# Lower Thames Crossing

## Thurrock Council Comments on Applicant's Submissions at Deadline 1 and 2 (D1 and D2)

## Summary Review of National Highways Localised Traffic Modelling Report – Appendix E

**Thurrock Council**

thurrock.gov.uk

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# Document Control Sheet

**Project Name:** **Lower Thames Crossing**

**Report Title:** **Thurrock Council Comments on Applicant's Submissions at Deadline 1 and 2 (D1 and D2) – Summary Review of National Highways Localised Traffic Modelling Report – Appendix E**

**Doc Ref:**

**Date:** **August 2023**

# Contents



# Annexes

# 1 Introduction

1.1.1 This technical note provides a summary review of the National Highways (NH) report:

TRO10032-003072-9.15 Localised Traffic Modelling (REP1-189)

1.1.2 This is a newly published document on the PINS website for the Lower Thames Crossing (LTC) Development Consent Order (DCO). The document is dated July 2023.

## 1.2 Document Purpose

1.2.1 It is stated that the purpose of the document is to:

a. Set out the localised traffic modelling work completed by NH during the development of the A122 LTC; and

b. To introduce additional information into the Examination process.

1.2.2 It is further stated that the document sets out:

a. Context in which NH has undertaken localised traffic modelling;

b. The Responses to **Action Points 8, 9, 10** from Issue Specific Hearing 1 (ISH1) of 21 and 23 June 2023;

c. Provide a comparative analysis of the findings of the localised traffic modelling and the LTAM; and

d. Provide summary of localised traffic modelling completed, signposting to submitted detailed reports on modelling work.

# 2 Summary of Localised Traffic Models undertaken by NH

2.1.1 NH has summarised the various localised traffic models it has undertaken, and these were summarised in Table 3.1 and Table 3.2 of the report. Figure 9.1 of the Local Impact Report drawn up by Thurrock Council (the Council) summarised the position of the Council on the LTAM as well as microsimulation modelling by NH. This included both operational and construction modelling requirements.

a. Having reviewed the localised traffic modelling report, Annex 1 of this document provides a summary of whether the provided localised traffic modelling now provided by NH covers the models requested by the Council.

b. It is noted that only Operational localised traffic models have been provided. No Construction impact models have been provided. Separate work is being undertaken by the Council to review the provided models as to their robustness and adequacy and hence whether the Council's position on the provided models.

c. It is noted that NH proposes to submit the following additional localised traffic models into the Examination process by Deadline 3 (paragraph 5.1.2):

- A1089 ASDA roundabout operational microsimulation model;
- A13 Five Bells junction operational model;
- A13 Pitsea interchange operational junction (not requested); and
- A1089 ASDA roundabout microsimulation for critical construction traffic modelling phases.

2.1.2 The Council looks forward to receiving these models by Deadline 3 so that a better understanding of localised impacts at these locations can be gained.

2.1.3 It is noted from Paragraph 5.1.3 of the Localised Traffic Modelling report (REP1-187) that the only Construction localised transport modelling that NH is proposing to submit is the A1089 ASDA roundabout microsimulation model. NH argues that the use of LTAM is appropriate for the consideration of the construction impacts.

2.1.4 The Council does not agree with this view and considers that LTAM as a strategic model representing average hour conditions, underestimates local junction and network impacts and therefore expects NH to provide requested localised junction or microsimulation models. The comparative analysis undertaken by NH for operational VISSIM modelling at The Manorway and Orsett Cock junctions, contrary to NH assertions, actually in the main, show that impacts are predicted to be worse in localised models than in LTAM. This is discussed further below.

# 3 Review of Comparative Analysis of Findings of the Localised Traffic Modelling and LTAM

3.1.1 Section 4 of the document provides a comparative analysis of results comparing LTAM results to VISSIM results at the A13 Manorway junction (Tables 4.1 to 4.4) and at Orsett Cock junction (Tables 4.5 to 4.8)

3.1.2 It is noted that invariably the comparisons in the AM peak are provided for 0700 – 0800 and not the local 0800 – 0900 peak hour. The PM peak hour 1700 – 1800 is also compared.

3.1.3 The comparisons are provided for 2030 and 2045 DM and DS.

3.1.4 The comparisons have tabulated route flows (vehicles), distance (metres), journey times (seconds) and weighted journey times (minutes) on specified routes or Origin to Destination (OD) pairs.

3.1.5 It is acknowledged that length of journeys between LTAM and the microsimulation are not identical due to differing links and model structure. Our analysis indicates that in most cases, the VISSIM routes are shorter than the equivalent LTAM routes. This is invariably likely to skew the results and the conclusions.

3.1.6 NH has only tabulated absolute values but not the impact, i.e. how the difference in journey time between the DM and DS compares for LTAM and for microsimulation. The Council has undertaken analysis to understand consistency of impacts and provided tabulations in Annex 2 for Orsett Cock interchange and for The Manorway junction.

3.1.7 It is worth noting that the additional analysis by the Council has utilised the provided results in the NH report as they are. The Council has not signed off the localised models and is raising a number of critical errors with NH. An informed review of the modelling would be made once the modelling has been amended to reflect those errors and updated outcomes provided by NH.

3.1.8 For journey times and weighted journey times, our analysis has looked at the difference between DS and DM times for both LTAM and VISSIM. A positive figure implies a comparatively higher figure in time and a negative implies a comparatively lower figure.

## Results

3.1.9 In paragraph 4.1.1 of the Localised Traffic Modelling report (REP1-187) NH states that the analysis it made demonstrates that the scale of the impacts on junctions in the LTAM results are similar to those forecast using microsimulation and shows that any differences would not lead to a change in the benefit cost ratio of the Project.

3.1.10 Given the limited number of junctions compared, and the differing purposes for which one would expect of the LTAM and localised junctions, the above statement is debatable. The main reason for requesting localised models has been to better understand local impacts and the Council's view, the results of the analysis in Appendix A.1 and A.2 show that in the main, changes in journey times are higher in the microsimulation models than in LTAM thus reinforcing the long stated view that LTAM as a strategic model, underestimates impacts. This is against a backdrop of predominantly shorter VISSIM routes compared to LTAM, which would only increase the difference between the journey time results if reconciled.

3.1.11 In The Manorway junction results, the limited number of routes analysed and the difference in journey time route length between the LTAM and VISSIM models, make a direct comparison

of journey times difficult. In most cases the VISSIM distances are much shorter for key routes compared to the LTAM routes. For example, Route 2 (assumed to be A13 mainline through The Manorway southbound) is 1,530 metres shorter in VISSIM. It is also noted that Route 1, assumed to be the A13 northbound equivalent route, at 2,687 metres in SATURN, is considerably shorter than Route 2 which is reported as 4,464 metres. This appears to be erroneous and there is concern that comparison is not like for like both in SATURN and when compared to VISSIM. There is also no journey time analysis presented at The Manorway junction for trips to and from the A103 arm of the junction, which is a key arm of the junction. Overall, there is little confidence in the accuracy of the analysis undertaken at the Manorway junction. There is no base model provided for The Manorway and so the Council is not in a position to comment on the validity of any of the models.

3.1.12 In the Orsett Cock junction results, the journey time and weighted journey time changes between the DS and DM clearly show that impacts are worse from the microsimulation than from LTAM. Even with generally shorter routes in VISSIM compared to LTAM, the increases in journey times on key routes or Origin – Destination (OD) movements indicate that the LTC would have any adverse impact at the Orsett Cock and that mitigation is required to offset these impacts. For example:

a. In 2030 AM peak, journey time increases are evident from Zone 1 (A128 North arm) in the VISSIM model to most destinations analysed and these range between increases of 68 seconds to 94 seconds. The LTAM changes where they occur are much smaller; and range between -29 seconds (a decrease) to 20 seconds.

b. In 2030 PM peak trips from Zone 1 also experience significant increases in time ranging between 48 and 87 seconds, compared to changes ranging from -17 seconds to 27 seconds for LTAM. Trips from Zone 2 (A13 East arm) experience even higher increases in time in VISSIM with the higher increases varying between 301 and 348 seconds. In LTAM the increases only range between 16 seconds and 52 seconds.

c. Needless to say, for trips from Zone 1 in both 2045 AM and 2045 PM peaks, conditions are predicted to deteriorate further, with the VISSIM models predicting much higher increases in times than LTAM. In 2045 AM peak, trips from Zone 1 in VISSIM are predicted to experience journey time increases between 88 seconds and 157 seconds while in LTAM, the range is from -40 seconds to 23 seconds. Trips from Zone 2 in the PM peak VISSIM model also experience a significant increase in time albeit the increases are noticeably lower than in 2030, this anomaly, likely indicating capacity constraints into the future. Although LTAM also predicts time increases for Zone 2 in 2045 PM peak, they are much lower than predicted by VISSIM. In VISSIM, the higher journey time increases from Zone 2 in 2045 PM ranges between 155 seconds and 206 seconds, while in LTAM increases vary between 27 seconds and 68 seconds.

# 4 Review Conclusions

4.1.1 In paragraph 2.2.3 of the Localised Traffic Modelling report (REP1-187) NH makes a number of statements summarised as follows:

a. That the information in the document demonstrates that the localised traffic modelling work supports and validates the findings of the LTAM

b. That the conclusions drawn from the LTAM about the overall performance of the project remain valid at a local level including:

- The performance of individual junctions
- The scale of traffic impacts and benefits, and by extrapolation, the scale of economic disbenefits and benefits at individual junctions

4.1.2 In paragraph 4.3.1 NH further states that:

a. The comparison of the modelled performance of the Orsett Cock and The Manorway junctions using two different modelling approaches gives similar results, which further provides confidence in the use of the LTAM for the appraisal of the Project.

4.1.3 The Council's review concludes that the above statements are not supported by NH's own comparative analysis and that the results of the microsimulation demonstrate that the impacts of the LTC are clearly worse in the localised models than in LTAM. This is particularly so at the Orsett Cock interchange where there appears to be a disparity in impact between the VISSIM and LTAM, with LTAM understating the time increases on key movements. This reinforces the need for microsimulation and junction models to better understand the impacts of the LTC on local communities. The impacts at Orsett Cock interchange in particular, point to a need for potential mitigation with the LTC in place.

# Annex 1 D3 Modelling Status Flowchart

**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

**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 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

**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

**Asda Roundabout**

- Operational Microsim Model developed by NH but yet to be shared with Thurrock
- To be submitted by NH at Deadline 3
- Base and Future Microsim modelling work is required to understand impacts of LTC

**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
- NH has provided updated model but no log of changes provided to understand updates

**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**

- 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**

- NH has developed junction model but has yet to share it with Thurrock
- To be submitted by NH at Deadline 3
- Base and Future Microsim modelling work is required to understand impacts of LTC

**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 state that it is preparing A1089 Asda roundabout Microsim model to be shared at Deadline 3), 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

**Change Log – Microsimulation and Junction Modelling**

This document summarises changes to the Model Status flow-chart and aims to support version control.

Local Microsimulation or Junction Modelling

| LIR status | D3 status |
|---|---|
| **Asda Roundabout**<br>• No modelling has been completed to assess and mitigate impacts<br>• Microsim modelling work is required to understand impacts of LTC | **Asda Roundabout**<br>• Operational Microsim Model has been developed by NH but yet to be shared with Thurrock<br>• To be submitted by NH at Deadline 3<br>• Base and Future Microsim modelling work is required to understand impacts of LTC |
| | |
| **Orsett Cock**<br>• Base Year model is complete<br>• Forecasts have been completed and shared with Thurrock but not signed off.<br>• Indicates significant capacity and safety concerns | **Orsett Cock**<br>• Base Year model is complete<br>• Forecasts have been completed and shared with Thurrock but not signed off.<br>• Indicates significant capacity and safety concerns<br>• NH has provided updated model but no Log of changes provided to understand updates |
| | |
| **Daneholes and Marshfoot junctions**<br>• Base Year East-West VISSIM is complete and shared with the Council.<br>• Forecasts have been completed but not shared with Thurrock.<br>• The impact of LTC on Daneholes or Marshfoot are not understood | **Daneholes and Marshfoot junctions**<br>• Base Year East-West VISSIM is complete, shared with the Council but not signed off.<br>• Forecasts have been completed and now shared with Thurrock but cannot be considered until the base year model is signed off.<br>• The impact of LTC on Daneholes or Marshfoot are not understood |
| | |
| **Five Bells junction**<br>• No modelling has been completed to assess and mitigate impacts | **Five Bells junction**<br>• NH has developed junction model but has yet to share it with Thurrock<br>• To be submitted by NH at Deadline 3<br>• Base and Future Microsim modelling work is required to understand impacts of LTC |
| | |

| **Known construction impacts – Local microsimulation or junction modelling is required to understand need for mitigation** | **Known construction impacts – Local microsimulation or junction modelling is required to understand need for mitigation** |
|---|---|
| The Manorway roundabout, Orsett Cock roundabout, ASDA roundabout 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 | The Manorway roundabout, Orsett Cock roundabout, ASDA roundabout (NH state that it is preparing A1089 Asda roundabout Microsim model to be shared at Deadline 3), 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 |

# Annex 2 Comparative Assessment of Journey Times

## COMPARATIVE ANALYSIS AT MANORWAY JUNCTION

**Table 4.1 A13 Manorway junction, 07:00-08:00, 2030 (REP1-187)**

*- National Highway's Data and Analysis*
*- Comparison Analysis completed and presented by Thurrock*

**DO MINIMUM**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| 1 | 2,687 | 2,919 | 232 | 8.6% | 2457 | 2449 | -8 | -0.3% | 117 | 103 | -14 | -12.0% | 4,806 | 4,198 | -608 | -12.7% |
| 2 | 4,464 | 2,934 | -1,530 | -34.3% | 3198 | 3189 | -9 | -0.3% | 217 | 111 | -106 | -48.8% | 11,569 | 5,897 | -5,672 | -49.0% |
| 3 | 4,253 | 4,088 | -165 | -3.9% | 380 | 374 | -6 | -1.6% | 245 | 238 | -7 | -2.9% | 1,550 | 1479 | -71 | -4.6% |
| 4 | 3,822 | 4,009 | 187 | 4.9% | 161 | 153 | -8 | -5.0% | 232 | 225 | -7 | -3.0% | 625 | 574 | -51 | -8.2% |
| 5 | 3,280 | 3,309 | 29 | 0.9% | 246 | 246 | 0 | 0.0% | 208 | 205 | -3 | -1.4% | 853 | 843 | -10 | -1.2% |
| 6 | 3,660 | 3,527 | -133 | -3.6% | 109 | 104 | -5 | -4.6% | 253 | 258 | 5 | 2.0% | 461 | 447 | -14 | -3.0% |
| 7 | 4,446 | 3,329 | -1,117 | -25.1% | 84 | 83 | -1 | -1.2% | 453 | 205 | -248 | -54.7% | 632 | 284 | -348 | -55.1% |
| 8 | 4,472 | 3,345 | -1,127 | -25.2% | 5 | 4 | -1 | -20.0% | 290 | 207 | -83 | -28.6% | 23 | 13 | -10 | -43.5% |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **69** | **61** | | |
| **TOTAL** | 31,084 | 27,460 | **-3,624** | **-11.7%** | 6,640 | 6,602 | **-38** | **-0.6%** | 2,015 | 1,552 | **-463** | **-23.0%** | 20,519 | 13,735 | **-6,784** | **-33.1%** |

**DO SOMETHING**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [9] | % from Saturn [10] | SATURN | Vissim | Time (Vissim - SATURN) [11] | % from Saturn [12] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [13] | % from Saturn [14] |
| 1 | 2,687 | 2,919 | 232 | 8.6% | 2,863 | 2,854 | -9 | -0.3% | 130 | 104 | -26 | -20.0% | 6,188 | 4,970 | -1,218 | -19.7% |
| 2 | 4,464 | 2,934 | -1,530 | -34.3% | 3,319 | 3,295 | -24 | -0.7% | 250 | 126 | -124 | -49.6% | 13,822 | 6,938 | -6,884 | -49.8% |
| 3 | 4,253 | 4,088 | -165 | -3.9% | 406 | 397 | -9 | -2.2% | 258 | 244 | -14 | -5.4% | 1,751 | 1,616 | -135 | -7.7% |
| 4 | 3,822 | 4,009 | 187 | 4.9% | 165 | 154 | -11 | -6.7% | 256 | 231 | -25 | -9.8% | 705 | 590 | -115 | -16.3% |
| 5 | 3,280 | 3,309 | 29 | 0.9% | 206 | 204 | -2 | -1.0% | 207 | 207 | 0 | 0.0% | 711 | 707 | -4 | -0.6% |
| 6 | 3,660 | 3,527 | -133 | -3.6% | 107 | 104 | -3 | -2.8% | 259 | 258 | -1 | -0.4% | 464 | 448 | -16 | -3.4% |
| 7 | 4,446 | 3,329 | -1,117 | -25.1% | 30 | 29 | -1 | -3.3% | 671 | 209 | -462 | -68.9% | 330 | 100 | -230 | -69.7% |
| 8 | 4,472 | 3,345 | -1,127 | -25.2% | 5 | 5 | 0 | 0.0% | 291 | 204 | -87 | -29.9% | 23 | 16 | -7 | -30.4% |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **66** | **58** | | |
| **TOTAL** | 31,084 | 27,460 | **-3,624** | **-11.7%** | 7,101 | 7,042 | **-59** | **-0.8%** | 2,322 | 1,583 | **-739** | **-31.8%** | 23,994 | 15,385 | **-8,609** | **-35.9%** |

**DO SOMETHING minus DO MINIMUM**

| Route | | | | | Flow Differences (vehicles) | | | | Time Differences (seconds) | | | | Weighted Time Changes (mins vehicles) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SATURN [15] | Vissim [16] | Flow Comparison [16]-[15] [17] | % from Saturn [18] | SATURN [19] | Vissim [20] | Flow Comparison [20]-[19] [21] | % from Saturn [22] | SATURN [23] | Vissim [24] | Flow Comparison [24]-[23] [25] | % from Saturn [26] |
| 1 | | | | | 406 | 405 | -1 | -0.2% | 13 | 1 | -12 | -92.3% | 1382 | 772 | -610 | -44.1% |
| 2 | | | | | 121 | 106 | -15 | -12.4% | 33 | 15 | -18 | -54.5% | 2253 | 1041 | -1,212 | -53.8% |
| 3 | | | | | 26 | 23 | -3 | -11.5% | 13 | 6 | -7 | -53.8% | 201 | 137 | -64 | -31.8% |
| 4 | | | | | 4 | 1 | -3 | -75.0% | 24 | 6 | -18 | -75.0% | 80 | 16 | -64 | -80.0% |
| 5 | | | | | -40 | -42 | -2 | 5.0% | -1 | 2 | 3 | -300.0% | -142 | -136 | 6 | -4.2% |
| 6 | | | | | -2 | 0 | 2 | -100.0% | 6 | 0 | -6 | -100.0% | 3 | 1 | -2 | -66.7% |
| 7 | | | | | -54 | -54 | 0 | 0.0% | 218 | 4 | -214 | -98.2% | -302 | -184 | 118 | -39.1% |
| 8 | | | | | 0 | 1 | 1 | #DIV/0! | 1 | -3 | -4 | -400.0% | 0 | 3 | 3 | #DIV/0! |
| **TOTAL** | | | | | 461 | 440 | **-21** | **-4.6%** | 307 | 31 | **-276** | **-89.9%** | 3,475 | 1,650 | **-1,825** | **-52.5%** |

**Table 4.2 A13 Manorway junction, 17:00-18:00, 2030 (REP1-187)**

*- National Highway's Data and Analysis*

*- Comparison Analysis completed and presented by Thurrock*

**DO MINIMUM**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| 1 | 2,687 | 2,919 | 232 | 8.6% | 2963 | 2955 | -8 | -0.3% | 147 | 105 | -42 | -28.6% | 7,281 | 5,149 | -2,132 | -29.3% |
| 2 | 4,464 | 2,934 | -1,530 | -34.3% | 2581 | 2570 | -11 | -0.4% | 194 | 104 | -90 | -46.4% | 8,328 | 4,435 | -3,893 | -46.7% |
| 3 | 4,253 | 4,088 | -165 | -3.9% | 187 | 181 | -6 | -3.2% | 241 | 240 | -1 | -0.4% | 752 | 721 | -31 | -4.1% |
| 4 | 3,822 | 4,009 | 187 | 4.9% | 447 | 436 | -11 | -2.5% | 242 | 217 | -25 | -10.3% | 1808 | 1579 | -229 | -12.7% |
| 5 | 3,280 | 3,309 | 29 | 0.9% | 112 | 110 | -2 | -1.8% | 205 | 204 | -1 | -0.5% | 380 | 375 | -5 | -1.3% |
| 6 | 3,660 | 3,527 | -133 | -3.6% | 239 | 231 | -8 | -3.3% | 284 | 282 | -2 | -0.7% | 1128 | 1086 | -42 | -3.7% |
| 7 | 4,446 | 3,329 | -1,117 | -25.1% | 9 | 8 | -1 | -11.1% | 292 | 206 | -86 | -29.5% | 44 | 29 | -15 | -34.1% |
| 8 | 4,472 | 3,345 | -1,127 | -25.2% | 99 | 94 | -5 | -5.1% | 324 | 210 | -114 | -35.2% | 535 | 327 | -208 | -38.9% |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **77** | **69** | | |
| **TOTAL** | 31,084 | 27,460 | **-3,624** | **-11.7%** | 6,637 | 6,585 | **-52** | **-0.8%** | 1,929 | 1,568 | **-361** | **-18.7%** | 20,256 | 13,701 | **-6,555** | **-32.4%** |

**DO SOMETHING**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [9] | % from Saturn [10] | SATURN | Vissim | Time (Vissim - SATURN) [11] | % from Saturn [12] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [13] | % from Saturn [14] |
| 1 | 2,687 | 2,919 | 232 | 8.6% | 3,599 | 3,584 | -15 | -0.4% | 153 | 106 | -47 | -30.7% | 6,188 | 4,970 | -1,218 | -19.7% |
| 2 | 4,464 | 2,934 | -1,530 | -34.3% | 3,121 | 3,109 | -12 | -0.4% | 220 | 116 | -104 | -47.3% | 13,822 | 6,938 | -6,884 | -49.8% |
| 3 | 4,253 | 4,088 | -165 | -3.9% | 197 | 188 | -9 | -4.6% | 254 | 238 | -16 | -6.3% | 1,751 | 1,616 | -135 | -7.7% |
| 4 | 3,822 | 4,009 | 187 | 4.9% | 490 | 472 | -18 | -3.7% | 259 | 232 | -27 | -10.4% | 705 | 590 | -115 | -16.3% |
| 5 | 3,280 | 3,309 | 29 | 0.9% | 108 | 108 | 0 | 0.0% | 205 | 207 | 2 | 1.0% | 711 | 707 | -4 | -0.6% |
| 6 | 3,660 | 3,527 | -133 | -3.6% | 154 | 151 | -3 | -1.9% | 427 | 276 | -151 | -35.4% | 464 | 448 | -16 | -3.4% |
| 7 | 4,446 | 3,329 | -1,117 | -25.1% | 9 | 9 | 0 | 0.0% | 277 | 203 | -74 | -26.7% | 330 | 100 | -230 | -69.7% |
| 8 | 4,472 | 3,345 | -1,127 | -25.2% | 80 | 75 | -5 | -6.3% | 314 | 216 | -98 | -31.2% | 23 | 16 | -7 | -30.4% |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **81** | **66** | | |
| **TOTAL** | 31,084 | 27,460 | **-3,624** | **-11.7%** | 7,758 | 7,696 | **-62** | **-0.8%** | 2,109 | 1,594 | **-515** | **-24.4%** | 23,994 | 15,385 | **-8,609** | **-35.9%** |

**DO SOMETHING minus DO MINIMUM**

| Route | | | | | Flow Differences (vehicles) | | | | Time Differences (seconds) | | | | Weighted Time Changes (mins vehicles) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SATURN [15] | Vissim [16] | Flow Comparison [16]-[15] [17] | % from Saturn [18] | SATURN [19] | Vissim [20] | Flow Comparison [20]-[19] [21] | % from Saturn [22] | SATURN [23] | Vissim [24] | Flow Comparison [24]-[23] [25] | % from Saturn [26] |
| 1 | | | | | 636 | 629 | -7 | -1.1% | 6 | 1 | -5 | -83.3% | 9200 | 6352 | -2,848 | -31.0% |
| 2 | | | | | 540 | 539 | -1 | -0.2% | 26 | 12 | -14 | -53.8% | 11444 | 6030 | -5,414 | -47.3% |
| 3 | | | | | 10 | 7 | -3 | -30.0% | 13 | -2 | -15 | -115.4% | 835 | 745 | -90 | -10.8% |
| 4 | | | | | 43 | 36 | -7 | -16.3% | 17 | 15 | -2 | -11.8% | 2112 | 1830 | -282 | -13.4% |
| 5 | | | | | -4 | -2 | 2 | -50.0% | 0 | 3 | 3 | #DIV/0! | 369 | 372 | 3 | 0.8% |
| 6 | | | | | -85 | -80 | 5 | -5.9% | 143 | -6 | -149 | -104.2% | 1099 | 694 | -405 | -36.9% |
| 7 | | | | | 0 | 1 | 1 | #DIV/0! | -15 | -3 | 12 | -80.0% | 44 | 31 | -13 | -29.5% |
| 8 | | | | | -19 | -19 | 0 | 0.0% | -10 | 6 | 16 | -160.0% | 421 | 271 | -150 | -35.6% |
| **TOTAL** | | | | | 1,121 | 1,111 | **-10** | **-0.9%** | 180 | 26 | **-154** | **-85.6%** | 25,524 | 16,325 | **-9,199** | **-36.0%** |

**Table 4.3 A13 Manorway junction, 07:00-08:00, 2045**

*- National Highway's Data and Analysis*
*- Comparison Analysis completed and presented by Thurrock*

**DO MINIMUM**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| 1 | 2,687 | 2,919 | 232 | 8.6% | 2853 | 2842 | -11 | -0.4% | 149 | 105 | -44 | -29.5% | 7,071 | 4,968 | -2,103 | -29.7% |
| 2 | 4,464 | 2,934 | -1,530 | -34.3% | 3195 | 3177 | -18 | -0.6% | 220 | 114 | -106 | -48.2% | 11,695 | 6,040 | -5,655 | -48.4% |
| 3 | 4,253 | 4,088 | -165 | -3.9% | 375 | 369 | -6 | -1.6% | 253 | 240 | -13 | -5.1% | 1,585 | 1479 | -106 | -6.7% |
| 4 | 3,822 | 4,009 | 187 | 4.9% | 162 | 153 | -9 | -5.6% | 235 | 221 | -14 | -6.0% | 632 | 562 | -70 | -11.1% |
| 5 | 3,280 | 3,309 | 29 | 0.9% | 234 | 233 | -1 | -0.4% | 208 | 206 | -2 | -1.0% | 811 | 799 | -12 | -1.5% |
| 6 | 3,660 | 3,527 | -133 | -3.6% | 107 | 103 | -4 | -3.7% | 290 | 265 | -25 | -8.6% | 518 | 455 | -63 | -12.2% |
| 7 | 4,446 | 3,329 | -1,117 | -25.1% | 43 | 43 | 0 | 0.0% | 588 | 208 | -380 | -64.6% | 424 | 149 | -275 | -64.9% |
| 8 | 4,472 | 3,345 | -1,127 | -25.2% | 6 | 5 | -1 | -16.7% | 294 | 202 | -92 | -31.3% | 30 | 16 | -14 | -46.7% |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **67** | **58** | | |
| **TOTAL** | 31,084 | 27,460 | **-3,624** | **-11.7%** | 6,975 | 6,925 | **-50** | **-0.7%** | 2,237 | 1,561 | **-676** | **-30.2%** | 22,766 | 14,468 | **-8,298** | **-36.4%** |

**DO SOMETHING**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [9] | % from Saturn [10] | SATURN | Vissim | Time (Vissim - SATURN) [11] | % from Saturn [12] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [13] | % from Saturn [14] |
| 1 | 2,687 | 2,919 | 232 | 8.6% | 3,293 | 3,282 | -11 | -0.3% | 152 | 106 | -46 | -30.3% | 8,351 | 5,808 | -2,543 | -30.5% |
| 2 | 4,464 | 2,934 | -1,530 | -34.3% | 3,392 | 3,364 | -28 | -0.8% | 255 | 135 | -120 | -47.1% | 14,434 | 7,558 | -6,876 | -47.6% |
| 3 | 4,253 | 4,088 | -165 | -3.9% | 410 | 401 | -9 | -2.2% | 266 | 242 | -24 | -9.0% | 1,819 | 1,619 | -200 | -11.0% |
| 4 | 3,822 | 4,009 | 187 | 4.9% | 165 | 154 | -11 | -6.7% | 353 | 239 | -114 | -32.3% | 971 | 612 | -359 | -37.0% |
| 5 | 3,280 | 3,309 | 29 | 0.9% | 187 | 183 | -4 | -2.1% | 208 | 213 | 5 | 2.4% | 647 | 650 | 3 | 0.5% |
| 6 | 3,660 | 3,527 | -133 | -3.6% | 101 | 99 | -2 | -2.0% | 353 | 264 | -89 | -25.2% | 595 | 435 | -160 | -26.9% |
| 7 | 4,446 | 3,329 | -1,117 | -25.1% | 35 | 34 | -1 | -2.9% | 716 | 207 | -509 | -71.1% | 413 | 119 | -294 | -71.2% |
| 8 | 4,472 | 3,345 | -1,127 | -25.2% | 10 | 9 | -1 | -10.0% | 291 | 207 | -84 | -28.9% | 49 | 31 | -18 | -36.7% |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **75** | **58** | | |
| **TOTAL** | 31,084 | 27,460 | **-3,624** | **-11.7%** | 7,593 | 7,526 | **-67** | **-0.9%** | 2,594 | 1,613 | **-981** | **-37.8%** | 27,279 | 16,832 | **-10,447** | **-38.3%** |

**DO SOMETHING minus DO MINIMUM**

| Route | | | | | Flow Differences (vehicles) | | | | Time Differences (seconds) | | | | Weighted Time Changes (mins vehicles) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SATURN [15] | Vissim [16] | Flow Comparison [16]-[15] [17] | % from Saturn [18] | SATURN [19] | Vissim [20] | Flow Comparison [20]-[19] [21] | % from Saturn [22] | SATURN [23] | Vissim [24] | Flow Comparison [24]-[23] [25] | % from Saturn [26] |
| 1 | | | | | 440 | 440 | 0 | 0.0% | 3 | 1 | -2 | -66.7% | 9200 | 6352 | -2,848 | -31.0% |
| 2 | | | | | 197 | 187 | -10 | -5.1% | 35 | 21 | -14 | -40.0% | 11444 | 6030 | -5,414 | -47.3% |
| 3 | | | | | 35 | 32 | -3 | -8.6% | 13 | 2 | -11 | -84.6% | 835 | 745 | -90 | -10.8% |
| 4 | | | | | 3 | 1 | -2 | -66.7% | 118 | 18 | -100 | -84.7% | 2112 | 1830 | -282 | -13.4% |
| 5 | | | | | -47 | -50 | -3 | 6.4% | 0 | 7 | 7 | #DIV/0! | 369 | 372 | 3 | 0.8% |
| 6 | | | | | -6 | -4 | 2 | -33.3% | 63 | -1 | -64 | -101.6% | 1099 | 694 | -405 | -36.9% |
| 7 | | | | | -8 | -9 | -1 | 12.5% | 128 | -1 | -129 | -100.8% | 44 | 31 | -13 | -29.5% |
| 8 | | | | | 4 | 4 | 0 | 0.0% | -3 | 5 | 8 | -266.7% | 421 | 271 | -150 | -35.6% |
| **TOTAL** | | | | | 618 | 601 | **-17** | **-2.8%** | 357 | 52 | **-305** | **-85.4%** | 25,524 | 16,325 | **-9,199** | **-36.0%** |

**Table 4.4 A13 Manorway junction, 17:00-18:00, 2045**

*- National Highway's Data and Analysis*
*- Comparison Analysis completed and presented by Thurrock*

**DO MINIMUM**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| 1 | 2,687 | 2,919 | 232 | 8.6% | 3090 | 3078 | -12 | -0.4% | 149 | 105 | -44 | -29.5% | 7,649 | 5,391 | -2,258 | -29.5% |
| 2 | 4,464 | 2,934 | -1,530 | -34.3% | 3031 | 3020 | -11 | -0.4% | 205 | 109 | -96 | -46.8% | 10,374 | 5,468 | -4,906 | -47.3% |
| 3 | 4,253 | 4,088 | -165 | -3.9% | 179 | 172 | -7 | -3.9% | 245 | 242 | -3 | -1.2% | 733 | 694 | -39 | -5.3% |
| 4 | 3,822 | 4,009 | 187 | 4.9% | 443 | 430 | -13 | -2.9% | 248 | 224 | -24 | -9.7% | 1837 | 1602 | -235 | -12.8% |
| 5 | 3,280 | 3,309 | 29 | 0.9% | 110 | 108 | -2 | -1.8% | 206 | 206 | 0 | 0.0% | 377 | 369 | -8 | -2.1% |
| 6 | 3,660 | 3,527 | -133 | -3.6% | 232 | 222 | -10 | -4.3% | 335 | 290 | -45 | -13.4% | 1295 | 1075 | -220 | -17.0% |
| 7 | 4,446 | 3,329 | -1,117 | -25.1% | 8 | 8 | 0 | 0.0% | 353 | 211 | -142 | -40.2% | 49 | 29 | -20 | -40.8% |
| 8 | 4,472 | 3,345 | -1,127 | -25.2% | 103 | 99 | -4 | -3.9% | 331 | 213 | -118 | -35.6% | 568 | 352 | -216 | -38.0% |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **81** | **69** | | |
| **TOTAL** | 31,084 | 27,460 | **-3,624** | **-11.7%** | 7,196 | 7,137 | **-59** | **-0.8%** | 2,072 | 1,600 | **-472** | **-22.8%** | 22,882 | 14,980 | **-7,902** | **-34.5%** |

**DO SOMETHING**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [9] | % from Saturn [10] | SATURN | Vissim | Time (Vissim - SATURN) [11] | % from Saturn [12] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [13] | % from Saturn [14] |
| 1 | 2,687 | 2,919 | 232 | 8.6% | 3,780 | 3,734 | -46 | -1.2% | 156 | 110 | -46 | -29.5% | 9,850 | 6,853 | -2,997 | -30.4% |
| 2 | 4,464 | 2,934 | -1,530 | -34.3% | 3,500 | 3,452 | -48 | -1.4% | 247 | 140 | -107 | -43.3% | 14,385 | 8,053 | -6,332 | -44.0% |
| 3 | 4,253 | 4,088 | -165 | -3.9% | 190 | 167 | -23 | -12.1% | 261 | 246 | -15 | -5.7% | 825 | 685 | -140 | -17.0% |
| 4 | 3,822 | 4,009 | 187 | 4.9% | 471 | 453 | -18 | -3.8% | 444 | 246 | -198 | -44.6% | 3483 | 1858 | -1,625 | -46.7% |
| 5 | 3,280 | 3,309 | 29 | 0.9% | 101 | 98 | -3 | -3.0% | 205 | 221 | 16 | 7.8% | 345 | 359 | 14 | 4.1% |
| 6 | 3,660 | 3,527 | -133 | -3.6% | 95 | 93 | -2 | -2.1% | 538 | 281 | -257 | -47.8% | 852 | 435 | -417 | -48.9% |
| 7 | 4,446 | 3,329 | -1,117 | -25.1% | 14 | 15 | 1 | 7.1% | 311 | 203 | -108 | -34.7% | 73 | 52 | -21 | -28.8% |
| 8 | 4,472 | 3,345 | -1,127 | -25.2% | 89 | 84 | -5 | -5.6% | 319 | 220 | -99 | -31.0% | 473 | 308 | -165 | -34.9% |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **101** | **62** | | |
| **TOTAL** | 31,084 | 27,460 | **-3,624** | **-11.7%** | 8,240 | 8,096 | **-144** | **-1.7%** | 2,481 | 1,667 | **-814** | **-32.8%** | 30,286 | 18,603 | **-11,683** | **-38.6%** |

**DO SOMETHING minus DO MINIMUM**

| Route | | | | | Flow Differences (vehicles) | | | | Time Differences (seconds) | | | | Weighted Time Changes (mins vehicles) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SATURN [15] | Vissim [16] | Flow Comparison [16]-[15] [17] | % from Saturn [18] | SATURN [19] | Vissim [20] | Flow Comparison [20]-[19] [21] | % from Saturn [22] | SATURN [23] | Vissim [24] | Flow Comparison [24]-[23] [25] | % from Saturn [26] |
| 1 | | | | | 690 | 656 | -34 | -4.9% | 7 | 5 | -2 | -28.6% | 9200 | 6352 | -2,848 | -31.0% |
| 2 | | | | | 469 | 432 | -37 | -7.9% | 42 | 31 | -11 | -26.2% | 11444 | 6030 | -5,414 | -47.3% |
| 3 | | | | | 11 | -5 | -16 | -145.5% | 16 | 4 | -12 | -75.0% | 835 | 745 | -90 | -10.8% |
| 4 | | | | | 28 | 23 | -5 | -17.9% | 196 | 22 | -174 | -88.8% | 2112 | 1830 | -282 | -13.4% |
| 5 | | | | | -9 | -10 | -1 | 11.1% | -1 | 15 | 16 | -1600.0% | 369 | 372 | 3 | 0.8% |
| 6 | | | | | -137 | -129 | 8 | -5.8% | 203 | -9 | -212 | -104.4% | 1099 | 694 | -405 | -36.9% |
| 7 | | | | | 6 | 7 | 1 | 16.7% | -42 | -8 | 34 | -81.0% | 44 | 31 | -13 | -29.5% |
| 8 | | | | | -14 | -15 | -1 | 7.1% | -12 | 7 | 19 | -158.3% | 421 | 271 | -150 | -35.6% |
| **TOTAL** | | | | | 1,044 | 959 | **-85** | **-8.1%** | 409 | 67 | **-342** | **-83.6%** | 25,524 | 16,325 | **-9,199** | **-36.0%** |

## COMPARATIVE ANALYSIS AT MANORWAY JUNCTION - Summary

**Table 4.1 A13 Manorway junction, 07:00-08:00, 2030 (REP1-187)**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| DO MINIMUM | 31,084 | 27,460 | **-3,624** | **-11.7%** | 6,640 | 6,602 | **-38** | **-0.6%** | 2,015 | 1,552 | **-463** | **-23.0%** | 20,519 | 13,735 | **-6,784** | **-33.1%** |
| DO SOMETHING | 31,084 | 27,460 | **-3,624** | **-11.7%** | 7,101 | 7,042 | **-59** | **-0.8%** | 2,322 | 1,583 | **-739** | **-31.8%** | 23,994 | 15,385 | **-8,609** | **-35.9%** |

**Table 4.2 A13 Manorway junction, 17:00-18:00, 2030 (REP1-187)**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| DO MINIMUM | 31,084 | 27,460 | **-3,624** | **-11.7%** | 6,637 | 6,585 | **-52** | **-0.8%** | 1,929 | 1,568 | **-361** | **-18.7%** | 20,256 | 13,701 | **-6,555** | **-32.4%** |
| DO SOMETHING | 31,084 | 27,460 | **-3,624** | **-11.7%** | 7,758 | 7,696 | **-62** | **-0.8%** | 2,109 | 1,594 | **-515** | **-24.4%** | 23,994 | 15,385 | **-8,609** | **-35.9%** |

**Table 4.3 A13 Manorway junction, 07:00-08:00, 2045**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| DO MINIMUM | 31,084 | 27,460 | **-3,624** | **-11.7%** | 6,975 | 6,925 | **-50** | **-0.7%** | 2,237 | 1,561 | **-676** | **-30.2%** | 22,766 | 14,468 | **-8,298** | **-36.4%** |
| DO SOMETHING | 31,084 | 27,460 | **-3,624** | **-11.7%** | 7,593 | 7,526 | **-67** | **-0.9%** | 2,594 | 1,613 | **-981** | **-37.8%** | 27,279 | 16,832 | **-10,447** | **-38.3%** |

**Table 4.4 A13 Manorway junction, 17:00-18:00, 2045**

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| DO MINIMUM | 31,084 | 27,460 | **-3,624** | **-11.7%** | 7,196 | 7,137 | **-59** | **-0.8%** | 2,072 | 1,600 | **-472** | **-22.8%** | 22,882 | 14,980 | **-7,902** | **-34.5%** |
| DO SOMETHING | 31,084 | 27,460 | **-3,624** | **-11.7%** | 8,240 | 8,096 | **-144** | **-1.7%** | 2,481 | 1,667 | **-814** | **-32.8%** | 30,286 | 18,603 | **-11,683** | **-38.6%** |

## COMPARATIVE ANALYSIS AT ORSETT COCK JUNCTION

**Table 4.5 A13 Orsett Cock junction, 07:00-08:00, 2030**

*- National Highway's Data and Analysis*
*- Comparison Analysis completed and presented by Thurrock*

| DO MINIMUM | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| 1-->2 | 2,055 | 2,122 | 67 | 3.3% | 155 | 196 | 41 | 26.5% | 107 | 123 | 16 | 15.0% | 277 | 401 | 124 | 44.8% |
| 1-->3 | 1,898 | 1,396 | -502 | -26.4% | 67 | 61 | -6 | -9.0% | 159 | 118 | -41 | -25.8% | 178 | 120 | -58 | -32.6% |
| 1-->4 | 2,940 | 1,347 | -1,593 | -54.2% | 77 | 79 | 2 | 2.6% | 181 | 107 | -74 | -40.9% | 232 | 141 | -91 | -39.2% |
| 1-->5 | 2,301 | 1,533 | -768 | -33.4% | 211 | 101 | -110 | -52.1% | 163 | 125 | -38 | -23.3% | 572 | 210 | -362 | -63.3% |
| 1-->6 | 3,636 | 3,025 | -611 | -16.8% | 140 | 233 | 93 | 66.4% | 237 | 193 | -44 | -18.6% | 552 | 748 | 196 | 35.5% |
| 1-->8 | 3,386 | 2,439 | -947 | -28.0% | 93 | 43 | -50 | -53.8% | 223 | 171 | -52 | -23.3% | 346 | 123 | -223 | -64.5% |
| 2-->1 | 2,160 | 2,360 | 200 | 9.3% | 209 | 284 | 75 | 35.9% | 152 | 161 | 9 | 5.9% | 529 | 760 | 231 | 43.7% |
| 2-->3 | 1,603 | 1,653 | 50 | 3.1% | 0 | 7 | 7 | #DIV/0! | 116 | 100 | -16 | -13.8% | 0 | 12 | 12 | #DIV/0! |
| 2-->4 | 2,645 | 1,605 | -1,040 | -39.3% | 77 | 141 | 64 | 83.1% | 137 | 90 | -47 | -34.3% | 176 | 210 | 34 | 19.3% |
| 2-->5 | 2,006 | 1,791 | -215 | -10.7% | 580 | 504 | -76 | -13.1% | 119 | 107 | -12 | -10.1% | 1152 | 901 | -251 | -21.8% |
| 2-->6 | 3,341 | 3,177 | -164 | -4.9% | 3323 | 3627 | 304 | 9.1% | 193 | 118 | -75 | -38.9% | 10,711 | 7130 | -3,581 | -33.4% |
| 2-->8 | 3,091 | 3,315 | 224 | 7.2% | 299 | 392 | 93 | 31.1% | 180 | 131 | -49 | -27.2% | 897 | 856 | -41 | -4.6% |
| 3-->1 | 1,853 | 1,590 | -263 | -14.2% | 341 | 108 | -233 | -68.3% | 137 | 144 | 7 | 5.1% | 778 | 259 | -519 | -66.7% |
| 3-->2 | 2,096 | 2,215 | 119 | 5.7% | 0 | 3 | 3 | #DIV/0! | 136 | 161 | 25 | 18.4% | 0 | 8 | 8 | #DIV/0! |
| 3-->4 | 2,338 | 835 | -1,503 | -64.3% | 7 | 60 | 53 | 757.1% | 122 | 73 | -49 | -40.2% | 14 | 73 | 59 | 421.4% |
| 3-->5 | 1,699 | 1,021 | -678 | -39.9% | 98 | 288 | 190 | 193.9% | 104 | 91 | -13 | -12.5% | 170 | 435 | 265 | 155.9% |
| 3-->6 | 3,034 | 2,513 | -521 | -17.2% | 314 | 170 | -144 | -45.9% | 178 | 158 | -20 | -11.2% | 934 | 449 | -485 | -51.9% |
| 3-->8 | 2,784 | 1,927 | -857 | -30.8% | 36 | 29 | -7 | -19.4% | 165 | 137 | -28 | -17.0% | 99 | 66 | -33 | -33.3% |
| 4-->1 | 3,027 | 1,431 | -1,596 | -52.7% | 274 | 200 | -74 | -27.0% | 210 | 217 | 7 | 3.3% | 958 | 725 | -233 | -24.3% |
| 4-->2 | 3,270 | 2,056 | -1,214 | -37.1% | 128 | 231 | 103 | 80.5% | 209 | 235 | 26 | 12.4% | 445 | 903 | 458 | 102.9% |
| 4-->3 | 3,113 | 1,330 | -1,783 | -57.3% | 12 | 29 | 17 | 141.7% | 261 | 230 | -31 | -11.9% | 52 | 111 | 59 | 113.5% |
| 4-->5 | 2,873 | 862 | -2,011 | -70.0% | 0 | 71 | 71 | #DIV/0! | 177 | 164 | -13 | -7.3% | 0 | 194 | 194 | #DIV/0! |
| 4-->6 | 4,208 | 2,354 | -1,854 | -44.1% | 207 | 167 | -40 | -19.3% | 251 | 232 | -19 | -7.6% | 867 | 645 | -222 | -25.6% |
| 4-->8 | 3,958 | 1,768 | -2,190 | -55.3% | 0 | 8 | 8 | #DIV/0! | 238 | 211 | -27 | -11.3% | 0 | 28 | 28 | #DIV/0! |
| 5-->1 | 2,208 | 1,465 | -743 | -33.7% | 0 | 145 | 145 | #DIV/0! | 159 | 157 | -2 | -1.3% | 0 | 379 | 379 | #DIV/0! |
| 5-->2 | 2,451 | 2,090 | -361 | -14.7% | 617 | 433 | -184 | -29.8% | 158 | 174 | 16 | 10.1% | 1623 | 1255 | -368 | -22.7% |
| 5-->3 | 2,294 | 1,364 | -930 | -40.5% | 92 | 62 | -30 | -32.6% | 210 | 169 | -41 | -19.5% | 322 | 175 | -147 | -45.7% |
| 5-->4 | 3,336 | 1,315 | -2,021 | -60.6% | 0 | 15 | 15 | #DIV/0! | 231 | 158 | -73 | -31.6% | 0 | 40 | 40 | #DIV/0! |
| 5-->6 | 3,389 | 2,387 | -1,002 | -29.6% | 0 | 16 | 16 | #DIV/0! | 201 | 171 | -30 | -14.9% | 0 | 46 | 46 | #DIV/0! |
| 5-->8 | 3,139 | 1,802 | -1,337 | -42.6% | 0 | 0 | 0 | #DIV/0! | 187 | 150 | -37 | -19.8% | 0 | 0 | 0 | #DIV/0! |
| 6-->1 | 3,082 | 2,770 | -312 | -10.1% | 238 | 293 | 55 | 23.1% | 173 | 153 | -20 | -11.6% | 684 | 749 | 65 | 9.5% |
| 6-->2 | 3,325 | 3,347 | 22 | 0.7% | 3061 | 3222 | 161 | 5.3% | 171 | 122 | -49 | -28.7% | 8738 | 6537 | -2,201 | -25.2% |
| 6-->3 | 3,168 | 2,669 | -499 | -15.8% | 184 | 105 | -79 | -42.9% | 223 | 166 | -57 | -25.6% | 685 | 290 | -395 | -57.7% |
| 6-->4 | 4,210 | 2,621 | -1,589 | -37.7% | 51 | 49 | -2 | -3.9% | 245 | 155 | -90 | -36.7% | 208 | 127 | -81 | -38.9% |
| 6-->5 | 3,571 | 2,807 | -764 | -21.4% | 0 | 17 | 17 | #DIV/0! | 227 | 173 | -54 | -23.8% | 0 | 49 | 49 | #DIV/0! |
| 6-->8 | 4,656 | 3,713 | -943 | -20.3% | 0 | 0 | 0 | #DIV/0! | 287 | 219 | -68 | -23.7% | 0 | 0 | 0 | #DIV/0! |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **212** | **191** | | |
| **TOTAL** | 104,144 | 74,015 | **-30,129** | **-28.9%** | 10,891 | 11,389 | **498** | **4.6%** | 6,627 | 5,564 | **-1,063** | **-16.0%** | 32,199 | 25,155 | **-7,044** | **-21.9%** |

| DO SOMETHING | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [9] | % from Saturn [10] | SATURN | Vissim | Time (Vissim - SATURN) [11] | % from Saturn [12] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [13] | % from Saturn [14] |
| 1-->2 | 2,055 | 2,122 | 67 | 3.3% | 124 | 161 | 37 | 29.8% | 127 | 193 | 66 | 52.0% | 263 | 517 | 254 | 96.6% |
| 1-->3 | 1,898 | 1,396 | -502 | -26.4% | 32 | 29 | -3 | -9.4% | 173 | 188 | 15 | 8.7% | 92 | 91 | -1 | -1.1% |
| 1-->4 | 2,940 | 1,347 | -1,593 | -54.2% | 52 | 55 | 3 | 5.8% | 190 | 177 | -13 | -6.8% | 165 | 162 | -3 | -1.8% |
| 1-->5 | 2,301 | 1,533 | -768 | -33.4% | 108 | 36 | -72 | -66.7% | 179 | 199 | 20 | 11.2% | 322 | 120 | -202 | -62.7% |
| 1-->6 | 3,636 | 3,025 | -611 | -16.8% | 190 | 224 | 34 | 17.9% | 222 | 261 | 39 | 17.6% | 704 | 976 | 272 | 38.6% |
| 1-->8 | 3,386 | 2,439 | -947 | -28.0% | 117 | 156 | 39 | 33.3% | 194 | 265 | 71 | 36.6% | 378 | 689 | 311 | 82.3% |
| 2-->1 | 2,160 | 2,360 | 200 | 9.3% | 78 | 149 | 71 | 91.0% | 180 | 183 | 3 | 1.7% | 234 | 455 | 221 | 94.4% |
| 2-->3 | 1,603 | 1,653 | 50 | 3.1% | 0 | 8 | 8 | #DIV/0! | 138 | 111 | -27 | -19.6% | 0 | 15 | 15 | #DIV/0! |
| 2-->4 | 2,645 | 1,605 | -1,040 | -39.3% | 28 | 87 | 59 | 210.7% | 155 | 101 | -54 | -34.8% | 72 | 146 | 74 | 102.8% |
| 2-->5 | 2,006 | 1,791 | -215 | -10.7% | 390 | 258 | -132 | -33.8% | 144 | 123 | -21 | -14.6% | 934 | 528 | -406 | -43.5% |
| 2-->6 | 3,341 | 3,177 | -164 | -4.9% | 2676 | 2794 | 118 | 4.4% | 187 | 120 | -67 | -35.8% | 8351 | 5603 | -2,748 | -32.9% |
| 2-->8 | 3,091 | 3,315 | 224 | 7.2% | 219 | 234 | 15 | 6.8% | 159 | 188 | 29 | 18.2% | 580 | 735 | 155 | 26.7% |
| 3-->1 | 1,853 | 1,590 | -263 | -14.2% | 167 | 28 | -139 | -83.2% | 162 | 183 | 21 | 13.0% | 452 | 86 | -366 | -81.0% |
| 3-->2 | 2,096 | 2,215 | 119 | 5.7% | 0 | 4 | 4 | #DIV/0! | 179 | 212 | 33 | 18.4% | 0 | 14 | 14 | #DIV/0! |
| 3-->4 | 2,338 | 835 | -1,503 | -64.3% | 6 | 58 | 52 | 866.7% | 137 | 101 | -36 | -26.3% | 14 | 97 | 83 | 592.9% |
| 3-->5 | 1,699 | 1,021 | -678 | -39.9% | 93 | 243 | 150 | 161.3% | 126 | 123 | -3 | -2.4% | 195 | 497 | 302 | 154.9% |
| 3-->6 | 3,034 | 2,513 | -521 | -17.2% | 408 | 267 | -141 | -34.6% | 170 | 185 | 15 | 8.8% | 1153 | 822 | -331 | -28.7% |
| 3-->8 | 2,784 | 1,927 | -857 | -30.8% | 46 | 27 | -19 | -41.3% | 141 | 188 | 47 | 33.3% | 108 | 85 | -23 | -21.3% |
| 4-->1 | 3,027 | 1,431 | -1,596 | -52.7% | 160 | 125 | -35 | -21.9% | 212 | 185 | -27 | -12.7% | 566 | 386 | -180 | -31.8% |
| 4-->2 | 3,270 | 2,056 | -1,214 | -37.1% | 96 | 222 | 126 | 131.3% | 229 | 214 | -15 | -6.6% | 367 | 792 | 425 | 115.8% |
| 4-->3 | 3,113 | 1,330 | -1,783 | -57.3% | 10 | 33 | 23 | 230.0% | 273 | 209 | -64 | -23.4% | 46 | 115 | 69 | 150.0% |
| 4-->5 | 2,873 | 862 | -2,011 | -70.0% | 0 | 63 | 63 | #DIV/0! | 176 | 125 | -51 | -29.0% | 0 | 131 | 131 | #DIV/0! |
| 4-->6 | 4,208 | 2,354 | -1,854 | -44.1% | 298 | 263 | -35 | -11.7% | 220 | 187 | -33 | -15.0% | 1091 | 818 | -273 | -25.0% |
| 4-->8 | 3,958 | 1,768 | -2,190 | -55.3% | 0 | 0 | 0 | #DIV/0! | 191 | 190 | -1 | -0.5% | 0 | 0 | 0 | #DIV/0! |
| 5-->1 | 2,208 | 1,465 | -743 | -33.7% | 0 | 138 | 138 | #DIV/0! | 160 | 158 | -2 | -1.3% | 0 | 363 | 363 | #DIV/0! |
| 5-->2 | 2,451 | 2,090 | -361 | -14.7% | 480 | 291 | -189 | -39.4% | 178 | 187 | 9 | 5.1% | 1420 | 906 | -514 | -36.2% |
| 5-->3 | 2,294 | 1,364 | -930 | -40.5% | 80 | 52 | -28 | -35.0% | 221 | 182 | -39 | -17.6% | 295 | 158 | -137 | -46.4% |
| 5-->4 | 3,336 | 1,315 | -2,021 | -60.6% | 0 | 14 | 14 | #DIV/0! | 238 | 171 | -67 | -28.2% | 0 | 40 | 40 | #DIV/0! |
| 5-->6 | 3,389 | 2,387 | -1,002 | -29.6% | 0 | 17 | 17 | #DIV/0! | 168 | 159 | -9 | -5.4% | 0 | 45 | 45 | #DIV/0! |
| 5-->8 | 3,139 | 1,802 | -1,337 | -42.6% | 0 | 0 | 0 | #DIV/0! | 139 | 163 | 24 | 17.3% | 0 | 0 | 0 | #DIV/0! |
| 6-->1 | 3,082 | 2,770 | -312 | -10.1% | 190 | 308 | 118 | 62.1% | 148 | 152 | 4 | 2.7% | 468 | 780 | 312 | 66.7% |
| 6-->2 | 3,325 | 3,347 | 22 | 0.7% | 2019 | 2485 | 466 | 23.1% | 165 | 127 | -38 | -23.0% | 5552 | 5265 | -287 | -5.2% |
| 6-->3 | 3,168 | 2,669 | -499 | -15.8% | 135 | 85 | -50 | -37.0% | 208 | 176 | -32 | -15.4% | 469 | 249 | -220 | -46.9% |
| 6-->4 | 4,210 | 2,621 | -1,589 | -37.7% | 42 | 39 | -3 | -7.1% | 224 | 165 | -59 | -26.3% | 157 | 107 | -50 | -31.8% |
| 6-->5 | 3,571 | 2,807 | -764 | -21.4% | 0 | 16 | 16 | #DIV/0! | 213 | 188 | -25 | -11.7% | 0 | 50 | 50 | #DIV/0! |
| 6-->8 | 4,656 | 3,713 | -943 | -20.3% | 0 | 0 | 0 | #DIV/0! | 228 | 253 | 25 | 11.0% | 0 | 0 | 0 | #DIV/0! |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **176** | **183** | | |
| **TOTAL** | 104,144 | 74,015 | **-30,129** | **-28.9%** | 8,244 | 8,969 | **725** | **8.8%** | 6,554 | 6,292 | **-262** | **-4.0%** | 24,448 | 21,843 | **-2,605** | **-10.7%** |

| DO SOMETHING minus DO MINIMUM | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | | | | | Flow Differences (vehicles) | | | | Time Differences (seconds) | | | | Weighted Time Changes (mins vehicles) | | | |
| | | | | | SATURN [15] | Vissim [16] | Flow Comparison [16]-[15] [17] | % from Saturn [18] | SATURN [19] | Vissim [20] | Flow Comparison [20]-[19] [21] | % from Saturn [22] | SATURN [23] | Vissim [24] | Flow Comparison [24]-[23] [25] | % from Saturn [26] |
| 1-->2 | | | | | -31 | -35 | -4 | 12.9% | 20 | 70 | 50 | 250.0% | -14 | 116 | 130 | -928.6% |
| 1-->3 | | | | | -35 | -32 | 3 | -8.6% | 14 | 70 | 56 | 400.0% | -86 | -29 | 57 | -66.3% |
| 1-->4 | | | | | -25 | -24 | 1 | -4.0% | 9 | 70 | 61 | 677.8% | -67 | 21 | 88 | -131.3% |
| 1-->5 | | | | | -103 | -65 | 38 | -36.9% | 16 | 74 | 58 | 362.5% | -250 | -90 | 160 | -64.0% |
| 1-->6 | | | | | 50 | -9 | -59 | -118.0% | -15 | 68 | 83 | -553.3% | 152 | 228 | 76 | 50.0% |
| 1-->8 | | | | | 24 | 113 | 89 | 370.8% | -29 | 94 | 123 | -424.1% | 32 | 566 | 534 | 1668.8% |
| 2-->1 | | | | | -131 | -135 | -4 | 3.1% | 28 | 22 | -6 | -21.4% | -295 | -305 | -10 | 3.4% |
| 2-->3 | | | | | 0 | 1 | 1 | #DIV/0! | 22 | 11 | -11 | -50.0% | 0 | 3 | 3 | #DIV/0! |
| 2-->4 | | | | | -49 | -54 | -5 | 10.2% | 18 | 11 | -7 | -38.9% | -104 | -64 | 40 | -38.5% |
| 2-->5 | | | | | -190 | -246 | -56 | 29.5% | 25 | 16 | -9 | -36.0% | -218 | -373 | -155 | 71.1% |
| 2-->6 | | | | | -647 | -833 | -186 | 28.7% | -6 | 2 | 8 | -133.3% | -2360 | -1527 | 833 | -35.3% |
| 2-->8 | | | | | -80 | -158 | -78 | 97.5% | -21 | 57 | 78 | -371.4% | -317 | -121 | 196 | -61.8% |
| 3-->1 | | | | | -174 | -80 | 94 | -54.0% | 25 | 39 | 14 | 56.0% | -326 | -173 | 153 | -46.9% |
| 3-->2 | | | | | 0 | 1 | 1 | #DIV/0! | 43 | 51 | 8 | 18.6% | 0 | 6 | 6 | #DIV/0! |
| 3-->4 | | | | | -1 | -2 | -1 | 100.0% | 15 | 28 | 13 | 86.7% | 0 | 24 | 24 | #DIV/0! |
| 3-->5 | | | | | -5 | -45 | -40 | 800.0% | 22 | 32 | 10 | 45.5% | 25 | 62 | 37 | 148.0% |
| 3-->6 | | | | | 94 | 97 | 3 | 3.2% | -8 | 27 | 35 | -437.5% | 219 | 373 | 154 | 70.3% |
| 3-->8 | | | | | 10 | -2 | -12 | -120.0% | -24 | 51 | 75 | -312.5% | 9 | 19 | 10 | 111.1% |
| 4-->1 | | | | | -114 | -75 | 39 | -34.2% | 2 | -32 | -34 | -1700.0% | -392 | -339 | 53 | -13.5% |
| 4-->2 | | | | | -32 | -9 | 23 | -71.9% | 20 | -21 | -41 | -205.0% | -78 | -111 | -33 | 42.3% |
| 4-->3 | | | | | -2 | 4 | 6 | -300.0% | 12 | -21 | -33 | -275.0% | -6 | 4 | 10 | -166.7% |
| 4-->5 | | | | | 0 | -8 | -8 | #DIV/0! | -1 | -39 | -38 | 3800.0% | 0 | -63 | -63 | #DIV/0! |
| 4-->6 | | | | | 91 | 96 | 5 | 5.5% | -31 | -45 | -14 | 45.2% | 224 | 173 | -51 | -22.8% |
| 4-->8 | | | | | 0 | -8 | -8 | #DIV/0! | -47 | -21 | 26 | -55.3% | 0 | -28 | -28 | #DIV/0! |
| 5-->1 | | | | | 0 | -7 | -7 | #DIV/0! | 1 | 1 | 0 | 0.0% | 0 | -16 | -16 | #DIV/0! |
| 5-->2 | | | | | -137 | -142 | -5 | 3.6% | 20 | 13 | -7 | -35.0% | -203 | -349 | -146 | 71.9% |
| 5-->3 | | | | | -12 | -10 | 2 | -16.7% | 11 | 13 | 2 | 18.2% | -27 | -17 | 10 | -37.0% |
| 5-->4 | | | | | 0 | -1 | -1 | #DIV/0! | 7 | 13 | 6 | 85.7% | 0 | 0 | 0 | #DIV/0! |
| 5-->6 | | | | | 0 | 1 | 1 | #DIV/0! | -33 | -12 | 21 | -63.6% | 0 | -1 | -1 | #DIV/0! |
| 5-->8 | | | | | 0 | 0 | 0 | #DIV/0! | -48 | 13 | 61 | -127.1% | 0 | 0 | 0 | #DIV/0! |
| 6-->1 | | | | | -48 | 15 | 63 | -131.3% | -25 | -1 | 24 | -96.0% | -216 | 31 | 247 | -114.4% |
| 6-->2 | | | | | -1,042 | -737 | 305 | -29.3% | -6 | 5 | 11 | -183.3% | -3186 | -1272 | 1,914 | -60.1% |
| 6-->3 | | | | | -49 | -20 | 29 | -59.2% | -15 | 10 | 25 | -166.7% | -216 | -41 | 175 | -81.0% |
| 6-->4 | | | | | -9 | -10 | -1 | 11.1% | -21 | 10 | 31 | -147.6% | -51 | -20 | 31 | -60.8% |
| 6-->5 | | | | | 0 | -1 | -1 | #DIV/0! | -14 | 15 | 29 | -207.1% | 0 | 1 | 1 | #DIV/0! |
| 6-->8 | | | | | 0 | 0 | 0 | #DIV/0! | -59 | 34 | 93 | -157.6% | 0 | 0 | 0 | #DIV/0! |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TOTAL** | | | | | -2,647 | -2,420 | **227** | **-8.6%** | -73 | 728 | **801** | **-1097.3%** | -7,751 | -3,312 | **4,439** | **-57.3%** |

## COMPARATIVE ANALYSIS AT ORSETT COCK JUNCTION

**Table 4.6 A13 Orsett Cock junction, 17:00-18:00, 2030**

*- National Highway's Data and Analysis*
*- Comparison Analysis completed and presented by Thurrock*

| DO MINIMUM | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| 1-->2 | 2,055 | 2,122 | 67 | 3.3% | 172 | 242 | 70 | 40.7% | 113 | 134 | 21 | 18.6% | 323 | 540 | 217 | 67.2% |
| 1-->3 | 1,898 | 1,396 | -502 | -26.4% | 195 | 124 | -71 | -36.4% | 194 | 131 | -63 | -32.5% | 630 | 270 | -360 | -57.1% |
| 1-->4 | 2,940 | 1,347 | -1,593 | -54.2% | 272 | 40 | -232 | -85.3% | 213 | 115 | -98 | -46.0% | 965 | 77 | -888 | -92.0% |
| 1-->5 | 2,301 | 1,533 | -768 | -33.4% | 107 | 170 | 63 | 58.9% | 186 | 134 | -52 | -28.0% | 332 | 380 | 48 | 14.5% |
| 1-->6 | 3,636 | 3,025 | -611 | -16.8% | 130 | 236 | 106 | 81.5% | 233 | 185 | -48 | -20.6% | 504 | 726 | 222 | 44.0% |
| 1-->8 | 3,386 | 2,439 | -947 | -28.0% | 82 | 26 | -56 | -68.3% | 220 | 164 | -56 | -25.5% | 301 | 71 | -230 | -76.4% |
| 2-->1 | 2,160 | 2,360 | 200 | 9.3% | 93 | 133 | 40 | 43.0% | 142 | 161 | 19 | 13.4% | 220 | 357 | 137 | 62.3% |
| 2-->3 | 1,603 | 1,653 | 50 | 3.1% | 1 | 12 | 11 | 1100.0% | 124 | 103 | -21 | -16.9% | 2 | 21 | 19 | 950.0% |
| 2-->4 | 2,645 | 1,605 | -1,040 | -39.3% | 174 | 39 | -135 | -77.6% | 143 | 88 | -55 | -38.5% | 414 | 57 | -357 | -86.2% |
| 2-->5 | 2,006 | 1,791 | -215 | -10.7% | 598 | 490 | -108 | -18.1% | 116 | 107 | -9 | -7.8% | 1159 | 873 | -286 | -24.7% |
| 2-->6 | 3,341 | 3,177 | -164 | -4.9% | 2987 | 3220 | 233 | 7.8% | 163 | 114 | -49 | -30.1% | 8,095 | 6106 | -1,989 | -24.6% |
| 2-->8 | 3,091 | 3,315 | 224 | 7.2% | 126 | 191 | 65 | 51.6% | 150 | 127 | -23 | -15.3% | 316 | 404 | 88 | 27.8% |
| 3-->1 | 1,853 | 1,590 | -263 | -14.2% | 129 | 134 | 5 | 3.9% | 128 | 139 | 11 | 8.6% | 276 | 310 | 34 | 12.3% |
| 3-->2 | 2,096 | 2,215 | 119 | 5.7% | 0 | 5 | 5 | #DIV/0! | 138 | 163 | 25 | 18.1% | 0 | 14 | 14 | #DIV/0! |
| 3-->4 | 2,338 | 835 | -1,503 | -64.3% | 12 | 13 | 1 | 8.3% | 129 | 66 | -63 | -48.8% | 26 | 14 | -12 | -46.2% |
| 3-->5 | 1,699 | 1,021 | -678 | -39.9% | 96 | 215 | 119 | 124.0% | 102 | 85 | -17 | -16.7% | 164 | 304 | 140 | 85.4% |
| 3-->6 | 3,034 | 2,513 | -521 | -17.2% | 314 | 119 | -195 | -62.1% | 149 | 135 | -14 | -9.4% | 779 | 268 | -511 | -65.6% |
| 3-->8 | 2,784 | 1,927 | -857 | -30.8% | 6 | 4 | -2 | -33.3% | 137 | 114 | -23 | -16.8% | 14 | 8 | -6 | -42.9% |
| 4-->1 | 3,027 | 1,431 | -1,596 | -52.7% | 117 | 73 | -44 | -37.6% | 178 | 136 | -42 | -23.6% | 347 | 165 | -182 | -52.4% |
| 4-->2 | 3,270 | 2,056 | -1,214 | -37.1% | 93 | 177 | 84 | 90.3% | 187 | 161 | -26 | -13.9% | 290 | 474 | 184 | 63.4% |
| 4-->3 | 3,113 | 1,330 | -1,783 | -57.3% | 7 | 84 | 77 | 1100.0% | 268 | 157 | -111 | -41.4% | 31 | 220 | 189 | 609.7% |
| 4-->5 | 2,873 | 862 | -2,011 | -70.0% | 0 | 50 | 50 | #DIV/0! | 152 | 82 | -70 | -46.1% | 0 | 68 | 68 | #DIV/0! |
| 4-->6 | 4,208 | 2,354 | -1,854 | -44.1% | 106 | 105 | -1 | -0.9% | 198 | 132 | -66 | -33.3% | 350 | 231 | -119 | -34.0% |
| 4-->8 | 3,958 | 1,768 | -2,190 | -55.3% | 0 | 6 | 6 | #DIV/0! | 186 | 111 | -75 | -40.3% | 0 | 11 | 11 | #DIV/0! |
| 5-->1 | 2,208 | 1,465 | -743 | -33.7% | 71 | 30 | -41 | -57.7% | 143 | 131 | -12 | -8.4% | 170 | 65 | -105 | -61.8% |
| 5-->2 | 2,451 | 2,090 | -361 | -14.7% | 646 | 472 | -174 | -26.9% | 153 | 156 | 3 | 2.0% | 1642 | 1224 | -418 | -25.5% |
| 5-->3 | 2,294 | 1,364 | -930 | -40.5% | 132 | 277 | 145 | 109.8% | 234 | 152 | -82 | -35.0% | 515 | 704 | 189 | 36.7% |
| 5-->4 | 3,336 | 1,315 | -2,021 | -60.6% | 0 | 3 | 3 | #DIV/0! | 253 | 137 | -116 | -45.8% | 0 | 7 | 7 | #DIV/0! |
| 5-->6 | 3,389 | 2,387 | -1,002 | -29.6% | 0 | 24 | 24 | #DIV/0! | 164 | 127 | -37 | -22.6% | 0 | 51 | 51 | #DIV/0! |
| 5-->8 | 3,139 | 1,802 | -1,337 | -42.6% | 0 | 1 | 1 | #DIV/0! | 152 | 106 | -46 | -30.3% | 0 | 2 | 2 | #DIV/0! |
| 6-->1 | 3,082 | 2,770 | -312 | -10.1% | 301 | 516 | 215 | 71.4% | 163 | 149 | -14 | -8.6% | 818 | 1283 | 465 | 56.8% |
| 6-->2 | 3,325 | 3,347 | 22 | 0.7% | 3509 | 3920 | 411 | 11.7% | 172 | 124 | -48 | -27.9% | 10078 | 8099 | -1,979 | -19.6% |
| 6-->3 | 3,168 | 2,669 | -499 | -15.8% | 349 | 150 | -199 | -57.0% | 254 | 171 | -83 | -32.7% | 1475 | 427 | -1,048 | -71.1% |
| 6-->4 | 4,210 | 2,621 | -1,589 | -37.7% | 185 | 18 | -167 | -90.3% | 273 | 155 | -118 | -43.2% | 841 | 47 | -794 | -94.4% |
| 6-->5 | 3,571 | 2,807 | -764 | -21.4% | 0 | 14 | 14 | #DIV/0! | 246 | 174 | -72 | -29.3% | 0 | 41 | 41 | #DIV/0! |
| 6-->8 | 4,656 | 3,713 | -943 | -20.3% | 0 | 0 | 0 | #DIV/0! | 280 | 204 | -76 | -27.1% | 0 | 0 | 0 | #DIV/0! |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **215** | **162** | | |
| **TOTAL** | 104,144 | 74,015 | **-30,129** | **-28.9%** | 11,010 | 11,333 | **323** | **2.9%** | 6,436 | 4,830 | **-1,606** | **-25.0%** | 31,077 | 23,919 | **-7,158** | **-23.0%** |

| DO SOMETHING | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [9] | % from Saturn [10] | SATURN | Vissim | Time (Vissim - SATURN) [11] | % from Saturn [12] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [13] | % from Saturn [14] |
| 1-->2 | 2,055 | 2,122 | 67 | 3.3% | 133 | 201 | 68 | 51.1% | 140 | 196 | 56 | 40.0% | 310 | 656 | 346 | 111.6% |
| 1-->3 | 1,898 | 1,396 | -502 | -26.4% | 103 | 37 | -66 | -64.1% | 203 | 179 | -24 | -11.8% | 348 | 110 | -238 | -68.4% |
| 1-->4 | 2,940 | 1,347 | -1,593 | -54.2% | 147 | 103 | -44 | -29.9% | 215 | 167 | -48 | -22.3% | 527 | 286 | -241 | -45.7% |
| 1-->5 | 2,301 | 1,533 | -768 | -33.4% | 132 | 168 | 36 | 27.3% | 190 | 192 | 2 | 1.1% | 419 | 537 | 118 | 28.2% |
| 1-->6 | 3,636 | 3,025 | -611 | -16.8% | 151 | 207 | 56 | 37.1% | 228 | 244 | 16 | 7.0% | 574 | 842 | 268 | 46.7% |
| 1-->8 | 3,386 | 2,439 | -947 | -28.0% | 81 | 130 | 49 | 60.5% | 203 | 251 | 48 | 23.6% | 274 | 543 | 269 | 98.2% |
| 2-->1 | 2,160 | 2,360 | 200 | 9.3% | 34 | 65 | 31 | 91.2% | 194 | 496 | 302 | 155.7% | 110 | 537 | 427 | 388.2% |
| 2-->3 | 1,603 | 1,653 | 50 | 3.1% | 0 | 10 | 10 | #DIV/0! | 166 | 404 | 238 | 143.4% | 0 | 67 | 67 | #DIV/0! |
| 2-->4 | 2,645 | 1,605 | -1,040 | -39.3% | 69 | 120 | 51 | 73.9% | 178 | 392 | 214 | 120.2% | 205 | 783 | 578 | 282.0% |
| 2-->5 | 2,006 | 1,791 | -215 | -10.7% | 425 | 227 | -198 | -46.6% | 153 | 417 | 264 | 172.5% | 1087 | 1576 | 489 | 45.0% |
| 2-->6 | 3,341 | 3,177 | -164 | -4.9% | 2399 | 2628 | 229 | 9.5% | 191 | 118 | -73 | -38.2% | 7648 | 5174 | -2,474 | -32.3% |
| 2-->8 | 3,091 | 3,315 | 224 | 7.2% | 91 | 84 | -7 | -7.7% | 166 | 475 | 309 | 186.1% | 252 | 666 | 414 | 164.3% |
| 3-->1 | 1,853 | 1,590 | -263 | -14.2% | 43 | 59 | 16 | 37.2% | 177 | 218 | 41 | 23.2% | 127 | 214 | 87 | 68.5% |
| 3-->2 | 2,096 | 2,215 | 119 | 5.7% | 0 | 5 | 5 | #DIV/0! | 206 | 269 | 63 | 30.6% | 0 | 22 | 22 | #DIV/0! |
| 3-->4 | 2,338 | 835 | -1,503 | -64.3% | 10 | 102 | 92 | 920.0% | 162 | 114 | -48 | -29.6% | 27 | 193 | 166 | 614.8% |
| 3-->5 | 1,699 | 1,021 | -678 | -39.9% | 94 | 181 | 87 | 92.6% | 137 | 139 | 2 | 1.5% | 215 | 418 | 203 | 94.4% |
| 3-->6 | 3,034 | 2,513 | -521 | -17.2% | 333 | 129 | -204 | -61.3% | 175 | 191 | 16 | 9.1% | 970 | 410 | -560 | -57.7% |
| 3-->8 | 2,784 | 1,927 | -857 | -30.8% | 13 | 4 | -9 | -69.2% | 150 | 197 | 47 | 31.3% | 32 | 13 | -19 | -59.4% |
| 4-->1 | 3,027 | 1,431 | -1,596 | -52.7% | 63 | 26 | -37 | -58.7% | 211 | 177 | -34 | -16.1% | 221 | 77 | -144 | -65.2% |
| 4-->2 | 3,270 | 2,056 | -1,214 | -37.1% | 95 | 178 | 83 | 87.4% | 240 | 228 | -12 | -5.0% | 379 | 678 | 299 | 78.9% |
| 4-->3 | 3,113 | 1,330 | -1,783 | -57.3% | 6 | 85 | 79 | 1316.7% | 301 | 211 | -90 | -29.9% | 30 | 300 | 270 | 900.0% |
| 4-->5 | 2,873 | 862 | -2,011 | -70.0% | 0 | 37 | 37 | #DIV/0! | 171 | 98 | -73 | -42.7% | 0 | 60 | 60 | #DIV/0! |
| 4-->6 | 4,208 | 2,354 | -1,854 | -44.1% | 172 | 173 | 1 | 0.6% | 208 | 150 | -58 | -27.9% | 597 | 432 | -165 | -27.6% |
| 4-->8 | 3,958 | 1,768 | -2,190 | -55.3% | 0 | 0 | 0 | #DIV/0! | 183 | 156 | -27 | -14.8% | 0 | 0 | 0 | #DIV/0! |
| 5-->1 | 2,208 | 1,465 | -743 | -33.7% | 77 | 33 | -44 | -57.1% | 156 | 159 | 3 | 1.9% | 200 | 87 | -113 | -56.5% |
| 5-->2 | 2,451 | 2,090 | -361 | -14.7% | 531 | 351 | -180 | -33.9% | 185 | 211 | 26 | 14.1% | 1633 | 1232 | -401 | -24.6% |
| 5-->3 | 2,294 | 1,364 | -930 | -40.5% | 104 | 250 | 146 | 140.4% | 245 | 194 | -51 | -20.8% | 425 | 807 | 382 | 89.9% |
| 5-->4 | 3,336 | 1,315 | -2,021 | -60.6% | 0 | 53 | 53 | #DIV/0! | 258 | 182 | -76 | -29.5% | 0 | 160 | 160 | #DIV/0! |
| 5-->6 | 3,389 | 2,387 | -1,002 | -29.6% | 0 | 25 | 25 | #DIV/0! | 153 | 132 | -21 | -13.7% | 0 | 55 | 55 | #DIV/0! |
| 5-->8 | 3,139 | 1,802 | -1,337 | -42.6% | 0 | 0 | 0 | #DIV/0! | 128 | 139 | 11 | 8.6% | 0 | 0 | 0 | #DIV/0! |
| 6-->1 | 3,082 | 2,770 | -312 | -10.1% | 224 | 506 | 282 | 125.9% | 149 | 205 | 56 | 37.6% | 556 | 1,726 | 1,170 | 210.4% |
| 6-->2 | 3,325 | 3,347 | 22 | 0.7% | 2729 | 3462 | 733 | 26.9% | 178 | 165 | -13 | -7.3% | 8089 | 9526 | 1,437 | 17.8% |
| 6-->3 | 3,168 | 2,669 | -499 | -15.8% | 271 | 137 | -134 | -49.4% | 238 | 239 | 1 | 0.4% | 1075 | 547 | -528 | -49.1% |
| 6-->4 | 4,210 | 2,621 | -1,589 | -37.7% | 166 | 69 | -97 | -58.4% | 249 | 227 | -22 | -8.8% | 688 | 261 | -427 | -62.1% |
| 6-->5 | 3,571 | 2,807 | -764 | -21.4% | 0 | 11 | 11 | #DIV/0! | 224 | 252 | 28 | 12.5% | 0 | 46 | 46 | #DIV/0! |
| 6-->8 | 4,656 | 3,713 | -943 | -20.3% | 0 | 0 | 0 | #DIV/0! | 237 | 311 | 74 | 31.2% | 0 | 0 | 0 | #DIV/0! |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **188** | **239** | | |
| **TOTAL** | 104,144 | 74,015 | **-30,129** | **-28.9%** | 8,696 | 9,856 | **1,160** | **13.3%** | 6,948 | 8,095 | **1,147** | **16.5%** | 27,018 | 29,041 | **2,023** | **7.5%** |

| DO SOMETHING minus DO MINIMUM | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | | | | | Flow Differences (vehicles) | | | | Time Differences (seconds) | | | | Weighted Time Changes (mins vehicles) | | | |
| | | | | | SATURN [15] | Vissim [16] | Flow Comparison [16]-[15] [17] | % from Saturn [18] | SATURN [19] | Vissim [20] | Flow Comparison [20]-[19] [21] | % from Saturn [22] | SATURN [23] | Vissim [24] | Flow Comparison [24]-[23] [25] | % from Saturn [26] |
| 1-->2 | | | | | -39 | -41 | -2 | 5.1% | 27 | 62 | 35 | 129.6% | -13 | 116 | 129 | -992.3% |
| 1-->3 | | | | | -92 | -87 | 5 | -5.4% | 9 | 48 | 39 | 433.3% | -282 | -160 | 122 | -43.3% |
| 1-->4 | | | | | -125 | 63 | 188 | -150.4% | 2 | 52 | 50 | 2500.0% | -438 | 209 | 647 | -147.7% |
| 1-->5 | | | | | 25 | -2 | -27 | -108.0% | 4 | 58 | 54 | 1350.0% | 87 | 157 | 70 | 80.5% |
| 1-->6 | | | | | 21 | -29 | -50 | -238.1% | -5 | 59 | 64 | -1280.0% | 70 | 116 | 46 | 65.7% |
| 1-->8 | | | | | -1 | 104 | 105 | ########## | -17 | 87 | 104 | -611.8% | -27 | 472 | 499 | -1848.1% |
| 2-->1 | | | | | -59 | -68 | -9 | 15.3% | 52 | 335 | 283 | 544.2% | -110 | 180 | 290 | -263.6% |
| 2-->3 | | | | | -1 | -2 | -1 | 100.0% | 42 | 301 | 259 | 616.7% | -2 | 46 | 48 | -2400.0% |
| 2-->4 | | | | | -105 | 81 | 186 | -177.1% | 35 | 304 | 269 | 768.6% | -209 | 726 | 935 | -447.4% |
| 2-->5 | | | | | -173 | -263 | -90 | 52.0% | 37 | 310 | 273 | 737.8% | -72 | 703 | 775 | -1076.4% |
| 2-->6 | | | | | -588 | -592 | -4 | 0.7% | 28 | 4 | -24 | -85.7% | -447 | -932 | -485 | 108.5% |
| 2-->8 | | | | | -35 | -107 | -72 | 205.7% | 16 | 348 | 332 | 2075.0% | -64 | 262 | 326 | -509.4% |
| 3-->1 | | | | | -86 | -75 | 11 | -12.8% | 49 | 79 | 30 | 61.2% | -149 | -96 | 53 | -35.6% |
| 3-->2 | | | | | 0 | 0 | 0 | #DIV/0! | 68 | 106 | 38 | 55.9% | 0 | 8 | 8 | #DIV/0! |
| 3-->4 | | | | | -2 | 89 | 91 | -4550.0% | 33 | 48 | 15 | 45.5% | 1 | 179 | 178 | 17800.0% |
| 3-->5 | | | | | -2 | -34 | -32 | 1600.0% | 35 | 54 | 19 | 54.3% | 51 | 114 | 63 | 123.5% |
| 3-->6 | | | | | 19 | 10 | -9 | -47.4% | 26 | 56 | 30 | 115.4% | 191 | 142 | -49 | -25.7% |
| 3-->8 | | | | | 7 | 0 | -7 | -100.0% | 13 | 83 | 70 | 538.5% | 18 | 5 | -13 | -72.2% |
| 4-->1 | | | | | -54 | -47 | 7 | -13.0% | 33 | 41 | 8 | 24.2% | -126 | -88 | 38 | -30.2% |
| 4-->2 | | | | | 2 | 1 | -1 | -50.0% | 53 | 67 | 14 | 26.4% | 89 | 204 | 115 | 129.2% |
| 4-->3 | | | | | -1 | 1 | 2 | -200.0% | 33 | 54 | 21 | 63.6% | -1 | 80 | 81 | -8100.0% |
| 4-->5 | | | | | 0 | -13 | -13 | #DIV/0! | 19 | 16 | -3 | -15.8% | 0 | -8 | -8 | #DIV/0! |
| 4-->6 | | | | | 66 | 68 | 2 | 3.0% | 10 | 18 | 8 | 80.0% | 247 | 201 | -46 | -18.6% |
| 4-->8 | | | | | 0 | -6 | -6 | #DIV/0! | -3 | 45 | 48 | -1600.0% | 0 | -11 | -11 | #DIV/0! |
| 5-->1 | | | | | 6 | 3 | -3 | -50.0% | 13 | 28 | 15 | 115.4% | 30 | 22 | -8 | -26.7% |
| 5-->2 | | | | | -115 | -121 | -6 | 5.2% | 32 | 55 | 23 | 71.9% | -9 | 8 | 17 | -188.9% |
| 5-->3 | | | | | -28 | -27 | 1 | -3.6% | 11 | 42 | 31 | 281.8% | -90 | 103 | 193 | -214.4% |
| 5-->4 | | | | | 0 | 50 | 50 | #DIV/0! | 5 | 45 | 40 | 800.0% | 0 | 153 | 153 | #DIV/0! |
| 5-->6 | | | | | 0 | 1 | 1 | #DIV/0! | -11 | 5 | 16 | -145.5% | 0 | 4 | 4 | #DIV/0! |
| 5-->8 | | | | | 0 | -1 | -1 | #DIV/0! | -24 | 33 | 57 | -237.5% | 0 | -2 | -2 | #DIV/0! |
| 6-->1 | | | | | -77 | -10 | 67 | -87.0% | -14 | 56 | 70 | -500.0% | -262 | 443 | 705 | -269.1% |
| 6-->2 | | | | | -780 | -458 | 322 | -41.3% | 6 | 41 | 35 | 583.3% | -1989 | 1427 | 3,416 | -171.7% |
| 6-->3 | | | | | -78 | -13 | 65 | -83.3% | -16 | 68 | 84 | -525.0% | -400 | 120 | 520 | -130.0% |
| 6-->4 | | | | | -19 | 51 | 70 | -368.4% | -24 | 72 | 96 | -400.0% | -153 | 214 | 367 | -239.9% |
| 6-->5 | | | | | 0 | -3 | -3 | #DIV/0! | -22 | 78 | 100 | -454.5% | 0 | 5 | 5 | #DIV/0! |
| 6-->8 | | | | | 0 | 0 | 0 | #DIV/0! | -43 | 107 | 150 | -348.8% | 0 | 0 | 0 | #DIV/0! |
| TOTAL | | | | | -2,314 | -1,477 | 837 | -36.2% | 512 | 3,265 | 2,753 | 537.7% | -4,059 | 5,122 | 9,181 | -226.2% |

## COMPARATIVE ANALYSIS AT ORSETT COCK JUNCTION

**Table 4.7 A13 Orsett Cock junction, 07:00-08:00, 2045**

*- National Highway's Data and Analysis*
*- Comparison Analysis completed and presented by Thurrock*

| DO MINIMUM | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| 1-->2 | 2,055 | 2,122 | 67 | 3.3% | 171 | 213 | 42 | 24.6% | 111 | 127 | 16 | 14.4% | 316 | 451 | 135 | 42.7% |
| 1-->3 | 1,898 | 1,396 | -502 | -26.4% | 75 | 71 | -4 | -5.3% | 165 | 119 | -46 | -27.9% | 206 | 141 | -65 | -31.6% |
| 1-->4 | 2,940 | 1,347 | -1,593 | -54.2% | 102 | 102 | 0 | 0.0% | 185 | 108 | -77 | -41.6% | 315 | 184 | -131 | -41.6% |
| 1-->5 | 2,301 | 1,533 | -768 | -33.4% | 234 | 121 | -113 | -48.3% | 169 | 135 | -34 | -20.1% | 659 | 272 | -387 | -58.7% |
| 1-->6 | 3,636 | 3,025 | -611 | -16.8% | 172 | 266 | 94 | 54.7% | 254 | 260 | 6 | 2.4% | 729 | 1152 | 423 | 58.0% |
| 1-->8 | 3,386 | 2,439 | -947 | -28.0% | 99 | 52 | -47 | -47.5% | 240 | 238 | -2 | -0.8% | 397 | 207 | -190 | -47.9% |
| 2-->1 | 2,160 | 2,360 | 200 | 9.3% | 236 | 312 | 76 | 32.2% | 152 | 163 | 11 | 7.2% | 599 | 849 | 250 | 41.7% |
| 2-->3 | 1,603 | 1,653 | 50 | 3.1% | 0 | 7 | 7 | #DIV/0! | 118 | 101 | -17 | -14.4% | 0 | 12 | 12 | #DIV/0! |
| 2-->4 | 2,645 | 1,605 | -1,040 | -39.3% | 56 | 120 | 64 | 114.3% | 138 | 90 | -48 | -34.8% | 129 | 180 | 51 | 39.5% |
| 2-->5 | 2,006 | 1,791 | -215 | -10.7% | 615 | 528 | -87 | -14.1% | 122 | 116 | -6 | -4.9% | 1248 | 1024 | -224 | -17.9% |
| 2-->6 | 3,341 | 3,177 | -164 | -4.9% | 3398 | 3702 | 304 | 8.9% | 207 | 121 | -86 | -41.5% | 11,729 | 7461 | -4,268 | -36.4% |
| 2-->8 | 3,091 | 3,315 | 224 | 7.2% | 300 | 394 | 94 | 31.3% | 193 | 134 | -59 | -30.6% | 965 | 880 | -85 | -8.8% |
| 3-->1 | 1,853 | 1,590 | -263 | -14.2% | 376 | 140 | -236 | -62.8% | 137 | 157 | 20 | 14.6% | 859 | 365 | -494 | -57.5% |
| 3-->2 | 2,096 | 2,215 | 119 | 5.7% | 0 | 3 | 3 | #DIV/0! | 138 | 177 | 39 | 28.3% | 0 | 9 | 9 | #DIV/0! |
| 3-->4 | 2,338 | 835 | -1,503 | -64.3% | 7 | 59 | 52 | 742.9% | 123 | 83 | -40 | -32.5% | 14 | 82 | 68 | 485.7% |
| 3-->5 | 1,699 | 1,021 | -678 | -39.9% | 106 | 283 | 177 | 167.0% | 106 | 110 | 4 | 3.8% | 188 | 518 | 330 | 175.5% |
| 3-->6 | 3,034 | 2,513 | -521 | -17.2% | 427 | 297 | -130 | -30.4% | 192 | 235 | 43 | 22.4% | 1365 | 1161 | -204 | -14.9% |
| 3-->8 | 2,784 | 1,927 | -857 | -30.8% | 35 | 29 | -6 | -17.1% | 178 | 213 | 35 | 19.7% | 104 | 103 | -1 | -1.0% |
| 4-->1 | 3,027 | 1,431 | -1,596 | -52.7% | 191 | 108 | -83 | -43.5% | 301 | 353 | 52 | 17.3% | 960 | 635 | -325 | -33.9% |
| 4-->2 | 3,270 | 2,056 | -1,214 | -37.1% | 126 | 190 | 64 | 50.8% | 302 | 373 | 71 | 23.5% | 634 | 1182 | 548 | 86.4% |
| 4-->3 | 3,113 | 1,330 | -1,783 | -57.3% | 8 | 19 | 11 | 137.5% | 356 | 365 | 9 | 2.5% | 47 | 116 | 69 | 146.8% |
| 4-->5 | 2,873 | 862 | -2,011 | -70.0% | 0 | 51 | 51 | #DIV/0! | 271 | 306 | 35 | 12.9% | 0 | 260 | 260 | #DIV/0! |
| 4-->6 | 4,208 | 2,354 | -1,854 | -44.1% | 221 | 159 | -62 | -28.1% | 356 | 431 | 75 | 21.1% | 1,312 | 1141 | -171 | -13.0% |
| 4-->8 | 3,958 | 1,768 | -2,190 | -55.3% | 0 | 7 | 7 | #DIV/0! | 342 | 409 | 67 | 19.6% | 0 | 48 | 48 | #DIV/0! |
| 5-->1 | 2,208 | 1,465 | -743 | -33.7% | 0 | 134 | 134 | #DIV/0! | 189 | 309 | 120 | 63.5% | 0 | 689 | 689 | #DIV/0! |
| 5-->2 | 2,451 | 2,090 | -361 | -14.7% | 607 | 383 | -224 | -36.9% | 190 | 329 | 139 | 73.2% | 1918 | 2103 | 185 | 9.6% |
| 5-->3 | 2,294 | 1,364 | -930 | -40.5% | 99 | 60 | -39 | -39.4% | 244 | 322 | 78 | 32.0% | 402 | 322 | -80 | -19.9% |
| 5-->4 | 3,336 | 1,315 | -2,021 | -60.6% | 0 | 15 | 15 | #DIV/0! | 264 | 311 | 47 | 17.8% | 0 | 78 | 78 | #DIV/0! |
| 5-->6 | 3,389 | 2,387 | -1,002 | -29.6% | 10 | 23 | 13 | 130.0% | 244 | 387 | 143 | 58.6% | 41 | 148 | 107 | 261.0% |
| 5-->8 | 3,139 | 1,802 | -1,337 | -42.6% | 0 | 0 | 0 | #DIV/0! | 230 | 365 | 135 | 58.7% | 0 | 0 | 0 | #DIV/0! |
| 6-->1 | 3,082 | 2,770 | -312 | -10.1% | 242 | 296 | 54 | 22.3% | 175 | 154 | -21 | -12.0% | 707 | 759 | 52 | 7.4% |
| 6-->2 | 3,325 | 3,347 | 22 | 0.7% | 3566 | 3711 | 145 | 4.1% | 176 | 124 | -52 | -29.5% | 10441 | 7656 | -2,785 | -26.7% |
| 6-->3 | 3,168 | 2,669 | -499 | -15.8% | 220 | 140 | -80 | -36.4% | 230 | 167 | -63 | -27.4% | 842 | 389 | -453 | -53.8% |
| 6-->4 | 4,210 | 2,621 | -1,589 | -37.7% | 56 | 54 | -2 | -3.6% | 250 | 156 | -94 | -37.6% | 233 | 140 | -93 | -39.9% |
| 6-->5 | 3,571 | 2,807 | -764 | -21.4% | 0 | 17 | 17 | #DIV/0! | 234 | 182 | -52 | -22.2% | 0 | 52 | 52 | #DIV/0! |
| 6-->8 | 4,656 | 3,713 | -943 | -20.3% | 0 | 0 | 0 | #DIV/0! | 305 | 286 | -19 | -6.2% | 0 | 0 | 0 | #DIV/0! |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **253** | **261** | | |
| **TOTAL** | 104,144 | 74,015 | **-30,129** | **-28.9%** | 11,755 | 12,066 | **311** | **2.6%** | 7,587 | 8,016 | **429** | **5.7%** | 37,359 | 30,769 | **-6,590** | **-17.6%** |

| DO SOMETHING | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [9] | % from Saturn [10] | SATURN | Vissim | Time (Vissim - SATURN) [11] | % from Saturn [12] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [13] | % from Saturn [14] |
| 1-->2 | 2,055 | 2,122 | 67 | 3.3% | 131 | 152 | 21 | 16.0% | 134 | 282 | 148 | 110.4% | 293 | 715 | 422 | 144.0% |
| 1-->3 | 1,898 | 1,396 | -502 | -26.4% | 39 | 31 | -8 | -20.5% | 180 | 276 | 96 | 53.3% | 117 | 143 | 26 | 22.2% |
| 1-->4 | 2,940 | 1,347 | -1,593 | -54.2% | 60 | 57 | -3 | -5.0% | 195 | 265 | 70 | 35.9% | 195 | 252 | 57 | 29.2% |
| 1-->5 | 2,301 | 1,533 | -768 | -33.4% | 158 | 27 | -131 | -82.9% | 186 | 287 | 101 | 54.3% | 491 | 129 | -362 | -73.7% |
| 1-->6 | 3,636 | 3,025 | -611 | -16.8% | 208 | 224 | 16 | 7.7% | 228 | 348 | 120 | 52.6% | 790 | 1301 | 511 | 64.7% |
| 1-->8 | 3,386 | 2,439 | -947 | -28.0% | 124 | 147 | 23 | 18.5% | 200 | 352 | 152 | 76.0% | 414 | 863 | 449 | 108.5% |
| 2-->1 | 2,160 | 2,360 | 200 | 9.3% | 70 | 140 | 70 | 100.0% | 189 | 181 | -8 | -4.2% | 221 | 423 | 202 | 91.4% |
| 2-->3 | 1,603 | 1,653 | 50 | 3.1% | 0 | 8 | 8 | #DIV/0! | 144 | 111 | -33 | -22.9% | 0 | 15 | 15 | #DIV/0! |
| 2-->4 | 2,645 | 1,605 | -1,040 | -39.3% | 25 | 85 | 60 | 240.0% | 159 | 100 | -59 | -37.1% | 66 | 142 | 76 | 115.2% |
| 2-->5 | 2,006 | 1,791 | -215 | -10.7% | 356 | 227 | -129 | -36.2% | 151 | 122 | -29 | -19.2% | 897 | 461 | -436 | -48.6% |
| 2-->6 | 3,341 | 3,177 | -164 | -4.9% | 2575 | 2704 | 129 | 5.0% | 193 | 120 | -73 | -37.8% | 8267 | 5420 | -2,847 | -34.4% |
| 2-->8 | 3,091 | 3,315 | 224 | 7.2% | 191 | 210 | 19 | 9.9% | 165 | 188 | 23 | 13.9% | 525 | 657 | 132 | 25.1% |
| 3-->1 | 1,853 | 1,590 | -263 | -14.2% | 134 | 17 | -117 | -87.3% | 171 | 191 | 20 | 11.7% | 381 | 54 | -327 | -85.8% |
| 3-->2 | 2,096 | 2,215 | 119 | 5.7% | 0 | 4 | 4 | #DIV/0! | 188 | 221 | 33 | 17.6% | 0 | 15 | 15 | #DIV/0! |
| 3-->4 | 2,338 | 835 | -1,503 | -64.3% | 6 | 58 | 52 | 866.7% | 141 | 109 | -32 | -22.7% | 14 | 106 | 92 | 657.1% |
| 3-->5 | 1,699 | 1,021 | -678 | -39.9% | 103 | 250 | 147 | 142.7% | 132 | 131 | -1 | -0.8% | 227 | 547 | 320 | 141.0% |
| 3-->6 | 3,034 | 2,513 | -521 | -17.2% | 421 | 272 | -149 | -35.4% | 174 | 193 | 19 | 10.9% | 1220 | 875 | -345 | -28.3% |
| 3-->8 | 2,784 | 1,927 | -857 | -30.8% | 36 | 23 | -13 | -36.1% | 146 | 197 | 51 | 34.9% | 88 | 76 | -12 | -13.6% |
| 4-->1 | 3,027 | 1,431 | -1,596 | -52.7% | 243 | 167 | -76 | -31.3% | 227 | 298 | 71 | 31.3% | 920 | 828 | -92 | -10.0% |
| 4-->2 | 3,270 | 2,056 | -1,214 | -37.1% | 108 | 187 | 79 | 73.1% | 244 | 328 | 84 | 34.4% | 440 | 1,022 | 582 | 132.3% |
| 4-->3 | 3,113 | 1,330 | -1,783 | -57.3% | 12 | 27 | 15 | 125.0% | 288 | 322 | 34 | 11.8% | 58 | 145 | 87 | 150.0% |
| 4-->5 | 2,873 | 862 | -2,011 | -70.0% | 0 | 49 | 49 | #DIV/0! | 189 | 238 | 49 | 25.9% | 0 | 195 | 195 | #DIV/0! |
| 4-->6 | 4,208 | 2,354 | -1,854 | -44.1% | 424 | 308 | -116 | -27.4% | 231 | 300 | 69 | 29.9% | 1629 | 1539 | -90 | -5.5% |
| 4-->8 | 3,958 | 1,768 | -2,190 | -55.3% | 2 | 2 | 0 | 0.0% | 203 | 304 | 101 | 49.8% | 7 | 10 | 3 | 42.9% |
| 5-->1 | 2,208 | 1,465 | -743 | -33.7% | 0 | 140 | 140 | #DIV/0! | 214 | 163 | -51 | -23.8% | 0 | 381 | 381 | #DIV/0! |
| 5-->2 | 2,451 | 2,090 | -361 | -14.7% | 467 | 283 | -184 | -39.4% | 231 | 194 | -37 | -16.0% | 1801 | 914 | -887 | -49.3% |
| 5-->3 | 2,294 | 1,364 | -930 | -40.5% | 63 | 35 | -28 | -44.4% | 275 | 188 | -87 | -31.6% | 289 | 109 | -180 | -62.3% |
| 5-->4 | 3,336 | 1,315 | -2,021 | -60.6% | 0 | 15 | 15 | #DIV/0! | 290 | 176 | -114 | -39.3% | 0 | 44 | 44 | #DIV/0! |
| 5-->6 | 3,389 | 2,387 | -1,002 | -29.6% | 0 | 17 | 17 | #DIV/0! | 217 | 166 | -51 | -23.5% | 0 | 47 | 47 | #DIV/0! |
| 5-->8 | 3,139 | 1,802 | -1,337 | -42.6% | 0 | 0 | 0 | #DIV/0! | 190 | 170 | -20 | -10.5% | 0 | 0 | 0 | #DIV/0! |
| 6-->1 | 3,082 | 2,770 | -312 | -10.1% | 248 | 362 | 114 | 46.0% | 157 | 156 | -1 | -0.6% | 648 | 939 | 291 | 44.9% |
| 6-->2 | 3,325 | 3,347 | 22 | 0.7% | 2372 | 2811 | 439 | 18.5% | 174 | 134 | -40 | -23.0% | 6883 | 6286 | -597 | -8.7% |
| 6-->3 | 3,168 | 2,669 | -499 | -15.8% | 205 | 166 | -39 | -19.0% | 217 | 180 | -37 | -17.1% | 742 | 498 | -244 | -32.9% |
| 6-->4 | 4,210 | 2,621 | -1,589 | -37.7% | 48 | 46 | -2 | -4.2% | 231 | 169 | -62 | -26.8% | 185 | 129 | -56 | -30.3% |
| 6-->5 | 3,571 | 2,807 | -764 | -21.4% | 0 | 15 | 15 | #DIV/0! | 222 | 191 | -31 | -14.0% | 0 | 48 | 48 | #DIV/0! |
| 6-->8 | 4,656 | 3,713 | -943 | -20.3% | 0 | 0 | 0 | #DIV/0! | 236 | 256 | 20 | 8.5% | 0 | 0 | 0 | #DIV/0! |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **211** | **227** | | |
| **TOTAL** | 104,144 | 74,015 | **-30,129** | **-28.9%** | 8,829 | 9,266 | **437** | **4.9%** | 7,112 | 7,607 | **495** | **7.0%** | 27,808 | 25,328 | **-2,480** | **-8.9%** |

| DO SOMETHING minus DO MINIMUM | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | | | | | Flow Differences (vehicles) | | | | Time Differences (seconds) | | | | Weighted Time Changes (mins vehicles) | | | |
| | | | | | SATURN [15] | Vissim [16] | Flow Comparison [16]-[15] [17] | % from Saturn [18] | SATURN [19] | Vissim [20] | Flow Comparison [20]-[19] [21] | % from Saturn [22] | SATURN [23] | Vissim [24] | Flow Comparison [24]-[23] [25] | % from Saturn [26] |
| 1-->2 | | | | | -40 | -61 | -21 | 52.5% | 23 | 155 | 132 | 573.9% | -23 | 264 | 287 | -1247.8% |
| 1-->3 | | | | | -36 | -40 | -4 | 11.1% | 15 | 157 | 142 | 946.7% | -89 | 2 | 91 | -102.2% |
| 1-->4 | | | | | -42 | -45 | -3 | 7.1% | 10 | 157 | 147 | 1470.0% | -120 | 68 | 188 | -156.7% |
| 1-->5 | | | | | -76 | -94 | -18 | 23.7% | 17 | 152 | 135 | 794.1% | -168 | -143 | 25 | -14.9% |
| 1-->6 | | | | | 36 | -42 | -78 | -216.7% | -26 | 88 | 114 | -438.5% | 61 | 149 | 88 | -144.3% |
| 1-->8 | | | | | 25 | 95 | 70 | 280.0% | -40 | 114 | 154 | -385.0% | 17 | 656 | 639 | -3758.8% |
| 2-->1 | | | | | -166 | -172 | -6 | 3.6% | 37 | 18 | -19 | -51.4% | -378 | -426 | -48 | -12.7% |
| 2-->3 | | | | | 0 | 1 | 1 | #DIV/0! | 26 | 10 | -16 | -61.5% | 0 | 3 | 3 | #DIV/0! |
| 2-->4 | | | | | -31 | -35 | -4 | 12.9% | 21 | 10 | -11 | -52.4% | -63 | -38 | 25 | -39.7% |
| 2-->5 | | | | | -259 | -301 | -42 | 16.2% | 29 | 6 | -23 | -79.3% | -351 | -563 | -212 | -60.4% |
| 2-->6 | | | | | -823 | -998 | -175 | 21.3% | -14 | -1 | 13 | -92.9% | -3462 | -2041 | 1,421 | -41.0% |
| 2-->8 | | | | | -109 | -184 | -75 | 68.8% | -28 | 54 | 82 | -292.9% | -440 | -223 | 217 | -49.3% |
| 3-->1 | | | | | -242 | -123 | 119 | -49.2% | 34 | 34 | 0 | 0.0% | -478 | -311 | 167 | -34.9% |
| 3-->2 | | | | | 0 | 1 | 1 | #DIV/0! | 50 | 44 | -6 | -12.0% | 0 | 6 | 6 | #DIV/0! |
| 3-->4 | | | | | -1 | -1 | 0 | 0.0% | 18 | 26 | 8 | 44.4% | 0 | 24 | 24 | #DIV/0! |
| 3-->5 | | | | | -3 | -33 | -30 | 1000.0% | 26 | 21 | -5 | -19.2% | 39 | 29 | -10 | -25.6% |
| 3-->6 | | | | | -6 | -25 | -19 | 316.7% | -18 | -42 | -24 | 133.3% | -145 | -286 | -141 | -97.2% |
| 3-->8 | | | | | 1 | -6 | -7 | -700.0% | -32 | -16 | 16 | -50.0% | -16 | -27 | -11 | -68.8% |
| 4-->1 | | | | | 52 | 59 | 7 | 13.5% | -74 | -55 | 19 | -25.7% | -40 | 193 | 233 | -582.5% |
| 4-->2 | | | | | -18 | -3 | 15 | -83.3% | -58 | -45 | 13 | -22.4% | -194 | -160 | 34 | -17.5% |
| 4-->3 | | | | | 4 | 8 | 4 | 100.0% | -68 | -43 | 25 | -36.8% | 11 | 29 | 18 | 163.6% |
| 4-->5 | | | | | 0 | -2 | -2 | #DIV/0! | -82 | -68 | 14 | -17.1% | 0 | -65 | -65 | #DIV/0! |
| 4-->6 | | | | | 203 | 149 | -54 | -26.6% | -125 | -131 | -6 | 4.8% | 317 | 398 | 81 | 25.6% |
| 4-->8 | | | | | 2 | -5 | -7 | -350.0% | -139 | -105 | 34 | -24.5% | 7 | -38 | -45 | -642.9% |
| 5-->1 | | | | | 0 | 6 | 6 | #DIV/0! | 25 | -146 | -171 | -684.0% | 0 | -308 | -308 | #DIV/0! |
| 5-->2 | | | | | -140 | -100 | 40 | -28.6% | 41 | -135 | -176 | -429.3% | -117 | -1189 | -1,072 | 916.2% |
| 5-->3 | | | | | -36 | -25 | 11 | -30.6% | 31 | -134 | -165 | -532.3% | -113 | -213 | -100 | 88.5% |
| 5-->4 | | | | | 0 | 0 | 0 | #DIV/0! | 26 | -135 | -161 | -619.2% | 0 | -34 | -34 | #DIV/0! |
| 5-->6 | | | | | -10 | -6 | 4 | -40.0% | -27 | -221 | -194 | 718.5% | -41 | -101 | -60 | 146.3% |
| 5-->8 | | | | | 0 | 0 | 0 | #DIV/0! | -40 | -195 | -155 | 387.5% | 0 | 0 | 0 | #DIV/0! |
| 6-->1 | | | | | 6 | 66 | 60 | 1000.0% | -18 | 2 | 20 | -111.1% | -59 | 180 | 239 | -405.1% |
| 6-->2 | | | | | -1,194 | -900 | 294 | -24.6% | -2 | 10 | 12 | -600.0% | -3558 | -1370 | 2,188 | -61.5% |
| 6-->3 | | | | | -15 | 26 | 41 | -273.3% | -13 | 13 | 26 | -200.0% | -100 | 109 | 209 | -209.0% |
| 6-->4 | | | | | -8 | -8 | 0 | 0.0% | -19 | 13 | 32 | -168.4% | -48 | -11 | 37 | -77.1% |
| 6-->5 | | | | | 0 | -2 | -2 | #DIV/0! | -12 | 9 | 21 | -175.0% | 0 | -4 | -4 | #DIV/0! |
| 6-->8 | | | | | 0 | 0 | 0 | #DIV/0! | -69 | -30 | 39 | -56.5% | 0 | 0 | 0 | #DIV/0! |
| TOTAL | | | | | -2,926 | -2,800 | 126 | -4.3% | -475 | -409 | 66 | -13.9% | -9,551 | -5,441 | 4,110 | -43.0% |

## COMPARATIVE ANALYSIS AT ORSETT COCK JUNCTION

**Table 4.8 A13 Orsett Cock junction, 17:00-18:00, 2045**

*- National Highway's Data and Analysis*
*- Comparison Analysis completed and presented by Thurrock*

| DO MINIMUM | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| 1-->2 | 2,055 | 2,122 | 67 | 3.3% | 209 | 283 | 74 | 35.4% | 116 | 138 | 22 | 19.0% | 403 | 653 | 250 | 62.0% |
| 1-->3 | 1,898 | 1,396 | -502 | -26.4% | 232 | 165 | -67 | -28.9% | 210 | 128 | -82 | -39.0% | 814 | 353 | -461 | -56.6% |
| 1-->4 | 2,940 | 1,347 | -1,593 | -54.2% | 320 | 48 | -272 | -85.0% | 232 | 113 | -119 | -51.3% | 1,238 | 91 | -1,147 | -92.6% |
| 1-->5 | 2,301 | 1,533 | -768 | -33.4% | 135 | 202 | 67 | 49.6% | 206 | 136 | -70 | -34.0% | 463 | 458 | -5 | -1.1% |
| 1-->6 | 3,636 | 3,025 | -611 | -16.8% | 55 | 163 | 108 | 196.4% | 251 | 185 | -66 | -26.3% | 230 | 502 | 272 | 118.3% |
| 1-->8 | 3,386 | 2,439 | -947 | -28.0% | 97 | 40 | -57 | -58.8% | 239 | 164 | -75 | -31.4% | 386 | 109 | -277 | -71.8% |
| 2-->1 | 2,160 | 2,360 | 200 | 9.3% | 115 | 156 | 41 | 35.7% | 145 | 165 | 20 | 13.8% | 278 | 428 | 150 | 54.0% |
| 2-->3 | 1,603 | 1,653 | 50 | 3.1% | 0 | 10 | 10 | #DIV/0! | 125 | 106 | -19 | -15.2% | 0 | 18 | 18 | #DIV/0! |
| 2-->4 | 2,645 | 1,605 | -1,040 | -39.3% | 179 | 38 | -141 | -78.8% | 147 | 91 | -56 | -38.1% | 439 | 58 | -381 | -86.8% |
| 2-->5 | 2,006 | 1,791 | -215 | -10.7% | 691 | 590 | -101 | -14.6% | 121 | 114 | -7 | -5.8% | 1392 | 1123 | -269 | -19.3% |
| 2-->6 | 3,341 | 3,177 | -164 | -4.9% | 3348 | 3580 | 232 | 6.9% | 166 | 115 | -51 | -30.7% | 9,279 | 6859 | -2,420 | -26.1% |
| 2-->8 | 3,091 | 3,315 | 224 | 7.2% | 149 | 214 | 65 | 43.6% | 154 | 128 | -26 | -16.9% | 381 | 456 | 75 | 19.7% |
| 3-->1 | 1,853 | 1,590 | -263 | -14.2% | 160 | 169 | 9 | 5.6% | 131 | 144 | 13 | 9.9% | 348 | 406 | 58 | 16.7% |
| 3-->2 | 2,096 | 2,215 | 119 | 5.7% | 0 | 5 | 5 | #DIV/0! | 140 | 172 | 32 | 22.9% | 0 | 14 | 14 | #DIV/0! |
| 3-->4 | 2,338 | 835 | -1,503 | -64.3% | 13 | 15 | 2 | 15.4% | 133 | 71 | -62 | -46.6% | 29 | 18 | -11 | -37.9% |
| 3-->5 | 1,699 | 1,021 | -678 | -39.9% | 108 | 230 | 122 | 113.0% | 106 | 94 | -12 | -11.3% | 191 | 358 | 167 | 87.4% |
| 3-->6 | 3,034 | 2,513 | -521 | -17.2% | 338 | 143 | -195 | -57.7% | 152 | 142 | -10 | -6.6% | 855 | 339 | -516 | -60.4% |
| 3-->8 | 2,784 | 1,927 | -857 | -30.8% | 7 | 4 | -3 | -42.9% | 139 | 121 | -18 | -12.9% | 16 | 8 | -8 | -50.0% |
| 4-->1 | 3,027 | 1,431 | -1,596 | -52.7% | 143 | 100 | -43 | -30.1% | 181 | 201 | 20 | 11.0% | 432 | 334 | -98 | -22.7% |
| 4-->2 | 3,270 | 2,056 | -1,214 | -37.1% | 115 | 204 | 89 | 77.4% | 190 | 229 | 39 | 20.5% | 365 | 777 | 412 | 112.9% |
| 4-->3 | 3,113 | 1,330 | -1,783 | -57.3% | 7 | 87 | 80 | 1142.9% | 285 | 219 | -66 | -23.2% | 33 | 317 | 284 | 860.6% |
| 4-->5 | 2,873 | 862 | -2,011 | -70.0% | 0 | 54 | 54 | #DIV/0! | 157 | 150 | -7 | -4.5% | 0 | 135 | 135 | #DIV/0! |
| 4-->6 | 4,208 | 2,354 | -1,854 | -44.1% | 127 | 131 | 4 | 3.1% | 202 | 199 | -3 | -1.5% | 428 | 434 | 6 | 1.4% |
| 4-->8 | 3,958 | 1,768 | -2,190 | -55.3% | 0 | 6 | 6 | #DIV/0! | 189 | 178 | -11 | -5.8% | 0 | 18 | 18 | #DIV/0! |
| 5-->1 | 2,208 | 1,465 | -743 | -33.7% | 20 | 2 | -18 | -90.0% | 146 | 131 | -15 | -10.3% | 49 | 4 | -45 | -91.8% |
| 5-->2 | 2,451 | 2,090 | -361 | -14.7% | 690 | 519 | -171 | -24.8% | 156 | 159 | 3 | 1.9% | 1789 | 1380 | -409 | -22.9% |
| 5-->3 | 2,294 | 1,364 | -930 | -40.5% | 129 | 275 | 146 | 113.2% | 250 | 149 | -101 | -40.4% | 538 | 685 | 147 | 27.3% |
| 5-->4 | 3,336 | 1,315 | -2,021 | -60.6% | 0 | 4 | 4 | #DIV/0! | 272 | 134 | -138 | -50.7% | 0 | 9 | 9 | #DIV/0! |
| 5-->6 | 3,389 | 2,387 | -1,002 | -29.6% | 0 | 24 | 24 | #DIV/0! | 167 | 130 | -37 | -22.2% | 0 | 52 | 52 | #DIV/0! |
| 5-->8 | 3,139 | 1,802 | -1,337 | -42.6% | 0 | 1 | 1 | #DIV/0! | 155 | 109 | -46 | -29.7% | 0 | 2 | 2 | #DIV/0! |
| 6-->1 | 3,082 | 2,770 | -312 | -10.1% | 316 | 532 | 216 | 68.4% | 164 | 150 | -14 | -8.5% | 866 | 1328 | 462 | 53.3% |
| 6-->2 | 3,325 | 3,347 | 22 | 0.7% | 3618 | 4026 | 408 | 11.3% | 174 | 125 | -49 | -28.2% | 10479 | 8380 | -2,099 | -20.0% |
| 6-->3 | 3,168 | 2,669 | -499 | -15.8% | 304 | 107 | -197 | -64.8% | 269 | 168 | -101 | -37.5% | 1361 | 299 | -1,062 | -78.0% |
| 6-->4 | 4,210 | 2,621 | -1,589 | -37.7% | 207 | 22 | -185 | -89.4% | 290 | 153 | -137 | -47.2% | 1001 | 56 | -945 | -94.4% |
| 6-->5 | 3,571 | 2,807 | -764 | -21.4% | 0 | 13 | 13 | #DIV/0! | 264 | 176 | -88 | -33.3% | 0 | 38 | 38 | #DIV/0! |
| 6-->8 | 4,656 | 3,713 | -943 | -20.3% | 0 | 0 | 0 | #DIV/0! | 297 | 203 | -94 | -31.6% | 0 | 0 | 0 | #DIV/0! |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **239** | **188** | | |
| **TOTAL** | 104,144 | 74,015 | **-30,129** | **-28.9%** | 11,832 | 12,162 | **330** | **2.8%** | 6,721 | 5,290 | **-1,431** | **-21.3%** | 34,083 | 26,499 | **-7,584** | **-22.3%** |

| DO SOMETHING | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [9] | % from Saturn [10] | SATURN | Vissim | Time (Vissim - SATURN) [11] | % from Saturn [12] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [13] | % from Saturn [14] |
| 1-->2 | 2,055 | 2,122 | 67 | 3.3% | 112 | 161 | 49 | 43.8% | 150 | 428 | 278 | 185.3% | 281 | 1,147 | 866 | 308.2% |
| 1-->3 | 1,898 | 1,396 | -502 | -26.4% | 112 | 43 | -69 | -61.6% | 219 | 413 | 194 | 88.6% | 410 | 296 | -114 | -27.8% |
| 1-->4 | 2,940 | 1,347 | -1,593 | -54.2% | 164 | 113 | -51 | -31.1% | 232 | 402 | 170 | 73.3% | 634 | 757 | 123 | 19.4% |
| 1-->5 | 2,301 | 1,533 | -768 | -33.4% | 158 | 175 | 17 | 10.8% | 207 | 427 | 220 | 106.3% | 546 | 1245 | 699 | 128.0% |
| 1-->6 | 3,636 | 3,025 | -611 | -16.8% | 171 | 199 | 28 | 16.4% | 244 | 480 | 236 | 96.7% | 696 | 1593 | 897 | 128.9% |
| 1-->8 | 3,386 | 2,439 | -947 | -28.0% | 95 | 133 | 38 | 40.0% | 218 | 486 | 268 | 122.9% | 345 | 1078 | 733 | 212.5% |
| 2-->1 | 2,160 | 2,360 | 200 | 9.3% | 22 | 55 | 33 | 150.0% | 213 | 371 | 158 | 74.2% | 78 | 341 | 263 | 337.2% |
| 2-->3 | 1,603 | 1,653 | 50 | 3.1% | 0 | 10 | 10 | #DIV/0! | 183 | 261 | 78 | 42.6% | 0 | 43 | 43 | #DIV/0! |
| 2-->4 | 2,645 | 1,605 | -1,040 | -39.3% | 64 | 117 | 53 | 82.8% | 196 | 249 | 53 | 27.0% | 209 | 486 | 277 | 132.5% |
| 2-->5 | 2,006 | 1,791 | -215 | -10.7% | 400 | 209 | -191 | -47.8% | 171 | 274 | 103 | 60.2% | 1139 | 955 | -184 | -16.2% |
| 2-->6 | 3,341 | 3,177 | -164 | -4.9% | 2558 | 2699 | 141 | 5.5% | 208 | 119 | -89 | -42.8% | 8855 | 5345 | -3,510 | -39.6% |
| 2-->8 | 3,091 | 3,315 | 224 | 7.2% | 70 | 65 | -5 | -7.1% | 181 | 333 | 152 | 84.0% | 212 | 361 | 149 | 70.3% |
| 3-->1 | 1,853 | 1,590 | -263 | -14.2% | 29 | 57 | 28 | 96.6% | 194 | 235 | 41 | 21.1% | 94 | 224 | 130 | 138.3% |
| 3-->2 | 2,096 | 2,215 | 119 | 5.7% | 0 | 5 | 5 | #DIV/0! | 237 | 282 | 45 | 19.0% | 0 | 23 | 23 | #DIV/0! |
| 3-->4 | 2,338 | 835 | -1,503 | -64.3% | 12 | 104 | 92 | 766.7% | 177 | 113 | -64 | -36.2% | 35 | 196 | 161 | 460.0% |
| 3-->5 | 1,699 | 1,021 | -678 | -39.9% | 116 | 202 | 86 | 74.1% | 152 | 138 | -14 | -9.2% | 294 | 466 | 172 | 58.5% |
| 3-->6 | 3,034 | 2,513 | -521 | -17.2% | 305 | 109 | -196 | -64.3% | 189 | 192 | 3 | 1.6% | 961 | 348 | -613 | -63.8% |
| 3-->8 | 2,784 | 1,927 | -857 | -30.8% | 10 | 1 | -9 | -90.0% | 163 | 197 | 34 | 20.9% | 27 | 3 | -24 | -88.9% |
| 4-->1 | 3,027 | 1,431 | -1,596 | -52.7% | 99 | 53 | -46 | -46.5% | 219 | 267 | 48 | 21.9% | 361 | 236 | -125 | -34.6% |
| 4-->2 | 3,270 | 2,056 | -1,214 | -37.1% | 100 | 185 | 85 | 85.0% | 261 | 313 | 52 | 19.9% | 436 | 966 | 530 | 121.6% |
| 4-->3 | 3,113 | 1,330 | -1,783 | -57.3% | 4 | 85 | 81 | 2025.0% | 328 | 299 | -29 | -8.8% | 22 | 424 | 402 | 1827.3% |
| 4-->5 | 2,873 | 862 | -2,011 | -70.0% | 0 | 37 | 37 | #DIV/0! | 177 | 170 | -7 | -4.0% | 0 | 105 | 105 | #DIV/0! |
| 4-->6 | 4,208 | 2,354 | -1,854 | -44.1% | 270 | 278 | 8 | 3.0% | 214 | 223 | 9 | 4.2% | 962 | 1034 | 72 | 7.5% |
| 4-->8 | 3,958 | 1,768 | -2,190 | -55.3% | 1 | 0 | -1 | -100.0% | 188 | 229 | 41 | 21.8% | 3 | 0 | -3 | -100.0% |
| 5-->1 | 2,208 | 1,465 | -743 | -33.7% | 9 | 0 | -9 | -100.0% | 162 | 188 | 26 | 16.0% | 24 | 0 | -24 | -100.0% |
| 5-->2 | 2,451 | 2,090 | -361 | -14.7% | 530 | 350 | -180 | -34.0% | 204 | 234 | 30 | 14.7% | 1806 | 1367 | -439 | -24.3% |
| 5-->3 | 2,294 | 1,364 | -930 | -40.5% | 114 | 262 | 148 | 129.8% | 271 | 220 | -51 | -18.8% | 516 | 961 | 445 | 86.2% |
| 5-->4 | 3,336 | 1,315 | -2,021 | -60.6% | 0 | 52 | 52 | #DIV/0! | 284 | 209 | -75 | -26.4% | 0 | 181 | 181 | #DIV/0! |
| 5-->6 | 3,389 | 2,387 | -1,002 | -29.6% | 0 | 25 | 25 | #DIV/0! | 157 | 144 | -13 | -8.3% | 0 | 60 | 60 | #DIV/0! |
| 5-->8 | 3,139 | 1,802 | -1,337 | -42.6% | 0 | 0 | 0 | #DIV/0! | 131 | 150 | 19 | 14.5% | 0 | 0 | 0 | #DIV/0! |
| 6-->1 | 3,082 | 2,770 | -312 | -10.1% | 243 | 518 | 275 | 113.2% | 155 | 345 | 190 | 122.6% | 626 | 2,982 | 2,356 | 376.4% |
| 6-->2 | 3,325 | 3,347 | 22 | 0.7% | 2842 | 3538 | 696 | 24.5% | 197 | 173 | -24 | -12.2% | 9325 | 10215 | 890 | 9.5% |
| 6-->3 | 3,168 | 2,669 | -499 | -15.8% | 279 | 136 | -143 | -51.3% | 263 | 378 | 115 | 43.7% | 1223 | 856 | -367 | -30.0% |
| 6-->4 | 4,210 | 2,621 | -1,589 | -37.7% | 173 | 76 | -97 | -56.1% | 274 | 366 | 92 | 33.6% | 790 | 464 | -326 | -41.3% |
| 6-->5 | 3,571 | 2,807 | -764 | -21.4% | 0 | 12 | 12 | #DIV/0! | 249 | 391 | 142 | 57.0% | 0 | 78 | 78 | #DIV/0! |
| 6-->8 | 4,656 | 3,713 | -943 | -20.3% | 0 | 0 | 0 | #DIV/0! | 260 | 450 | 190 | 73.1% | 0 | 0 | 0 | #DIV/0! |
| **Total weighted time, excluding mainline, hours** | | | | | | | | | | | | | **212** | **321** | | |
| **TOTAL** | 104,144 | 74,015 | **-30,129** | **-28.9%** | 9,062 | 10,064 | **1,002** | **11.1%** | 7,528 | 10,149 | **2,621** | **34.8%** | 30,910 | 34,836 | **3,926** | **12.7%** |

| DO SOMETHING minus DO MINIMUM | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Route | | | | | Flow Differences (vehicles) | | | | Time Differences (seconds) | | | | Weighted Time Changes (mins vehicles) | | | |
| | | | | | SATURN [15] | Vissim [16] | Flow Comparison [16]-[15] [17] | % from Saturn [18] | SATURN [19] | Vissim [20] | Flow Comparison [20]-[19] [21] | % from Saturn [22] | SATURN [23] | Vissim [24] | Flow Comparison [24]-[23] [25] | % from Saturn [26] |
| 1-->2 | | | | | -97 | -122 | -25 | 25.8% | 34 | 290 | 256 | 752.9% | -122 | 494 | 616 | -504.9% |
| 1-->3 | | | | | -120 | -122 | -2 | 1.7% | 9 | 285 | 276 | 3066.7% | -404 | -57 | 347 | -85.9% |
| 1-->4 | | | | | -156 | 65 | 221 | -141.7% | 0 | 289 | 289 | #DIV/0! | -604 | 666 | 1,270 | -210.3% |
| 1-->5 | | | | | 23 | -27 | -50 | -217.4% | 1 | 291 | 290 | 29000.0% | 83 | 787 | 704 | 848.2% |
| 1-->6 | | | | | 116 | 36 | -80 | -69.0% | -7 | 295 | 302 | 4314.3% | 466 | 1091 | 625 | 134.1% |
| 1-->8 | | | | | -2 | 93 | 95 | -4750.0% | -21 | 322 | 343 | 1633.3% | -41 | 969 | 1,010 | -246.3% |
| 2-->1 | | | | | -93 | -101 | -8 | 8.6% | 68 | 206 | 138 | 202.9% | -200 | -87 | 113 | -56.5% |
| 2-->3 | | | | | 0 | 0 | 0 | #DIV/0! | 58 | 155 | 97 | 167.2% | 0 | 25 | 25 | #DIV/0! |
| 2-->4 | | | | | -115 | 79 | 194 | -168.7% | 49 | 158 | 109 | 222.4% | -230 | 428 | 658 | -286.1% |
| 2-->5 | | | | | -291 | -381 | -90 | 30.9% | 50 | 160 | 110 | 220.0% | -253 | -168 | 85 | -33.6% |
| 2-->6 | | | | | -790 | -881 | -91 | 11.5% | 42 | 4 | -38 | -90.5% | -424 | -1514 | -1,090 | 257.1% |
| 2-->8 | | | | | -79 | -149 | -70 | 88.6% | 27 | 205 | 178 | 659.3% | -169 | -95 | 74 | -43.8% |
| 3-->1 | | | | | -131 | -112 | 19 | -14.5% | 63 | 91 | 28 | 44.4% | -254 | -182 | 72 | -28.3% |
| 3-->2 | | | | | 0 | 0 | 0 | #DIV/0! | 97 | 110 | 13 | 13.4% | 0 | 9 | 9 | #DIV/0! |
| 3-->4 | | | | | -1 | 89 | 90 | -9000.0% | 44 | 42 | -2 | -4.5% | 6 | 178 | 172 | 2866.7% |
| 3-->5 | | | | | 8 | -28 | -36 | -450.0% | 46 | 44 | -2 | -4.3% | 103 | 108 | 5 | 4.9% |
| 3-->6 | | | | | -33 | -34 | -1 | 3.0% | 37 | 50 | 13 | 35.1% | 106 | 9 | -97 | -91.5% |
| 3-->8 | | | | | 3 | -3 | -6 | -200.0% | 24 | 76 | 52 | 216.7% | 11 | -5 | -16 | -145.5% |
| 4-->1 | | | | | -44 | -47 | -3 | 6.8% | 38 | 66 | 28 | 73.7% | -71 | -98 | -27 | 38.0% |
| 4-->2 | | | | | -15 | -19 | -4 | 26.7% | 71 | 84 | 13 | 18.3% | 71 | 189 | 118 | 166.2% |
| 4-->3 | | | | | -3 | -2 | 1 | -33.3% | 43 | 80 | 37 | 86.0% | -11 | 107 | 118 | -1072.7% |
| 4-->5 | | | | | 0 | -17 | -17 | #DIV/0! | 20 | 20 | 0 | 0.0% | 0 | -30 | -30 | #DIV/0! |
| 4-->6 | | | | | 143 | 147 | 4 | 2.8% | 12 | 24 | 12 | 100.0% | 534 | 600 | 66 | 12.4% |
| 4-->8 | | | | | 1 | -6 | -7 | -700.0% | -1 | 51 | 52 | 5200.0% | 3 | -18 | -21 | -700.0% |
| 5-->1 | | | | | -11 | -2 | 9 | -81.8% | 16 | 57 | 41 | 256.3% | -25 | -4 | 21 | -84.0% |
| 5-->2 | | | | | -160 | -169 | -9 | 5.6% | 48 | 75 | 27 | 56.3% | 17 | -13 | -30 | -176.5% |
| 5-->3 | | | | | -15 | -13 | 2 | -13.3% | 21 | 71 | 50 | 238.1% | -22 | 276 | 298 | -1354.5% |
| 5-->4 | | | | | 0 | 48 | 48 | #DIV/0! | 12 | 75 | 63 | 525.0% | 0 | 172 | 172 | #DIV/0! |
| 5-->6 | | | | | 0 | 1 | 1 | #DIV/0! | -10 | 14 | 24 | 240.0% | 0 | 8 | 8 | #DIV/0! |
| 5-->8 | | | | | 0 | -1 | -1 | #DIV/0! | -24 | 41 | 65 | 270.8% | 0 | -2 | -2 | #DIV/0! |
| 6-->1 | | | | | -73 | -14 | 59 | -80.8% | -9 | 195 | 204 | 2266.7% | -240 | 1654 | 1,894 | -789.2% |
| 6-->2 | | | | | -776 | -488 | 288 | -37.1% | 23 | 48 | 25 | 108.7% | -1154 | 1835 | 2,989 | -259.0% |
| 6-->3 | | | | | -25 | 29 | 54 | -216.0% | -6 | 210 | 216 | 3600.0% | -138 | 557 | 695 | -503.6% |
| 6-->4 | | | | | -34 | 54 | 88 | -258.8% | -16 | 213 | 229 | 1431.3% | -211 | 408 | 619 | -293.4% |
| 6-->5 | | | | | 0 | -1 | -1 | #DIV/0! | -15 | 215 | 230 | 1533.3% | 0 | 40 | 40 | #DIV/0! |
| 6-->8 | | | | | 0 | 0 | 0 | #DIV/0! | -37 | 247 | 284 | 767.6% | 0 | 0 | 0 | #DIV/0! |
| **TOTAL** | | | | | -2,770 | -2,098 | **672** | **-24.3%** | 807 | 4,859 | **4,052** | **502.1%** | -3,173 | 8,337 | **11,510** | **-362.7%** |

## COMPARATIVE ANALYSIS AT ORSETT COCK - Summary

### Table 4.5 A13 Orsett Cock junction, 07:00-08:00, 2030

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| DO MINIMUM | 104,144 | 74,015 | -30,129 | -28.9% | 10,891 | 11,389 | 498 | 4.6% | 6,627 | 5,564 | -1,063 | -16.0% | 32,199 | 25,155 | -7,044 | -21.9% |
| DO SOMETHING | 104,144 | 74,015 | -30,129 | -28.9% | 8,244 | 8,969 | 725 | 8.8% | 6,554 | 6,292 | -262 | -4.0% | 24,448 | 21,843 | -2,605 | -10.7% |

### Table 4.6 A13 Orsett Cock junction, 17:00-18:00, 2030

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| DO MINIMUM | 104,144 | 74,015 | -30,129 | -28.9% | 11,010 | 11,333 | 323 | 2.9% | 6,436 | 4,830 | -1,606 | -25.0% | 31,077 | 23,919 | -7,158 | -23.0% |
| DO SOMETHING | 104,144 | 74,015 | -30,129 | -28.9% | 8,696 | 9,856 | 1,160 | 13.3% | 6,948 | 8,095 | 1,147 | 16.5% | 27,018 | 29,041 | 2,023 | 7.5% |

### Table 4.7 A13 Orsett Cock junction, 07:00-08:00, 2045

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| DO MINIMUM | 104,144 | 74,015 | -30,129 | -28.9% | 11,755 | 12,066 | 311 | 2.6% | 7,587 | 8,016 | 429 | 5.7% | 37,359 | 30,769 | -6,590 | -17.6% |
| DO SOMETHING | 104,144 | 74,015 | -30,129 | -28.9% | 8,829 | 9,266 | 437 | 4.9% | 7,112 | 7,607 | 495 | 7.0% | 27,808 | 25,328 | -2,480 | -8.9% |

### Table 4.8 A13 Orsett Cock junction, 17:00-18:00, 2045

| Route | Distance (metres) | | Comparison | | Flows (vehicles) | | Comparison | | Time (secs) | | Comparison | | Weighted time (mins x veh) | | Comparison | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SATURN | Vissim | Distance (Vissim - SATURN) [1] | % from Saturn [2] | SATURN | Vissim | Flow (Vissim - SATURN) [3] | % from Saturn [4] | SATURN | Vissim | Time (Vissim - SATURN) [5] | % from Saturn [6] | SATURN | Vissim | Weighted Time Comparison (Vissim - SATURN) [7] | % from Saturn [8] |
| DO MINIMUM | 104,144 | 74,015 | -30,129 | -28.9% | 11,832 | 12,162 | 330 | 2.8% | 6,721 | 5,290 | -1,431 | -21.3% | 34,083 | 26,499 | -7,584 | -22.3% |
| DO SOMETHING | 104,144 | 74,015 | -30,129 | -28.9% | 9,062 | 10,064 | 1,002 | 11.1% | 7,528 | 10,149 | 2,621 | 34.8% | 30,910 | 34,836 | 3,926 | 12.7% |

# Annex 3 Orsett Cock VISSIM Model v1.5 and v2.4 Differences

# Lower Thames Crossing

## Orsett Cock VISSIM Modelling

## Comparison of VISSIM Model Versions: v1.5 and v2.4

On behalf of **Thurrock Council**

Project Ref: 332510911/001 | Rev: AA | Date: August 2023

Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address: Caversham Bridge House, Waterman Place, Reading, Berkshire RG1 8DN
T: +44 (0)118 950 0761 E: Reading.uk@stantec.com

# Document Control Sheet

**Project Name:** **Lower Thames Crossing**

**Project Ref:** **Stantec LTC Review of Modelling Document**

**Report Title:** **Orsett Cock and The Manorway Modelling**

**Doc Ref:**

**Date:** **August 2023**

| | Name | Position | Signature | Date |
|---|---|---|---|---|
| **Prepared by:** | Grant Paterson | Principal Transport Planner | GP | 01/08/2023 |
| **Reviewed by:** | Nadia Lyubimova | Director | NL | 17/08/2023 |
| **Approved by:** | Nadia Lyubimova | Director | NL | 17/08/2023 |
| **For and on behalf of Stantec UK Limited** | | | | |

| Revision | Date | Description | Prepared | Reviewed | Approved |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |

# Contents



# Figures

# Tables

No table of figures entries found.

# Appendices

No table of contents entries found.

# 1 Introduction

## 1.1 Purpose of Document

1.1.1 In support of continuing work for Thurrock Council, Stantec were commissioned to review the July 2023 documentation relating to Orsett Cock VISSIM microsimulation modelling. Transport models have been developed by National Highways (NH) and their consultant Jacobs with Stantec undertaking subsequent reviews and appraisal testing over the period of this study. This document focuses on the July 2023 reporting provided by NH for the Orsett Cock junction at Deadline 1.

1.1.2 This note provides an overview of the detail regarding the forecast models developed by NH and provides an independent review of the forecast microsimulation models in VISSIM.

## 1.2 NH Document provision

1.2.1 Relevant to Orsett Cock microsimulation modelling NH has provided the following documents:

- Localised Traffic Modelling Report (REP1-187)
- Localised Traffic Modelling Appendix B – Orsett Cock LMVR (REP1-188)
- Localised Traffic Modelling Appendix C – Orsett Cock Forecasting Report (REP1-189)
- Localised Traffic Modelling Appendix G – Traffic Operational Appraisal – VISSIM Local Model Validation Report (LMVR) (REP1-193)
- Localised Traffic Modelling Appendix H – Traffic Operational Appraisal – VISSIM Forecasting Report (REP1-194)

# 2 Localised Traffic Modelling Appendix B – Orsett Cock LMVR

## 2.1 Introduction

2.1.1 This section provides a review of the July 2023 Orsett Cock LMVR and compare it with the previous May 2022 NH document, which was issued to Thurrock, to identify any changes.

2.1.2 The July 2023 updated document is location on the Planning Inspectorate website (REP1-188). The associated document reference is Planning Inspectorate Scheme Ref: TR010032 Examination Document Ref: TR010032/EXAM/9.15.

2.1.3 The May 2022 document provided by NH is named as Orsett Cock VISSIM Local Model Validation Report, with the references Planning Inspectorate Scheme Ref: TR010032, Document Ref: HE540039-CJV-GEN-A13-REP-TRA-00001.

## 2.2 Document Comparison

2.2.1 Inconsistencies are noted between both documents; however, these are mainly confined to marginal revisions to grammar and descriptive text.

2.2.2 The second chapter deals with Modelling Scope. Again, there are changes in the descriptive language used, however the image of the traffic operation study area remains consistent.

2.2.3 Chapter Three relates to Traffic Data Analysis. There are changes in the descriptive language used, but the narrative of the chapter remains consistent.

2.2.4 Chapter Four covers the Technical Guidelines, again the narrative is consistent with marginal amendments to the wording.

2.2.5 The Fifth chapter discusses VISSIM Model Calibration with Chapter Six referring to the Model Validation Results, with the same outcomes defined.

2.2.6 Conclusions are provided in Chapter seven with a consistent message being provided.

## 2.3 Summary

2.3.1 There are marginal changes between the June 2022 report, which was previously reviewed by Thurrock, and July 2023 report. They are confined to additional reporting text. A comparison of the model output in terms of network performance statistics, journey time and flow analysis, show consistent model outputs.

# 3 Traffic Operational Appraisal – VISSIM Local Model Validation Report (LMVR)

## 3.1 Introduction

3.1.1 This chapter provides an overview of the Traffic Operational Appraisal – VISSIM Local Model Validation Report (LMVR). A new document has been uploaded to the Planning Inspectorate website REP1-193, further commentary on it is provided in this chapter.

## 3.2 Purpose

3.2.1 The purpose of Appendix G is to provide a summary of the traffic operational appraisal undertaken at Preliminary Design. As well as Appendix G, which details the VISSIM base local model validation report, another report '9.15 Localised Traffic Modelling Appendix H - Traffic Operational Appraisal - VISSIM Forecasting Report' is produced (REP1-194). Appendix G presents the local VISSIM model validation report for the A13 reference network from the Orsett Cock junction to the A1012, including the A13/ A1089 junction, it presents the calibration and validation of the VISSIM base model.

3.2.2 NH's report states that according to the Design Manual for Roads and Bridges (DMRB) Chapter 12, Section 1, Part 1, Chapter 13 Operational Appraisal, the purpose of a traffic operational technical investigation is to:

- Ensure results from the higher tier macro-model are reasonable, especially in the early stages of the project;
- Describe the local impact of the scheme and suggest beneficial amendments to the design; and,
- Describe the local impact and identify areas where complementary actions will be needed by statutory and other bodies such as local authorities.

## 3.3 Report Summary

3.3.1 This section provides a summary of Appendix G and extracts the main points of the report.

VISSIM Application

3.3.2 A chapter is provided within Appendix G, which aims to define the need to use VISSIM on the Project by taking into considerations the following topics:

- Technical best practice documentation;
- Type of traffic analysis required using the VISSIM model;
- The data exchange process between disciplines; and,
- The type of outputs required.

3.3.3 The report presents the technical guidelines that have been used in the model:

- Design Manual for Roads and Bridges (DMRB) 2020.
- Traffic Modelling Guidelines, TfL, Version 3.0 (September 2010); and

- Model Auditing Process (MAP) – Traffic Schemes in London Urban Network, TfL, Version 3.5 (March 2017).

3.3.4 The report states that “micro-simulation models do provide a mechanism to undertake analyses that cannot be realistically addressed using traditional packages”, this is in reference to the strategic models associated with this area. The Project undertaken, focuses on studying:

- Interactions between closely spaced junctions on a grade separated network and the effect of flow breakdown on network performance;
- Signalised gyratories;
- The impact of HGV platooning; and,
- Technical visualisation.

3.3.5 The report states that “The VISSIM model was built for use:

- during the design development, typically to assess the interaction of closely spaced junctions or signalised gyratories; and,
- at intervals to undertake a network wide assessment of proposed design”.

3.3.6 A section is provided detailing the data exchange process between disciplines, this is presented in Figure 3-1. The traffic operations modelling, shown in orange, was structured as a series of smaller assessments characterised by:

- The progressive aggregation of network elements considered for the analysis. Initially, the Project network was studied road segment by road segment, then a series of nearby merges and diverges were studied as sub-networks, then the entire Project network was modelled using VISSIM; and,
- DMRB early assessment methods were performed for isolated merge or diverge segments. For non-isolated merge or diverge segments, engineering judgment based on calculations and SATURN models were used before the development of VISSIM microsimulation model.

3.3.7 The report states that “the above methodology closely follows the best practice recommendations in National Highways documentation, and it enabled a high level of pro-active interactions between the various disciplines employed on the design of the Project.”

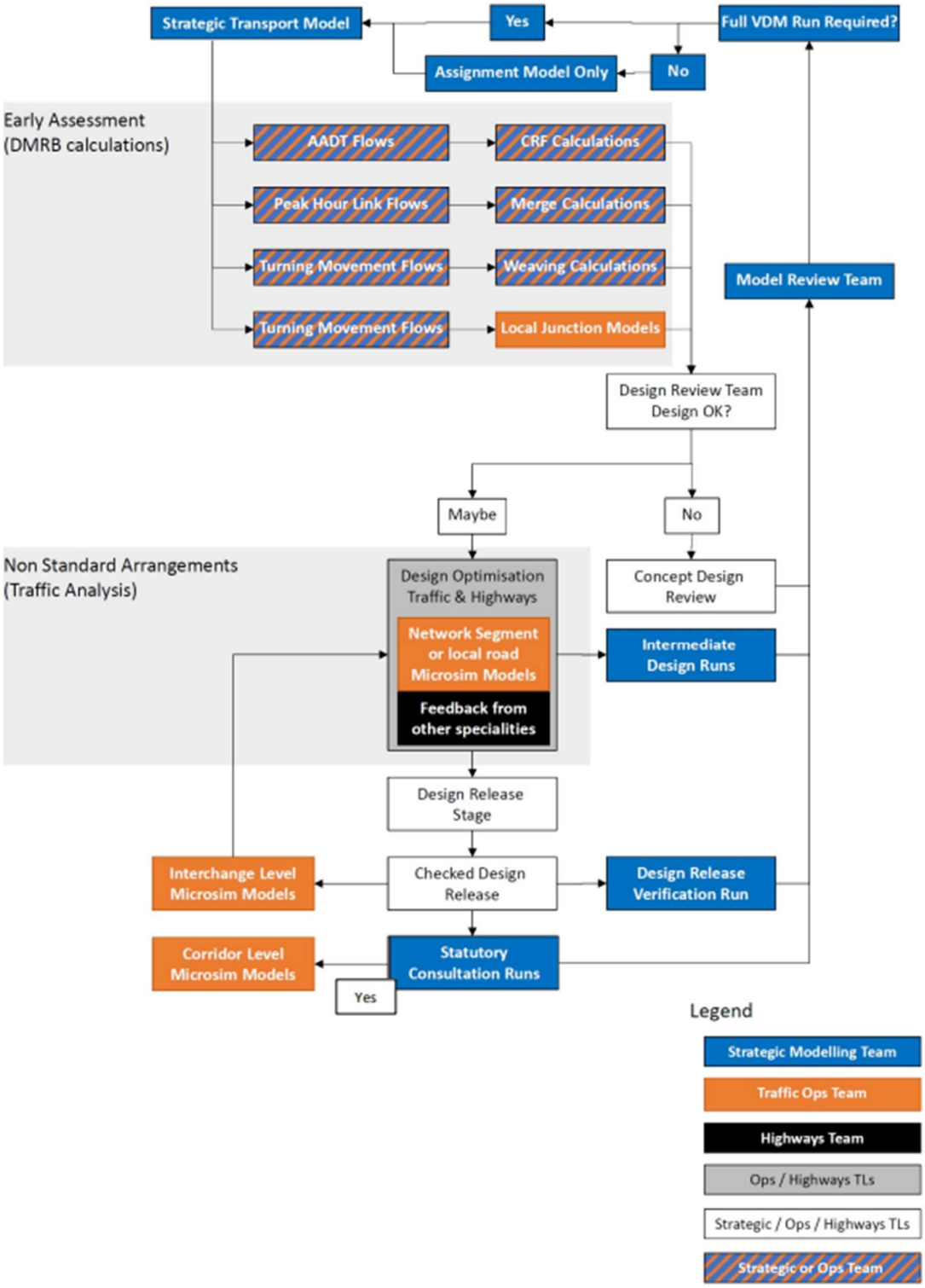



**Figure 3-1 Lower Thames Crossing Design Process**

3.3.8 A section is provided on the suitable model outputs that are to be reported on, this is based on the HCM 2010 where appropriate. NH specifically references traffic density and speed.

Software

3.3.9 The report provides a chapter on the software employed on the project, describing the purpose of random seeds. Further reference is made to the UK modelling guidelines.

3.3.10 Appendix G states that the VISSIM software version used is 11.00-11. This was the latest software release available when the model was developed, however based on Appendix B noted in Chapter 3 above, this seems to contradict the version used in the VISSIM LMVR which states that version 2020 SP13 has been used in model development.

Base Study Area

3.3.11 A chapter is provided giving an overview of the study area and the purpose of a reference network.

Traffic Data Collection

3.3.12 A chapter on the traffic data collection programme is provided, this focuses upon the survey schedule, any incidents during the survey and the types of survey undertaken. This shows that Automatic Traffic Counts (ATC), Automatic Number Plate Recognition Surveys (ANPR) and Trafficmaster travel time data was used in model development.

VISSIM Calibration Parameters

3.3.13 The document makes specific reference to how the parameters have been employed in the modelling:

- Calibrate the car-following model, adjusting the way vehicles interact with other vehicles in front of them (In VISSIM, vehicles do not adjust their behaviour to vehicles behind them, except for lane change behaviour);
- Calibrate the vehicles' speed distribution, to account for the fact that vehicles in VISSIM do not adjust their speed in reaction to vehicles situated behind them; and,
- Test and standardise the merge/diverge network coding, to provide an accurate and consistent coding method throughout the model.

3.3.14 The report states that "the selection of the parameters used in the final calibrated model was the result of numerous tests and based on experience gained from the calibration of VISSIM driving behaviours for other schemes. Appropriate adjustments to the driving behaviour parameters in VISSIM, where required, were selected from the list provided in the Guidelines for Microsimulation (section 5.2.8), Highways Agency, July 2007."

3.3.15 Differing driver behaviour types were used in the model depending on the type of the road. This is in addition to the car following model employed and the departures from predefined model settings based on the type of road. This is primarily undertaken to improve the model's representation of driver conditions.

3.3.16 An overview of the model's speed distributions is summarised in addition to the linkages with national speed limits.

3.3.17 An explanation is provided on the network coding and driving behaviours within the model. Given the issues noted above and throughout the project on the network coding of grade separated diverges, commentary is given on the departure from the existing default lane change parameters. This departure from default parameters is also discussed for grade separated merges.

3.3.18 The report states that "In order to achieve an adequate level of accuracy for the Project, the operational modelling followed the recommendation of the Guidelines for the Use of Microsimulation Software and developed a calibration method.

3.3.19 Such a level of calibration goes beyond that which is typically undertaken for grade separated network microsimulation projects in the UK. The complexity of the proposed A13 interchange, however, required such a level of development. The following were developed:

- A network coding structure that could be systematically applied to the future network; and,
- Driving behaviour overwrite values for both the grade separated and the local merge segment types."

3.3.20 Further details are provided on the representation of merging within the models and the justification employed.

Traffic Demand Preparation

3.3.21 A chapter is provided giving further information on how traffic demand is loaded into the model, this includes the base VISSIM model zoning system. The traffic assignment in the base model is simple as there is only one possible path between any two zones. It is, therefore, a shortest path, 'all or nothing', assignment type.

3.3.22 The matrices have been developed by using the collected ANPR surveys and matrix estimation using excel. This has resulted in 15-minute matrix profiling.

Model Validation

3.3.23 Validation uses the GEH statistic with the model outputs averaged over multiple seeds. Validation statistics are reported, with traffic volumes for all time periods within acceptable GEH guidelines and only one link being above 5% link flow difference.

3.3.24 Traffic time comparisons are based on zone to zone observed timings. The results indicate that for the AM Peak, all journey times are within recommended guidelines. The results for the PM Peak stretch over the following hours 15:00 – 16:00, 16:00 – 17:00, 17:00 – 18:00 and 18:00 – 19:00. It is not clear why there are so many PM peaks. The previous Orsett Cock Appendix B notes that the following modelling periods were created: 07:00 – 08:00, 08:00 – 09:00 and 17:00 – 18:00.

3.3.25 The report states that there are no travel time comparisons between 15:00 – 16:00 exceeding guidelines, however, this is not the case for the remaining peak hours, where between three and four routes are commonly found to exceed guidelines. An overview is provided on the reasoning behind the travel time conditions with an appropriate representation of queueing.

3.3.26 Figures are located with the Appendix showing the Trafficmaster traffic conditions in 15-minute periods.

Conclusion

3.3.27 The report provides the following conclusion, "the validation of the reference network shows that the model is fit for purpose to assess traffic conditions for complex sub-network segments. The network coding method replicated overall traffic conditions, both in free-flow conditions and in saturated circumstances in line with guidance."

## 3.4 Conclusion

3.4.1 This section of the chapter provides a summary of the differences and inconsistencies between Appendix B and Appendix G. In general, both documents provide a similar summary of the project. Both Appendices focus on different purposes, as such the information is suited to those needs. Ultimately, the same conclusions are reached in that the models are "fit-for-purpose", however, the methodology behind each Appendix is different.

3.4.2 There are three immediate and obvious areas where inconsistencies between both Appendices are noted.

(1) The version of VISSIM reported differs considerably.

(2) A further discrepancy is noted in Appendix G where the base model image is different as illustrated below, this is in comparison to the Appendix B where a smaller study area is noted.


**Figure 3-2 Appendix G Base Model Study Area**

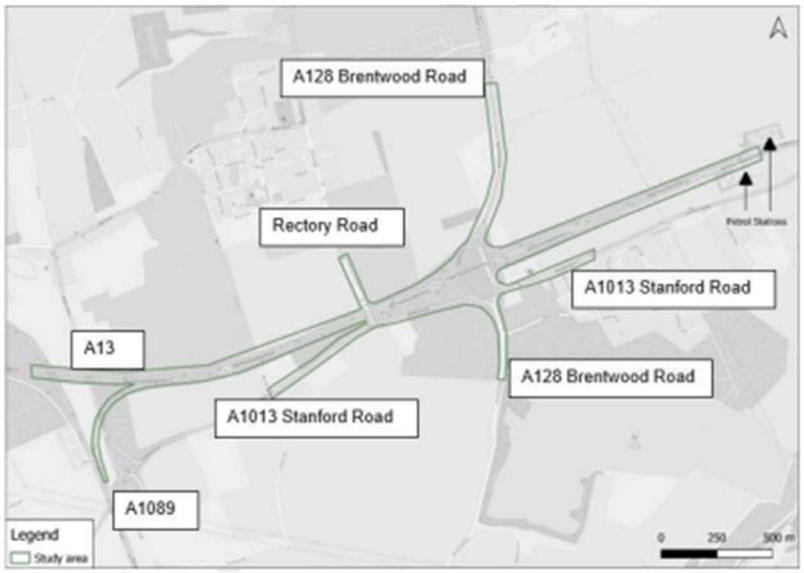



**Figure 3-3 Appendix B Traffic Operations Study Area**

(3) Peak hour periods are presented for four separate hours in the PM; however, the Appendix B gives the impression that only one peak hour is relevant in the PM.

3.4.3 It is recommended that further explanations are provided from NH on the points noted above.

# 4 Orsett Cock Forecast VISSIM Models and Documentation

## 4.1 Introduction

4.1.1 This chapter focusses upon the model versions supplied by NH. In September 2022, (version 1.5) of the Orsett Cock VISSIM microsimulation model was provided by NH. Subsequently a revised model was provided in July 2023 (version 2.4).

4.1.2 An associated forecasting report named, Lower Thames Crossing 9.15 Localised Traffic Modelling Appendix C – Orsett Cock Forecasting Report, Infrastructure Planning (Examination Procedure) Rules 2010 Volume 9 was provided in July 2023 (REP1 - 189). The purpose of this NH document is to present the findings from the traffic operation assessment undertaken for Design Release 4.3 (DR4.3) of the network in the vicinity of the Orsett Cock junction including the A13/A1089 and the A1013 Stanford Road/Rectory Road junction.

4.1.3 A document comparison has been undertaken with the NH Orsett Cock 2030 Operational Appraisal Design Release 4.3 Operational Modelling Report (August 2022). The main revisions to include further methodology on the 2045 forecast year scenarios.

4.1.4 This chapter reviews the model differences between v1.5 and v2.4, it focuses on the following items:

- Model structures
- Modifications
- Matrices
- LTAM Version
- Model Outputs

4.1.5 The Council has not signed off the localised forecast models for the Orsett Cock interchange and therefore the comparison provided in this section of the report is for information only and aims to assist the Council in the forecast model audit and future discussions with National Highways.

## 4.2 Model Structure Differences

4.2.1 The model comparison focussed on reading the .inpx files into Notepad++ with a comparison undertaken. Both .pdb files were opened in VISSIM to determine the scenarios and the associated modifications. It should be noted that no corresponding information has been provided by NH on the reasoning for these changes. The results are summarised below.

Software Version

4.2.2 Both models use VISSIM 2020.00, however the service packs differ, v1.5 uses service pack 14, whereas v2.4 uses service pack 13. This is not thought to result in a significant difference between models, however, it should be borne in mind.

Desired Speed Decisions

4.2.3 A new desired speed decision is included in v2.4, named “30mph 30/40”. The addition of a new speed will have a resultant impact on the vehicle speeds throughout the section of road where the desired speed decision marker is located.

Evaluation

4.2.4 The Node Delay segment start parameter in v1.5 is set to “400” meters, whereas in v2.4 this parameter is set to “2000” meters. Changing this parameter will result in the delay segment calculation starting earlier before the node. The impact of this values being changed to a greater distance will result in a worsening case scenario being extracted from the model.

Driving Behaviour

4.2.5 The models show differences in advanced merging parameters, these are set to “false” in v1.5, whereas these are now set to “true” in v2.4. Cooperative Deceleration parameters are changed from “-3” in v1.5 to “-6” in v2.4. Additionally, the cooperative lane parameter has been amended from “false” in v1.5 to “true” in v2.4. This would suggest that it has not been employed in the previous modelling. This parameter change will impact on the driver behaviour especially at the give way and merging areas. If the links are congested, there is scope for the vehicle’s performance to be improved, however, this wouldn’t necessarily fix any outstanding issues. Other model parameters would require amending to make the vehicles move aggressive.

Network Performance Data Collection

4.2.6 There is a marginal change in the set-up, in v1.5, this is set to “false” whereas in v2.4 this is now set to “true”. This would suggest that in v1.5 the network performance data collection was not required, however, in v2.4 the outputs being reported require the network performance data to be collected. Having this parameter set to “true” will have no impact on the model’s results other than now outputting this metric.

Node Parameters

4.2.7 A number of node parameters that are used for evaluation purposes have been amended from “true” in v1.5 to “false” in v2.4. This would suggest that these are no longer required in the dynamic assignment process. The location of the nodes no longer requiring evaluation are situated on diverge points and at zone access locations. This will have no impact on the model’s performance as it is only used for evaluation techniques.

## 4.3 Modification Analysis

4.3.1 A comparison has been undertaken into the modifications allocated in the project scenario manager. This identifies whether the same modifications are attributed to the same scenarios in v1.5 and v 2.4. This comparison noted that the same modifications are used in each version, with the exception of modification 11 being used in v1.5. Figure 4-1 illustrates the scenarios and modifications used in both versions. Further analysis was undertaken to determine any differences in the modifications, the changes are noted below.

Version 1.5

| Count: 8 | No | Name | Modifications |
|---|---|---|---|
| 1 | 1 | AM 2030 DM | 1 |
| 2 | 4 | PM 2030 DM | 5 |
| 3 | 5 | AM 2030 DS - A13W extension | 2,3,6 |
| 4 | 6 | PM 2030 DS - A13W extension | 2,4,6 |
| 5 | 7 | AM 2045 DM | 7 |
| 6 | 8 | PM 2045 DM | 8 |
| 7 | 9 | AM 2045 DS - A13W extension | 2,6,9 |
| 8 | 10 | PM 2045 DS - A13W extension | 2,6,10,11 |

Version 2.4

| Count: 8 | No | Name | Modifications |
|---|---|---|---|
| 1 | 1 | AM 2030 DM | 1 |
| 2 | 4 | PM 2030 DM | 5 |
| 3 | 5 | AM 2030 DS - A13W extension | 2,3,6 |
| 4 | 6 | PM 2030 DS - A13W extension | 2,4,6 |
| 5 | 7 | AM 2045 DM | 7 |
| 6 | 8 | PM 2045 DM | 8 |
| 7 | 9 | AM 2045 DS - A13W extension | 2,6,9 |
| 8 | 10 | PM 2045 DS - A13W extension | 2,6,10 |

**Figure 4-1 Scenario and Modifications**

Modification 1 – 2030 DM AM Model

Based on a comparison of this modification, this has indicated that only matrices are different. Further analysis has been undertaken to determine where the matrices have changed. Figure 4-2, provides the range of total zone reductions and increases, this is based on summing all cell-to-cell movements, ultimately this shows the matrix changes. There are significant differences in the AM Car matrices from 08:00 to 09:00. Traffic destinating at Zone 5 (A1013 Stanford Rd (West)) are shown to increase by the largest number of trips, this is made up of traffic originating from Zones 2 (A13 (East)) and 3 (A1013 Stanford Rd (East)).

| Modification 1 - 2030 DM AM Peak | | |
|---|---|---|
| 2030 AM | Total Difference Range | |
| | Reduction | Increase |
| 2030 AM Car Warmup | -1 | 16 |
| 2030 AM LGV Warmup | -9 | 10 |
| 2030 AM HGV Warmup | -1 | 1 |
| 2030 AM Car 0700 - 0715 | -23 | 9 |
| 2030 AM Car 0715 - 0730 | -22 | 12 |
| 2030 AM Car 0730 - 0745 | -1 | 14 |
| 2030 AM Car 0745 - 0800 | -16 | 15 |
| 2030 AM Car 0800 - 0815 | 0 | 140 |
| 2030 AM Car 0815 - 0830 | -10 | 145 |
| 2030 AM Car 0830 - 0845 | -10 | 152 |
| 2030 AM Car 0845 - 0900 | 0 | 106 |
| 2030 AM LGV 0700 - 0715 | -1 | 10 |
| 2030 AM LGV 0715 - 0730 | -1 | 8 |
| 2030 AM LGV 0730 - 0745 | -8 | 7 |
| 2030 AM LGV 0745 - 0800 | -1 | 9 |
| 2030 AM LGV 0800 - 0815 | -2 | 0 |
| 2030 AM LGV 0815 - 0830 | -3 | 0 |
| 2030 AM LGV 0830 - 0845 | -2 | 0 |
| 2030 AM LGV 0845 - 0900 | -2 | 0 |
| 2030 AM HGV 0700 - 0715 | -1 | 0 |
| 2030 AM HGV 0715 - 0730 | -1 | 0 |
| 2030 AM HGV 0730 - 0745 | -1 | 4 |
| 2030 AM HGV 0745 - 0800 | 0 | 1 |
| 2030 AM HGV 0800 - 0815 | 0 | 1 |
| 2030 AM HGV 0815 - 0830 | -1 | 0 |
| 2030 AM HGV 0830 - 0845 | -1 | 1 |
| 2030 AM HGV 0845 - 0900 | -1 | 0 |

**Figure 4-2 2030 DM AM Peak Matrix Amendments**

Modification 2 – 2030 DS AM/PM, 2045 DS AM/PM Model

4.3.2 There are no matrix changes in the modification between v1.5 and v2.4, however, there are differences with the networks structure. An amendment has been made to a conflict marker located on the circulatory approach to the A128 Brentwood Road signal. It is not known why a conflict marker should be located at this location due to the lane setup. In v1.5 the conflict marker was set to be as “undetermined” with both lanes set as red, meaning that no vehicles would be able to use the lanes. In v2.4, this has been amended to passive, meaning that the conflict marker is not active. This could provide a marginal area where additional capacity is given to the network as illustrated in Figure 4-3.

4.3.3 Further amendments are noted with respect to desired speed decisions numbered (49/50/51/52/56/57/58/59/60/61/62/97/99/99/100/101/102/103/105/106/107/109/112/113/114/115/118/119/120/121). Some of the desired speed decisions relate to a change of position on the links, other relate to a change in speed. Where speed changes are noted, an initial review sees the desired speed changing from 50mph in v1.5 to 30mph in v2.4. An example being the

LTC northbound off ramp to A13 westbound. The changes will have an impact on vehicle interaction.

4.3.4 Lane change parameters have been amended on link 910679, this is a single lane section of the LTC southbound off ramp to the A13 Eastbound. V1.5 provides a lane change distance of 1,500m, whereas v2.4 notes 800m. This means that vehicles will start changing to be in the correct lane much closer to this particular link. Link 10032 which is the exit from the Orsett Cock roundabout to the A1013 Stanford Road has its lane change distance reduced from 200m in v1.5 to 100m in v2.4. A similar reduction is noted on the exit from the roundabout to A128 Brentwood Road South, where in v1.5, 150m was used, however in v2.4, 100m is used.

4.3.5 Ultimately, these changes will have an impact on vehicle interaction and their desire to be in the correct lane.

4.3.6 The driving behaviour of the link type slip road has been amended from having a standstill distance CC0 in v1.5 of 6 meters to 3 meters in v2.4. Additionally, the maximum deceleration for cooperative braking has been revised from -3.00 m/s$^2$ in v1.5 to -6.00m/s$^2$. The advanced merge is also selected from this link type in v2.4, whereas in v1.5, this wasn't selected. If this option is selected, more vehicles can change lanes earlier. Thus, the capacity increases and the probability, that vehicles come to a stop to wait for a gap, is reduced.

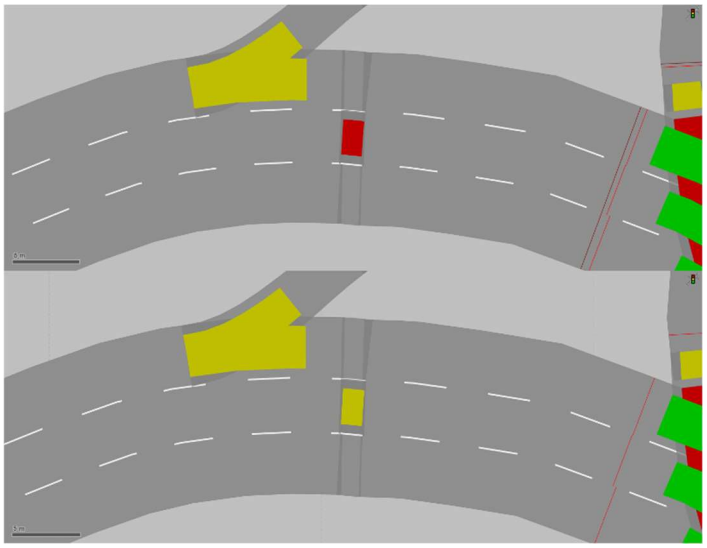


**Figure 4-3 Conflict Marker Amendments**

Modification 3 – 2030 DS AM Model

4.3.7 The comparison has indicated that only matrices are different. Further analysis has been undertaken to determine where the matrices have changed. As illustrated in Figure 4-4, the range of total zone reductions and increases, this is based on summing all cell-to-cell movements, ultimately this shows the matrix changes. There are significant differences in the AM Car, LGV and HGV warmup matrices of a maximum changes of 165, 84 and 210 respectively. There are still subsequent changes in the 15-minute car matrices, which a roughly show maximum increases by 20. It is worth noting that, the AM Car 08:30 – 08:45 matrix has a total reduction of 57 vehicles, entering the model at Zone 3 (A1013 Stanford Rd (East)) with the principal movement to Zone 5 (A1013 Stanford Rd (West)) decreasing by 53 vehicles.

| Modification 3 - 2030 DS AM Peak | | |
|---|---|---|
| 2030 AM | Total Difference Range | |
| | Reduction | Increase |
| 2030 AM Car Warmup | -5 | 165 |
| 2030 AM LGV Warmup | -4 | 84 |
| 2030 AM HGV Warmup | -2 | 210 |
| 2030 AM Car 0700 - 0715 | -2 | 18 |
| 2030 AM Car 0715 - 0730 | -3 | 22 |
| 2030 AM Car 0730 - 0745 | -5 | 20 |
| 2030 AM Car 0745 - 0800 | -3 | 23 |
| 2030 AM Car 0800 - 0815 | -3 | 22 |
| 2030 AM Car 0815 - 0830 | -3 | 20 |
| 2030 AM Car 0830 - 0845 | -57 | 20 |
| 2030 AM Car 0845 - 0900 | -1 | 17 |
| 2030 AM LGV 0700 - 0715 | -2 | 1 |
| 2030 AM LGV 0715 - 0730 | -2 | 0 |
| 2030 AM LGV 0730 - 0745 | -2 | 0 |
| 2030 AM LGV 0745 - 0800 | -2 | 0 |
| 2030 AM LGV 0800 - 0815 | -2 | 1 |
| 2030 AM LGV 0815 - 0830 | -1 | 0 |
| 2030 AM LGV 0830 - 0845 | -1 | 0 |
| 2030 AM LGV 0845 - 0900 | -1 | 1 |
| 2030 AM HGV 0700 - 0715 | -1 | 0 |
| 2030 AM HGV 0715 - 0730 | -1 | 0 |
| 2030 AM HGV 0730 - 0745 | -1 | 0 |
| 2030 AM HGV 0745 - 0800 | -2 | 1 |
| 2030 AM HGV 0800 - 0815 | -1 | 1 |
| 2030 AM HGV 0815 - 0830 | -1 | 1 |
| 2030 AM HGV 0830 - 0845 | -1 | 1 |
| 2030 AM HGV 0845 - 0900 | -1 | 0 |

**Figure 4-4 2030 DS AM Peak Matrix Amendments**

Modification 4 – 2030 DS PM Model

4.3.8 The comparison has indicated that only matrices are different. Analysis has been undertaken which highlights substantial changes in the PM LGV warmup matrix, whereby traffic reduces by 759. V1.5 of the model had 208 vehicles routing from Zone 12 (LTC North) to Zone 2 (A13 (East)), whereas v2.4 only has 55 vehicles. Another large reduction is noted from Zone 12 (LTC North) to Zone 9 (LTC South), v1.5 had 745 vehicles whereas this is reduced to 198 vehicles. A summary of the total reductions and increased is presented in Figure 4-5.

| Modification 4 - 2030 DS PM Peak | | |
|---|---|---|
| 2030 PM | Total Difference Range | |
| | Reduction | Increase |
| 2030 PM Car Warmup | 0 | 162 |
| 2030 PM LGV Warmup | -2 | 70 |
| 2030 PM HGV Warmup | -759 | 0 |
| 2030 PM Car 1700 - 1715 | -1 | 13 |
| 2030 PM Car 1715 - 1730 | 0 | 12 |
| 2030 PM Car 1730 - 1745 | 0 | 12 |
| 2030 PM Car 1745 - 1800 | -2 | 13 |
| 2030 PM LGV 1700 - 1715 | 0 | 0 |
| 2030 PM LGV 1715 - 1730 | -1 | 0 |
| 2030 PM LGV 1730 - 1745 | 0 | 0 |
| 2030 PM LGV 1745 - 1800 | -1 | 0 |
| 2030 PM HGV 1700 - 1715 | -1 | 1 |
| 2030 PM HGV 1715 - 1730 | -1 | 0 |
| 2030 PM HGV 1730 - 1745 | 0 | 0 |
| 2030 PM HGV 1745 - 1800 | -1 | 1 |

**Figure 4-5 2030 DS PM Peak Matrix Amendments**

Modification 5 – 2030 DM PM Model

4.3.9 Modification 5 shows minor flow modifications across the modelled time periods. The majority of the increases are noted coming from A1013 Stanford Road East to A128 Brentwood Road North, a summary of the individual cell-to-cell movements is presented in Figure 4-6.

| Modification 5 - 2030 DM PM Peak | | |
|---|---|---|
| 2030 PM | Total Difference Range | |
| | Reduction | Increase |
| 2030 PM Car Warmup | -2 | 22 |
| 2030 PM LGV Warmup | -1 | 7 |
| 2030 PM HGV Warmup | -1 | 1 |
| 2030 PM Car 1700 - 1715 | 0 | 26 |
| 2030 PM Car 1715 - 1730 | -4 | 14 |
| 2030 PM Car 1730 - 1745 | -1 | 12 |
| 2030 PM Car 1745 - 1800 | 0 | 12 |
| 2030 PM LGV 1700 - 1715 | 0 | 1 |
| 2030 PM LGV 1715 - 1730 | -1 | 1 |
| 2030 PM LGV 1730 - 1745 | 0 | 0 |
| 2030 PM LGV 1745 - 1800 | -1 | 1 |
| 2030 PM HGV 1700 - 1715 | 0 | 1 |
| 2030 PM HGV 1715 - 1730 | -1 | 0 |
| 2030 PM HGV 1730 - 1745 | -1 | 0 |
| 2030 PM HGV 1745 - 1800 | 0 | 0 |

**Figure 4-6 2030 DM PM Peak Matrix Amendments**

Modification 6 – 2030/2045 DS AM/PM Model

4.3.10 The comparison has identified that lane change parameters differ on one specific link between the two model versions. Link number 10086 has a lane change parameter of “800”m in v1.5, however, this is set to “1000”m in v2.4. This link in located on the A13 Eastbound off ramp approaching Orsett Cock roundabout. Having a change of this magnitude will have an impact on the vehicles arriving at the roundabout. Vehicles in v2.4 will be aware that they have a larger distance available to them to be in the correct lane at the roundabout. There are no changes to modelled flow associated with this modification.

Modification 7 – 2045 DM AM Model

4.3.11 The comparison has identified that data collection modifications have been amended, previously in v1.5, this was set to false, however, in v2.4, this is no longer selected. This setting suggests that when outputting model outputs for v2.4, data collection was not selected.

4.3.12 Further analysis indicates significant changes to vehicle matrices as illustrated in Figure 4-7. There is a large fluctuation in the HGV flows, the largest decrease noted between the A13 East to A13 West, this compares to an increase noted in the reverse direction from the A13 West to the A13 East. Overall, there is no pattern of the same zone to zone movements being responsible for the increase or decrease in volumes.

| Modification 7 - 2045 DM AM Peak | | |
|---|---|---|
| 2045 AM | Total Difference Range | |
| | Reduction | Increase |
| 2045 AM Car Warmup | -1 | 78 |
| 2045 AM LGV Warmup | -7 | 10 |
| 2045 AM HGV Warmup | -168 | 224 |
| 2045 AM Car 0700 - 0715 | -1 | 80 |
| 2045 AM Car 0715 - 0730 | -46 | 15 |
| 2045 AM Car 0730 - 0745 | 0 | 45 |
| 2045 AM Car 0745 - 0800 | -1 | 69 |
| 2045 AM Car 0800 - 0815 | 0 | 49 |
| 2045 AM Car 0815 - 0830 | -4 | 93 |
| 2045 AM Car 0830 - 0845 | -4 | 57 |
| 2045 AM Car 0845 - 0900 | -56 | 53 |
| 2045 AM LGV 0700 - 0715 | -1 | 10 |
| 2045 AM LGV 0715 - 0730 | 0 | 8 |
| 2045 AM LGV 0730 - 0745 | -7 | 1 |
| 2045 AM LGV 0745 - 0800 | 0 | 9 |
| 2045 AM LGV 0800 - 0815 | 0 | 9 |
| 2045 AM LGV 0815 - 0830 | 0 | 9 |
| 2045 AM LGV 0830 - 0845 | 0 | 0 |
| 2045 AM LGV 0845 - 0900 | 0 | 0 |
| 2045 AM HGV 0700 - 0715 | -65 | 0 |
| 2045 AM HGV 0715 - 0730 | 0 | 79 |
| 2045 AM HGV 0730 - 0745 | 0 | 109 |
| 2045 AM HGV 0745 - 0800 | 0 | 0 |
| 2045 AM HGV 0800 - 0815 | 0 | 5 |
| 2045 AM HGV 0815 - 0830 | -84 | 105 |
| 2045 AM HGV 0830 - 0845 | 0 | 89 |
| 2045 AM HGV 0845 - 0900 | -86 | 0 |

**Figure 4-7 2045 DM AM Peak Matrix Amendments**

Modification 8 – 2045 DM PM Model

4.3.13 The comparison generally shows marginal changes in traffic volumes, however, there are instances of increase above 50 vehicles being added to the matrices as illustrated in Figure 4-8.

| Modification 8 - 2045 DM PM Peak | | |
|---|---|---|
| 2045 PM | Total Difference Range | |
| | Reduction | Increase |
| 2045 PM Car Warmup | -2 | 2 |
| 2045 PM LGV Warmup | -1 | 1 |
| 2045 PM HGV Warmup | 0 | 5 |
| 2045 PM Car 1700 - 1715 | -1 | 53 |
| 2045 PM Car 1715 - 1730 | 0 | 0 |
| 2045 PM Car 1730 - 1745 | 0 | 0 |
| 2045 PM Car 1745 - 1800 | -1 | 56 |
| 2045 PM LGV 1700 - 1715 | -16 | 0 |
| 2045 PM LGV 1715 - 1730 | 0 | 1 |
| 2045 PM LGV 1730 - 1745 | 0 | 0 |
| 2045 PM LGV 1745 - 1800 | -16 | 1 |
| 2045 PM HGV 1700 - 1715 | 0 | 0 |
| 2045 PM HGV 1715 - 1730 | 0 | 0 |
| 2045 PM HGV 1730 - 1745 | 0 | 0 |
| 2045 PM HGV 1745 - 1800 | 0 | 0 |

**Figure 4-8 2045 DM PM Peak Matrix Amendments**

Modification 9 – 2045 DS AM Model

4.3.14 The comparison has identified that data collection modifications have been amended, previously in v1.5, this was set to false, however, in v2.4, this is no longer selected. This setting suggests that when outputting model outputs for v2.4, data collection was not selected.

4.3.15 It should be noted that in both v1.5 and v2.4 of the model, the matrices are incorrectly named. As illustrated in Figure 4-9, the matrices are named 2030, whereas they should be named 2045. It is assumed that this is just a naming issue and that the correct matrices are used in both model versions. The comparison shows marginal changes associated with the majority of 15-minute matrices, however, there are substantial increases relating to the warmup periods of all user classes. Traffic originating from the LTC North is shown to increase to destinate at the A128 Brentwood Road and LTC South.

| Modification 9 - 2045 DS AM Peak | | |
|---|---|---|
| 2045 AM | Total Difference Range | |
| | Reduction | Increase |
| 2030 AM Car Warmup | 0 | 199 |
| 2030 AM LGV Warmup | -1 | 101 |
| 2030 AM HGV Warmup | 0 | 207 |
| 2030 AM Car 0700 - 0715 | -1 | 1 |
| 2030 AM Car 0715 - 0730 | -2 | 1 |
| 2030 AM Car 0730 - 0745 | -2 | 1 |
| 2030 AM Car 0745 - 0800 | -2 | 2 |
| 2030 AM Car 0800 - 0815 | -1 | 2 |
| 2030 AM Car 0815 - 0830 | 0 | 2 |
| 2030 AM Car 0830 - 0845 | -1 | 2 |
| 2030 AM Car 0845 - 0900 | -1 | 1 |
| 2030 AM LGV 0700 - 0715 | 0 | 1 |
| 2030 AM LGV 0715 - 0730 | -1 | 0 |
| 2030 AM LGV 0730 - 0745 | 0 | 2 |
| 2030 AM LGV 0745 - 0800 | -1 | 1 |
| 2030 AM LGV 0800 - 0815 | 0 | 9 |
| 2030 AM LGV 0815 - 0830 | 0 | 1 |
| 2030 AM LGV 0830 - 0845 | 0 | 0 |
| 2030 AM LGV 0845 - 0900 | -1 | 1 |
| 2030 AM HGV 0700 - 0715 | 0 | 1 |
| 2030 AM HGV 0715 - 0730 | -1 | 1 |
| 2030 AM HGV 0730 - 0745 | -1 | 2 |
| 2030 AM HGV 0745 - 0800 | -1 | 1 |
| 2030 AM HGV 0800 - 0815 | -1 | 2 |
| 2030 AM HGV 0815 - 0830 | -1 | 1 |
| 2030 AM HGV 0830 - 0845 | 0 | 0 |
| 2030 AM HGV 0845 - 0900 | 0 | 0 |

**Figure 4-9 2045 DS AM Peak Matrix Amendments**

Modification 10 – 2045 DS PM Model

4.3.16 Modification 10 notes that large changes are noted in the warmup periods. Increases are noted in the car and LGV matrices, whereas the HGV matrix reduces by 751. The increases are mainly by traffic originating from the LTC North.

4.3.17 It should be noted that in both v1.5 and v2.4 of the model, the matrices are incorrectly named. As illustrated in Figure 4-10, the matrices are named 2030, whereas they should be named 2045. It is assumed that this is just a naming issue and that the correct matrices are used in both model versions.

| Modification 10 - 2045 DS PM Peak | | |
|---|---|---|
| 2045 PM | Total Difference Range | |
| | Reduction | Increase |
| 2030 PM Car Warmup | -1 | 165 |
| 2030 PM LGV Warmup | 0 | 84 |
| 2030 PM HGV Warmup | -751 | 0 |
| 2030 PM Car 1700 - 1715 | -2 | 1 |
| 2030 PM Car 1715 - 1730 | -2 | 1 |
| 2030 PM Car 1730 - 1745 | -1 | 1 |
| 2030 PM Car 1745 - 1800 | -2 | 0 |
| 2030 PM LGV 1700 - 1715 | -1 | 4 |
| 2030 PM LGV 1715 - 1730 | 0 | 3 |
| 2030 PM LGV 1730 - 1745 | 0 | 2 |
| 2030 PM LGV 1745 - 1800 | 0 | 3 |
| 2030 PM HGV 1700 - 1715 | 0 | 0 |
| 2030 PM HGV 1715 - 1730 | 0 | 0 |
| 2030 PM HGV 1730 - 1745 | -1 | 1 |
| 2030 PM HGV 1745 - 1800 | 0 | 0 |

**Figure 4-10 2045 DS PM Peak Matrix Amendments**

## 4.4 Modification summary

4.4.1 As noted above there are numerous instances of matrices being different from the v1.5 model. It is understood that the combined network link and merge parameters associated with Do Something amendments have been undertaken to enhance the vehicle performance and result in more realistic driving conditions. As expected, all the modifications will have an impact on and lead to revised model outputs, however, the conclusions ultimately provide a similar picture. It should be noted that Stantec have not observed the models running and as such the comments on the modifications are based on interpretation of the files provided.

## 4.5 Versions of LTAM

4.5.1 The Forecasting Report associated with version 2.4 of the model states that “The 2030 and 2045 DM forecast traffic demand in VISSIM was determined by examining the differences in forecast traffic flows (for model zones) predicted by the 2016 base year and 2030/2045 DM Lower Thames Area Model (LTAM) – the Project’s transport model (CM49) models for the available hours of 07:00 – 08:00 in the AM peak and 17:00 – 18:00 in the PM peak.”

4.5.2 Additional “The 2030 and 2045 DS forecast traffic demand matrices in VISSIM were determined using the same method as the 2030 and 2045 DM, that is by examining the differences in forecast traffic flows from the LTAM for the 2016 base year and 2030/2045 DS (CS72).”

4.5.3 This is in contrast to version 1.5, where “The 2030 DM forecast traffic demand in VISSIM was determined by examining the differences in forecast traffic flows (for model zones) predicted by the 2016 Base Year and 2030 DM LTAM (CM45) models for the available hours of 07:00 – 08:00 in the AM Peak and 17:00 – 18:00 in the PM Peak.” Furthermore, “The 2030 DS forecast traffic demand matrices in VISSIM were determined using the same method as the 2030 DM, that is by examining the differences in forecast traffic flows predicted by the 2016 Base Year and 2030 DS (CS67) LTAM models.”

4.5.4 The different sources of LTAM result in different matrices being used in the models, this explains the modifications.

## 4.6 Model Outputs

4.6.1 Appendix C presents model outputs, which relate to traffic flows and journey times. These have not been reviewed as Thurrock has not signed off the forecast Orsett Cock VISSIM

model. The model outputs will be agreed once a version of the model is agreed that can be used as a suitable basis for forecasting.

## 4.7 Summary

4.7.1 A document comparison has been undertaken of the Localised Traffic Modelling Appendix C – Orsett Cock Forecasting Report (REP1-189) with the NH Orsett Cock 2030 Operational Appraisal Design Release 4.3 Operational Modelling Report (August 2022). In addition, the chapter has presented result of the review of the model differences between v1.5 and v2.4. Multiple changes have been identified both in terms of the network parameters and travel demand.

4.7.2 At the meeting on 16/08/23 National Highways clarified that the changes are mainly due to an update to the LTAM (i.e. for the Do-Minimum microsimulation matrices, version CM45 was used originally and CM49 has been used more recently; and for the Do-Something matrices CS67 was used originally and CS72 has been used more recently). The Council has asked to see the extent and the magnitude of the changes within the LTAM by providing flow difference figures in the first instance. An explanation of the network changes implemented between v1.5 and v2.4 is also required.

4.7.3 The Council has not signed off the localised forecast models for the Orsett Cock interchange and therefore the comparison provided in this chapter of the report is for information only and aims to assist the Council in the forecast model audit and future discussions with National Highways.

# 5 Appendix H

5.1.1 Stantec have been provided by NH with the Lower Thames Crossing 9.15 Localised Traffic Modelling Appendix H - Traffic Operational Appraisal - VISSIM Forecasting report July 2023 (REP1 - 194).

5.1.2 The purpose of Appendix H is to present the traffic operation appraisal report of the Lower Thames Crossing by using operational analysis to describe the traffic conditions of the project's proposed highway layout using DMRB merge and diverge segment analysis as well as the assessment using the traffic microsimulation model of the project. The document states that "The traffic operational appraisal has been undertaken for 2045 to remain consistent with the design year ". Chapter 1 of Appendix H provides an overview of the project illustrating its route and the subsequent connectivity.

5.1.3 Chapter 2 of Appendix H references the previously mentioned Appendix G, commenting on the data exchange processes between different disciplines. Further discussion is provided on the application of DMRB merge and diverge calculations. The use of VISSIM to undertake detailed modelling is provided including the source of the traffic demand "The VISSIM model traffic demand come from the 2045 LTAM (version CS72)."

5.1.4 Chapter 3 focuses on the key assignment principles, as stated "a. To ensure free-flowing traffic conditions at the design year (2045); b. To ensure safe traffic conditions: i. With an easily understandable road network for the driver; and, ii. With the avoidance of blocking back queues from the local road network. c. To account for known blocking back queue events." Further information in provided on traffic investigations during the design development, this sets out the Key Traffic Appraisal Assessments undertaken.

5.1.5 Grade separated network traffic analysis is provided in Chapter 4, this sets out the criteria and notes the 2045 traffic conditions on the project. Speed profiles graphs illustrate how the Lower Thames Crossing's speed will vary based on the VISSIM model outputs. Traffic conditions of the A2/M2, the A13 and the M25 corridor are also reported on, note that no source is provided, so it is assumed that the data comes from LTAM. In both cases, speed plots are provided. The document concludes that "In conclusion, the Lower Thames Crossing corridor is forecast to be freeflowing with stable traffic conditions. The M25, A13 and A2/M2 are also forecast to be generally free-flowing, with some merge and diverge segments experiencing capacity issues."

5.1.6 Chapter 5 focuses on local road traffic analysis, the document states that "To assess the design year traffic conditions, it was therefore decided to use the 2045 traffic volumes directly from SATURN. The assessment has been performed using VISSIM for consistency". Junction performance guidance is laid out which aligns with "current industry best practice". This relates to the volume, number of lanes, volume/capacity calculations, delay, average queue length and maximum queue length for each approach at the following junctions:

- M25 Junction 29,
- A2 Gravesend East Interchange,
- Henhurst Road,
- Collector Road Junction,
- Thong Lane New Junction,
- Thong Lane to Brewers Lane,
- Brewers Road Junction.

5.1.7 The document concludes in Chapter 6 with the following statement: “In conclusion, extensive traffic operation analyses were developed throughout the design development process. The design progressed logically, starting with key weaving segments, followed by interchanges and then local roads.

5.1.8 2045 mainline forecasted traffic conditions are: a. Project mainline – free-flowing; b. M25 mainline – free-flowing, with localised merges experiencing capacity issues; c. A13 mainline – free-flowing, with localised segments at experiencing capacity issues; and, d. A2 mainline – free-flowing, with localised segments experiencing capacity issues.

5.1.9 Junctions on the local road network are also free-flowing, but the Brewer’s Road junction will require further signal timing optimisation as part of detailed design.”

## 5.2 Appendix H Summary

5.2.1 In summary Appendix H focuses on more of the strategic aspects of the project, the name of the document is slightly misleading as there is limited connection to the VISSIM models.

5.2.2 The results of the assessment presented by NH in Appendix H will need to be updated once the Orsett Cock forecast model is signed off by the Council.

# Annex 4 Review of Base Year East-West Base Model

# TECHNICAL NOTE

**Job Name:** East West Microsimulation Modelling

**Job No:** 332510911

**Note No:** TN003

**Date:** August 2023

**Prepared By:** Sid Iyer

**Subject:** **East-West Base Version 3 Microsimulation Model – Review**

## 1. Introduction

1.1. In support of ongoing work with Thurrock (the Council) regarding the Lower Thames Crossing DCO, the applicant has agreed to undertake a microsimulation modelling exercise to better understand any traffic operational impacts of the LTC within the area of the East-West model incorporating 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.

1.2. As part of this process the applicant has been sharing the base models for review with the Council.

1.3. The East-West microsimulation model and associated LMVR were initially issued on the 27th June 2022. A revised Base Model Issue 2 was received in September 2022 which the Council has reviewed and provided a response to the applicant in the form of Technical Note 002 issued to the applicant on 9th November 2023. Subsequently, Base Model Issue 3 has been submitted by the applicant in July 2023 at Deadline 1. This model has been reviewed and the findings of this review are included in this technical note.

1.4. As illustrated within the LMVR the modelled area and zones are illustrated within Figure 1.

| Zone Number | Zone Name |
|---|---|
| 1 | A13 North |
| 2 | A13 South |
| 3 | High Road |
| 4 | Stifford Clays |
| 5 | Long Lane |
| 6 | Elizabeth Road |
| 7 | Arterial Road North |
| 8 | Windsor Avenue |
| 9 | Hathaway Road |
| 10 | Conaught Avenue |
| 11 | Bradleigh Avenue |
| 12 | Blackshots Lane |
| 13 | Rectory Road |
| 14 | Southend Road |
| 15 | Heath Road |
| 16 | Baker Street |
| 17 | Rectory Road |
| 18 | A1013 |
| 19 | Nutberry Avenue |
| 20 | Victoria Avenue |
| 21 | King Edwards Drive |
| 22 | Wood View |
| 23 | Chadwell Road |
| 24 | Marshfoot Road |
| 25 | Chadwell Bypass |
| 26 | St. Chads Road |
| 27 | Brentwood Road |
| 28 | River View |
| 29 | Linford Road |
| 30 | A1089 South |
| 31 | A1089 North |


Figure 1: East - West Microsimulation Model Zoning System

## 2. Overview

2.1. This technical note provides an updated Red/Amber/Green (RAG) review of the base East-West microsimulation model and identifies elements within the model that require review and an update. The Council will also be reviewing the LMVR and will provide comments separately.

2.2. A summary of the RAG review categorisation along with a brief description is provided below in Table 1:

Table 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. |

2.3. A full review of the model outputs and LMVR will be completed once outstanding issues highlighted in this technical note have been sufficiently addressed.

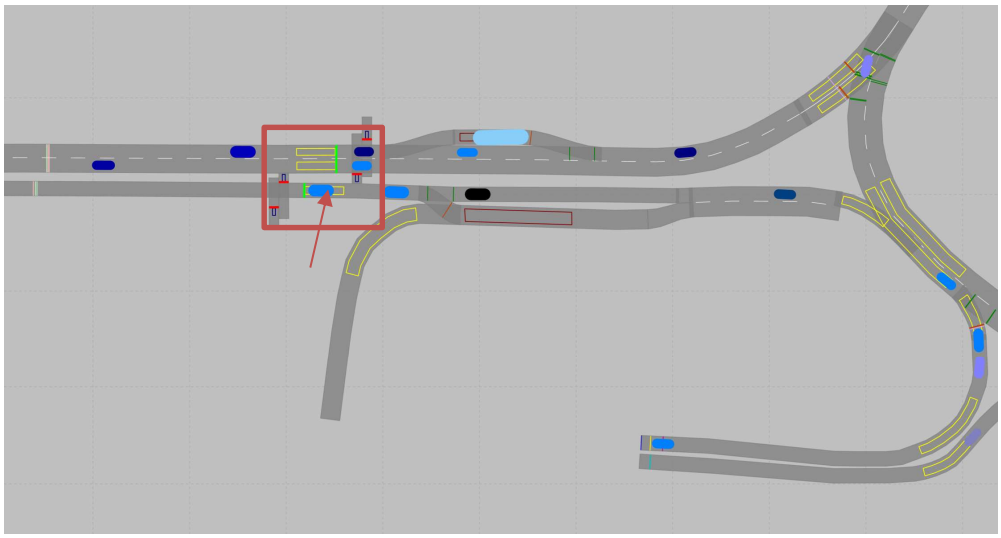
2.4. Table 2 provides details on key elements within the model that have been identified to remain a concern and should be addressed. A model can be signed off by the Council when all the issues classed as Red or Amber are addressed.

## 3. Base Model Version 3 Observations

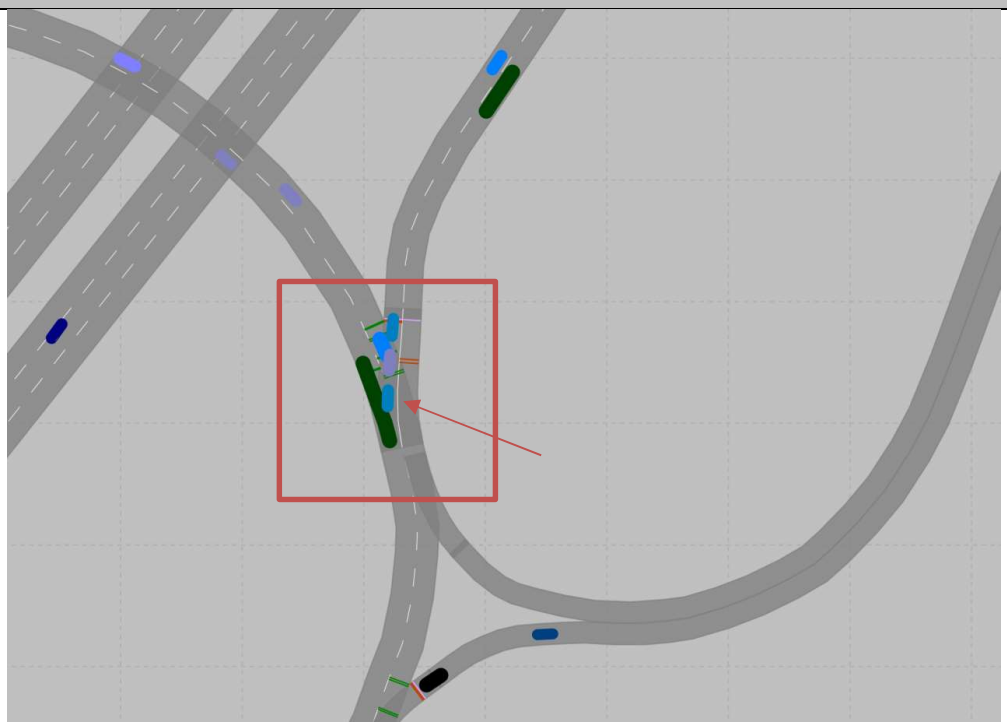
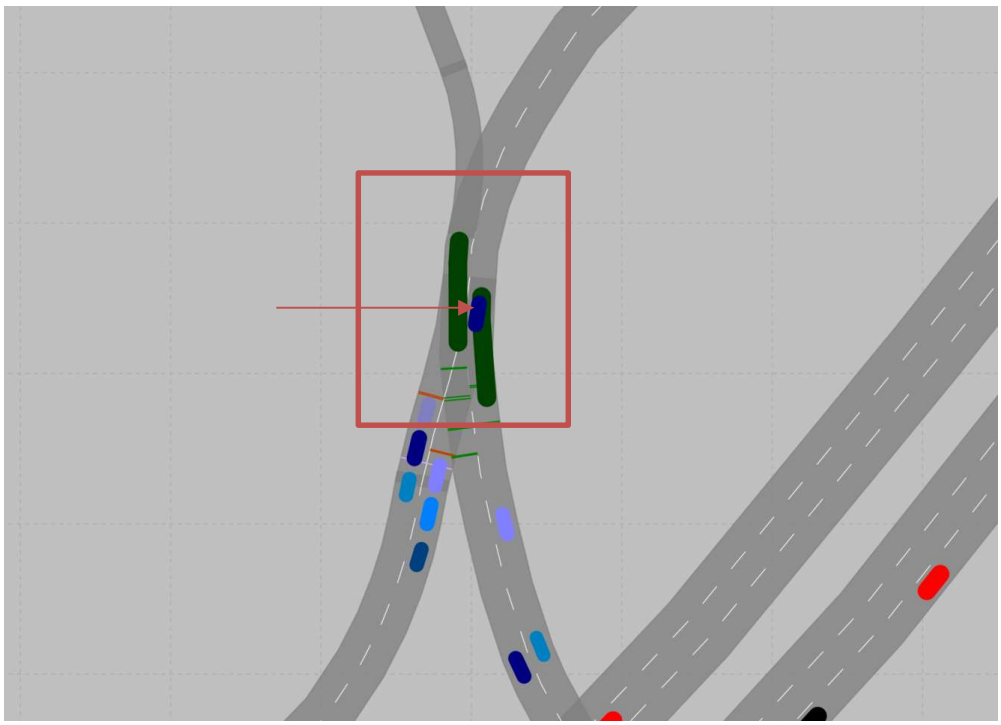
3.1. A further review of the version 3 Base Model has been undertaken and has identified the following elements that still require further investigation.

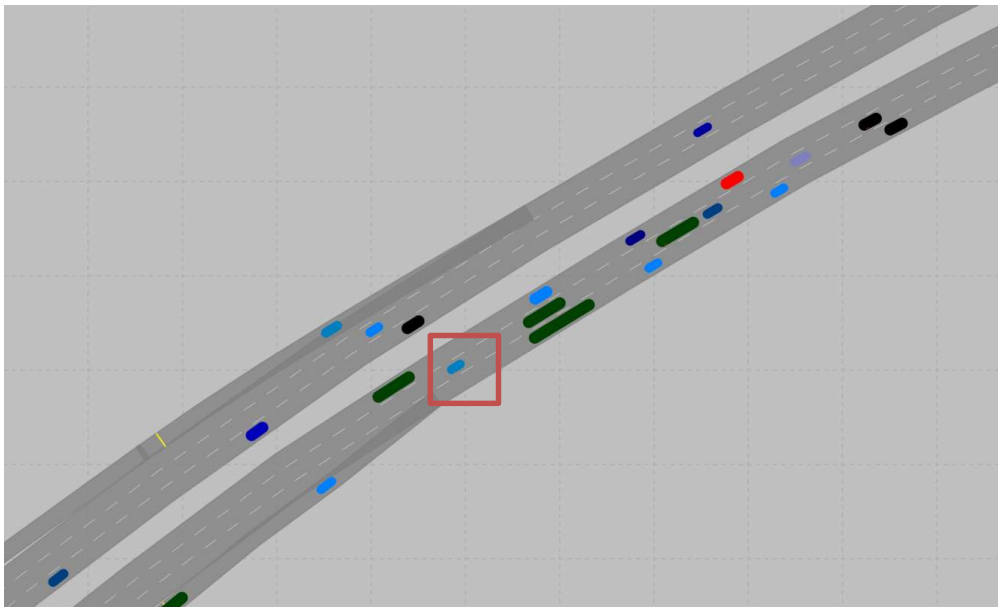
Table 2: East-West Microsimulation Model RAG Review

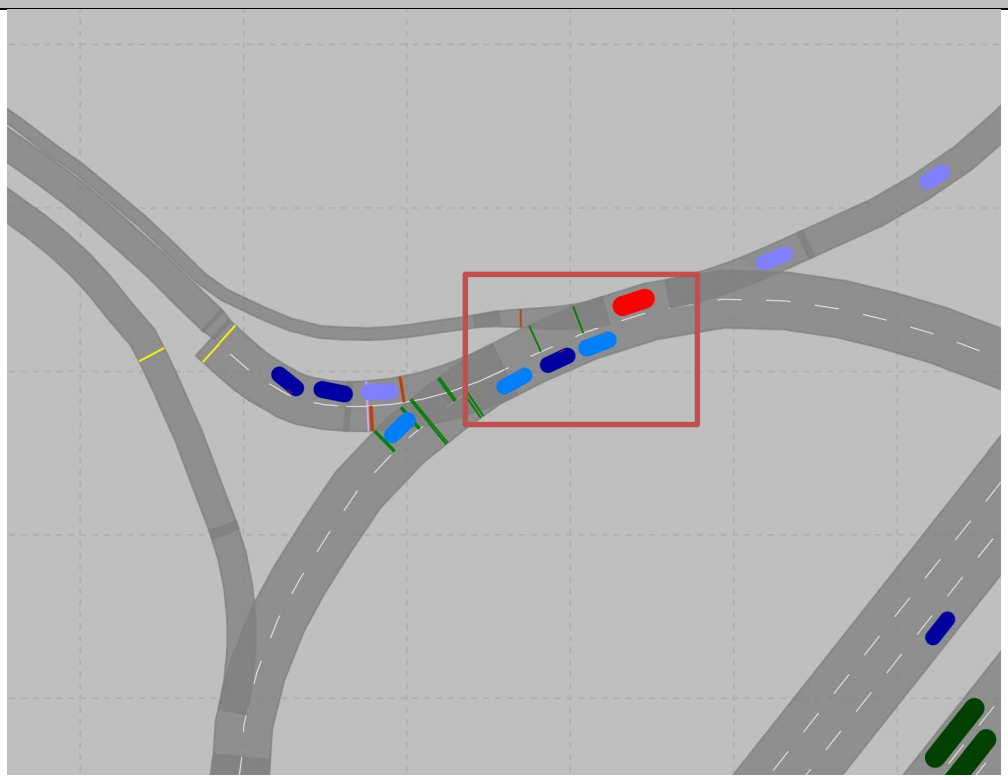
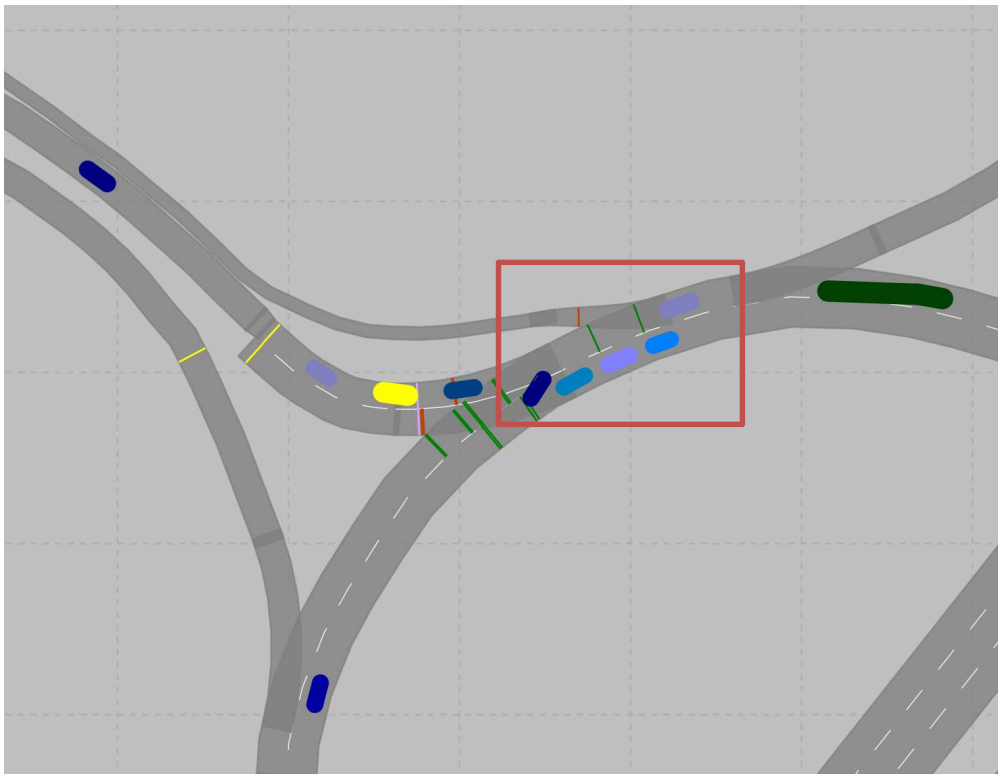
| Network Objects | Issue | *RAG* |
|---|---|---|
| Modelled Time Period | Upon review of Base Model Issue 2, it had been identified in TN002, issued in November 2022, that the time period within the microsimulation AM model started at 07:30, however, the LMVR referenced the peak period for the AM peak as between 07:00 to 09:00 including warm up and cool down. This has been amended in Base Model Issue 3 with model simulation period set from 06:30 to 09:30 including warm up and cool down period. No amendments are required to PM peak modelled time period from previous submission. | |
| Vehicle Composition | The vehicle composition for HGV is made of a single vehicle type and model – Vehicle type 300 and Vehicle Model 20 (length 10.22 to 15.96m). Traffic flow diagrams have been provided within Appendix A of the LMVR however it is unclear | |

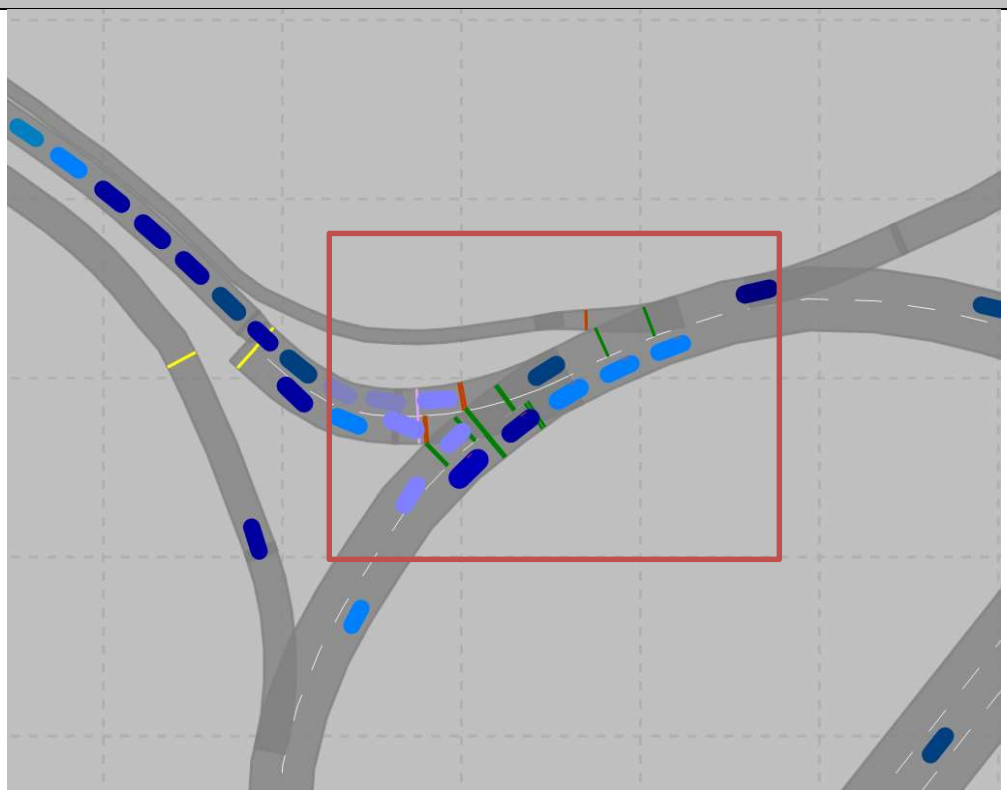
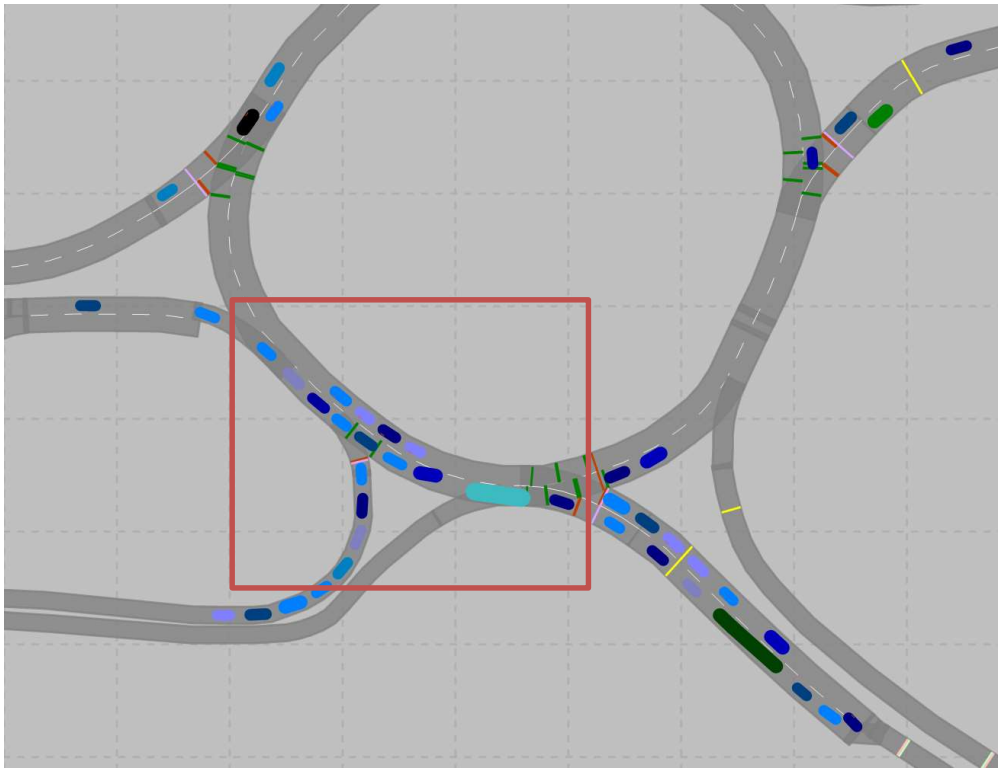
| Network Objects | Issue | *RAG* |
|---|---|---|
| | if survey data classified heavy vehicles into two separate vehicle types, OGV1 and OGV2. A higher proportion of OGV2 type vehicles could have an impact on speeds and journey times within the model network. It is good practice to estimate average vehicle proportions from survey data for model input. | |
| Desired Speed distributions | Speed distributions included in the model are generally considered acceptable however the LMVR does not refer to the source of this information i.e. whether this was derived using observed data (ATCs) or obtained from other sources. | |
| Signal Timings | Unusual signal change occurring in the PM peak model at SC 1013 for signal phase F at the start of the simulation period. Whilst this may not impact the overall results, this is highlighted in the error log at the end of the simulation run and as such should be reviewed. | |
| Reduced Speed Areas | Reduced speed areas have been coded in the model using various speed distributions included within the model. Whilst the reduced speed areas used within the model extent are generally considered acceptable, additional commentary is required in the LMVR to elaborate on the speeds using at following locations:<br><br>1) Signalised pedestrian crossing to the west of Daneholes roundabout uses two different speed distributions for reduced speed areas in the EB and WB directions respectively. The speed distribution used for the WB approach at the pedestrian signals is slightly slower than the EB approach. The lower speed distribution results in vehicles slowing down unnecessarily when the traffic phase for WB vehicles is green and flow is not impeded by an upstream queue.<br><br>  <br><br>2) A review of the reduced speed areas input for Daneholes Roundabout and A13/A1012 gyratory suggests the speed through the circulatory carriageway at Daneholes Roundabout is higher than the A13/A1012 gyratory. This is unlikely and therefore modelled input should be reviewed or further evidence should be provided to confirm the input. | |

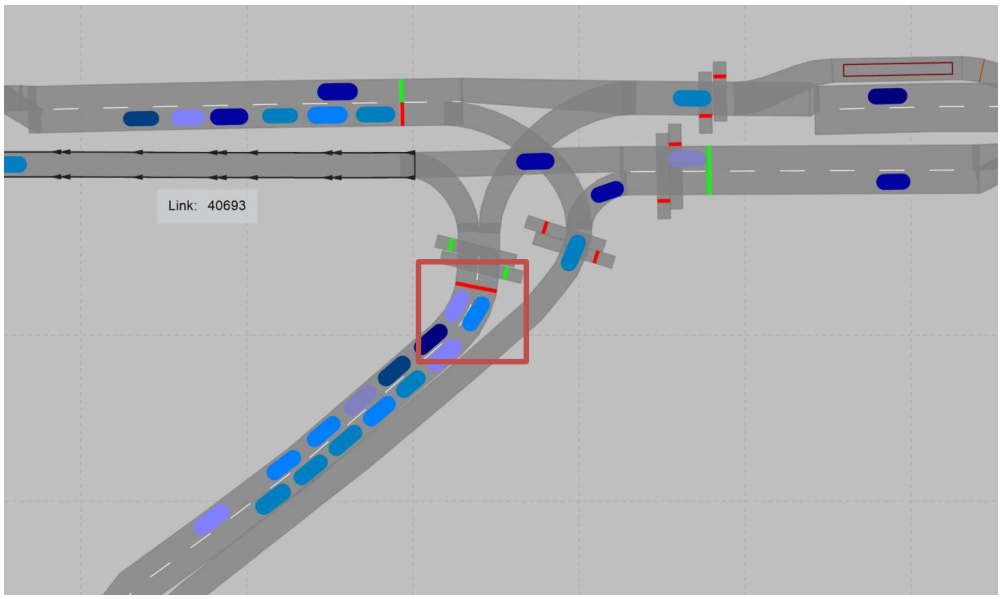
| Network Objects | Issue | *RAG* |
|---|---|---|
| | 3) Although not fully coded which is okay, Reduced Speed Areas should be coded on Marshfoot Road to accurately represent slower moving traffic going ahead at the roundabout.<br><br>  | |
| Network Coding | Lane change parameters for connectors 41160 and 41175 need reviewing, in particular the emergency stop position. Vehicles on static routes looking to exit the A13 slips and join High Road and A1012 respectively randomly stop in the offside lane past the roundabout approach and are removed from the simulation after 60 seconds. This also results in overlapping of vehicles on the circulatory section which needs amending. | |

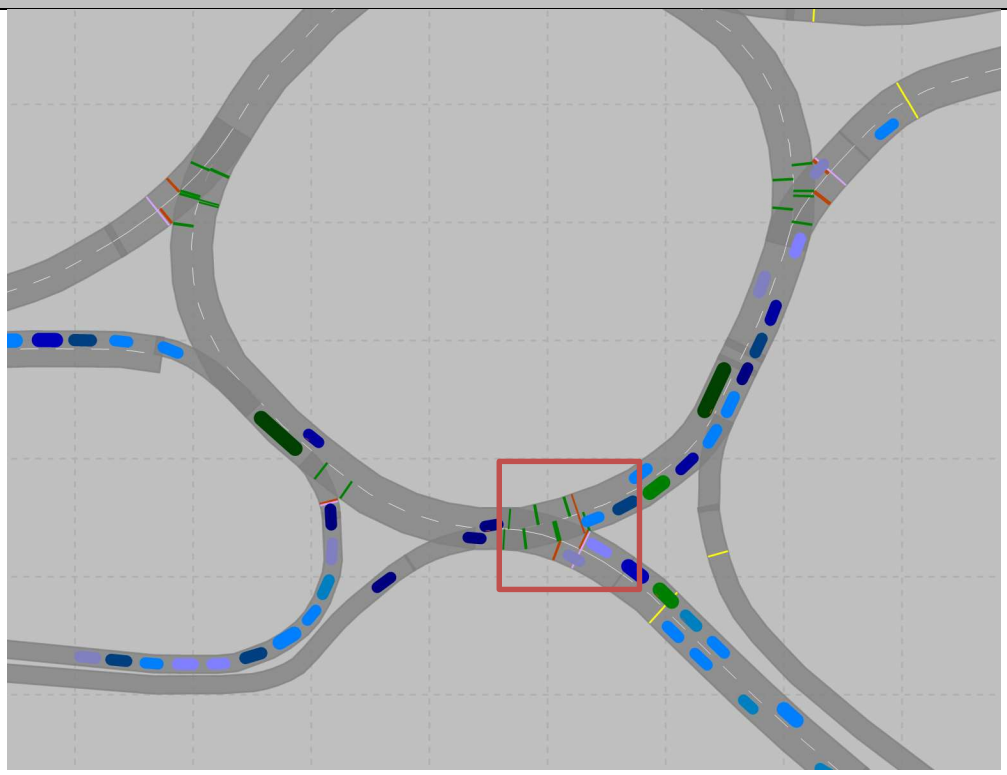
| Network Objects | Issue | RAG |
|---|---|---|
| |  <br>Vehicle looking to turn left onto A1012 stopping randomly in the offside lane<br>  <br>Vehicle looking to turn left onto High Road stopping randomly in the offside lane | |

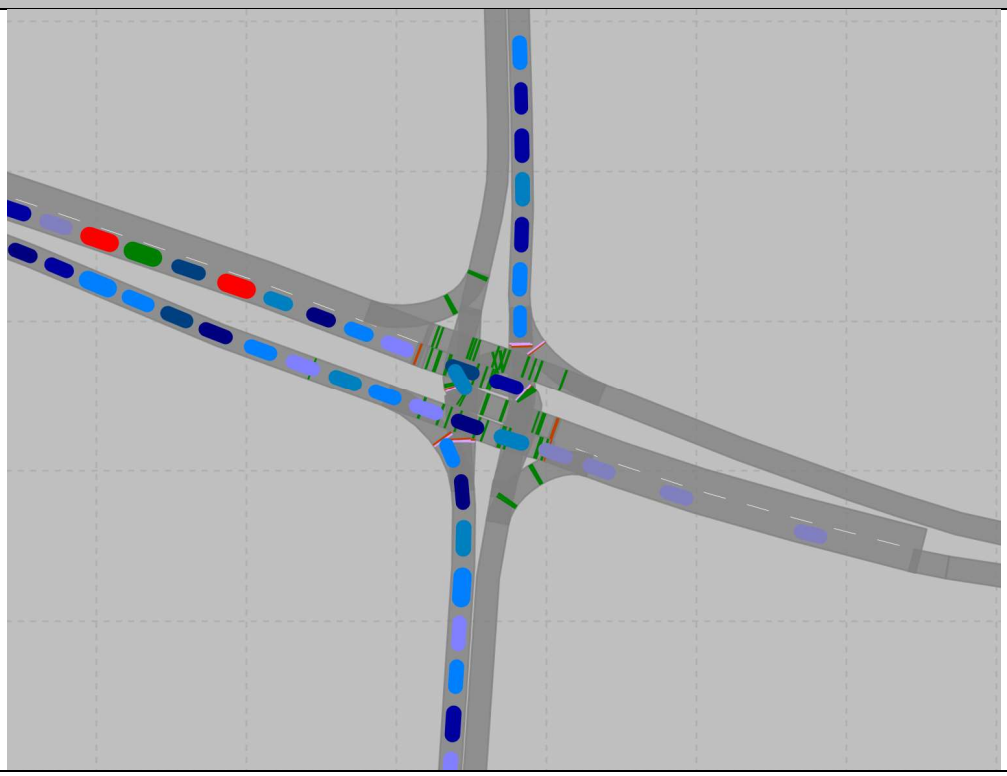
| Network Objects | Issue | *RAG* |
|---|---|---|
| Network Coding | Lane change parameters for connectors 41184 need reviewing, in particular the emergency stop position. A review of the error log suggests vehicles on static routes looking to exit the A13 randomly stop after travelling past the point where they lane change should occur and are subsequently removed from the simulation after 60 seconds.<br>  | |
| Network Coding | Network coding for circulatory section at A13/A1012 gyratory and Daneholes Roundabout should be reviewed to ensure vehicles exiting the roundabout change lanes well in advance. It is noted that vehicles approach the exit to the roundabout in the offside lane and abruptly stop in the offside lane to seek a gap. This creates a queue of several stand still vehicles in the offside lane of the circulatory carriageway and is affecting the movement of vehicles from High Road. This could also be the reason for a queue and potentially latent demand on the High Road approach in the PM peak. | |

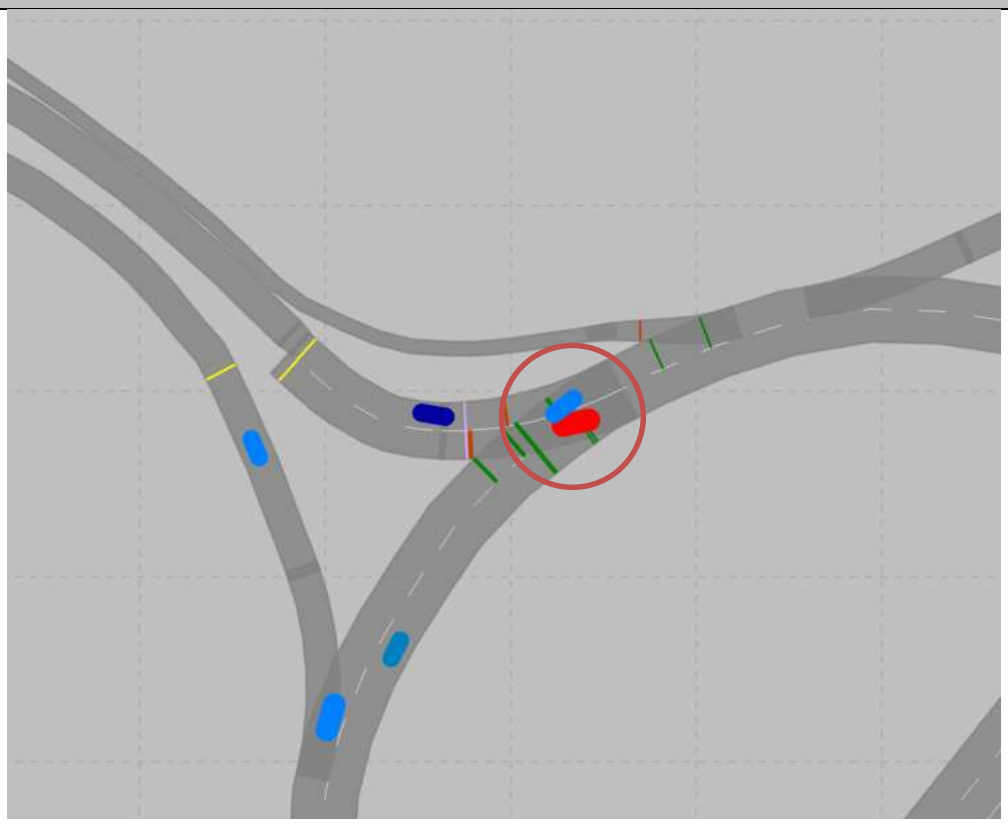
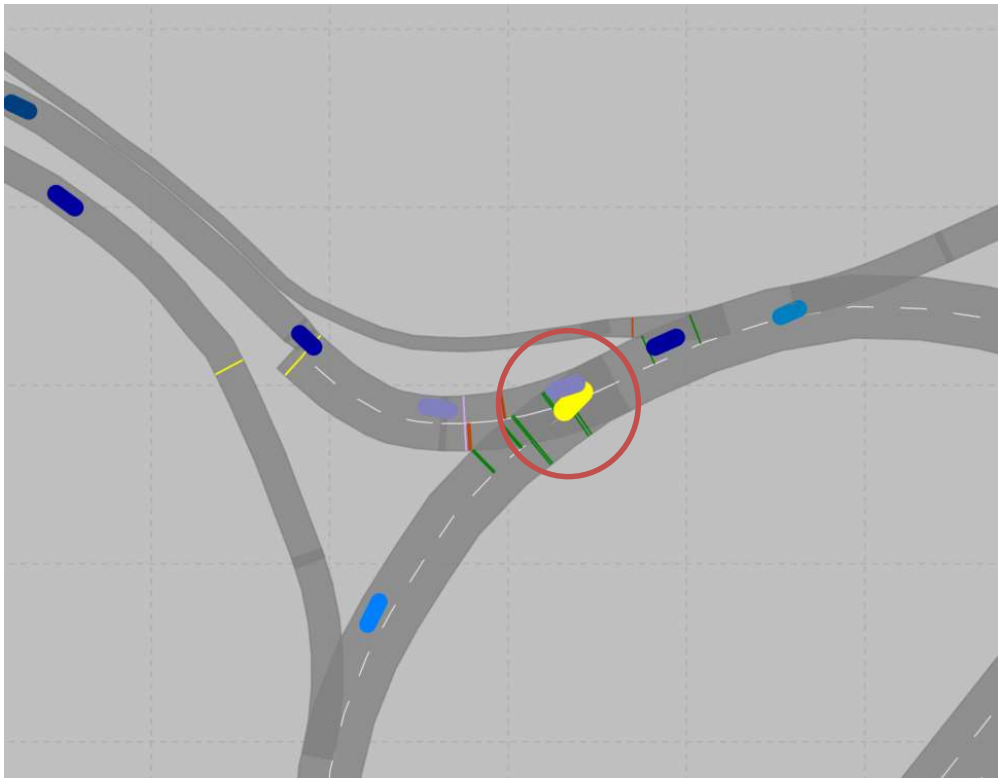
| Network Objects | Issue | RAG |
|---|---|---|
| |  Simulation time: 07:25:34  Simulation time: 07:31:17 | |

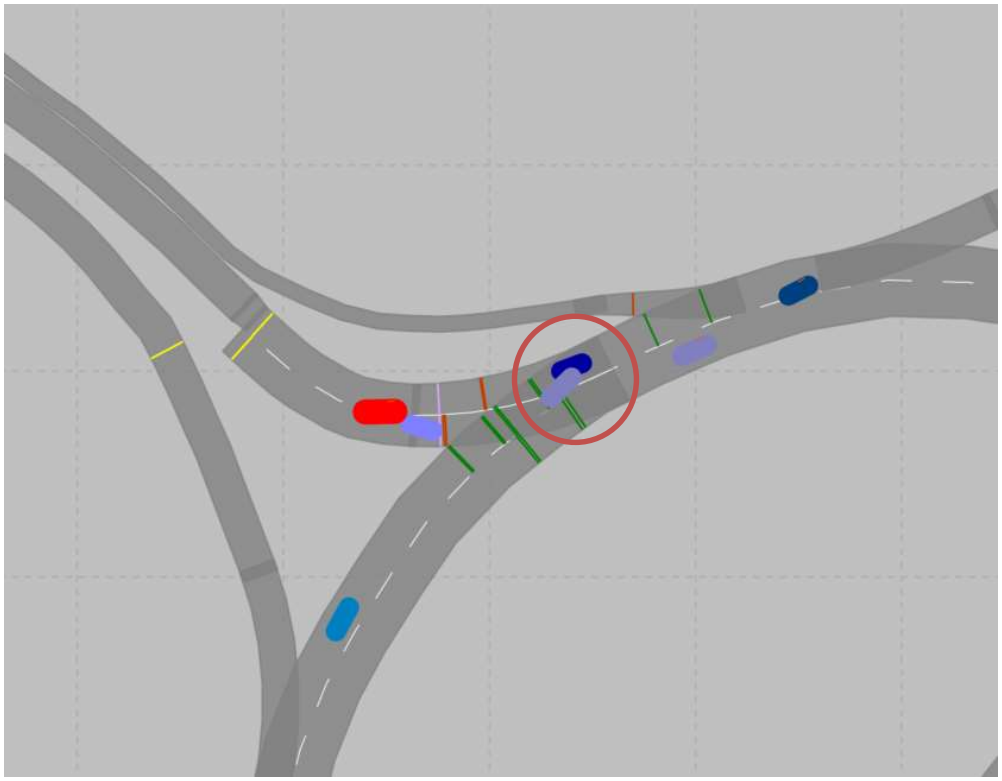
| Network Objects | Issue | RAG |
|---|---|---|
| |  <br>Simulation time: 17:09:13<br>  <br>Simulation time: 07:56:50 | |

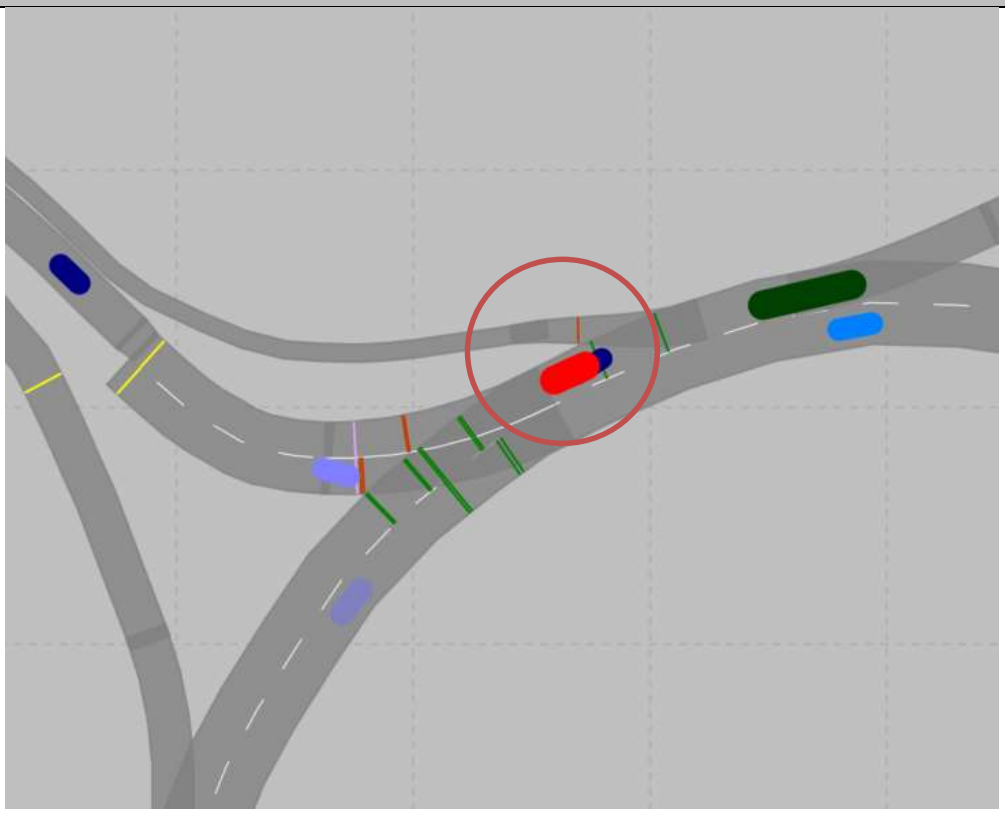
| Network Objects | Issue | *RAG* |
|---|---|---|
| Network Coding | Lane change parameters, in particular emergency stop position for connector 40721 needs reviewing as vehicle turning left from Southern Road approaches the junction in the offside lane, is unable to change lanes and subsequently removed from the network. This issue could be exaggerated in the forecast scenarios and could also impact the right turn movement from Southern Road and should therefore be addressed in the Base Model.<br>  <br>Simulation time: 08:41:20 | |
| Network Coding | Priority rule on southern circulatory section at Daneholes roundabout needs reviewing. Vehicles on the circulatory are stopping to give way to the approaching traffic which is incorrect unless observed on site. This results in queueing of traffic on circulatory carriageway. Please provide supporting evidence if this has been observed on site. | |

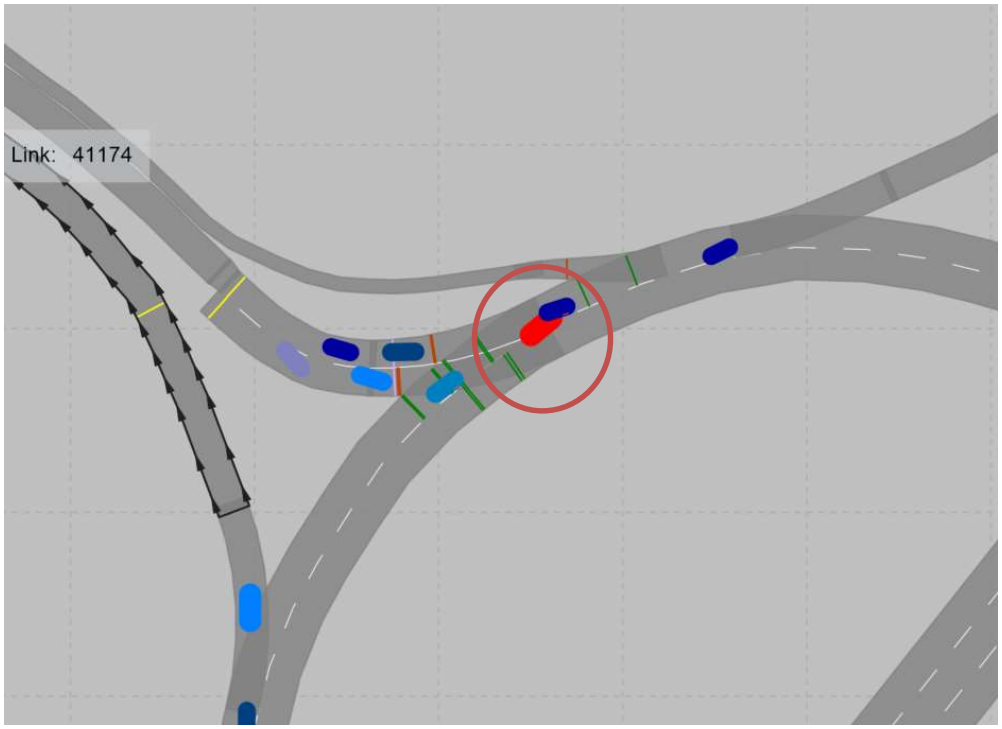
| Network Objects | Issue | *RAG* |
|---|---|---|
| |  <br>Simulation time: 07:57:50 | |
| Network Coding | Network coding, in particular gap acceptance and clearance parameters for priority rules, needs reviewing at Lodge Lane/Bradleigh Avenue/Connaught Ave priority junction. It is noted that the yellow box behaviour modelled using priority rules is not being observed correctly in the model and therefore occurrences such as below are noted particularly in the AM peak, with several movements at this junction gridlocking for a brief period. This subsequently results in overlapping vehicles before the traffic clears the junction. | |

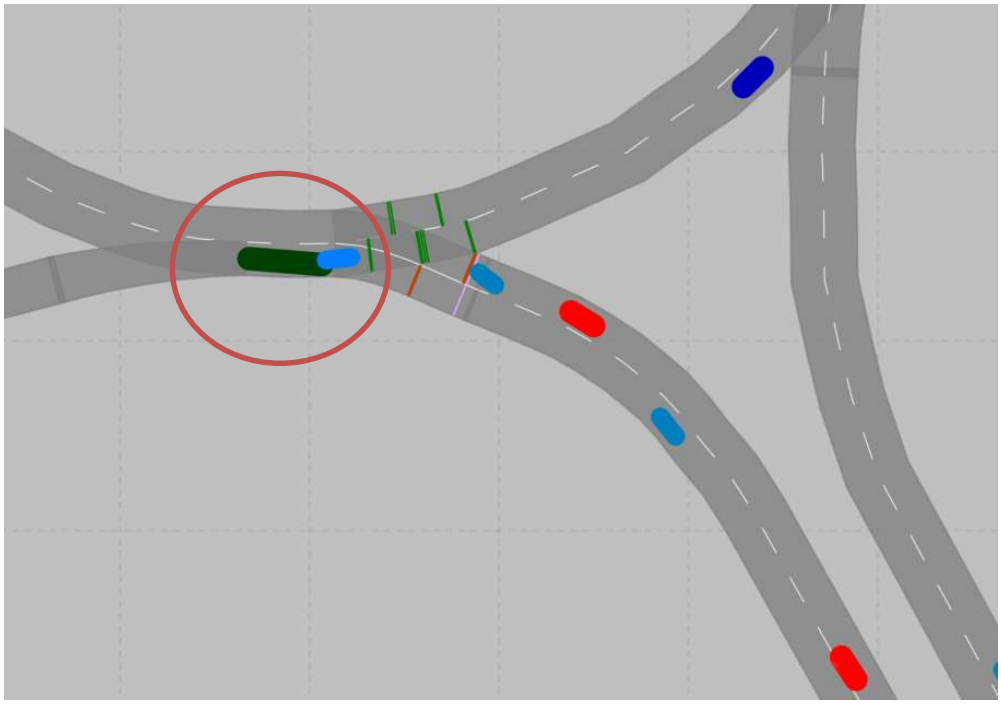
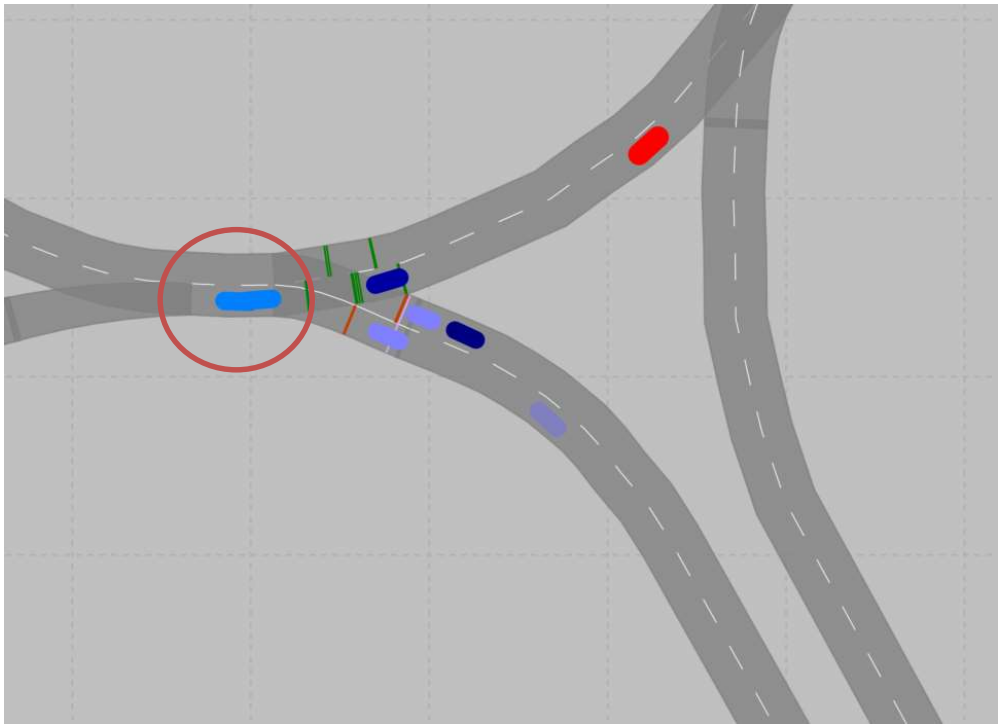
| Network Objects | Issue | *RAG* |
|---|---|---|
| |  | |
| Overlapping Vehicles | Through the model review, it is identified that there are still locations where significant overlapping vehicles occur. This is specifically identified at A13/A1012 gyratory and Daneholes roundabout which is a result of queuing back into the roundabout due to the pedestrian crossing on the A1013 arm of the junction.<br><br>The Daneholes roundabout junction is a key location for the Council and as such the Priority Rules should be reviewed and amended.<br><br>Overlapping Vehicles at A13/A1012 gyratory | |

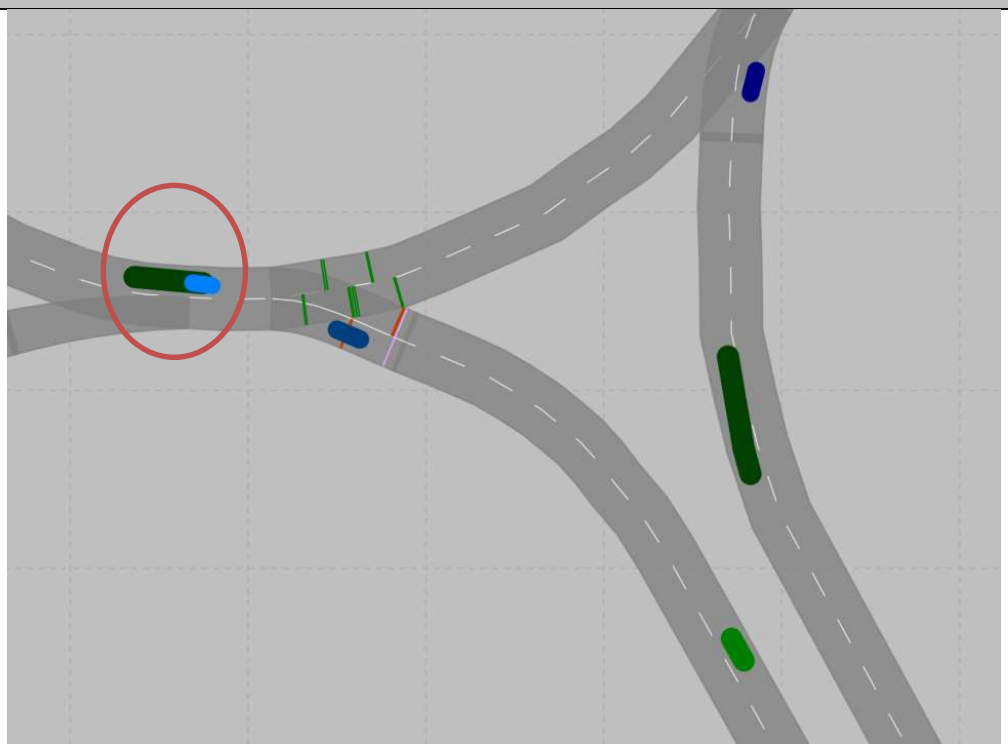
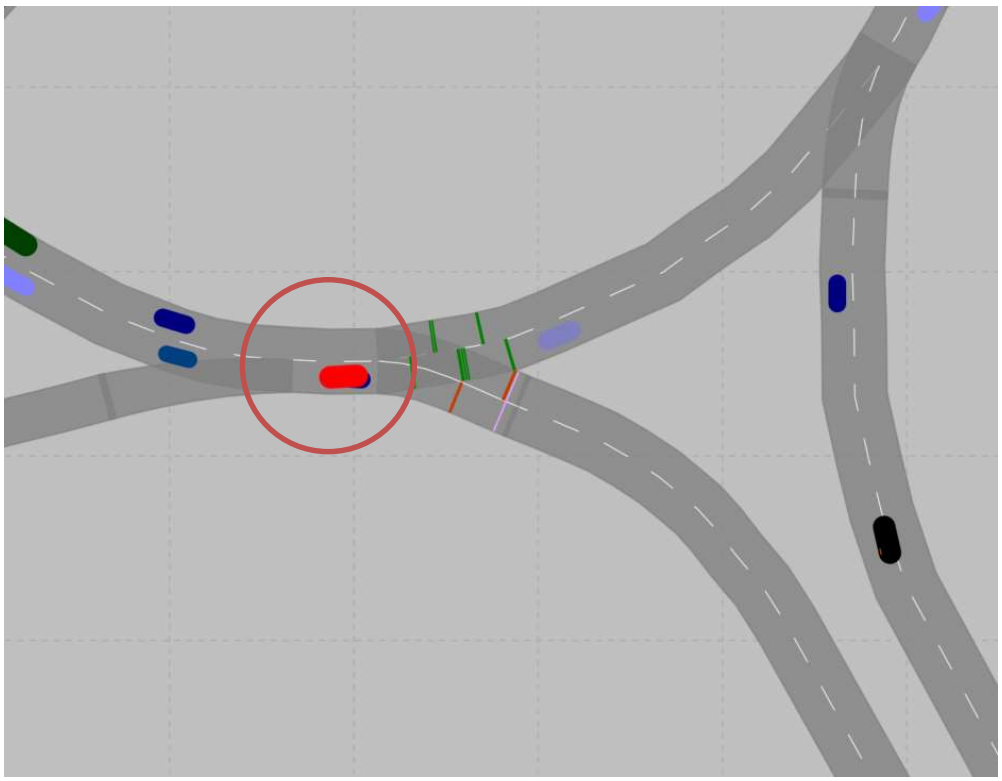
| Network Objects | Issue | RAG |
|---|---|---|
| |  Simulation time: 07:07:00  | |

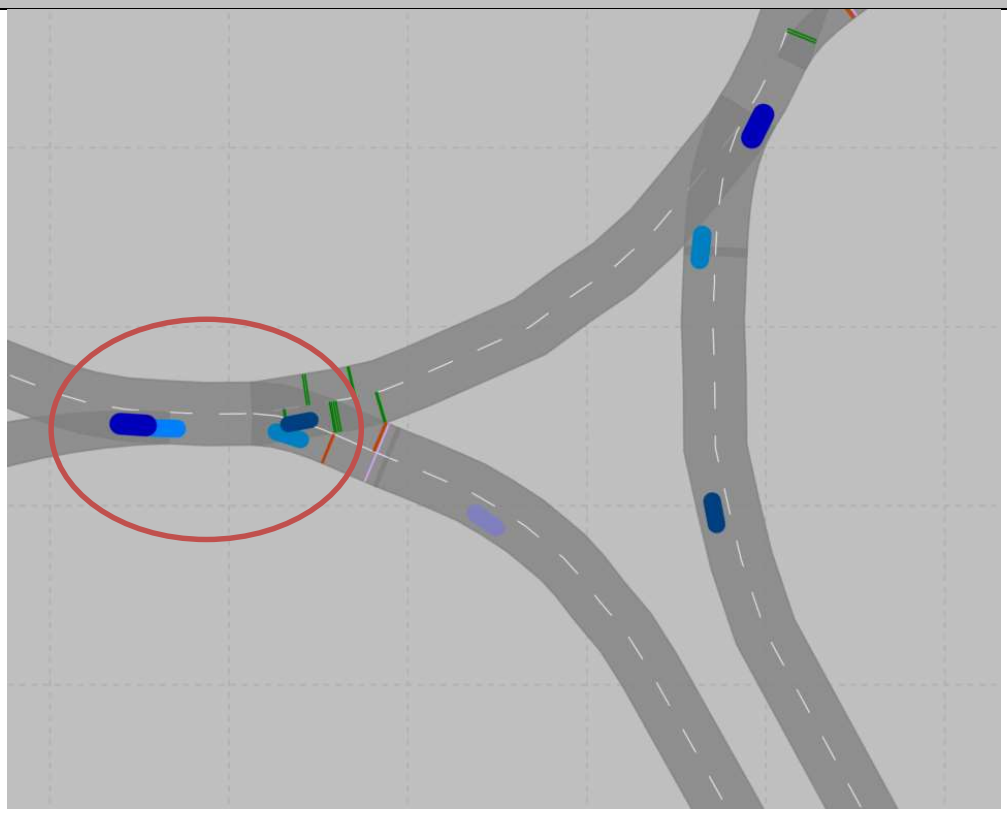
| Network Objects | Issue | *RAG* |
|---|---|---|
| | Simulation time; 07:07:18<br>  <br>Simulation time: 07:07:42 | |

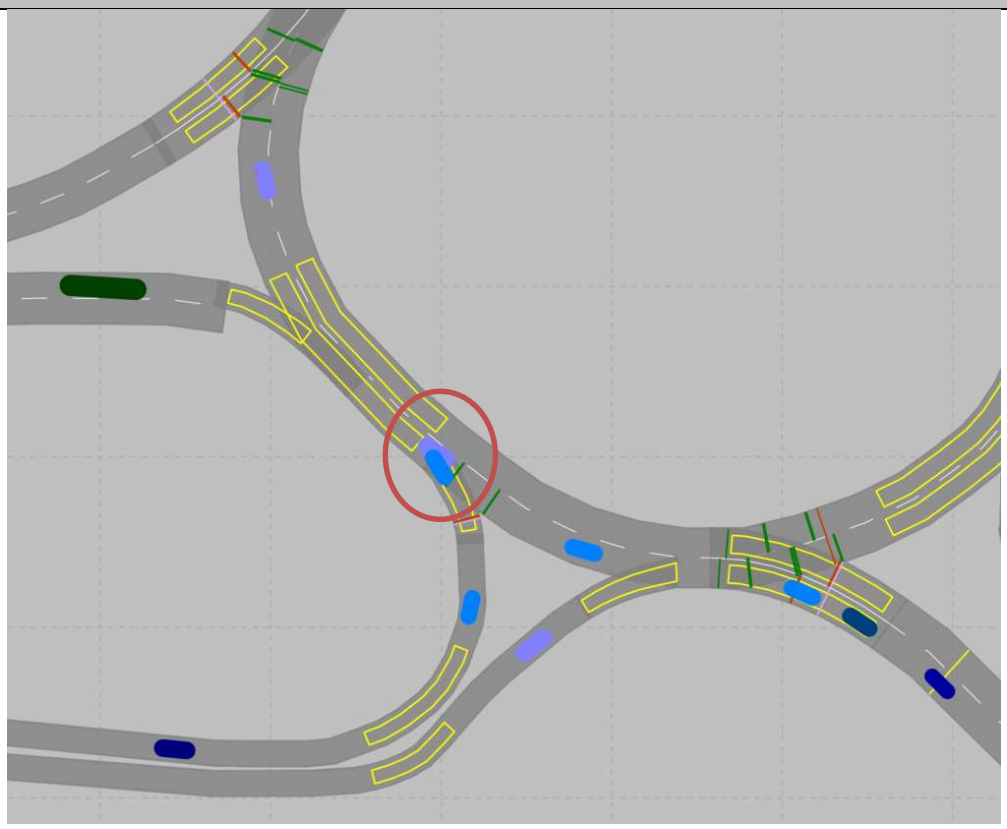
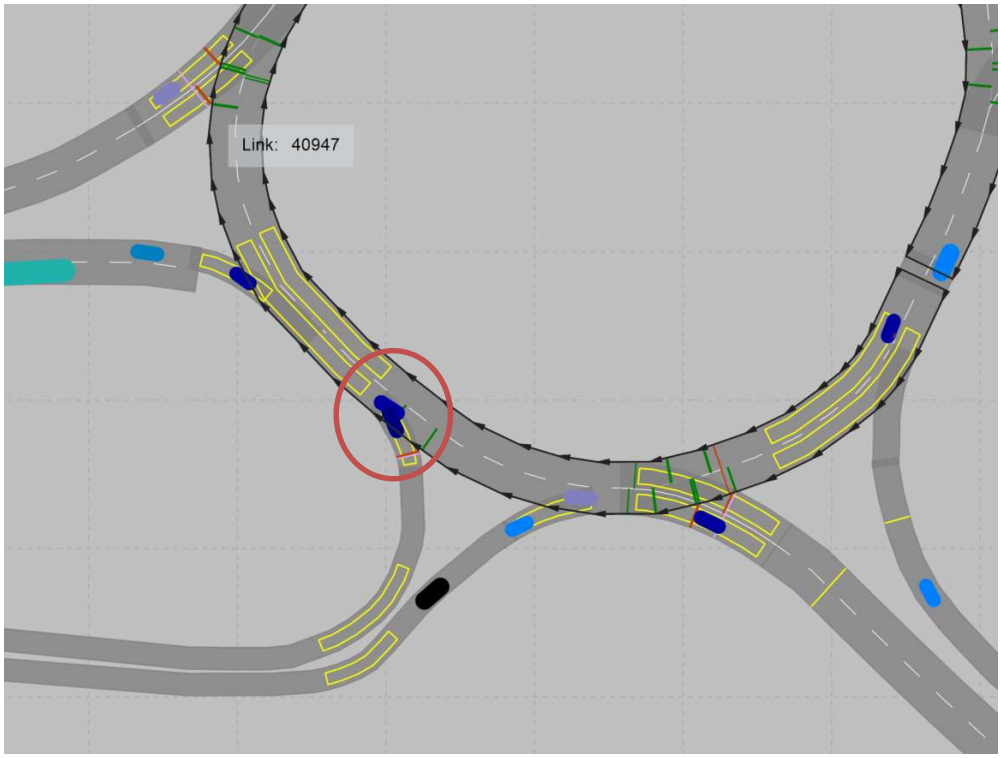
| Network Objects | Issue | *RAG* |
|---|---|---|
| |  Simulation time: 07:07:55 | |

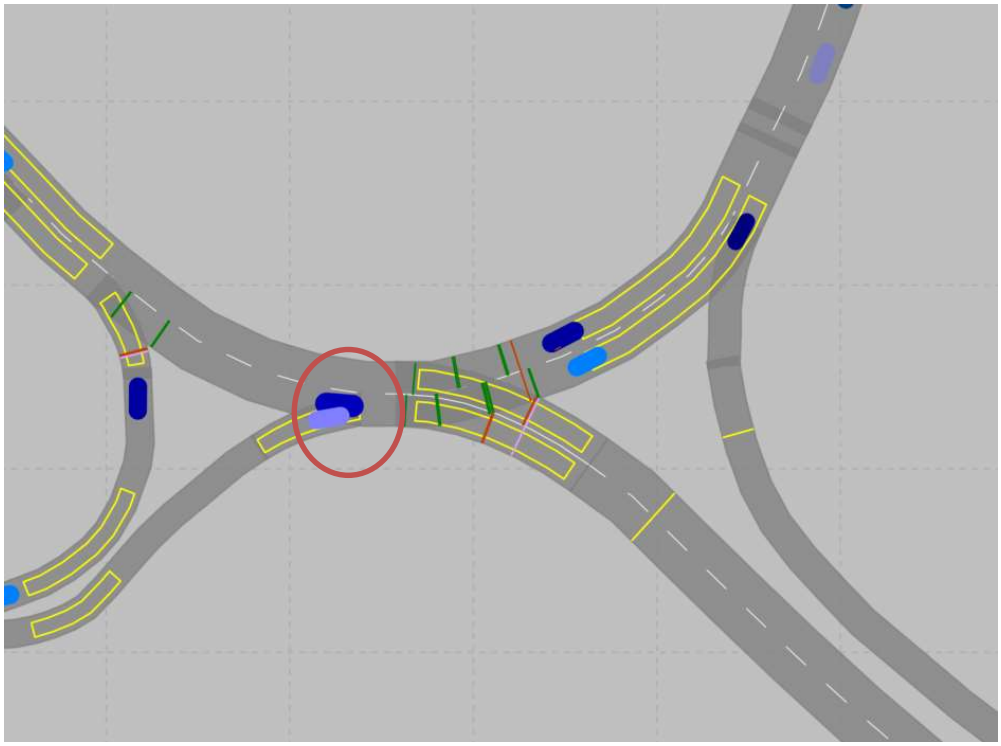
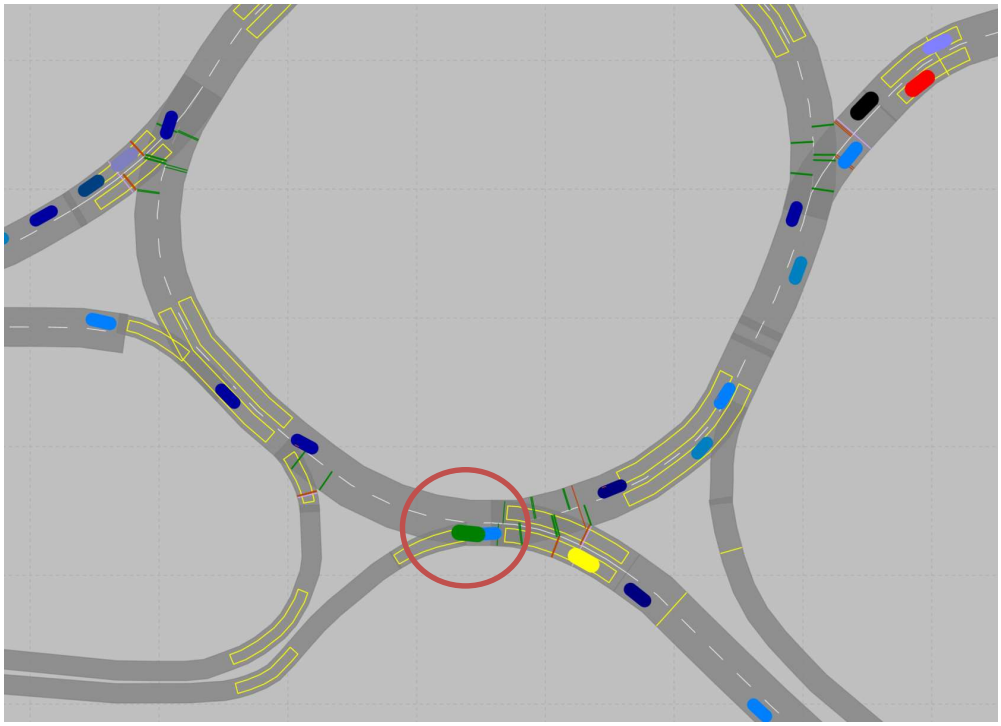
| Network Objects | Issue | RAG |
|---|---|---|
| |  <br>Simulation time: 07:08:08<br>  <br>Simulation time: 07:07:06 | |

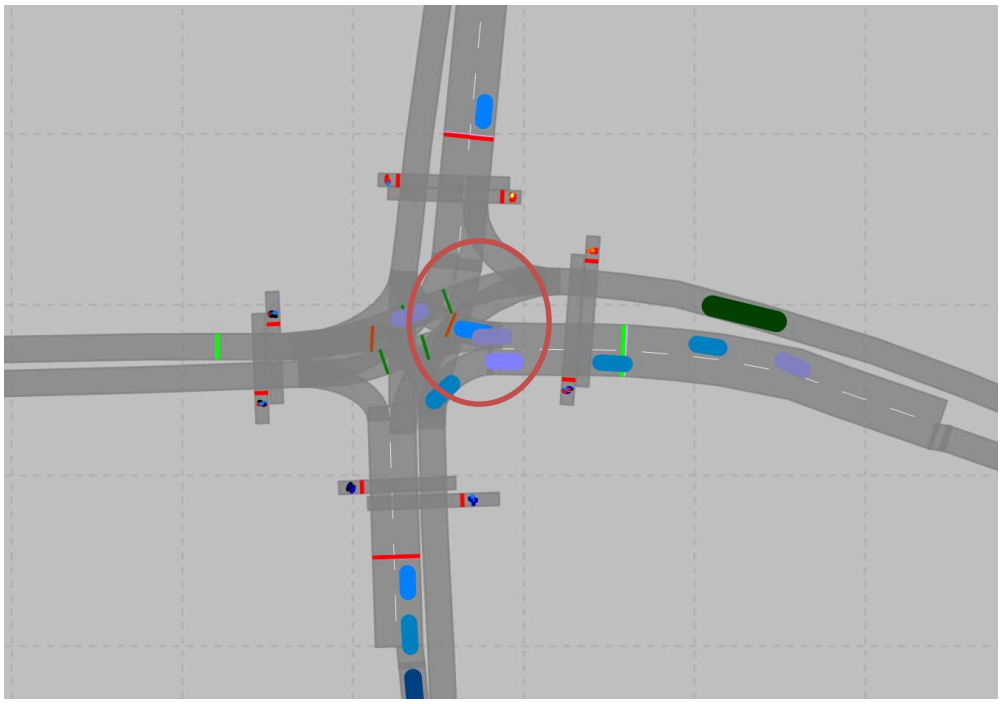
| Network Objects | Issue | *RAG* |
|---|---|---|
| |  <br>Simulation time; 07:30:04<br>  <br>Simulation time: 07:30:39 | |

| Network Objects | Issue | RAG |
|---|---|---|
| |  <br>Simulation time: 07:31:33<br>  <br>Simulation time: 07:37:12 | |

| Network Objects | Issue | *RAG* |
|---|---|---|
| |  <br>Simulation time: 07:46:00<br>Overlapping Vehicles at Daneholes Roundabout | |

| Network Objects | Issue | RAG |
|---|---|---|
| |  Simulation time: 08:46:16   Simulation time: 08:40:47 | |

| Network Objects | Issue | *RAG* |
|---|---|---|
| |  <br>Simulation time: 08:42:52<br>  <br>Simulation time: 08:56:14 | |

| Network Objects | Issue | *RAG* |
|---|---|---|
| | Overlapping Vehicles at Chadwell Hill/River View/Brentwood Rd/Linford Rd Junction<br>  <br>Simulation time: 07:54:02 | |
| Latent Demand | Number of vehicles are not able to deploy in the network within the evaluation period, in particular the PM peak. Base Models should not reflect any latent demand as the network extent should capture existing traffic conditions. If the latent demand is a direct result of observed congestion in the network the model should be extended appropriately to ensure full extent of queue and congestion is captured within the Base Model. | |
| Network Extent | It is noted that the model extent does not include A1089/Thurrock Parkway (ASDA) roundabout or the junction of A1012 / Devonshire Road, which has been identified in the strategic LTAM as being negatively impacted by LTC, and therefore capacity constraints at these locations and likely blocking back effects onto the area of the network covered by the microsimulation models have not been considered in the model.<br><br>Similarly, the model extent on the A13 corridor does not take into account any interaction with M25 J30 to the west and A13/Orsett Cock junction to the East.<br><br>Whilst the above may not be of concern in the base model, increased forecast demand resulting in extended queues in the WB and EB directions at M25 J30 and A13/Orsett Cock junctions respectively will need to be reviewed carefully to understand if this could have a material impact on the East-West microsimulation model network operation. | |
| LMVR and Model Validation | It has not been possible to undertake a full review of the LMVR and model outputs due to the number of outstanding issues highlighted in this technical note. A detailed review of the LMVR and modelled outputs will be undertaken once issues highlighted in this technical note have been appropriately addressed. | |

## 4. Summary

4.1. The third review has focused on the base microsimulation model, rather than the complete review of the LMVR and accompanying model outputs at this time.

4.2. The RAG outlines a number of key areas that still remain a concern and as such should be updated within the next issue of the model prior to model agreement by the Council.

4.3. Through further discussions with the Council, Daneholes and the Marshfoot/A1089 junction is a particular concern regarding any model forecasting and as such the elements identified above should be updated.

4.4. It is therefore required that all the issues are rectified to create a robust model that can be used as suitable evidence for the assessment and impact on the network within the Council as a result of the opening of the LTC.

# Annex 5 Review of Do Minimum and Do Something Orsett Cock VISSIM Models

# TECHNICAL NOTE

**Job Name:** Orsett Cock Microsimulation Modelling

**Job No:** 332510911

**Note No:** TN004

**Date:** August 2023

**Prepared By:** Zoltan Tosaki

**Subject:** **Review and Correction of Orsett Cock Forecast Microsimulation Models**

## 1. Introduction

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.

1.2. The models have been audited by the Council. A number of critical errors were identified. The Council has sought to prepare a corrected version of the forecast model version 1.5 to reflect more accurately network operation.

## 2. Network Coding Corrections

2.1. This document describes the network coding changes made by the Council with the models provided. The Council would request that the applicant uses this corrected version 1.5 forecast microsimulation model and the further changes that the Council would require would be for the applicant to use the updated demand matrices from LTAM CM49 for the DM model and LTAM CS72 for the DS model as well as extend the link lengths to resolve the latent demand issues raised by the Council.

2.2. The corrections presented in Table 2 have been assigned a Red/Amber/Green (RAG) status as defined in Table 1.

Table 1: RAG Review Categorisation

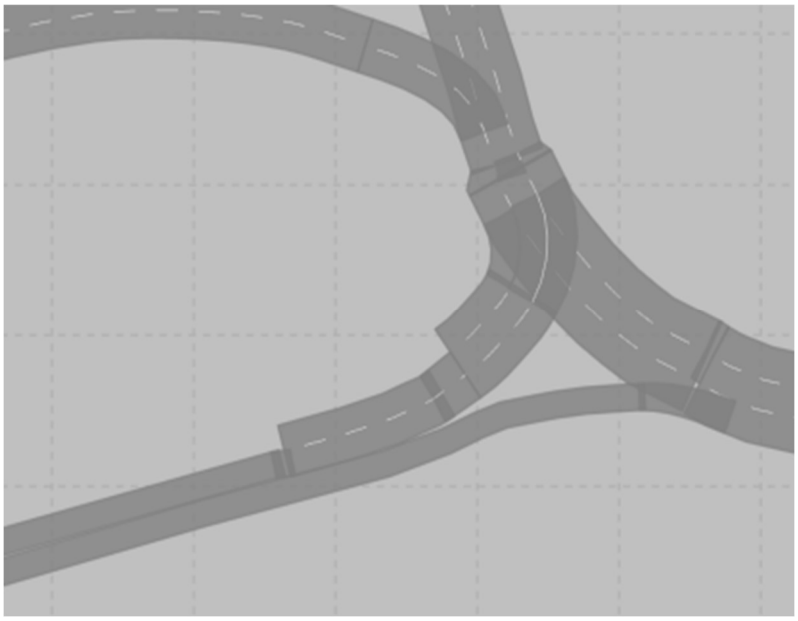
| RAG Category | Description |
|---|---|
| Comments | Findings noted as part of the model audit process that may require consideration and amendment however not deemed to have a material impact on the overall operation or outputs derived from the model. |
| Recommendations /Additional Information required | 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. |

Table 2: Do Minimum and Do Something Network Coding Corrections

| No. | Scenario(s) | Difference | Description | Impacted network objects | Reference | RAG |
|---|---|---|---|---|---|---|
| 1 | DM and DS | Orsett Cock junction edge closures | It is good practive 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 unrelistic movements. Number of open edges reduced to 36 in the DM and 37 in the DS scenarios. | Node 1 edges | | Red |
| 2 | DM and DS | A1013 EB approach | Flare length was reduced to more accurately reflect available road space. | Links 29, 74 | Ref2 | Red |
| 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 |
| 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 |
| 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 |
| 6 | DS | Changes to diverge locations | Changes to entry diverge locations within the model | | Ref4 | Red |
| 7 | DS | Reduced speed areas updated | Reduced speed areas updated on slip roads | | Ref4 | Red |
| 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 |

| No. | Scenario(s) | Difference | Description | Impacted network objects | Reference | RAG |
|---|---|---|---|---|---|---|
| 9 | DS | Link resolution and accuracy | Links are adjusted to follow road design more accurately - across the whole model | | | Green |
| 10 | DS | A13 EB approach extended | A13 EB approach extended by appx 700 metres to ensure that traffic has sufficient distance to prepare for upcoming diverge | | Ref10 | Red |
| 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 |
| 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 critial error in VISSIM where vehicles does not pick up (or drop off) the reduced speed in the bend | All reduced speed areas in the OC junction | | Red |
| 13 | DS | Node 119 adjusted | Node did not include diverge point | | | Red |
| 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 |
| 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 |
| 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 |

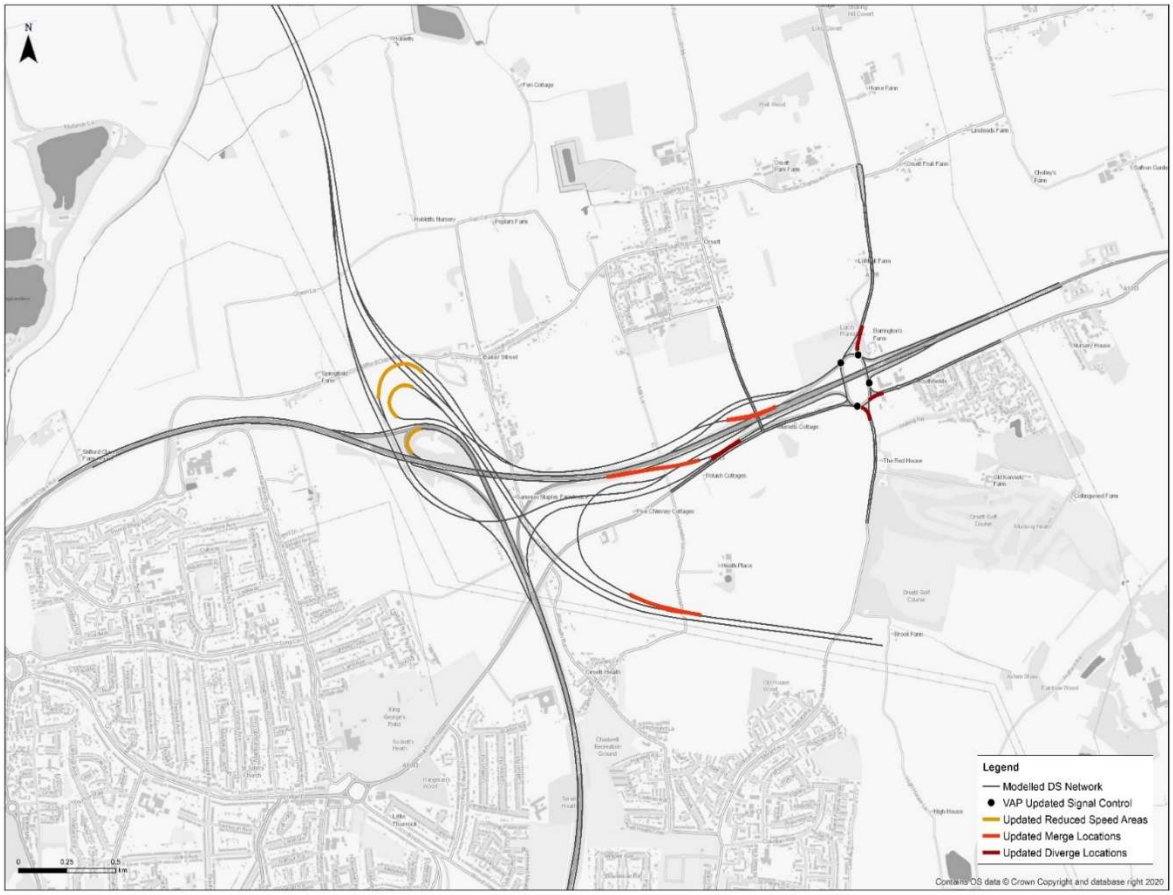
***Ref 2***



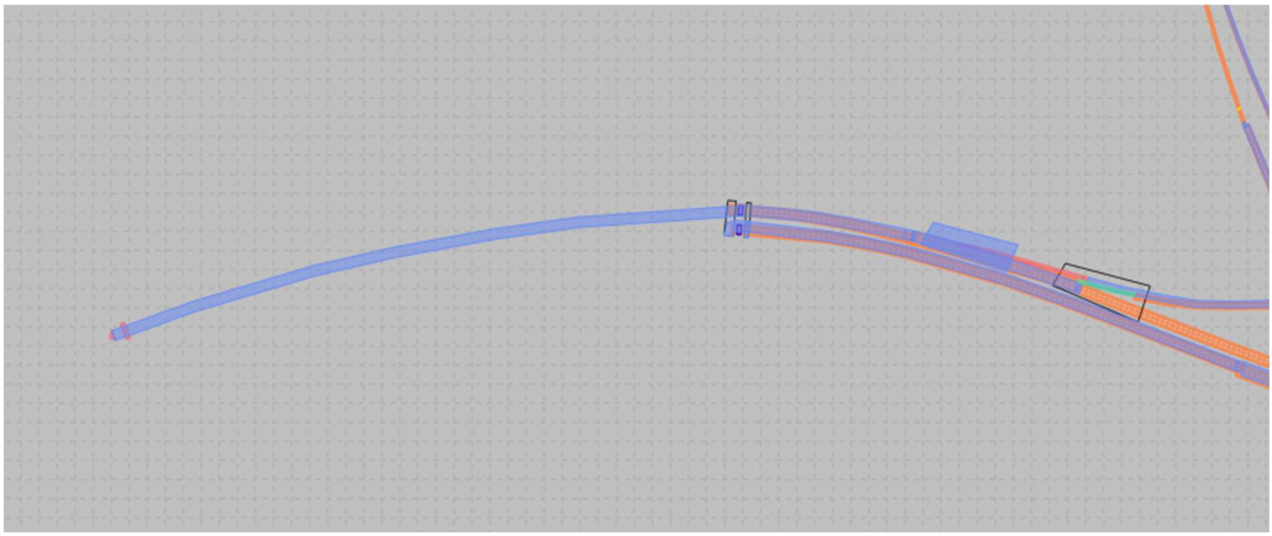
***Ref 3***

| | Offside lane to: | Middle lane to: | Nearside lane to: |
|---|---|---|---|
| **2030 DM original** | A13(W)<br>A128 | Brentwood Rd<br>A1013 (W) | A1013 (E) |
| **2030 DM amended** | A13(W)<br>A128 | A1013 (W) | Brentwood Rd<br>A1013 (E) |

***Ref 4***


N
Legend
Modelled DS Network
VAP Updated Signal Control
Updated Reduced Speed Areas
Updated Merge Locations
Updated Diverge Locations
Contains OS data © Crown Copyright and database right 2020

***Ref 10***



## 3. Summary

3.1. The review has focused on the forecast Do Minimum and Do Something microsimulation models for Orsett Cock. Version 1.5 issued by the applicant to the Council in September 2022 was used as the basis for the review.

3.2. The RAG table presented in this document outlines a number of key areas that need to be addressed and the Council has provided corrected network coding to facilitate this. The Council would also request further changes, which include the use of the updated demand matrices from LTAM CM49 for the DM model and LTAM CS72 for the DS model as well as extend the link lengths to resolve the latent demand issues raised by the Council.

# Annex 6 The Manorway VISSIM Modelling, Comparison of Model Documentation September 2022 vs July 2023

# Lower Thames Crossing

## The Manorway VISSIM Modelling

## Comparison of VISSIM Model Documentation. September 2022 vs July 2023

On behalf of **Thurrock Council**

Project Ref: 332510911/001 | Rev: AA | Date: August 2023

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# Document Control Sheet

**Project Name:** **Lower Thames Crossing**

**Project Ref:** **Stantec LTC Review of Modelling Document**

**Report Title:** **Orsett Cock and The Manorway Modelling**

**Doc Ref:**

**Date:** **August 2023**

| | Name | Position | Signature | Date |
|---|---|---|---|---|
| **Prepared by:** | Grant Paterson | Principal Transport Planner | GP | 01/08/2023 |
| **Reviewed by:** | Nadia Lyubimova | Director | NL | 17/08/2023 |
| **Approved by:** | Nadia Lyubimova | Director | NL | 17/08/2023 |
| **For and on behalf of Stantec UK Limited** | | | | |

| Revision | Date | Description | Prepared | Reviewed | Approved |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |

# Contents

# 1 Introduction

## 1.1 Purpose of Document

1.1.1 In support of continuing work for Thurrock Council, Stantec has been commissioned to review the July 2023 documentation relating to VISSIM microsimulation modelling outputs. Transport models have been developed by National Highways (NH) and their consultant Jacobs with Stantec undertaking subsequent reviews and appraisal testing over the period of this study. This document focuses on the July 2023 reporting provided by NH for The Manorway and compares it to the reporting provided by Nh to the Council in October 2022 using v8.0 of the model.

## 1.2 NH Document provision

1.2.1 At Deadline 1 NH have provided the following documents:

- Localised Traffic Modelling Report (REP1-187)
- Localised Traffic Modelling Appendix D – Manorway Forecasting Report (REP1-190)

# 2 Appendix D – Manorway Forecasting Report

2.1.1 Stantec have been provided with the following documentation (9.15 Localised Traffic Modelling Infrastructure Planning (Examination Procedure) Rules 2010 Volume 9, July 2023) from NH (REP1-190). This document has been compared with the previously submitted document Lower Thames Crossing Manorway 2030 & 2045 Operational Appraisal Design Release 4.3 Operational Modelling, September 2022.

2.1.2 The July 2023 document has been prepared to set out the localised traffic modelling work completed by the Applicant during the development of the A122 Lower Thames Crossing (the Project), and to introduce additional information into the Examination process. This differs from the September 2022 document which is designed to present the findings from the traffic operation appraisal undertaken for Design Release 4.3 (DR4.3) of Manorway roundabout on the A13, A1014 The Manorway/ The Sorrells junction and Sorrells roundabout on the A1014, near DP World Gateway Port.

2.1.3 The 2022 report focuses upon the operation modelling analysis based on the VISSIM microsimulation modelling. This includes the model scope, model development, results, sensitivity testing and a conclusion where NH describes the impact of the LTC scheme. Relative delay plots and sensitivity analysis of the models are summarised. The 2023 report is a broader document focusing on the traffic models employed, the approaches used, in addition to providing a summary of the action point request from respective council close to the scheme. Commentary is provided on the application of LTAM.

2.1.4 This chapter does not delve any further into the differences between the reports. Analysis has been undertaken to determine if the model results contained in each of the reports is consistent. Chapter 4 in each of the documents provide journey time analysis for the 2030 and 2045 Do Minimum and Do Something models. In all scenarios, the reported journey time results are consistent between the 2022 and 2023 documentation for the Manorway model.

2.1.5 The July 2023 report goes onto to provide tables presenting the Manorway results. A review has been undertaken to check whether these results match the results provided in Lower Thames Crossing 9.15 Localised Traffic Modelling, July 2023. Where a comparison can be made, both reports provide the same journey time results suggesting these are from the same version of the microsimulation model provided by NH to the Council in October 2022.

2.1.6 A base model has not been provided for this junction and so it is not feasible to sign off a validated base year model and is therefore not possible to judge whether the provided forecast models are sound.