Three Rivers and Watford LDF

Technical Note 1: 2010 Base Model

Technical note

August 2011

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1 Task 1: Base 2010 Model

Introduction

1.1 The central part of the South West Herts SATURN Highway Model, taking in the town centre and the area west of the town towards Rickmansworth, has recently been updated to represent 2010 base year conditions to support the assessment of the Croxley Rail Link.

1.2 There is now a need to incorporate this update into the wider SATURN model to provide evidence of the potential transport impacts of the combined strategies of Three Rivers District Council and Watford Borough Council in support of their LDF site allocation consultation.

Network

1.3 Records of changes to the network in the central have been maintained, and the same changes have been made to the wider model.

1.4 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.

1.5 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) 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.

Matrix

1.6 In updating the central area, a cordon matrix has been developed. When the cordon was initially created from the wider SATURN model, records were stored of the origins of all trips entering the central area along each cordon link. Similarly the destinations of all trips leaving the central area were also stored.

1.7 To 'feed back' the update cordon matrix into the wider model demand matrices, the following steps have been undertaken:

- Zones internal to the central cordon area are identified, and trips between these nodes are removed from the wider model matrix.
- These are replaced with updated trips internal to the cordon (Internal-Internal).

- For trips into the cordon area (External-Internal), the number of trips entering along a particular link is then factored in proportion to the origins stored for that link.
- Similarly, for trips out of the cordon area (Internal-External) the number of trips leaving along a particular link are assigned in proportion to the stored destinations.
- To create a set of trips passing through the cordon (External-External), a combination of origins from the entry link and destinations from the exit link are used.
- It is then acknowledged that it is possible for alternative routes to be used between any two external zones and, as such, the External-External matrix derived in the step above is subtracted from the wider area matrix, leaving those external trips that do not pass through the central area.
- Each step is then added together to create the updated wider area matrix.

1.8 This exercise is repeated for each of the AM and PM peaks and results in the following matrix totals, suggesting that the evening peak is busiest in the wider model area.

- AM Peak: 53391 trips
- PM Peak: 56334 trips

Additional Data

1.9 Once the network and matrices had been updated, the next stage was to compare the updated model with latest count data. A request for new automatic count data was made with Herts Highway's data collection team and data was received for a total of 18 site, in each direction.

1.10 Data has been made available for a consistent week in each year between 2007 and 2011. Across all sites, there is no consistent pattern of growth through the five years available. Similarly there is no real suggestion at any of the sites that the 2010 flows would not be expected. As such, flows for 2010 have been used for flow calibration and is consistent with data used for the update of the central area.

1.11 The sites used for flow calibration are listed in the table below.

TABLE 1.1 CALIBRATION COUNTS

Reference	Location	AM Peak	PM Peak
153	Colne Way, Watford	S: 1425 E: 1215	S: 1118 E: 1260
154	North Western Avenue, Garston	E: 1213 W: 1042	E: 1099 W: 1207
155	Watford Road, Leavesden	N: 831 S: 958	N: 866 S: 1066
156	Watford Road, Langleybury	N: 637	N: 699

		S: 637	S: 832
206	Rickmansworth Road, Chorleywood	W: 835 E: 973	W: 904 E: 895
207	London Road, Batchworth Heath	E: 892 W: 1008	E: 1040 W: 794
208	Hempstead Road, Watford	N: 809 S: 1123	N: 1096 S: 910
214	St Albans Road, Garston	N: 525 S: 815	N: 716 S: 740
215	St Albans Road, Watford	N: 553 S: 426	N: 488 S: 449
216	Scots Hill, Rickmansworth	W: 1087 E: 1018	W: 1087 E: 1167
252	Oxhey Lane, Watford	N: 573 S: 751	N: 685 S: 782
317	Sandy Lane, Eastbury	N: 585 S: 627	N: 567 S: 669
346	Moor Lane, Batchworth	W: 582 E: 731	W: 715 E: 403
351	Prestwick Road, South Oxhey	S: 363 N: 650	S: 569 N: 476
453	Horseshoe Lane, Leavesden	W: 349 E: 394	W: 414 E: 374
454	High Road, Leavesden	S: 460 N: 170	S: 213 N: 298
542	Rickmansworth	S: 986 N: 705	S: 685 N: 1082
562	Uxbridge Road, Rickmansworth	E: 676 W: 923	E: 978 W: 731

Update Calibration

1.12 Initial calibration against 2010 flows was poor, and identified a need to carry out additional model flow calibration of the wider model area, beyond the cordon.

1.13 Where possible, calibration of modelled flows to link counts has been dealt with manually, and minor changes to a small number of external zone feeds have been made to better reflect observed flows on the edge of the model area. However, it

has also been necessary to carry out matrix estimation (SATPIJA/SATME2) in an attempt to improve the match against the 36 directional counts detailed above.

1.14 The following table provides a comparison of trip matrix totals before and after the recalibration to a 2010 base for each of the AM and PM peaks. As shown, overall demand in the PM peak remains relatively stable, yet the AM peak is reduced further by around 3.5%.

TABLE 1.2 TRIP MATRIX TOTALS

	AM Peak	PM Peak
Pre-calibration	53391	56334
Post-calibration	51511	56489
% difference	-3.5%	+0.3%

1.15 The resulting matrices are re-assigned to the wider model network and resulting modelled flows compared against the 36 counts available.

1.16 The following tables provide resulting flow comparisons, in terms of absolute and percentage differences and the modeller's geh-statistic, where a value less that 5 is considered a good fit between any two flows.

TABLE 1.3 FLOW CALIBRATION – AM PEAK

Site Ref	Location	Anode	Bnode	Observed	Model	Diff	%diff	geh
153	Colne Way, Watford	5057	5038	1425	1227	-198	-14%	5.44
		5038	5058	1215	969	-246	-20%	7.44
154	North Western Avenue, Garston	5004	5011	1213	703	-510	-42%	16.48
		5009	5004	1042	883	-159	-15%	5.13
155	Watford Road, Leavesden	5050	1020	831	828	-3	0%	0.10
		1020	5050	958	1074	116	12%	3.64
156	Watford Road, Langleybury	1020	9017	637	594	-43	-7%	1.73
		9017	1020	637	632	-5	-1%	0.20
206	Rickmansworth Road, Chorleywood	1009	9008	835	953	118	14%	3.95
		9008	1009	973	976	3	0%	0.10
207	London Road, Batchworth Heath	3044	9006	892	1047	155	17%	4.98
		9006	3044	1008	1103	95	9%	2.92
208	Hempstead Road, Watford	5020	5086	809	703	-106	-13%	3.86
		5086	5020	1123	724	-399	-36%	13.13
214	St Albans Road, Garston	5055	5017	525	626	101	19%	4.21
		5017	5056	815	1176	361	44%	11.44
215	St Albans Road, Watford	95022	5043	553	434	-119	-22%	5.36
		5043	95022	426	682	256	60%	10.88
216	Scots Hill, Rickmansworth	3014	3008	1087	1240	153	14%	4.49
		3008	3014	1018	1028	10	1%	0.31
252	Oxhey Lane, Watford	4015	4037	573	538	-35	-6%	1.48
		4037	4015	751	684	-67	-9%	2.50
317	Sandy Lane, Eastbury	4022	4032	585	693	108	18%	4.27
		4032	4022	627	483	-144	-23%	6.11
346	Moor Lane, Batchworth	3017	3010	582	682	100	17%	3.98
		3010	3017	731	775	44	6%	1.60
351	Prestwick Road, South Oxhey	94034	4034	363	387	24	7%	1.24
		4034	94034	650	600	-50	-8%	2.00
453	Horseshoe Lane, Leavesden	5066	5065	349	296	-53	-15%	2.95
		5065	5066	394	288	-106	-27%	5.74
454	High Road, Leavesden	5062	5040	460	460	0	0%	0.00
		5040	5062	170	156	-14	-8%	1.10
542	Rickmansworth	1011	3009	986	1027	41	4%	1.29
		3009	1011	705	979	274	39%	9.44
562	Uxbridge Road, Rickmansworth	3013	3003	676	669	-7	-1%	0.27
		3003	3013	923	992	69	7%	2.23

TABLE 1.4 FLOW CALIBRATION – PM PEAK

Site Ref	Location	Anode	Bnode	Observed	Model	Diff	%diff	geh
153	Colne Way, Watford	5057	5038	1188	1053	-135	-11%	4.03
		5038	5058	1260	972	-288	-23%	8.62
154	North Western Avenue,	5004	5011	1099	928	-171	-16%	5.37
	Garston	5009	5004	1207	1219	12	1%	0.34
155	Watford Road, Leavesden	5050	1020	866	951	85	10%	2.82
		1020	5050	1066	1485	419	39%	11.73
156	Watford Road, Langleybury	1020	9017	699	699	0	0%	0.00
		9017	1020	832	716	-116	-14%	4.17
206	Rickmansworth Road,	1009	9008	904	880	-24	-3%	0.80
	Chorleywood	9008	1009	895	958	63	7%	2.07
207	London Road, Batchworth	3044	9006	1040	1009	-31	-3%	0.97
	Heath	9006	3044	794	834	40	5%	1.40
208	Hempstead Road, Watford	5020	5086	1096	927	-169	-15%	5.31
		5086	5020	910	638	-272	-30%	9.78
214	St Albans Road, Garston	5055	5017	716	760	44	6%	1.62
		5017	5056	740	743	3	0%	0.11
215	St Albans Road, Watford	95022	5043	488	578	90	18%	3.90
		5043	95022	449	431	-18	-4%	0.86
216	Scots Hill, Rickmansworth	3014	3008	1087	1156	69	6%	2.06
		3008	3014	1167	1103	-64	-5%	1.90
252	Oxhey Lane, Watford	4015	4037	685	605	-80	-12%	3.15
		4037	4015	782	722	-60	-8%	2.19
317	Sandy Lane, Eastbury	4022	4032	567	521	-46	-8%	1.97
		4032	4022	669	665	-4	-1%	0.15
346	Moor Lane, Batchworth	3017	3010	715	654	-61	-9%	2.33
		3010	3017	403	560	157	39%	7.15
351	Prestwick Road, South	94034	4034	569	562	-7	-1%	0.29
	Oxhey	4034	94034	476	302	-174	-37%	8.82
453	Horseshoe Lane, Leavesden	5066	5065	414	455	41	10%	1.97
		5065	5066	374	296	-78	-21%	4.26
454	High Road, Leavesden	5062	5040	213	21	-192	-90%	17.75
		5040	5062	298	245	-53	-18%	3.22
542	Rickmansworth	1011	3009	685	743	58	8%	2.17
		3009	1011	1082	1007	-75	-7%	2.32
562	Uxbridge Road,	3013	3003	978	1135	157	16%	4.83
	Rickmansworth	3003	3013	731	786	55	8%	2.00

1.17 As shown, some 69% of comparisons in the AM peak achieve a geh of less than 5, with 81% achieving less than 6. In the PM peak, the corresponding values are 78% and 83%.

Conclusion

1.18 Having incorporated updated to the central cordon to the wider model area, the initial comparison of assigned flows to counts did not result in many matches and as such the need for a relatively minor update to the calibration was identified.

1.19 It should be noted that the exercise outlined in this Technical Note represents a flow calibration exercise only, and shouldn't be regarded as a model upgrade,

particularly given that no additional information has been gathered on origins and destinations of journeys within the model area.

1.20 However, it is believed that the resulting 2010 base model are provide a suitable base point for the preparation of a transport evidence base to support the LDF consultation process.

CONTROL SHEET

Project/Proposal Name	Three Rivers and Watford LDF
Document Title	Technical Note 1: 2010 Base Model
Client Contract/Project No.	Click here to enter text.
SDG Project/Proposal No.	224042/01

ISSUE HISTORY

Issue No.	Date	Details
1	3 August 2011	Draft

REVIEW

Originator	Steve Oliver
Other Contributors	
Review by:	Print
	Sign .....

DISTRIBUTION

Client:	Hertfordshire County Council
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