Technical Note

Project:	Royal Tunbridge Wells Local Plan SATURN model review		
Subject:	SATURN Highway Assignment Model review		
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1. Introduction

The technical note provides a concise review of the Royal Tunbridge Well Local Plan – highway assignment model. Commissioned by Royal Tunbridge Wells Borough Council (RTW), SWECO have developed an AM peak SATURN highway assignment model reviewed in this technical note. The model has been developed with the purpose of providing RTW with a tool with which they are able to better understand the transport implications of the council's preferred growth strategy and help formulate a borough wide transport strategy to support the emerging local plan.

This review has been undertaken on behalf of Highways England to determine the appropriateness of the model for representing the existing traffic patterns on the Strategic Road Network (SRN), within the study area.

The model will then provide a solid foundation for future year forecasts which need to be sensitive to route choice; not only for the A21 and A26 but also other significant roads surrounding the major highways.

It should be noted that the Local Model Validation Report (LMVR) is not reviewed here and only used to provide information for this review

1.1. Model files for review

Table 1 shows the files that were supplied for the review of the traffic model

Table-1 – Files used in review

Filename	File
Tunbridge Wells Traffic Model- LMVR_V5-DRAFT.PDF	*Draft local model validation report (Provided for information only)*
AM_RTW_Base_Prior_Northfarmv8_PRIOR.UFM	Prior matrix .UFM
AM_RTW_Base_Prior_Northfarmv8_L2_E6.UFM	Post Matrix Estimation matrix .UFM
RTW_AM_NorthFarm_v18_Post,DAT	Model Newtork.dat file .DAT
RTW_AM_NorthFarm_v18_Post.UFS	Model RUN output file .UFS

1.2. Model output check

The model LMVR reports that the version of SATURN used for the model is 11.3.12W. Using this version of SATURN the model was run to ensure that the results presented could be reproduced with the files provided.

To check consistency between the model runs, convergence statistics were compared between the supplied model run file (.UFS) and the re-run model output .LPT file. The values were found to be identical, and therefore the presented results are reproduceable with the files provided

1.3. Network file parameter review

Network file 'Parameter' checks were conducted for the AM peak base model. It is found that the majority of parameter values are in line with industry best practice and guidance given in WebTAG M3.1 and supported by Transport for London (TfL) model guidance.

The exception to this compliance is PCNEAR, the value used in the model is 2% where WebTAG M3.1 guidance and SATURN model default are both 1%,

Table-2 shows the key parameters applied in the model which control the assignment model convergence. In general, these model settings are considered to be appropriate, although the effect changing value of PCNEAR to the recommended value of 1% is not clear.

Table-2 - Model Convergence Parameters

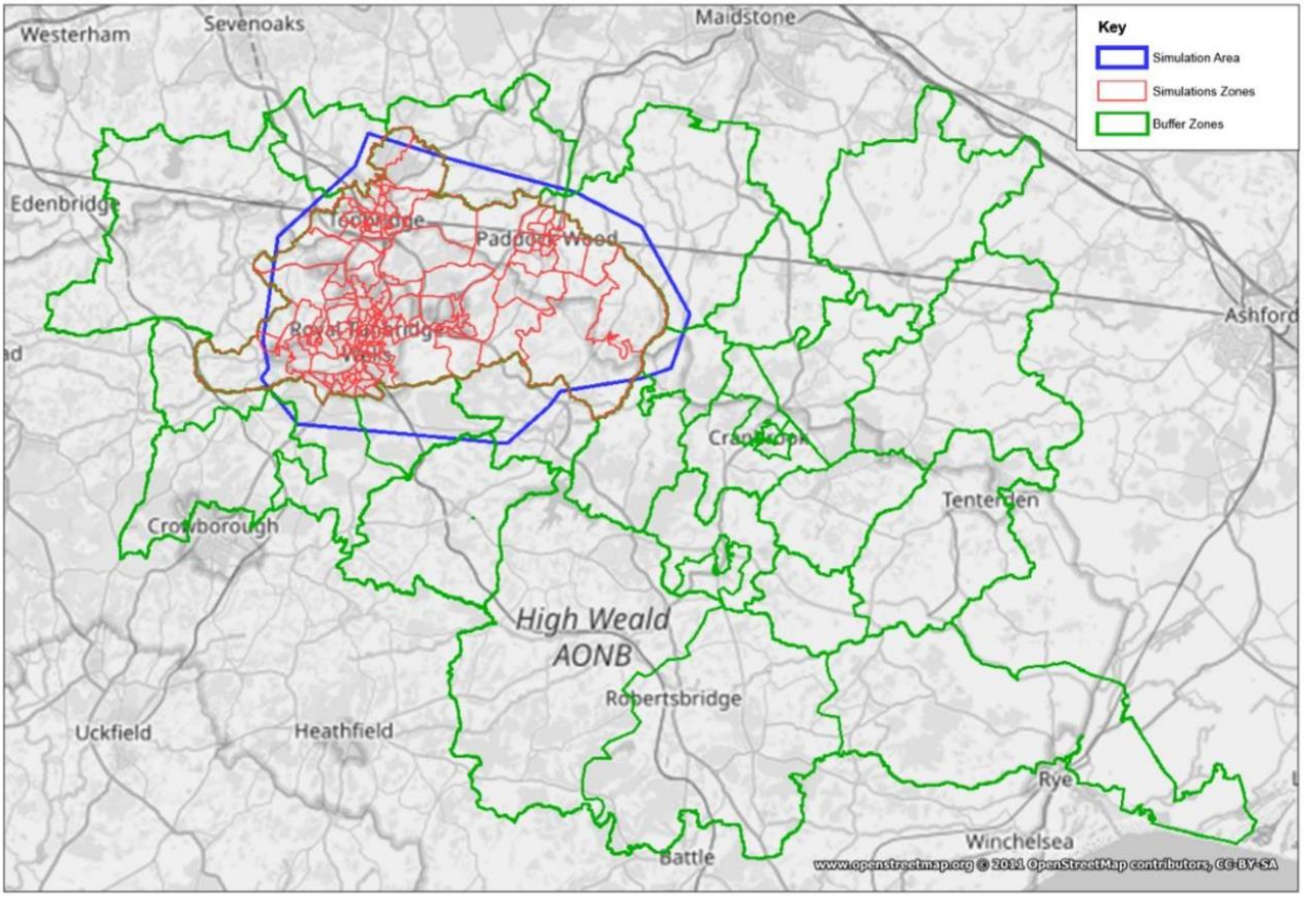
Parameter	Description	Values defined in the model	Comments
KONSTOP	This parameter allows for different assignment stopping criterion monitoring methods to be set	5	Convergence based on both ISTOP and %Gap criteria, in line with the best industry practice and default setting within SATURN since version11.3
RSTOP	The loops stop automatically if RSTOP % of the link flows change by less than “PCNEAR” percent (default 5%) from one assignment to the next.	98	In line with WebTAG
NISTOP	The number of successive loops which must satisfy the “ISTOP” criteria for convergence of the assignment/simulation loops	4	In line with WebTAG
STPGAP	Critical gap value used to terminate assignment-simulation loops	0.025%	In line with WebTAG
PCNEAR	Percentage change in flows judged to be “near” in successive assignments	2%	WebTAG recommends a value, consistent with SATURN default setting, of 1% change between successive assignments.
UNCRTS	Wardrop assignment stopping parameter monitoring the parameter epsilon	0.025	This parameter sets the stopping criteria for the assignment stage on its own should be less than STPGAP. The impact on model outputs is likely insignificant

1.4. Model coverage check.

The model coverage and extent of the model simulation area (area of detailed modelling) are shown in Figure-1, The external boundary of the model is determined by the boundaries of the parent model (SERTM). The simulation area sits in the north eastern corner of the model, with the majority of the model’s buffer network located to the south and west of the simulation area.

This maybe a result of extending the model further to the north and east would include M25 and M20 to the north and M23 to the east. Exclusion of these routes will have simplified model development. Although omission of these major strategic routes may prevent route choice within the model should the model be required to provide forecasts for significant developments.

Figure-1 – Royal Tunbridge Wells Local Plan Highway assignment model – model coverage



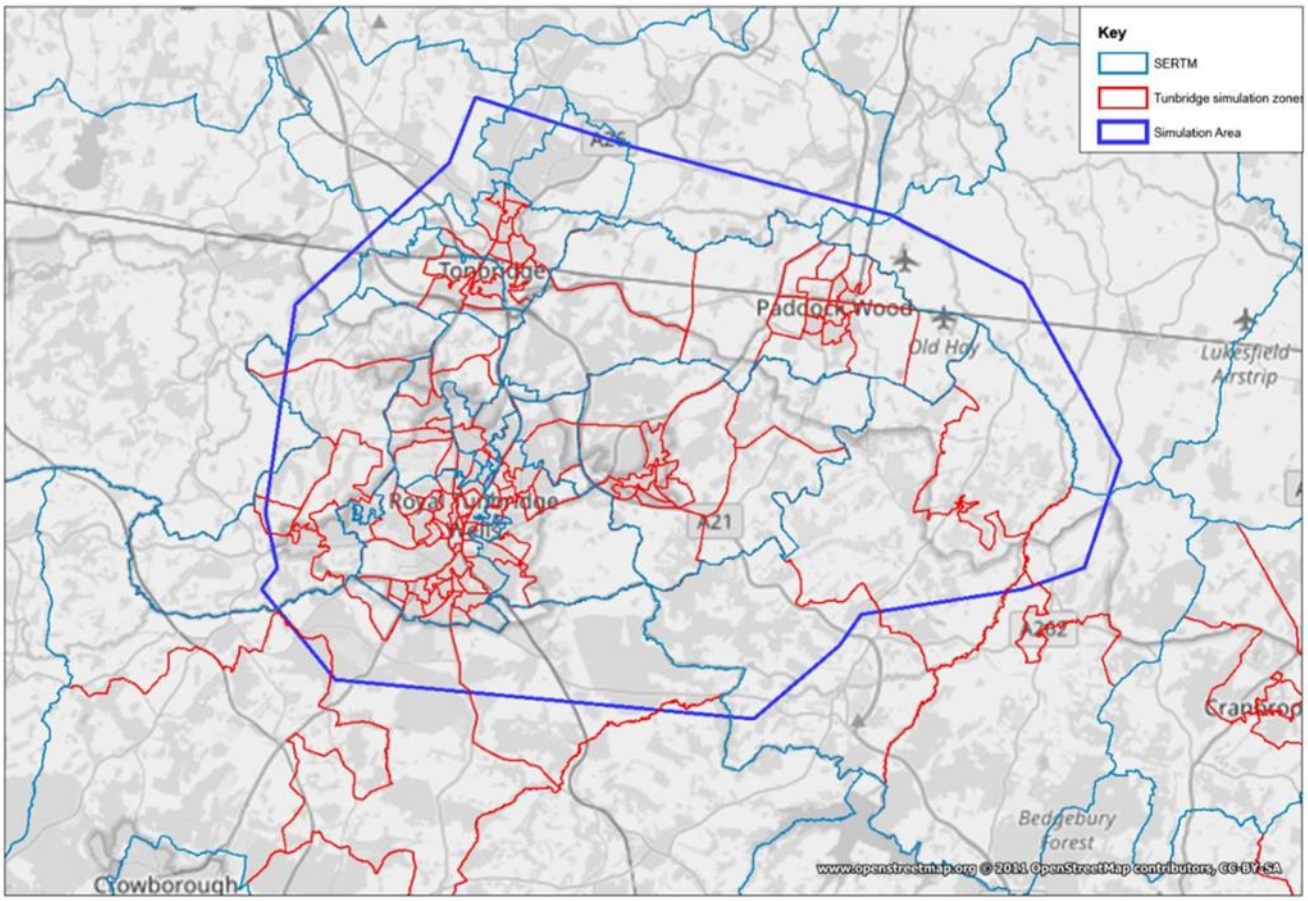
Definition within zoning of the simulation area of the model has been significantly disaggregated from the parent (SERTM) model as shown in Figure-2 The disaggregation shown has increased the numbers of zones within the model areas as shown in Table-3

Table-3 - Matrix - zone disaggregation

Model Area	SERTM	LSOA	Final Disaggregation
Simulation	12	67	157
Buffer	12	23	29
Cordon crossing	26	26	26
TOTAL	50	116	212

The resulting model definition within the simulation area would seem to give adequate detail within the urban centres to satisfy the model's proposed usage to inform planning decisions in support of the emerging RTW local plan.

Figure-2 - Disaggregation of parent model (SERTM) zones



1.5. Matrix totals check

The two matrices included for this review are prior and post matrix estimation, the difference between the two matrices shows the effect of the matrix estimation process on the total number of trips. Table -4 shows the trip totals for the two matrices provided. The differences indicate that there has been significant (potentially excessive) change to the prior matrix, by the matrix estimation process, to produce the final model matrix.

Table -4 - Prior & Post Matrix Estimation trip totals

Matrix User class	Prior matrix	Post ME Matrix	Absolute difference	%age difference
UC1	2478	2908	430	17.4%
UC2	11143	13531	2388	21.4%
UC3	12960	16328	3368	26.0%
UC4	3472	4675	1203	34.6%
UC5	2563	2723	160	6.2%
TOTAL	32617	40166	7549	23.1%

Significant changes to the matrices through matrix estimation could potentially distort the underlying patterns in the observed demand data, thereby changing the distribution of the trips on the strategic network.

Investigation of the change to Individual zone trip ends demonstrates significant change to trip end totals across the whole matrix. From the information provided it is unclear if the changes made by matrix estimation are appropriate or simply the effects of the process matching target link counts.

The scope of this tech note has not included a review of the flow validation

1.6. Network coding check

The model's network input (.DAT) file supplied has been interrogated. The network was 'built' by running the .DAT file with SATNET and the output .LPN file was examined. The model build process resulted in an error log showing 9 non-fatal, 605 serious warnings and 1061 warnings. Given the scope of this review these errors/warnings were not all followed through.

There has been significant increase in model definition within the urban areas of the model. These additions are not annotated within the network .DAT file making it difficult to identify the added network within the file without identification.

Checks have been made to the coding of the SRN (A21 and A26) to identify that the correct number of lanes, link lengths and speed have been applied to the network coding.

It has been identified that there are discrepancies between speed limits observed using Google Streetview and network coding on the SRN.

In particular, sections of the A21, where the carriageway standard is dual-2 the coded model speed is 98kph where the speed limit is 113kph (70mh) as shown in Table-5

Table-5 - A21 - coding check example (speed)

SRN -route	Model a-node	Model b-node	Coded speed	Signed speed limit
A21	15294	18205	98kph	113kph
A21	18203	18204	98kph	113kph

The A26 from its junction with A21, south of Tonbridge (wide single carriageway at this location) is coded with different speeds in different directions, as shown in Table-6, which are again different from the signed speed limit, as viewed on Google Streetview.

Table-6 - A26 - coding check example (speed)

SRN - route	Model a-node	Model b-node	e/b	w/b	Signed speed limit
A26	15301	15306	64kph	80kph	97kph (60mph)
A26	15306	18321	80kph	64kph	97kph (60mph)

These identified discrepancies suggest that the network would benefit from further checks to ensure network coding is accurate before the model is used for its intended purpose

1.7. Conclusion

The Royal Tunbridge Wells (RTW) Local Plan highway assignment model has been developed as a cordon model from the South East Regional Traffic Model (SERTM). Owing to the strategic nature of the parent model the RTW model has had local detail added. That detail has included disaggregation of the traffic model zones as described in Table-3. It would appear the level of detail achieved from this disaggregation is appropriate for the model and its purpose. The matrix has been produced from the parent model cordon matrix by undertaking matrix estimation. This has resulted in large changes to the number of trips within the model. It is recommended that the changes seen through matrix estimation are investigated to demonstrate that the revised matrix is suitable for use in its intended purpose.

Network coding checks have been undertaken, primarily for the SRN (A21 and A26), these checks have identified some errors in the coding of network link speeds. Therefore prior to this model being used for its

intended purpose it is recommended that a network audit be undertaken to remove identifiable network coding mistakes.