

A428 Black Cat to Caxton Gibbet improvements

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Volume 9

9.44 Scope of Junction Model Sensitivity Test

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**A428 Black Cat to Caxton Gibbet
improvements
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1 Summary

- 1.1.1 This scoping document has been prepared in response to an action identified at Issue Specific Hearing 2 (ISH2) held on transport and highways matters on 23 September 2021. The action was as follows:
- Report on the possibility, process and outcomes of greater sensitivity testing of the strategic traffic model with regard to stated concerns from Local Highway Authorities (LHAs), in locations highlighted in Local Impact Reports, at minimum:*
- a. Great north road (and side roads) leading to Wyboston Roundabout, St Neots*
 - b. Caxton Gibbet Roundabout*
 - c. A1/A603 Roundabout, Sandy*
- 1.1.2 Junction modelling for the Scheme has been the subject of extensive discussions between the Applicant and the local highway authorities. The basis of the local highway authorities' concerns in relation to junction modelling is set out in detail in their Relevant Representations **[RR-013, RR-023]** and Written Representations **[REP1-048]**, to which the Applicant has provided a full response [TN73] including an explanation on the rationale for adopting the chosen methodology as a robust, reasonable and proportionate approach to the assessment of impacts of the Scheme.
- 1.1.3 During ISH2 Cambridgeshire County Council (CCC), Huntingdonshire District Council (HDC) and South Cambridgeshire District Council (SCDC) re-stated their concerns regarding the methodology for the junction modelling as raised within their Written Representations **[REP1-048]**. Central Bedfordshire Council (CBC) has also raised similar concerns regarding junction modelling for some junctions within their jurisdiction **[REP1-055]**. Notwithstanding the Applicant's firm position that the modelling undertaken is robust and already goes beyond the extent of modelling normally required for schemes of this nature, the Applicant has agreed to undertake a sensitivity test of selected junctions in order to provide further confidence to the local highway authorities that the modelling already undertaken is appropriate and reliable as a means of assessing the potential impacts of local junctions outside of the Order Limits for the Scheme.
- 1.1.4 This Scoping Note summaries the position of the parties (as understood by the Applicant) and then describes the scope of the proposed sensitivity test for the selected junctions. It also outlines the approach to be taken in respect of the sensitivity test, in the expectation that this can be jointly agreed with the local highway authorities in advance of the Applicant commencing the sensitivity test and reporting this to the Examining Authority in due course.

2 Respective positions of the parties

2.1.1 In summary, the key concerns raised by the local highway authorities were as follows:

- a. The local models presented in the Transport Assessment Annex **[APP-243]** did not include the local junctions along Great North Road and Cambridge Road, St Neots, where the strategic model is forecasting a significant increase in traffic flows resulting from the Scheme.
- b. The base models were not developed and calibrated/validated for most of the junctions.
- c. In several locations, the 2025 (opening year) and 2040 (design year) Do Minimum (without the Scheme) and Do Something (with the Scheme) forecast flows were taken directly from the strategic model (SATURN), which was not calibrated to individual turning flows, and the method followed did not take account of surveyed turning flows.

2.1.2 The Applicant's position is that existing turning flows not relevant to the outcome of the assessment given that the new Scheme will fundamentally change the existing junction layout. This means turning proportions and routings would change significantly between the base and forecast years such that comparison of base and future year turning flows in these junctions cannot be construed as like for like comparisons. In addition, the strategic model flows indicated that the Scheme would reduce flows and improve operation of junctions on the wider network, or that the junction(s) would operate well within capacity. Given these indications and bearing in mind the scale and nature of the Schemewhere, for similar schemes, wider junction impacts are not normally assessed, adopting forecast turning flows from the strategic models to assess the junctions was considered to be a reasonable and proportionate approach.

3 Selection Criteria for Sensitivity Test Modelling

- 3.1.1 The Applicant has reviewed the work originally carried out in the preparation of the Transport Assessment [APP-241] and [APP-242] and Transport Assessment Annex [APP-243], and the concerns raised in the Local Impact Reports [REP2-003] and [REP2-004] in order to identify the most appropriate locations for sensitivity testing. The approach to this screening exercise is reported below.
- 3.1.2 Cambridgeshire County Council (CCC), HDC and SCDC’s Joint Local Impact Report [REP2-003] raised concerns with the junction modelling in some locations, which are discussed in the table below. The key concern relates to direct use of strategic model flows in the models, without taking account of observed traffic data where available.
- 3.1.3 Further to the ISH2, CCC has provided their preferred method for deriving the junction model flows for future years. CCC has suggested an approach would be acceptable where base models are not developed, but where the observed traffic data is used to derive future year flows (referred to as ‘Option 2’). The Applicant agrees with this approach for deriving future year flows, where sensitivity testing is identified as being required following the screening exercise (see below).
- 3.1.4 CCC has also specified the junctions where they consider sensitivity tests are required and these have been considered in the screening exercise, with responses to the issues raised by CCC provided in the tables below.

Table 3-1 CCC, HDC and SCDC Joint Local Impact Report [REP2-003]

Item	Issue Raised	Applicant response	Proposed course of action
7.2.5 – 7.2.7: Great North Road and Cambridge Road, St Neots	Impact of traffic flow increases on local road network junctions along Great North Road and Cambridge Road, within St Neots. CCC has identified the following junctions where modelling should be undertaken: Great North Road/ Alpha Drive/ Marlborough Road; Great North Road/ Howard Road; Great North Road/ Little End Road;	The Applicant acknowledges that the modelling shows an increase in flows along Great North Road and Cambridge Road within St Neots. However, in section 7.2.6 of the LIR [REP2-003], the Councils acknowledge that this is an effect of traffic re-routing within St Neots to access the wider road network via the Wyboston and Cambridge Road junctions and that it is linked with a predicted significant reduction in traffic using the B1428 Town Bridge and other roads in the town	No further action proposed by the Applicant

Item	Issue Raised	Applicant response	Proposed course of action
	<p>Great North Road/ Nelson Road.</p> <p>Cambridge Street/ Cromwell Road/ Station Road/ Cambridge Road;</p> <p>Cambridge Road/ Dramsell Rise;</p> <p>Cambridge Road/ Stone Hill/ Wintringham Park access.</p>	<p>centre. The Councils have welcomed this reduction.</p> <p>The Scheme would remove through traffic from St. Neots thereby providing net relief to local traffic. Local traffic would re-route and benefit through a net reduction of traffic within the town centre.</p> <p>In considering the proposed Scheme, and in particular, when weighing its adverse impacts against its benefits, the Applicant has established through its comprehensive and robust assessments of the network that the Scheme does offer significant net benefits to all the local towns and villages in the vicinity of the Scheme and to the majority of the junctions in the network.</p> <p>The Applicant considers that it would not be reasonable or proportionate to carry out further modelling to assess a potential deterioration in traffic conditions on selective approach arms of a number of specific individual junctions within the urban road network of a town, where the overall impact of the Scheme on the town is beneficial, and where the increase in traffic flows concerned is acknowledged to be the effect of local reassignment of traffic away from less suitable routes within the town centre.</p>	
7.2.17– 7.2.18	There are some issues with the inputs, particularly with the geometries for the junctions modelled in	The Applicant has listed the junctions associated with this issue in the table below.	The action proposed to be taken is listed in the table below

Item	Issue Raised	Applicant response	Proposed course of action
	ARCADY, and with some of the parameters used in the VISSIM models.		for each junction.
7.2.19– 7.2.24	No base models have been developed. Traffic flows used in local junction models taken directly from the Strategic Model.	The Applicant has listed the junctions associated with this issue in the table below.	The action proposed to be taken is listed in the table below for each junction.

Table 3-2 Junctions associated with Issue highlighted in Section 7.2.17 – 7.2.24 of the LIR [REP2-003]

Junction Ref:	Issue Raised	Applicant's response	Proposed course of action
<p>Black Cat Junction</p> <p>Caxton Gibbet Junction</p> <p>Cambridge Road Junction</p>	<p>No base models have been developed.</p> <p>Traffic flows used in local junction models taken directly from the Strategic Model.</p> <p>Some Vissim model parameters have been questioned.</p>	<p>The junction layout changes fundamentally and the future layout does not resemble the existing layout. A base model would not be relevant and would not provide useful information.</p> <p>Taking into account observed traffic count data may have some impact on the turning flows of the forecast year models.</p> <p>As these are the three main Scheme junctions, sensitivity tests are proposed, for the 2040 AM and PM Do Something scenarios, using traffic count data to derive future year traffic flows – following the 'Option 2' approach recommended by CCC.</p> <p>The sensitivity tests are only required for 2040, as traffic flows are higher in 2040 compared to 2025, so this will demonstrate that the junctions will operate acceptably.</p> <p>The Vissim parameters (such as look ahead distance of priority markers, the HGV disaggregation between OGV1 and OGV2, etc.) which have been questioned are not likely to have a significant impact on model results. However, as a sensitivity test is being run to take into account survey data, then the parameters can be adjusted to test the impact of different Vissim parameters.</p>	<p>Sensitivity test to be undertaken by the Applicant for these junctions</p>

Junction Ref:	Issue Raised	Applicant's response	Proposed course of action
Yelling & Toseland Crossroads	<p>No base models have been developed.</p> <p>Traffic flows used in local junction models taken directly from the Strategic Model.</p>	<p>The Scheme significantly reduces flows in the east-west and west-east direction through this junction but increases flows in the north-south and south-north directions. Some of the capacity results indicate a marginal deterioration in capacity in the north-south and south-north directions as a result of the Scheme.</p> <p>The local junction model shows that this Junction is predicted to operate well within capacity in 2040 DS (max RFC=0.27). Source: TAA [APP-243] Table 3-10. This junction could therefore in principle carry more than double the amount of traffic assigned to it in the Model before reaching its capacity. There is therefore no reason for further modelling, to confirm the adequacy of the current junction layout at this location with the Scheme in place.</p>	No further action proposed by the Applicant
A428/ Toseland Road/ Abbotsley Road junction	<p>No base models have been developed.</p> <p>Traffic flows used in local junction models taken directly from the Strategic Model.</p>	<p>This junction is currently dominated by heavy through traffic along the existing A428. The Scheme will remove almost all of the A428 through traffic. Therefore, whilst the layout of this junction will remain unaltered, the junction will operate completely differently to how it does today. The performance of the existing junction is therefore not a useful guide to the performance of the junction once the Scheme opens.</p> <p>The local junction model shows that this Junction is</p>	No further action proposed by the Applicant

Junction Ref:	Issue Raised	Applicant's response	Proposed course of action
		<p>predicted to operate well within capacity in 2040 DS (max RFC=0.28). Source: TA [APP-241] Table 6-8. This junction could therefore in principle carry more than double the amount of traffic assigned to it in the Model before reaching its capacity. There is therefore no reason for further modelling, to confirm the adequacy of the current junction layout at this location with the Scheme in place.</p>	
<p>Potton Road/ B1046 Junction</p>	<p>No base models have been developed. Traffic flows used in local junction models taken directly from the Strategic Model.</p>	<p>This junction is to be reconfigured by the Scheme. The performance of the existing junction is therefore not a useful guide to the performance of the junction once the Scheme opens. This junction is predicted to operate well within capacity in 2040 DS (max RFC=0.44). Source: TA [APP-241] Table 6-6. This junction could therefore in principle carry almost double the amount of traffic assigned to it in the Model before reaching its capacity. There is therefore no reason for further modelling, to confirm the adequacy of the layout proposed at this junction in the Scheme.</p>	<p>No further action proposed by the Applicant</p>
<p>Eltisley Link Junction</p>	<p>No base models have been developed. Traffic flows used in local junction models taken directly from the Strategic Model.</p>	<p>The junction layout changes fundamentally and the future layout does not resemble the existing layout. A base model would not be relevant and would not provide useful information. Taking into account observed traffic count data may have some impact on the turning</p>	<p>No further action proposed by the Applicant</p>

Junction Ref:	Issue Raised	Applicant's response	Proposed course of action
		<p>flows of the forecast year models.</p> <p>However, the pattern of traffic flows at this junction will be fundamentally different with the Scheme because of the removal of through traffic from the existing A428.</p> <p>This junction is predicted to operate well within capacity in 2040 DS (max RFC=0.33). Source: TA [APP-241] Table 6-9. This junction could therefore in principle carry more than double the amount of traffic assigned to it in the Model before reaching its capacity. There is therefore no reason for further modelling, to confirm the adequacy of the layout proposed at this junction in the Scheme.</p>	
Cambourne Junction	Query over the geometric inputs into the LinSig models.	<p>The Applicant has checked that the geometry coded in LinSig accurately represents the developer-funded mitigation scheme proposed in this location and confirms this is the case.</p> <p>As reported in Tables 3-19 and 3-20 of the TAA [APP-243], this junction is predicted to operate well within capacity in 2040 DS (max DoS=38.2%). Source: TAA [APP-243] Table 3.20. It could therefore in principle carry more than double the amount of traffic assigned to it in the Model before reaching its capacity. There is therefore no reason for further modelling, to assess the performance of this junction in order to justify the</p>	No further action proposed by the Applicant

Junction Ref:	Issue Raised	Applicant's response	Proposed course of action
		minimal impact the Scheme has at this location.	
Scotland Road, Hardwick, Junction	This junction has been recently included in a list of junctions for which CCC have requested further modelling.	<p>In the papers prepared for the meeting held on 09/09/2021, CCC did not challenge the modelling of this junction because they were not aware of any observed traffic flows being available with which to calculate an alternative set of base model flows.</p> <p>The modelling undertaken by the Applicant indicates that this junction would remain well within capacity through to 2040 with the Scheme in place (max RFC=0.42). Source: TAA [APP-243] Table 3-26.</p> <p>This junction is not referred to as being of concern in either the Local Impact Report [REP2-003] or Written Representations at Deadline 1 [REP1-048].</p>	No further action proposed by the Applicant
Madingley Mulch Junction	Query over the accuracy of the representation of queues at the Madingley Mulch junction.	<p>This junction is affected by queueing back from M11 J13 which results in exit blocking on the A1303. As a modelling issue, this has been addressed by the extension of the M11 J13 VISSIM model to cover this junction; as a practical issue, it will be addressed by the M11 J13 RIS scheme and there may be other, shorter term, measures which could be taken to minimise queueing on the slip road-which will be implemented under National Highways' "monitor and manage" strategy.</p> <p>The M11 J13 VISSIM model is a better guide to the performance of this junction</p>	No further action proposed by the Applicant

Junction Ref:	Issue Raised	Applicant's response	Proposed course of action
		<p>than a free-standing ARCADY model. TAA [APP-243] para 3.8.8 acknowledges this.</p> <p>There is therefore no case to be made for further, more detailed modelling using ARCADY, to assess the performance of this junction in order to justify the impact the Scheme has at this location.</p>	
Wyboston Junction	<p>Several issues raised. CCC assert that their preferred approach to modelling would show a deterioration in junction performance compared to the Applicant's model.</p>	<p>The Applicant maintains that the impact of the Scheme on this junction will still be beneficial whatever modelling approach is used.</p> <p>Nevertheless, the Applicant is prepared to undertake sensitivity testing to address the issues raised by CCC and to re-assess the net impact of the Scheme on the Local Road Network at this junction.</p>	<p>Sensitivity test to be undertaken by the Applicant for this junction</p>
A428 Barford Road junction	<p>CCC assert that the base flows used are low relative to observed data from 2017.</p>	<p>The Applicant maintains that the impact of the Scheme on this junction will still be beneficial whatever modelling approach is used.</p> <p>With the modelling undertaken, by 2040, this junction will remain within capacity (max RFC=0.80). Source: TAA [APP-243] Table 3-52. Whilst the modelling shows a small increase (of the order of 3% - 6%) in flows using Barford Road (north), the Barford Road (north) arm of the junction remains well within capacity (max RFC=0.64) and it is unlikely that a higher level of base flows would</p>	<p>Sensitivity test to be undertaken by the Applicant for this junction</p>

Junction Ref:	Issue Raised	Applicant's response	Proposed course of action
		<p>result in this giving rise to a queue-back problem on the Local Road Network.</p> <p>It would not normally be appropriate for National Highways to carry out further, more detailed modelling to assess the performance of this junction, where the overall impact is so clearly beneficial.</p> <p>Nevertheless, the Applicant is prepared to undertake sensitivity testing to quantify the net impact of the Scheme on the Local Road Network at this junction using a set of traffic flow forecasts based on the observed flows – following the 'Option 2' approach recommended by CCC.</p>	
<p>M11 Junction 13/ A1303</p> <p>Buckden Roundabout</p>	<p>Some Vissim model parameters have been questioned.</p>	<p>The number of parameters under question is low.</p> <p>Base models have been developed and calibrated/ validated to TAG standards, which is the accepted and standard approach required in the NPSNN. The calibration and validation was done with the parameters in place – so the capacity of junctions and queue lengths are calibrated to observed information and are robustly modelled. The parameters are also consistent between the Do Minimum and Do Something scenarios, so the modelling submitted provides a robust assessment of the impacts of the Scheme.</p>	<p>No further action proposed by the Applicant</p>

Central Bedfordshire Council (CBC)

3.1.5 The accuracy of the modelling is not explicitly referred to by Central Bedfordshire Council (CBC) in either their LIR [REP2-004] or their Written Representations

[REP1-055] at Deadline 1. However, CBC has subsequently expressed concerns regarding the modelling approach and modelling results in the locations considered in the table below. Therefore, the Applicant has considered these in the screening exercise to identify if any sensitivity tests are required.

Table 3-3 Junctions highlighted by CBC

Item	Issue Raised	Applicant response	Proposed course of action
Biggleswade North Junction	It is noted that a hybrid of model and observed flows were used to assess the operation of the Biggleswade North junction (A1 / Hill Lane), and that the base model was not validated. In addition, junction surveys associated with recent planning applications show higher levels of queuing than modelled within the Transport Assessment Annex for this junction, which raises queries over the confidence that can be given to the modelling. Traffic surveys available on public file (as part of these planning applications) include queue lengths - it is considered they represent a suitable data source for model validation – the applicant has been provided with links to the relevant data and CBC request that a validation exercise is undertaken. CBC would further request that a sensitivity test based upon	The Applicant notes the existence of a more reliable set of observed base flows and observed queue lengths. Whilst the overall impact on traffic flows at this junction is predicted to be minimal, the Applicant acknowledges the concerns expressed by CBC and is proposing to undertake sensitivity testing to quantify the net impact of the Scheme on this junction using a set of traffic flow forecasts based on the observed flows – following the ‘Option 2’ approach recommended by CCC.	Sensitivity test to be undertaken by the Applicant for this junction
Biggleswade South		The Applicant acknowledges that this junction is expected to be broadly at capacity in 2025 and over capacity in 2040. However, the impact of the Scheme on traffic flows at this location is minimal, with an overall predicted increase of between 0 and 2% and increases on individual arms of up to 4%. Source: TAA [APP-243] Tables 3-77 and 3-78. The local junction model indicates that, whilst there might be some deterioration in conditions on the A1 at	No further action proposed by the Applicant

Item	Issue Raised	Applicant response	Proposed course of action
	<p>observed turning movements to provide an updated base, with the addition of modelled growth for forecast assessment, is undertaken.</p> <p>Whilst reference is made to the reduction of flows or improved operation, this is not the case for junctions on the A1, where flows are predicted to increase following the opening of the scheme. In addition, the junctions in question are over capacity and subject to congestion and delay. As such accurate modelling of the junctions current and future operation is considered to be essential.</p> <p>The junctions of concern within CBC are not new 'Scheme' junctions and therefore existing baseline operation can be assessed.</p> <p>The junctions of concern in the CBC area (those on the A1 within CBC and at M1 J13) are also expected to experience increases in flow as a result of the proposed scheme and are predicted to operate over capacity.</p> <p>In addition, the</p>	<p>this location, the Local Road Network arm of this junction would remain well within capacity (max RFC=0.24). Source: TAA [APP-243] Table 3-82. Para 3.19.23 of the TAA [APP-243] proposes a 'monitor and manage' approach at this junction, in which the performance of this junction will be monitored and consideration given to the potential need for interventions if required.</p> <p>The Applicant therefore considers that it would not be reasonable or proportionate to carry out further modelling of this junction to justify the impact of the Scheme in this location.</p>	

Item	Issue Raised	Applicant response	Proposed course of action
	<p>operation of the local road approaches to these junctions are considered to be sensitive to increases in flow on the A1 Strategic Route, and as such the schemes impact upon individual turning movements is considered to be both relevant and important for CBC to have a full understanding of potential scheme impacts.</p>		
M1 Junction 13		<p>A base model was used as the basis for developing future year models that was calibrated and validated to observed turning counts and delay data. The future year flows were derived by applying the changes from the strategic models to the validated turning movements for the base scenario. The comments are therefore not applicable to this junction model, and the modelling presented in the Transport Assessment Annex [APP-243] is considered robust.</p> <p>It should be noted that the impact predicted at this location was found to be relatively minor.</p>	No further action proposed by the Applicant
Sandy A1 / A603	As detailed in the Written Statement, CBC continue to have concern over the significant	A base model was used as the basis for developing future year models that was calibrated and validated	No further action proposed by the Applicant

Item	Issue Raised	Applicant response	Proposed course of action
	<p>differences between the strategic model and VISSIM model when assessing the highway network around Sandy, including the A1 / A603 junction, due in part to the sensitivity of this junction to additional traffic, the potential for the displacement of traffic through the centre of Sandy (as predicted within the Strategic Modelling) and the resultant implications in terms of congestion and air quality.</p>	<p>to observed turning counts and delay data. The future year flows were derived by applying the changes from the strategic models to the validated turning movements for the base scenario. The modelling presented in the Transport Assessment Annex [APP-243] is considered robust.</p> <p>The A428 Strategic Traffic Model indicated there is a potential for rat-running, through Sandy, along St Neots and New Road. However, the A428 Strategic Traffic Model is developed in SATURN software, which is not designed for localised assessment where capacity and route choice may be influenced by network details such as pedestrian crossings and blocking back between junctions, which are difficult to replicate in SATURN.</p> <p>Hence, the Vissim microsimulation model was developed to assess whether this is an issue, since this software is specifically designed to provide a more detailed assessment.</p> <p>The Vissim model has been developed based on more comprehensive coverage of turning count data and link count data in the Sandy area, compared to the A428 Strategic Traffic Model, which is not calibrated to</p>	

Item	Issue Raised	Applicant response	Proposed course of action
		<p>turning flows. In addition, the base model is validated to journey time data along the A1 and routes through Sandy. The Vissim model is therefore considered a reliable tool to assess changes in route choice in forecast scenarios. The Vissim modelling demonstrated that the Scheme does not induce more trips to use the St Neots and New Road route to bypass the A1.</p> <p>The Vissim model results are considered reliable and robust. The Vissim models have been provided to CBC for review and no specific issues have been raised with the models at this time.</p>	

Bedford Borough Council (BBC)

- 3.1.6 Bedford Borough Council (BBC) has stated that the modelling is acceptable, and no issues have been raised in either the LIR **[REP2-002]** or Written Representations **[REP1-045]**.

4 Scope of sensitivity testing

- 4.1.1 As reported in Section 3, the Applicant proposes to undertake sensitivity tests for the following junction models:
- a. Black Cat Vissim model (Scheme junction – Transport Assessment) AM and PM 2040 Do Something.
 - b. Cambridge Road Vissim model (Scheme junction – Transport Assessment) AM and PM 2040 Do Something.
 - c. Caxton Gibbet Vissim model (Scheme junction – Transport Assessment) AM and PM 2040 Do Something.
 - d. A1/A428 Wyboston Junctions9 (ARCADY) model – (Transport Assessment Annex) AM and PM 2025/2040 Do Minimum and Do Something.
 - e. A1/A6001/ B658 Biggleswade North Junctions9 (ARCADY) model – (Transport Assessment Annex) AM and PM 2025/2040 Do Minimum and Do Something.
 - f. A428/Barford Road St Neots Junctions9 (ARCADY) model –(Transport Assessment Annex) AM and PM 2025/2040 Do Minimum and Do Something.
- 4.1.2 Sensitivity test models will be developed for the junctions assessed as part of the Transport Assessment **[APP-241]**. These models will include the following changes to the models developed as part of the DCO application for the Scheme, to assess the impact of the changes to parameters requested by the local highway authorities.
- a. Black Cat, Cambridge Road and Caxton Gibbet Vissim models (to be developed for 2040 Do Something AM and PM peak hours):
 - i. Obtain most up to date observed traffic count data and agree with local highway authorities.
 - ii. Identify the AM and PM peak hours for the junction from the observed data.
 - iii. Create AM and PM peak hour base year matrices for all vehicle types.
 - iv. Calculate the absolute flow changes, for existing movements retained in the proposed layout, using the forecast year and base year SATURN models.
 - v. Apply the absolute changes to the observed turning flows, for existing movements which are retained in the proposed layout.
 - vi. The SATURN flows will be used directly for new movements which do not currently exist.
 - vii. Change TfL driving behaviours to the PTV defaults, with a standstill distance of 1.5m, as suggested by CCC (based on the National Highways guidance for high speed roads).

- viii. HGVs will include two vehicle types - OGV1 and OGV2 and the proportion will be determined from survey data. OGV2 will be articulated 16.5m vehicles.
- b. Wyboston, Biggleswade North and Barford Road junctions (ARCADY models):
 - i. Obtain latest available pre-Covid observed traffic count data from 2016, 2017 or 2019.
 - ii. Identify the actual AM and PM peak hours for each junction.
 - iii. Create AM and PM peak hour matrices for all vehicles and for heavy vehicles for the base year.
 - iv. Run the ARCADY models of the junctions with these sets of traffic flows.
 - v. Compare the results of the models with observed queue length data (where available), or with pre-Covid screen shots from Google traffic which illustrate the extent of slow moving traffic conditions on the approach to the junctions.
 - vi. If the modelled and observed queue lengths are broadly aligned, the models can be confirmed as 'validated' in the terms defined in the Junctions9 manual (final paragraph of section 13.13).
 - vii. If the modelled and observed queue lengths are not aligned, consider alternative ways of modelling the junctions, for example, to adjust the lane simulation parameters and/or the use of exit capacity restrictions within the models. It is not proposed to calibrate slope and intercept values, as this requires considerably more data to be collected than is currently available and is not considered proportionate for a sensitivity test of this nature.
 - viii. Calculate growth factors to obtain 2025 DM and 2040 DM traffic flows from the observed peak hour matrices – these could be obtained using TEMPro growth factors or they could be calculated by comparing the 2015 SATURN model base with the 2025 DM and 2040 DM SATURN model output turning flows for the junctions concerned.
 - ix. Derive 2025 and 2040 DS matrices for the junction by comparing the 2025 DM vs 2025 DS and the 2040 DM vs 2040 DS SATURN model output flows and apply analogous changes to the 2025 and 2040 DM matrices derived from the observed data.
 - x. Run the ARCADY models for each junction using the newly derived 2025 DS, 2025 DM, 2040 DM and 2040 DS traffic flow matrices.

5 Outcomes of sensitivity test

- 5.1.1 A technical note will be prepared to compare the outputs presented in the Transport Assessment **[APP-241]** and Transport Assessment Annex **[APP-243]** with the sensitivity test outputs.
- 5.1.2 The following results will be provided for the sensitivity test results at each location:
- a. Black Cat, Cambridge Road and Caxton Gibbet junctions: The average speed results provided in Appendix 5.1 (TN 44) of the Transport Assessment **[APP-241]** show the extent of congestion/ queues in the model area, and these will be compared to the sensitivity test outputs to show the impact caused by addressing the concerns raised.
 - b. Wyboston, Barford Road and Biggleswade North Junctions: The ARCADY model outputs in terms of the RFC (Ratio of Flow to Capacity), Average Delay and Maximum Queue will be extracted from the sensitivity test models and compared with the similar results provided in the Transport Assessment Annex **[APP-243]**.

6 Programme for completing the sensitivity test

- 6.1.1 Any changes in the scope identified above may impact the programme to complete the sensitivity test. However, on the basis of the scope identified above, it will take approximately four weeks to complete the sensitivity test from its date of commencement.