

Project:	Highways England Spatial Planning Arrangement	Job No: 60600479 DM014.012
Subject:	South Caldecotte, Audit of revised forecast VISSIM model	
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Executive Summary

This Technical Note describes the modelling audit of the South Caldecotte forecast Vissim models of the A5/A4146 Kelly's Kitchen Roundabout, provided by BWB to support the planning application of the proposed South Caldecotte development in Milton Keynes. The audit was carried out based on WebTAG guidance and best practice recommended in Transport for London (TfL) Traffic Modelling Guidance.

This Technical Note follows on from AECOM Technical Note 03 ('South Caldecotte VISSIM Model Review_v10'), Technical Note 04 ('Revised South Caldecotte VISSIM review_v8'), Technical Note 05 ('Revised South Caldecotte VISSIM review_v7'), Technical Note 07 ('TN07 South Caldecotte Revised Forecast VISSIM review_v13'), Technical Note 09 ('TN09 South Caldecotte Revised Forecast VISSIM Review_v14') and Technical Note 10 ('South Caldecotte Revised Forecast VISSIM Review_V2) which document the review of the previous base and forecast models. In addition, AECOM Technical Note 06 ('TN06_Review of South Caldecotte TA_v7') and AECOM Technical Note 08 ('TN08_Review of South Caldecotte revised TA info v6') document the review of the revised Transport Assessment (TA) associated with the proposed development.

The forecast models were approved in the last review (TN10), where it was also recommended that additional measures were put forward in order to mitigate the impact of the proposed development on the A5 northbound.

This audit focuses on the updated models and forecast report submitted by BWB on 19th May 2020.

The note draws attention to the elements described in BWB's TN 'SCD-BWB-GEN-XX-RP-TR-013_A5 KKR Impact & Mitigation TN-S2-P1':

- Changes to the model from the previous submission;
- Modelling results;
- Outstanding comments from the previous review; and
- Analysis and interpretation of modelling results.

The audit of the mitigation design will be reported in a separate Technical Note, TN12. This technical note should be read in conjunction with TN12.

Issues/Errors that were found in the models have been classified into three levels:

- **MINOR** – The issues found are likely to produce minimal changes in the results.
- **MEDIUM** – The issues found could have a medium impact on the results.
- **SIGNIFICANT** – The issues are considered as an error and are likely to have a large/ significant impact on the results.

Table 1 summarises the status of the issues identified during the previous audits:

Table 1. Summary of outstanding issues with the models from previous audits.

Issue Identified in Previous Audit	Level of Issue	Resolved?	Comments
Incomplete definition of scenarios	Minor	No	The new report does not contain a description of the modelled scenarios
Use of both priority rules and conflict areas	Minor	No	The model still contains priority rules and conflict areas controlling the same conflict points

No other modelling issues were found in the models that require further attention.

The modelling results show that the impact of the development on journey times across the junction is effectively mitigated on all approaches.

Overall network performance results show that, with mitigation, average delay across the network is reduced in the Do Something scenario, compared to the Reference Case. Delays at the junction remain at similar levels to the Reference Case in the AM peak hour, and are significantly reduced in the PM peak hour.

The increase in congestion on the A5 northbound approach to the junction caused by the development that was observed in the previous model submissions, has been effectively addressed with the additional mitigation proposed and the better optimisation of signal controllers.

This model shows that the junction, with the mitigation proposal in place and an optimal signal configuration, can effectively mitigate the impacts caused by the development flows.

1 Introduction

This Technical Note (TN11) provides a summary of the audit of the revised forecast Vissim models (dated 19th May 2020) developed for the A5 Kelly's Kitchen Roundabout by BWB. The Vissim models have been prepared to support the planning application of an employment development at South Caldecotte in Milton Keynes.

AECOM has previously undertaken three reviews of the base models:

- 'TN03 South Caldecotte VISSIM Model Review_v10' – dated 2nd November 2018;
- 'TN04 Revised South Caldecotte VISSIM Review_v8' – dated 26th April 2019; and
- 'TN05 South Caldecotte Revised VISSIM Review_v7' – dated 1st August 2019.

In the last review of the base models (TN05), these were approved (subject to minor amendments) and agreed to be taken forward for forecast modelling. Subsequently, AECOM carried out three reviews of the proposed models:

- 'TN07 South Caldecotte Revised Forecast VISSIM Review_v13' – dated 24th January 2020
- 'TN09 South Caldecotte Revised Forecast VISSIM Review_v14' – dated 20th March 2020; and
- 'TN10 South Caldecotte Revised Forecast VISSIM Review_V2.12' – dated 24th April 2020.

The audit of the most recently submitted forecast model (Technical Note 10 – 24th April 2020) recommended that additional measures were sought to mitigate the impacts of the proposed development on the A5 northbound.

Subsequently, BWB submitted new updated models and modelling report, as well as drawings of the proposed mitigation. The models/information received by AECOM for this audit include:

- The forecast VISSIM models;
- Updated Forecast Model Report (*SCD-BWB-GEN-XX-RP-TR-013_A5 KKR Impact & Mitigation TN-S2-P1*); and
- Mitigation drawing (*SCD-BWB-GEN-01-SK-TR-SK01_Kelly's Kitchen Roundabout_P2* dated 21st May 2020).

2 Forecast model review – changes from previous model submission

2.1 Modelling approach

BWB reported that one of the committed developments previously included in the models, Levante Gate, had recently been rejected planning permission. Consequently, BWB removed Levante Gate from the committed development flows. This is considered appropriate.

Table 2 shows the composition of the modelled scenarios. It should be noted that the scenario labelled 'Do Minimum' includes the proposed development, but no mitigation. To evaluate the impact of the proposed development trips and mitigation on the network, a comparison should be made against the 'Reference Case – without proposed development but with committed Kelly's Kitchen Hamburger Scheme (by others)' and 'Do Minimum - with development' and the 'Do Something – with development, plus mitigation'.

Table 2. Composition of modelled scenarios.

	Flows	Schemes
Reference Case 2023	Base + Committed Developments (without Levante Gate)	Kelly's Kitchen Roundabout Scheme
Do Min 2023	Base + Committed developments (without Levante Gate) + Proposed development	Kelly's Kitchen Roundabout Scheme
Do Something 2023	Base + Committed developments (without Levante Gate) + Proposed development	Kelly's Kitchen Roundabout Scheme + Tilbrook Roundabout Scheme + change in lane allocation on A5 SB
Reference Case 2031	Base + Committed Developments (without Levante Gate)	Kelly's Kitchen Roundabout Scheme
Do Min 2031	Base + Committed developments (without Levante Gate) + Proposed development	Kelly's Kitchen Roundabout Scheme
Do Something 2031	Base + Committed developments (without Levante Gate) + Proposed development	Kelly's Kitchen Roundabout Scheme + Tilbrook Roundabout Scheme + mitigation

2.2 Demand checks

The model demand is consistent with the previous submission without Levante Gate (refer to TN10 - §2.1.1).

2.3 Network Changes

2.3.1 Link and connectors

The changes to the link and connector structure of the model accurately represent the proposed extension of the flares on the approaches to the junction from Brickhill Street and the A4146, as specified on the mitigation drawing (SCD-BWB-GEN-01-SK-TR-SK01_Kelly's Kitchen Roundabout_P2).

There are no additional changes to links and connectors other than those necessary to replicate the proposed mitigation.

2.3.2 Other changes

There are other changes to reduced speed areas, signal heads, and vehicle routing decisions to account for the different link and connector structure associated with the proposed mitigation. These are considered appropriate.

2.4 Changes to signal controllers

The previous audit indicated that the signal controllers could be better optimised to distribute the journey time improvements observed on the A5 southbound in the Do Something scenario and reduce the unmitigated increase in queues on the A5 northbound caused by the development flows.

A change in the operation of signal controller 'South Stream 1' has been introduced in all scenarios, including the addition of new detectors into the Kelly's Kitchen Roundabout (as shown in Figure 1), which help to manage the queues inside the roundabout. This is considered appropriate.

The only changes in signal controllers across the modelled scenarios are maximum and minimum green times, which are considered appropriate changes for signal timing optimization. Signal Controller 5 (South Stream 1) is forced to run for 7 seconds (maximum green time of 7 seconds) in the Do Something scenarios.

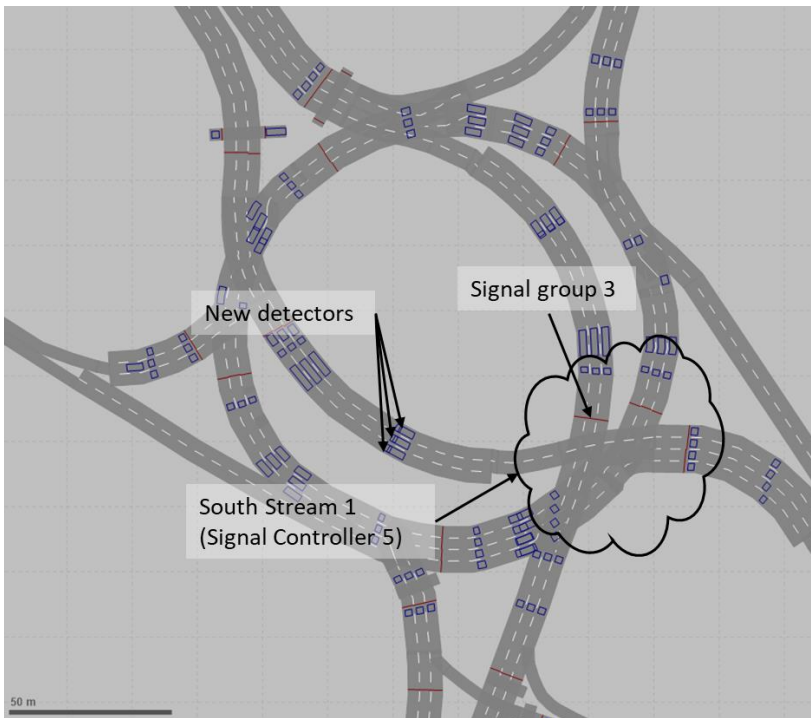


Figure 1. Detectors added on south stream 2, signal controller 5.

2.5 Modelling results

2.5.1 Replication of modelling results

The model results contained in the forecast report have been successfully replicated by AECOM for all scenarios.

2.5.2 Analysis of modelling results

Figure 2 shows the location of the journey time sections defined across the model.

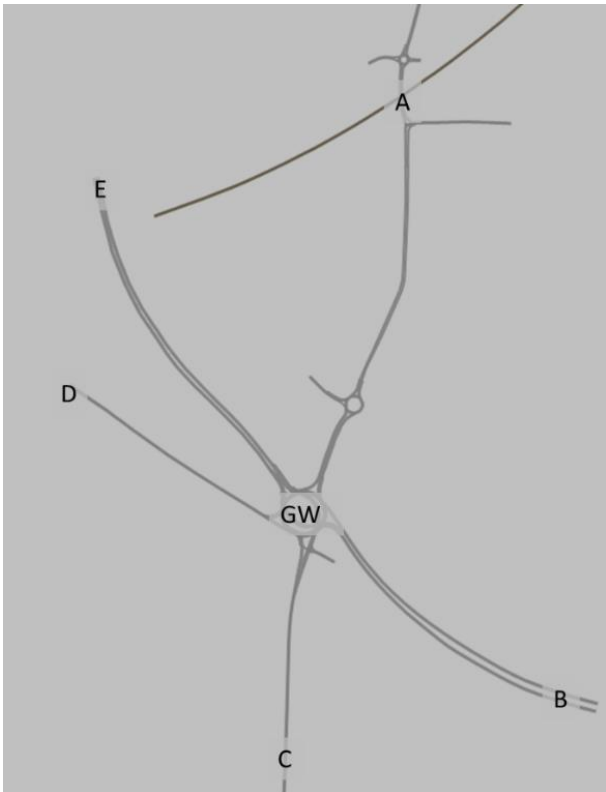


Figure 2. Journey time sections through the model.

Figure 3 shows the journey time results for the AM and PM peak hours on all the approaches to the junction produced by the model submitted by BWB.

The journey time results are broadly consistent for both time periods, showing that:

- The proposed mitigation and signal optimisation in the Do Something scenario effectively offsets the increase in journey times seen from the Reference Case to Do Minimum (with development trips added) on all approaches to the junction (A-GW, B-GW, C-GW, D-GW and E-GW);
- The optimisation of signal timings in the Do Something scenario (described in §2.4) results in more available green time for the A5 northbound approach (B-GW), which prevents congestion on this approach from increasing in the Do Something scenario (as was seen in previous model submissions);

- At the same time, the updated green time allocation causes an increase in journey times across the junction from the A5 southbound access towards the A4146 (GW[E]-C) of 46 seconds in AM 2023 and 27 seconds in PM 2023, with similar increases in 2031. It should be noted that the journey time increase observed on this section of the route is compensated by the journey time reduction observed on the A5 southbound;
- The change in lane allocation at the southbound approach on the A5 (E-GW) in the Do Something scenarios results in a large reduction in journey times, such that it is an improvement to those in the Reference Case; over 130 seconds in 2023 AM and over 280 seconds in 2023 PM; and
- The mitigation at Tilbrook Roundabout results in a significant reduction in northbound journey times along Brickhill St (route 7 – B-A, route 12 - C-A, and route 17 - D-A) in both peaks.



Figure 3. Modelled journey times.

The previous review highlighted a significant increase in queues during the AM peak on the A5 northbound in the Do Something scenario compared to the Reference Case. Observation of the updated model runs shows consistent levels of congestion on the A5 northbound in the Reference Case and Do Something scenarios (as

shown in Figure 4).

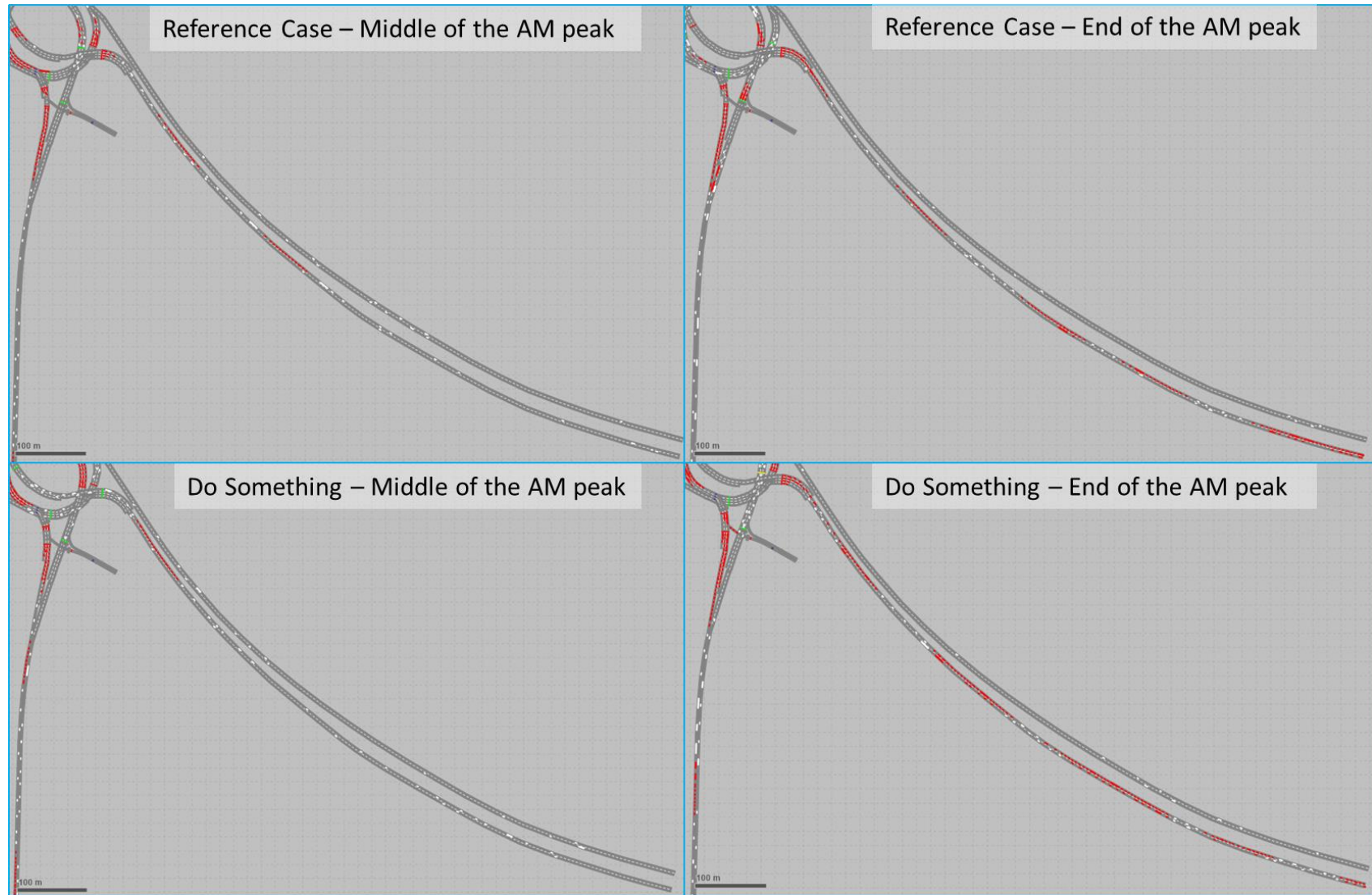


Figure 4. AM Peak model observations

Table 3 and Figure 7 show the network performance results, as produced by the models submitted by BWB.

There is predicted to be a significant reduction in overall average delay and latent demand with the implementation of the proposed mitigations (comparison between Reference Case, Do Minimum and Do Something).

The Total Delay figures include the delay experienced by all vehicles loaded in the network, plus the delay experienced by vehicles that could not be loaded on to the network during the simulation. The results indicate that the additional delay caused by the development in the AM peak hour is effectively mitigated in the Do Something Scenario. The results also show that there is less delay in the Do Something scenarios compared to the Reference Case scenarios in the PM peak hour.

It should be noted however that this assessment includes the mitigation at the Tilbrook Roundabout. The latent demand indicates, that due to congestion, not all vehicles are able to enter the model network.

Table 3. Modelled network performance results.

		Delay Avg (s)	Speed Avg (mph)	Veh arrived	Latent demand (veh)	Total delay ¹ (s)
AM	Reference Case 2023	209	14	6645	1118	3955745
	Do Min 2023	218	13	6832	1469	4712242
	Do Something 2023	170	16	7380	956	3588015
	Reference Case 2031	243	12	6762	1757	5641323
	Do Min 2031	255	12	6909	2127	6522237
	Do Something 2031	221	13	7450	1526	5445025
PM	Reference Case 2023	198	15	6268	926	3244640
	Do Min 2023	202	14	6469	1148	3698330
	Do Something 2023	145	18	7224	154	1336196
	Reference Case 2031	212	14	6416	1588	4793689
	Do Min 2031	213	14	6603	1832	5267392
	Do Something 2031	172	16	7379	762	2709900

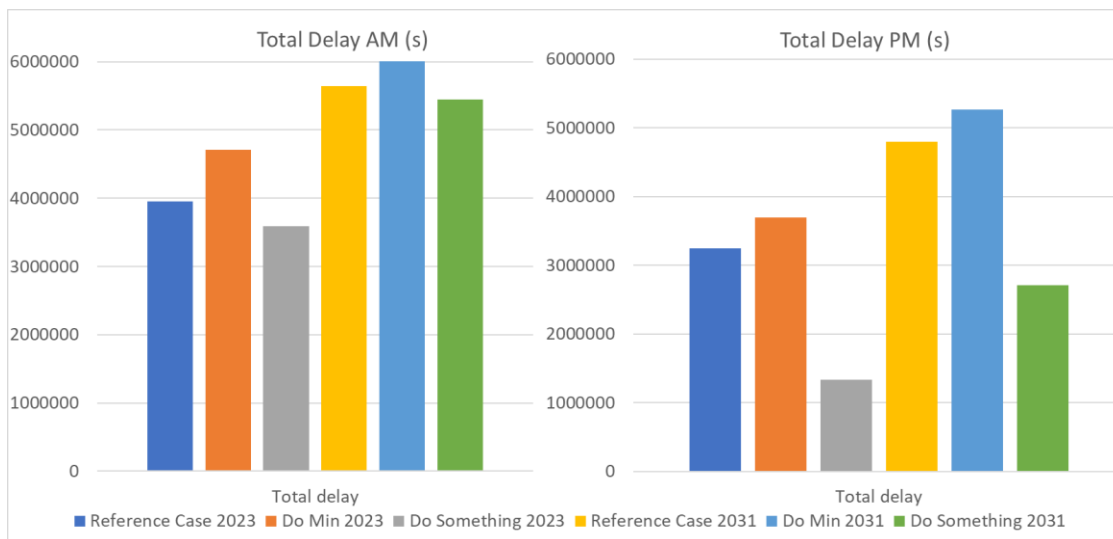


Figure 7. Network Performance results for total delay¹ including latent delay.

1 - Total delay is expressed in seconds and calculated as the sum of the total delay experienced by all vehicles that have been loaded onto the model at the end of the simulation plus the latent delay experienced by all vehicles that could not be loaded onto the network on time.

3 Conclusions

AECOM has undertaken an audit of the South Caldecotte Vissim Base (already approved in previous audits) and Forecast models, as part of a wider review of the potential impact of the proposed South Caldecotte development on the strategic and local road network.

All the coding issues identified and marked as significant during the previous audits of the models have been addressed.

The modelling results indicate that the proposed mitigations offset the increase in journey times caused by the development on all approaches to the junction. All Journey Times across the modelled area remain similar or are reduced by the mitigation compared to the Reference Case.

The network performance results show that due to the proposed mitigations, delays across the network are reduced in the Do Something scenario, compared to the Reference Case. The mitigations offset any overall increase in delay resulting from the proposed development trips in both peak hours.

The increase in congestion on the A5 northbound approach to the junction caused by the development trips that was observed in the previous model submissions, has been effectively addressed with the additional mitigation proposed and through better optimisation of signal controllers.

This model shows that the junction, with the mitigation proposal in place and an optimal signal configuration, can effectively mitigate the impacts caused by the development flows.