

# Lower Thames Crossing

## 9.15 Localised Traffic Modelling

### Appendix C – Orsett Cock Forecasting Report

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# Lower Thames Crossing

## 9.15 Localised Traffic Modelling Appendix C – Orsett Cock Forecasting Report

### List of contents

	Page number
<b>1 Introduction .....</b>	<b>1</b>
1.1 Purpose of document.....	1
1.2 Modelling software.....	1
1.3 The Project .....	1
<b>2 Modelling scope .....</b>	<b>4</b>
<b>3 2030 and 2045 model development &amp; forecasting.....</b>	<b>6</b>
3.1 Introduction.....	6
3.2 Network development – Do minimum .....	6
3.3 Network development – Do Something .....	6
3.4 Forecast traffic demand .....	7
3.5 Public transport.....	10
3.6 Traffic signals optimisation.....	10
3.7 DM and DS VISSIM model calibration .....	10
3.8 Initial visual observations .....	11
3.9 Improvements for the DS Network.....	12
<b>4 Traffic condition analysis .....</b>	<b>14</b>
4.1 Introduction.....	14
4.2 Junctions traffic condition .....	14
4.3 Journey times .....	21
4.4 Relative delays .....	45
<b>5 Conclusions.....</b>	<b>53</b>
<b>References .....</b>	<b>54</b>
<b>Glossary .....</b>	<b>55</b>

## List of plates

	<b>Page number</b>
Plate 1.1 Lower Thames Crossing route.....	3
Plate 2.1 Traffic Operations Study Area .....	4
Plate 3.1 Forecast Traffic Demand Calculation for VISSIM .....	7
Plate 3.2 Do-Something model VISSIM Zones .....	9
Plate 3.3 Traffic Behaviour at A13 West & Circulatory.....	11
Plate 3.4 Lane change in northern circulatory.....	12
Plate 3.5 A13 West approach improvement .....	12
Plate 3.6 Modified Lane Markings at A128(N) exit.....	13
Plate 4.1 Journey Time Start and End Locations.....	21
Plate 4.2 Relative Delay Plot (2030 DM 07:00 – 08:00).....	46
Plate 4.3 Relative Delay Plot (2030 DS 07:00 – 08:00) .....	46
Plate 4.4 Relative Delay Plot (2030 DM 08:00 – 09:00).....	47
Plate 4.5 Relative Delay Plot (2030 DS 08:00 – 09:00) .....	47
Plate 4.6 Relative Delay Plot (2030 DM 17:00 – 18:00).....	48
Plate 4.7 Relative Delay Plot (2030 DS 17:00 – 18:00) .....	48
Plate 4.8 Relative Delay Plot (2045 DM 07:00 – 08:00).....	50
Plate 4.9 Relative Delay Plot (2045 DS 07:00 – 08:00) .....	50
Plate 4.10 Relative Delay Plot (2045 DM 08:00 – 09:00).....	51
Plate 4.11 Relative Delay Plot (2045 DS 08:00 – 09:00) .....	51
Plate 4.12 Relative Delay Plot (2045 DM 17:00 – 18:00).....	52
Plate 4.13 Relative Delay Plot (2045 DS 17:00 – 18:00) .....	52

## List of tables

	<b>Page number</b>
Table 3.1 Traffic Volumes (Vehicles) in Study Area by Scenario.....	8
Table 4.1 07:00 – 08:00 Traffic Conditions, 2030 .....	15
Table 4.2 08:00 – 09:00 Traffic Conditions, 2030 .....	16
Table 4.3 17:00 – 18:00 Traffic Conditions, 2030 .....	17
Table 4.4 07:00 – 08:00 Traffic Conditions, 2045 .....	18
Table 4.5 08:00 – 09:00 Traffic Condition, 2045 .....	19
Table 4.6 17:00 – 18:00 Traffic Condition, 2045 .....	20
Table 4.7 2030 Journey Time Comparison, AM 07:00 – 08:00.....	22
Table 4.8 2030 Journey Time Comparison, AM 08:00 – 09:00.....	26
Table 4.9 2030 Journey Time Comparison, PM 17:00 – 18:00.....	30
Table 4.10 2045 Journey Time Comparison, AM 07:00 – 08:00.....	34
Table 4.11 2045 Journey Time Comparison, AM 08:00 – 09:00.....	38
Table 4.12 2045 Journey Time Comparison, PM 17:00 – 18:00.....	42

# 1 Introduction

## 1.1 Purpose of document

- 1.1.1 The purpose of this document is to present the findings from the traffic operation appraisal undertaken for Design Release 4.3 (DR4.3) of the network in vicinity of the Orsett Cock junction including the A13/ A1089 and the A1013 Stanford Road/ Rectory Road junction.

## 1.2 Modelling software

- 1.2.1 Road traffic micro-simulation models represent individual vehicles travelling within the road network, providing realistic driver behaviour such as lane changing and overtaking. The micro-simulation software selected for the Lower Thames Crossing is VISSIM. The model has been developed in VISSIM version 2020 (SP13).

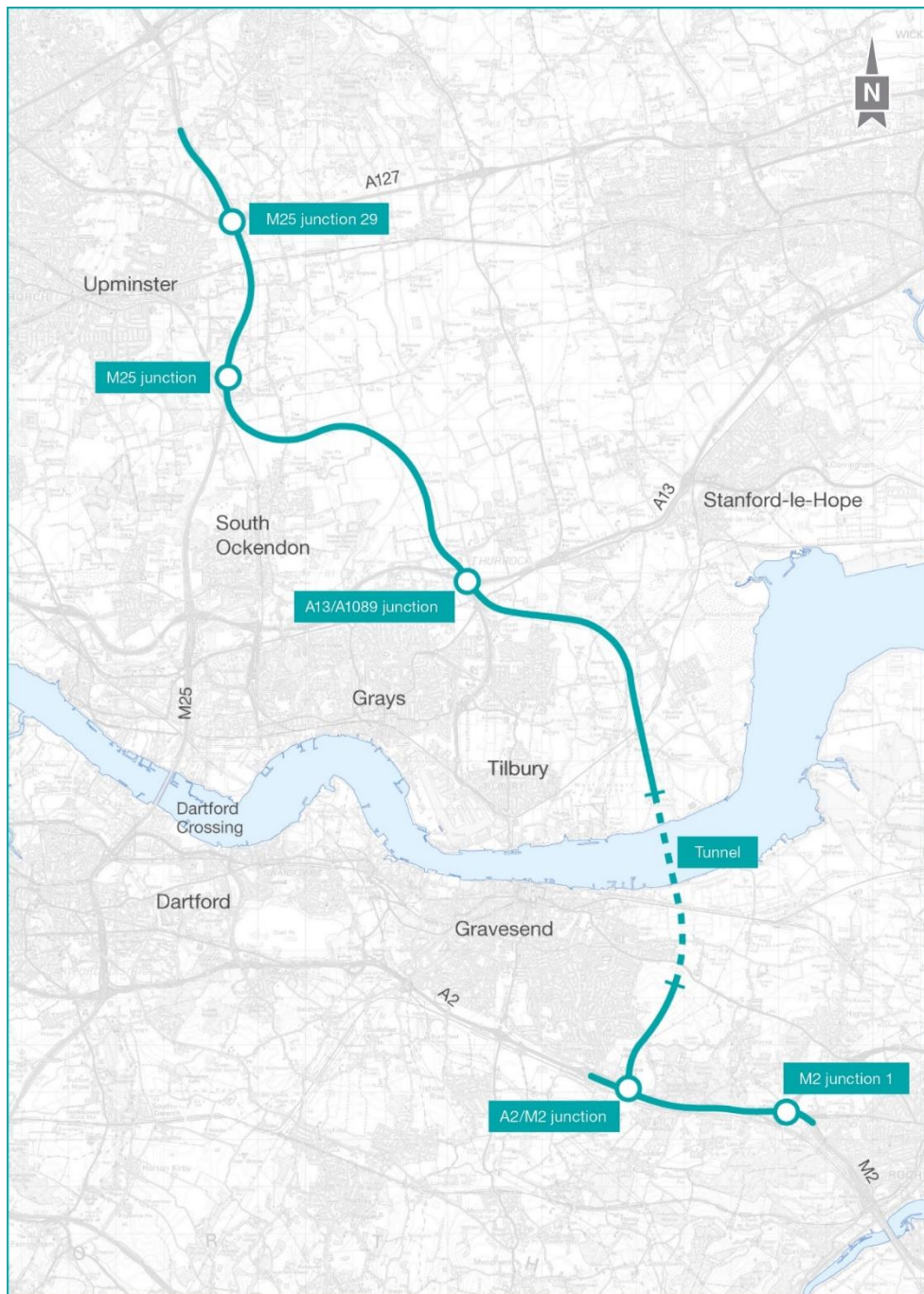
## 1.3 The Project

- 1.3.1 The A122 Lower Thames Crossing (the Project) would provide a connection between the A2 and M2 in Kent, south-east of Gravesend, crossing under the River Thames through a tunnel, before joining the M25 south of junction 29. The Project route is presented in Plate 1.1.
- 1.3.2 The A122 would be approximately 23km long, 4.25km of which would be in tunnel. On the south side of the River Thames, the Project route would link the tunnel to the A2 and M2. On the north side, it would link to the A13, M25 junction 29 and the M25 south of junction 29. The tunnel entrances would be located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.
- 1.3.3 Junctions are proposed at the following locations:
- a. New junction with the A2 to the south-east of Gravesend
  - b. Modified junction with the A13/A1089 in Thurrock
  - c. New junction with the M25 between junctions 29 and 30
- 1.3.4 To align with NPSNN policy and to help the Project meet the Scheme Objectives, it is proposed that road user charges would be levied in line with the Dartford Crossing. Vehicles would be charged for using the new tunnel.
- 1.3.5 The Project route would be three lanes in both directions, except for:
- a. link roads
  - b. stretches of the carriageway through junctions
  - c. the southbound carriageway from the M25 to the junction with the A13/A1089, which would be two lanes
- 1.3.6 In common with most A-roads, the A122 would operate with no hard shoulder but would feature a 1m hard strip on either side of the carriageway. It would

also feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. The A122 design outside of the tunnel would include emergency areas. The tunnel would include a range of enhanced systems and response measures instead of emergency areas.

- 1.3.7 The A122 would be classified as an ‘all-purpose trunk road’ with green signs. For safety reasons, walkers, cyclists, horse-riders and slow-moving vehicles would be prohibited from using it.
- 1.3.8 The Project would include adjustment to a number of local roads. There would also be changes to a number of public rights of way, used by walkers, cyclists and horse riders. Construction of the Project would also require the installation and diversion of a number of utilities, including gas mains, overhead electricity powerlines and underground electricity cables, as well as water supplies and telecommunications assets and associated infrastructure.
- 1.3.9 The Project has been developed to avoid or minimise significant effects on the environment. Some of the measures adopted include landscaping, noise mitigation, green bridges, floodplain compensation, new areas of ecological habitat and two new parks.

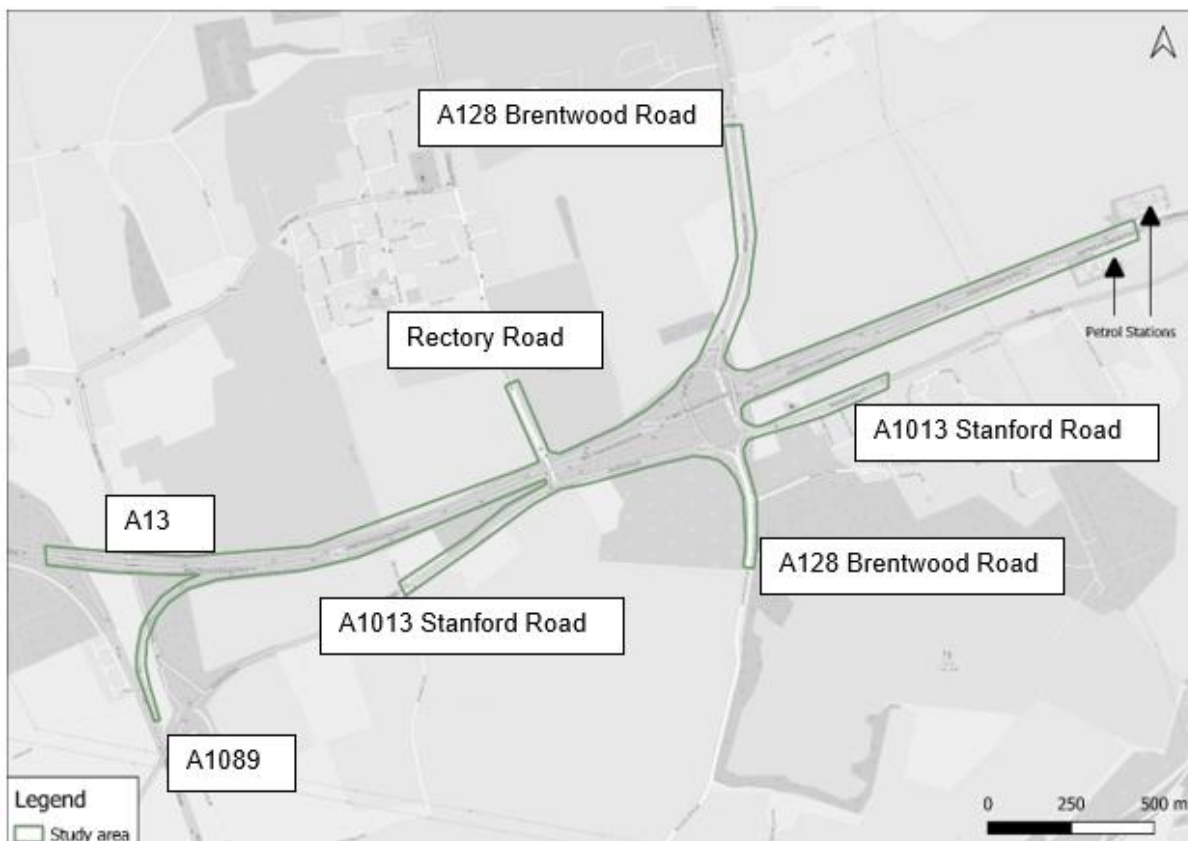
**Plate 1.1 Lower Thames Crossing route**



## 2 Modelling scope

- 2.1.1 The traffic operation study area, modelling years and time periods have been defined based on discussion and agreement with Thurrock Council and their consultants during a workshop on 14 December 2021. Further information is set out in 9.15 Localised Traffic Modelling Appendix B – Orsett Cock LMVR.
- 2.1.2 The study area is located to the north-east of Grays and Plate 2.1 shows the extent of the study area covered by the VISSIM model. The section of the A13 in this area and the Orsett Cock junction recently had construction works completed as part of the A13 Widening Scheme between the Orsett Cock and the Manorway junctions, undertaken by Thurrock Council.
- 2.1.3 The Orsett Cock junction in 2016 was an unsignalised, grade-separated roundabout with two circulatory lanes. The A13 had three lanes in each direction west of the junction and two lanes east of the junction. The area of interest also extends to the westbound diverge from the A13 onto the A1089 in order to capture the anticipated changes proposed around the A13/ A1089 interchange in the Project.
- 2.1.4 The model also includes the A1013 Stanford Road/ Rectory Road unsignalized T- Junction, located just to the west of the Orsett Cock junction.

**Plate 2.1 Traffic Operations Study Area**



- 2.1.5 The VISSIM base year model was developed to reflect the road network and traffic condition in 2016, before the construction work commenced. Accordingly, a Local Model Validation Report (LMVR) was issued in June 2022 explaining how the base year model was developed and validated for two time periods, namely:
- a. AM Peak Period (07:00 - 09:00) to capture the peak hour for the A13 and strategic road network (07:00–08:00) and the peak hour of the junction and local roads (08:00–09:00); and
  - b. PM Peak Period (17:00 - 18:00).
- 2.1.6 Following this, Do Minimum models representing forecast years 2030 and 2045 without the Project and 2030 and 2045 Do Something models with the Project were developed.
- 2.1.7 This report explains how the Do Minimum (DM) and Do Something (DS) models were developed and compares results from the 2030 and 2045 DS models with the results of the 2030 and 2045 DM models to aid understanding of how network operating conditions are forecast to change from the Do Minimum without the Project, to the Do Something with the Project.



## 3 2030 and 2045 model development & forecasting

### 3.1 Introduction

3.1.1 This section describes the development of the 2030 and 2045 DM and DS VISSIM models in terms of:

- a. Network development
- b. Forecast traffic demand
- c. Traffic signal optimisation
- d. Model calibration
- e. Initial visual observation
- f. Interim improvements in the DS scenario

### 3.2 Network development – Do minimum

3.2.1 The 2030 and 2045 DM scenarios have the same network. The DM network was developed from the 2016 base year network by incorporating the A13 widening scheme between the Orsett Cock and Manorway junctions. This scheme was recently completed by Thurrock Council.

3.2.2 The principal network changes between the 2016 base year and the DM were:

- a. Introduction of an extra lane in both directions on the A13 east of the Orsett Cock junction.
- b. Reconfiguration of the merges and diverges at the Orsett Cock junction with the A13 in both directions.
- c. Reconfiguration of the westbound on-slip to the A13 West with the slip road reduced to one lane.
- d. Reconfiguration of the A128 North approach with an extra flare lane.
- e. Reconfiguration of the A13 West approach (eastbound off-slip) with an extra flare lane.
- f. Introduction of an extra lane in the circulatory.
- g. Introduction of controlled pedestrian crossings and traffic signals on the A13 West and A13 East approaches.

### 3.3 Network development – Do Something

3.3.1 The DS network was developed from the DM network by incorporating the highway design as per the DCO application within the traffic operations study area for Orsett Cock. The principal network changes between the DM and DS models were:

- a. Introduction of new Project links around the A13/ A1089 interchange.
- b. Reconfiguration of A13/ A1089 interchange.
- c. Reconfiguration of slip roads on the A13 west of the Orsett Cock junction.
- d. Realignment of A1013 (West) Stanford Road.
- e. Introduction of traffic signals on the A128 North and A128 South approaches at Orsett Cock.
- f. Reconfiguration of the A1013/ Rectory Road junction.

3.3.2 The network coding for both DM and DS networks were undertaken using highway design drawing – for the DM network drawings of the A13 widening scheme were provided by Thurrock Council, and for the DS network the design of the Project as per the drawings submitted in the DCO application.

### 3.4 Forecast traffic demand

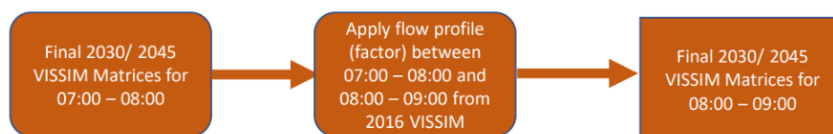
3.4.1 The forecast traffic demand matrices for each vehicle type in VISSIM were calculated as shown in Plate 3.1 and described in detail in subsequent sections.

**Plate 3.1 Forecast Traffic Demand Calculation for VISSIM**

For LTAM Peak Hours 07:00 – 08:00 and 17:00 – 18:00



For Second AM Peak 08:00 – 09:00



3.4.2 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.

3.4.3 The absolute differences in flows between these models were identified and then applied to the 2016 base year VISSIM model to develop the 2030/2045 DM matrices. This was undertaken on the basis of origin-destination matrices so applying a matrix of ‘flow differences’ to the 2016 Base Year matrix to create the 2030 and 2045 DM matrix.

- 3.4.4 Where applying absolute differences resulted in negative values, the percentage difference was used instead of the absolute difference. This was the case for the origin – destination pairs for which the LTAM forecast indicated negative growth. If the 2016 base year flows in VISSIM were lower than the LTAM base flows, applying this negative flow difference would lead in some instances to a negative number, therefore it was preferred to use percentage difference instead where this occurred.
- 3.4.5 For the second hour in the AM (08:00 – 09:00), which is not available from the LTAM, the existing flow base year profile in VISSIM (derived from count data) was used to factor the 2030 and 2045 matrices from the 07:00 – 08:00 hour to the 08:00 – 09:00 hour.
- 3.4.6 The 2030 and 2045 hourly matrices were split into 15-minute intervals using the flow profiles from the base year VISSIM model. In summary, the comparison of the 2016 Base and 2030 DM traffic demands in Table 3.1 indicates that the overall traffic demand is forecast to increase by 30%-32% in the AM peak hours and 27% in the PM peak hour, whereas for 2045 DM traffic demand is forecast to increase by 41%-43% in the AM peak hours and 36% in the PM peak hour.

**Table 3.1 Traffic Volumes (Vehicles) in Study Area by Scenario**

Peak	Vehicle Type	2016 Base	2030 DM	2030 DS		2045 DM	2045 DS	
				Project mainline flows*	Total *		Project mainline flows*	Total**
AM (07:00 – 08:00)	Car	6,698	8,876	1,818	14,713	9,602	2,091	16,129
	LGV	1,693	2,028	599	3,165	2,270	733	3,628
	HGV	739	1,010	630	2,361	1,035	628	2,378
	<b>Total</b>	<b>9,130</b>	<b>11,914</b>	<b>3,046</b>	<b>20,239</b>	<b>12,906</b>	<b>3,453</b>	<b>22,135</b>
AM (08:00 – 09:00)	Car	6,790	9,057	1,818	14,912	9,817	2,091	16,312
	LGV	1,247	1,485	599	2,633	1,675	733	3,022
	HGV	822	1,112	630	2,477	1,141	628	2,494
	<b>Total</b>	<b>8,859</b>	<b>11,653</b>	<b>3,046</b>	<b>20,022</b>	<b>12,633</b>	<b>3,453</b>	<b>21,828</b>
PM (17:00 – 18:00)	Car	8,172	10,201	1,787	17,397	10,915	1,978	18,897
	LGV	1,300	1,635	417	2,574	1,850	479	2,939
	HGV	3,86	654	541	1,722	659	517	1,716
	<b>Total</b>	<b>9,858</b>	<b>12,490</b>	<b>2,745</b>	<b>21,692</b>	<b>13,424</b>	<b>2,974</b>	<b>23,553</b>

Note: \* Project mainline flows are those that travel through the A13/A1089/A122 junction.

\*\* Total DS traffic volumes include Project mainline flows.

- 3.4.7 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).
- 3.4.8 There are new zones associated with the new traffic from the Project in the DS models. The new zones are shown in Plate 3.2. The traffic demand and the distributions for these zones were taken directly from the LTAM cordon matrices and added to the VISSIM matrices.

**Plate 3.2 Do-Something model VISSIM Zones**



- 3.4.9 Similar to the 2030 and 2045 DM matrices, for the second hour in the AM (08:00 – 09:00) which is not available from the LTAM, flow matrices were derived using the existing base year flow profile between 07:00 – 08:00 and 08:00 – 09:00.
- 3.4.10 The DS hourly matrices were also split into 15-minute intervals using the existing flow profiles from the VISSIM base year model. In summary, the comparison of the 2030 DM and DS and 2045 DM and DS traffic demands in Table 3.1 indicates that the overall traffic demand in the study area increases by approximately 73% between the DM and DS scenarios in the AM and PM peak hours.
- 3.4.11 It should be noted that the DM versus DS is not a direct comparison for traffic demands at the Orsett Cock junction as the DS total volume includes the mainline traffic travelling north-south on the Project. For clarity the mainline traffic volumes on the Project have been shown separately in Table 3.1.

## 3.5 Public transport

- 3.5.1 Bus services and location of bus stops in the DM and DS models were assumed to remain consistent with those in the base year model.

## 3.6 Traffic signals optimisation

- 3.6.1 The operation of traffic signals in the 2030 and 2045 DM and DS network were initially optimised using LinSIG models and then further fine-tuned in VISSIM to reflect the small changes in demand and arrival pattern of vehicles in the 15-minute intervals.
- 3.6.2 A cycle time of 60 seconds was used in the DM and DS models.

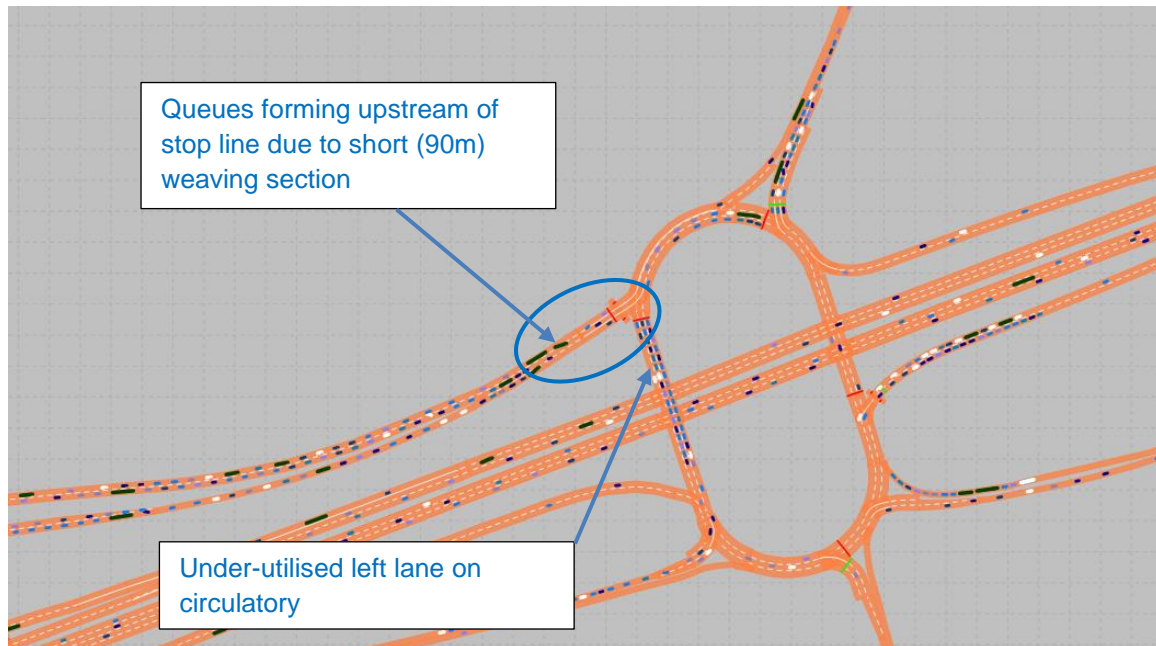
## 3.7 DM and DS VISSIM model calibration

- 3.7.1 The network coding method and model parameters used in the DM and DS models were largely consistent with those calibrated in the base year model. However, due to changes of the network layout at the Orsett Cock junction, some parameters were adjusted in the DM and DS models to provide more realistic driving behaviours to reflect the new layout. These adjustments and the justifications for the changes are summarised below:
- a. The speed distributions of the desired speed and reduced speed areas on the circulatory were reduced by 10% to reflect the new circulatory carriageway lane configuration in the DM and DS models, compared to the base model.
  - b. The circulatory has two lanes in the base model and most of the links use the standard “Urban (motorised)” link behaviour type, except for a short three-lane section just before the A1013 (W) exit which uses the “Urban (merge)” link type to allow smoother lane change behaviour, as there will be more lane changes and weaving in the three-lane section. Given the whole circulatory is widened to three lanes in the DM and DS models, all circulatory links in these models have been adjusted to use the “Urban (merge)” link type.

## 3.8 Initial visual observations

- 3.8.1 Visual observations during the simulation runs of the DS models indicated the traffic behaviour upstream of the traffic signals at the A13 west approach and its circulatory, were impacting the efficiency of these traffic signals. This is shown in Plate 3.3 and summarised below.

**Plate 3.3 Traffic Behaviour at A13 West & Circulatory**



### Weaving on the A13 West approach

- 3.8.2 The section where traffic from the Project and the A13 would merge on the A13 west approach has a modelled length of 90m. The model results for the PM peak indicated that this merge length would need to be increased as a large number of vehicles from the Project need to be in the middle and right-hand lanes while much of the traffic from the A13 needs to use the middle and left-hand lanes for the A128 (N) exit. The short 90m merge length causes a bottleneck upstream of the stop line with queues predicted to extend to the A13 mainline. Extending the merge would provide more space for lane change and remove the bottleneck.

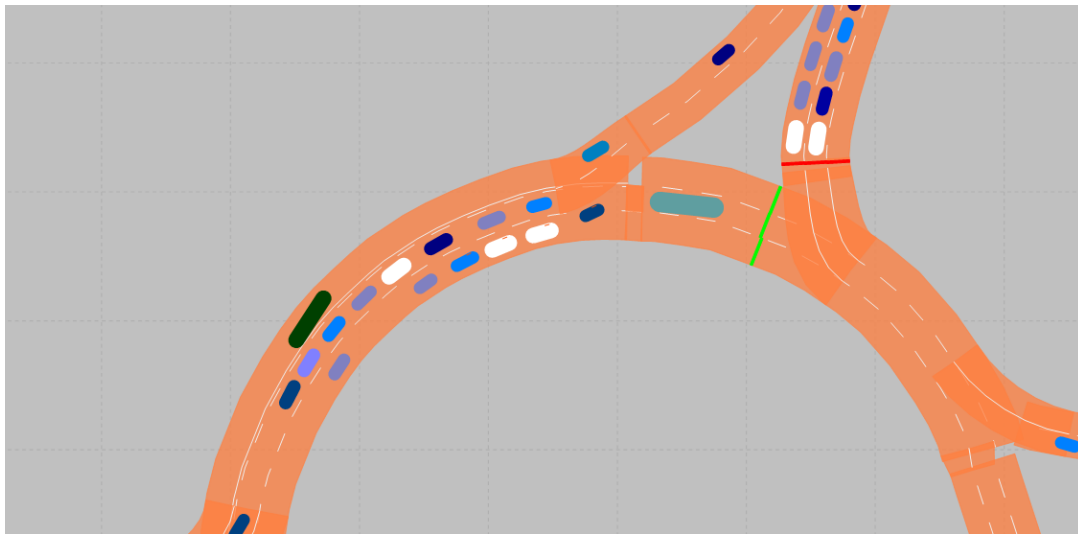
### Under-utilised left lane on the western overbridge

- 3.8.3 The lane markings on the eastern overbridge are currently marked with the left lane dedicated for the A128 (N), middle lane for the A128 (N) & A13 (E) and right lane for the A13 (E) & A1013. The volume of traffic travelling from the circulatory to the A128 (N) is relatively low in comparison to other movements which resulted in the left lane being under-utilised.

### Lane change at the northern circulatory

- 3.8.4 As shown in Plate 3.4, traffic travelling from the right-hand lane on the western overbridge needs to change to the middle lane for the A13 (E) exit. This causes delays upstream of the stop line.

**Plate 3.4 Lane change in northern circulatory**



### 3.9 Improvements for the DS Network

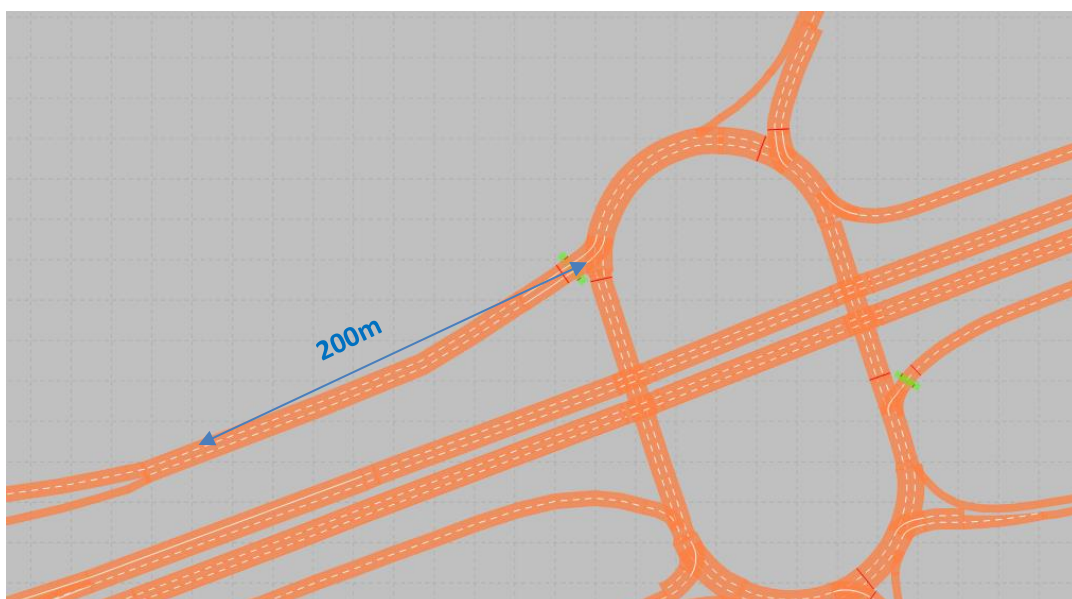
3.9.1 The changes described below have been implemented into the DS network in VISSIM as a provisional improvement. These are currently limited to changes on the slip roads connecting the Project to the A13 (W), and minor changes to the lane markings at the Orsett Cock junction.

3.9.2 The changes described below can be accommodated using the flexibility available within the draft DCO. Requirements for further improvements at the Orsett Cock junction would be determined following detailed design, stakeholder engagement and using the flexibility available within the draft DCO.

#### A13 West approach Improvement

3.9.3 The improved DS network increases the modelled length of the section where traffic from the Project and the A13 merges on the A13 west approach, from 90m to 200m as shown in Plate 3.5.

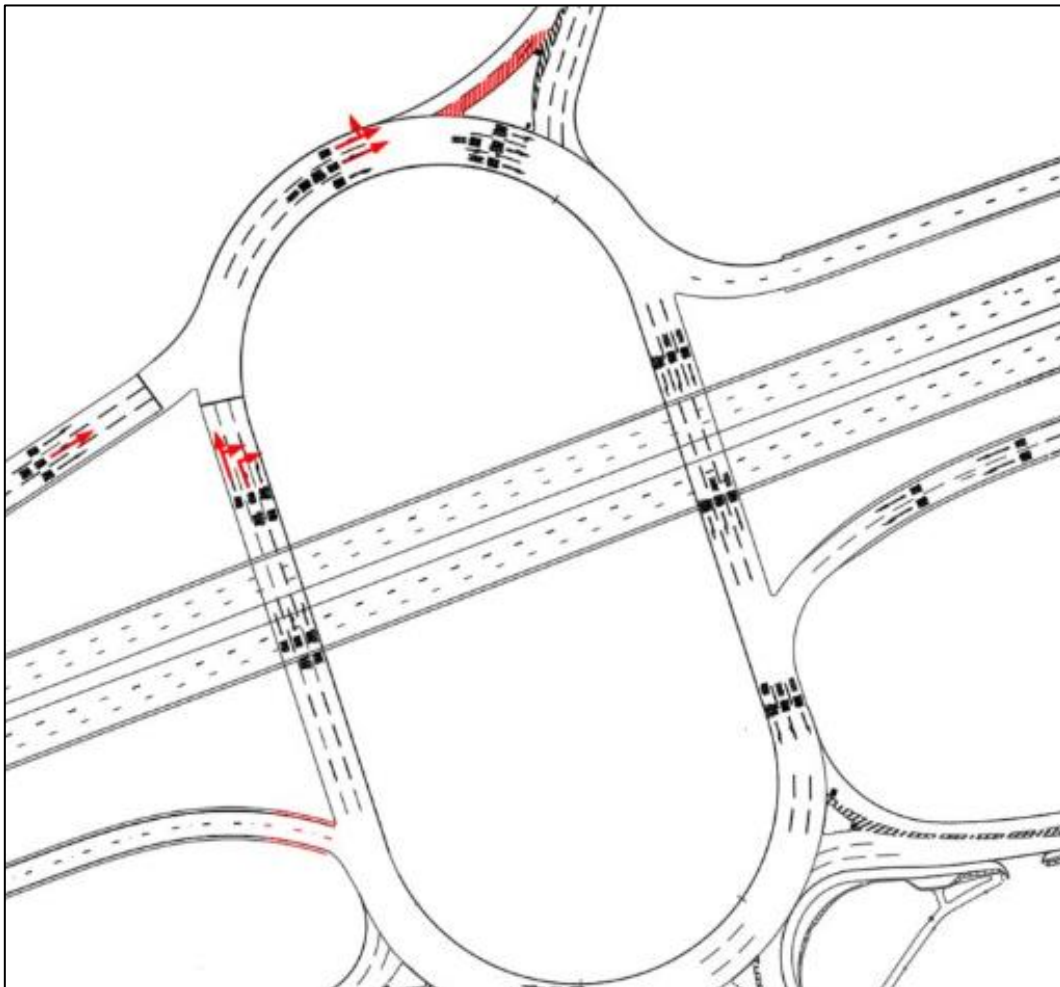
**Plate 3.5 A13 West approach improvement**



### Modified lane markings at A128 (N) exit

- 3.9.4 The purpose of this modification is to achieve a more even spread in lane usage on the western overbridge and avoid traffic changing lanes in the northern circulatory for the A13 (E) exit. The modifications as shown in Plate 3.6 in red include the following changes:
- A128 (N) exit reduced to one lane
  - Allow traffic to use the left lane on the western overbridge for the A13 (E) exit

**Plate 3.6 Modified Lane Markings at A128(N) exit**



### Modified lane markings at A13 (W) exit

- 3.9.5 The westbound on-slip on the A13 West exit is one lane in the DM network. This has been modified to two lanes in the DS network so as to tie in with the Project's design which has two lanes on the slip road.



## 4 Traffic condition analysis

### 4.1 Introduction

- 4.1.1 This section compares the results of the 2030 and 2045 DM and DS VISSIM models in terms of the following traffic condition indicators:
- a. Average delays per vehicle
  - b. Average queues
  - c. Predicted journey times
  - d. Relative delays on links
- 4.1.2 Both the AM and PM Do Something models used in this analysis include the improvements described in section 3.9.
- 4.1.3 Consistent with the base year model validation, the results of the DM and DS models are the averages of the same 20 random seeds used in the base model.

### 4.2 Junctions traffic conditions

- 4.2.1 The predicted traffic conditions at the Orsett Cock and A1013/ Rectory Road junctions are shown in Table 4.1 to Table 4.3 for 2030 and Table 4.4 to Table 4.6 for 2045 and have been measured in terms of the total throughput flow in vehicles, average delay per vehicle and average queue length in metres for each hour within the AM and PM peak period.
- 4.2.2 The average delay per vehicle is calculated by taking the weighted average of the delay from all movements on each approach. It should be noted that for the Orsett Cock junction, the delays are measured for each vehicle completing the full movement from the entry to the exit, therefore including delays from the traffic signals on the circulatory.
- 4.2.3 The average queue lengths are calculated by taking the average of the maximum queue length in each five-minute interval. This is more reliable in comparison to taking the maximum queue length over a one-hour interval, where the maximum queue can sometimes be misleading as it may have occurred only for a very short time/ single time step during the simulation. Vehicles are defined to be in a queue when their headway and speed drops below 20 meters and 3.1mph respectively and exit the queue when their speed increases above 6.2mph.

## 2030 traffic conditions

4.2.4 Table 4.1 shows that the traffic conditions in the 2030 DM scenario on the A128 (N), A13 (E), A1013 (E) and A13 (W) approaches are predicted to be in free-flowing condition with shorter queues and delays of less than 35 seconds during the 07:00 – 08:00 period.

**Table 4.1 07:00 – 08:00 Traffic Conditions, 2030**

Junction	Approach	Flow [veh]			Avg. Delay per veh [s]			Mean Max. Queue [m]		
		Base	DM	DS	2016 Base	2030 DM	2030 DS	2016 Base	2030 DM	2030 DS
Orsett Cock	A128 Brentwood Rd (North)	632	720	690	15	27	93	37	26	128
	A13 (East)	676	943	770	26	27	52	37	59	52
	A1013 Stanford Rd (East)	655	663	669	49	25	55	114	36	78
	A128 Brentwood Rd (South)	602	706	723	41	127	79	55	254	152
	A1013 Stanford Rd (West)	599	796	637	46	65	73	97	144	94
	A13 (West)	497	472	1476	54	35	31	93	37	64
A1013 Stanford Road / Rectory Road	Rectory Rd	136	186	272	9	23	48	13	56	64
	Stanford Rd (East)	833	983	853	7	8	8	10	15	38
	Stanford Rd (West)	557	725	565	3	4	3	-	-	-

4.2.5 Delays on the A128 Brentwood Road (S) and A1013 Stanford Road (West) approaches respectively, are forecast to increase in the 2030 DM scenario compared to 2016, with queues on the A128 Brentwood Road (S) extending past the junction with Welling Road.

4.2.6 Delays at the Orsett Cock junction are forecast to increase on all approaches in the 2030 DS scenario compared to the 2030 DM scenario. However, the predicted queues on all approaches can be accommodated within the available safe storage space.

4.2.7 The greatest forecast increase in delay in the 2030 DS scenario would be on the A128 Brentwood Road (N). This approach is signalised in the DS scenario and has short green times in order to prioritise the circulatory to minimise queueing on the circulating carriageway due to the short storage space available.

4.2.8 The delay on the A1013 Stanford Road (W) approach is forecast to increase, but the respective queues are predicted to be shorter in the 2030 DS scenario compared to 2030 DM scenario. This is because vehicles on the approach wait longer to enter the roundabout in the 2030 DS scenario but there are less traffic joining the back of the queue as demand flow on the approach is lower in the 2030 DS scenario compared to 2030 DM.

4.2.9 At the A1013 Stanford Road/ Rectory Road junction, traffic conditions remain free-flowing in the 2030 DM scenario. There would be small increases in delays and queues on Rectory Road and Stanford Road (E) in the 2030 DS scenario. The increase in queues on Stanford Road (E) is due to the removal of the right turn pocket resulting in right turning vehicles blocking the ahead traffic.

**Table 4.2 08:00 – 09:00 Traffic Conditions, 2030**

Junction	Approach	Flow [veh]			Avg. Delay per veh [s]			Mean Max. Queue [m]		
		Base	DM	DS	2016 Base	2030 DM	2030 DS	2016 Base	2030 DM	2030 DS
Orsett Cock	A128 Brentwood Rd (North)	695	800	789	25	30	181	51	33	382
	A13 (East)	788	895	763	40	26	56	47	56	56
	A1013 Stanford Rd (East)	637	616	646	96	23	69	153	31	86
	A128 Brentwood Rd (South)	610	818	794	216	267	108	127	537	209
	A1013 Stanford Rd (West)	722	849	766	59	168	197	109	647	453
	A13 (West)	506	473	1,526	60	35	34	85	37	70
A1013 Stanford Road / Rectory Road	Rectory Rd	205	206	335	11	72	352	16	223	244
	Stanford Rd (East)	1,141	986	867	8	10	12	13	28	75
	Stanford Rd (West)	620	800	624	3	76	32	-	-	-

4.2.10 Table 4.2 shows that in the 2030 DM 08:00 – 09:00 period, the traffic conditions on the A128 (N), A13 (E), A1013 (E) and A13 (W) approaches are forecast to be similar to the 07:00 – 08:00 period and are predicted to be in free-flowing condition with delays of less than 35 seconds.

4.2.11 Both the A128 Brentwood Road (S) and A1013 Stanford Road (W) approaches are forecast to be over saturated in the 2030 DM scenario with long queues. The queue on the A128 Brentwood Road (S) approach is predicted to extend past the Orsett Golf Club and the queue on the A1013 (W) approach is predicted to extend past Rectory Road.

- 4.2.12 Similar to the 07:00 – 08:00 period, there are forecast to be increased delays on most approaches at the Orsett Cock junction in the 2030 DS scenario compared to the 2030 DM scenario. The predicted queues on most approaches can be accommodated within the available safe storage space, except for the A1013 Stanford Road (W) approach where the queue reaches just east of Rectory Road.
- 4.2.13 Traffic delays would increase most on the A128 Brentwood Road (N) in the 2030 DS scenario compared to the DM scenario with delays increasing by 151s resulting in a 382m queue.
- 4.2.14 Traffic delays would decrease on the A128 Brentwood Road (S) approach as a result of the implementation of the traffic signals and lower demand flow in the DS scenario.
- 4.2.15 The A1013 Stanford Road (W) approach is forecast to remain over saturated in the 2030 DS scenario. Delays are predicted to increase but queues are predicted to be shorter in the 2030 DS scenario compared to 2030 DM scenario due to the lower demand flow in the 2030 DS scenario.
- 4.2.16 At the A1013 Stanford Road/ Rectory Road junction, delays and queueing are forecast to increase in both the 2030 DM and DS scenarios compared to the 2016 base year. Rectory Road is saturated with long queues in both scenarios.

**Table 4.3 17:00 – 18:00 Traffic Conditions, 2030**

Junction	Approach	Flow [veh]			Avg. Delay per veh [s]			Mean Max. Queue [m]		
		Base	DM	DS	2016 Base	2030 DM	2030 DS	2016 Base	2030 DM	2030 DS
Orsett Cock	A128 Brentwood Rd (North)	854	839	870	54	33	83	88	37	132
	A13 (East)	442	678	546	69	23	328	87	48	215
	A1013 Stanford Rd (East)	501	497	518	24	20	72	34	19	70
	A128 Brentwood Rd (South)	410	494	498	13	41	69	19	38	43
	A1013 Stanford Rd (West)	988	999	901	30	47	80	135	76	49
	A13 (West)	805	702	2,155	205	32	138	467	38	692
A1013 Stanford Road / Rectory Road	Rectory Rd	311	323	329	21	29	186	34	129	158
	Stanford Rd (East)	680	946	880	6	9	14	10	20	83
	Stanford Rd (West)	855	986	895	4	6	5	-	-	-

- 4.2.17 In the PM peak, traffic conditions at the Orsett Cock junction are forecast to be free-flowing in the 2030 DM scenario, as shown in Table 4.3.
- 4.2.18 In the 2030 DS scenario, the Orsett Cock junction is predicted to be over-saturated in the PM peak with delays and queues on the A128 (N), A13 (E) and A13 (W) approaches.
- 4.2.19 At the A1013 Stanford Road/ Rectory Road junction, delays and queues on Rectory Road increase in both the 2030 DM and 2030 DS scenarios compared to the base year with long queues in both scenarios. The queues on Stanford Road (E) also increase in the 2030 DS scenario due to the removal of the right turn pocket resulting in right turning vehicles blocking the ahead traffic.

### 2045 traffic conditions

- 4.2.20 At the Orsett Cock junction, Table 4.4 shows that the traffic conditions in the 2045 DM scenario on the A128 (N), A13 (E), A1013 (E) and A13 (W) approaches are predicted to be in free-flowing condition with short delays and short queues during the 07:00 – 08:00 period.

**Table 4.4 07:00 – 08:00 Traffic Conditions, 2045**

Junction	Approach	Flow [veh]			Avg. Delay per veh [s]			Mean Max. Queue [m]		
		Base	DM	DS	2016 Base	2045 DM	2045 DS	2016 Base	2045 DM	2045 DS
Orsett Cock	A128 Brentwood Rd (North)	632	832	667	15	33	166	37	29	311
	A13 (East)	676	984	702	26	29	52	37	61	48
	A1013 Stanford Rd (East)	655	812	658	49	42	63	114	70	93
	A128 Brentwood Rd (South)	602	527	756	41	310	278	55	400	534
	A1013 Stanford Rd (West)	599	729	589	46	215	77	97	591	89
	A13 (West)	497	514	1,877	54	37	35	93	37	81
A1013 Stanford Road / Rectory Road	Rectory Rd	136	130	261	9	77	45	13	128	58
	Stanford Rd (East)	833	1,002	819	7	16	8	10	82	41
	Stanford Rd (West)	557	755	583	3	119	3	-	-	-

- 4.2.21 Delays on the A128 Brentwood Road (S) and A1013 Stanford Road (West) approaches respectively, are forecast to increase in the 2045 DM scenario compared to 2016, with queues on the A128 Brentwood Road (S) extending past the junction with Welling Road.

- 4.2.22 Delays at the Orsett Cock junction are forecast to increase on the A128 (N), A13 (E) and A1013 (E) approaches in the 2045 DS scenario compared to the 2045 DM scenario. Delays on the A128 Brentwood Road (S) approach is forecast to decrease slightly in the 2045 DS scenario due to the introduction of traffic signals, but queues are predicted to be longer in the 2045 DS scenario compared to 2045 DM scenario due to higher flow in the 2045 DS scenario.
- 4.2.23 Delays also decreased on the A1013 Stanford Road (West) approach in 2045 DS due to lower flow.
- 4.2.24 At the A1013 Stanford Road/ Rectory Road junction, traffic conditions improve in the 2045 DS scenario with shorter delays on all three approaches.

**Table 4.5 08:00 – 09:00 Traffic Condition, 2045**

Junction	Approach	Flow [veh]			Avg. Delay per veh [s]			Mean Max. Queue [m]		
		Base	DM	DS	2016 Base	2045 DM	2045 DS	2016 Base	2045 DM	2045 DS
Orsett Cock	A128 Brentwood Rd (North)	695	915	751	25	34	388	51	36	792
	A13 (East)	788	938	686	40	30	55	47	60	49
	A1013 Stanford Rd (East)	637	762	658	96	50	104	153	105	150
	A128 Brentwood Rd (South)	610	566	824	216	479	244	127	538	537
	A1013 Stanford Rd (West)	722	839	691	59	182	172	109	791	309
	A13 (West)	506	516	1,957	60	38	38	85	39	92
A1013 Stanford Road / Rectory Road	Rectory Rd	205	146	371	11	114	273	16	223	232
	Stanford Rd (East)	1,141	1,047	835	8	18	9	13	104	49
	Stanford Rd (West)	620	904	638	3	112	8	-	-	-

- 4.2.25 Table 4.5 shows that in the 2045 DM 08:00 – 09:00 period, the traffic conditions on the A128 (N), A13 (E), A1013 (E) and A13 (W) approaches are forecast to be similar or slightly improved when compared to the 2016 base scenario.
- 4.2.26 Both the A128 Brentwood Road (S) and A1013 Stanford Road (W) approaches are forecast to be over saturated in the 2045 DM scenario with long queues without the Project. The queue on the A128 Brentwood Road (S) approach is predicted to extend past the Orsett Golf Club and the queue on the A1013 (W) approach is predicted to extend past Rectory Road.

- 4.2.27 The forecast shows increased delays on some approaches at the Orsett Cock junction in the 2045 DS scenario compared to the 2045 DM scenario with delays and queues increasing the most on the A128 (N) approach due to the large increase in flow from A13(W) that includes traffic from the Project.
- 4.2.28 Traffic delays would decrease on the A128 Brentwood Road (S) in the 2045 DS scenario compared to the DM scenario due to the traffic signals, but queues remain long due to the higher demand flow.
- 4.2.29 The A1013 Stanford Road (W) approach is forecast to remain over saturated in the 2045 DS scenario. Queues are predicted to be shorter in the 2045 DS scenario compared to 2045 DM scenario due to the lower demand flow in the 2045 DS scenario.
- 4.2.30 At the A1013 Stanford Road/ Rectory Road junction, delays and queues are forecast to increase in 2045 DS at Rectory Road compared to the 2045 DM scenario.

**Table 4.6 17:00 – 18:00 Traffic Condition, 2045**

Junction	Approach	Flow [veh]			Avg. Delay per veh [s]			Mean Max. Queue [m]		
		Base	DM	DS	2016 Base	2045 DM	2045 DS	2016 Base	2045 DM	2045 DS
Orsett Cock	A128 Brentwood Rd (North)	854	902	849	54	31	320	88	38	770
	A13 (East)	442	800	495	69	27	188	87	57	116
	A1013 Stanford Rd (East)	501	573	511	24	25	72	34	27	73
	A128 Brentwood Rd (South)	410	577	639	13	110	148	19	151	173
	A1013 Stanford Rd (West)	988	979	888	30	46	107	135	74	85
	A13 (West)	805	677	2,218	205	31	289	467	37	1,753
A1013 Stanford Road / Rectory Road	Rectory Rd	311	249	354	21	48	175	34	167	165
	Stanford Rd (East)	680	1,097	888	6	13	14	10	54	88
	Stanford Rd (West)	855	1,076	975	4	7	5	-	-	-

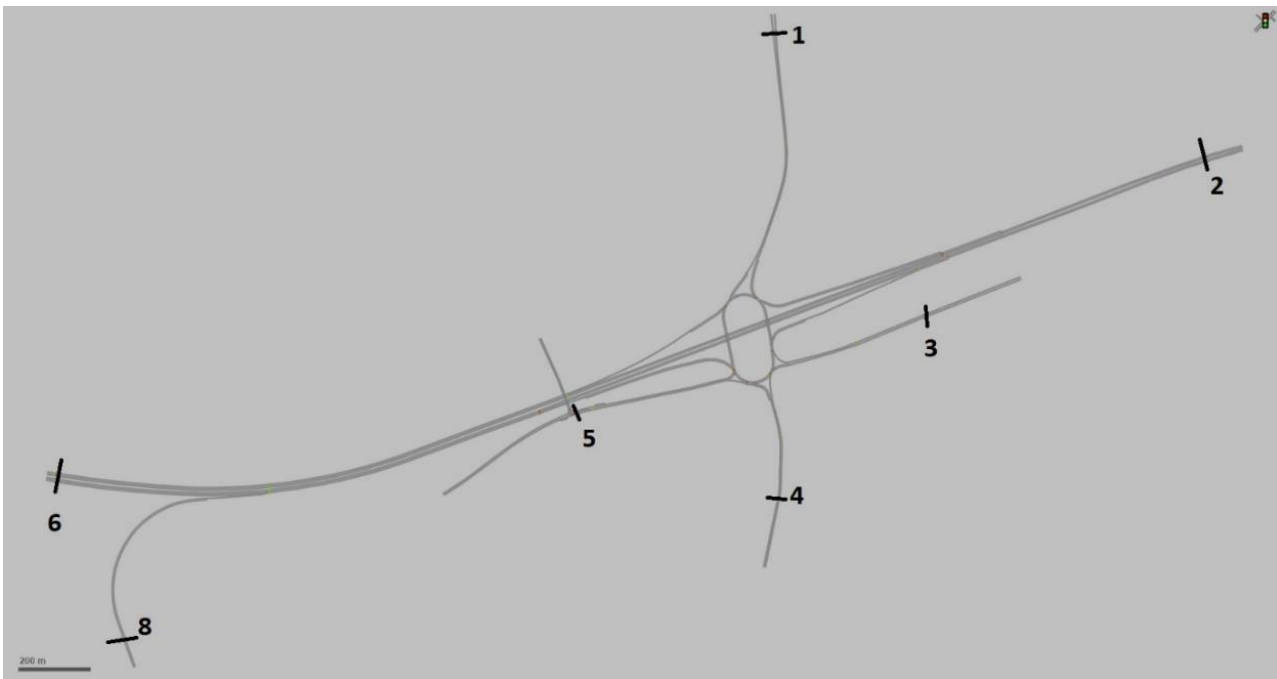
- 4.2.31 In the PM peak, traffic conditions at the Orsett Cock junction in 2045 DM are forecast to improve when compared to the 2016 base scenario except for the A128 (S) approach which is over-saturated in 2045 DM with longer delays and queues, as shown in Table 4.6.

- 4.2.32 In the 2045 DS scenario, traffic conditions at the Orsett Cock junction are forecast to be worse than the 2045 DM with delays and queues increasing on all approaches. The largest increase in queue is on the A13(W) approach due to the additional traffic from the Project.
- 4.2.33 At the A1013 Stanford Road/ Rectory Road junction, delays and queues on Rectory Road increase in both the 2045 DM scenario compared to the base year with long queues on Rectory Road and the traffic conditions at this junction are forecast to remain similar in the 2045 DS scenario.

### 4.3 Journey times

- 4.3.1 Journey time comparison has been carried out on the same routes used for the base year model validation. These cover all movements between the origins and destinations as illustrated in Plate 4.1.

**Plate 4.1 Journey Time Start and End Locations**



- 4.3.2 Table 4.7 to Table 4.9 show a summary comparing the journey times for the 2016 Base Year, 2030 DM and 2030 DS for the AM and PM peak periods.



**Table 4.7 2030 Journey Time Comparison, AM 07:00 – 08:00**

Route	Name	2016 Base			2030 DM			2030 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
1-->2	A128 Brentwood Rd (North) to A13 EB mainline	2,084	109	42.8	2,122	123	38.7	2,122	193	24.7
1-->3	A128 Brentwood Rd (North) to A1013 Stanford Rd (East)	1,381	102	30.3	1,396	118	26.5	1,396	188	16.6
1-->4	A128 Brentwood Rd (North) to A128 Brentwood Rd (South)	1,341	90	33.3	1,347	107	28.1	1,347	177	17.0
1-->5	A128 Brentwood Rd (North) to A1013 Stanford Rd (West)	1,555	107	32.4	1,533	125	27.5	1,535	199	17.2
1-->6	A128 Brentwood Rd (North) to A13 WB mainline	3,051	152	45.0	3,025	193	35.1	3,036	261	26.0
1-->8	A128 Brentwood Rd (North) to A13 WB off-slip to A1089	3,189	164	43.5	2,439	171	31.9	3,071	265	25.9
2-->1	A13 WB mainline to A128 Brentwood Rd (North)	2,343	144	36.3	2,360	161	32.9	2,359	183	28.8
2-->3	A13 WB mainline to A1013 Stanford Rd (East)	1,629	101	36.1	1,653	100	36.9	1,653	111	33.3
2-->4	A13 WB mainline to A128 Brentwood Rd (South)	1,588	89	39.8	1,605	90	40.1	1,605	101	35.7
2-->5	A13 WB mainline to A1013 Stanford Rd (West)	1,803	106	37.9	1,791	107	37.4	1,793	123	32.7
2-->6	A13 WB mainline to A13 WB mainline	3,177	119	59.7	3,177	118	60.3	3,178	120	59.1
2-->8	A13 WB mainline to A13 WB off-slip to A1089	3,315	131	56.4	3,315	131	56.6	3,329	188	39.5
3-->1	A1013 Stanford Rd (East) to A128 Brentwood Rd (North)	1,563	151	23.1	1,590	144	24.7	1,589	183	19.4

Route	Name	2016 Base			2030 DM			2030 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
3-->2	A1013 Stanford Rd (East) to A13 EB mainline	2,176	158	30.8	2,215	161	30.8	2,216	212	23.4
3-->4	A1013 Stanford Rd (East) to A128 Brentwood Rd (South)	808	96	18.8	835	73	25.6	835	101	18.6
3-->5	A1013 Stanford Rd (East) to A1013 Stanford Rd (West)	1,022	113	20.2	1,021	91	25.2	1,023	123	18.6
3-->6	A1013 Stanford Rd (East) to A13 WB mainline	2,517	157	35.8	2,513	158	35.5	2,523	185	30.6
3-->8	A1013 Stanford Rd (East) to A13 WB off-slip to A1089	2,655	170	35.0	1,927	137	31.4	2,559	188	30.4
4-->1	A128 Brentwood Rd (South) to A128 Brentwood Rd (North)	1,397	128	24.4	1,431	217	14.7	1,430	185	17.3
4-->2	A128 Brentwood Rd (South) to A13 EB mainline	2,010	135	33.3	2,056	235	19.6	2,057	214	21.5
4-->3	A128 Brentwood Rd (South) to A1013 Stanford Rd (East)	1,307	128	22.9	1,330	230	13.0	1,330	209	14.2
4-->5	A128 Brentwood Rd (South) to A1013 Stanford Rd (West)	856	90	21.3	862	164	11.7	864	125	15.5
4-->6	A128 Brentwood Rd (South) to A13 WB mainline	2,351	134	39.2	2,354	232	22.7	2,364	187	28.3
4-->8	A128 Brentwood Rd (South) to A13 WB off-slip to A1089	2,489	147	38.0	1,768	211	18.8	2,400	190	28.2
5-->1	A1013 Stanford Rd (West) to A128 Brentwood Rd (North)	1,452	133	24.4	1,465	157	20.9	1,474	158	20.9
5-->2	A1013 Stanford Rd (West) to A13 EB mainline	2,066	140	32.9	2,090	174	26.9	2,101	187	25.2

Route	Name	2016 Base			2030 DM			2030 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
5-->3	A1013 Stanford Rd (West) to A1013 Stanford Rd (East)	1,363	133	22.9	1,364	169	18.1	1,375	182	16.9
5-->4	A1013 Stanford Rd (West) to A128 Brentwood Rd (South)	1,322	122	24.3	1,315	158	18.6	1,326	171	17.3
5-->6	A1013 Stanford Rd (West) to A13 WB mainline	2,407	139	38.6	2,387	171	31.2	2,409	159	33.8
5-->8	A1013 Stanford Rd (West) to A13 WB off-slip to A1089	2,545	152	37.5	1,802	150	26.9	2,445	163	33.5
6-->1	A13 EB mainline to A128 Brentwood Rd (North)	2,767	162	38.2	2,770	153	40.4	2,775	152	40.9
6-->2	A13 EB mainline to A13 EB mainline	3,345	121	62.0	3,347	122	61.5	3,347	127	58.9
6-->3	A13 EB mainline to A1013 Stanford Rd (East)	2,678	162	36.9	2,669	166	36.1	2,676	176	34.1
6-->4	A13 EB mainline to A128 Brentwood Rd (South)	2,637	150	39.2	2,621	155	37.8	2,627	165	35.5
6-->5	A13 EB mainline to A1013 Stanford Rd (West)	2,852	168	38.1	2,807	173	36.4	2,815	188	33.6
6-->8	A13 EB mainline to A13 WB off-slip to A1089	4,485	224	44.7	3,713	219	37.9	4,351	253	38.4

- 4.3.3 The journey time comparison between the 2030 DM scenario and the 2016 Base Year for the 07:00 – 08:00 period shows the following:
- a. Journey times in the DM are similar or slightly higher than the base year across the majority of the routes, except for those routes originating from the A128 (S) and A1013 (W) where journey times increase on average by 60s due to the delays on these approaches as described in the previous section.
- 4.3.4 The journey time comparison between the 2030 DS and 2030 DM scenarios for the 07:00 – 08:00 period shows the following:
- a. Journey times in the DS scenario are forecast to be higher than the DM scenario across the majority of the routes, except for those routes originating from the A128 (S) and the A1013 (W) where journey times decrease in the DS scenario.
  - b. The journey time from the A13 (E) to the A1089 are forecast to increase more than the journey times from the A13 (E) to other destinations, as traffic travelling from the A13 (E) to the A1089 is required to travel through the Orsett Cock junction in the DS scenario.
  - c. Journey times in the DS scenario on the A13 mainline would be similar to the DM scenario in both directions.

**Table 4.8 2030 Journey Time Comparison, AM 08:00 – 09:00**

Route	Name	2016 Base			2030 DM			2030 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
1-->2	A128 Brentwood Rd (North) to A13 EB mainline	2,084	119	39.3	2,122	126	37.8	2,122	281	16.9
1-->3	A128 Brentwood Rd (North) to A1013 Stanford Rd (East)	1,381	112	27.6	1,396	121	25.7	1,396	273	11.4
1-->4	A128 Brentwood Rd (North) to A128 Brentwood Rd (South)	1,341	99	30.1	1,347	110	27.4	1,347	264	11.4
1-->5	A128 Brentwood Rd (North) to A1013 Stanford Rd (West)	1,555	119	29.3	1,533	129	26.6	1,535	290	11.8
1-->6	A128 Brentwood Rd (North) to A13 WB mainline	3,051	161	42.3	3,025	190	35.6	3,036	350	19.4
1-->8	A128 Brentwood Rd (North) to A13 WB off-slip to A1089	3,189	174	41.0	2,439	169	32.3	3,071	352	19.5
2-->1	A13 WB mainline to A128 Brentwood Rd (North)	2,343	157	33.4	2,360	160	32.9	2,359	187	28.2
2-->3	A13 WB mainline to A1013 Stanford Rd (East)	1,629	115	31.7	1,653	100	36.8	1,653	115	32.1
2-->4	A13 WB mainline to A128 Brentwood Rd (South)	1,588	103	34.7	1,605	89	40.4	1,605	106	34.0
2-->5	A13 WB mainline to A1013 Stanford Rd (West)	1,803	122	33.1	1,791	108	37.2	1,793	132	30.4
2-->6	A13 WB mainline to A13 WB mainline	3,177	118	60.1	3,177	117	60.8	3,178	122	58.3
2-->8	A13 WB mainline to A13 WB off-slip to A1089	3,315	131	56.7	3,315	130	57.1	3,329	194	38.4
3-->1	A1013 Stanford Rd (East) to A128 Brentwood Rd (North)	1,563	187	18.7	1,590	142	25.0	1,589	193	18.4
3-->2	A1013 Stanford Rd (East) to A13 EB mainline	2,176	196	24.8	2,215	160	31.0	2,216	224	22.1

Route	Name	2016 Base			2030 DM			2030 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
3-->4	A1013 Stanford Rd (East) to A128 Brentwood Rd (South)	807	133	13.6	835	71	26.5	835	112	16.7
3-->5	A1013 Stanford Rd (East) to A1013 Stanford Rd (West)	1,022	152	15.1	1,021	89	25.5	1,023	138	16.5
3-->6	A1013 Stanford Rd (East) to A13 WB mainline	2,517	194	29.0	2,513	151	37.3	2,523	198	28.5
3-->8	A1013 Stanford Rd (East) to A13 WB off-slip to A1089	2,655	207	28.7	1,927	130	33.3	2,559	200	28.6
4-->1	A128 Brentwood Rd (South) to A128 Brentwood Rd (North)	1,396	265	11.8	1,431	275	11.6	1,430	201	15.9
4-->2	A128 Brentwood Rd (South) to A13 EB mainline	2,010	274	16.4	2,056	293	15.7	2,057	232	19.9
4-->3	A128 Brentwood Rd (South) to A1013 Stanford Rd (East)	1,307	268	10.9	1,330	289	10.3	1,330	224	13.3
4-->5	A128 Brentwood Rd (South) to A1013 Stanford Rd (West)	856	230	8.3	862	223	8.7	864	146	13.3
4-->6	A128 Brentwood Rd (South) to A13 WB mainline	2,351	273	19.3	2,353	284	18.5	2,364	205	25.8
4-->8	A128 Brentwood Rd (South) to A13 WB off-slip to A1089	2,489	285	19.5	1,768	263	15.0	2,400	208	25.8
5-->1	A1013 Stanford Rd (West) to A128 Brentwood Rd (North)	1,453	133	24.4	1,465	265	12.3	1,474	288	11.5
5-->2	A1013 Stanford Rd (West) to A13 EB mainline	2,066	143	32.4	2,090	283	16.5	2,101	319	14.8
5-->3	A1013 Stanford Rd (West) to A1013 Stanford Rd (East)	1,363	136	22.5	1,364	279	10.9	1,375	311	9.9

Route	Name	2016 Base			2030 DM			2030 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
5-->4	A1013 Stanford Rd (West) to A128 Brentwood Rd (South)	1,323	123	24.0	1,315	267	11.0	1,326	301	9.8
5-->6	A1013 Stanford Rd (West) to A13 WB mainline	2,407	141	38.2	2,387	274	19.5	2,409	292	18.4
5-->8	A1013 Stanford Rd (West) to A13 WB off-slip to A1089	2,545	153	37.1	1,802	253	15.9	2,445	295	18.6
6-->1	A13 EB mainline to A128 Brentwood Rd (North)	2,767	160	38.8	2,770	154	40.4	2,775	155	40.0
6-->2	A13 EB mainline to A13 EB mainline	3,345	121	61.8	3,347	122	61.5	3,347	128	58.6
6-->3	A13 EB mainline to A1013 Stanford Rd (East)	2,678	162	37.0	2,669	167	35.8	2,676	179	33.5
6-->4	A13 EB mainline to A128 Brentwood Rd (South)	2,637	150	39.4	2,621	155	37.7	2,627	169	34.8
6-->5	A13 EB mainline to A1013 Stanford Rd (West)	2,852	169	37.8	2,807	174	36.0	2,815	195	32.3
6-->8	A13 EB mainline to A13 WB off-slip to A1089	4,485	224	44.8	3,713	214	38.7	4,351	257	37.8

- 4.3.5 The journey time comparison between the 2030 DM scenario and the 2016 Base Year for the 08:00 – 09:00 period shows the following:
- a. Journey times in the DM would be similar to the base year across the majority of the routes, except for those routes originating from the A1013 (W) where journey times increase on average by 132s due to the delays on the approach.
  - b. Journey times for those routes originating from the A1013 (E) on average decrease by 54s as the traffic signals at the A13 (E) approach assists with creating gaps in opposing traffic that contributes to the decrease in journey times.
- 4.3.6 The journey time comparison between the 2030 DS and 2030 DM scenarios for the 08:00 – 09:00 period shows the following:
- a. Journey times in the DS scenario would be higher than the DM scenario across the majority of the routes, except for those routes originating from the A128 (S) and the A1013 (W) where journey times decrease in the DS scenario.
  - b. The journey times originating from A128 (S) decrease on average by 84s as the introduction of traffic signals controlling the traffic contributes to the reduction in journey times.
  - c. Journey time from the A13 (E) to the A1089 is forecast to increase more than the journey times from the A13 (E) to other destinations, as traffic travelling from the A13 (E) to the A1089 are required to travel through the Orsett Cock junction in the DS scenario.
  - d. Journey times in the DS scenario on the A13 mainline would be similar to the DM scenario in both directions.



**Table 4.9 2030 Journey Time Comparison, PM 17:00 – 18:00**

Route	Name	2016 Base			2030 DM			2030 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
1-->2	A128 Brentwood Rd (North) to A13 EB mainline	2,084	153	30.5	2,122	134	35.5	2,122	196	24.2
1-->3	A128 Brentwood Rd (North) to A1013 Stanford Rd (East)	1,381	145	21.3	1,396	131	23.9	1,396	179	17.4
1-->4	A128 Brentwood Rd (North) to A128 Brentwood Rd (South)	1,341	130	23.0	1,347	115	26.1	1,347	167	18.1
1-->5	A128 Brentwood Rd (North) to A1013 Stanford Rd (West)	1,555	147	23.7	1,533	134	25.5	1,535	192	17.9
1-->6	A128 Brentwood Rd (North) to A13 WB mainline	3,051	190	36.0	3,025	185	36.7	3,036	244	27.8
1-->8	A128 Brentwood Rd (North) to A13 WB off-slip to A1089	3,189	202	35.2	2,439	164	33.3	3,071	251	27.4
2-->1	A13 WB mainline to A128 Brentwood Rd (North)	2,343	188	27.9	2,360	161	32.8	2,359	496	10.6
2-->3	A13 WB mainline to A1013 Stanford Rd (East)	1,628	150	24.2	1,653	103	35.8	1,653	404	9.2
2-->4	A13 WB mainline to A128 Brentwood Rd (South)	1,588	136	26.2	1,605	88	40.8	1,605	392	9.2
2-->5	A13 WB mainline to A1013 Stanford Rd (West)	1,803	152	26.6	1,791	107	37.5	1,793	417	9.6
2-->6	A13 WB mainline to A13 WB mainline	3,177	113	62.8	3,177	114	62.5	3,178	118	60.2
2-->8	A13 WB mainline to A13 WB off-slip to A1089	3,315	126	59.0	3,315	127	58.5	3,329	475	15.7
3-->1	A1013 Stanford Rd (East) to A128 Brentwood Rd (North)	1,563	122	28.6	1,590	139	25.6	1,589	218	16.3
3-->2	A1013 Stanford Rd (East) to A13 EB mainline	2,176	136	35.8	2,215	163	30.3	2,215	269	18.4

Route	Name	2016 Base			2030 DM			2030 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
3-->4	A1013 Stanford Rd (East) to A128 Brentwood Rd (South)	807	70	25.8	835	66	28.4	835	114	16.4
3-->5	A1013 Stanford Rd (East) to A1013 Stanford Rd (West)	1,022	86	26.6	1,021	85	27.0	1,023	139	16.5
3-->6	A1013 Stanford Rd (East) to A13 WB mainline	2,517	129	43.6	2,513	135	41.6	2,523	191	29.6
3-->8	A1013 Stanford Rd (East) to A13 WB off-slip to A1089	2,655	142	41.9	1,927	114	37.8	2,559	197	29.0
4-->1	A128 Brentwood Rd (South) to A128 Brentwood Rd (North)	1,397	98	31.9	1,431	136	23.6	1,430	177	18.1
4-->2	A128 Brentwood Rd (South) to A13 EB mainline	2,010	112	40.3	2,056	161	28.7	2,057	228	20.1
4-->3	A128 Brentwood Rd (South) to A1013 Stanford Rd (East)	1,307	104	28.1	1,330	157	18.9	1,330	211	14.1
4-->5	A128 Brentwood Rd (South) to A1013 Stanford Rd (West)	856	62	31.1	862	82	23.6	864	98	19.8
4-->6	A128 Brentwood Rd (South) to A13 WB mainline	2,351	105	50.2	2,354	132	39.8	2,365	150	35.3
4-->8	A128 Brentwood Rd (South) to A13 WB off-slip to A1089	2,489	117	47.4	1,768	111	35.5	2,400	156	34.3
5-->1	A1013 Stanford Rd (West) to A128 Brentwood Rd (North)	1,452	118	27.4	1,465	131	25.0	1,474	159	20.7
5-->2	A1013 Stanford Rd (West) to A13 EB mainline	2,065	132	34.9	2,090	156	30.0	2,101	211	22.3
5-->3	A1013 Stanford Rd (West) to A1013 Stanford Rd (East)	1,362	125	24.4	1,364	152	20.0	1,375	194	15.9

Route	Name	2016 Base			2030 DM			2030 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
5-->4	A1013 Stanford Rd (West) to A128 Brentwood Rd (South)	1,321	110	26.9	1,315	137	21.4	1,326	182	16.3
5-->6	A1013 Stanford Rd (West) to A13 WB mainline	2,406	125	42.9	2,387	127	41.9	2,409	132	40.8
5-->8	A1013 Stanford Rd (West) to A13 WB off-slip to A1089	2,544	138	41.2	1,802	106	37.9	2,445	139	39.4
6-->1	A13 EB mainline to A128 Brentwood Rd (North)	2,768	374	16.6	2,770	149	41.5	2,775	205	30.3
6-->2	A13 EB mainline to A13 EB mainline	3,345	267	28.1	3,347	124	60.4	3,347	165	45.3
6-->3	A13 EB mainline to A1013 Stanford Rd (East)	2,678	380	15.8	2,669	171	35.0	2,676	239	25.0
6-->4	A13 EB mainline to A128 Brentwood Rd (South)	2,637	365	16.2	2,621	155	37.7	2,627	227	25.9
6-->5	A13 EB mainline to A1013 Stanford Rd (West)	2,852	381	16.7	2,807	174	36.0	2,815	252	25.0
6-->8	A13 EB mainline to A13 WB off-slip to A1089	4,485	437	23.0	3,713	204	40.8	4,351	311	31.3

- 4.3.7 The journey time comparison between the 2030 DM scenario and 2016 base year for the 17:00 – 18:00 period shows the following:
- a. Journey times in the DM scenario are forecast to be lower than the base year across the majority of the routes, except for those routes originating from the A128 (S) where journey times increase on average by 30s.
  - b. Journey times for routes originating from the A13 (W) eastbound are forecast to reduce significantly by over 200 seconds due to widening of the A13 mainline in the DM scenario.
- 4.3.8 The journey time comparison between the 2030 DS and 2030 DM scenarios for the 17:00 – 18:00 period shows the following:
- a. Journey times in the DS scenario would be higher than the DM scenario across all routes due to the increased number of vehicles using the Orsett Cock junction.
  - b. Journey times of routes originating from the A13 (E) and the A128 (N) increase the most due to the delay on the approach to the junction. Journey times from the A13 (E) are forecast to increase by over 300s and the journey times from the A128 (N) increase by 147s on average.
- 4.3.9 Table 4.10 show a summary comparing the journey times for the 2016 Base Year, 2045 DM and 2045 DS for the AM and PM peak periods.

**Table 4.10 2045 Journey Time Comparison, AM 07:00 – 08:00**

Route	Name	2016 Base			2045 DM			2045 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
1-->2	A128 Brentwood Rd (North) to A13 EB mainline	2,084	109	42.8	2,122	127	37.4	2,122	282	16.8
1-->3	A128 Brentwood Rd (North) to A1013 Stanford Rd (East)	1,381	102	30.3	1,396	119	26.2	1,396	276	11.3
1-->4	A128 Brentwood Rd (North) to A128 Brentwood Rd (South)	1,341	90	33.3	1,347	108	27.8	1,347	265	11.4
1-->5	A128 Brentwood Rd (North) to A1013 Stanford Rd (West)	1,555	107	32.4	1,533	135	25.4	1,535	287	12.0
1-->6	A128 Brentwood Rd (North) to A13 WB mainline	3,051	152	45.0	3,025	260	26.0	3,036	348	19.5
1-->8	A128 Brentwood Rd (North) to A13 WB off-slip to A1089	3,189	164	43.5	2,439	238	22.9	3,072	352	19.5
2-->1	A13 WB mainline to A128 Brentwood Rd (North)	2,343	144	36.3	2,360	163	32.3	2,359	181	29.1
2-->3	A13 WB mainline to A1013 Stanford Rd (East)	1,629	101	36.1	1,653	101	36.8	1,653	111	33.3
2-->4	A13 WB mainline to A128 Brentwood Rd (South)	1,588	89	39.8	1,605	90	39.9	1,605	100	35.9
2-->5	A13 WB mainline to A1013 Stanford Rd (West)	1,803	106	37.9	1,791	116	34.4	1,793	122	32.9
2-->6	A13 WB mainline to A13 WB mainline	3,177	119	59.7	3,177	121	58.8	3,178	120	59.1
2-->8	A13 WB mainline to A13 WB off-slip to A1089	3,315	131	56.4	3,315	134	55.3	3,329	188	39.7
3-->1	A1013 Stanford Rd (East) to A128 Brentwood Rd (North)	1,563	151	23.1	1,590	157	22.7	1,589	191	18.6
3-->2	A1013 Stanford Rd (East) to A13 EB mainline	2,176	158	30.8	2,215	177	27.9	2,216	221	22.4

Route	Name	2016 Base			2045 DM			2045 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
3-->4	A1013 Stanford Rd (East) to A128 Brentwood Rd (South)	808	96	18.8	835	83	22.4	835	109	17.1
3-->5	A1013 Stanford Rd (East) to A1013 Stanford Rd (West)	1,022	113	20.2	1,021	110	20.8	1,023	131	17.4
3-->6	A1013 Stanford Rd (East) to A13 WB mainline	2,517	157	35.8	2,513	235	24.0	2,523	193	29.3
3-->8	A1013 Stanford Rd (East) to A13 WB off-slip to A1089	2,655	170	35.0	1,927	213	20.2	2,559	197	29.1
4-->1	A128 Brentwood Rd (South) to A128 Brentwood Rd (North)	1,397	128	24.4	1,431	353	9.1	1,430	298	10.8
4-->2	A128 Brentwood Rd (South) to A13 EB mainline	2,010	135	33.3	2,056	373	12.3	2,057	328	14.0
4-->3	A128 Brentwood Rd (South) to A1013 Stanford Rd (East)	1,307	128	22.9	1,330	365	8.1	1,331	322	9.3
4-->5	A128 Brentwood Rd (South) to A1013 Stanford Rd (West)	856	90	21.3	862	306	6.3	864	238	8.1
4-->6	A128 Brentwood Rd (South) to A13 WB mainline	2,351	134	39.2	2,354	431	12.2	2,365	300	17.6
4-->8	A128 Brentwood Rd (South) to A13 WB off-slip to A1089	2,489	147	38.0	1,768	409	9.7	2,400	304	17.7
5-->1	A1013 Stanford Rd (West) to A128 Brentwood Rd (North)	1,452	133	24.4	1,465	309	10.6	1,474	163	20.2
5-->2	A1013 Stanford Rd (West) to A13 EB mainline	2,066	140	32.9	2,090	329	14.2	2,101	194	24.3
5-->3	A1013 Stanford Rd (West) to A1013 Stanford Rd (East)	1,363	133	22.9	1,364	322	9.5	1,375	188	16.4

Route	Name	2016 Base			2045 DM			2045 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
5-->4	A1013 Stanford Rd (West) to A128 Brentwood Rd (South)	1,322	122	24.3	1,315	311	9.5	1,326	176	16.8
5-->6	A1013 Stanford Rd (West) to A13 WB mainline	2,407	139	38.6	2,387	387	13.8	2,409	166	32.5
5-->8	A1013 Stanford Rd (West) to A13 WB off-slip to A1089	2,545	152	37.5	1,802	365	11.0	2,445	170	32.2
6-->1	A13 EB mainline to A128 Brentwood Rd (North)	2,767	162	38.2	2,770	154	40.3	2,775	156	39.9
6-->2	A13 EB mainline to A13 EB mainline	3,345	121	62.0	3,347	124	60.5	3,347	134	55.8
6-->3	A13 EB mainline to A1013 Stanford Rd (East)	2,678	162	36.9	2,669	167	35.8	2,676	180	33.3
6-->4	A13 EB mainline to A128 Brentwood Rd (South)	2,637	150	39.2	2,621	156	37.6	2,627	169	34.8
6-->5	A13 EB mainline to A1013 Stanford Rd (West)	2,852	168	38.1	2,807	182	34.4	2,815	191	33.0
6-->8	A13 EB mainline to A13 WB off-slip to A1089	4,485	224	44.7	3,713	286	29.0	4,351	256	38.0

- 4.3.10 The journey time comparison between the 2045 DM scenario and the 2016 Base Year for the 07:00 – 08:00 period shows the following:
- a. Journey times in the DM are higher than the base year across the majority of the routes.
- 4.3.11 The journey time comparison between the 2045 DS and 2045 DM scenarios for the 07:00 – 08:00 period shows the following:
- a. Journey times in the DS scenario are forecast to be higher than the DM scenario across the majority of the routes, except for those routes originating from the A128 Brentwood Rd (S) and the A1013 Stanford Rd (W) where journey times decrease in the DS scenario.
  - b. The journey time from the A13 (E) to the A1089 are forecast to increase more than the journey times from the A13 (E) to other destinations, as traffic travelling from the A13 (E) to the A1089 is required to travel through the Orsett Cock junction in the DS scenario.
  - c. Journey times in the DS scenario on the A13 mainline would be similar to the DM scenario in both directions.



**Table 4.11 2045 Journey Time Comparison, AM 08:00 – 09:00**

Route	Name	2016 Base			2045 DM			2045 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
1-->2	A128 Brentwood Rd (North) to A13 EB mainline	2,084	119	39.3	2,122	131	36.2	2,122	478	9.9
1-->3	A128 Brentwood Rd (North) to A1013 Stanford Rd (East)	1,381	112	27.6	1,396	125	25.0	1,396	469	6.7
1-->4	A128 Brentwood Rd (North) to A128 Brentwood Rd (South)	1,341	99	30.1	1,347	113	26.6	1,347	458	6.6
1-->5	A128 Brentwood Rd (North) to A1013 Stanford Rd (West)	1,555	119	29.3	1,533	143	24.0	1,535	481	7.1
1-->6	A128 Brentwood Rd (North) to A13 WB mainline	3,051	161	42.3	3,025	212	31.9	3,036	543	12.5
1-->8	A128 Brentwood Rd (North) to A13 WB off-slip to A1089	3,189	174	41.0	2,439	191	28.6	3,072	547	12.6
2-->1	A13 WB mainline to A128 Brentwood Rd (North)	2,343	157	33.4	2,360	163	32.4	2,359	183	28.8
2-->3	A13 WB mainline to A1013 Stanford Rd (East)	1,629	115	31.7	1,653	103	36.1	1,653	114	32.4
2-->4	A13 WB mainline to A128 Brentwood Rd (South)	1,588	103	34.7	1,605	91	39.5	1,605	103	34.7
2-->5	A13 WB mainline to A1013 Stanford Rd (West)	1,803	122	33.1	1,791	121	33.2	1,793	126	31.7
2-->6	A13 WB mainline to A13 WB mainline	3,177	118	60.1	3,177	119	59.8	3,178	121	58.8
2-->8	A13 WB mainline to A13 WB off-slip to A1089	3,315	131	56.7	3,315	132	56.2	3,329	192	38.8
3-->1	A1013 Stanford Rd (East) to A128 Brentwood Rd (North)	1,563	187	18.7	1,590	164	21.7	1,589	225	15.8
3-->2	A1013 Stanford Rd (East) to A13 EB mainline	2,176	196	24.8	2,215	186	26.6	2,216	257	19.3

Route	Name	2016 Base			2045 DM			2045 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
3-->4	A1013 Stanford Rd (East) to A128 Brentwood Rd (South)	807	133	13.6	835	92	20.3	835	145	12.9
3-->5	A1013 Stanford Rd (East) to A1013 Stanford Rd (West)	1022	152	15.1	1,021	122	18.8	1,023	168	13.6
3-->6	A1013 Stanford Rd (East) to A13 WB mainline	2,517	194	29.0	2,513	191	29.4	2,523	229	24.6
3-->8	A1013 Stanford Rd (East) to A13 WB off-slip to A1089	2,655	207	28.7	1,927	170	25.4	2,559	233	24.5
4-->1	A128 Brentwood Rd (South) to A128 Brentwood Rd (North)	1,396	265	11.8	1,431	407	7.9	1,430	268	11.9
4-->2	A128 Brentwood Rd (South) to A13 EB mainline	2,010	274	16.4	2,056	429	10.7	2,057	301	15.3
4-->3	A128 Brentwood Rd (South) to A1013 Stanford Rd (East)	1,307	268	10.9	1,330	423	7.0	1,331	292	10.2
4-->5	A128 Brentwood Rd (South) to A1013 Stanford Rd (West)	856	230	8.3	862	364	5.3	864	211	9.1
4-->6	A128 Brentwood Rd (South) to A13 WB mainline	2,351	273	19.3	2,353	434	12.1	2,365	273	19.4
4-->8	A128 Brentwood Rd (South) to A13 WB off-slip to A1089	2,489	285	19.5	1,768	413	9.6	2,400	277	19.4
5-->1	A1013 Stanford Rd (West) to A128 Brentwood Rd (North)	1,453	133	24.4	1,464	281	11.7	1,474	258	12.8
5-->2	A1013 Stanford Rd (West) to A13 EB mainline	2,066	143	32.4	2,090	303	15.4	2,101	290	16.2
5-->3	A1013 Stanford Rd (West) to A1013 Stanford Rd (East)	1,363	136	22.5	1,364	297	10.3	1,375	282	10.9

Route	Name	2016 Base			2045 DM			2045 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
5-->4	A1013 Stanford Rd (West) to A128 Brentwood Rd (South)	1,323	123	24.0	1,315	285	10.3	1,326	271	11.0
5-->6	A1013 Stanford Rd (West) to A13 WB mainline	2,407	141	38.2	2,387	308	17.3	2,409	262	20.6
5-->8	A1013 Stanford Rd (West) to A13 WB off-slip to A1089	2,545	153	37.1	1,801	287	14.1	2,445	266	20.6
6-->1	A13 EB mainline to A128 Brentwood Rd (North)	2,767	160	38.8	2,770	155	40.1	2,775	159	39.0
6-->2	A13 EB mainline to A13 EB mainline	3,345	121	61.8	3,347	124	60.5	3,347	135	55.6
6-->3	A13 EB mainline to A1013 Stanford Rd (East)	2,678	162	37.0	2,669	171	35.0	2,676	183	32.7
6-->4	A13 EB mainline to A128 Brentwood Rd (South)	2,637	150	39.4	2,621	159	36.9	2,627	172	34.1
6-->5	A13 EB mainline to A1013 Stanford Rd (West)	2,852	169	37.8	2,807	189	33.3	2,815	195	32.3
6-->8	A13 EB mainline to A13 WB off-slip to A1089	4,485	224	44.8	3,713	237	35.1	4,351	261	37.4

- 4.3.12 The journey time comparison between the 2045 DM scenario and the 2016 Base Year for the 08:00 – 09:00 period shows the following:
- a. Journey times in the DM would be similar to the base year across the majority of the routes, except for those routes originating from the A1013 (W), A128 (N) and A128 (S) where journey times increase due to the delays on the approach.
  - b. Journey times for those routes originating from the A1013 (E) on average decrease by 24s as the traffic signals at the A13 (E) approach assists with creating gaps in opposing traffic that contributes to the decrease in journey times.
- 4.3.13 The journey time comparison between the 2045 DS and 2045 DM scenarios for the 08:00 – 09:00 period shows the following:
- a. Journey times in the DS scenario would be higher than the DM scenario across the majority of the routes, except for those routes originating from the A128 (S) and the A1013 (W) where journey times decrease in the DS scenario.
  - b. The journey times originating from A128 (S) decrease on average by 161s as the introduction of traffic signals controlling the traffic contributes to the reduction in journey times.
  - c. Journey time from the A13 (E) to the A1089 is forecast to increase, as traffic travelling from the A13 (E) to the A1089 are required to travel through the Orsett Cock junction in the DS scenario.
  - d. Journey time from the A128 (N) is forecast to increase on average by 343s in DS due to higher delays and congestions at the approach.
  - e. Journey times in the DS scenario on the A13 mainline would be similar to the DM scenario in both directions.

**Table 4.12 2045 Journey Time Comparison, PM 17:00 – 18:00**

Route	Name	2016 Base			2045 DM			2045 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
1-->2	A128 Brentwood Rd (North) to A13 EB mainline	2,084	153	30.5	2,122	138	34.3	2,122	428	11.1
1-->3	A128 Brentwood Rd (North) to A1013 Stanford Rd (East)	1,381	145	21.3	1,396	128	24.3	1,396	413	7.6
1-->4	A128 Brentwood Rd (North) to A128 Brentwood Rd (South)	1,341	130	23.0	1,347	113	26.6	1,347	402	7.5
1-->5	A128 Brentwood Rd (North) to A1013 Stanford Rd (West)	1,555	147	23.7	1,533	136	25.2	1,535	427	8.0
1-->6	A128 Brentwood Rd (North) to A13 WB mainline	3,051	190	36.0	3,025	185	36.6	3,036	480	14.1
1-->8	A128 Brentwood Rd (North) to A13 WB off-slip to A1089	3,189	202	35.2	2,439	164	33.3	3,071	486	14.1
2-->1	A13 WB mainline to A128 Brentwood Rd (North)	2,343	188	27.9	2,360	165	32.0	2,359	371	14.2
2-->3	A13 WB mainline to A1013 Stanford Rd (East)	1,628	150	24.2	1,653	106	34.8	1,653	261	14.2
2-->4	A13 WB mainline to A128 Brentwood Rd (South)	1,588	136	26.2	1,605	91	39.3	1,605	249	14.4
2-->5	A13 WB mainline to A1013 Stanford Rd (West)	1,803	152	26.6	1,791	114	35.1	1,793	274	14.6
2-->6	A13 WB mainline to A13 WB mainline	3,177	113	62.8	3,177	115	61.8	3,178	119	59.8
2-->8	A13 WB mainline to A13 WB off-slip to A1089	3,315	126	59.0	3,315	128	58.0	3,329	333	22.3
3-->1	A1013 Stanford Rd (East) to A128 Brentwood Rd (North)	1,563	122	28.6	1,590	144	24.7	1,589	235	15.1
3-->2	A1013 Stanford Rd (East) to A13 EB mainline	2,176	136	35.8	2,215	172	28.8	2,215	282	17.6

Route	Name	2016 Base			2045 DM			2045 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
3-->4	A1013 Stanford Rd (East) to A128 Brentwood Rd (South)	807	70	25.8	835	71	26.4	835	113	16.5
3-->5	A1013 Stanford Rd (East) to A1013 Stanford Rd (West)	1,022	86	26.6	1,021	94	24.4	1,023	138	16.5
3-->6	A1013 Stanford Rd (East) to A13 WB mainline	2,517	129	43.6	2,513	142	39.5	2,523	192	29.4
3-->8	A1013 Stanford Rd (East) to A13 WB off-slip to A1089	2,655	142	41.9	1,927	121	35.5	2,559	197	29.0
4-->1	A128 Brentwood Rd (South) to A128 Brentwood Rd (North)	1,397	98	31.9	1,431	201	16.0	1,430	267	12.0
4-->2	A128 Brentwood Rd (South) to A13 EB mainline	2,010	112	40.3	2,056	229	20.1	2,057	313	14.7
4-->3	A128 Brentwood Rd (South) to A1013 Stanford Rd (East)	1,307	104	28.1	1,330	219	13.6	1,331	299	9.9
4-->5	A128 Brentwood Rd (South) to A1013 Stanford Rd (West)	856	62	31.1	862	150	12.8	864	170	11.4
4-->6	A128 Brentwood Rd (South) to A13 WB mainline	2,351	105	50.2	2,354	199	26.5	2,365	223	23.7
4-->8	A128 Brentwood Rd (South) to A13 WB off-slip to A1089	2,489	117	47.4	1,768	178	22.2	2,400	229	23.4
5-->1	A1013 Stanford Rd (West) to A128 Brentwood Rd (North)	1,452	118	27.4	1,465	131	24.9	1,474	188	17.5
5-->2	A1013 Stanford Rd (West) to A13 EB mainline	2,065	132	34.9	2,090	159	29.3	2,101	234	20.1
5-->3	A1013 Stanford Rd (West) to A1013 Stanford Rd (East)	1,362	125	24.4	1,364	149	20.4	1,375	220	14.0

Route	Name	2016 Base			2045 DM			2045 DS		
		Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]	Distance [m]	JT [s]	Speed [mph]
5-->4	A1013 Stanford Rd (West) to A128 Brentwood Rd (South)	1,321	110	26.9	1,315	134	21.9	1,326	209	14.2
5-->6	A1013 Stanford Rd (West) to A13 WB mainline	2,406	125	42.9	2,387	130	41.1	2,409	144	37.4
5-->8	A1013 Stanford Rd (West) to A13 WB off-slip to A1089	2,544	138	41.2	1,802	109	37.1	2,445	150	36.5
6-->1	A13 EB mainline to A128 Brentwood Rd (North)	2,768	374	16.6	2,770	150	41.4	2,775	345	18.0
6-->2	A13 EB mainline to A13 EB mainline	3,345	267	28.1	3,347	125	60.0	3,347	173	43.2
6-->3	A13 EB mainline to A1013 Stanford Rd (East)	2,678	380	15.8	2,669	168	35.6	2,676	378	15.9
6-->4	A13 EB mainline to A128 Brentwood Rd (South)	2,637	365	16.2	2,621	153	38.4	2,627	366	16.1
6-->5	A13 EB mainline to A1013 Stanford Rd (West)	2,852	381	16.7	2,807	176	35.8	2,815	391	16.1
6-->8	A13 EB mainline to A13 WB off-slip to A1089	4,485	437	23.0	3,713	203	40.8	4,351	450	21.6

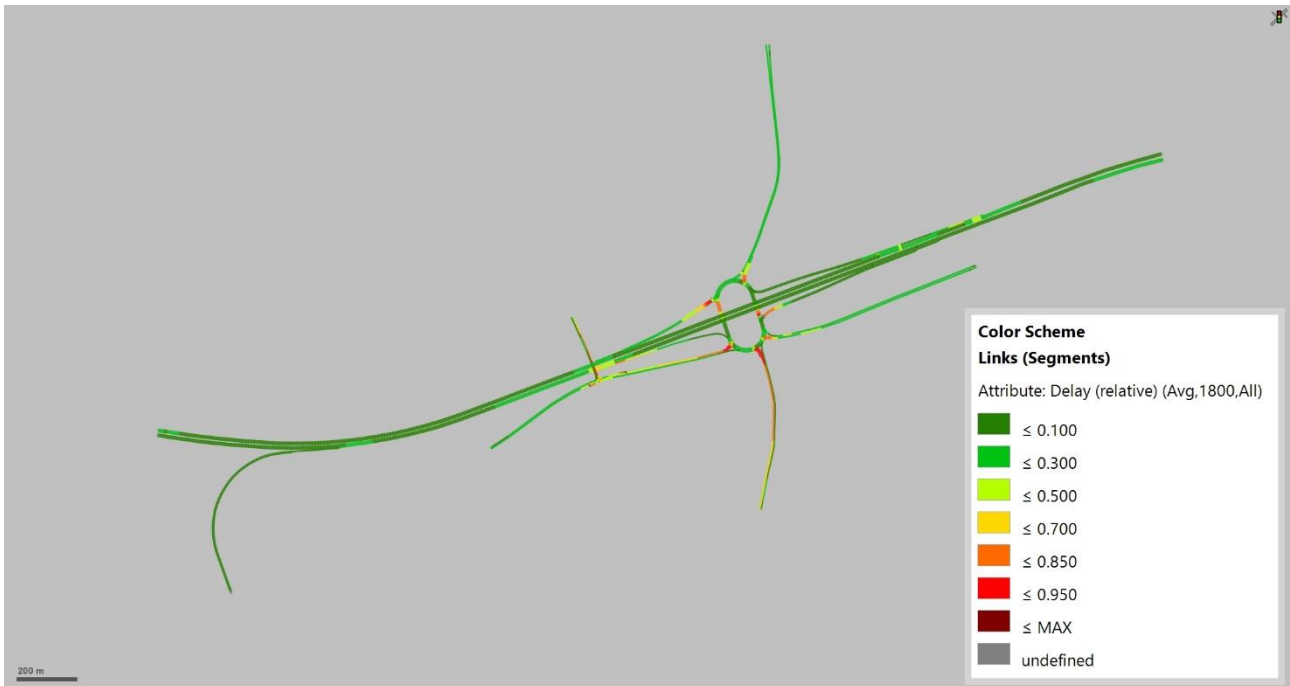
- 4.3.14 The journey time comparison between the 2045 DM scenario and 2016 base year for the 17:00 – 18:00 period shows the following:
- a. Journey times in the DM scenario are forecast to be similar to the base year across the majority of the routes, except for those routes originating from the A128 (S) where journey times increase on average by 96s.
  - b. Journey times for routes originating from the A13 (W) eastbound are forecast to reduce significantly by over 200 seconds due to widening of the A13 mainline in the DM scenario.
- 4.3.15 The journey time comparison between the 2045 DS and 2045 DM scenarios for the 17:00 – 18:00 period shows the following:
- a. Journey times in the DS scenario would be higher than the DM scenario across all routes due to the increased number of vehicles using the Orsett Cock junction.
  - b. Journey times of routes originating from the A13 (E) and the A128 (N) increase the most due to the delay on the approach to the junction. Journey times from the A13 (E) are forecast to increase by over 200s and the journey times from the A128 (N) increase by 295s on average.
  - c. Journey times in the DS scenario on the A13 mainline would be similar to the DM scenario in the westbound direction but increase slightly in the eastbound direction.

## 4.4 Relative delays

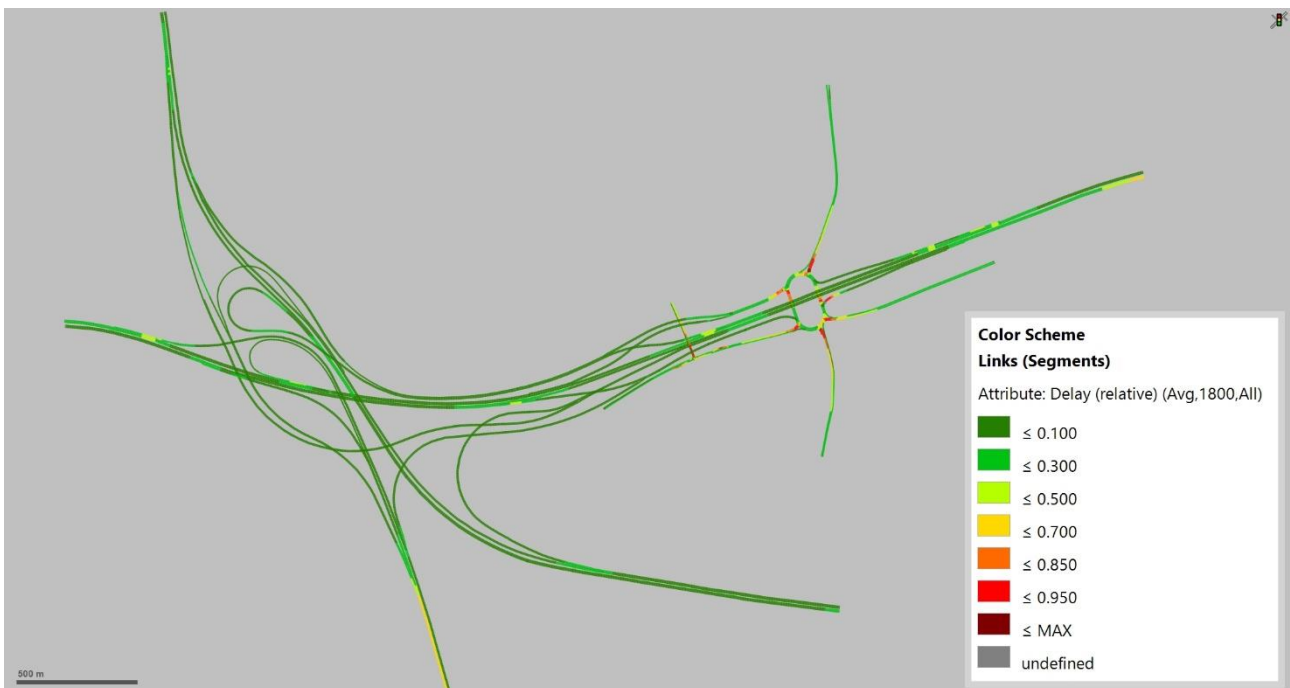
- 4.4.1 The relative delay in VISSIM is the total segment delay divided by the total segment travel time on a link, with the link made up of 10m length segments.
- 4.4.2 The 2030 relative delay plots on all links in the network are shown in Plate 4.2 to Plate 4.7. They provide a visual representation of the delays at the junctions and along the mainline.



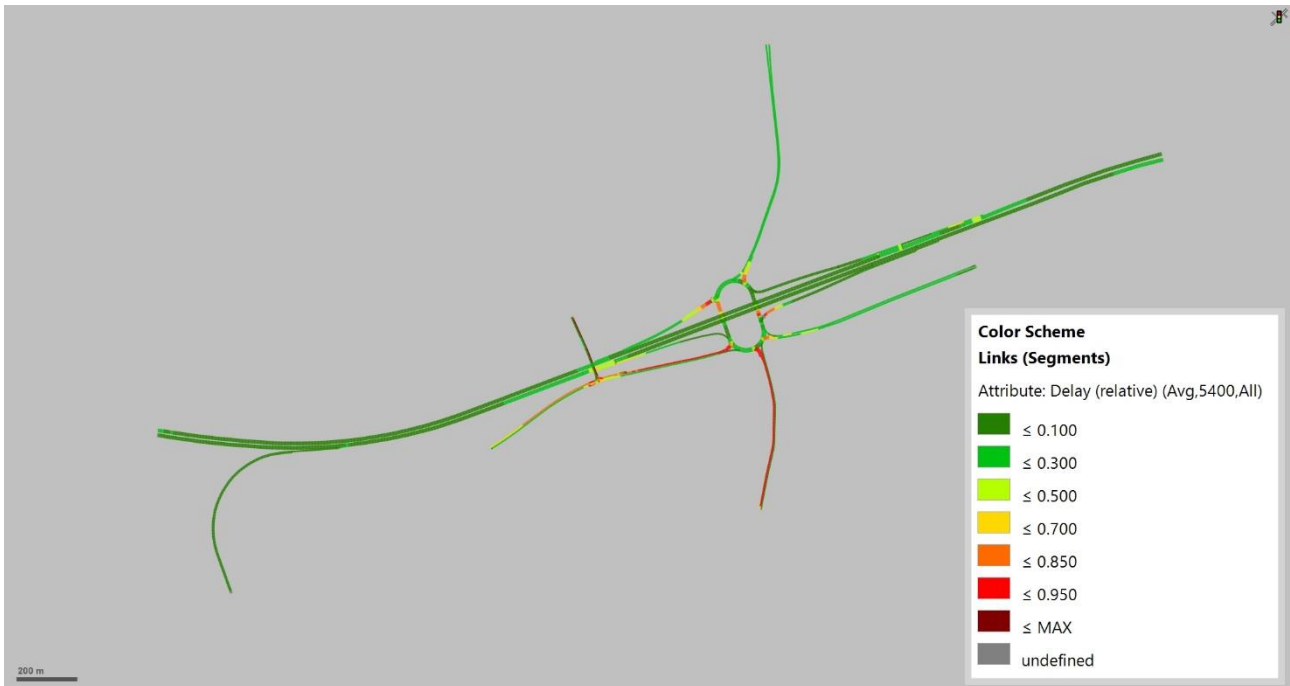
**Plate 4.2 Relative Delay Plot (2030 DM 07:00 – 08:00)**



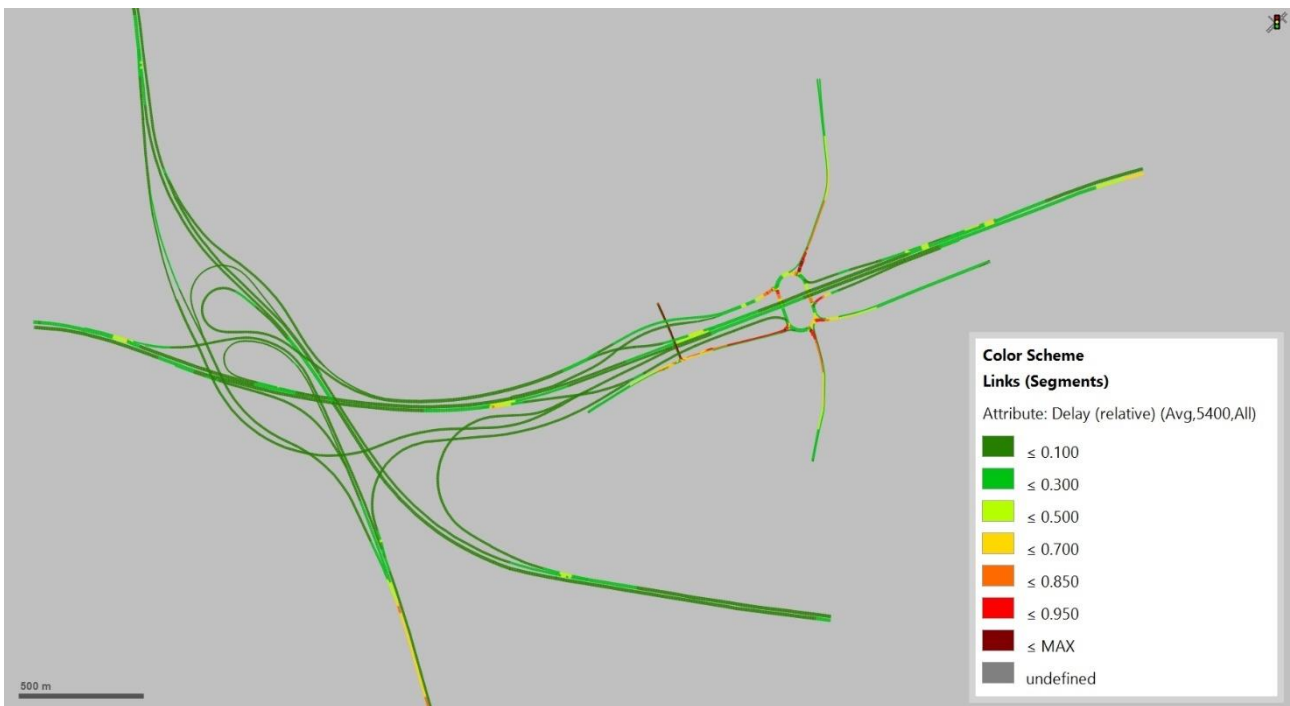
**Plate 4.3 Relative Delay Plot (2030 DS 07:00 – 08:00)**



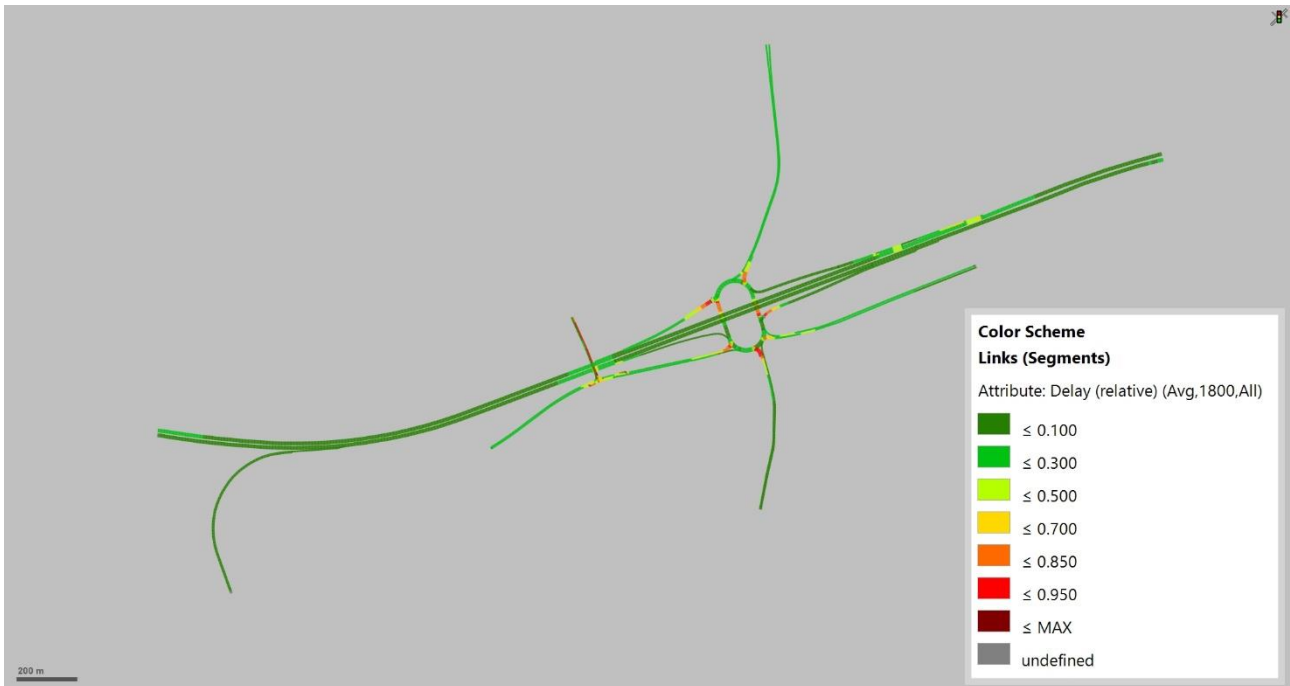
**Plate 4.4 Relative Delay Plot (2030 DM 08:00 – 09:00)**



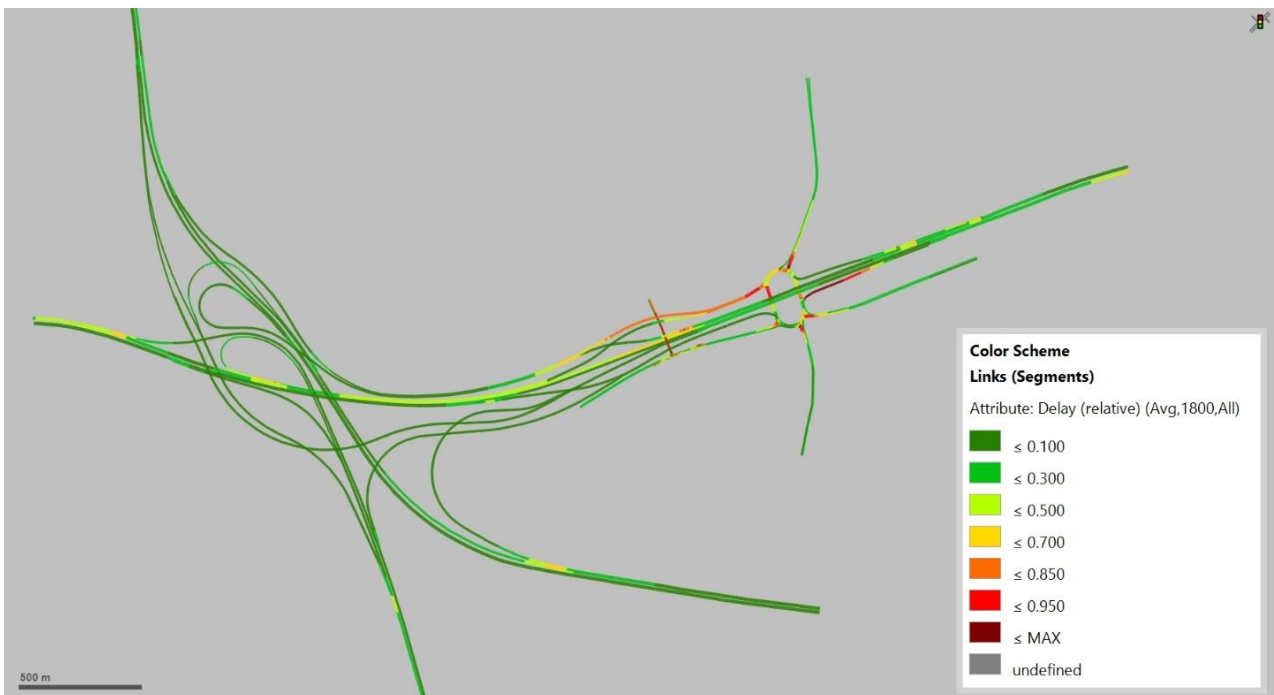
**Plate 4.5 Relative Delay Plot (2030 DS 08:00 – 09:00)**



**Plate 4.6 Relative Delay Plot (2030 DM 17:00 – 18:00)**



**Plate 4.7 Relative Delay Plot (2030 DS 17:00 – 18:00)**

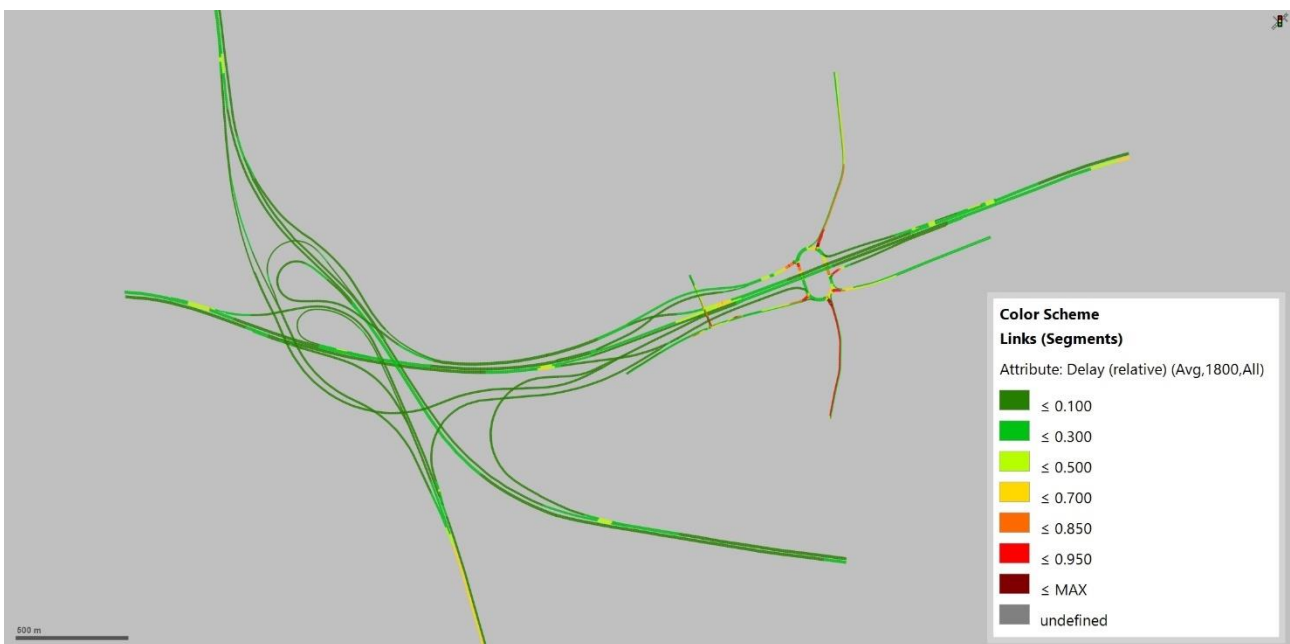


- 4.4.3 In addition to the delays at the Orsett Cock junction and the A1013 Stanford Road/ Rectory Road junction, which have been described in the previous sections, the plots also show that the traffic conditions of the A13 mainline are free-flowing in all peak periods.
- 4.4.4 Plate 4.3 and Plate 4.5 show that the 2030 DS scenario has some minor delays on the A1089 northbound before the diverge to the Project in the AM peak.
- 4.4.5 Plate 4.7 additionally shows some minor delays on the Project southbound before the diverge to the Orsett Cock junction and at the southbound merge with the A13 mainline.
- 4.4.6 The 2045 relative delay plots on all links in the network are shown in Plate 4.8 to Plate 4.13. They provide a visual representation of the delays at the junctions and along the mainline

**Plate 4.8 Relative Delay Plot (2045 DM 07:00 – 08:00)**



**Plate 4.9 Relative Delay Plot (2045 DS 07:00 – 08:00)**



**Plate 4.10 Relative Delay Plot (2045 DM 08:00 – 09:00)**



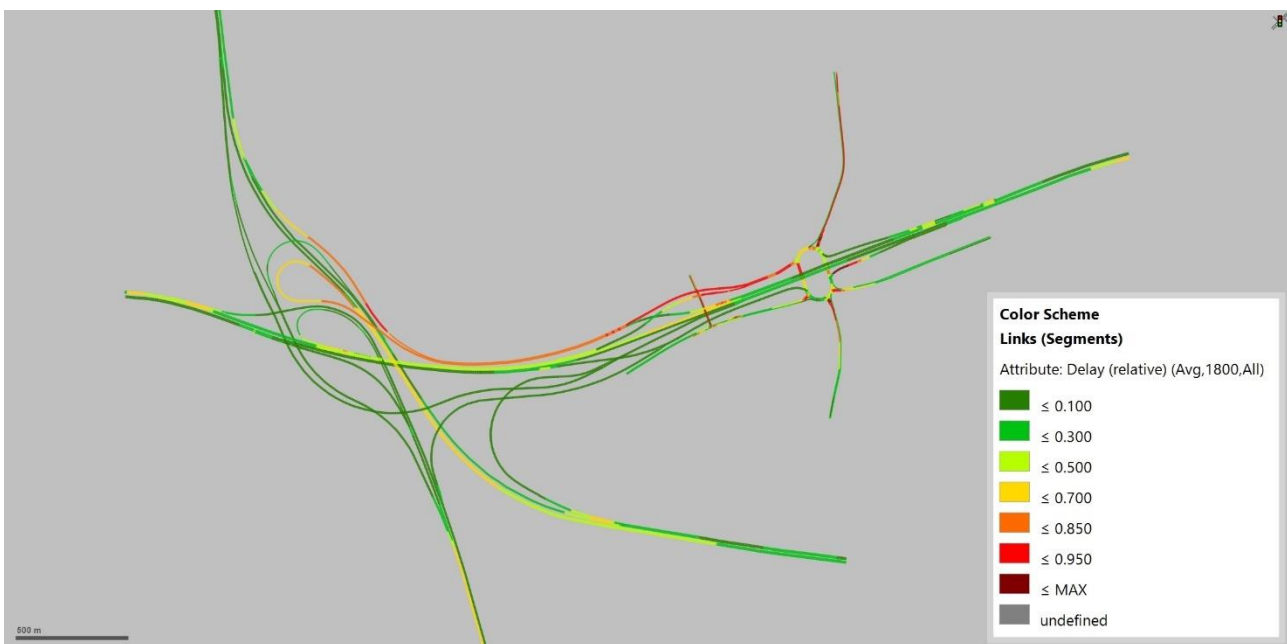
**Plate 4.11 Relative Delay Plot (2045 DS 08:00 – 09:00)**



**Plate 4.12 Relative Delay Plot (2045 DM 17:00 – 18:00)**



**Plate 4.13 Relative Delay Plot (2045 DS 17:00 – 18:00)**



- 4.4.7 The plots show that the traffic conditions of the A13 mainline are free-flowing in all peak periods.
- 4.4.8 A128 Brentwood Road (S) is forecast with long delays in the two AM peak hours in both DM and DS scenarios in 2045.
- 4.4.9 Plate 4.13 shows that the 2045 DS scenario has long delays on the A13 (W) approach extending to the Project.

## 5 Conclusions

- 5.1.1 This report describes the development of the 2030 and 2045 Do Minimum (DM) and the 2030 and 2045 Do Something (DS) VISSIM models of the Orsett Cock study area that includes the Orsett Cock junction. It also compares the results between the two models.
- 5.1.2 The DS models contain initial ideas on changes to improve conditions at the junction. Further improvements will be developed through detailed design and stakeholder engagement.
- 5.1.3 The analysis of the traffic conditions at the Orsett Cock junction shows that the A128 (S) and the A1013 (W) approaches are predicted to be over-saturated in DM scenarios (without the Project). The traffic conditions on these approaches improve slightly in DS scenarios (with the Project).
- 5.1.4 Overall delays and queueing are forecast to increase at the junction with the implementation of the Project in 2030 and 2045, particularly in the PM peak period with an increase in delays and queues in the 2030/2045 DS scenarios on the A13 (W), A128 (N), A128 (S) and A13 (E) approaches.
- 5.1.5 Analysis of the traffic conditions at the A1013 Stanford Road/ Rectory Road junction shows that Rectory Road is over-saturated in the 2030 DM scenario and the delays and queues increase in the 2030 DS scenarios due to the higher demand flow in the 2030 DS scenario and the removal of the right turn pocket on A1013 which reduces the gaps in traffic on the A1013 westbound for right turning vehicles from Rectory Road.



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<https://content.tfl.gov.uk/traffic-modelling-guidelines.pdf>

Transport for London (March 2017). Model Auditing Process (MAP) Version 3.5. Engineer Guide for Design Engineer (DE), Checking Engineer (CE) and Model Auditing Engineer (MAE).

<https://content.tfl.gov.uk/map-v3-5-engineer-guide.pdf>

AECOM (September 2016). A13 Widening – A13 / A128 Orsett Cock Roundabout Assessment of Proposed Layout with Capacity Improvements.

## Glossary

Term	Explanation
ANPR	Automatic Number Plate Recognition
ATC	Automatic Traffic Count
DCO	Development Consent Order - Means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects (NSIPs)
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges: A comprehensive manual which contains requirements, advice and other published documents relating to works on motorway and all-purpose trunk roads for which one of the Overseeing Organisations (National Highways, Transport Scotland, the Welsh Government or the Department for Regional Development (Northern Ireland)) is the highway authority. For the Lower Thames Crossing, the Overseeing Organisation is National Highways.
Do Minimum	A future year scenario which includes changes to the road network and planned development that is forecast to go ahead, but not the Lower Thames Crossing.
Do Something	A future year scenario which includes changes to the road network and planned development that is forecast to go ahead, and the Lower Thames Crossing.
EB	Eastbound
GEH	A formula used to compare two traffic volumes, named after its originator, Geoff E. Havers. It is similar to a chi-squared test.
HGV	Heavy Goods Vehicle
LGV	Light Goods Vehicle
LinSig	A Design and Assessment Tool for Traffic Signal Junctions and Urban Networks
LMVR	Local Model Validation Report
LTC	Lower Thames Crossing
NB	Northbound
OS	Ordnance Survey
PTV	German for Planning Transport and Traffic Software package
SATURN	Simulation and Assignment of Traffic to Urban Networks
SB	Southbound
TAG	Transport Analysis Guidance published by DfT
TfL	Transport for London - The integrated body responsible for London's transport system

Term	Explanation
VISSIM	Micro-simulation software developed by PTV. Verkehr In Städten - SIMulationsmodell (German for "Traffic in cities - simulation model)
WB	Westbound

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