

Orchard Farm, Pershore Modelling Review

Date:	8 February 2024	Jacobs U.K. Limited
Project name:	Orchard Farm Transport Assessment	7th Floor
Project no:	B2367230	2 Colmore Square
Company:	Jacobs	Birmingham, B4 68N
Prepared by:	Parmjit Nila	United Kingdom
Document no:	01	T +44 (0)117 237 4000
		www.jacobs.com

1. Introduction

1.1 Background

This Technical Note presents the findings of a review of modelling work carried out in support of the Orchard Farm Transport Assessment in Pershore.

1.2 Items Reviewed

The following items have been provided for the purpose of this review:

- "Land at Orchard Farm Transport Assessment", September 2023;
- Associated modelling files; and
- PDF copies of the junction layouts.

2. Base Model Review

The models have been assessed in terms of their ability to replicate existing or proposed junction forms, and to ensure that traffic flows, geometry and modelling parameters have been entered and used correctly.

It is difficult to check geometric parameters without CAD layouts, a pdf copy of the junctions has been provided and initial checks using google maps has been undertaken.

The TA states, a AM peak of 08:00 to 09:00 and PM peak of 17:00 to 18:00 has been used, for a robust assessment the peak hours with the highest background flows calculated from the surveys should be used for the modelling of the highway network.

There appears to be no calibration and validation of the base models. WCC require each of the junctions to reflect observed traffic queues and delays, this could be done by undertaking a queue and delay surveys at the same time as the traffic survey and matching the modelled and observed queues and delays. WCC allow validation of just queues as a minimum requirement.

Without full confidence in the base models there can be little confidence the junctions will perform as forecast by the modelling.

3. Model Audit

3.1 A4104 Three Springs Road/ B4084 Worcester Road

The junction has been modelled using the JUNCTIONS9 software, the following issues have been identified that require further consideration and clarification:

Table 3.1: A4104 Three Springs Road/ B4084 Worcester Road

	Reviewers Comments
1.	The time periods for the AM and PM peaks have been incorrectly input with a start time of 00:00 hr and a finish time of 01:30 hrs. The model needs to be amended to show the correct AM and PM peak start and finish times.
2.	A flat modelling profile has been chosen, the TA states this is based on the traffic flows through the junction being largely flat (or the same) during 15-minute segments in the peak hours. A 90-minute time period has been selected for the modelled peak hour. It should be noted that for a flat profile analysis, a 60 minute and not 90-minute modelled period is required. Flat profiles do not require a synchronised 15 minutes either side of the central period, as a warmup and run down period.
3.	There is evidence from Google traffic of slow moving/ and stationary traffic on the B408 Worcester Road caused by interaction between this priority junction and adjacent signalised junction. Stand-alone modelling programs such as Junctions9 have limitations to accurately model these types of situations. Therefore, consideration to model the two junctions as a mini- network using micro-simulation should be discussed with WCC.
4.	No calibration and validation of the base models have been undertaken, as such WCC have no confidence the modelling reflects the typical queues and delays experienced by users of the network. WCC cannot assess the forecast development impact until there is an agreed base validated model.

3.2 A4104 Three Springs Road/ Defford Rd

The junction has been modelled using the JUNCTIONS9 software, the following issues have been identified that require further consideration and clarification:

Table 3.2: A4104 Three Springs Road/ Defford Road

	Reviewers Comments
1.	The time periods for the AM and PM peaks have been incorrectly input with a start time of 00:00 hr and a finish time of 01:30 hrs. The model needs to be amended to show the correct AM and PM peak start and finish times.
2.	The ARCADY guidance states that effective geometric measurement should be used in modelling, as such it is recommended the theoretical measurements are checked on site and any evidence of effective road space should be factored into the measurements input into the modelling. Some of the measurements on the minor arm appear to be high and a validation check on site is recommended, in addition OS data Hs up to a 10% error margin.
3.	No calibration and validation of the base models have been undertaken, as such WCC have no confidence the modelling reflects the typical queues and delays experienced by users of the network. WCC cannot assess the forecast development impact until there is an agreed base validated model.

3.3 A4104 Three Springs Road/ Petrol Filling Station

The junction has been modelled using the JUNCTIONS9 software, the following issues have been identified that require further consideration and clarification:

Table 3.3: A4104 Three Springs Road/ Petrol Filling Station

	Reviewers Comments
1.	The time periods for the AM and PM peaks have been incorrectly input with a start time of 00:00 hr and a finish time of 01:30 hrs. The model needs to be amended to show the correct AM and PM peak start and finish times.
2.	The Petrol filling station arm is exit only. Any exit-only arm should be identified using the Exit Only data field within the geometry data section of the ARCADY model.
3.	No calibration and validation of the base models have been undertaken, as such WCC have no confidence the modelling reflects the typical queues and delays experienced by users of the network. WCC cannot assess the forecast development impact until there is an agreed base validated model.

3.4 Site Access/ Defford Rd

The junction has been modelled using the JUNCTIONS9 software, the following issues have been identified that require further consideration and clarification:

Table 3.4: Site Access/ Defford Road

	Reviewers Comments
1.	The time periods for the AM and PM peaks have been incorrectly input with a start time of 00:00 hr and a finish time of 01:30 hrs. The model needs to be amended to show the correct AM and PM peak start and finish times.

3.5 A4104 Worcester Road/High Street/ Station Road

The junction has been modelled using the LinSig software, the following issues have been identified that require further consideration and clarification:

Table 3.5: A4104 Three Springs Road/ Petrol Filling Station

	Reviewers Comments
1.	The base LinSig results show that the junction already suffers from significant congestion, the TA states that the level of development impact is small. WCC is concerned at locations of significant congestion even a small level of additional trips could increase queues and delays significantly and could also trigger trips reassigning onto alternative routes, which would impact on the wider highway network.
2.	WCC is concerned that there is queue and delay interaction between the signals and adjacent junctions, due to limitations in the software of stand-alone programs such as LinSig, the modelling results could be inaccurate. Micro-simulation would be the ideal tool to provide better an understanding of the potential impacts.
3.	Lane 3/2 should be a long lane not Lane 3/1, there are much higher traffic flows using Lane 3/2 and therefore Lane 3/1 will be starved of entry flow and act as a short lane.
4.	No calibration and validation of the base models have been undertaken, as such WCC have no confidence the modelling reflects the typical queues and delays experienced by users of the network. WCC cannot assess the forecast development impact until there is an agreed base validated model.

4. Conclusions

The key issues for the junctions are as follows:

The existing base models should be validated against observed queue data to verify the model has been correctly calibrated and is capable of producing valid predictions for proposed scenarios.

All the issues raised require to be addressed before WCC can approve the models for the purpose of determining forecast junction performance.