

Lower Thames Crossing

Thurrock Council Comments on Traffic Modelling (D6A)

14 November 2023

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Executive Summary

Section 1 – Introduction

1. This Deadline 6A submission responds to the Examining Authority's letter of 27 October 2023 ([PD-045](#)), which amended the Examination timetable and provided a new Deadline 6A. Further analysis and commentary is provided on the transport modelling prepared by the applicant together with further analysis of the impact of LTC on the Council's highway network.

Section 2 – Orsett Cock: Summary of Council's Position

2. Traffic models are not a means to an end, they are tools to aid decision makers to make judgements on the forecast traffic impacts of a project. However, the evidence currently before the ExA shows very significant divergence between LTAM and the VISSIM models. Based on these tools, very different judgements would be made with regards to the impacts of LTC on Orsett Cock depending on whether the judgements are based on LTAM or VISSIM.
3. The applicant continues to maintain a position that its application is predicated on LTAM. However, the applicant has submitted evidence to the Examination that demonstrates that the assessment of traffic impacts, and scheme appraisal resulting from this, would be significantly different from that presented by the applicant in the DCO submission were the LTAM model more closely aligned with the VISSIM models for critical junctions.
4. The VISSIM model for Orsett Cock Junction provides a better understanding of likely traffic impacts than LTAM. The applicant should have undertaken VISSIM modelling of Orsett Cock Junction prior to submission to validate its LTAM model but chose not to. The applicant has now recognised that VISSIM shows a need deliver a scheme for Orsett Cock Junction to mitigate the effects of the proposed development and to implement this prior to the start of construction (refer to paragraph 3.15 of [REP6-091](#)). This is formal recognition by the applicant that the LTAM model alone does not provide the local transport modelling required to assess the impact of the LTC scheme.
5. The VISSIM modelling shows that there are unacceptable adverse impacts at Orsett Cock as a result of LTC that need to be mitigated. The applicant has accepted that there are impacts at Orsett Cock Junction that need to be mitigation and has included a draft Requirement in the dDCO at D6. The Council considers that the draft Requirement is insufficient and has worked with the two national Ports and Thames Enterprise Park to prepare a joint position on draft Requirements, including a draft Requirement for Orsett Cock Junction, which will be submitted at D7.
6. Moreover, the evidence submitted by the applicant shows that the forecast delays at Orsett Cock junction will result in traffic reassigning through Orsett village. Therefore, mitigation should not only focus on Orsett Cock junction, but also include sufficient measures to control and manage traffic to prevent it from routing through Orsett village.

Section 3 – Orsett Cock: Results and Analysis of VISSIM Models

7. It is standard practice to use VISSIM models to understand the operational traffic impacts of new infrastructure and the applicant has prepared a VISSIM model of the Orsett Cock junction. This base model has been agreed with the Council. Several versions of the forecast model have been provided with the most recent being Version 3.6 (v3.6).
8. The Council is Local Highway Authority with responsibility for this section of the A13 and the Orsett Cock junction. It has reviewed v3.6 and considers that the changes made to the modelling of the circulatory carriageway are unrealistic and that the 'without LTC' scenario is also unrealistic

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and that the forecast queues would not arise in reality, as the LHA would intervene to deliver straightforward adjustments of the junction to prevent queues arising. In addition, the applicant has changed modelling parameters related to driver behaviour, which increase traffic throughput in the 'with LTC' model compared to the 'without LTC' model, which tends to reduce the impact of LTC on the operation of the junction.

9. These issues with the model mean that the Council has created a modified Version 3.6T (v3.6T), which corrects these issues. The results of v3.6T show that the introduction of LTC would lead to adverse impacts on the operation of the junction and would severely constrain the ability of the Council to deliver growth. In addition, the VISSIM analysis shows that LTAM is significantly underestimating delays at the Orsett Cock junction and that the economic appraisal is underestimating the traffic disbenefits of the LTC and the environmental assessment is underestimating the environmental impacts of the scheme.

Section 4 – Orsett Cock: Review of LTAM Sensitivity Tests

10. Given the significant concerns raised by the Council and other stakeholders concerning the lack of alignment of LTAM and VISSIM, the applicant agreed to incorporate parameters from the Orsett Cock Junction VISSIM model into LTAM. The Council's review of these tests has shown that the applicant's manipulation of the network parameters in LTAM has failed to replicate the level of delays forecast by VISSIM in LTAM. The Council notes the tests show traffic reassigning to unsuitable routes. The Council considers that the iteration between the LTAM and VISSIM models should continue until the models are broadly aligned in terms of flows and delays.
11. The Council has previously raised concerns that the delays forecast at Orsett Cock Junction will result in traffic re-routing through Orsett village. The applicant has provided further modelling analysis of two tests related to the routing of traffic near the Orsett Cock junction. Based on these sensitivity tests, the Council considers that the applicant must provide mitigation for Orsett village to deter traffic from re-routing through the village, as a result of increased delays at Orsett Cock Junction, following the implementation of LTC.

Section 5 – Impact on Economic Appraisal of using VISSIM Results rather than LTAM Results

12. There continues to be a lack of alignment between the results of the LTAM and VISSIM models for the Orsett Cock Junction. The applicant argues that this difference is not important. However, the applicant relies on the lower traffic delays forecast from LTAM to inform their economic appraisal. VISSIM predicts higher levels of traffic delays at Orsett Cock and if these delays are included in the economic appraisal of LTC then the Benefit Cost Ratio reduces further and will approach a level where costs are higher than benefits. If the National Highways Spatial Planning team was assessing the impact on the SRN, it would normally require microsimulation (e.g. VISSIM) to be undertaken. If a similar analysis of Orsett Cock in VISSIM was undertaken for other local junctions, it is highly likely that this would increase the assessed delays, which would impose additional costs for LTC and the scheme appraisal would likely show that costs exceed benefits.

Section 6 – Wider Network Impacts

13. The applicant has continued to resist efforts to complete a collaborative localised modelling process. Almost all the localised models remain incomplete and therefore the LTC impacts on the operation of the local highway network are not appropriately understood. There is not sufficient time remaining in the Examination process to complete the localised modelling and it therefore remains not agreed. Given this, and without prejudice to the Council's contention that the evidence base is insufficient to allow this application reasonably to be granted, the Council has worked jointly with PoTLL, DPWLG and TEP to agree draft Requirements for the monitoring and mitigation of Wider Network Impacts.

Section 7 – Tilbury Junction

14. Tilbury Junction has been designed for the use of emergency vehicles and for operational access, potential future use by public transport vehicles and with passive provision for a connection to Tilbury Link Road (which formed part of LTC up until late-2018). An adequate explanation has not been provided of why Tilbury Link Road was removed from the scheme and its inclusion would provide greatly improved access to public transport services for Thurrock residents and alleviate the mitigation required at the Orsett Cock junction by reducing the traffic needing to use it. The Council will provide its version of the new Requirement for this junction at D7, which differs from that from the PoTLL and this difference is explained in the Council's D7 submission.

Section 8 – Proposed Draft Requirements

15. The Council objects to the current proposals for LTC as the scheme fails to strike an acceptable balance between national benefit and the substantial harm to the Borough. Furthermore, the applicant has not adequately explored alternatives that might better meet scheme objectives, including alternative designs at the LTC/A13/Orsett Cock junction that would require less land take and have significantly fewer resulting impacts.
16. Notwithstanding and without prejudice to this, the Council has sought to engage with the applicant so that, in the event that the DCO is granted, measures to mitigate the LTC impacts on the local highway network are secured.
17. Despite significant engagement with the applicant on the impact assessment of LTC on the local highway network, there remains substantial outstanding concerns with the adequacy of the applicant's assessment and the evidence base overall. Based on the evidence before the Examination, the Council remains concerned that there are unacceptable adverse impacts on the local highway network that need to be mitigated.
18. Since Deadline 6, the Council has continued to work closely with PoTLL, DPWLG and TEP to jointly prepare an agreed set of draft Requirements. Consequently, those directly affected by the need for new Requirements, namely the Council, PoTLL, DPWLG and TEP have agreed the three Requirements relating to Orsett Cock Junction, Asda Roundabout and an overall Monitoring and Mitigation Strategy and these will be submitted in a 'Joint Position Statement' by PoTLL at D6A and so this Joint Statement is not included here to avoid repetition.
19. The Council will submit separately new draft Requirements for both 'Air Quality Monitoring and Mitigation' and for the 'Tilbury Link Road Junction readiness and compatibility'.
20. The Council continues to remain seriously concerned that the inadequacies of the LTAM modelling in fact extend beyond the critical junctions that have been the focus of discussion during the Examination. This inadequate understanding of the local transport impacts is compounded by the refusal of the applicant to accept that it is responsible for any wider network impacts that may in fact emerge during construction and after opening. The Council does not accept that LTAM appropriately represents likely impact on the local road network, as has been evidenced by the assessment of Orsett Cock Junction and that to account for this, the applicant must secure a robust commitment to monitor and mitigate impact on the local transport network.

1 Introduction

1.1.1 This Deadline 6A submission responds to the Examining Authority's letter of 27 October 2023 ([PD-045](#)), which amended the Examination timetable and provided a new Deadline 6A for the:

'Submission of comments by Local Highway Authorities, Ports and other IPs engaged in traffic and transportation topics relating to traffic modelling and intended to be heard at ISH13 on 27 November 2023'.

1.1 Structure of this Submission

1.1.2 This document provides details of the work completed by the Council over many years concerning the modelling of junctions on the local highway network for which the Council is the Local Highway Authority. This work has been subject to ongoing discussions with the applicant and this document provides details of the Council's analysis of information recently provided by the applicant.

1.1.3 Following this introduction, the structure of the document is, as follows:

- a. Section 2 – Orsett Cock: Summary of Council's Position
- b. Section 3 – Orsett Cock: Results and Analysis of VISSIM Models
- c. Section 4 – Orsett Cock: Review of LTAM sensitivity tests
- d. Section 5 – Impact on Economic Appraisal of using VISSIM Results rather than LTAM Results
- e. Section 6 – Wider Network Impacts
- f. Section 7 – Tilbury Junction
- g. Section 8 – Proposed Draft Requirements

1.1.4 **Summary: this Deadline 6A submission responds to the Examining Authority's letter of 27 October 2023 ([PD-045](#)), which amended the Examination timetable and provided a new Deadline 6A. Further analysis and commentary is provided on the transport modelling prepared by the applicant, together with further analysis of the impact of LTC on the Council's local highway network.**

2 Orsett Cock: Summary of Council's Position

2.1 Introduction

- 2.2.1 The effective operation of the A13/A1089/Orsett Cock junction (hereafter referred to as the Orsett Cock junction) is of fundamental importance to the Council.
- 2.2.2 As stated by the applicant (see the email provided in **Appendix B** of the Council's Post-Event Submissions for Issue Specific Hearings (ISH8 – ISH10) ([REP6-166](#)), the Orsett Cock junction is part of the main LTC scheme and any identified issues concerning queues and delays at the junction following the introduction of LTC need to be addressed as part of the scheme design development process and not as part of any wider mitigation strategy.
- 2.2.3 This section summarises the Orsett Cock Junction assessment to date and the Council's position.

2.2 Summary of Orsett Cock Assessment

Lack of Alignment of Traffic Models

- 2.2.4 The applicant has provided the Examination with two models, which forecast significantly different outcomes: VISSIM with high levels of forecast delay; and, LTAM with significantly lower levels of forecast delay.
- 2.2.5 Traffic models are not a means to an end, they are tools to aid decision makers to make judgements on the forecast traffic impacts of a project. Based on the evidence currently before the ExA, different judgements would be made with regards to the impacts of LTC on Orsett Cock Junction depending on whether the judgements are based on LTAM or VISSIM.
- 2.2.6 Whilst the level of traffic through the Orsett Cock junction is broadly aligned between LTAM and VISSIM, the level of delay is significantly different.
- 2.2.7 **Tables 2.1 and 2.2** below summarise the vehicle delay at Orsett Cock Junction and A1013 Stanford Road / Rectory Road junction in LTAM compared to the most recent version (Version 3.6) of VISSIM submitted by the applicant at Deadline 6 ([REP6-058](#)) for the 2030 Do Minimum (without LTC) and Do Something (with LTC) scenarios for the AM and PM peak hours.
- 2.2.8 It should be noted that the comparison has been made for 0700-0800 and 1700-1800 as these are the only modelled hours for LTAM and therefore the only hours available for comparison between LTAM and VISSIM. The morning network peak hour at Orsett Cock Junction is actually 0800-0900, which has been modelled in VISSIM, but not in LTAM. Again, this shows that the delays in LTAM are an underestimate of the peak hour delays at the Orsett Cock Junction because LTAM is modelling a period between 0700-0800, which has lower traffic flows than the actual peak period (0800-0900).

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Table 2.1: Comparison of LTAM and VISSIM V3.6: Orsett Cock Junction – 2030 AM Peak Hour (0700-0800) – Delay per Vehicle (seconds)

DO MINIMUM 2030, AM (0700-0800)					DO SOMETHING 2030, AM (0700-0800)				
Junction	Approach	LTAM	VISSIM V3.6	VSSIM 3.6 as % of LTAM	Junction	Approach	LTAM	VISSIM V3.6	VSSIM 3.6 as % of LTAM
Orsett Cock	A128 Brentwood Rd (North)	4	44	905%	Orsett Cock	A128 Brentwood Rd (North)	26	80	206%
	A13 (East)	12	30	145%		A13 (East)	26	52	102%
	A1013 Stanford Rd (East)	10	27	177%		A1013 Stanford Rd (East)	22	61	182%
	Brentwood Rd (South)	27	145	428%		Brentwood Rd (South)	29	99	247%
	A1013 Stanford Rd (West)	17	76	343%		A1013 Stanford Rd (West)	22	79	255%
	A13 (West)	24	36	47%		A13 (West)	14	29	103%
A1013 Stanford Road / Rectory Road	Rectory Rd	23	62	175%	A1013 Stanford Road / Rectory Road	Rectory Rd	34	50	48%
	Stanford Rd (East)	7	8	13%		Stanford Rd (East)	6	7	8%
	Stanford Rd (West)	6	4	-28%		Stanford Rd (West)	5	3	-43%

Table 2.2: Comparison of LTAM and VISSIM V3.6: Orsett Cock Junction – 2030 PM Peak Hour (1700-1800) – Delay per Vehicle (Seconds)

DO MINIMUM 2030, PM (1700-1800)					DO SOMETHING 2030, PM (1700-1800)				
Junction	Approach	LTAM	VISSIM V3.6	VSSIM 3.6 as % of LTAM	Junction	Approach	LTAM	VISSIM V3.6	VSSIM 3.6 as % of LTAM
Orsett Cock	A128 Brentwood Rd (North)	5	109	1964%	Orsett Cock	A128 Brentwood Rd (North)	34	74	118%
	A13 (East)	12	74	510%		A13 (East)	37	330	796%
	A1013 Stanford Rd (East)	8	51	525%		A1013 Stanford Rd (East)	20	112	449%
	Brentwood Rd (South)	7	66	888%		Brentwood Rd (South)	25	91	259%
	A1013 Stanford Rd (West)	6	50	717%		A1013 Stanford Rd (West)	7	97	1245%
	A13 (West)	22	39	77%		A13 (West)	16	137	764%
A1013 Stanford Road / Rectory Road	Rectory Rd	55	260	370%	A1013 Stanford Road / Rectory Road	Rectory Rd	46	81	75%
	Stanford Rd (East)	7	9	28%		Stanford Rd (East)	8	10	21%
	Stanford Rd (West)	7	6	-19%		Stanford Rd (West)	8	4	-50%

2.2.9 The comparison is graphically presented in **Figures 2.1 and 2.2** and the data shows that LTAM underestimates the level of delay at Orsett Cock Junction. The comparisons of LTAM and VISSIM vehicle delays for 2045 are included in **Appendix A**.

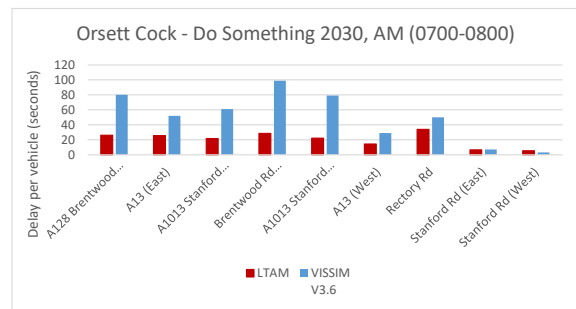
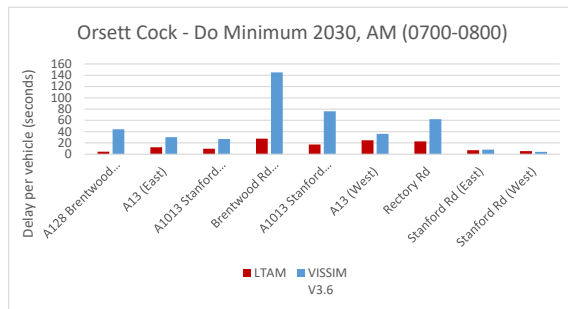


Figure 2.1: Comparison of LTAM and VISSIM V3.6: Orsett Cock Junction – 2030 AM Peak Hour (0700-0800) – Delay per Vehicle (Seconds)

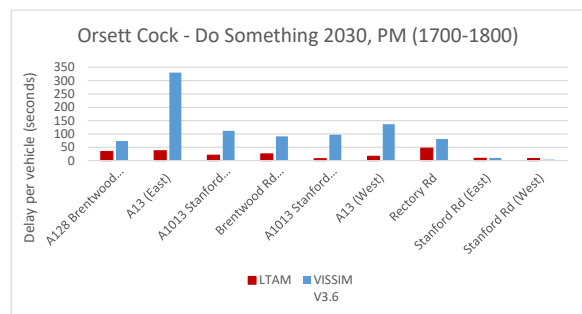
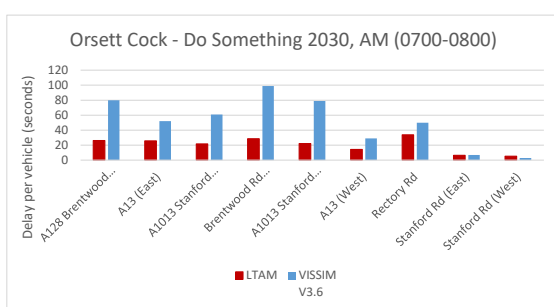


Figure 2.2: Comparison of LTAM and VISSIM V3.6: Orsett Cock Junction – 2030 PM Peak Hour (1700-1800) – Delay per Vehicle (Seconds)

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- 2.2.10 This data shows that LTAM typically forecasts delays on approaches to the junction up to 30 seconds, i.e. half a minute, on the approaches to Orsett Cock Junction.
- 2.2.11 In contrast, VISSIM forecasts delays up to 5.5 minutes on the approaches to Orsett Cock Junction.
- 2.2.12 This clearly shows that there is a significant difference between the two models submitted by the applicant in terms of the traffic delays forecast at Orsett Cock. In many cases the delays forecast by VISSIM are two to three times higher than the delays forecast by LTAM.
- 2.2.13 The applicant's position is that the ExA should make judgements based solely on LTAM. The applicant does not consider the difference in delays forecast between LTAM and VISSIM to be a problem. The applicant needs to maintain this position as LTAM has formed the basis of the scheme appraisal.
- 2.2.14 However, the Council's analysis of the VISSIM and LTAM modelling results shows that LTAM is significantly underestimating delays at the Orsett Cock junction.
- 2.2.15 This means that the economic appraisal (and the appraisal of other impacts, such as noise and air quality, are clearly underestimating the traffic disbenefits of LTC.
- 2.2.16 If the VISSIM results for delay were incorporated into the economic appraisal then the BCR would decrease even further below the stated **0.48:1** for well-established Level 1 traffic-related benefits (Table 11.1 of 7.7 Combined Modelling and Appraisal Report Appendix D Economic Appraisal Report ([APP-526](#))). This is covered in more detail in Section 5 of this submission.

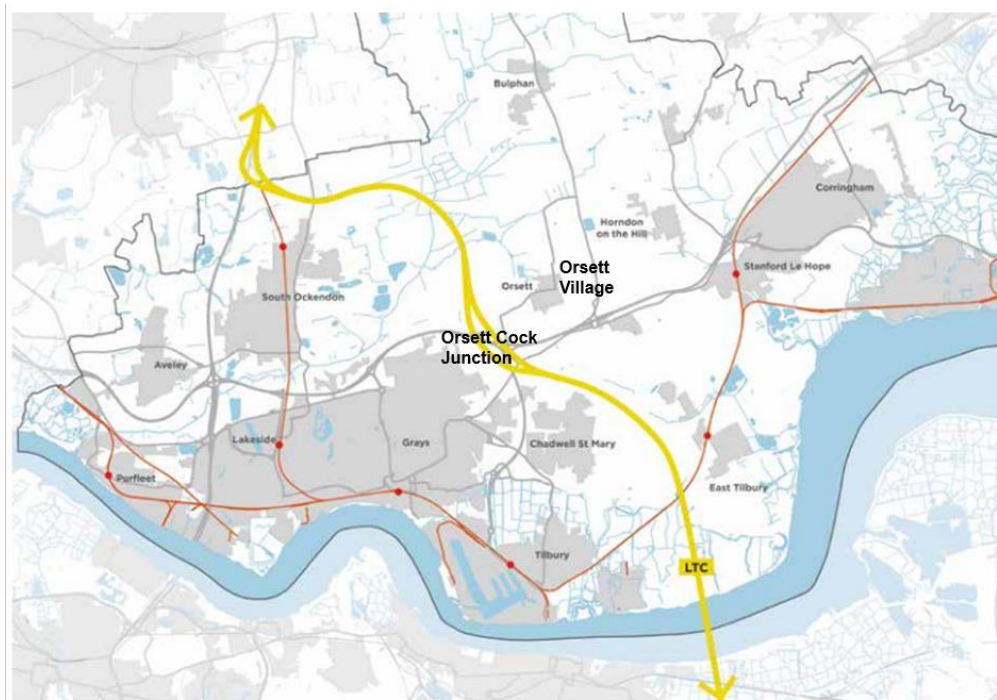
Test to input Orsett Cock VISSIM parameters into LTAM

- 2.2.17 Given the significant concerns raised by the Council and other stakeholders concerning the lack of alignment of LTAM and VISSIM in terms of level of forecast vehicle delay, the applicant agreed to incorporate parameters from the Orsett Cock VISSIM model into LTAM (Action 8 from the Joint Position Paper on Orsett Cock ([REP5-084](#))).
- 2.2.18 The Council's review of this test is set out in Section 4 of this submission but, in summary, the revised LTAM modelling shows a reassignment of traffic away from Orsett Cock Junction as a result of the increased delays at Orsett Cock input to LTAM. This has potentially negative impacts on the operation of the local road network, particularly through Orsett village.
- 2.2.19 Whilst the Council accepts that, given the remaining time available before the close of the Examination, there are limitations to the number of tests that can be completed on the further work would be required to better align VISSIM and LTAM, what is clear from these initial results is that the assessment of traffic impacts and scheme appraisal could be significantly different from that presented by the applicant in the DCO submission were the LTAM and VISSIM models to be more closely aligned.

Re-routing of traffic through Orsett village

- 2.2.20 The Council is particularly concerned that the forecast delays at Orsett Cock junction will result in traffic reassigning through Orsett village. Given the narrow nature of the road network in this semi-rural village area and its residential nature, makes this impact unacceptable to the Council. The test undertaken by the applicant to input VISSIM delays into LTAM demonstrates that this is a justified concern and that increased delays at Orsett Cock in LTAM would result in traffic re-routing through Orsett village, as well as other local routes. This likelihood of this happening is demonstrated by **Figure 2.3** below (which re-presents Figure 2.1 of the Council's Local Impact Report ([REP1-281](#))) and shows that delays at the Orsett Cock junction will likely cause traffic to divert through the nearby Orsett Village.

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Source: Thurrock Council, Thurrock Local Plan Issues & Options (Stage 2), December 2018

Figure 2.3 Indicative LTC Route within Thurrock showing proximity of Orsett Village to Orsett Cock Junction

- 2.2.21 Given these concerns about traffic re-routing through Orsett village as a result of delays at Orsett Cock, the applicant agreed to undertake two sensitivity tests to assess the effect on Orsett Cock of traffic not being able to re-route through Orsett village.
- 2.2.22 The sensitivity tests reassigned traffic from Rectory Road to A128 southbound and formed Actions 9 and 10 of the Joint Position Paper on Orsett Cock ([REP5-084](#)).
- 2.2.23 The applicant submitted a Technical Note to the Council on 31 October 2023 and the applicant will evidently submit this Technical Note at Deadline 6A, which summarises the results of the 'Rectory Road' sensitivity tests and the Council's review is summarised in Section 4 of this submission. As would be expected, the tests show that forcing traffic to stay on the A128 and not re-route through Orsett village will result in increased delays on the approaches to Orsett Cock Junction.
- 2.2.24 The scheme design for Orsett Cock should therefore not only reduce the delays for vehicles on the approaches to Orsett Cock, but mitigation should also be provided for Orsett village to deter traffic from re-routing through the village.

Orsett Cock VISSIM modelling

- 2.2.25 The applicant has prepared a micro-simulation VISSIM model of the Orsett Cock junction. The VISSIM model of the junction has evolved since it was first issued to the Council in September 2022, with several updates to the modelling being prepared and issued by the applicant in recent weeks. The latest version of the model (Version 3.6) was submitted by the applicant at Deadline 6 ([REP6-058](#)). Each time the applicant changes the model it is necessary for the Council, as local highway authority, to review the model. This is standard practice for a local highway authority, but it is unprecedented to be doing this level of analysis for this size of scheme during a DCO Examination under significant pressure with so little time available.

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2.2.26 The Council has reviewed Version 3.6 of the VISSIM model and a summary of the review is provided in Section 3 of this submission. In summary, there are outstanding issues with the VISSIM modelling that need to be addressed by the applicant.

2.2.27 The Council has made changes to Version 3.6 of the VISSIM model to seek to rectify the concerns raised from the model review and enable the ExA to have a clearer understanding of the operational impacts of LTC at Orsett Cock. This updated version of the model prepared by the Council is referred to as 'Version 3.6T' and is summarised in Section 3 of this submission.

Requirement for Orsett Cock Mitigation

2.2.28 The VISSIM modelling shows that there are unacceptable adverse impacts as a result of LTC that need to be mitigated. The applicant has not put forward any proposals that would mitigate the significant adverse impacts at Orsett Cock identified in the VISSIM modelling, nor does it plan to submit any mitigation proposals to the Examination.

2.2.29 Notwithstanding this, the applicant has accepted that mitigation would be required at Orsett Cock junction and has sought to secure this, via a very recent draft Requirement.

2.2.30 At Deadline 5, and in accordance with the request in Action Point 5 of ISH7, the applicant proposed a draft Requirement in relation to the impacts at Orsett Cock within the Wider Networks Impacts Update ([REP5-085](#)). Then at Deadline 6 the applicant inserted this draft Requirement (Requirement 18) into its dDCO ([REP6-074](#)). Further comments on this new draft Requirement and references to it in the accompanying Explanatory Memorandum ([REP6-013](#)) will be made at D7.

2.2.31 However, as set out by the Council at Deadline 6 in Appendix N of the Council's Comments on applicant's submissions at D4 and D5 ([REP6-168](#)), it is the view of PoTLL, DPWLG and the Council that the applicant's drafting of draft Requirement 18 is inadequate.

2.2.32 The applicant's draft Requirement would not secure the necessary works to the Orsett Cock junction required to avoid serious adverse impacts on the transport network and for access to the two national Ports as a result of LTC as currently designed. In particular, it does not seek to identify or secure any threshold or standard to which the Orsett Cock junction must operate. A full explanation of the Council's views on this new Requirement from the applicant are set out below.

2.2.33 The Council welcomes the addition of Requirement 18 in version 8 of the draft DCO. The Explanatory Memorandum explains that this is necessary *'in light of the potential for traffic impacts at the Orsett Cock roundabout'*. The Council has previously set out its concerns regarding the operation of the Orsett Cock Junction. In particular, the Council is concerned about the modelling used and that the delays predicted are unrealistic without further mitigation measures being introduced. Accordingly, having a requirement for the Secretary of State to approve a new scheme for the Orsett Cock Junction (after consultation with the relevant highway authority, Port of Tilbury and DP World London Gateway) is positive.

2.2.34 The current wording suggested by the applicant is, as follows:

Operation of the Orsett Cock roundabout

18.—(1) No part of Work No. 7F is to commence until a scheme for the Orsett Cock roundabout

has been submitted to and approved in writing by the Secretary of State, following consultation with the relevant highway authority, the Port of Tilbury London Limited and DP World London Gateway.

(2) The scheme submitted under subparagraph (1) must include details, and a programme for the

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*implementation, of the proposed design and signalisation on that roundabout or other related measures as may be reasonably practicable to minimise delays for traffic arising as a result of the authorised development and optimise the performance of the Orsett Cock roundabout.
 (3) The authorised development must be carried out in accordance with the approved plan referred to in sub-paragraph (1).*

- 2.2.35 Whilst it is positive that the applicant has acknowledged the need to review the operation of this roundabout, there are a number of amendments, which are necessary to that draft Requirement to ensure that it is effective. The wording as currently drafted seeks to optimise the performance of the roundabout and minimise delays as far as reasonably practicable. In order to be effective, the requirement needs to be more specific about what it is aiming to achieve. In the wording proposed by the Council, we have highlighted that the purpose of the design needs to be to avoid a material worsening on the highway network and a substantial detriment to the efficient operation of the Port of Tilbury and DP World London Gateway. This detail is required to give the Secretary of State and other stakeholders confidence in how LTC will operate once open. How this junction operates is a relevant consideration when measuring the impact of LTC.
- 2.2.36 In addition, the wording suggested by the applicant does not include any further monitoring or mitigation, should the mitigation originally agreed be ineffective. This is an essential element of the requirement, as without it, there remains significant uncertainty about the operation of the roundabout.
- 2.2.37 The Council's primary objective with the requirement (without prejudice to its wider concerns about LTC) is that the Orsett Cock Junction functions as anticipated and does not cause a material worsening of traffic conditions or a substantial detriment to the efficient operation of the ports. In order to provide sufficient confidence, the requirement needs to clearly set out what it is trying to achieve and have a monitoring and mitigation strategy to ensure that it achieves its objectives. Whilst the wording proposed by the applicant is a positive first step, the Council (in conjunction with the Port of Tilbury, DP World London Gateway and TEP) have proposed amendments to this wording, which better achieves its desired outcome.
- 2.2.38 The Council has continued to liaise with PoTLL, DPWLG and recently with Thames Enterprise Park (TEP) to reach a joint position on draft Requirements. This is summarised in Section 8 of this submission and will be set out in more detail in the Council's Deadline 7 submission.
- 2.2.39 In order to provide comfort to the ExA that a mitigation scheme could be implemented within the Order Limits, including other highway land (whether strategic road network or owned/operated by the local highway authority), the Council has tested some initial, potential mitigation measures within VISSIM using V3.6T. The mitigation options tested, and modelling results will be submitted at D7.
- 2.2.40 These initial, potential measures are not proposed as the definite mitigation scheme but is purely to demonstrate that a mitigation is achievable without third party land being required and that the draft Requirement put forward by the Council, PoTLL, DPWLG and TEP would meet the tests for Requirements set out in paragraph 4.9 of the NPSNN.
- 2.2.41 **Summary: traffic models are not a means to an end; they are tools to enable decision makers to make judgements on the forecast traffic impacts of a project. However, the evidence currently before the ExA shows very significant divergence between LTAM and the VISSIM models. Based on these tools, very different judgements would be made with regards to the impacts of LTC on Orsett Cock depending on whether the judgements are based on LTAM or VISSIM.**
- 2.2.42 **The applicant continues to maintain a position that its DCO application is predicated on LTAM. However, the applicant has submitted evidence to the Examination that**

demonstrates that the assessment of traffic impacts and the scheme appraisal resulting from this, would be significantly different from that presented by the applicant in the DCO submission were the LTAM model more closely aligned with the VISSIM models for critical junctions in Thurrock.

- 2.2.43 The VISSIM model for Orsett Cock Junction provides a better understanding of likely traffic impacts than LTAM. The applicant should have undertaken VISSIM modelling of Orsett Cock Junction prior to submission to validate its LTAM model but chose not to. The applicant has now recognised that VISSIM shows a need to deliver a scheme for Orsett Cock Junction and implement this prior to the start of construction (see paragraph 3.15 of [REP6-091](#)). This is formal recognition by the applicant that the LTAM model alone does not provide the local transport modelling required to assess the impact of the LTC scheme.**
- 2.2.44 The evidence submitted by the applicant shows that the forecast delays at Orsett Cock junction will result in traffic reassigning through Orsett Village at a level that is considered unacceptable. Therefore, mitigation should not only focus on Orsett Cock junction, but also include sufficient measures to control and manage traffic to prevent it from routing through Orsett village.**
- 2.2.45 The VISSIM modelling shows that there are unacceptable adverse impacts at Orsett Cock junction as a result of LTC that need to be mitigated. The applicant has accepted that there are impacts at Orsett Cock junction that need to be mitigated and has included a draft Requirement in the dDCO at D6. The Council considers the draft Requirement is inadequate and has worked with the two national Ports and Thames Enterprise Park to prepare a joint position on draft Requirements, including a draft Requirement for Orsett Cock Junction at D7.**

3 Orsett Cock: Results and Analysis of VISSIM Models

3.1 Introduction

- 3.1.1 The applicant has prepared a VISSIM model of the Orsett Cock junction to understand the traffic impact of LTC on the operation of the junction. VISSIM is a 'microsimulation' model that models the movement and behaviour of individual cars through a network. The latest version of the VISSIM model for Orsett Cock Junction was submitted by the applicant at Deadline 6 (Version 3.6).
- 3.1.2 This section summarises the evolution of the VISSIM modelling, the Council's review of Version 3.6 of the Orsett Cock Junction VISSIM Model and the changes made by the Council to the applicant's latest VISSIM model to address the Council's concerns.

Evolution of Orsett Cock VISSIM Modelling

- 3.1.3 It is standard practice to use VISSIM models to understand the operational traffic impacts of new infrastructure or development schemes and the applicant has used VISSIM for precisely this purpose as part of several other DCOs (e.g. A30 Chiverton to Carland Cross, A303 Amesbury to Berwick Downs (Stonehenge) and others as shown in Table 9.2 of the Council's Local Impact Report ([REP1-281](#)).
- 3.1.4 VISSIM models have been prepared by the applicant for the Orsett Cock junction for opening year (2030) and design year (2045) for scenarios without LTC (Do Minimum) and with LTC (Do Something) for the AM and PM peak periods.
- 3.1.5 Through earlier engagement with the applicant, the Council signed off the Base Year Orsett Cock Junction VISSIM model. The applicant subsequently issued forecast models of the Orsett Cock VISSIM model for the Do Minimum (without LTC) and Do Something (with LTC) scenarios. The forecast VISSIM models of the junction have evolved since they were first issued to the Council in September 2022, with several updates to the modelling being prepared and issued by the applicant in recent weeks.
- 3.1.6 **Table 3.1** summarises these updates and shows that Version 3.6 is the latest forecast VISSIM model of the Orsett Cock junction provided by the applicant.

Table 3.1: Evolution of Orsett Cock forecast VISSIM modelling prepared by applicant

Version	Date Issued	Comments – and changes since previous version
1	September 2022	The Council provided the review of V2 at Deadline 3 (REP3-207), Appendix E, Annex 5. The applicant set out the changes they proposed to make to V2 in response to the Council's review and the Council's set out their position on the proposed changes in the Joint Position Statement: Orsett Cock junction (REP5-084)
2	July 2023	
3	6 October 2023	The applicant provided the Council with V3 of the forecast models in accordance with the changes the applicant set out in Joint Position Paper for Orsett Cock (REP5-084)
3.6	20 October 2023	This version was provided unexpectedly and corrected some miscalculations in Version 3

Results of Orsett Cock VISSIM Version 3.6 compared to Version 2

- 3.1.7 As set out in Table 3.1 above, the applicant made changes to V2 of the forecast VISSIM model based on changes set out in Joint Position Paper for Orsett Cock ([REP5-084](#)); and, based on these changes, the applicant submitted v3.6 of the forecast model to the Council on 20 October 2023 with the accompanying updated VISSIM forecast report submitted at Deadline 6 ([REP6-058](#)).
- 3.1.8 Given the changes proposed by the applicant, the Council was expecting the results of v3.6 to be relatively similar to v2. However, the results from v3.6 provide a different story about the impact of LTC on the Orsett Cock junction to that previously reported by the applicant in previous versions of the VISSIM model.
- 3.1.9 Rather than an increase in queuing and delays as forecast by the previous versions of the model, the applicant is now stating that LTC delays at the Orsett Cock junction are forecast to remain similar or slightly increase on most of the approaches in the 2030 Do Something scenario compared to the 2030 Do Minimum scenario.
- 3.1.10 The Council's analysis presented in **Table 3.2** (and graphically in **Figure 3.1**) for 2030 AM (0800-0900) shows that in VISSIM v2 the total delays (measured in vehicle hours) travelled through Orsett Cock junction and the A1013 Stanford Road / Rectory Road junction increase by 27% with LTC, but reduce by 30% in VISSIM v3.6,.
- 3.1.11 In the 2030 PM model the total delays through the junction increases by 362% in VISSIM v2 and drops to 82% in VISSIM v3.6. This seems counter-intuitive given that LTC is forecast to increase flows.

Table 3.2: Comparison of VISSIM v2 and v3.6 Total Vehicle Hour Delays in 2030

	VISSIM version 2			VISSIM version 3.6		
	AM 0700-0800	AM 0800-0900	PM 1700-1800	AM 0700-0800	AM 0800-0900	PM 1700-1800
Do Minimum (DM)	65.1	145.7	46.3	77.3	282.4	113.8
Do Something (DS)	86.7	185.3	214.0	88.3	198.9	207.1
DS minus DM	21.6	39.6	167.7	11.0	-83.5	93.3
DS vs DM (i.e. impact of LTC), %	33%	27%	362%	14%	-30%	82%

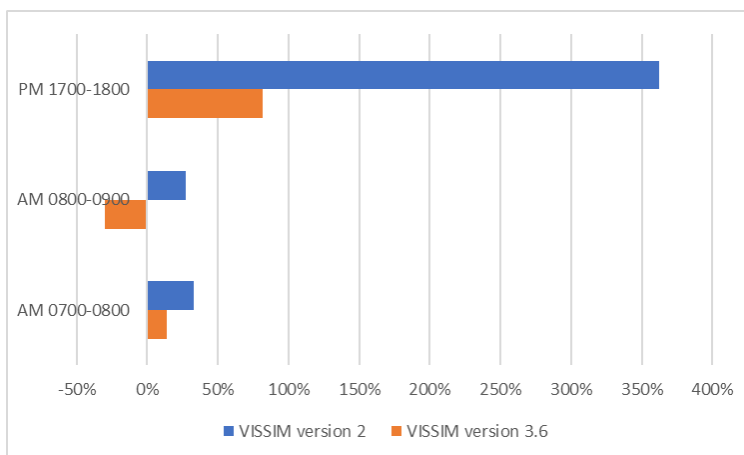


Figure 3.1: Comparison of VISSIM v2 and v3.6 Total Vehicle Hour Delays in 2030

Review of Orsett Cock VISSIM Version 3.6

- 3.1.12 Given these counter-intuitive results, the Council has closely examined the assumptions in the 'without LTC' (Do Minimum) and 'with LTC' (Do Something) scenarios, which have been used by the applicant in the v3.6 forecast VISSIM models.
- 3.1.13 Close analysis of the 'with' and 'without' LTC scenarios shows that the reason for the changes to the results in v3.6 is primarily because of the following features in the 'without LTC' and 'with LTC' models:
- a. Introduction of revised lane marking arrangements on the southbound circulatory carriageway at Orsett Cock junction – these provide additional circulatory capacity in the 'with LTC' scenario by allowing vehicles to use more lanes for accessing Brentwood Road southbound.
 - b. Introduction of Pegasus crossing at Rectory Road – the introduction of this crossing leads to more gaps in the east-west traffic flow on A1013 Stanford Road enabling traffic to exit more easily from the minor arm of Rectory Road.
 - c. Assumption of more 'aggressive' parameter settings influencing traffic behaviour in the 'with LTC' and some more conservative driver behaviour in the 'without LTC' models.
- 3.1.14 With regards to the revised lane marking, this was set out by the applicant in Plate 3.6 of the Orsett Cock VISSIM Forecasting Report ([REP6-058](#)) and has been reproduced below in **Figure 3.2**, but was not discussed with the Council before submitting v3.6, nor did it inform the Council it was making these changes.

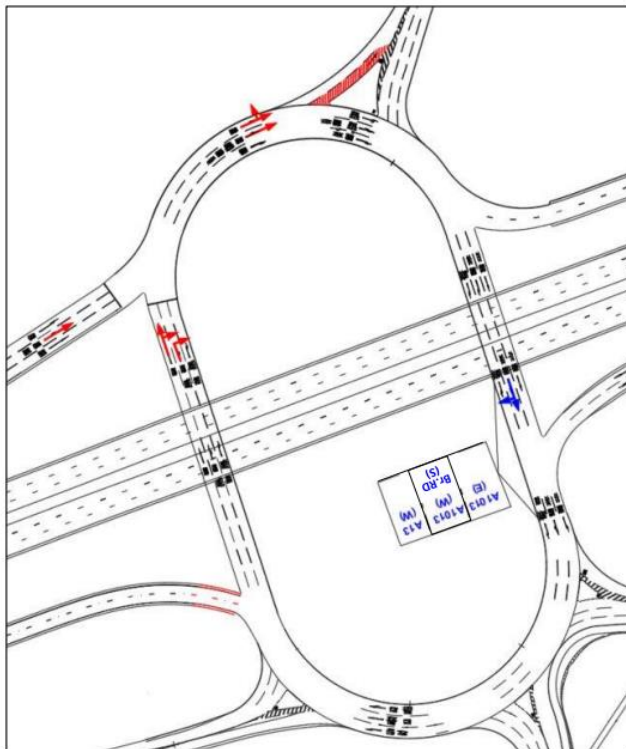


Figure 3.2: Proposed lane marking modifications at Orsett Cock (Plate 3.6 of [REP6-058](#))

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- 3.1.15 One of the changes made by the applicant in the 'with LTC' Do Something v3.6 model was to allow traffic to use the middle lane for the Brentwood Road (south) exit as well as the inside lane, with traffic needing to merge to a single lane to exit.
- 3.1.16 However, in the v3.6 'with LTC' model, all traffic on the circulatory was allowed to exit onto Brentwood Road (south) even from the outside lane. This would require traffic in three lanes to merge to a single lane on the circulatory carriageway to exit as illustrated in **Figure 3.3** below.

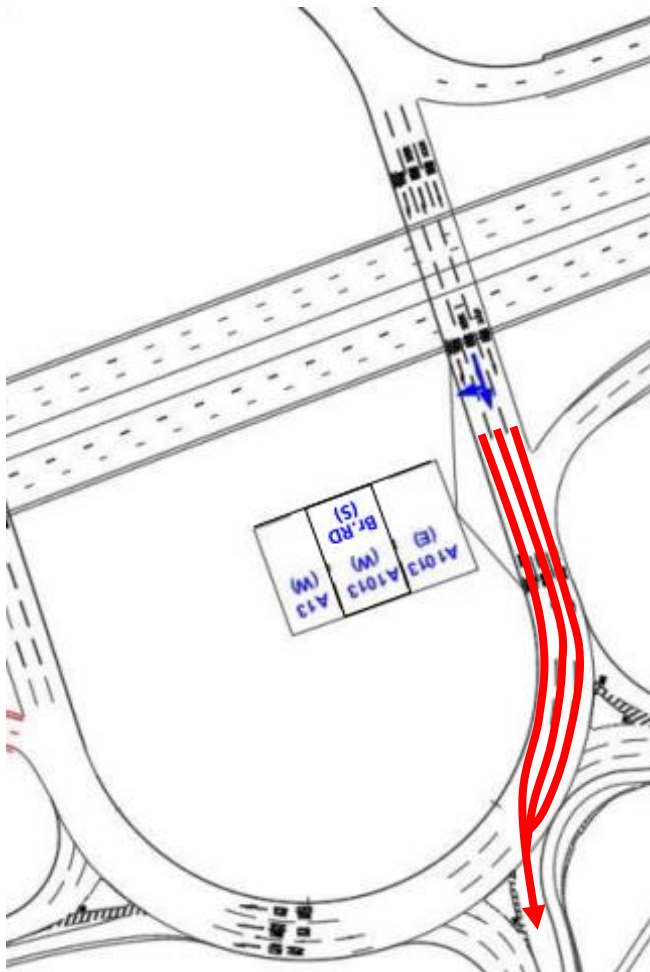


Figure 3.3: Illustration of the lane allocation modelled in v3.6 of the forecast 'with LTC' VISSIM model

- 3.1.17 This is different to the arrangements presented in the Forecasting Report ([REP6-058](#)) and would likely be raised in a Road Safety Audit as a safety issue. This is because the proposed lane markings lead to conflicting vehicle movements, which would increase the chance of a collision. This is of concern to the Council as the Local Highway Authority for the junction and therefore responsible for ensuring the junction is designed and operates in a safe manner.
- 3.1.18 Regardless of this, the Council considers that the manoeuvre would not be undertaken by drivers in reality because the merge of three lanes into one leads to conflicts between vehicles and hence will be perceived by drivers as a manoeuvre with increased risk and something to be avoided, especially by drivers who regularly use junction. Therefore, the v3.6 forecast model for the 'with LTC' scenario has provided 'theoretical' additional capacity that would not materialise in reality.

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- 3.1.19 The 'without LTC' model only allows the single inside lane to exit onto Brentwood Road (south) and the 'with LTC' model allows all three circulatory lanes to exit onto Brentwood Road (south). A compromise position is though possible, which allows two circulatory lanes (inside lane and middle lane) to exit onto Brentwood Road (south). This provides more capacity without requiring the more risky merge movements associated with merging three lanes into one lane.
- 3.1.20 The v3.6 model therefore creates an unrealistic 'without LTC' scenario, which includes significant queuing at Orsett Cock Junction, which the local highway authority would likely not allow to materialise. This is true when the 'compromise' intervention of allowing two circulatory lanes to exit onto Brentwood Road (south) could be implemented using a single change to the lane arrow lane markings at the junction. This type of change requires changes to the painted lane markings (and potentially associated signage) and hence is straightforward to implement with an associated low cost).
- 3.1.21 The v3.6 model therefore also creates an unrealistic 'with LTC' scenario, as it would create an unsafe driving situation on the circulatory carriageway, as three lanes are expected to merge into a single lane to exit onto Brentwood Road (south). Therefore, both the 'without LTC' and 'with LTC' models should allow two lanes to merge to one lane to exit onto Brentwood Road (south).
- 3.1.22 The second change made to v3.6 'with LTC' model was to introduce a Pegasus Crossing on A1013 Stanford Road at the junction with Rectory Road. This is proposed by the applicant, but to date has not been modelled. The v3.6 'without LTC' model shows significant queuing and delay on Rectory Road by 2030, i.e. 601 seconds delay per vehicle in the AM peak hours. It is not considered realistic that the local highway authority would allow this level of delay to materialise on Rectory Road in 2030 without intervention, particular as the intervention is a low cost signal controlled crossing that would benefit non-motorised users as well reduce queuing on Rectory Road. Therefore, this minor intervention should be included in the 2030 'without LTC' scenario.
- 3.1.23 The third change is that driver behaviour has been made by the applicant to be more aggressive in the 'with LTC' model compared to the 'without LTC' and some model parameters have been changed to make drivers in the 'without LTC' model more conservative. The use of different driver behaviour between the 'with LTC' and 'without LTC' scenarios skews the evaluation of the impact of the LTC scheme is not considered acceptable by the Council. This is because the same driver behaviour parameters should be used for both 'without LTC' and 'with LTC' scenarios, to ensure that the results of the modelling process are directly comparable.
- 3.1.24 The Council has also identified a series of issues with the coding of some parameters in the v3.6 VISSIM model and these are presented in **Appendix B**.

Results of Council's updated Orsett Cock VISSIM Version 3.6

- 3.1.25 Given these issues with the v3.6 forecast models, the Council has updated Version 3.6 of the VISSIM model to create a new model referred to as 'Version 3.6T'. Key changes to the Council's updated model are:
- a. Traffic is able to exit onto Brentwood Road (south) from the inside and middle lanes of the circulatory carriageway for the 'without LTC' and 'with LTC' scenarios;
 - b. A Pegasus crossing has been included in the 'without LTC' and 'with LTC' scenarios; and,
 - c. Driver behaviour has been made consistent between the 'without LTC' and 'with LTC' models.

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- 3.1.26 A number of other minor changes have been made to v3.6 of the forecast models to address the concerns raised in the Council's review as set out in **Appendix B**.
- 3.1.27 The Council considers v3.6T to be a more realistic representation of the likely traffic arrangements in place for the 'without LTC' and 'with LTC' scenarios and provides a more realistic understanding of the forecast impacts of LTC on Orsett Cock Junction.
- 3.1.28 The results from v3.6T of the Council's VISSIM model are provided in **Table 3.3** for the 2030 AM Peak 'with LTC' and 'without LTC' and **Table 3.4** for the 2030 PM peak 'with LTC' and 'without LTC'. The Council has not run the model for 2045 due to time constraints. A video showing the queuing expected at Orsett Cock Junction is provided as part of **Appendix B**.

Table 3.3: Orsett Cock VISSIM v3.6T Results – 2030 AM Peak (0800-0900)

Junction	Approach	2030 Do Min AM (0800-0900)			2030 Do Something AM (0800-0900)			Do Something minus Do Min		
		Flow [veh]	Avg. Delay per veh [s]	Mean Max. Queue [m]	Flow [veh]	Avg. Delay per veh [s]	Mean Max. Queue [m]	Flow [veh]	Avg. Delay per veh [s]	Mean Max. Queue [m]
Orsett Cock	Brentwood Road North (In)	801	53	61	684	569	1409	-117	516	1348
	A13 East Off-Slip	897	27	82	769	168	87	-128	140	5
	A1013 East (In)	618	22	55	626	53	124	8	31	68
	Brentwood Road South (In)	808	515	1449	812	121	568	4	-394	-881
	A1013 West (In)	828	152	468	696	195	467	-132	43	-2
	A13/LTC West Off-Slip	473	35	56	1552	31	114	1079	-3	57
A1013 Stanford Road / Rectory Road	Rectory Road	186	946	1342	252	491	1437	66	-455	96
	Stanford Road (East)	984	12	1385	862	44	210	-122	33	-1176
	Stanford Road (West)	790	101	-	612	71	-	-178	-29	-
Total Vehicle Hours			251.6			288.9			37.3	

Table 3.4: Orsett Cock VISSIM v3.6T Results – 2030 PM Peak (1700-1800)

Junction	Approach	2030 Do Min PM (1700-1800)			2030 Do Something PM (1700-1800)			Do Something minus Do Min		
		Flow [veh]	Avg. Delay per veh [s]	Mean Max. Queue [m]	Flow [veh]	Avg. Delay per veh [s]	Mean Max. Queue [m]	Flow [veh]	Avg. Delay per veh [s]	Mean Max. Queue [m]
Orsett Cock	Brentwood Road North (In)	1024	57	149	800	163	570	-224	106	421
	A13 East Off-Slip	885	65	194	496	552	1079	-389	487	885
	A1013 East (In)	587	61	116	515	141	118	-72	80	2
	Brentwood Road South (In)	496	46	116	513	145	116	17	99	0
	A1013 West (In)	1047	39	274	685	326	464	-362	287	190
	A13/LTC West Off-Slip	773	37	54	1439	636	636	666	599	582
	Rectory Road	317	231	373	215	474	474	-102	244	102

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Junction	Approach	2030 Do Min PM (1700-1800)			2030 Do Something PM (1700-1800)			Do Something minus Do Min		
		Flow [veh]	Avg. Delay per veh [s]	Mean Max. Queue [m]	Flow [veh]	Avg. Delay per veh [s]	Mean Max. Queue [m]	Flow [veh]	Avg. Delay per veh [s]	Mean Max. Queue [m]
A1013 Stanford Road / Rectory Road	Stanford Road (East)	945	10	388	798	21	21	-147	11	-367
	Stanford Road (West)	1035	6	-	754	142	-	-281	136	-
Total Vehicle Hours			92.6			532.3			439.7	

3.1.29 This analysis shows that the impact of LTC is now more intuitive, i.e. the increase in traffic flows leads to increases in queues and delays at the Orsett Cock junction. As previously forecast by the applicant, the impact of LTC on the PM network peak period is significant, i.e. an increase in 440 total vehicle hours.

3.1.30 The comparison of total vehicle delays in VISSIM v2 and VISSIM v3.6T is presented in **Table 3.5** below.

Table 3.5: Comparison of VISSIM v2 and v3.6T Total Vehicle delays in 2030, hours

	VISSIM version 2			VISSIM version 3.6T		
	AM 0700-0800	AM 0800-0900	PM 1700-1800	AM 0700-0800	AM 0800-0900	PM 1700-1800
Do Minimum (DM)	65.1	145.7	46.3	72.7	251.6	92.6
Do Something (DS)	86.7	185.3	214.0	96.6	288.9	532.3
DS minus DM	21.5	39.6	167.7	23.9	37.3	439.7
DS vs DM (i.e. impact of LTC), %	33%	27%	362%	33%	15%	475%

3.1.31 **Figure 3.4** then presents the data graphically and demonstrates that the models are now more aligned, and Do Something performs worse than Do Minimum as would be expected given the increase in traffic through the junction as a result of LTC.

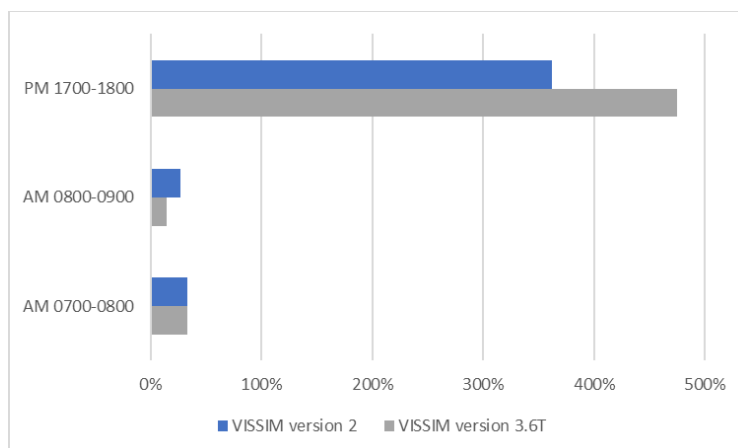


Figure 3.4: Comparison of VISSIM v2 and v3.6T Total Vehicle delays in 2030, hours

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3.1.32 Finally, **Tables 3.6 and 3.7** below compare the level of delay in LTAM with the delay per vehicle in VISSIM V3.6T and shows that LTAM continues to significantly underestimate delays at Orsett Cock.

Table 3.6: Comparison of LTAM and VISSIM v3.6T: Orsett Cock Junction – 2030 AM Peak Hour (0700-0800) – Delay per Vehicle (seconds)

DO MINIMUM 2030, AM (0700-0800)					DO SOMETHING 2030, AM (0700-0800)				
Junction	Approach	LTAM	VISSIM V3.6T	VISSIM 3.6T as % of LTAM	Junction	Approach	LTAM	VISSIM V3.6T	VISSIM 3.6T as % of LTAM
Orsett Cock	A128 Brentwood Rd (North)	4	49	1019%	Orsett Cock	A128 Brentwood Rd (North)	26	135	417%
	A13 (East)	12	27	118%		A13 (East)	26	76	195%
	A1013 Stanford Rd (East)	10	24	143%		A1013 Stanford Rd (East)	22	48	123%
	Brentwood Rd (South)	27	135	393%		Brentwood Rd (South)	29	78	174%
	A1013 Stanford Rd (West)	17	68	296%		A1013 Stanford Rd (West)	22	84	275%
	A13 (West)	24	34	37%		A13 (West)	14	29	106%
A1013 Stanford Road / Rectory Road	Rectory Rd	23	64	185%	A1013 Stanford Road / Rectory Road	Rectory Rd	34	32	-6%
	Stanford Rd (East)	7	8	16%	Stanford Rd (East)	6	20	210%	
	Stanford Rd (West)	6	4	-23%	Stanford Rd (West)	5	7	39%	

Table 3.7: Comparison of LTAM and VISSIM v3.6T: Orsett Cock Junction – 2030 PM Peak Hour (1700-1800) – Delay per Vehicle (seconds)

DO MINIMUM 2030, PM (1700-1800)					DO SOMETHING 2030, PM (1700-1800)				
Junction	Approach	LTAM	VISSIM V3.6T	VISSIM 3.6T as % of LTAM	Junction	Approach	LTAM	VISSIM V3.6T	VISSIM 3.6T as % of LTAM
Orsett Cock	A128 Brentwood Rd (North)	5	57	973%	Orsett Cock	A128 Brentwood Rd (North)	34	163	380%
	A13 (East)	12	65	438%		A13 (East)	37	552	1399%
	A1013 Stanford Rd (East)	8	61	653%		A1013 Stanford Rd (East)	20	141	592%
	Brentwood Rd (South)	7	46	584%		Brentwood Rd (South)	25	145	470%
	A1013 Stanford Rd (West)	6	39	535%		A1013 Stanford Rd (West)	7	326	4425%
	A13 (West)	22	37	69%		A13 (West)	16	636	3911%
A1013 Stanford Road / Rectory Road	Rectory Rd	55	231	317%	A1013 Stanford Road / Rectory Road	Rectory Rd	46	474	925%
	Stanford Rd (East)	7	10	48%	Stanford Rd (East)	8	21	159%	
	Stanford Rd (West)	7	6	-17%	Stanford Rd (West)	8	142	1684%	

3.1.33 **Figures 3.5 and 3.6** below show this data graphically and clearly show the lack of alignment between the delays forecast by the two models.

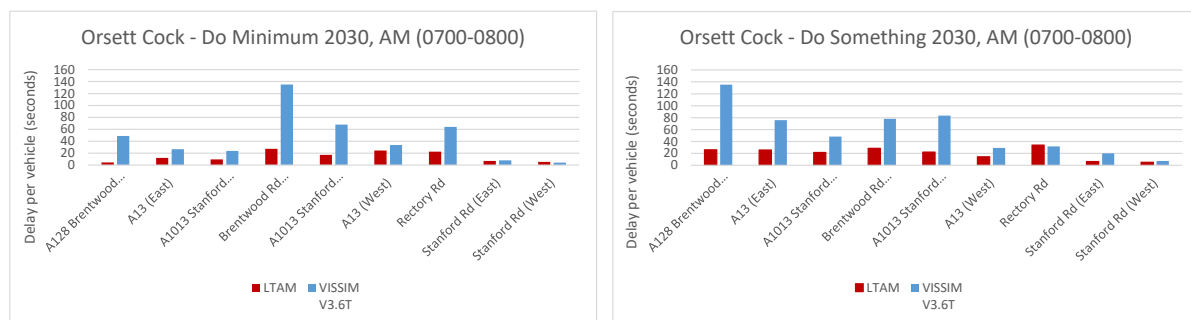


Figure 3.5: Comparison of LTAM and VISSIM v3.6T: Orsett Cock Junction – 2030 AM Peak Hour (0700-0800) – Delay per Vehicle (Seconds)

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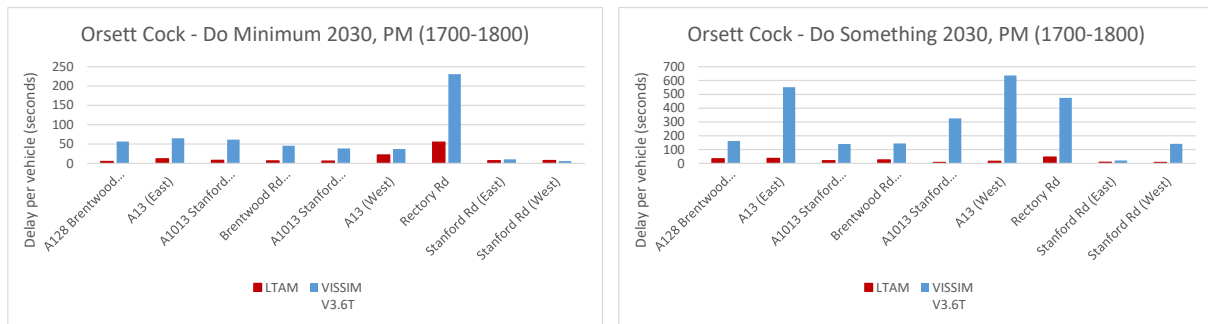


Figure 3.6: Comparison of LTAM and VISSIM v3.6T: Orsett Cock Junction – 2030 PM Peak Hour (0700-0800) – Delay per Vehicle (Seconds)

Impact of LTC on operation of Orsett Cock Junction

3.1.34 The Council's analysis of the results of the revised v3.6T VISSIM model shows that LTC increases queues and delays at the Orsett Cock junction both in the AM and PM peaks. In 2030 PM mean maximum queue lengths are forecast to increase significantly particularly on the A13 East off-slip (increase in queue of 885m), A128 Brentwood Road north (increase in queue of 421m) and A13 West off-slip (increase in queue of 582m). In order to assist the ExA in understanding the level of impact of LTC on Orsett Cock, the Council has prepared videos of the VISSIM model. This is provided in **Appendix H** and a screenshot is provided below in **Figure 3.7**.



Figure 3.7: Screenshot of VISSIM outputs for Orsett Cock Junction

3.1.35 The following commentary is provided to aid understanding of the video. The video provides a 'fly through' around the Orsett Cock junction for the 'with LTC' (Do Something) scenario in 2030 for the PM peak (1700-1800).

3.1.36 The video starts by showing the Orsett Cock junction viewed from an elevated position to the east of the junction and looking west towards LTC. The view then 'flies' westwards over the A13 eastbound exit slip road and the exit from LTC. Extensive queues can be seen on both these parts of the junction. An extensive queue can be observed on the southbound direction of Rectory Road on its approach to the A1013 Stanford Road. The video ends over LTC and

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it can be observed that the queues associated with the Orsett Cock Junction extend back to LTC and along the northbound exit slip road from LTC towards the A13 eastbound.

- 3.1.37 **In summary, the video clearly shows the extensive queues forecast by VISSIM at the Orsett Cock Junction following the introduction of LTC and the significant effect they have on the operation of the local highway network and LTC.**
- 3.1.38 In summary, the Council continues to have significant concerns about the level of impact at Orsett Cock Junction because:
- a. Given the importance of this junction for the Council as a major junction connecting key east-west and north-south routes within the Borough, the adverse impacts forecast by the applicant's VISSIM modelling of Orsett Cock Junction are unacceptable and would severely constrain the ability of the Council to deliver growth; and,
 - b. These traffic impacts do not reflect the results of the LTAM modelling on which the applicant has based their appraisal and BCR. LTAM is significantly underestimating delays at the Orsett Cock junction. This means that the economic appraisal is underestimating the traffic disbenefits of LTC and the environmental assessment is underestimating the environmental impacts of the scheme.
- 3.1.39 **Summary: it is standard practice to use VISSIM models to understand the operational traffic impacts of new infrastructure and the applicant has prepared a VISSIM model of the Orsett Cock junction. This base model has been agreed with the Council. Several versions of the forecast model have been provided with the most recent being v3.6.**
- 3.1.40 **The Council has reviewed v3.6 and considers that the changes made to the modelling of the circulatory carriageway in the 'with LTC scenario' to provide three lanes merging into a single lane are unrealistic. In addition, the Council considers that the 'without LTC' scenario is also unrealistic and that the forecast queues would not be allowed to happen in reality. This is because the queues could and would be addressed by the Council (as the local highway authority) through the introduction of modest and straightforward measures, such as providing lanes markings on the circulatory carriageway, which enable two lanes to merge into a single lane and the provision of a Pegasus crossing (or similar) at the junction of Rectory Road and A1013 Stanford Road. In addition, the applicant has changed modelling parameters, which make driving behaviour more aggressive in the 'with LTC' model compared to the 'without LTC' model, which tends to reduce the modelled impact of LTC on the operation of the junction. These issues with the model mean that the Council has created a modified v3.6T, which corrects these issues.**
- 3.1.41 **The results of v3.6T show that the introduction of LTC would lead to adverse impacts on the operation of the junction and would severely constrain the ability of the Council to deliver growth. In addition, the VISSIM analysis shows that LTAM is significantly underestimating delays at the Orsett Cock junction and that the economic appraisal is underestimating the traffic disbenefits of the LTC and the environmental assessment is underestimating the environmental impacts of the scheme.**

4 Orsett Cock: Review of Sensitivity Tests

4.1 Introduction

- 4.1.1 Given the significant concerns raised by the Council and other stakeholders concerning the lack of alignment of LTAM and VISSIM, the applicant agreed to incorporate parameters from the Orsett Cock VISSIM model into LTAM (Action 8 from the Joint Position Paper on Orsett Cock ([REP5-084](#))).
- 4.1.2 In addition, the Council has raised concerns that the forecast delays at Orsett Cock junction will result in traffic reassigning unacceptably through Orsett village.
- 4.1.3 Given these concerns, the applicant agreed to undertake two sensitivity tests using VISSIM to assess the effect on Orsett Cock of traffic not being able to re-route through Orsett village.
- 4.1.4 These sensitivity tests reassigned traffic from Rectory Road to A128 southbound and formed Actions 9 and 10 of the Joint Position Paper on Orsett Cock ([REP5-084](#)).
- 4.1.5 This section summarises the results of these LTAM sensitivity tests undertaken by the applicant.

4.2 Orsett Cock VISSIM parameters input to LTAM

- 4.2.1 The applicant summarised the results of inputting VISSIM parameters into LTAM in Appendix B of Localised Traffic Modelling ([REP6-056](#)). The applicant reported on three tests:
- Test 1 - taking the signal timings from the VISSIM model into LTAM;
 - Test 2 - taking the saturation flows from the VISSIM model into LTAM; and,
 - Test 3 - taking the forecast delays from the VISSIM model into LTAM
- 4.2.2 The Council's review of the LTAM tests is included in **Appendix C** of this submission.
- 4.2.3 Late on Friday afternoon 10 November 2023, the applicant issued to the Council and other Interested Parties 36 pages containing 12 Tables of data on route based journey time comparisons. The only explanation provided is: *'Tables 1-12 set out changes in journey times between the Do-minimum and the test in the LTAM where the delays from the Orsett Cock VISSIM model were incorporated. These reflect the route based journey times originally produced in Appendices B and C of the Transport Assessment [[REP4-154](#) and [REP4-156](#)]. The sensitivity test where the VISSIM delays were incorporated into the LTAM has the model run ID LEO_CS34'*.
- 4.2.4 The applicant provided no advance notice of its intention to provide this data this late prior to Deadline 6A except within an email on 10 November 2023 at 13.41pm, thus eliminating the potential for the Council to review this data. Although it is accepted that it was referred to in its submission at D5 on 3 October 2023 – paragraph 3.5 (e) ([REP5-084](#)), although no timetable was provided at that time.
- 4.2.5 The applicant provides no analysis of the data it provided. This means that the Council and Interested Parties are unable to determine the significance of the data without undertaking detailed additional analysis, comparing these results with the data the applicant has previously provided in its Transport Assessment. The Council considers that this data has likely been provided to respond to queries from the two national Ports concerning the impact of LTC on

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journey times to and from the Ports, although this not obvious from the information provided by the applicant. The applicant has also not provided any detail of the technical methodology and assumptions made to derive the data, eliminating the ability to scrutinise or validate the approach adopted to create the data. The Council has repeatedly raised concerns about the poor communication and pace at which the applicant is reluctantly undertaking traffic modelling work. This is creating severe strain on the programme as scrutiny of complex issues is rushed and has introduced errors. For example, the need for the applicant to unexpectedly provided a new v3.6 VISSIM model on 20 October 2023. It is noted that the data has been issued with no confirmation of any quality audit or sign off process by the applicant. The Council and Interested Parties have been provided inadequate time to review and respond to this new data prior to Deadlines 6A or D7 and therefore comments will be provided at D8 on 5 December 2023.

- 4.2.6 In summary, the Council's review has concluded that the results for Test 1 (taking the signal timings from VISSIM into LTAM) and Test 2 (taking the saturation flows from the VISSIM model into LTAM), show that manipulating the network parameters in LTAM as completed by these tests has failed to replicate the level of delays forecast by VISSIM in LTAM. This continues to show the lack of alignment between the results of the VISSIM and LTAM models.
- 4.2.7 Test 3 (inputting delay penalties in LTAM) provides a more reliable assessment for replicating VISSIM levels of delay in LTAM. However, Test 3 shows that traffic from Orsett Cock is forecast to re-route to other local roads, which are often unsuitable for the level of traffic choosing to use them. An example is Conway's Road leading to Orsett village from the north, which in Test 3 (2045 PM) is forecast to see an increase in the two-way traffic flow of 550 passenger car units (PCUs).
- 4.2.8 The Council acknowledges the limitations of this test, as it is only a single model iteration. The Council considers that the iteration between the LTAM and VISSIM models should continue until the models are broadly aligned in terms of flows and delays.
- 4.2.9 However, this is not feasible within the Examination programme.
- 4.2.10 What is clear from the initial results provided by the applicant is that the assessment of traffic impacts and scheme appraisal could be significantly different from that presented by the applicant in the DCO submission were the LTAM and VISSIM models to be more closely aligned.

4.3 Rectory Road Sensitivity Tests

- 4.3.1 The Council has previously raised concerns that the delays forecast at Orsett Cock Junction will result in traffic re-routing through Orsett village.
- 4.3.2 The test undertaken by the applicant to input VISSIM delays into LTAM (Test 3 above) demonstrates that this is a justified concern and that increased delays at Orsett Cock in LTAM would result in traffic re-routing through Orsett village, as well as other local routes, which are not suitable for the forecast increases in traffic flows and which would lead to additional adverse impacts associated with the increased traffic flows (e.g. severance, noise, air quality).
- 4.3.3 Given these concerns, the applicant agreed to undertake two sensitivity tests using VISSIM to assess the effect on Orsett Cock of traffic not being able to re-route through Orsett village.
- 4.3.4 The two sensitivity tests were, as follows:
 - a. Test 1: Assume 2016 base traffic through Orsett village remains and all other traffic reallocated onto A128 (Action 9 ([REP5-084](#))); and,

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- b. Test 2: Rectory Road closed to all traffic except public transport and active travel (Action 10 ([REP5-084](#))).
- 4.3.5 The applicant will present the Technical Note that summarises the results of Rectory Road sensitivity tests in Deadline 6A and the Council's review is included in **Appendix D** of this submission, as it was received by the Council on 31 October 2023.
- 4.3.6 In summary, the Council's review concluded that:
 - a. Test 1: the results indicate that the performance of the Orsett Cock junction is slightly worse in many cases compared to the Core Scenario (i.e. where traffic can re-route through Orsett village), which means that the junction is sensitive to even small changes in traffic flows; and,
 - b. Test 2: the results show that the performance of the Orsett Cock junction is significantly worse when no traffic is assigned to Rectory Road. For example, in the PM peak of the 2030 'with LTC' scenario the delays on the A128 Brentwood Rd (North) approach increase from 74 seconds in the 'without LTC' scenario to 427 seconds in the 'with LTC' scenario.
- 4.3.7 Based on these sensitivity tests, the Council considers that the applicant needs to provide mitigation for Orsett village to deter traffic from re-routing through the village as a result of increased delays at Orsett Cock following the implementation of LTC. Although this was initially included within the S106 list by the Council in January 2022, the applicant refused to consider it further in a meeting with the Council in October 2023.
- 4.3.8 In addition, Orsett Cock Junction needs to be designed to accommodate traffic which remains on the A128 Brentwood Road and which is not re-routing through Orsett village. This is proposed to be secured through the draft Requirement for Orsett Cock, which has been agreed jointly by the Council, PoTLL, DPWLG and TEP and which will be submitted at D7.
- 4.3.9 **Summary: given the significant concerns raised by the Council and other stakeholders concerning the lack of alignment of LTAM and VISSIM, the applicant agreed to incorporate parameters from the Orsett Cock VISSIM model into LTAM. The Council's review of these tests has shown that manipulating the network parameters in LTAM has failed to replicate the level of delays forecast by VISSIM in LTAM. The Council notes the tests show traffic reassigning to unsuitable routes. The Council considers that the iteration between the LTAM and VISSIM models should continue until the models are broadly aligned in terms of flows and delays.**
- 4.3.10 **The Council has previously raised concerns that the delays forecast at Orsett Cock Junction will result in traffic re-routing through Orsett village. The applicant has provided further modelling analysis of two tests related to the routing of traffic near the Orsett Cock junction. Based on these sensitivity tests, the Council considers that the applicant needs to provide mitigation for Orsett village to deter traffic from re-routing through the village as a result of increased delays at Orsett Cock following the implementation of LTC.**

5 Impact on Economic Appraisal of using VISSIM Results rather than LTAM Results

5.1 Introduction

- 5.1.1 The analysis of VISSIM and LTAM modelling results shows a continuing lack of alignment between the two sets of modelling results. The applicant considers that this is not important and that they can rely solely on the LTAM modelling results to inform the appraisal of the scheme.
- 5.1.2 The Council does not agree that the difference between the two models is 'not important'. The Council considers that the VISSIM model results show that the appraisal is not considering a large amount of traffic disbenefits and this should be incorporated into the appraisal.

5.2 Need to better align VISSIM and LTAM

- 5.2.1 Based on the review of LTAM, the Council has identified a limited number of junctions, for which it is particularly concerned in respect of the impact of LTC on the local highway network. These junctions were summarised in the LIR ([REP1-281](#)). The Council required the applicant to prepare localised models of these junctions to enable a more detailed understanding of the impact of LTC on the operation of the junctions.
- 5.2.2 This localised modelling is incomplete, as set out in the model status update in Section 6 of this submission.
- 5.2.3 The Orsett Cock VISSIM modelling has been progressed by the applicant in more detail than any of the other localised modelling and it has highlighted significant differences between VISSIM and LTAM in terms of the level of delay.
- 5.2.4 The VISSIM and LTAM models should broadly align so that similar rather than conflicting judgements can be made. This is not specific to Orsett Cock Junction and as the other six localised models progress, their results should also broadly align with LTAM. These models are considered in more detail in Section 6 below.
- 5.2.5 Given that the Council and other stakeholders have highlighted the significant divergence between VISSIM and LTAM at Orsett Cock Junction, the applicant agreed to undertake some high-level tests to input VISSIM parameters at Orsett into LTAM and these are reviewed above in Section 4.
- 5.2.6 The Council acknowledges the limitations of this test as it is only a single model iteration. The iteration between the LTAM and VISSIM should continue until the models are broadly aligned in terms of flows and delays and this exercise should also be completed for the other key junctions identified by the Council, which the applicant has been progressing localised models for (refer to Section 6 below).
- 5.2.7 However, achieving this model alignment is not feasible within the Examination programme. What is clear from these initial results is that the assessment of traffic impacts and scheme appraisal could be significantly different from that presented by the applicant in the DCO submission if the LTAM and VISSIM models were more closely aligned.
- 5.2.8 Very importantly, if the VISSIM model results (and associated additional delays at Orsett Cock Junction and other locations in Thurrock) were included in the economic appraisal of LTC, the additional economic costs of the additional delays would further reduce the benefit cost ratio

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for the scheme towards a level where costs outweigh benefits. There would be further additional environmental impacts associated with these additional traffic delays.

5.3 Alternative Approach to Capture Missing Disbenefits

- 5.3.1 Given it is not possible to re-run the LTAM model in the time available, the Council has developed a high-level spreadsheet-based approach to estimate the impact of the traffic delays, which are missing from the appraisal, particularly the economic appraisal.
- 5.3.2 The approach for the Orsett Cock junction is, as follows:
- a. Calculate total delays using LTAM for each scenario;
 - b. Calculate total delays using VISSIM for each scenario;
 - c. Calculate difference between LTAM and VISSIM estimates of delay;
 - d. Annualise delays using standard factors;
 - e. Apply value of time estimates to convert delays into monetary values; and,
 - f. Estimate present value of delays over 60-year appraisal period
- 5.3.3 This method has been applied to Orsett Cock Junction with the following result (refer to **Appendix E** for further details and it should be noted that this impact does not include delays outside AM and PM peak periods and at weekends and hence is an underestimate):
- a. Impact of incorporating VISSIM delays into appraisal leads to further disbenefits of approximately **£100m** (present value, 2010 prices)
- 5.3.4 Similar effects are expected at the other junctions within Thurrock.
- 5.3.5 If the disbenefits at the Orsett Cock Junction are included in the economic appraisal for the scheme then the BCR for well-established Level 1 benefits reduces by 0.05 from 0.48:1 to approximately 0.53:1. The BCR including all benefits reduces from 1.22:1 by 0.05 to 1.17:1, including the expected similar effects at other junctions in Thurrock will further reduce the BCR.
- 5.3.6 In addition, when the other issues with the economic analysis are incorporated as shown in Table 10.1 of the Council's D6 'Thurrock Council's Comments on Applicant's Submissions at Deadline 4 (D4) and Deadline 5 (D5)' ([REP6-164](#)) then this additional analysis provides additional evidence that the BCR for LTC will be approaching a level below 1:1, i.e. the costs will exceed the benefits.
- 5.3.7 In practice, the BCR for the scheme is even lower than that stated by the applicant because of the inadequate assessment of forecasting and uncertainty as shown by the Council's analysis presented in Table 10.1 its D6 submission 'Thurrock Council's Comments on Applicant's Submissions at Deadline 4 (D4) and Deadline 5 (D5)' ([REP6-164](#)).
- 5.3.8 This analysis shows that the lack of alignment of the LTAM and VISSIM models means that the results of LTAM cannot be relied upon to assess the economic benefit of LTC. Incorporating the results of VISSIM has a significant effect on the BCR and brings it ever close to level where costs are greater than benefits.
- 5.3.9 **Summary: there continues to be a lack of alignment between the results of the LTAM and VISSIM models for the Orsett Cock junction. The applicant continues to maintain**

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that this difference is not important, and they rely on the lower traffic delays forecast from LTAM to inform their economic appraisal. VISSIM predicts high levels of traffic delays at Orsett Cock Junction and if these delays are included in the economic appraisal of LTC then the Benefit Cost Ratio reduces further and approaches a level where costs are higher than benefits. If a similar analysis were included for other local junctions, it is likely that costs for LTC would exceed benefits.

6 Wider Network Impacts

6.1 Introduction

6.1.1 This section provides a summary of the Council's position on major junctions on the local highway network which are forecast to be impacted by LTC. These junctions are as described within the Council's LIR ([REP1-281](#)):

- a. The A13/A1089/Orsett Cock junction;
- b. The Manorway roundabout;
- c. ASDA Roundabout;
- d. Daneholes roundabout;
- e. A126 Marshfoot Road Junction;
- f. A13 westbound merge at Five Bells junction; and,
- g. A1012 / Devonshire Road junction.

6.1.2 It is agreed by the applicant that the Orsett Cock junction is not a Wider Network Impact and therefore this junction has been dealt with in earlier sections of this submission. The Council's position on the Tilbury junction is summarised in Section 7.

6.2 Progress of Localised Transport Modelling

6.2.1 To address limitations of the strategic model LTAM, the Council requested the applicant to complete localised traffic modelling relating to local junctions within Thurrock. The localised traffic modelling would then be used to assess the impact of LTC on the local highway network at key locations and serve as the basis for mitigation requirements.

6.2.2 Prior to the DCO submission in October 2022 the Council had received from the applicant:

- a. A base model and a provisional version of a forecast model for the A13/A1089/LTC/Orsett Cock interchange (v1.5);
- b. A forecast model only of The Manorway junction; and,
- c. A base year model only of the Thurrock East-West model, which includes Daneholes roundabout and A126 Marshfoot Road junction.

6.2.3 Prior to the DCO submission only the base model for Orsett Cock has been agreed by the Council but the forecast models of that interchange have not been agreed and are not acceptable for assessing the impacts of LTC. Further versions of the localised models have been issued by the applicant during the Examination.

6.2.4 The status of these models is summarised in

6.2.5 **Table 6** below and further detailed in **Appendix F** 'D6a Modelling Status Flowchart' of this submission. The lack of acceptable analysis on how LTC will affect the local highway network is evident from the Table 6.1 below and from the diagram in Appendix F.

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Table 66.1: Status of Localised Modelling in Thurrock

Location	Localised Model	Provided by the applicant to the Council?	Base year model agreed between the Council and the Applicant?	Forecast Model agreed between the Council and the Applicant?
a. The Orsett Cock junction	Orsett Cock Vissim model	✓	✓	✗
b. The Manorway roundabout	The Manorway Vissim model	✓ (base year model has been developed by the Council but not agreed)	✗	✗
c. Daneholes roundabout	East-west Vissim model	✓	✗	✗
d. ASDA Roundabout	ASDA Vissim Model	✓	✗	✗
e. A126 Marshfoot Road Junction	East-west Vissim model	✓	✗	✗
f. A13 westbound merge at Five Bells junction; and	<i>Requested but not provided</i>	✗	✗	✗
g. A1012 / Devonshire Road junction	<i>Requested but not provided</i>	✗	✗	✗

6.2.6 Each of the junctions has been considered in turn below.

6.3 The Manorway

6.3.1 At Deadline 1 the applicant issued a Localised Traffic Modelling Appendix D – Manorway Forecasting Report ([REP1-190](#)).

6.3.2 As stated in the Council's D3 submission, Section 14.3 ([REP3-211](#)), a base model for the Manorway junction was not undertaken and therefore the forecast model provided at D1 was not based on a validated base model and was not a reliable model for assessment.

6.3.3 The Council and DPWLG have repeatedly raised concerns about the inadequacy of the applicant's approach to modelling the Manorway junction, particularly that the applicant had produced a forecast model without a validated base model. The applicant continues to claim that the LTAM model outputs for the Manorway are sufficient for purpose of the Examination and maintains that its junction modelling (without a validated base model) is evidence to uphold this view.

6.3.4 Due to the inadequacy of the applicant's analysis of local traffic impacts the Council commissioned survey data to enable it to develop a validated base model. The applicant declined to contribute towards the costs of this survey work. The applicant was consulted and did engage on the development of the survey specification for the Manorway. The applicant at no stage offered to prepare a base model. As such, the Council has developed the base model in collaboration with DPWLG.

6.3.5 The Council has prepared a base year model using observed traffic flows from 2022 to allow an updated forecast model to be developed by the applicant and agreed by the Council. The AM peak base model was shared with the applicant prior to the D5 submission. The PM peak base model and the Local Model Validation Report (LMVR) were shared with the applicant in

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advance of D6, for them to review and adopt the base year model in forecasting prior to D6 submission.

- 6.3.6 At D6 submission the applicant provided a review of the Council's base year VISSIM model for the Manorway junction.
- 6.3.7 The applicant's review raised a number of concerns in relation to the model and as such concluded that the model is not suitable to be used for forecasting in its current form. The Council has reviewed the applicant's comments on the base year VISSIM model and has provided a response in **Appendix G**. The Council has concluded that the concerns raised by the applicant are not critical to the reliability of the model and therefore the base year model in its current form is perfectly suitable as the basis for testing forecast impacts of LTC on the Manorway.
- 6.3.8 Efforts have been made in collaboration with the applicant to develop a satisfactory VISSIM base model and subsequent forecast models. Once these models are completed, it is highly likely that mitigation will be required, as the initial analysis undertaken by the Council using LTAM indicated an increase in delays at this location with the LTC in place. This is particularly true on the B1007 approach to the junction from the north (the Council's analysis of LTAM was presented in the Council's LIR, the 'Lower Thames Crossing. Review of DCO Cordon Transport Models', Appendix C, Annex 1, Sub-Annex 1.1 [REP1-281](#)).

6.4 Asda Roundabout

- 6.4.1 The Council has repeatedly expressed serious concerns about the inadequacy of analysis by the applicant to assess the operational impact of LTC and the impact of construction traffic on the Asda Roundabout. Initial modelling was provided by the applicant during the Examination at Deadline 3 and the Council provided its response on the inadequacies of that modelling in Appendix A of the Council's Comments on the Applicant's Submissions at D3 ([REP4-354](#)). The Council's review of the base year model has identified critical issues, which need to be addressed before comments can be provided on the forecast models and the results. Therefore, the base micro-simulation modelling was not approved and as such neither the operational or the construction forecast modelling were considered ready for review.
- 6.4.2 Traffic data used by the applicant as the basis of its modelling has been shown by Port of Tilbury London Limited (PoTLL) in their Deadline 4 Submission - DCO Drafting Proposals ([REP4-350](#)) to be significantly below typical traffic flow through the Asda Roundabout, illustrating that the applicant has underestimated the effects of LTC on the safe and efficient operation of the roundabout and adjoining network both during construction and in operation.
- 6.4.3 The applicant had asserted that its workers would be required to adhere to agreed routes so as to minimise the impacts on the Local Road Network and local communities. For access to the North Tunnel Portal compound and the Station Road compound that access route was focused on A1089 and St Andrews Road. Inspection of the assignment within LTAM during the construction phase scenarios has shown that that worker traffic has in fact been assigned to the local road network through communities to the east of A1089, including Chadwell St Mary, East and West Tilbury. This is contrary to the commitment made by the applicant, which would generate harm to the local communities. If as the applicant has indicated, it ensures workers use the SRN through its contractual requirements, it would mean that the applicant's traffic modelling currently significantly under-estimates the impacts of traffic on Asda Roundabout during construction.
- 6.4.4 Notwithstanding the issues with the base year model, which need to be addressed, the Asda Roundabout 2030 and 2045 forecast operational model ([REP3-129](#)) has shown increased queueing and delays at this location with LTC in place, which will need to be resolved.

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- 6.4.5 The Council has also raised concerns about the safe routing of pedestrians and cyclists across the junctions during construction and this must be addressed by the applicant as part of any mitigation.
- 6.4.6 Given the outstanding issues with the assessment and the forecast impacts of LTC at Asda Roundabout, the PoTLL has drafted a draft Requirement for Asda Roundabout, which the Council fully supports. The position on draft Requirements is summarised in Section 8 below.

6.5 A13 westbound merge at Five Bells junction

- 6.5.1 LTAM forecasts significant worsening of congestion on the A13 westbound merge at the Five Bells junction, resulting in traffic re-routing through communities of Corringham and Stanford-le-Hope. This concern has been shared in depth with the applicant and is summarised in the Council's LIR ([REP1-281](#)).
- 6.5.2 At D3 the applicant shared a Five Bells and Pitsea Hall forecast model and forecasting report ([REP3-130](#)). This is an ARCADY model covering three roundabouts at the Five Bells:
- a. A176/ B1464;
 - b. A176/ High Road; and,
 - c. A176/ B1420.
- 6.5.3 The Council's response to the applicant's modelling of Five Bells submitted at D3 is covered in the Council's Comments on the Applicant's Submissions at D3 ([REP4-354](#)). A review by the Council revealed that the model does not cover the A13 westbound merge at Five Bells junction and therefore does not address the Council's concerns. There is no benefit in the Council analysing the provided models, as they do not include the part of the junction that is forecast to be impacted.
- 6.5.4 Despite repeated requests, the Council has not received operational period localised modelling for the A13 westbound merge at Five Bells junction.

6.6 Daneholes Roundabout and A126 Marshfoot Road Junction

- 6.6.1 In June 2022 the applicant provided the Council with the East-West base year microsimulation model and associated LMVR (Local Model Validation Report). The modelled area of the East-West model covers the network from the A13/A1012 junction, Lodge Lane through Daneholes Roundabout, incorporating Marshfoot Road and junction to the roundabout of the B149/St. Chads Road. The Council's review of the base year model was provided to the applicant in November 2022. The applicant was required to address the Council's comments on the model before the model could be agreed by the Council.
- 6.6.2 An updated version of the base year model and the accompanying documentation was issued by the applicant at Deadline 1 and included in the Localised Traffic Modelling Appendix E – Thurrock East-West LMVR ([REP1-191](#)). The Council undertook a review of this model, which was presented in the Council's D3 submission, Appendix E, Annex 4 ([REP3-207](#)). The review identified that only selected issues reported to the applicant in November 2022 were addressed and therefore there are residual critical problems. The review of the model has also identified further critical issues, which need to be addressed before comments can be provided on the forecast models and the results. No further updates have been provided by the applicant on the East-West modelling since Deadline 1 and it remains not agreed with the Council.

6.7 A1012 / Devonshire Road junction

- 6.7.1 LTAM identifies that there is forecast to be an adverse impact at the junction of A1012/Devonshire Road junction. This junction has not been included in the East-West microsimulation model and no localised modelling has been provided by the applicant to understand the operational impacts of LTC on the junction. This remains an outstanding concern raised by the Council.
- 6.7.2 **Overall Summary of All Junctions: the applicant has continued to resist efforts to complete a collaborative localised modelling process. Almost all the localised models remain incomplete and therefore the LTC impacts on the operation of the local highway network are not understood. There is not sufficient time remaining in the Examination process to complete the localised modelling and it therefore remains not agreed. Given this, the Council has worked jointly with PoTLL, DPWLG and TEP to agree draft Requirements for the monitoring and mitigation of Wider Network Impacts, which have been presented at D6 by the PoTLL and will be presented by the Council at D7.**

7 Tilbury Junction

7.1 Introduction

- 7.1.1 Tilbury Junction is located to the north of the Northern Portal and it has been designed to provide emergency and operational access to the tunnel. The applicant states that it could also potentially be used by public transport services in the future and the junction allows for the passive provision for connection to a future Tilbury Link Road. Previous designs for LTC included the Tilbury Link Road (TLR), but it was removed prior to Statutory Consultation in 2018.
- 7.1.2 The applicant has never provided an adequate explanation as to why it was removed and the modelling that they provided in December 2021 and described in Appendix B, Annex 2 – LTC Alternatives: TLR and A13 Junction of the Council's Local Impact Report ([REP1-283](#)) showed that the junction in combination with a link road, would significantly reduce pressure on the Orsett Cock Junction and provide a more balanced approach to manage traffic movements across the area with greater resilience in the network.

7.2 Emergency Access

- 7.2.1 The Council agrees that the design of Tilbury Junction provides suitable access for emergency and operational vehicles. The bridges at the proposed junction are not, however, required to cater for emergency or operational vehicles, which could manoeuvre via use of Station Road. Betterment has been provided at this location to cater for additional traffic connecting with a future TLR.

7.3 Access for Public Transport Services

- 7.3.1 Tilbury Junction has been designed to provide passive provision for the vehicle turning movements associated with public transport services. This means that if the Tilbury Link Road were provided then public transport services could access Tilbury Link Road and a potential link road to the east. This would provide significant benefits for northbound public transport passengers through the LTC tunnel as they would no longer be required to travel approximately 7km north to the Orsett Cock junction to access local destinations via the local road network. It would provide important connectivity between north Kent and the southern, most populated, part of Thurrock establishing a distinct advantage to travel by public transport in comparison to car.
- 7.3.2 The Council notes though that in providing this passive provision for public transport services the junction has been 'over designed' beyond the minimum that would be required for emergency services access and operational access. The Council estimates that this additional level of design provision has increased the cost of the junction by approximately £50m.
- 7.3.3 Tilbury Link Road has no funding and given that the applicant's initial assessments have suggested that the TLR is low value for money (because the scheme is treated in isolation and not part of LTC), it is considered unlikely to be brought forward in RIS3, if indeed there is a RIS3 programme. The applicant has created a junction as part of its LTC scheme, which is intended to connect to an aspirational TLR, for which there is no identified opportunity to secure funding for delivery. The Council is aware that National Highways made similar promises 30 years ago during the construction of the QE2 bridge to implement east-facing slips on the A13 to Lakeside. These promised junction modifications still have not been delivered, despite it being agreed that they are necessary and beneficial to alleviate pressure

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from M25 J30. The Council is concerned that history is repeating itself and that the applicant's proposed approach is unworkable, inappropriate and misleading.

7.4 Council Concerns with Proposed Tilbury Junction

- 7.4.1 The Tilbury Junction provided for in the DCO is not sufficient for the provision of a TLR that is open for public use. The modelling provided by the applicant showed that there would be significant demand for traffic to use the Tilbury Junction and TLR. To cater for this demand the junction would require greater capacity than has currently been designed. For example, the on/off-slips would need to be longer to meet highway design standards and the length of these slips are governed by the distance from the tunnel portal. To accommodate longer slips to provide the necessary capacity at Tilbury Junction it would be necessary to substantially reconfigure the current scheme design, including a likely change to its location further north.
- 7.4.2 The key issue with the Tilbury Junction is that it is passive provision for a TLR that has not been appropriately assessed or agreed. Its current design constrains the ability for a TLR to be provided for public access. The future function and purpose of the TLR has not been agreed. The applicant did not consult and agree the design of the Tilbury Junction with the Council. The Council had no opportunity to influence the design of the junction, as it was predetermined by the applicant. The applicant has therefore pre-determined that the Tilbury Junction it is providing is not able to cater public access via a TLR.
- 7.4.3 For this Tilbury Junction to cater for traffic in addition to emergency and operational vehicles, the access on/off the LTC will need to be constrained to cater for only limited movements, such as buses and port traffic. The ability to do this will be dependent on the ability of the Council to agree innovative /novel demand management measures that meet the strict requirements of the applicant's operations teams. This need will significantly limit the likelihood of any additional traffic being permitted to use the junction in future.
- 7.4.4 If this configuration of the Tilbury Junction is built, then the cost of redesigning the Tilbury Junction to accommodate traffic via a TLR would be prohibitive. The Tilbury Junction itself will cost in the region of £50 million to construct and much of this cost would be abortive spend. The impact of a sub-standard design at Tilbury serves only to increase the cost and thus reduce the benefit cost ratio of a future TLR. The passive provision of a junction for the TLR has been ill conceived and rushed without adequate discussions and consultation due to the insistence of the applicant to meet its self-imposed DCO submission deadline. The Council's concerns with regards to the Tilbury Junction and TLR have simply been ignored by the applicant.
- 7.4.5 The Council's position is that the Tilbury Junction should be redesigned to ensure that it is capable of catering for an agreed function, alignment and design of TLR. Approval of the scheme as per this DCO is highly likely to eliminate the potential to provide a future TLR. Given the unresolved and highly critical issue of lack of capacity at Orsett Cock Junction, the TLR provides attractive design advantages to alleviate traffic pressure and deliver a better balance to movement across the region that to date have been inadequately considered.
- 7.4.6 Appendix B, Annex 2 – LTC Alternatives: TLR and A13 Junction of the Council's Local Impact Report ([REP1-283](#)) showed that the junction in combination with a link road, would significantly reduce pressure on the Orsett Cock Junction and provide a more balanced approach to manage traffic movements across the area with greater resilience in the network.

7.5 Benefits of Providing Tilbury Junction and Tilbury Link Road

- 7.5.1 Throughout the Examination, the Council has consistently highlighted the benefits of providing Tilbury Junction, which should be designed for all types of users and Tilbury Link Road. These benefits include:

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- a. Improved access to the local transport network for public transport services;
 - b. Improved access to the local transport network for people travelling to and from local destinations in Thurrock (and beyond); and,
 - c. Size of Orsett Cock junction could be reduced from 112ha to 56ha greatly reducing the land take and associated impacts of the Orsett Cock junction.
- 7.5.2 These benefits are described in Appendix B Transport Alternatives of the Council's Local Impact Report ([REP1-283](#)), as set out in Section 7.1.2 above.
- 7.5.3 The applicant has not provided suitable evidence to justify the removal of Tilbury Link Road from the scheme.
- 7.5.4 **Summary: the Tilbury Junction has been designed for the use of emergency and operational vehicles, potential future use by public transport vehicles and with passive provision for a connection to Tilbury Link Road (which formed part of LTC until late-2018). An adequate explanation has not been provided of why Tilbury Link Road was removed from the scheme and its inclusion would provide greatly improved access to public transport services for Thurrock residents and enable the Orsett Cock junction to be significantly reduced in size.**

8 Proposed Draft Requirements

8.1 Introduction

8.1.1 This submission sets out the significant residual concerns that the Council has with the assessment of impacts of LTC on the local highway network. There is not sufficient time remaining in the Examination to resolve the issues with regards to the incomplete and inadequate assessment of local highway impacts. These deficiencies are such that the Council considers that the DCO cannot and should not be granted. Without prejudice to this primary position, if the DCO is to be allowed the Council considers that new Requirements are necessary to provide assurance that key road junctions will operate effectively and to cover overall mitigation matters. This section summarises the Council's position on these new Requirements.

8.2 Council's Position on Requirements

- 8.2.1 The Council objects to the current proposals for LTC as the scheme fails to strike an acceptable balance between national benefit and the substantial harm to the Borough. Furthermore, the applicant has not adequately explored alternatives that might better meet scheme objectives, including alternative designs at the LTC/A13/Orsett Cock junction that would require less land take and significantly less impacts.
- 8.2.2 Notwithstanding and without prejudice to this, the Council has sought to engage with the applicant so that, in the event that the DCO is granted, measures to mitigate the LTC impacts on the local highway are secured.
- 8.2.3 Despite significant engagement with the applicant on the impact assessment of LTC the local highway network, there remains substantial outstanding concerns with the assessment. However, based on the evidence before the Examination, the Council remains concerned that there are unacceptable adverse impacts on the local highway network that need to be mitigated.
- 8.2.4 The Council and other stakeholders remain firmly of the view that the applicant should be mitigating unacceptable impacts on the local highway network, and it is therefore critical that certain details are expressly addressed, assessed and mitigated for within the DCO, if it is to be granted. The inclusion of additional Requirements will help to address this issue.
- 8.2.5 The Council submitted draft Requirements at Deadline 6, which dealt with Asda Roundabout, Tilbury Link Road, Monitoring and Mitigation Strategy and Air Quality Monitoring and Mitigation. The Council did not submit a draft Requirement for Orsett Cock as it was still in the process of reviewing the modelling that had been submitted by the applicant.
- 8.2.6 Since Deadline 6, the Council has continued to work closely with PoTLL, DPWLG and TEP to jointly prepare an agreed set of draft Requirements. Consequently, those directly affected by the need for new Requirements, namely the Council, PoTLL, DPWLG and TEP have agreed the three Requirements relating to Orsett Cock Junction, Asda Roundabout and an overall Monitoring and Mitigation Strategy and these will be submitted in a 'Joint Position Statement' by PoTLL at D6A and so this Joint Statement is not included here to avoid repetition.
- 8.2.7 The jointly submitted Requirements contain provisions to provide for the following:
- a. Mitigation proposals and an ongoing scheme of monitoring and mitigation for Orsett Cock junction, including deterring traffic from routing through Orsett Village;
 - b. Construction traffic mitigation and monitoring at the Asda Roundabout; and,

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- c. An overall Monitoring and Mitigation Strategy similar to Silvertown Tunnel.
- 8.2.8 The Council will submit separately within its D7 submission the Air Quality Monitoring and Mitigation draft Requirement.
- 8.2.9 In addition, regarding the Requirement for **‘Tilbury Link Road Junction readiness and compatibility’**, this will also be submitted by the Council as an alternative to that already submitted by PoTLL in its D6 submission, because the Requirement as drafted by the Port of Tilbury is considered by the Council to be insufficiently certain in the standard of roads that will be delivered. The Council would require that any new TLR would be a publicly accessible road to meet growth ambitions, however, it is understood that the Port of Tilbury would be satisfied with a private road to serve the Port. Notwithstanding these approaches, it should be noted that the applicant is comfortable with the principle of a passive Tilbury Link Road Requirement and therefore the benefits of agreeing this with the other interested parties is less. Accordingly the Council’s wording is to be preferred in relation to the Tilbury Link Road.
- 8.2.10 In order to provide comfort to the ExA that a mitigation scheme for Orsett Cock Junction could be implemented within the Order Limits, including other highway land (whether strategic or owned by the local highway authority), the Council is in the process of testing some initial, potential mitigation measures within VISSIM using v3.6T. The mitigation options tested and modelling results will be submitted at D7.
- 8.2.11 The reason for this exercise and the reliance placed in it is explained above. It is not proposed to act as the definite mitigation scheme, but is purely to examine whether a solution is possible without third party land being required and that the draft Requirement for Orsett Cock Junction put forward by the Council, PoTLL, DPWLG and TEP would meet the tests for Requirements set out in paragraph 4.9 of the NPSNN.
- 8.2.12 PoTLL has undertaken a similar exercise for Asda Roundabout and submitted a potential mitigation scheme to the Examination at Deadline 6 ([REP6-163](#)) that demonstrated that mitigation is possible within the highway boundary.
- 8.2.13 **Summary: the Council has worked closely with PoTLL, DPWLG and TEP to jointly prepare an agreed set of three draft Requirements; and the Council will submit separately new draft Requirements for both ‘Air Quality Monitoring and Mitigation’ and for the ‘Tilbury Link Road Junction readiness and compatibility’.**

Appendix A 2045 LTAM and VISSIM v3.6 Comparison

Lower Thames Crossing

Thurrock Council Submission at Deadline 6A (D6A)

Appendix A: 2045 LTAM and VISSIM 3.6 Comparison

14 November 2023

Thurrock Council

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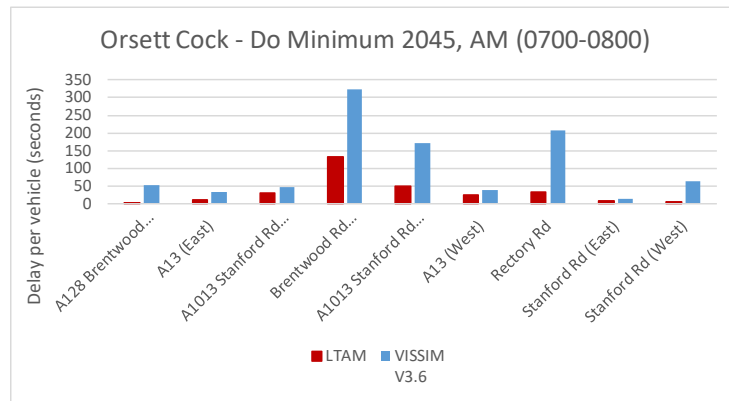
Thurrock Council Comments on Traffic Modelling (D6A) – Appendix A: 2045 LTAM and VISSIM 3.6 Comparison
Lower Thames Crossing

Table A.1: Comparison of LTAM and VISSIM V3.6 – 2045 AM Peak Hour (0700-0800) – Delay per Vehicle (seconds)

DO MINIMUM

2045, AM (0700-0800)

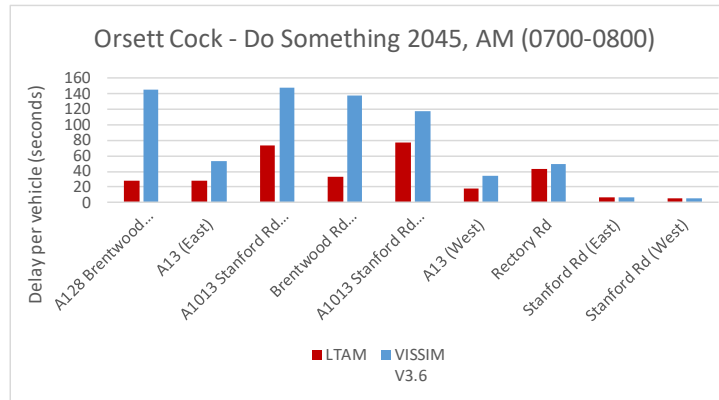
Junction	Approach	LTAM	VISSIM V3.6	VSSIM 3.6 as % of LTAM
Orsett Cock	A128 Brentwood Rd (North)	4	52	1061%
	A13 (East)	13	33	163%
	A1013 Stanford Rd (East)	32	47	48%
	Brentwood Rd (South)	133	323	144%
	A1013 Stanford Rd (West)	49	173	251%
	A13 (West)	26	39	53%
A1013 Stanford Road / Rectory Road	Rectory Rd	33	207	519%
	Stanford Rd (East)	8	16	96%
	Stanford Rd (West)	7	63	812%



DO SOMETHING

2045, AM (0700-0800)

Junction	Approach	LTAM	VISSIM V3.6	VSSIM 3.6 as % of LTAM
Orsett Cock	A128 Brentwood Rd (North)	28	145	414%
	A13 (East)	28	53	91%
	A1013 Stanford Rd (East)	73	148	103%
	Brentwood Rd (South)	33	137	313%
	A1013 Stanford Rd (West)	77	118	52%
	A13 (West)	18	35	95%
A1013 Stanford Road / Rectory Road	Rectory Rd	43	49	13%
	Stanford Rd (East)	7	7	0%
	Stanford Rd (West)	6	5	-9%



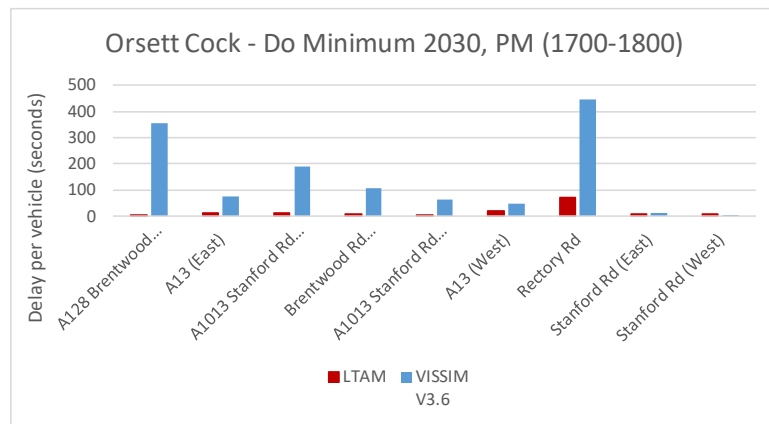
Thurrock Council Comments on Traffic Modelling (D6a) – Appendix A: 2045 LTAM and VISSIM 3.6 Comparison
Lower Thames Crossing

Table A.2: Comparison of LTAM and VISSIM V3.6 – 2045 PM Peak Hour (1700-1800) – Delay per Vehicle (seconds)

DO MINIMUM

2045, PM (1700-1800)

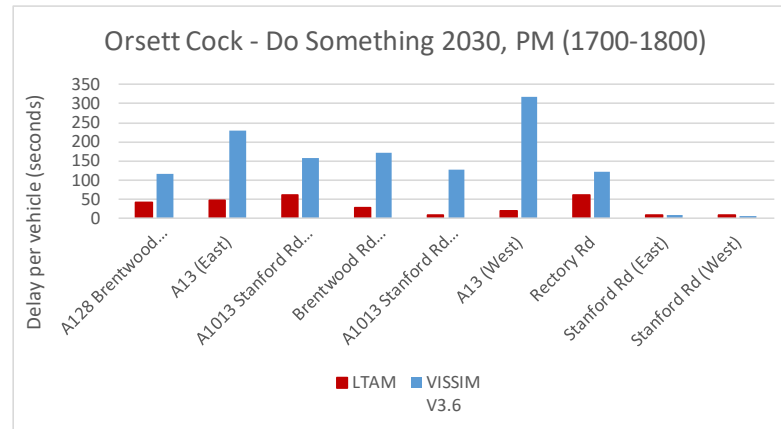
Junction	Approach	LTAM	VISSIM V3.6	VSSIM 3.6 as % of LTAM
Orsett Cock	A128 Brentwood Rd (North)	6	356	6201%
	A13 (East)	13	78	500%
	A1013 Stanford Rd (East)	11	192	1572%
	Brentwood Rd (South)	8	107	1210%
	A1013 Stanford Rd (West)	7	63	840%
	A13 (West)	22	47	111%
A1013 Stanford Road / Rectory Road	Rectory Rd	74	445	500%
	Stanford Rd (East)	9	12	27%
	Stanford Rd (West)	9	7	-20%



DO SOMETHING

2045, PM (1700-1800)

Junction	Approach	LTAM	VISSIM V3.6	VSSIM 3.6 as % of LTAM
Orsett Cock	A128 Brentwood Rd (North)	41	117	184%
	A13 (East)	47	230	394%
	A1013 Stanford Rd (East)	63	159	153%
	Brentwood Rd (South)	27	171	527%
	A1013 Stanford Rd (West)	9	127	1285%
	A13 (West)	21	318	1397%
A1013 Stanford Road / Rectory Road	Rectory Rd	62	121	96%
	Stanford Rd (East)	9	10	14%
	Stanford Rd (West)	9	6	-32%



Appendix B D6A Orsett Cock VISSIM Model Review Log

Lower Thames Crossing

Thurrock Council Submission at Deadline 6A (D6A)

Appendix B: D6A Orsett Cock VISSIM Model Review Log

14 November 2023

B.1 Introduction

- B.1.1. Through earlier engagement with National Highways, the Council signed off the Base Year Orsett Cock microsimulation model. Following that the Council was issued with provisional forecast models in September 2022 (version 1.5) – Do Minimum without LTC and Do Something representing the interchange between LTC / A1089 / A13 and the Orsett Cock interchange.
- B.1.2. The Council audited the models and identified several critical errors, which were presented at Deadline 3 Submission - Comments on Applicant's submissions at D1 and D2, Appendix E, Annex 5 ([REP3-207](#)).
- B.1.3. The applicant responded to the Council's comments in the Deadline 5 Submission - Joint Position Statement: Orsett Cock junction ([REP5-084](#)).
- B.1.4. The applicant released VISSIM version 3.6 before Deadline 6.
- B.1.5. Section 2 of this technical note provides an update on the critical issues identified by the Council and whether the applicant addressed them in VISSIM version 3.6.
- B.1.6. Section 3 identifies further critical issues, which the Council identified by reviewing the latest version of the microsimulation model, VISSIM version 3.6.
- B.1.7. The issues presented have been assigned a Red/Amber/Green (RAG) status as defined in **Table B1.1**.

Table B1.1: RAG Review Categorisation

RAG Category	Description
Comments	Findings noted as part of the model audit process that may require consideration and amendment however not deemed to have a material impact on the overall operation or outputs derived from the model.
Recommendations /Additional Information required	These observations constitute of suggested recommendations as part of the model audit process and request for supporting evidence made by the reviewer to provide assurance that best modelling practice has been adhered to and therefore the modelling outputs are reliable.
Critical Issues	Issues in the model that require corrective action as these are deemed to have an impact on the operation of the model and associated outputs.

B.2 Update on the Council's comments provided at Deadline 3, Appendix E, Annex 5 ([REP3-207](#))

- B.2.1 This section provides an update on the issues identified by the Council and commentary on whether these issues were addressed by the applicant in VISSIM version 3.6. The note states that the applicant has addressed many of the comments raised by the Council at Deadline 3. However, there are still critical issues that remain outstanding as presented in **Table B2.1**.

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Table B2.1: Update on the Council's comments provided at Deadline 3, Appendix E, Annex 5 (REP3-207)

No.	Scenario(s)	Area of Concern	Description	Impacted network objects	Visual Aid Reference	Original RAG	NH Response provided at Deadline 5 Submission - 9.113 Joint Position Statement: (REP3-207)	Thurrock Council Response	Updated RAG
1	DM and DS	Orsett Cock junction edge closures	It is good practice to keep only one edge through the junction for every movement. In the model received over 120 edges were open, creating competing routes through the junction. This increases convergence times and creates unrealistic movements. Number of open edges reduced to 36 in the DM and 37 in the DS scenarios.	Node 1 edges		Red	Already included in NH version 2., and will be included in version 3	NH's resolution is accepted	Green
2	DM and DS	A1013 EB approach	Flare length was reduced to more accurately reflect available road space.	Links 29, 74	Ref2	Red	We coded the flares following TfL's standard practice to extend the link to the flare as necessary to allow diverging at the correct location on the link, as vehicles do not change lane immediately when they enter a link representing a flare. These changes are small and not all of the flares reduce in length. Additionally, the model was originally built while the Orsett Cock junction was under construction. Now the works are complete the flare lengths can be adjusted if required to match the junction as built, if we are provided with an 'as-built' drawing., but these are small. Otherwise, version 3 will retain the same dimensions as version 1 & 2	NH's resolution is accepted. It should be noted that NH has already been provided with the 'for construction' drawings of the Orsett Cock improvement scheme that was recently implemented. Thurrock Council has requested the 'as built' drawings', which will be provided when available.	Green
3	DM	Lane use in the circulatory carriageway	Lane allocation was updated on the main circulatory carriageway between the A13 eastbound off-slip and Brentwood Rd arm to reflect constructed lane allocation.		Ref3	Amber	At the time of model development, no as-built drawings were available. We agree to change this lane allocation in version 3 with southbound traffic to Brentwood Rd (S) using the left (nearside) lane, if we are provided with an 'as-built' drawing	NH has already been provided with the 'for construction' drawings. The as-built lane allocation for the southbound circulatory can also clearly be seen on aerial mapping. The Council has re-provided the 'for construction' drawings and has requested the 'as built' drawings', which will be provided when available. the Council accepts NH proposed resolution of this issue.	Green

Thurrock Council Comments on Traffic Modelling (D6A) – Appendix B: D6A Orsett Cock VISSIM Model Review Log
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4	DM and DS	Change in link behaviour	Link behaviour for the Orsett Cock junction main circulatory carriageway updated from 'Urban (merge)' behaviour to 'Urban (motorised).	OC circulatory links		Red	<p>The Urban (merge) behaviour was applied to allow smoother and more co-operative lane change behaviour between vehicles on the circulatory, and to avoid vehicles waiting for unrealistically long times to change lane.</p> <p>NH do not agree to changing the link behaviour.</p>	<p>Changing link behaviour to 'merging' is not accepted to be good practice in the circulatory, and it should only be used where traffic is temporarily expected to accept reduced safety standards, e.g. when joining the motorway from a slip road. This is a temporary behaviour and should not be used as a standard way of practice to increase the throughput of the roundabout. 'Advanced merging' or 'cooperative lane change' could be considered, which are parameters on the Lane Change tab of the driving behaviour. Proposed resolution is not accepted.</p>	Red
5	DS	Changes to merge locations	Changes to merge locations between the new LTC network and the A13 or the A13 and the LTC		Ref4	Red	<p>This is a difference in VISSIM coding style. The coding currently allows a merging behaviour for vehicles to merge in turn which is judged to be representative of driver behaviour in this area. NH do not agree with this change.</p>	<p>Thurrock Council considers that the applied VISSIM coding may underestimate throughput at the merges and may highlight issues with the model which would not happen when built. Despite differences from the recommended approach, National Highways' resolution is accepted.</p>	Green
6	DS	Changes to diverge locations	Changes to entry diverge locations within the model		Ref4	Red	<p>The slight difference in diverge locations is due to the coding style referred to above. NH do not agree with this change.</p>	<p>Thurrock Council considers that the applied VISSIM coding may underestimate throughput at the merges and may highlight issues with the model which would not happen when built. Despite differences from the recommended approach, National Highways' resolution is accepted.</p>	Green
7	DS	Reduced speed areas updated	Reduced speed areas updated on slip roads		Ref4	Red	<p>The speeds on two slip roads were amended in version 2 of the model - the speed from LTC S (NB) to A123 EB (Orsett Cock) was changed from 40mph to 30mph and the speed from A1089 to LTC S from 70mph to 50mph, with Desired Speed Decision (DSD)</p> <p>NH do not agree with Thurrock that the slip road from the A1089 to LTC (S) should be 30mph as the advisory speed limit is 50mph.</p>	<p>National Highways' resolution is accepted.</p>	Green

Thurrock Council Comments on Traffic Modelling (D6A) – Appendix B: D6A Orsett Cock VISSIM Model Review Log Lower Thames Crossing

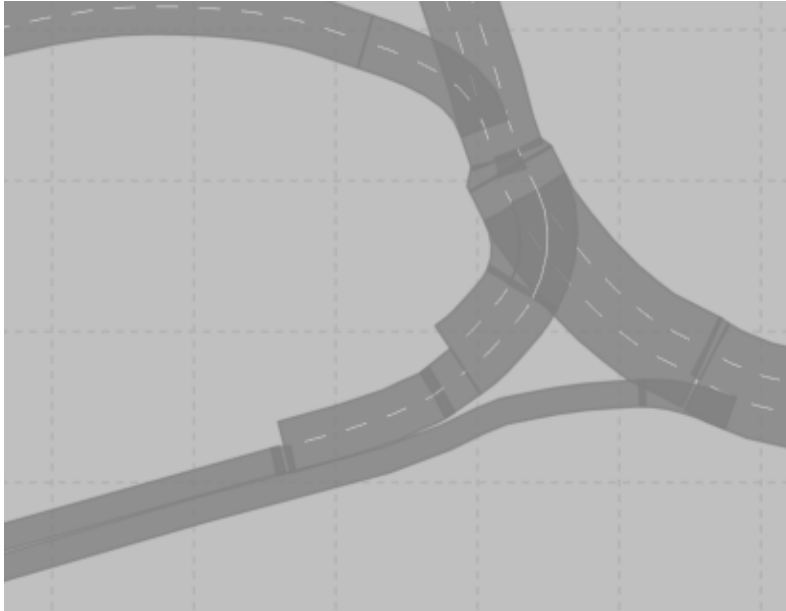
8	DS	Signal control updated	VISVAP has been included at Orsett Cock gyratory to better replicate signal control at Orsett dependent on traffic demand		Ref4	Amber	NH do not agree with this. Fixed signal timings maintain signal coordination of the stop lines on the circulatory.	National Highways' comment on the application of signal timings contradicts the practice followed by National Highways on the released Version 2 models. While the 2030 DM and DS models are using fixed time, the 2045 DM and DS models use VISVAP. National Highways is required to explain this approach.	Amber
9	DS	Link resolution and accuracy	Links are adjusted to follow road design more accurately - across the whole model			Green	These are very minor discrepancies which would have no impact on the performance of the junction in the model. NH can change in version 3 of the model if necessary following receipt of the as-built drawings.	National Highways' resolution is accepted.	Green
10	DS	A13 EB approach extended	A13 EB approach extended by approx 700 metres to ensure that traffic has sufficient distance to prepare for upcoming diverge		Ref10	Red	Agreed - tis addresses the latent demand issue as the entire length of any queue would appear in the model. The entry links at Rectory Road and the A128 N approach will also be extended for the same reason in version 3.	National Highways' resolution is accepted. In order to determine if the latent demand issue has been sufficiently resolved by v3 of the forecast model, the applicant is required to include latent demand and delay results within the model outputs submitted to the Examination.	Green
11	DS	A13 WB - LTC NB merge coding updated	A13 WB - LTC NB merge coding updated to provide more realistic merging behaviour	Node 132		Red	This is a difference in VISSIM coding style. The coding currently allows a merging behaviour for vehicles to merge in turn which is judged to be representative of driver behaviour in this area. NH do not agree with this change.	applied VISSIM coding may underestimate throughput at the merges and may highlight issues with the model which would not happen when built. Despite differences from the recommended approach, National Highways' resolution is accepted.	Green
12	DM and DS	Reduced speed areas for Orsett Cock junction	RSA length updated to avoid them running through connector start or end points. This is a lesser known but critical error in VISSIM where vehicles do not pick up (or drop off) the reduced speed in the bend	All reduced speed areas in the OC junction		Red	This occurs at the A128 N, A1013 E and A128 S entries to the roundabout, with minor impacts. Agree to update RSA lengths in version 3.	National Highways' resolution is accepted.	Green
13	DS	Node 119 adjusted	Node did not include diverge point			Red	Agree to add diverge to node 119 in version 3.	National Highways' resolution is accepted.	Green
14	DS	Nodes added to diverge points	While it is not strictly required, nodes were added to 9 diverge point in the network for a more robust node/edge definition			Green	Agree to add nodes to 9 diverge points in version 3.	National Highways' resolution is accepted.	Green
15	DS	Vehicle route closure	Vehicle route closure is added to prevent vehicles to use the A13 WB offslip - Orsett Cock - A12 EB onslip route		Ref15	Red	Already included in NH version 2 and will be included in version 3.	National Highways' resolution is accepted.	Green

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16	DS	Pegasus crossing	A pegasus crossing is part of the design on A1013 w/o Rectory Road, which is not included in the design.		Amber	(included in v3)	National Highways' resolution is accepted.	Green
<p>As set out in Thurrock Council's LIR [REP1-281] and reiterated at ISH3 [REP4-352] there is a discrepancy between the VISSIM forecast model and weaving length on the eastbound approach to the Orsett Cock junction requires vehicles leaving LTC to merge with traffic on the A13 eastbound off-slip over just 90m. The forecast VISSIM model shows significant congestion at this location and in order to resolve this the applicant extended the weave length from 90m to circa 200m within the model, which is still not sufficient to accommodate the coming off LTC and queuing. However, the design of the junction has not been updated to reflect the need for a much longer weave length.</p>								
17	DS	Extended weave length for traffic coming off LTC and weaving with A12 EB off slip			Red	The Applicant has set out its position on the detailed design process. In recognition of the concern expressed by Thurrock Council, the Applicant has set out a proposed Requirement in relation to the operation of Orsett Cock junction, which is discussed in 9.114 Wider Network Impacts Update. The Applicant considers that the VISSIM model design is appropriate.	The Council considers that the general arrangement drawings submitted with the DCO application need to be updated to reflect the extended weave length shown to be required by the VISSIM forecast modelling. The updated general arrangement drawings need to be submitted by the applicant as part of the Examination. The weave length would need to be extended by more than 100m, which is not insignificant and could have consequential effect on the other aspects of the junction design. This issue should not be left to the detailed design stage to be resolved. The Council does not accept National Highways' position.	Red

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 Lower Thames Crossing

Ref 2

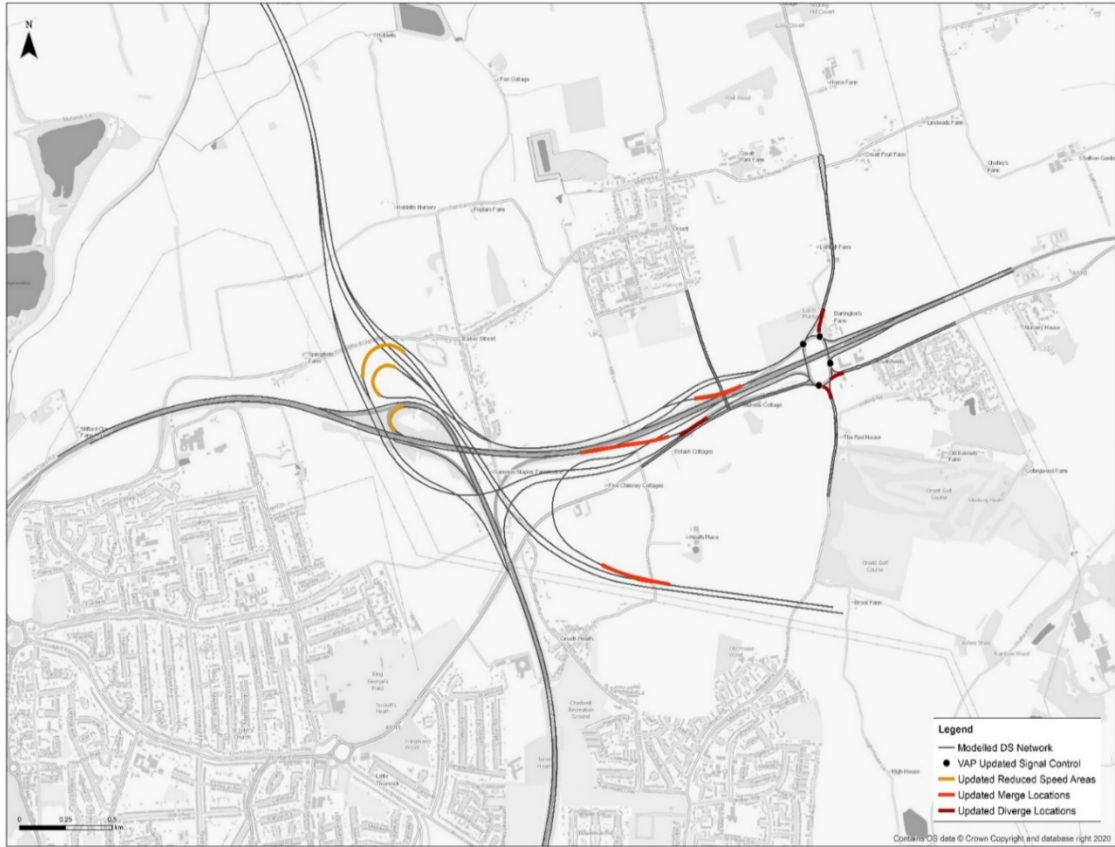


Ref 3

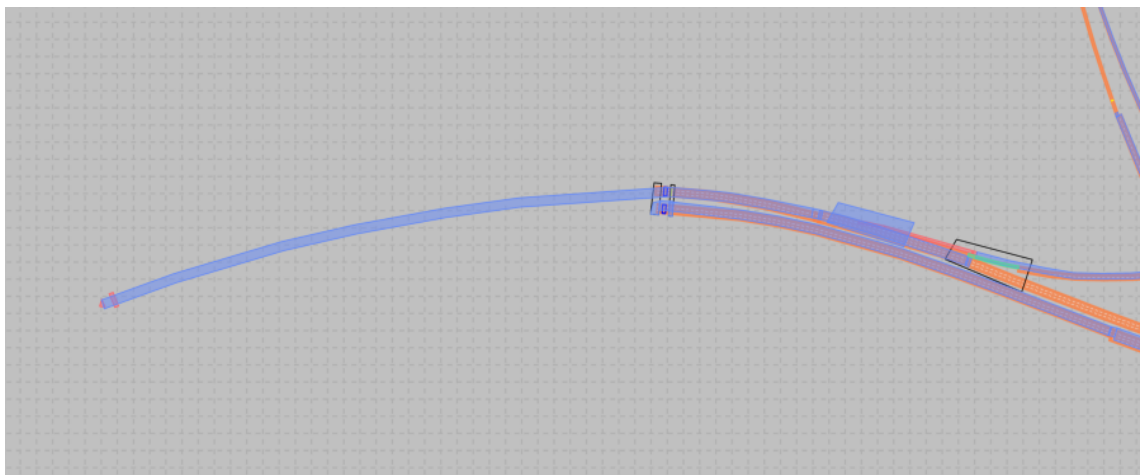
	Offside lane to:	Middle lane to:	Nearside lane to:
2030 DM original	A13(W) A128	Brentwood Rd A1013 (W)	A1013 (E)
2030 DM amended	A13(W) A128	A1013 (W)	Brentwood Rd A1013 (E)

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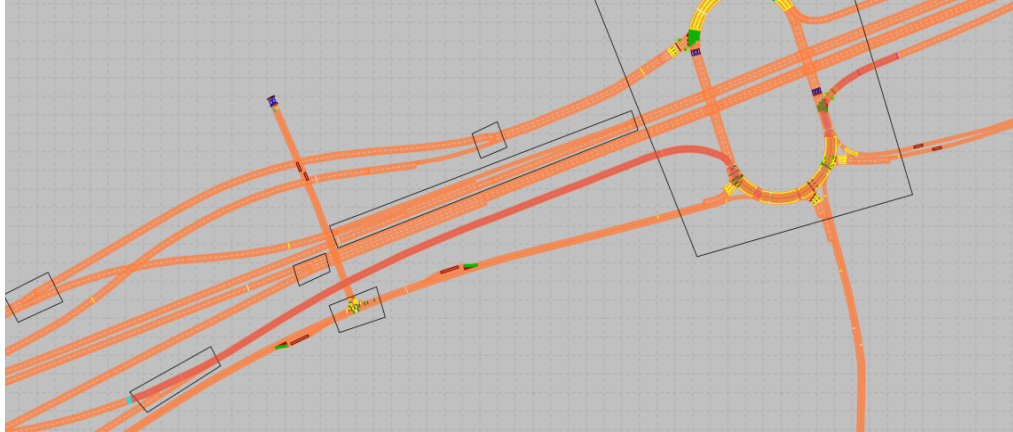
Ref 4



Ref 10



Ref 15



B.3 Additional Issues Identified through the review of VISSIM version 3.6

B.3.1 The Council's review of VISSIM 3.6 has identified further critical issues with the model. These are presented in the RAG table below and need to be addressed.

Thurrock Council Comments on Traffic Modelling (D6A) – Appendix B: D6A Orsett Cock VISSIM Model Review Log
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Table B3.1: Additional issues identified through the review of VISSIM version 3.6

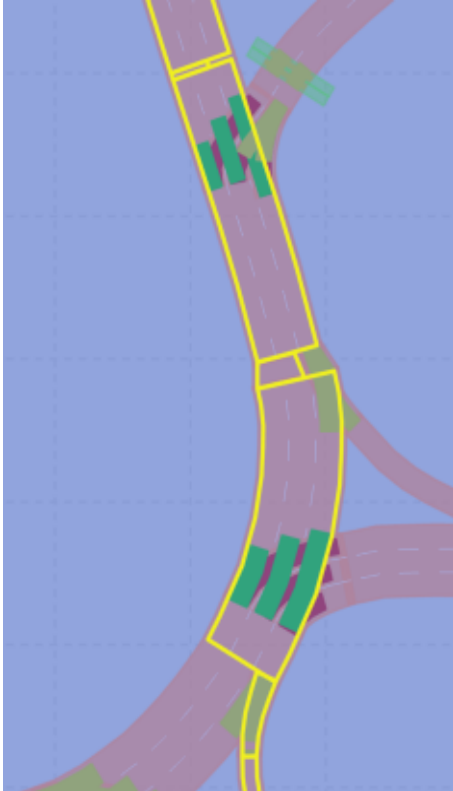
No.	Scenario(s)	Area of Concern	Description	Impacted network objects	Visual Aid Reference	RAG
18	DS	Edges	<p>It is noted that National Highways updated the edges for the DS models to allow the traffic toward Brentwood Rd S to use the middle lane.</p> <p>The opened edge now lets traffic to use the middle and offside lane in the southbound circulatory, which is unrealistic and unsafe. When the junction operates safely for all road users, it is not expected that traffic would cut through across two lanes on 100 metres to leave the junction towards Brentwood Road S.</p>		see Ref18	Red
19	DM vs DS	Driving behaviour	<p>Look ahead distance changed from 50m to 100m for the Urban (merge) driving behaviour, which makes drivers to behave more agile.</p> <p>This change is not in line with best practices, not expected and not accepted.</p>			Red
20	DM vs DS	Lane change distances	<p>Lane change distance has been reduced for three connectors between the DM and DS model. This change makes driving behaviour more aggressive in the junction.</p> <p>Lane change distance changes: A13 EB onslip (10008) from 150 to 60m A1013 EB exit (10032) from 150 to 100m Brentwood Rd S (10080) from 150m to 100m</p> <p>This change is not in line with modelling best practice, not expected and not accepted.</p>			Red
21	DM vs DS	Conflict areas	<p>The default minimum time for minor flow to enter in front of vehicles of the major flow (MinGapBlockDef) has been changed between the DM to DS models from 3.0 seconds to 0.5 seconds. This makes the minor flow to enter the junction much more aggressively.</p> <p>The use of different parameters skews the evaluation and comparison of the scenarios, and not following good modelling practices. It is not accepted.</p>			Red

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22	DM AM vs DM PM Priority rules		<p>Parameters between the DM AM and DM PM models has been changed for a number of priority rules, making the PM model more conservative. As these priority rules are removed for the DS model because of the signalisation of the junction, it makes the DM PM model much worse, and masks the delay differences between the DM and DS models.</p> <p>The parameters for the priority rules should be the same for the DM models as for the Base Year model, and should not be different between the AM and PM models. This change is not accepted.</p>	Red
23	DS	Pegasus crossing	<p>As requested by Thurrock Council, National Highways included a design of the pedestrian crossing in the DS models. Due to a software error in VISSIM 2020 version, the parametering of signal control behaviour not just reducing the safety distance of the vehicles around the signal stopline, but also reduces the gap acceptance times at priority rules, making vehicles to accept much lower gaps in traffic. This behaviour is unrealistically overestimating the capacity of Rectory Road priority junction.</p> <p>We suggest the application of a modified driving behaviour at the vicinity of the pegasus crossing, where the 'Reduced safety distance close to stop line' parameters are updated to have neutral impact on nearby priority markers.</p>	Red
24	DM and DS	Maximum queue reporting	<p>The mean maximum queues reported for the DM and DS scenarios are calculated incorrectly in NH results, and for many approaches underreported by 50%. Reported results should not be dependent on the length of the evaluation period. Instead of:</p> <ul style="list-style-type: none"> -taking the maximum queue for 5 minute evaluation intervals, -taking the average of 5 minute intervals across the hour, -taking the average of 20 model runs, <p>the correct method is:</p> <ul style="list-style-type: none"> -taking the maximum queue for 5 minute evaluation intervals, -taking the maximum of 5 minute intervals across the hour -taking the average of 20 model runs. 	Red

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Appendix C Review of VISSIM Parameters into LTAM Test

Lower Thames Crossing

Thurrock Council Submission at Deadline 6A (D6A)

Appendix C: Review of VISSIM Parameters into LTAM Test

14 November 2023

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C.1. Background

- C.1.1 On 31 October 2023 the applicant issued a technical note (also submitted at D6 ([REP6-056](#))), which responded to Action Point 8 from the Joint Position Paper on Orsett Cock ([REP5-084](#)). The action was for the 'Applicant to incorporate signal timings and junction arm delays into the LTAM, and provide model outputs showing changes to flows, delays and V/C (Volume over Capacity) on the local road network and strategic road network for the entire LTAM area.'
- C.1.2 The action was identified in response to the Council's concern about a significant level of discrepancy between LTAM and VISSIM results at Orsett Cock and other locations on the LRN (Local Road Network). The Council set out its detailed response on model iteration within their Post-event submissions, including written submission of oral comments made at the hearings held during week commencing 4 and 11 Sept 2023 ([REP4-352](#)) (Appendix A of ISH4 written submission). This summarised the industry best practice for model iteration to ensure a reasonable level of consistency across different modelling software platforms. The industry best practice for model iteration set out by Thurrock Council is a matter that specialist transport consultants representing Thurrock Council, Essex County Council, and the two national ports (PoTLL and DPWLG) are all in agreement on.
- C.1.3 There is not sufficient time within the Examination for the applicant to undertake the industry best practice approach to model iteration. Therefore, it was agreed at the Orsett Cock Joint Workshop for the applicant to undertake the steps set out in the Joint Position Paper on Orsett Cock, paragraph 3.5 ([REP5-084](#)). Whilst it is not industry best practice, the Council considers that the proposed steps provide a simplistic way of reflecting the delays forecast in VISSIM at Orsett Cock within LTAM in the short timescales available.
- C.1.4 The Council has reviewed the technical note issued by the applicant in response to Action Point 8 from the Joint Position Paper on Orsett Cock ([REP5-084](#)) and this note provides a summary of the Council's findings.

C.2. Summary of the Council's Review

- C.2.1 The applicant has reported on three tests:
- a. Test 1 - taking the signal timings from the VISSIM model into the LTAM
 - b. Test 2 - taking the saturation flows from the VISSIM model into the LTAM
 - c. Test 3 - taking the forecast delays from the VISSIM model into the LTAM
- C.2.2 Test 2 is additional to the two tests (Test 1 and Test 3) agreed in the Action Point 8 from the Joint Position Paper on Orsett Cock ([REP5-084](#)).
- C.2.3 The tests have been completed for 2030 and 2045, AM peak (0700-0800) and PM peak (1700-1800). All the tests have been completed for the Do Something models only with LTC included (using LTAM CS72 run, as used in the DCO application).
- C.2.4 The applicant's technical note has provided:
- a. Comparison of base year and forecast LTAM and VISSIM flows on the entry and exit links to/from Orsett Cock junction.
 - b. Inputs to LTAM at each entry arm of the Orsett Cock junction. This has included VISSIM green and inter green time at the signals (an input into Test 1), saturation flows (an input into Test 2) and delay penalties, which represent delays forecast by VISSIM (an input into Test 3).
 - c. Outputs from LTAM for each test. This has included travel time in seconds, delay time in seconds, the average queue in PCUs and the length of the queue in metres. It is the Council's view that SATURN software package used to develop LTAM is not accurate in representing queue lengths at junctions and therefore this parameter has been excluded by the Council from further consideration.

Comparison of LTAM and VISSIM flows on the entry and exit links to/from Orsett Cock junction

- C.2.5 Table 1 of the applicant's technical note presents a comparison of the modelled base year 2016 LTAM and VISSIM flows on entries to Orsett Cock junction, whereas Table 2 has presented a comparison of the flows on exits from Orsett Cock junction.
- C.2.6 The Council has completed further analysis using the data presented within the applicant's Tables 1 and 2 and this is presented in **Table C2.1** and **Table C2.2** below.
- C.2.7 Though the total Orsett Cock junction throughput is very similar between the two model types, there are significant differences in flows on individual entries and exits. This is particularly prominent on the Brentwood Road (South) approach with the flow differences varying between 17% and 83%. This reiterates the need for the microsimulation modelling requested by the Council to provide more reliable evidence for local junction assessment. Unlike the strategic LTAM, which provides an aggregated representation of traffic flow, the locally validated microsimulation model represents individual vehicles, attempts to replicate the behaviour of individual drivers and therefore has a greater 'realism'. This makes the microsimulation models particularly appropriate for examining complex traffic interactions and potential operational problems at local junctions.

Thurrock Council Comments on Traffic Modelling (D6A) – Appendix C: Review of VISSIM Parameters into LTAM Test
Lower Thames Crossing

C.2.8 The Council also notes that the 0800-0900 total VISSIM flow on entries (**Table C2.1**) does not match the total flow on exits (**Table C2.2**). This is likely to be an error in reporting and should be corrected.

Table C2.1: (Table 1) LTAM and VISSIM flows on entries to Orsett Cock junction, 2016

Link name	07.00 - 08.00			08.00 - 09.00	17.00 - 18.00		
	LTAM	VISSIM	VISSIM vs LTAM	VISSIM	LTAM	VISSIM	VISSIM vs LTAM
A128 Brentwood Rd (North)	659	641	-3%	696	809	869	7%
A13 (East)	667	693	4%	783	509	444	-13%
A1013 Stanford Rd (East)	823	672	-18%	613	513	492	-4%
Brentwood Rd (South)	422	630	49%	607	272	408	50%
A1013 Stanford Rd (West)	604	618	2%	710	938	983	5%
A13 (West)	512	518	1%	494	928	872	-6%
Total	3687	3772	2%	3903	3969	4068	2%

Table C2.2: (Table 2) LTAM and VISSIM flows on exits from Orsett Cock junction, 2016

Link name	07.00 - 08.00			08.00 - 09.00	17.00 - 18.00		
	LTAM	VISSIM	VISSIM vs LTAM	VISSIM	LTAM	VISSIM	VISSIM vs LTAM
A128 Brentwood Rd (North)	1004	1067	6%	863	783	898	15%
A13 (East)	560	605	8%	673	650	668	3%
A1013 Stanford Rd (East)	377	312	-17%	386	861	865	0%
Brentwood Rd (South)	160	293	83%	310	470	551	17%
A1013 Stanford Rd (West)	840	867	3%	1127	668	683	2%
A13 (West)	743	628	-15%	544	537	403	-25%
Total	3684	3772	2%	3040	3969	4068	2%

C.2.9 Table 3 and Table 5 of the applicant's technical note present a 2030 matrix comparison for the AM and PM peaks, whereas Table 4 and Table 6 have presented a 2045 matrix comparison. The approach to VISSIM forecast matrix development is reasonable. The VISSIM matrix totals are 0-5% higher than the LTAM matrix totals. This is reasonable given the difference between the VISSIM and LTAM flows in the base year models.

Test 1 and Test 2 Results

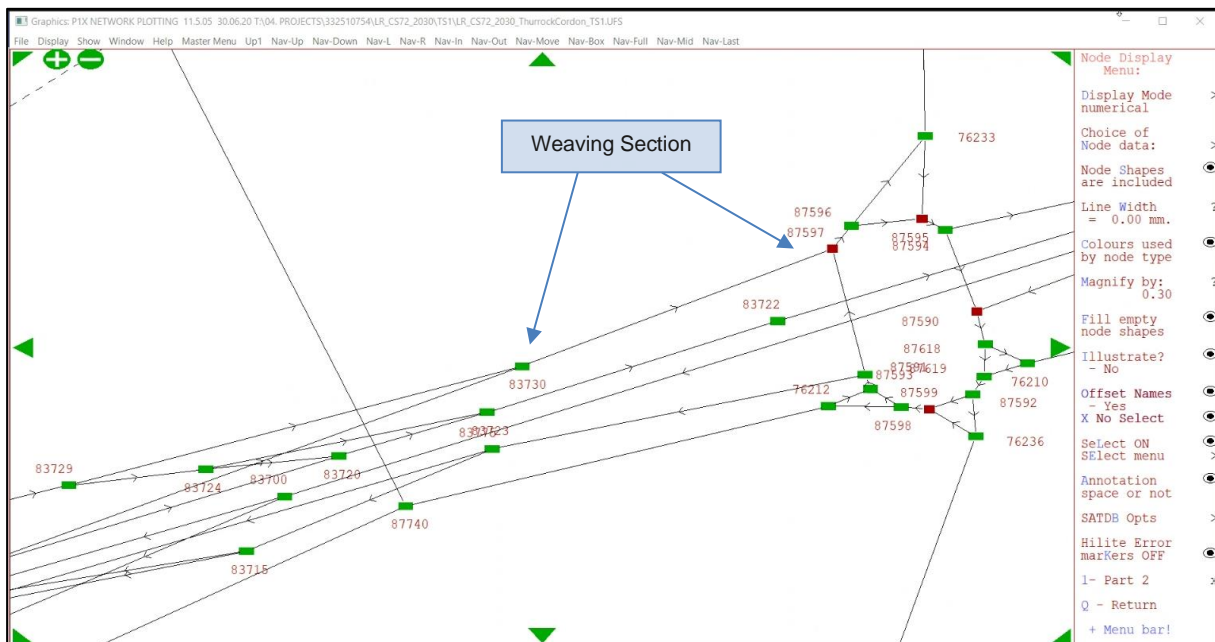
- C.2.10 Test 1 and Test 2 have aimed to take network parameters from VISSIM (signal timings and saturation flows) and incorporate them into the LTAM.
- C.2.11 In each test, once the LTAM input network parameters were updated, either by adjusting the signal timings or saturation flows, the LTAM was re-run through the variable demand model. This modelled the full range of drivers' behavioural response to the changes at the Orsett Cock junction, including the re-routing and redistribution of trips.
- C.2.12 A much better approach would be to combine all changes to network parameters in a single test to estimate the combined effect of the changes on the network performance. It is not the approach that has been taken by the applicant.
- C.2.13 The Council would like to point out that in none of the tests does the LTAM coding of the weaving section on the A13 West approach to the junction reflect the capacity constraint identified by VISSIM. In VISSIM this section has resulted in significant queueing and delays as traffic merging from the A13 off-slip weaves with the traffic merging from the LTC over a very

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short section, which is not sufficient for the level of weaving traffic. The location of the weaving section of the highway network is presented in **Figure C2.1**, and it is the section between node 83730 and node 87597.

C.2.14 In LTAM, this section has a distance of 334 metres, which is longer than the distance assumed in the LTC drawings (90m) or in VISSIM (220m). The use of a distance of 334m further adds to the additional capacity at the junction and potentially results in an underestimation of queues and delays.

Figure C2.1: A13 off slip and LTC weaving section



**red labels are node numbers in LTAM*

C.2.15 Notwithstanding the Council's concerns on the LTAM network coding, the Council has reviewed Test 1 and Test 2 results and has concluded that these show relatively small changes to LTAM network performance at Orsett Cock junction if the VISSIM signal timings or VISSIM saturation flows are used in the LTAM.

C.2.16 This finding is consistent with the applicant's conclusion. The results show that manipulating network parameters has failed to replicate the level of delays forecast by VISSIM, which is considered to be a more reliable tool for local junction assessment.

C.2.17 Therefore, replicating VISSIM network delays within LTAM by using delay penalties (Test 3) will provide a more reliable assessment. The Council's review of Test 3 results is presented in the following section.

Test 3 Results

C.2.18 Test 3 has aimed to align the strategic and the microsimulation models by replicating VISSIM delays in LTAM. This has been completed by introducing delay penalties on the Orsett Cock junction approaches in LTAM. The Council has reviewed the delay penalty values that were applied in Test 3 and can confirm that these are representative of the additional level of delays forecast by VISSIM.

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C.2.19 The LTAM delays (CS72 run with LTC, as used in the DCO application), VISSIM 3.6 delays and their comparison for each Orsett Cock junction approach are shown in **Table C2.3**. The comparison shows a significant level of variation in delays between the two models with VISSIM delays being significantly higher than LTAM values on all approaches to the junction.

Table C2.3: Comparison of LTAM and VISSIM delays

Arm	2030 AM (0700-0800)			2030 PM (1700-1800)			2045 AM (0700-0800)			2045 PM (1700-1800)		
	LTAM SC72	VISSIM 3.6	Diff. %	LTAM SC72	VISSIM 3.6	Diff. %	LTAM SC72	VISSIM 3.6	Diff. %	LTAM SC72	VISSIM 3.6	Diff. %
A128 N	26	80	208%	34	74	118%	28	145	418%	40	117	193%
A13 E	25	51	104%	37	331	795%	28	53	89%	48	229	377%
A1013 E	21	61	190%	20	112	460%	79	148	87%	62	158	155%
A128 S	29	100	245%	25	91	264%	33	137	315%	27	171	533%
A1013 W	21	79	276%	7	97	1286%	71	118	66%	9	127	1311%
A13 W	14	29	107%	16	137	756%	17	35	106%	21	318	1414%

C.2.20 The introduction of VISSIM delays (which is a more accurate reflection of future network conditions) significantly impacts the findings of the LTAM CS72 run (with LTC), as used in the DCO application.

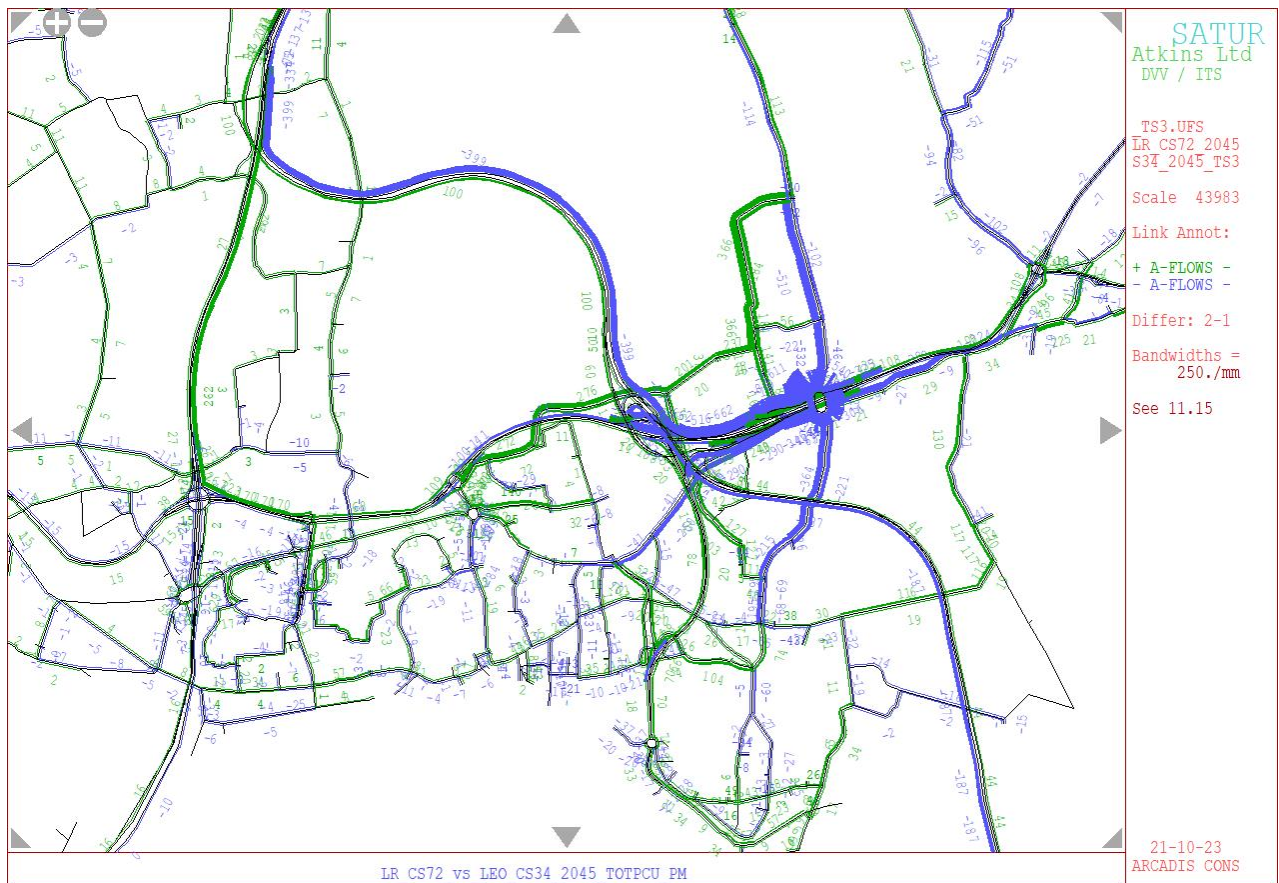
C.2.21 At Orsett Cock junction the total flow reduces both in 2030 and 2045, with the highest reduction of 42% observed in 2045 PM as summarised in **Table C2.4**. This means that as a result of increased delays, traffic from Orsett Cock is forecast to re-route to other local roads, which are often unsuitable for the level of traffic choosing to use them. An example is Conway's Road leading to Orsett Village from the north, which in Test 3 (2045 PM) is forecast to see an increase in a two-way flow of 550 PCU. 2045 PM flow changes have been presented in Figure 12 of the applicant's technical note and also reproduced in **Figure C2.2** of this document.

Table C2.4: Comparison of LTAM CS72 Scenario and Test 3 flows

Arm	2030 AM (0700-0800)			2030 PM (1700-1800)			2045 AM (0700-0800)			2045 PM (1700-1800)		
	LTAM SC72	Test 3	Diff. %	LTAM SC72	Test 3	Diff. %	LTAM SC72	Test 3	Diff. %	LTAM SC72	Test 3	Diff. %
A128 N	726	522	-28%	779	674	-13%	833	438	-47%	849	803	-5%
A13 E	779	739	-5%	698	152	-78%	705	666	-6%	629	323	-49%
A1013 E	790	744	-6%	534	436	-18%	760	849	12%	509	529	4%
A128 S	575	432	-25%	343	208	-39%	808	426	-47%	493	128	-74%
A1013 W	675	527	-22%	792	525	-34%	609	704	16%	738	453	-39%
A13 W	1,727	1,694	-2%	2,567	1,907	-26%	2,166	2,021	-7%	2,946	1,335	-55%
Total	5,272	4,658	-12%	5,713	3,902	-32%	5,881	5,104	-13%	6,164	3,571	-42%

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Figure C2.2: 2045 PM plots VISSIM delays hard coded into SATURN, Thurrock (Figure 12 in the applicant’s note)



C.2.22 The iteration between the LTAM and VISSIM should ideally continue until convergence between the two models is reached and a single set of modelling results is available to inform the cost/benefit analysis for the LTC scheme and the assessment of scheme impacts on the LRN. However, this is not feasible within the examination programme, and these initial results show that if the best practice for the assessment of LTC was followed, the assessment results and conclusions presented for the DCO examination are likely to be significantly different.

Appendix D Review of LTAM Rectory Road Sensitivity Tests

Lower Thames Crossing

Thurrock Council Submission at Deadline 6A (D6A)

Appendix D: Review of LTAM Rectory Road Sensitivity Tests

14 November 2023

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D.1 Background

- D.1.1. On 31 October 2023 the applicant issued a technical note, which responds to Action Points 9 and 10 from the Joint Position Paper on Orsett Cock ([REP5-084](#)). The actions were for the applicant to 'run a sensitivity test reallocating a proportion of Rectory Road traffic to A128 (i.e. limit to local traffic through Orsett) and understand implications on the Orsett Cock junction' by completing the following two tests:
- a. Test 1: Assume 2016 base traffic through Orsett village remains and all other traffic reallocated onto A128 – Action 9
 - b. Test 2: Rectory Road closed to all traffic except public transport and active travel – Action 10.
- D.1.2. The action was identified in response to the Council's concern relating to the use of Rectory Road by traffic seeking to avoid the Orsett Cock junction. The Council's recent experience during the A13 improvement works shows traffic re-routing through Orsett village, which required extensive traffic management at Orsett Cock. The Council continues to be concerned that the forecast delays at Orsett Cock junction will result in traffic reassigning through Orsett village and this is identified as an issue in the tests run by the applicant to input VISSIM parameters into LTAM (refer to Appendix D of this submission for the Council's review).
- D.1.3. The Rectory Road sensitivity tests effectively seek to reassign traffic back onto appropriate routes (i.e. from Rectory Road to A128 southbound) to determine the impact at Orsett Cock without additional reassignment of traffic.
- D.1.4. The Council has reviewed the technical note issued by the applicant in response to Action Points 9 and 10 from the Joint Position Paper on Orsett Cock ([REP5-084](#)) and this note provides a summary of the Council's findings.

D.2 Summary of the Council's Review

Introduction

D.2.1 The applicant has reported on the two tests:

- a. Test 1 - Re-assign a proportion of Rectory Road traffic to the A128 to match 2016 Base Year flow modelled on Rectory Road.
- b. Test 2 - Re-assign all of Rectory Road traffic to the A128 except public transport and active travel modes.

D.2.2 Both tests are based on the Orsett Cock version 3 VISSIM forecast model Core Scenario (run ID 3.6). The sensitivity tests have been completed reallocating different proportions of trips of VISSIM zone 1 (Rectory Road) to zone 7 (A128). Locations of zones 1 and 7 are shown in **Figure D2.1**. Signal timings have also been optimised. The remainder of the model network and other network parameters are the same as for VISSIM version 3.6.

D.2.3 The total trips in each test that have been re-allocated from zone 7 to zone 1 are reported in Table 2 and Table 10 of the applicant's technical note.

D.2.4 Tests have been completed for 2030 and 2045, Do Minimum and Do Something scenarios. Both AM peaks (i.e. 0700-0800 and 0800-0900) and PM peak (1700-1800) have been considered.



Figure D2.1: VISSIM model zones

Test Results – the Council's Comments

- D.2.5 The applicant's technical note summarises how the Orsett Cock junction is affected by different traffic scenarios. Table 3 to Table 8 of the applicant's technical note have presented the results of Test 1. The results indicate that the junction performance is slightly worse in many cases compared to the Core Scenario, which means that the junction is sensitive to even small changes in traffic flows.
- D.2.6 Table 11 to Table 16 of the applicant's technical note show the results of Test 2, which re-routes all the traffic from Rectory Road to the A128 (except trips by public transport and active travel modes), not just the additional forecast traffic.
- D.2.7 The results show that the junction performance is significantly worse in Test 2, as the junction has to handle more traffic than in Test 1.
- D.2.8 For example, in the 2030 PM scenario, Test 2 re-assigns 651 trips in the Do Minimum and 650 trips in the Do Something from Rectory Road to the A128. As expected, this reduces the delays on Rectory Road from 260 seconds to 30 seconds in the Do Minimum and from 81 seconds to 41 seconds in the Do Something.
- D.2.9 However, most of the other junction approaches have increased delays, especially in the Do Something with LTC included. For instance, the delays on the A128 Brentwood Road (North) approach on the 2030 PM peak increase from 109 seconds to 141 seconds in the Do Minimum and from 74 seconds to 427 seconds in the Do Something.

Appendix E Impact of VISSIM Delays on BCR

Lower Thames Crossing

Thurrock Council Submission at Deadline D6A (D6A)

Appendix E: Impact of VISSIM Delays on BCR

14 November 2023

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E.1 Impact of VISSIM Delays on BCR

E.1.1 The following analysis provides a high-level assessment of the impact of including the forecast VISSIM delays for the Orsett Cock junction in the economic appraisal of LTC. These delays are in addition to the delays forecast by LTAM.

E.2 Assessment of Vehicle Type

E.2.1 The first step is to estimate the split of traffic (i.e. car, LGV etc) at Orsett Cock junction. This has been undertaken by examining the split of traffic in the trip matrix used in LTAM and then applying values of time from the DfT's Transport Appraisal Guidance.

E.2.2 This calculation is show in **Table E2.1**.

Table E2.1: Vehicle type assessment at Orsett Cock Junction

User class	Movements in AM Time Period in 2045 [veh]	% Split	AM	PM	AM	PM
			Value of time per vehicle (£/hour/vehicle) 2010 prices and 2010 values		Weighted Value of time (£/hour/vehicle) 2010 prices and 2010 values	
Average Car	5,391,383	83%	£11.33	£10.88	£11.84	£11.46
Average LGV	1,051,706	16%	£14.29	£14.29		
OGV	57162	1%	£14.43	£14.43		

Note: 1. Movements take from Table 7.39 of 7.7 Combined Modelling and Appraisal Report Appx C (APP-522)

Note: 2. Values of Time taken from TAG data book v1.21 Table A1.3.5.

E.3 Vehicle Delays

E.3.1 Vehicle delays at the Orsett Cock junction have then been estimated for the AM and PM peaks based on the results of the VISSIM and LTAM models.

E.3.2 These delays are presented in **Table E3.1**.

Table E3.1: Vehicle delays at Orsett Cock Junction AM and PM peaks (VISSIM and LTAM models)

Peak Period	Vehicle Delay (Hours) – Do Something		
	VISSIM v3.6	LTAM	Difference [s] (VISSIM - LTAM)
2030 AM Peak (0700-0800)	88.3	34.7	53.6
2030 PM Peak (1700-1800)	207.1	37.7	169.4
2045 AM Peak (0700-0800)	138.2	58.1	80.1
2045 PM Peak (1700-1800)	353.2	56.5	296.7

E.4 Estimate of Cost of Delay per Year

- E.4.1. Based on these forecast additional delays a factor of two is applied to convert the hourly model results into the two hourly values which have been used by the applicant and to which the applicant's annualisation factors can be applied.
- E.4.2. The following annualisation factors used by the applicant in the LTAM model (Table A.6 and A.10 of Combined Modelling and Appraisal Report Appendix D (APP-526) has been applied: AM Peak 497; PM Peak 511.
- E.4.3. The resulting annual costs of delay are approximately £2.5m in 2030 rising to £4m in 2045.
- E.4.4. It should be noted that this estimate of delays excludes delays during the interpeak period (1000-1600), in evenings and at weekends. This means that the estimate of delay is an underestimate.

E.5 Cost of Delay over Appraisal Period

- E.5.1. The total cost of delay of c£6.5m per year is then considered to apply in each of the 60 years of the appraisal. Standard discounting is applied (3.5% for first 30 years, then 3.0% for rest of appraisal) and this leads to an overall estimate of the cost of delay having a present value of approximately £100m (2010 prices).

Appendix F D6A Modelling Status Flowchart

Lower Thames Crossing

Thurrock Council Submission at Deadline D6A (D6A)

Appendix F: D6A Modelling Status Flowchart

14 November 2023

Thurrock Council

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LTAM (Lower Thames Area Model) - Strategic Model

- Better suited to inform LTC business case, economic appraisal and strategic effects assessment
- Inadequate tool to inform and understand the operational impacts of LTC on local junctions
- Out-dated base data
- Poor local road validation
- Uses SRN peak period not LRN

Alternative LGV and HGV Growth Assumptions

- To align with LTC objectives and Wider Economic Impact Assessment

Forecast Growth scenarios

- Completed based on dated guidance and assumptions

Application of Common Analytical Scenarios Framework

- Required to confirm LTC benefits/disbenefits in the context of national uncertainties

Alternative scheme layout

- Required to test adequacy of alternatives

Incident Management scenarios

- Required to substantiate resilience objective

Key

- Completed and approved by the council
- Completed but not approved
- Not completed

Local Microsimulation or Junction Modelling

- To understand operational Impacts of LTC on local junctions and local communities
- Neither of the assessment results have been agreed between NH and Thurrock

Local Plan Growth Scenarios

- To ensure LTC does not preclude delivery of Thurrock's Local Plan

Impact arising from Thames Freeport

- To test LTC in the context of local uncertainty

Construction Impact Assessment

- To test LTC in the context of local uncertainty

Impact of Significant Events (e.g. Covid-19 pandemic)

- To confirm the assessment results are still valid

Application of the latest DfT's national travel growth forecasts using NTEM 8.0 (for car and public transport trips) and NRTP2022 (for LGV and HGV traffic)

- To confirm the assessment results are still valid

Asda Roundabout

- Base Year model has been completed and shared with the Council but not signed off
- Forecasts have been completed and shared with the Council but not signed off
- Forecast construction model has been completed and shared with the Council but not signed off
- Indicates capacity and safety concerns

Orsett Cock

- Base Year model is complete
- Forecasts have been completed and shared with Thurrock but not signed off
- Indicates significant capacity and safety concerns

Daneholes and Marshfoot junctions

- Base Year East-West VISSIM is complete, shared with the Council but not signed off
- Forecasts have been completed and now shared with Thurrock but not cannot be considered until the base year model is signed off
- The impact of LTC on Daneholes or Marshfoot are not understood

The Manorway

- Base year model has been produced by the Council and has been reviewed by NH but not agreed
- Forecast model has been produced but cannot be relied upon as it was not validated using base year flows
- Further work is required to refine the model before the impacts can be understood

Five Bells junction

- No modelling has been completed to assess and mitigate impacts of the A13 westbound merge at Five Bells junction

A1012/Devonshire Road

- No modelling has been completed to assess and mitigate impacts

Tilbury Junction

- No modelling to support future connection
- Further work is required to refine the operational junction

Known construction impacts – Local microsimulation or junction modelling is required to understand need for mitigation

The Manorway roundabout, Orsett Cock roundabout, ASDA roundabout (NH has shared A1089 Asda roundabout Microsim model at Deadline 4) Daneholes roundabout, Marshfoot Road/ A1089 junction, Five Bells westbound merge with A13, A1012/Arterial Road North Stifford/Lodge Lane/ Long Lane roundabout, A1013/ Rectory Road junction, A128 Brentwood Road/ Prince Charles Avenue, A13/A1012 Gyratory in North Stifford, Grays, B149/ Chadwell Hill/ St Chads Road/ Marshfoot Road roundabout, Brentwood Road/ Heath Road, Muckingford Road/ Construction Haul Road, Southend Rd/ Lampits Hill, Station Road/ Love Lane, Stifford Road approach to B1335 Stifford Road


Appendix G D6A Response to the Manorway VISSIM Review

Lower Thames Crossing

Thurrock Council Submission at Deadline D6A (D6A)

Appendix G: D6A Response to the Manorway VISSIM Review

14 November 2023

Thurrock Council
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G.1 Introduction

G.1.1 Stantec, on behalf of Thurrock Council, has developed and validated the 2022 AM and PM base VISSIM models for the Manorway. The AM base model was submitted at Deadline 5, and the PM base model and Local Model Validation Report (LMVR) were submitted prior to Deadline 6. NH provided comments on the base models and the LMVR on 31 October 2023. This technical note sets out Stantec's response to NH's comments. For reference, the colours in the table are colours included by the applicant in their document.

No.	Item	Applicant's Comment (31/10/2023)	Applicant's Comment (31/10/2023)	Thurrock Council Response (10/11/2023)
1	Para 1.2.4	Thurrock reports in the LMVR that 'it became clear that the applicant was not going to prepare a base model for this junction'. This comment is refuted as NH provided input to and reviewed the survey specification, confirming their intention to prepare a base model in the future. However, after inputting to the survey specification no further communication from Thurrock was forthcoming of when the surveys have been ordered and completed, and no provision of the surveyed data to NH in order for NH to prepare the base model.	Reporting issue. Remove the statement implying no intention by NH to prepare a base model for this junction	<p>The Council and London Gateway DP World have repeatedly raised concerns about the inadequacy of the NH approach to modelling of the Manorway junction, particularly that NH had produced a forecast model without a validated base model. NH continues to claim that the LTAM model outputs for Manorway are sufficient for purpose of the Examination and maintains that its junction modelling (without a validated base model) is evidence to uphold this view. The Council would welcome clarification should NH now accept that a VISSIM model should be developed using a validated base model and be submitted to the ExA for consideration as part of the LTC Examination. As NH has not agreed to prepare a base model for the Manorway junction for purposes of the LTC Examination, the statement remains valid.</p> <p>Due to the inadequacy of NH analysis of local traffic impacts the Council commissioned survey data to enable it to develop a valid base model. NH declined to contribute towards the costs of this. NH was consulted and did engage on the development of the survey specification for Manorway. The applicant's comment is misleading as NH has at no stage offered to prepare a base model. The Council is developing the base model in collaboration with LG DPW.</p>

Thurrock Council Comments on Traffic Modelling (D6a) – Appendix G: D6A Response to the
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No.	Item	Applicant's Comment (31/10/2023)	Applicant's Comment (31/10/2023)	Thurrock Council Response (10/11/2023)
2	Table 2-1	For the Manorway junction the method of control for each intersection is listed individually, hence the title of the last 2 columns should not be "priority junction" and "signalised junction" since they are not always referring to the whole junction.	Reporting issue	Agreed, this is a reporting issue. Table 2.1 can be amended to remove the word "junction" from the last two columns.
3	Section 5.4, para 5.4.2	Para 5.4.2 mentions that a change to the forecast model to create the base model was that the A13 was revised to 3 lanes from 2 lanes. Further clarification is required as to where the 2 lanes was revised to 3 lanes. According to the A13 widening scheme drawings, the A13 has 3 lanes only west of the Manorway Junction	Clarify which section of the A13 was revised from 2 lanes to 3 lanes, and amend the text in para accordingly	Changes were made to the forecast model that was initially received from NH to develop the base model, in particular to the southbound A13 on-slip from the Manorway / Stanford-le-Hope roundabout. In the forecast model provided by NH, the southbound on-slip consisted of two lanes with both joining the two-laned A13 southbound mainline at the same location. In the base model, the two lanes of the on-slip separate and join the A13 at different locations of the southbound mainline. The offside lane merges into the A13 mainline first forming a short section of three lane traffic (link 3300) to allow traffic to merge in before the mainline becomes two lanes again. The nearside lane continues southbound and merges into the A13 further south of the offside lane. From this point onwards, the A13 is three lanes westbound. Annex A provides an illustration of the three-lane section on the A13 mainline carriageway heading westbound.

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No.	Item	Applicant's Comment (31/10/2023)	Applicant's Comment (31/10/2023)	Thurrock Council Response (10/11/2023)
4	Section 5.5	The bus frequencies have been identified and bus inputs have been subsequently used in the model in specific time segments, rather than use the actual times from the timetables. Bus service 100 is running at 600, 1800, 3000, 4200, 5400, 6600, 7800, 9000, 10200 for both directions.	Not expected to have an impact on the results	Bus times were last checked within the model on 01/09/2023. The timings have slightly altered since this as the 100 service bus timetable was updated on 31 October 2023 as stated on Thurrock and First Bus websites. The altered timetable is not too dissimilar from the times within the model.
5	Section 5.6.5 / Priority Rules 306, 307	The same gap times have been used for HGVs and Lights. 4.8 seconds gap time for the nearside lane for Lights seems too high (default value 3s) and creates some queueing in periods that the network is not busy (see screenshot 1). This looks like an artificial way to create delay; therefore, additional justification is required.	Relaxing these priority rules for Lights could potentially affect JT validation	Video footage was used to identify that in some instances queues do form along the A1013 in the peak hours. This has been evidenced using screenshots which can be found in Annex B of this response. It is also observed that there is a range in wait times for vehicles waiting to enter the junction from the A1013 which is largely dependent on when the vehicle arrives at the junction from the A1013 within the signal phasing of the A1014 Manorway eastbound approach and Eastern Circulatory of the roundabout.
6	Section 5.7 Areas	There are 21 large areas in the model outside of The Manorway model area, which are not serving any obvious purpose	Not Expected to have an impact on the results	Several large areas were included within the forecast model which are located outside of the modelling area. These have been left over from the forecast modelling and have not been removed, however they have no material impact on the model or the results.

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No.	Item	Applicant's Comment (31/10/2023)	Applicant's Comment (31/10/2023)	Thurrock Council Response (10/11/2023)
7	Section 6 Matrix Development	<p>It is reported that a 4-day average of the recorded ATC data was used in the matrix development - Mon to Thu. Best practice for localised modelling is to not generally include Mondays and Fridays in calculations as travel patterns may not be representative of typical travel patterns on these days, potentially due to less people making trips on these days. The average flows could be underestimated if Monday's recorded trips are an order of magnitude lower than the other 3 days. For this reason, in order for a robust review of the matrix development to be carried out, it would be beneficial if the hourly matrices and calculation sheets used could be provided.</p>	<p>Including recorded trips on the Monday, which could be lower, could underestimate typical flows and influence the matrix development.</p>	<p>An average was taken from data collected on Mondays, Tuesdays, Wednesdays, and Thursdays for the ATC data. This methodology was used because a comparison of the three day and four-day averages (see Annex C of this response) showed that they compared well and there was not a significant difference, thus using a four-day average provides a more robust average for the data collection period to represent the average weekday.</p>

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No.	Item	Applicant's Comment (31/10/2023)	Applicant's Comment (31/10/2023)	Thurrock Council Response (10/11/2023)
8	Section 7.2	<p>The Journey Time validation tables have been provided for the 6 routes and all routes look to be within the acceptable thresholds. Typically, the routes should have been broken down in shorter sections to demonstrate that the delay is generated in the correct locations. Since this kind of information is not available in the ANPR data, shorter JT sections at each junction should also be investigated. This kind of information exists in the model folders (e.g., pdf file "AM Base 2022_Journey Time Results Summary"), which shows a lot of subsections having significant deviations from observed (e.g., A13 North to A1013 Stanford Road 7-8 is - 96%). This table should be added in the main report, accompanied with commentary and justification for the segments with high differences. (See screenshot 2, with AM key sections highlighted. PM table is missing from the model folder).</p>	<p>This could be a critical issue as the model is potentially not generating the delays at the appropriate locations, therefore not an accurate representation of existing traffic conditions.</p>	<p>The six journey time routes presented in the LMVR are consistent with the information provided by NH in the Manorway Forecast Model report, with exception to A13 Mainline eastbound and westbound routes which are not included in the LMVR due to lack of available observed data. The ANPR cameras were placed on the on and off slips to and from the A13 mainline carriageway and therefore do not capture the journey times on the mainline carriageway.</p> <p>NH has stated in Comment 1 that they had input to the survey agreement and would have therefore been aware that shorter distances for the six routes presented in the LMVR would not be able to be reported since this information is not available in ANPR data.</p>

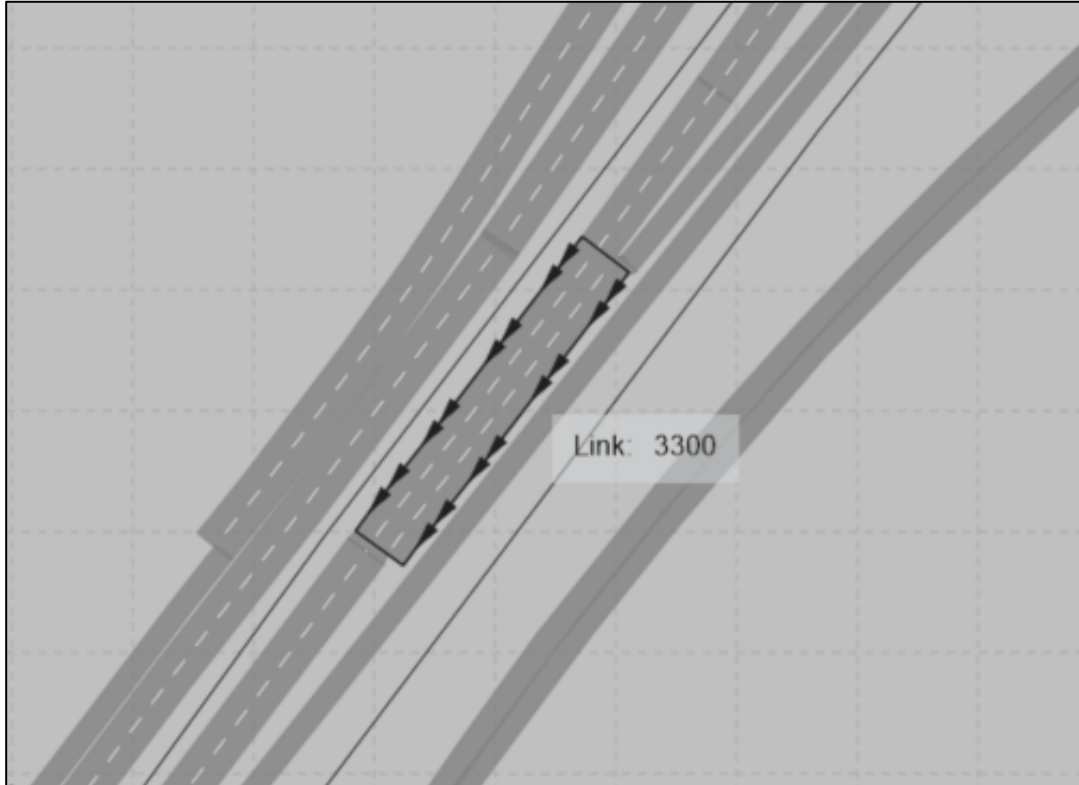
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No.	Item	Applicant's Comment (31/10/2023)	Applicant's Comment (31/10/2023)	Thurrock Council Response (10/11/2023)
				<p>There are two shorter segments in the AM 0700 - 0800 (A13 North to A1013 Stanford Road) and one short segment 0800 - 0900 (A13 North to B1007) that highlight greater deviation in % difference when compared with observed ANPR data however, both these routes sit well within 60s of observed data. Similarly, there is one segment in the PM 1700 - 1800 (B1007 to A1013 Stanford Road) that highlights a 67% difference with observed data however, the absolute difference is well within 60s of observed journey time. The A13/A1014 Manorway junction operates on MOVA control on site and therefore the signal optimisation is more refined for each cycle on site when compared to the fixed time signals modelled based on average green time lengths for individual phases. The six main journey time routes presented in LMVR provide a robust match to observed data and furthermore the link count and turning count validation demonstrate a strong correlation with observed traffic counts, the model is therefore considered to be fit for the purpose of developing forecast assessments.</p>

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No.	Item	Applicant's Comment (31/10/2023)	Applicant's Comment (31/10/2023)	Thurrock Council Response (10/11/2023)
9	Pedestrian Inputs	The pedestrian inputs in the model look to be very low (values below 4), which raises the question if these values are hourly volumes as they should. As a result, the model potentially has only 1/4 of actual pedestrian demand.	Not expected to have an impact on the results	It is noted that pedestrian input in the model should be x4 for 15 min intervals. However, the signals at The Sorrells junction are modelled as fixed time based on average green time lengths observed from video footage therefore the pedestrian input is immaterial to the operation of the junction. The pedestrian stage at this location is called every cycle in the model during peak period and modelled using green time averages calculated across the peak period for AM and PM respectively. Furthermore, the pedestrian survey data for Corringham Road pedestrian crossing highlights a total of two pedestrians across the peak period for AM and PM respectively. The Corringham Road crossing is modelled using VAP and whilst the pedestrian input should be x4 for 15 min intervals, this does not have any material impact on the results.

Annex A Layout of A13 Westbound



Annex B Video Screenshots

Video Footage Screenshots Illustrating Queues Along the A1013 Stanford Road approach to the roundabout.



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Annex C Analysis of Traffic Data

4 Day Weekday Average:	Mon, Tues, Wed, Thurs
3 Day Weekday Average:	Tue, Wed, Thurs

		ATC 1 NB		ATC 1 SB		ATC 2 NB		ATC 2 SB		ATC 3 WB		ATC 3 EB	
		4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.
Car	07:00 - 08:00	398	408	380	376	1692	1734	2317	2327	16	17	315	320
	08:00 - 09:00	547	561	471	478	1677	1710	1927	1909	31	33	438	434
	17:00 - 18:00	590	608	530	555	2602	2601	2120	2140	40	41	828	847
LGV	07:00 - 08:00	45	46	42	42	450	456	748	749	1	1	48	49
	08:00 - 09:00	65	64	49	50	391	394	506	502	3	3	52	53
	17:00 - 18:00	46	46	35	36	527	527	311	304	1	1	47	48
HGV	07:00 - 08:00	2	3	3	2	213	218	156	155	0	0	1	2
	08:00 - 09:00	3	2	2	2	204	212	173	173	0	0	2	2
	17:00 - 18:00	2	1	1	1	39	39	18	19	0	0	1	1

		ATC 4 NB		ATC 4 SB		ATC 5 NB		ATC 5 SB		ATC 6 NB		ATC 6 SB	
		4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.
Car	07:00 - 08:00	92	93	213	209	193	193	407	408	156	152	385	392
	08:00 - 09:00	224	223	317	317	289	314	436	439	148	158	340	344
	17:00 - 18:00	257	255	189	195	420	397	353	326	548	548	235	234
LGV	07:00 - 08:00	16	18	23	24	27	28	41	42	49	51	47	50
	08:00 - 09:00	12	11	20	21	33	35	42	42	103	105	32	34
	17:00 - 18:00	19	18	11	11	23	23	28	26	38	39	60	64
HGV	07:00 - 08:00	0	0	0	0	17	18	26	27	122	123	123	130
	08:00 - 09:00	1	1	1	0	17	16	30	32	129	133	121	123
	17:00 - 18:00	0	0	0	0	22	20	17	15	100	97	99	97

		ATC 7 EB		ATC 7 WB		ATC 9 EB		ATC 9 WB		ATC 11 NB		ATC 11 SB	
		4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.
Car	07:00 - 08:00	184	187	142	141	610	622	13	12	276	293	225	237
	08:00 - 09:00	391	385	297	301	587	602	28	30	412	443	317	333
	17:00 - 18:00	301	312	249	253	417	420	41	43	396	454	322	328
LGV	07:00 - 08:00	30	32	18	20	59	58	0	0	35	37	28	31
	08:00 - 09:00	28	28	20	20	50	50	2	3	29	33	30	30
	17:00 - 18:00	21	22	17	17	26	28	1	1	24	29	13	15
HGV	07:00 - 08:00	3	3	1	0	1	0	0	0	2	2	1	1
	08:00 - 09:00	1	1	1	1	2	2	0	0	2	2	1	2
	17:00 - 18:00	1	1	0	0	0	0	0	0	3	3	2	2

		ATC 12 EB		ATC 12 WB	
		4 Day Av.	3 Day Av.	4 Day Av.	3 Day Av.
Car	07:00 - 08:00	1759	1805	2741	2755
	08:00 - 09:00	1833	1869	2354	2322
	17:00 - 18:00	3001	2945	2318	2340
LGV	07:00 - 08:00	506	501	827	830
	08:00 - 09:00	433	432	593	589
	17:00 - 18:00	432	423	298	317
HGV	07:00 - 08:00	356	371	334	322
	08:00 - 09:00	330	334	328	334
	17:00 - 18:00	227	220	205	204

ATC	Location
ATC 1	B1007
ATC 2	A13 North
ATC 3	Southend Road North
ATC 4	The Sorrells
ATC 5	A1014 The Manorway
ATC 6	London Gateway
ATC 7	Corringham Road
ATC 9	Southend Road South
ATC 11	A1013 Stanford Road
ATC 12	A13 South

Appendix H Video showing Outputs from VISSIM at Orsett Cock Junction