalibration exercise. The ‘original’ interpeak matrix contained a total of 40,095 trips, falling to 39,673 trips in the current matrix, a change of just 422 trips or 1.1%.
- 6.6 The comparison of modelled flow to observed flow between the previous model validation report and the updated interpeak model are provided in Table 6.1 below.

TABLE 6.1 INTERPEAK FLOW VALIDATION

		LMVR	Update
All calibration counts (161)	GEH<5	91%	85%
Screenline/cordon counts (39)	GEGH<5	92%	85%
	Flows <700 within 100	90%	93%
	Flows >700 within 15%	90%	80%

- 6.7 For the screenline and cordon counts, Table 6.2 provides a more detailed breakdown of flow comparisons by link and by direction.

³ Watford SATURN Model Update - Local Model Validation Report - Morning Peak, Inter-Peak and Evening Peak (SDG, October 2007)

Local Model Validation Report

TABLE 6.2 INTERPEAK SCREENLINES

Location			Observed	Modelled	Diff.	% Diff.	GEH
	A-Node	B-Node	Count	Flow			
Town Centre Cordon - inbound							
Clarendon Road - inbound	6044	96044	488	496	8	1.7	0.4
Beechen Grove - inbound	6087	6008	1353	1198	-154	-11.5	4.3
Water Lane - inbound	6100	6009	397	416	19	4.8	0.9
Vicarage Road - inbound	6058	6012	380	167	-212	-55.9	12.9
Marlborough Street - inbound	6099	6038	349	349	0	0.0	0.0
Upton Road - inbound	6077	6014	327	280	-46	-14.2	2.7
Beechen Grove - inbound	6059	6006	1292	1058	-233	-18.1	6.8
TOTAL			4586	3964	-618	-13.5	9.5
Town Centre Cordon - outbound							
Clarendon Road - outbound	96044	6044	379	463	84	22.2	4.1
Beechen Grove - outbound	96065	6067	841	909	68	8.1	2.3
Water Lane - outbound	6009	6100	238	242	4	1.5	0.3
Vicarage Road - outbound	6012	6058	361	420	59	16.3	3.0
Market Street - outbound	6013	6037	113	115	2	2.2	0.2
Marlborough Street - outbound	6038	6099	324	230	-93	-29.2	5.6
Upton Road - outbound	6014	6077	169	208	39	22.9	2.8
Beechen Grove - outbound	6060	6059	847	872	25	3.0	0.9
TOTAL			3272	3459	188	5.7	3.2
Northern Screenline - inbound							
A411 Hempstead Road	5086	5020	754	805	51	6.8	1.8
Ashfields	7111	5079	964	991	27	2.8	0.9
St Albans Road	5053	5082	395	408	13	3.4	0.6
Woodmere Avenue	5038	5070	304	191	-112	-37.3	7.2
Stephenson Way	5027	5010	1610	1711	101	6.3	2.5
Hartspring Lane	4020	4023	274	288	14	5.2	0.8
TOTAL			4301	4394	93	2.2	1.4
Northern Screenline - outbound							
A411 Hempstead Road	5020	5086	560	497	-62	-11.2	2.7
Ashfields	5079	7111	559	639	80	14.3	3.3
St Albans Road	5082	5054	387	448	61	15.7	3.0
Woodmere Avenue	5070	5038	148	169	21	14.2	1.7
Stephenson Way	5015	5027	1322	1000	-321	-24.3	9.5
Hartspring Lane	4023	4020	248	207	-40	-16.6	2.7
TOTAL			3224	2960	-264	-8.2	4.7
Southern Screenline - inbound							
London Road	4009	4010	398	437	39	9.8	1.9
Oxhey Lane	4037	4016	498	473	-24	-5.0	1.1
Prestwick Road	4034	94034	296	309	13	4.4	0.7
Hampermill Lane	94017	4018	491	566	75	15.3	3.3
Tolpits Lane	3021	3018	322	364	42	12.9	2.3
Rickmansworth Road	3016	3019	857	737	-119	-14.1	4.3
TOTAL			2862	2886	24	0.8	0.4
Southern Screenline - outbound							
London Road	4010	4009	402	425	23	5.7	1.1
Oxhey Lane	4016	4037	465	473	8	1.8	0.4
Prestwick Road	94034	4034	301	313	12	4.1	0.7
Hampermill Lane	4018	94017	398	492	94	23.7	4.5
Tolpits Lane	3018	3021	331	241	-89	-27.2	5.3
Rickmansworth Road	3019	3016	1075	1193	118	11.0	3.5
TOTAL			2972	3137	165	5.6	3.0

- 6.8 While only minor adjustments have been carried out to the interpeak model, it is considered suitable for use to derive interpeak costs for input to the scheme appraisal process.
- 6.9 The interpeak model has not been updated to a 2010 Base Year and, as such remains a 2006 base. Although peak hour traffic levels in Watford have been assumed relatively constant in the peak hours, there is more variation in interpeak levels. This needs to be considered for any subsequent creation of future year interpeak models.

7 Summary and Conclusions

- 7.1 The need to upgrade the Watford SATURN model is twofold. First, a Transport Assessment of the impact of the Croxley Rail Link proposals is required to support the planning process for the scheme and it has been acknowledged that the peak period validation of the existing model was poor in the vicinity of the scheme proposals. An upgrade to the model will also provide more reliable highways inputs to the appraisal process, and go some way to addressing previously raised concerns over the use of the existing model in earlier scheme appraisals.
- 7.2 It was agreed with the model owners, Hertfordshire County Council, that any upgrade would be undertaken using available traffic data collected since 2007, and that no additional data collection would be required.
- 7.3 Use of the most recent traffic data has enabled the AM and PM peak Base Year to be updated to 2010.
- 7.4 It was further agreed that although the model will be used to provide inputs to scheme appraisal, the upgrade should focus on the area most likely to be impacted by the Croxley Rail Link proposals, including extension to include Watford Junction station and the town centre. This area is referred to as the cordon area.
- 7.5 Hertfordshire County Council (HCC) made the following data available:
- Automatic Traffic Count Data (13 sites) - HCC, 2010
 - Recent Watford Met Survey Data - Steer Davies Gleave, 2010
 - Rickmansworth Road Turning Counts (5 junctions) - Hyder, 2008
 - Miscellaneous data contained within Transport Assessments (3 sites)
- 7.6 When using this data, it has been assumed that peak hour growth in Watford has been negligible in recent years and the Base Year for the updated model is 2010.
- 7.7 A thorough review of network coding for the cordon area has been undertaken and relatively minor coding changes have been made, such as revisions to turn priority markers and to link speeds to better reflect observed journey times along Rickmansworth Road and Tolpits Lane.
- 7.8 The cordon matrices have been recalibrated to observed 2010 flows. Where possible, calibration of modelled flows to link/turn counts has been dealt with manually alongside the network calibration stage outlined in Section 3. However, matrix estimation (SATPIJA/SATME2) has been used to attempt to improve the match against some 85 counts. Trips into and out of the Watford Metropolitan station zone have been 'frozen' during the matrix estimation exercise.
- 7.9 As a result of the matrix recalibration to a 2010 Base Year, both the AM and PM matrices for the cordon area reduced in size by between 12% and 14%. Given that the 2006 Base Year model validation generally indicated that model flows were higher than observed, this is not an unexpected result.

- 7.10 The updated validation exercise has focused on making best use of available data to improve the model. Along with the 85 link and turning flows used to recalibrate the demand matrices, a further 20 links counts have been retained as independent data against which flow validation is evaluated.
- 7.11 In the morning peak, some 90% of assigned flows are within $\text{geh} < 5$ of observed, with a corresponding value of 85% in the evening peak. In both cases, links closest to the existing and new Croxley rail stations provide the closest overall fit.
- 7.12 The previous model validation exercise demonstrated that the interpeak model validated well.
- 7.13 Although the interpeak model is not required for the Transport Assessment work, it is recognised that any changes to the peak hour models in terms of network coding or zone definitions should be incorporated into the interpeak model to ensure that this satisfactory level of validation is not 'lost'. As such an update of the interpeak calibration has been completed.
- 7.14 Only relatively minor adjustments to interpeak demand has been required and this has been carried out through manual matrix adjustments without recourse to matrix estimation. The resulting upgrade to the interpeak model demonstrates that 85% of overall link flow comparisons are within $\text{geh} < 5$.

Conclusions

- 7.15 The update to the cordon area most likely to be impacted by the Croxley Rail Link proposals provides improved validation in the AM and PM peaks than was previously achieved. It is therefore considered that the updated AM and PM peak hour models are suitable for use both in the Transport Assessment for the scheme and the scheme appraisal.
- 7.16 While only minor adjustments have been carried out to the interpeak model it is considered suitable for use deriving interpeak costs for input to the scheme appraisal process. In addition, the interpeak model has not been updated to a 2010 Base Year and, as such remains a 2006 base. This needs to be considered for any subsequent creation of future year interpeak models.

APPENDIX

A

TRAFFIC COUNT DATA

A1 2010 ATC DATA

			00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
Site 361 A4178 Wiggenshall Road	Apr-10	Northbound	54	33	28	21	26	79	252	727	658	692	591	581	522	554	580	591	574	569	593	526	368	294	232	152
		Southbound	77	42	30	26	25	106	234	550	591	576	555	615	673	675	734	813	916	982	810	611	481	397	262	179
Site 378 A4008 Stephenson Way (M1 Link)	Sep-10	Westbound	260	156	122	133	142	342	1058	2628	3252	2543	1852	1863	2030	2022	2112	2409	2671	3249	2903	1899	1221	913	729	476
		Eastbound	149	86	86	117	119	275	795	1639	1538	1128	1053	1214	1372	1366	1461	1550	2002	2076	1765	1147	776	560	409	270
Site 423 Whippendell Road	Apr-10	Eastbound	33	17	13	14	15	40	128	291	423	363	279	280	310	314	322	364	404	387	395	299	227	128	127	81
		Westbound	37	26	16	15	20	49	90	333	466	328	206	250	287	293	322	344	345	403	387	262	189	158	139	102
Site 424 A4145 Vicarage Road	Apr-10	Eastbound	53	29	26	20	30	66	208	469	590	494	489	494	532	519	554	597	637	662	564	550	419	299	171	117
		Westbound	55	35	32	20	29	90	346	986	999	758	666	652	674	766	801	787	743	823	813	638	401	315	236	156
Site 781 Beechen Grove (adj. Derby Road)	Apr-10	Clockwise	130	75	87	78	71	193	619	1446	1658	1501	1550	1698	1883	1869	1924	1985	2263	2494	1875	1261	851	677	470	303
Site 782 Exchange Road (adj Lady's Close)	Apr-10	Clockwise	133	77	66	41	63	132	489	1626	2157	1559	1382	1489	1626	1700	1666	1680	1704	1847	1638	1230	807	616	508	321
Site 783 Exchange Road (Marlborough Road)	Apr-10	Clockwise	175	105	89	62	65	165	561	1486	2216	1680	1561	1743	1867	1860	1885	1957	2060	2129	1739	1323	977	785	592	380
Site 784 Beechen Grove (adj. Upton Road)	Apr-10	Clockwise	206	135	119	85	65	166	530	1296	1986	1739	1615	1799	1908	1884	1937	1982	2102	2150	1690	1312	988	813	623	405
Site 785 A411 Beechen Grove	Apr-10	Eastbound	78	49	46	58	44	110	392	1108	1453	1222	1063	1001	1033	1003	959	1077	1075	1125	946	751	477	360	264	181
Site 786 A412 St Albans Road	Nov-10	Northbound	110	59	50	55	54	159	302	744	1095	952	890	933	1060	1058	1080	1128	1232	1300	1092	873	629	555	384	264
		Southbound	111	48	40	29	51	132	364	842	837	761	746	744	807	849	836	857	849	893	818	719	552	421	338	229
Site 788 A4008 Pinner Road	Apr-10	Southbound	58	29	26	21	25	78	227	552	614	451	394	434	468	473	475	568	639	737	664	495	388	285	222	134
		Northbound	77	38	35	31	52	120	305	426	306	425	430	400	405	393	400	399	346	288	389	441	340	267	254	128
Site 789 B462 Aldenham Road	Apr-01	Southbound	21	13	8	7	13	38	138	392	377	325	307	338	347	353	354	379	380	420	419	342	268	181	145	66
		Northbound	21	12	10	12	19	60	163	375	412	360	363	353	366	356	377	402	408	421	410	343	222	142	103	58
Site 791 A4125 Eastbury Road	Apr-10	Westbound	103	57	34	29	47	119	440	1098	1047	861	851	892	892	855	889	947	1107	1150	1103	942	774	592	453	288
		Eastbound	52	24	17	33	42	151	381	744	783	730	673	684	702	684	675	700	741	743	684	609	412	302	200	118

APPENDIX

B

JOURNEY TIME DATA

Local Model Validation Report

B1 ROUTE 1: A4125 SANDY LANE/HAMPERHILL LANE

Route 1: A4125 Sandy Lane/Hamperhill Lane

Start point - The Woods

Start point - R'about Waterfields Way

LinkID	RNum	Start	End	Start Node	End Node	Link length	Time (s)
400000030137650B	A4125	The Woods	Apollo Ave	4022	-	158	13.61
400000030097205B	A4125	Apollo Ave	Unknown (Private Driveway)	-	-	309	21.68
400000030700465B	A4125	Unknown (Private Driveway)	Unknown (Private Driveway)	-	-	73	4.71
400000030327810B	A4125	Unknown (Private Driveway)	Unknown (Private Driveway)	-	-	52	3.34
400000030137651B	A4125	Unknown (Private Driveway)	Unknown (Private Driveway)	-	-	205	14.41
400000030701270B	A4125	Unknown (Private Driveway)	Batchwood Lane	-	4032	30	2.36
400000030700573B	A4125	Batchwood Lane	Batchwood Lane	4032	-	3	0.22
400000030225925B	A4125	Batchwood Lane	Unknown	-	-	108	9.62
400000030098034B	A4125	Unknown	Westbury Road	-	4033	292	21.35
400000030225926B	A4125	Westbury Road	Hayling Road	4033	-	108	9.06
400000030098039B	A4125	Hayling Road	Sandy Lodge Lane	-	4017	350	28.46
400000030140509B	A4125	Sandy Lodge Lane	Unknown	4017	-	205	18.59
400000030098038B	A4125	Unknown	Unclassified (pumping station)	-	-	383	36.27
400000030331925A	A4125	Unclassified (pumping station)	Unclassified (pumping station)	-	94017	76	8.25
400000030140555A	A4125	Unknown (pumping station)	Vivian Gardens	94017	-	188	24.41
400000030226052B	A4125	Vivian Gardens	Hillcroft Crescent	-	-	83	13.33
400000030140588A	A4125	Hillcroft Crescent	Private Driveway (Oxhey Hall)	-	-	127	23.82
400000030332125A	A4125	Private Driveway (Oxhey Hall)	Oaklands Avenue	-	-	37	7.05
400000030226116B	A4125	Unknown (en-bloc garages)	Raglan Gardens	-	-	178	20.93
400000030140587A	A4125	Raglan Gardens	Brookdene Avenue	-	4018	180	54.64
400000030332126A	A4125	Brookdene Avenue	Unclassified	4018	-	62	15.39
400000030332124A	A4125	Post Office	Thorpe Crescent	-	-	102	24.07
400000030226118A	A4125	Thorpe Crescent	Silk Mill Road	-	-	64	14.98
400000030412426A	A4125	Silk Mill Road	Thorpe Crescent	-	-	44	10.64
400000030332137B	A4125	Thorpe Crescent	Longcroft	-	-	65	16.3
400000030700584B	A4125	Longcroft	Colne Avenue	-	-	148	38.42
400000030332151A	A4125	Colne Avenue	Blackwell Drive	-	94019	58	16.23
400000030226146B	A4125	Blackwell Drive	Unknown	94019	-	104	40.62
400000031047497B	A4125	Unknown	Oxhey Road	-	4019	30	13.87
400000031047493B	A4125	Oxhey Road	Unknown	4019	-	37	4.13
400000030082034B	A4125	Unknown	Oakview Close	-	-	161	18.82
400000030701023B	A4125	Oakview Close	Manning Court	-	-	58	7.64
400000030700431B	A4125	Manning Court	Kingsfield Road	-	4026	191	31.73
400000030226166B	A4125	Kingsfield Road	St Matthews Close	4026	-	100	18.02
400000030332171B	A4125	St Matthews Close	Unknown	-	-	44	8.73
400000030226172B	A4125	St Matthews Close	R'about Waterfields Way Approach	-	-	97	24.34
400000030332175B	A4125	R'about Waterfields Way Approach	R'about Waterfields Way	-	6030	17	7.28

Local Model Validation ReportLocal Model Validation Report

B2 ROUTE 2: A4008 OXHEY LANE

Route 2: A4008 Oxhey Lane

Start point - B4542

Start point - Aldenham Road

LinkID	RNum	Start	End	Start Node	End Node	Link length	Time (s)
4000000031233543A	A4008	B4542	Unknown	4015	-	64	5.73
4000000030140852B	A4008	Unknown	Unclassified (Cemetery Entrance)	-	-	219	14.84
4000000030098056B	A4008	Unclassified (Cemetery Entrance)	Highfield	-	-	379	31.72
4000000030140578B	A4008	Unclassified (Carpenters Park Farm)	Carpenters Avenue	-	-	157	12.4
4000000030098065B	A4008	Carpenters Avenue	By the Wood	-	4037	403	34.57
4000000030140577B	A4008	By the Wood	Unclassified (Brickfield Farm)	4037	-	325	28.8
4000000031206197B	A4008	Unclassified (Brickfield Farm)	Unclassified (Oxhey Grange)	-	-	206	20.91
4000000030140608B	A4008	Unclassified (Oxhey Grange)	Unknown	-	-	223	24.61
4000000030456211A	A4008	Unknown	Sherwoods Road	-	-	14	1.73
4000000030412454A	A4008	Sherwoods Road	Watford Heath	-	-	26	3.61
4000000030332161A	A4008	Watford Heath	Unknown	-	-	37	5.39
4000000030412452A	A4008	Unknown	Watford Heath	-	4016	33	5.44
4000000030412453B	A4008	Watford Heath	Vera Court	4016	-	29	5.97
4000000030140609B	A4008	Vera Court	Unknown	-	-	170	43.52
4000000030226155B	A4008	Unknown	Heath Road	-	-	87	26.18
4000000030332170A	A4008	Heath Road	Bucks Avenue	-	-	58	19.18
4000000030332169A	A4008	Bucks Avenue	Firbank Drive	-	-	51	18.52
4000000030412459A	A4008	Firbank Drive	Villiers Road	-	4025	22	7.31
4000000030226167B	A4008	Villiers Road	Oxhey Avenue	4025	-	128	46.2
4000000030332172A	A4008	Oxhey Avenue	Hillside Crescent	-	-	39	22.28
4000000030332177A	A4008	Hillside Crescent	Grover Road	-	-	36	18.75
4000000031004765A	A4008	Grover Road	Caroline Place	-	-	43	24.41
4000000030140618A	A4008	Caroline Place	Capel Road	-	-	89	62.01
4000000030412465A	A4008	Capel Road	Aldenham Road	-	-	36	21.67
4000000030456213A	A4008	Aldenham Road	Aldenham Road	-	6032	18	2.95

Local Model Validation Report

ROUTE 3 - TOLPITS LANE/VICARAGE ROAD - AM PEAK

Route No. 3: Moor Lane/Tolpits Lane
 Start point - A414/A412 Junction, beside Police Station
 End point - Vicarage Road/Exchange Road

LinkID	RNum	Start	End	Start Node	End Node	Link length	Time (s)
400000030140510A	A4145	Moor Lane Crossing	Century Court	3117	-	124	8.09
400000030140512A	A4145	Century Court	Dwight Road	-	-	206	14.04
4000000301030798A	A4145	Dwight Road	Dwight Road	-	-	23	1.36
400000030098044A	A4145	Dwight Road	R'about Dwight Road Approach	-	3021	279	17.19
400000030331932A	A4145	R'about Dwight Road Approach	Dwight Road	3021	3021	42	4.53
400000030456132A	A4145	Dwight Road	Dwight Road	3021	3021	17	1.6
400000030456131A	A4145	Dwight Road	R'about Dwight Road Exit	3021	3021	11	0.94
400000030331934A	A4145	R'about Dwight Road Exit	Unknown	3021	-	48	4.55
400000030098047A	A4145	Unknown	Chenies Way	-	-	436	33.22
400000030225953A	A4145	Chenies Way	Chaffinch Lane	-	3018	139	12.48
400000030225954A	A4145	Chaffinch Lane	Chenies Way	3018	-	77	7.8
400000030225955A	A4145	Chenies Way	Benneck House	-	-	116	10.81
400000030480448A	A4145	Benneck House	Redding House	-	-	42	6.5
400000030959300A	A4145	Redding House	Unclassified (School Entrance)	-	-	41	4.71
400000030331975A	A4145	Unclassified (School Entrance)	Croxley View	-	-	50	5.5
400000030225956A	A4145	Croxley View	Unknown	-	-	73	8.96
400000031064021A	A4145	Unknown	Unclassified	-	-	12	1.37
400000031064019A	A4145	Unclassified	Unclassified	-	-	9	1.14
400000030456170A	A4145	Unclassified	Tolpits Lane	-	-	11	1.61
400000030456169A	A4145	Tolpits Lane	Tolpits Lane	-	-	18	2.88
400000030331974A	A4145	Tolpits Lane	Croxley View	-	-	74	18.39
400000030331972A	A4145	Croxley View	Unknown	-	-	60	6.78
400000030225971A	A4145	Unknown	Scammell Way	-	-	94	9.82
400000030456186A	A4145	Scammell Way	Scammell Way	-	-	12	1.23
400000030456187A	A4145	Scammell Way	Tolpits Close	-	-	194	21.9
400000030412534A	A4145	Tolpits Close	Hagden Lane	-	6035	37	7.43
400000030226241A	A4145	Hagden Lane	Belgrave Ave	6035	-	76	10.4
400000030226242A	A4145	Belgrave Ave	Unclassified	-	-	94	10.67
400000031050631A	A4145	Unclassified	Kelmscott Crescent	-	-	65	11.91
400000030140666A	A4145	Kelmscott Crescent	Queens Avenue	-	6034	152	17.52
400000030412536A	A4145	Queens Avenue	Benskin Road	6034	-	28	4.75
400000030332276B	A4145	Benskin Road	Kelmscott Crescent	-	-	55	7.99
400000030332279B	A4145	Brightwell Road	Holywell Road	-	-	76	11.78
400000030456240B	A4145	Kelmscott Crescent	Brightwell Road	-	-	19	2.9
400000030332277B	A4145	Holywell Road	Unknown	-	-	55	9.59
400000030332278B	A4145	Unknown	Willow Lane	-	6033	42	11.52
400000030140705B	A4145	Willow Lane	Unclassified (Hospital Entrance)	6033	96050	173	39.98
400000030700586B	A4145	Unclassified (Hospital Entrance)	Harwoods Road	96050	6050	33	8.02
400000030226321B	A4145	Harwoods Road	Banbury Street	6050	-	59	11.31
400000030140706B	A4145	Banbury Street	Occupation Road	-	-	166	43.85
400000030412599B	A4145	Occupation Road	Aynho Street	-	6098	16	5.17
400000030226322B	A4145	Aynho Street	Farraline Road	6098	6016	128	62.29
400000030456260B	A4145	Farraline Road	Farraline Road	6016	6016	12	2.15
400000030332338A	A4145	Fearnley Street	Merton Road	-	6057	54	9.71
400000030332339A	A4145	Farraline Road	Fearnley Street	6016	-	39	6.01
400000030456261A	A4145	Merton Road	Merton Road	6057	6057	10	1.94
400000030456262A	A4145	Merton Road	Merton Road	6057	6057	13	3
400000030456258A	A4178	Merton Road	Merton Road	6057	-	17	3.81
400000030412595B	A4145	Merton Road	Vicarage Road	-	6058	21	3.46
400000030226355A	A4145	Vicarage Road	Lady's Close	6058	-	153	25.24
400000030412611A	A4145	Lady's Close	Exchange Road	-	-	28	13.81
400000030456278A	A4145	Exchange Road	Exchange Road	-	6012	17	11.7

Local Model Validation Report

B3 ROUTE 3 - TOLPITS LANE/VICARAGE ROAD - PM PEAK

Route No. 3: Moor Lane/Tolpits Lane
 Start point - A414/A412 Junction, beside Police Station
 End point - Vicarage Road/Exchange Road

LinkID	RNum	Start	End	Start Node	End Node	Link length	Time (s)
4000000030140510A	A4145	Moor Lane Crossing	Century Court	3117	-	124	7.36
4000000030140512A	A4145	Century Court	Dwight Road	-	-	206	13.01
4000000031030798A	A4145	Dwight Road	Dwight Road	-	-	23	1.28
4000000030098044A	A4145	Dwight Road	R'about Dwight Road Approach	-	3021	279	17.12
4000000030331932A	A4145	R'about Dwight Road Approach	Dwight Road	3021	3021	42	4.03
4000000030456132A	A4145	Dwight Road	Dwight Road	3021	3021	17	1.3
4000000030456131A	A4145	Dwight Road	R'about Dwight Road Exit	3021	3021	11	0.93
4000000030331934A	A4145	R'about Dwight Road Exit	Unknown	3021	-	48	4.45
4000000030098047A	A4145	Unknown	Chenies Way	-	-	436	32.98
4000000030225953A	A4145	Chenies Way	Chaffinch Lane	-	3018	139	12.51
4000000030225954A	A4145	Chaffinch Lane	Chenies Way	3018	-	77	7.39
4000000030225955A	A4145	Chenies Way	Benneck House	-	-	116	10.62
4000000030480448A	A4145	Benneck House	Redding House	-	-	42	4.52
4000000030959300A	A4145	Redding House	Unclassified (School Entrance)	-	-	41	3.66
4000000030331975A	A4145	Unclassified (School Entrance)	Croxley View	-	-	50	4.72
4000000030225956A	A4145	Croxley View	Unknown	-	-	73	7.85
4000000031064021A	A4145	Unknown	Unclassified	-	-	12	1.35
4000000031064019A	A4145	Unclassified	Unclassified	-	-	9	1.12
4000000030456170A	A4145	Unclassified	Tolpits Lane	-	-	11	1.34
4000000030456169A	A4145	Tolpits Lane	Tolpits Lane	-	-	18	2.82
4000000030331974A	A4145	Tolpits Lane	Croxley View	-	-	74	15.11
4000000030331972A	A4145	Croxley View	Unknown	-	-	60	6.58
4000000030225971A	A4145	Unknown	Scammell Way	-	-	94	10.22
4000000030456186A	A4145	Scammell Way	Scammell Way	-	-	12	1.31
4000000030456187A	A4145	Scammell Way	Tolpits Close	-	-	194	23.93
4000000030412534A	A4145	Tolpits Close	Hagden Lane	-	6035	37	7.37
4000000030226241A	A4145	Hagden Lane	Belgrave Ave	6035	-	76	9.73
4000000030226242A	A4145	Belgrave Ave	Unclassified	-	-	94	9.52
4000000031050631A	A4145	Unclassified	Kelmescott Crescent	-	-	65	7.36
4000000030140666A	A4145	Kelmescott Crescent	Queens Avenue	-	6034	152	16.85
4000000030412536A	A4145	Queens Avenue	Benskin Road	6034	-	28	4.47
4000000030332276B	A4145	Benskin Road	Kelmescott Crescent	-	-	55	8.58
4000000030332279B	A4145	Brightwell Road	Holywell Road	-	-	76	13.94
4000000030456240B	A4145	Kelmescott Crescent	Brightwell Road	-	-	19	3.66
4000000030332277B	A4145	Holywell Road	Unknown	-	-	55	11.15
4000000030332278B	A4145	Unknown	Willow Lane	-	6033	42	9.82
4000000030140705B	A4145	Willow Lane	Unclassified (Hospital Entrance)	6033	96050	173	34.75
4000000030700586B	A4145	Unclassified (Hospital Entrance)	Harwoods Road	96050	6050	33	8.68
4000000030226321B	A4145	Harwoods Road	Banbury Street	6050	-	59	14.46
4000000030140706B	A4145	Banbury Street	Occupation Road	-	-	166	44.48
4000000030412599B	A4145	Occupation Road	Aynho Street	-	6098	16	3.73
4000000030226322B	A4145	Aynho Street	Farraline Road	6098	6016	128	53.74
4000000030456260B	A4145	Farraline Road	Farraline Road	6016	6016	12	2.08
4000000030332338A	A4145	Fearnley Street	Merton Road	-	6057	54	7.97
4000000030332339A	A4145	Farraline Road	Fearnley Street	6016	-	39	6.16
4000000030456261A	A4145	Merton Road	Merton Road	6057	6057	10	1.72
4000000030456262A	A4145	Merton Road	Merton Road	6057	6057	13	2.84
4000000030456258A	A4178	Merton Road	Merton Road	6057	-	17	3.51
4000000030412595B	A4145	Merton Road	Vicarage Road	-	6058	21	4.71
4000000030226355A	A4145	Vicarage Road	Lady's Close	6058	-	153	28.1
4000000030412611A	A4145	Lady's Close	Exchange Road	-	-	28	11.61
4000000030456278A	A4145	Exchange Road	Exchange Road	-	6012	17	12.98

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B4 ROUTE 4 - RICKMANSWORTH ROAD - AM PEAK

Route No. 4: A412 Watford Road/Rickmansworth Road
 Start point – A414/A412 Junction, beside Police Station
 End point – A412 Rickmansworth Road j/w Cassio Road

LinkID	RNum	Start	End	Start Node	End Node	Link length	Time (s)
400000030326028B	A412	The Green	All Saints Lane	3014	-	60	7.91
400000030136435B	A412	All Saints Lane	Yorke Road	-	3050	133	12.49
400000030218672B	A412	Yorke Road	Bateman Road	3050	-	59	5.19
400000030136443B	A412	Bateman Road	Harvey Road	-	-	261	26.99
400000030218673B	A412	Harvey Road	Dickinson Square	-	3015	46	4.56
400000030326040A	A412	Dickinson Square	Gonville Avenue	3015	-	55	5.31
400000030218671A	A412	Gonville Avenue	Gonville Avenue	-	-	103	10.55
400000030326042A	A412	Gonville Avenue	The Crescent	-	-	31	3.66
400000030218670A	A412	The Crescent	The New Road	-	-	195	22.85
400000030412285A	A412	The New Road	Winton Drive	-	3043	13	1.4
400000030140513A	A412	Winton Drive	Frankland Road	3043	-	107	10.1
4000000301019785A	A412	Frankland Road	Unknown	-	-	23	2.19
400000030331936A	A412	Unknown	Hazelwood Road	-	-	31	2.87
400000030140631A	A412	Hazelwood Road	Unknown	-	-	235	18.31
400000030226191A	A412	Unknown	Valley Walk	-	3037	85	7.43
400000030226190A	A412	Valley Walk	Winton Approach	3037	-	167	18.1
400000030226192A	A412	Winton Approach	Sycamore Approach	-	-	87	7.7
400000030595676A	A412	Sycamore Approach	Sycamore Approach	-	-	11	0.88
400000030140645A	A412	Sycamore Approach	Dorrofield Close	-	-	112	8.26
400000030412488A	A412	Dorrofield Close	Unknown (Pub Entrance)	-	-	153	12.51
400000030332216A	A412	Unknown (Pub Entrance)	R'about Baldwins Lane	-	3016	36	5.38
400000030456220A	A412	R'about Baldwins Lane	Baldwins Lane	3016	3016	15	1.67
400000030412492A	A412	Baldwins Lane	Baldwins Lane	3016	3016	21	2.05
400000030332214A	A412	Baldwins Lane	R'about Baldwins Lane Exit	3016	3016	34	4.22
400000030226198A	A412	R'about Baldwins Lane Exit	Unknown	3016	-	169	18.79
400000031037512A	A412	Unknown	R'about A412	-	3019	64	9.98
400000030412493A	A412	R'about A412	Arm 1	3019	3019	28	3.99
400000030226199B	A412	Arm 1	R'about A412 Exit	3019	3019	69	14.78
400000030474447B	A412	R'about A412 Exit	Unknown	3019	-	4	0.67
400000030226225B	A412	Unknown	Gade Avenue	-	-	89	15.09
400000030332250B	A412	Gade Avenue	Maythorne Close	-	-	54	10.96
400000030456230B	A412	Maythorne Close	Cassiobridge Road	-	-	65	14.54
400000030332251B	A412	Cassiobridge Road	Gade Close	-	-	43	10.07
400000030479318B	A412	Gade Close	The Chase	-	-	55	14.1
400000030332253B	A412	The Chase	The Chase	-	-	42	10.25
400000030959298B	A412	The Chase	Unknown (Observer Drive)	-	-	116	28.74
400000030098097B	A412	Unknown (Observer Drive)	Unknown	-	-	157	46.66
400000030908161B	A412	Unknown	Metropolitan Station Approach	-	6047	20	5.8
400000030908157B	A412	Metropolitan Station Approach	Queens Avenue	6047	-	18	2.44
400000030908160B	A412	Queens Avenue	Unknown	-	-	23	2.88
400000030908158B	A412	Unknown	Unknown	-	-	22	2.49
400000030140678B	A412	Unknown	Unknown (School Entrance)	-	-	71	8.81
400000030226264B	A412	Unknown (School Entrance)	Shepherds Road	-	-	110	15.21
400000030226265B	A412	Shepherds Road	Harwoods Road	-	6079	133	17.99
400000030098100A	A412	Harwoods Road	Unknown	6079	-	273	28.06
400000030412559A	A412	Unknown	Park Avenue	-	6017	30	3.03
400000030456244A	A412	Park Avenue	Cassiobury Park Avenue	6017	6017	16	1.34
400000030140721A	A412	Cassiobury Park Avenue	A4178 Cassio Road	6017	6018	291	23.33

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B5 ROUTE 4 - RICKMANSWORTH ROAD - PM PEAK

Route No. 4: A412 Watford Road/Rickmansworth Road
 Start point – A414/A412 Junction, beside Police Station
 End point – A412 Rickmansworth Road j/w Cassio Road

LinkID	RNum	Start	End	Start Node	End Node	Link length	Time (s)
4000000030326028B	A412	The Green	All Saints Lane	3014	-	60	7.59
4000000030136435B	A412	All Saints Lane	Yorke Road	3014	3050	133	11.57
4000000030218672B	A412	Yorke Road	Bateman Road	3050	-	59	5.18
4000000030136443B	A412	Bateman Road	Harvey Road	-	-	261	23.34
4000000030218673B	A412	Harvey Road	Dickinson Square	-	3015	46	3.92
4000000030326040A	A412	Dickinson Square	Gonville Avenue	3015	-	55	4.66
4000000030218671A	A412	Gonville Avenue	Gonville Avenue	-	-	103	8.68
4000000030326042A	A412	Gonville Avenue	The Crescent	-	-	31	3.48
4000000030218670A	A412	The Crescent	The New Road	-	-	195	20.7
4000000030412285A	A412	The New Road	Winton Drive	-	3043	13	1.4
4000000030140513A	A412	Winton Drive	Frankland Road	3043	-	107	9.99
4000000031019785A	A412	Frankland Road	Unknown	-	-	23	2.07
4000000030331936A	A412	Unknown	Hazelwood Road	-	-	31	2.95
4000000030140631A	A412	Hazelwood Road	Unknown	-	-	235	18.42
4000000030226191A	A412	Unknown	Valley Walk	-	3037	85	7.89
4000000030226190A	A412	Valley Walk	Winton Approach	3037	-	167	21.41
4000000030226192A	A412	Winton Approach	Sycamore Approach	-	-	87	7.53
4000000030595676A	A412	Sycamore Approach	Sycamore Approach	-	-	11	0.92
4000000030140645A	A412	Sycamore Approach	Dorrofield Close	-	-	112	8.19
4000000030412488A	A412	Dorrofield Close	Unknown (Pub Entrance)	-	-	153	12.5
4000000030332216A	A412	Unknown (Pub Entrance)	R'about Baldwins Lane	-	3016	36	7.03
4000000030456220A	A412	R'about Baldwins Lane	Baldwins Lane	3016	3016	15	1.5
4000000030412492A	A412	Baldwins Lane	Baldwins Lane	3016	3016	21	2.04
4000000030332214A	A412	Baldwins Lane	R'about Baldwins Lane Exit	3016	3016	34	3.55
4000000030226198A	A412	R'about Baldwins Lane Exit	Unknown	3016	-	169	13.85
4000000031037512A	A412	Unknown	R'about A412	-	3019	64	8.22
4000000030412493A	A412	R'about A412	Arm 1	3019	3019	28	3.13
4000000030226199B	A412	Arm 1	R'about A412 Exit	3019	3019	69	8.49
4000000030474447B	A412	R'about A412 Exit	Unknown	3019	-	4	0.45
4000000030226225B	A412	Unknown	Gade Avenue	-	-	89	10.49
4000000030332250B	A412	Gade Avenue	Maythome Close	-	-	54	7.28
4000000030456230B	A412	Maythome Close	Cassiobridge Road	-	-	65	10.73
4000000030332251B	A412	Cassiobridge Road	Gade Close	-	-	43	7.28
4000000030479318B	A412	Gade Close	The Chase	-	-	55	11.05
4000000030332253B	A412	The Chase	The Chase	-	-	42	8.33
4000000030959298B	A412	The Chase	Unknown (Observer Drive)	-	-	116	24.18
4000000030098097B	A412	Unknown (Observer Drive)	Unknown	-	-	157	45.2
4000000030908161B	A412	Unknown	Metropolitan Station Approach	-	6047	20	5.86
4000000030908157B	A412	Metropolitan Station Approach	Queens Avenue	6047	-	18	2.35
4000000030908160B	A412	Queens Avenue	Unknown	-	-	23	3.28
4000000030908158B	A412	Unknown	Unknown	-	-	22	2.54
4000000030140678B	A412	Unknown	Unknown (School Entrance)	-	-	71	9.34
4000000030226264B	A412	Unknown (School Entrance)	Shepherds Road	-	-	110	16.06
4000000030226265B	A412	Shepherds Road	Harwoods Road	-	6079	133	19.49
4000000030098100A	A412	Harwoods Road	Unknown	6079	-	273	30.13
4000000030412559A	A412	Unknown	Park Avenue	-	6017	30	3.1
4000000030456244A	A412	Park Avenue	Cassiobury Park Avenue	6017	6017	16	1.37
4000000030140721A	A412	Cassiobury Park Avenue	A4178 Cassio Road	6017	6018	291	24.32

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B6 ROUTE 5: HEMPSTEAD ROAD

Route 5: Hempstead Road
 Start point - R'about M25 Jct 20
 Start point - R'about A411 / A412

LinkID	RNum	Start	End	Start Node	End Node	Link length	Time (s)
4000000027908673A	A41	R'about M25 Jct 20	Unclassified	1020	-	94	6.77
4000000027866313A	A41	Unclassified	Bridge Road	-	-	765	70.65
4000000028013340A	A41	Bridge Road	Bridge Road	-	-	17	11.35
4000000027987761A	A41	Bridge Road	Bridge Road	-	5050	12	2.61
4000000027875965A	A41	Bridge Road	End of Dual Carriageway	5050	-	402	76.7
4000000030098224A	A41	End of Dual Carriageway	Old Mill Road	-	7118	348	49.36
4000000030959303A	A41	Old Mill Road	Unknown	7118	-	3	0.48
4000000031190237B	A41	Unknown	Unclassified	-	-	111	19.66
4000000030227018A	A41	Unclassified	Gypsy Lane	-	-	52	8.93
4000000030332960A	A41	Gypsy Lane	R'about M25 / A41	-	5089	54	11.79
4000000030332958B	A41	R'about M25 / A41	A41	5089	-	84	9.26
4000000030227012B	A41	A41	A41	-	5002	104	25.35
4000000030474509B	A41	A41	R'about M25 / A41 Exit	5002	5086	19	1.94
4000000030141065B	A411	R'about M25 / A41 Exit	Russell Lane	5086	-	121	15.82
4000000030332955A	A411	Russell Lane	Unclassified	-	-	38	4.82
4000000030332956A	A411	Unclassified	Unclassified (Pumping Station)	-	-	153	18.62
4000000030098210A	A411	Unclassified (Pumping Station)	Unknown	-	-	463	53.2
4000000031019784A	A411	Unknown	Grove Mill Lane	-	5020	105	14.15
4000000030098216A	A411	Grove Mill Lane	Courtlands Drive	5020	5042	193	26.74
4000000030226957A	A411	Courtlands Drive	Glen Way	5042	-	148	19.04
4000000030141039A	A411	Glen Way	Ridge Lane	-	-	141	17.35
4000000030456426A	A411	Ridge Lane	Ridge Lane	-	-	18	2.33
4000000030226958A	A411	Ridge Lane	Bromet Close	-	-	169	18.5
4000000030456427A	A411	Bromet Close	Bromet Close	-	-	10	0.96
4000000031033507A	A411	Bromet Close	Unknown	-	-	55	5.38
4000000030226959A	A411	Unknown	Wentworth Close	-	5103	56	5.35
4000000030141038A	A411	Wentworth Close	Elizabeth Court	5103	-	188	20.14
4000000031213272A	A411	Elizabeth Court	Unknown	-	-	41	6.22
4000000030332327A	A411	Unknown	Langley Road	-	5021	112	39.88
4000000030332329A	A411	Langley Road	Unknown	5021	-	58	9.01
4000000030140695B	A411	Unknown	Kildonan Close	-	-	118	18.2
4000000030226300B	A411	Kildonan Close	Oaklands Court	-	-	148	19.46
4000000030226301A	A411	Oaklands Court	Kenilworth Court	-	5121	80	11.13
4000000030140696A	A411	Kenilworth Court	Woodville Court	5121	-	174	23.4
4000000030226303A	A411	Woodville Court	Dellfield Close	-	-	68	9.56
4000000030332315A	A411	Dellfield Close	Unknown	-	-	34	4.73
4000000030226281A	A411	Unknown	Stratford Way	-	5039	116	23.83
4000000030332314A	A411	Stratford Way	Unknown	5039	-	41	9.37
4000000030140771A	A411	Unknown	Unclassified (College Entrance)	-	-	204	32.51
4000000030653881A	A411	Unclassified (College Entrance)	Unclassified (College Entrance)	-	-	94	14.79
4000000030332464A	A411	Unknown	Hyde Road	-	6005	57	8.46
4000000030412665A	A411	Hyde Road	The Avenue	6005	-	42	7.18
4000000030412677A	A411	The Avenue	A411	-	-	20	3.36
4000000030332467A	A411	A411	R'about A411 / A412 Approach	-	-	49	10.47
4000000030226471A	A411	R'about A411 / A412 Approach	R'about A411 / A412	-	6036	78	22.6

Local Model Validation Report

B7 ROUTE 7: A4008 STEPHENSON WAY

Route 7: A4008 Stephenson Way

Start point - R'about M1 jct 5 /A41/A4008

Start point - R'about A4008 / A411

LinkID	RNum	Start	End	Start Node	End Node	Link length	Time (s)
4000000030333092A	A41	R'about M1 jct 5 /A41/A4008	R'about M1 jct 5 /A41/A4008 Exit	5037	5027	34	3.22
4000000030082069B	A4008	R'about M1 jct 5 /A41/A4008 Exit	Bridge Bushy Mill Lane	5027	5010	573	28.37
4000000030098141B	A4008	Bridge Bushy Mill Lane	Unknown	5010	5028	509	22.93
4000000030098140B	A4008	Unknown	Unknown	5028	5032	463	29.14
4000000030332555A	A4008	Unknown	Bridge Link Road	5032	-	37	1.84
4000000030082038A	A4008	Bridge Link Road	R'about A4008 / A411 Approach	-	6023	738	38.38
4000000030226436A	A4008	R'about A4008 / A411 Approach	R'about A4008 / A411	6023	6040	111	11.39

Local Model Validation Report

B8 ROUTE 8: B1462 ALDENHAM ROAD

Route 8: B1462 Aldenham Road
 Start point - R'about A41/B462
 Start point - Chalk Hill

LinkID	RNum	Start	End	Start Node	End Node	Link length	Time (s)
400000030412920B	B462	R'about A41/B462	R'about A41/B462 Exit	4020	-	24	2.91
400000030412919A	B462	R'about A41/B462 Exit	Park Avenue	-	4023	29	3.57
400000031067793A	B462	Park Avenue	Park Avenue	4023	-	17	2.3
400000030654291A	B462	Park Avenue	Unknown	-	-	81	7.8
400000031067792A	B462	Unknown	Unknown	-	-	26	2.86
400000031236672A	B462	Unknown	Bushy Mill Lane	-	4024	327	53.78
400000030654327B	B462	Bushy Mill Lane	Unknown (School Entrance)	4024	-	154	13.49
400000030654386B	B462	Unknown (School Entrance)	Unknown (School Entrance)	-	-	82	7.86
400000031236670B	B462	Unknown (School Entrance)	Unknown	-	-	151	12.54
400000031236671B	B462	Unknown	Unknown	-	-	85	6.44
400000031047507B	B462	Unknown	Unknown	-	-	407	29.97
400000031047509A	B462	Unknown	Unknown	-	-	20	2.53
400000031047511B	B462	Unknown	Unknown	-	-	14	1.35
400000031047516B	B462	Unknown	Unknown	-	-	5	0.54
400000031047512B	B462	Unknown	Unknown	-	-	14	1.42
400000031047505B	B462	Unknown	R'about The Avenue	-	-	158	14.39
400000031047508B	B462	Unknown	Unknown	-	-	18	2.1
400000030412658B	B462	R'about The Avenue	Arm 1	-	-	37	4.9
400000030412661A	B462	Arm 1	Arm 2	-	4021	11	0.72
400000030701991B	B462	Arm 2	Arm 3	4021	-	12	1.42
400000030332448B	B462	Arm 3	Arm 4	-	-	13	1.72
400000030456292B	B462	Arm 4	R'about The Avenue Exit	-	-	17	2.09
400000030140764A	B462	Unknown	Heathfield Road	-	-	117	10.47
400000030226424A	B462	Heathfield Road	Woodlands Road	-	4031	113	12
400000030332432A	B462	Woodlands Road	James Close	4031	-	59	7.04
400000030226426A	B462	James Close	Belmont Road	-	-	72	6.44
400000030226425A	B462	Belmont Road	Silverdale Road	-	-	98	8.56
400000030412648A	B462	Silverdale Road	Beechcroft Road	-	-	22	2.17
400000030332428A	B462	Beechcroft Road	Hillside Road	-	-	63	5.9
400000030140745A	B462	Hillside Road	Vale Road	-	-	109	12.74
400000030456288A	B462	Vale Road	Vale Road	-	-	8	1.11
400000030985117A	B462	Unknown	The Larches	-	-	161	32.45
400000030140744B	B462	The Larches	Chalk Hill	-	6031	92	51.35

Local Model Validation Report

B9 ROUTE 9: A411 LONDON ROAD

Route 9: A411 London Road

Start point - A4140

Start point - Chalk Hill

LinkID	RNum	Start	End	Start Node	End Node	Link length	Time (s)
400000030332676B	A4140	A4140	A411	4002	-	45	3.73
400000030701027B	A4140	A411	A411	-	-	21	2.18
400000030701573B	A411	A411	Unknown	-	-	8	0.64
400000030332670B	A411	Unknown	Unknown	-	4008	45	3.99
400000030226703B	A411	Unknown	Larken Drive	4008	-	44	3.87
400000030456360A	A411	Larken Drive	Sparrows Way	-	-	16	1.53
400000030332678B	A411	Sparrows Way	Sparrows Way	-	-	28	2.48
400000030412807B	A411	Sparrows Way	Sparrows Way	-	-	25	2.47
400000030226705B	A411	Sparrows Way	Brooke Close	-	-	76	8.1
400000030332675B	A411	Brooke Close	Catsey Lane	-	4009	47	6.17
400000030332674B	A411	Catsey Lane	Merry Hill Road	4009	-	45	5.64
400000030412770A	A411	Merry Hill Road	Upton Lodge Close	-	-	37	4.32
400000030140866B	A411	Upton Lodge Close	Unknown	-	-	191	20.72
400000030140867A	A411	Unknown	Unknown	-	-	136	13.08
400000030332622B	A411	Claybury	Chestnut Rise	-	-	59	5.55
400000030332621A	A411	Chestnut Rise	Unknown	-	-	59	6.23
400000030412771A	A411	Unknown	Steeplands	-	-	21	2.02
400000030332648B	A411	Steeplands	Risingholme Close	-	-	61	5.41
400000030226680A	A411	Risingholme Close	Meadowcroft	-	-	138	12.52
400000030701025B	A411	Meadowcroft	Meadowcroft	-	-	48	4.61
400000030226681B	A411	Meadowcroft	Melbourne Road	-	-	63	7.28
400000030701026B	A411	Melbourne Road	The Cloisters	-	-	45	4.77
400000030226682B	A411	Melbourne Road	The Cloisters	-	-	81	7.89
400000030226669B	A411	The Cloisters	Koh - I - Noor Ave	-	-	77	9.66
400000030226667B	A411	Koh - I - Noor Ave	Unknown	-	-	49	6.22
400000030985090B	A411	Unknown	BourneHall Road	-	-	40	4.63
400000030226668B	A411	BourneHall Road	Park Road	-	-	72	10.93
400000030226665B	A411	Park Road	Rudolph Road	-	-	106	16.58
400000030456352B	A411	Rudolph Road	Kemp Place	-	-	9	1.37
400000030332640B	A411	Kemp Place	Cow Lane	-	-	29	4.25
400000030700587A	A411	Cow Lane	Unknown	-	-	49	5.64
400000031236668A	A411	Unknown	Unknown	-	-	46	4.68
400000030140876A	A411	Unknown	Falconer Road	-	4010	51	7.08
400000030226666A	A411	Falconer Road	Merry Hill Road	4010	-	127	14.69
400000030098075A	A411	Merry Hill Road	Unknown (school entrance)	-	-	423	30.4
400000030843544B	A411	Unknown (school entrance)	Grange Road	-	4030	39	6.4
400000030332188A	A411	Grange Road	Vale Road	4030	-	49	6.98
400000030332187A	A411	Vale Road	Haydon Road	-	-	40	5.79
400000030226181A	A411	Haydon Road	King Edward Road	-	4040	71	12.57
400000030226171A	A411	King Edward Road	Villers Road	4040	-	121	33.19
400000030332176A	A411	Villers Road	Chalk Hill	-	6031	58	28.56

