SBC Local Plan – Paramics Support

Supplementary Paramics Modelling Overview

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Introduction

1. Stevenage Borough Council (SBC) has commissioned Vectos to undertake some modelling analysis, using the Stevenage Paramics Model, to establish the impact of potential changes to the assumptions contained within the modelling that has been completed to date.

2. The purpose of these changes is to introduce a more refined level of growth within the Stevenage Paramics model which takes cognisance of more appropriate development trip rates and includes growth in traffic volumes which are considered to be more realistic.

Methodology

Demand Adjustments

3. The original 2031 model demands provided by AECOM project traffic growth in Stevenage to be between 26.3% and 37.6% across the AM and PM periods. This is made up of a combination of background growth, committed development and Local Plan traffic demand.

4. A series of adjustments have been applied by Vectos to the AECOM model demands on the following basis:

- **Step 1:** Any zones which do not contain committed development and/or Local Plan development (i.e. only background growth) remain unchanged from Base levels. Background growth is still included in all zones that include committed development and/or Local Plan development as it is not possible to isolate out this demand in the model provided. This step reduced traffic growth to 25.8% in the AM and 33.6% in the PM period (i.e. a reduction of less than 1% in the AM and 4% in the PM).
- **Step 2:** A factor has been applied to Local Plan residential and employment sites to reflect a revised trip rate which is considered to be more reflective of the site location. This As a result of these changes, traffic growth in Stevenage is 21.5% and 27.9% across the AM and PM periods respectively.
- **Step 3:** This refined traffic growth (i.e. demands of 21.5% and 27.9% across the AM and PM periods) has then been reduced to reflect a mode shift of 15% by 2031. This results in a residual traffic growth of 6.5% in the AM and 13% in the PM periods.
- **Step 4:** Finally, a small amount of peak spreading was applied to the matrices, which resulted in 2% and 3.5% of traffic in the AM and PM peak hours starting its trip in the shoulder hours instead. It should be noted that the peak spreading does not reduce the

overall demands for the three hour peak periods but just reflects the effect of re-timing of trips.

Network Adjustments

5. Demands equivalent to the above revised growth levels have then been assigned to the following networks:

- 2031 Local Plan Reference Case Network
- 2031 Vectos Optimised Network

6. The 2031 Local Plan Reference Case Network is in line with the network provided by AECOM following the completion of the December 2016 study.

7. The 2031 Vectos Optimised Network has been developed from the 2031 Local Plan Reference Case Network but has made the following driver behavioural changes:

- The introduction of visibility on junction approaches in line with SiAS (software proprietors) guidelines.
- Removal of 'Gap Acceptance Look Next' where links are longer than 5 Passenger Car Units (PCUs) to reflect that, if a vehicle has been queuing for a long time, the driver will likely consider a gap of 5 vehicles as sufficient to move into the junction.
- Introduction of Gap Acceptance Look Next on links shorter than 25m to reflect the same principle.
- Review of roundabout behaviour, removal of superfluous or conflicting next-lanes and alterations to lane usage to reflect a higher capacity arrangement (in some cases considered as a corrective measure in others a measure simply reflecting a change in lane markings on-street).

8. The above optimisation of the network has only been undertaken where the network has been observed to be operating under stress and further optimisation could be undertaken to make the network perform better.

9. Within the 2031 Vectos Optimised Network, all of the non-committed junction improvement schemes (i.e. anything other than A1(M) SMART motorway and GSK hamburger roundabout) have been removed. The exception to the is the improvement to the Gunnells Wood Road/Fairlands Way junction, which has been included to manage conflicts at this junction. It is considered that these conflicts arise primarily as a result of re-routing of traffic as a result of the Lytton Way Closure. However, it is likely that when the Lytton Way Closure is implemented, traffic demand will redistribute both geographically as well as temporally in a way that the Paramics model is not able to replicate. Therefore, a scheme at this junction may not actually be required in reality.

10. Three scenarios have therefore been created and reported on as follows:

- 2021 Reference Case – 2021 Reference Case Network (as provided by AECOM) with Vectos demands associated with Committed Development zones only.

- 2031 Local Plan Scenario 01 – 2031 Local Plan Reference Case Model (as provided by AECOM) inclusive of the AECOM identified highway schemes with the revised Vectos Local Plan forecast demands (6.5% AM/13% PM).
- 2031 Local Plan Scenario 02 – 2031 Vectos Optimised Network with the revised Vectos Local Plan forecast demands (6.5%AM/13%PM)

Reporting

11. In order that the analysis can be retained at a relatively high level, the performance of the options has concentrated on two elements:

- Model Stability
- Average network Journey Time (seconds)

Model Stability

12. Due to the deterministic nature of assignment within Paramics it is possible for vehicles to continue to attempt to enter a network even when congestion has reached such an extent that the network is effectively 'gridlocked'. In some cases, the gridlock can occur due to problems that will require mitigation, in other cases it can be something as simple as vehicles in the model entering a mini-roundabout from all three approaches at exactly the same time (i.e. model error). If the model does not lock up every time it can be concluded that the problem is not severe enough to cause the network to cease to operate and mitigation is likely to not be required.

13. Therefore, a review of the model stability has been undertaken first to establish the prevalence of gridlock to occur in each scenario. In instances where this is not 100% then results have been quoted from those model runs which did not experience gridlock as it is felt that the gridlock effects are not entirely realistic for the reasons outlined previously.

Average Network Journey Time

14. The average network journey time is presented as the average completion time for all trips that are completed within the model period. This value is quoted for the entire three hour AM and PM model periods as this approach takes account of peak spreading and also allows for the effects of the dissipation of peak hour congestion to be considered within the assessment.

Results Analysis

15. The analysis of the model stability levels identified within the three scenarios is summarised in **Table 1**.

Table 1: Model Stability

Scenario	2021 Reference Case	2031 Local Plan Scn01	2031 Local Plan Scn02
AM	100%	0%	90%
PM	100%	0%	100%

16. **Table 1** reveals that the 2031 Local Plan Reference Case network, inclusive of the AECOM highway proposals, in unable to accommodate the demands being assessed without inducing 'gridlock'.

17. When the AECOM highway schemes are removed and the refinements included within the model network to reflect a driver behavioural change in response to the congestion observed on the model network then the prevalence for gridlock is almost entirely removed in the AM peak and is removed in the PM peak.

18. Although not 100% successful a 90% success rate on model runs is not considered to be unacceptable on the grounds that 'gridlock' as a quantitative measure, can be affected by unrealistic behaviour within the model network and so an occasional lock up could simply imply model error during one particular run.

19. Having discounted the 2031 Local Plan Scenario 01 network from subsequent stages of the analysis, a further assessment of the two remaining scenarios was undertaken to establish the journey times that are experienced, across the entire model network and period, as a result of the changes.

20. The journey times extracted for this analysis are presented within **Table 2** below. Analysis of these journey times reveals that there is a modest increase in journey times between 2021 Reference Case and 2031 Local Plan Case of between 1m 33 secs in the AM period and 1m 21secs in the PM period.

Table 2: Average Network Journey Time (seconds)

Scenario	2021 Reference Case	2031 Local Plan Scn02
AM Period	245	338
PM Period	380	461

Conclusions

21. The modelling has been used to make the following judgements:

- With the provision of more realistic trip rates, a small amount of peak spreading and 15% mode shift, the network will not gridlock. Infact, the results show that on average, journey times across the network will only increase by around 90 seconds.
- Only one junction has been modified within the 2031 Local Plan model network to manage conflicts. It is considered that these conflicts arise primarily as a result of re-routing of traffic as a result of the Lytton Way Closure. However, it is likely that when the Lytton Way Closure is implemented, traffic demand will redistribute both

geographically as well as temporally in a way that the Paramics model is not able to replicate. Therefore, a scheme at this junction may not actually be required in reality.