Dartford Local Plan

Strategic transport modelling

Stage 4 – Local Plan mitigation modelling

On behalf of

DARTFORD BOROUGH COUNCIL

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Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address:
T: E:

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	Name	Position	Signature	Date
Prepared by:	Daniel Smith	Transport Planner		05-11-2021
Reviewed by:	Gary Heard	Director		01-12-2021
Approved by:	Gary Heard	Director		01-12-2021
For and on behalf of Stantec UK Limited				

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1 Introduction

1.1.1 Stantec has been appointed by Dartford Borough Council (DBC) to provide strategic modelling evidence in support of their emerging Local Plan. The current Dartford Local Plan comprises the Core Strategy 2011 and the Development Policies Plan 2017.

1.1.2 The Council is carrying out a review of its Local Plan, with a time horizon for the Local Plan of 2037. On current information, DBC considers that the existing permissions and identified locations will be largely capable of delivering the new homes and employment required to meet local housing and employment need. On this basis, considerations for the new Local Plan in this study predominantly relate to the intensity of development at growth locations, rather than reviewing alternative spatial distributions Borough-wide.

1.2 Dartford Cordon of the Lower Thames Area Model (DCLTAM)

1.2.1 DBC has been provided with the Dartford Cordon of the Lower Thames Area Model (DCLTAM) by National Highways (NH) (formerly Highways England). This model is the supplementary consultation version, which was provided to DBC during April 2020, and forms a key component of the Local Plan strategic transport modelling appointment.

1.2.2 Due to the new Local Plan identifying that an update of the current development strategy would provide a sustainable basis for addressing future need, with urban intensification at locations, Stantec's remit was to review and update the DCLTAM to create a base year model (see Stage 1 report) and forecast year model (see Stage 2a / 2b reports) and use this for Local Plan option testing (see Stage 3a and 3b reports).

1.2.3 The Stage 3b report relates to the output derived from the Stage 3 model, the Preferred Local Plan scenario compared to the Reference Case model.

1.2.4 At various stages, the transport modelling has been presented to, and discussed with, highway authority officers at KCC and NH during their undertaking. Comments provided by the highway officers have been responded to and have influenced the work that has been undertaken and, where appropriate, incorporated into the technical reports. This ensured that agreement was reached with the highway authorities on the methodology adopted for the transport modelling.

1.3 This document

1.3.1 The following Stage 4 report has been prepared to consider the output from the Stage 3 modelling with respect to the junctions it identifies that may require consideration for mitigation as Local Plan development comes forward. This document is structured in the following way.

- Section 2 considers the Stage 3 modelling output and how this provides input to the Stage 4 assessment.
- Section 3 reviews the M25 / A282 corridor junctions with respect to merge / diverge analysis.
- Section 4 reviews the A2 corridor junctions with respect to merge / diverge analysis.
- Section 5 reviews the Local Road Network with respect to those junctions identified within the Stage 3b report.
- Section 6 provides a summary

2 Stage 3b output and further analysis

2.1.1 The Preferred Local Plan scenario has an increased number of residential units and non residential floorspace when compared to the Reference Case scenario.

2.1.2 The Stage 3b report presents the assessment of the Preferred Local Plan option compared to the Reference Case and the subsequent findings with respect to the effect on the highway network.

2.1.3 The potential traffic generation from each scenario is calculated by multiplying the land use quanta associated with each modelled zone by the appropriate land use urban/suburban trip generation rate. This has been undertaken for morning and evening peak hours and with and without the Lower Thames Crossing (LTC) implemented. A 15% and 30% mode shift scenario have also been developed to test the impact of a higher modal shift on local trips from new development.

2.1.4 The assessment completed provides an overview of the traffic movements on both the strategic and local road networks within the Borough as a result of the various scenarios tested. The outputs allow identification of locations where the operation of particular junctions is expected to deteriorate as a result of the Local Plan scenario being considered and is hence valuable in determining locations where mitigation measures may be required.

2.1.5 However, it is also recognised by the Stage 3 modelling work that the use of the strategic LTAM model, to determine the location and magnitude of a scenario's effect, would need to be supplemented with more detailed modelling to confirm whether mitigation is indeed required at a specific location and the extent of that mitigation. It is also recognised that there are complexities associated with the both the strategic and local road networks within the Borough where more detailed modelling may be necessary, for example the possible interaction between junctions or the impact of constraints on the network.

2.2 Strategic Road Network (SRN)

2.2.1 With respect to the SRN, the Stage 3b report identifies the key findings as follows :

- M25 (A282) J1a – Further detailed studies of this junction may be necessary to demonstrate its ability to serve Reference Case and Preferred Local Plan development. This may require a detailed modelling exercise of this junction to be completed using stand alone junction modelling software or microsimulation modelling software.

- M25 (A282) J1b – It is concluded that the junction is predicted to operate within capacity under Reference Case conditions and that the addition of the Preferred Local Plan traffic, whilst increasing traffic flows, does not increase junction link Volume/Capacity ratio (V/C) or entry node V/C values greater than 100%. On this basis it is not anticipated that the implementation of the Local Plan would have a significantly detrimental effect on the operation of Junction 1b compared to the Reference Case.

- M25 (A282) J2 – It is concluded that the junction is predicted to generally operate within capacity under Reference Case conditions and that the addition of the Preferred Local Plan traffic, whilst increasing traffic flows, does not increase junction link V/C or entry node V/C values greater than 100%. The exception to this is the indication that the M25 southbound on-slip entry may exceed capacity during the morning peak hour under Reference Case and Local Plan scenarios. This may require a detailed modelling review as Local Plan development comes forward. Nevertheless, based upon the modelling completed, it is not anticipated that the implementation of the Local Plan would have a significantly detrimental effect on the operation of Junction 2 compared to the Reference Case.

- A2 / A2018 assessment - Further detailed studies of this junction may be necessary to demonstrate its ability to serve Reference Case and Preferred Local Plan development. This may require a detailed modelling exercise of this junction to be completed using stand alone junction modelling software or microsimulation modelling software.

- A2 Bean interchange - Further detailed studies of this junction may be necessary to demonstrate its ability to serve Reference Case and Preferred Local Plan development. This may require a detailed modelling exercise of this junction to be completed, specifically in relation to the south roundabout, using stand alone junction modelling software or microsimulation modelling software.

- A2 Ebbsfleet interchange – The findings show that the principal issue with this junction relates to the east roundabout access road serving the Ebbsfleet development. Further detailed studies of this junction will be carried out as the Ebbsfleet development comes forward to ensure that there is sufficient capacity at this junction to serve the planned development without causing significant adverse effect on the strategic road network.

- A2 Pepper Hill interchange - The junction is predicted to operate within capacity under Reference Case conditions and the addition of the Preferred Local Plan traffic, whilst increasing traffic flows, does not increase junction link V/C or entry node V/C values greater than 100%. On this basis, it is not anticipated that the implementation of the Local Plan would have a significantly detrimental effect on the operation of the junction compared to the Reference Case.

2.2.2 Detailed junction modelling of the above SRN junctions may be required as Local Plan development sites come forward. This will need to be determined through a scoping exercise with the highway authority, as is typical, and may require contemporary junction count and queue / delay data to be collected.

2.2.3 At this stage, and at the request of NH, it was considered appropriate to review the merge / diverge movements predicted by the Stage 3 strategic modelling work.

2.2.4 Demand flows have been extracted from the various model scenarios for different user classes and these are converted from their standard SATURN PCU output, to vehicles.

2.2.5 Document CD122 has been used to adjust the vehicle flows to allow for uphill gradients (using LIDAR data) and percentage of HGV flow. Table 3.9a and Table 3.9b (extracted from CD122) shown below, give the criteria for applying an adjustment factor to each flow group, with the exception of diverging traffic which does not have a factor applied to it.

Table 3.9a Adjustment factors for uphill gradients and for the presence of large goods vehicles on the mainline

% HGVs on mainline	Mainline gradient	
	<2%	≥2%
5	none	1.10
10	none	1.15
15	none	1.20
20	1.05	1.25

Table 3.9b Adjustment factors for uphill gradients and for the presence of large goods vehicles on merge connector roads

% HGVs on merge connector	Merge connector gradient		
	<2%	2% to 4%	>4%
5	-	1.15	1.30
10	-	1.20	1.35
15	1.05	1.25	1.40
20	1.10	1.30	1.45

2.2.6 By using the resulting factored flows, analysis is completed for each of the junction merges and diverges based upon Figures 3.12a/b and 3.26a/b in CD122 (see Appendix A). It has been assumed that the merge and diverge points for the A2 corridor are classified as All-Purpose, whilst the A282 and M25 are classified as motorway.

2.2.7 The layout categories in CD122 are also included at Appendix B for ease of reference.

2.3 Local Road Network (LRN)

2.3.1 With respect to the LRN (A roads and B roads) the Stage 3b report identifies a number of junctions that require further consideration and these are listed below.

2.3.2 Node based data was extracted from the models and presented for demand flow in PCUs, and turn based data has also been extracted, for each junction, with respect to the number of turns at each junction where V/C exceeds 100%.

2.3.3 Assessment criteria was adopted to categorise junctions based upon the overall modelled performance of the junction (turn based) with respect to the number of turns where V/C > 100%.

2.3.4 Each junction has been given a category number between 1 and 4 based upon the criteria. The categories assigned to each junction have been compared between scenarios. The objective of the comparison is to determine whether implementation of the Local Plan moves specific junctions from their Reference Case category, and whether this move means an operational benefit or disbenefit to that junction.

2.3.5 The tables presented indicate whether detailed modelling is likely to be required to assess local junctions, either for Reference Case performance or Local Plan performance.

2.3.6 The tables presented also indicate whether mitigation measures are potentially required (subject to detailed modelling) as a result of Local Plan implementation. The LRN junctions where this applies are listed below for reference as presented in the Stage 3b report.

- A206 / Galleon Boulevard
- A225 Lowfield Street / B2174 Princes Road
- A225 / Parsonage Lane
- A226 / Park Road
- A226 / Great Queen Street
- A226 / Cotton Lane
- A226 / Hillhouse Road
- A2018 Shepherds Lane / B2174 Princes Road

- B255 / Castlebridge Drive
- B255 / Mounts Road
- B255 Southbound to Bean
- B260 / Darenth Hill
- B262 / Springhead Road

3 M25 / A282 corridor

3.1 Junction 1a

3.1.1 The Stage 3 modelling demonstrates that the Reference Case includes the following entry turning movements where V/C > 100%

- A282 southbound entry during the evening peak hour without LTC.
- A282 northbound entry during the morning peak hour with LTC.
- A206 north entry during the morning peak hour with LTC.

3.1.2 The Stage 3 modelling demonstrates that the Preferred Local Plan scenario includes the following entry turning movements where V/C > 100%

- A282 southbound entry during the evening peak hour with and without LTC.
- A282 northbound entry during the morning and evening peak hour with LTC.
- A206 north entry during the morning peak hour with LTC.
- Rennie Drive entry during the morning peak hour with and without LTC.

3.1.3 Detailed modelling of this junction will be required as Local Plan development (that would affect its operation) comes forward, and this would be a matter for discussion during the pre-application scoping exercise. A review of merge and diverge movements has been completed for this junction as summarised below.

Northbound A282 merge

3.1.4 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	1,907	1,364	1,857	1,380
Preferred LP	1,927	1,389	1,854	1,432
Preferred LP + 15% shift	1,923	1,393	1,848	1,438
Preferred LP + 30% shift	1,922	1,394	1,847	1,439

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	1,550	1,146	1,498	1,333
Preferred LP	1,535	1,198	1,534	1,338
Preferred LP + 15% shift	1,535	1,199	1,530	1,341
Preferred LP + 30% shift	1,528	1,206	1,526	1,345

3.1.5 Transferring the above traffic flows on to CDD122 Figure 3.12b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	2	2	1
Reference	#	#	2	2	2
Preferred LP	#	#	2	2	2
Preferred LP + 15% shift	#	#	2	2	2
Preferred LP + 30% shift	#	#	2	2	2

 # indicates areas of uncertainty and the choice depends on the upstream and downstream provision and the ability for the mainline to accept the flows from the merge.

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	2	2	1
Reference	D	D	1	2	1
Preferred LP	D	D	1	2	1
Preferred LP + 15% shift	D	D	1	2	1
Preferred LP + 30% shift	D	D	1	2	1

3.1.6 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

Southbound A282 merge

3.1.7 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	7,927	1,722	7,807	1,812
Preferred LP	7,944	2,006	7,872	1,949
Preferred LP + 15% shift	7,937	1,969	7,824	1,933
Preferred LP + 30% shift	7,937	1,959	7,824	1,901

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,619	2,238	6,151	2,373
Preferred LP	6,642	2,339	6,164	2,451
Preferred LP + 15% shift	6,631	2,326	6,150	2,413
Preferred LP + 30% shift	6,629	2,229	6,149	2,389

3.1.8 Transferring the above traffic flows on to CDD122 Figure 3.12b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP + 15% shift	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP + 30% shift	EXCEEDS*	EXCEEDS*	0	0	0

** exceeds the limit of Figure 3.12b in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	E	E	4	5	2
Preferred LP	E	E	4	5	2
Preferred LP + 15% shift	E	E	4	5	2
Preferred LP + 30% shift	E	E	4	5	2

3.1.9 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

Northbound A282 diverge

3.1.10 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,210	1,551	5,730	1,525
Preferred LP	6,274	1,557	5,759	1,757
Preferred LP + 15% shift	6,270	1,537	5,753	1,713

Preferred LP + 30% shift	6,269	1,516	5,752	1,694

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,696	1,871	4,675	1,776
Preferred LP	4,718	1,891	4,736	1,865
Preferred LP + 15% shift	4,717	1,882	4,732	1,852
Preferred LP + 30% shift	4,711	1,875	4,728	1,838

3.1.11 Transferring the above traffic flows on to CDD122 Figure 3.26b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	D	D	5	4	2
Preferred LP	D	D	5	4	2
Preferred LP + 15% shift	D	D	5	4	2
Preferred LP + 30% shift	D	D	5	4	2

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	D	D	4	3	2
Preferred LP	D	D	4	3	2
Preferred LP + 15% shift	D	D	4	3	2
Preferred LP + 30% shift	D	D	4	3	2

3.1.12 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

Southbound A282 diverge

3.1.13 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	7,927	1,285	7,807	1,383
Preferred LP	7,944	1,323	7,872	1,402
Preferred LP + 15% shift	7,937	1,328	7,824	1,442
Preferred LP + 30% shift	7,937	1,328	7,824	1,442

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,619	1,417	6,151	1,200
Preferred LP	6,642	1,440	6,164	1,249
Preferred LP + 15% shift	6,631	1,449	6,150	1,261
Preferred LP + 30% shift	6,629	1,450	6,149	1,262

3.1.14 Transferring the above traffic flows on to CDD122 Figure 3.26b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	2
Reference	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP + 15% shift	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP + 30% shift	EXCEEDS*	EXCEEDS*	0	0	0

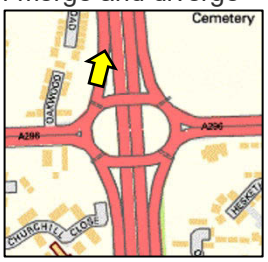
** exceeds the limit of Figure 3.26b in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	2
Reference	D	C	5	4	2
Preferred LP	D	C	5	4	2
Preferred LP + 15% shift	D	C	5	4	2
Preferred LP + 30% shift	D	C	5	4	2

3.1.15 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

3.2 Junction 1b

3.2.1 The Stage 3 modelling demonstrates that the Reference Case and Local Plan Scenarios do not include any entry turning movements where V/C > 100%. A review of merge and diverge movements has been completed for this junction as summarised below.



Northbound A282 merge

3.2.2 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,429	1,343	5,957	1,298
Preferred LP	6,505	1,337	6,137	1,447
Preferred LP + 15% shift	6,481	1,336	6,097	1,438
Preferred LP + 30% shift	6,465	1,330	6,083	1,431

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,661	906	5,022	1,428
Preferred LP	5,689	920	5,212	1,389
Preferred LP + 15% shift	5,681	918	5,204	1,380
Preferred LP + 30% shift	5,671	961	5,201	1,366

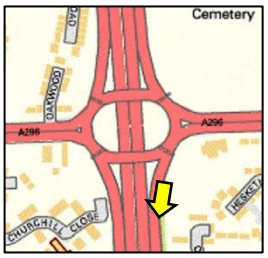
3.2.3 Transferring the above traffic flows on to CDD122 Figure 3.12b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	D	D	4	5	1
Preferred LP	D	E	4	5	2
Preferred LP + 15% shift	D	E	4	5	2
Preferred LP + 30% shift	D	E	4	5	2

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	B	E	4	4	2
Preferred LP	B	E	4	4	2
Preferred LP + 15% shift	B	E	4	4	2
Preferred LP + 30% shift	B	E	4	4	2

3.2.4 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario in the "with LTC" scenario.

3.2.5 With respect to the "no LTC" scenario, the PM category changes from D to E when the Local Plan is implemented. This is on the basis that the Reference Case and Local Plan scenarios are both borderline D and E.



Southbound A282 merge

3.2.6 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	843	1,404	800	865
Preferred LP	918	1,507	813	967
Preferred LP + 15% shift	919	1,482	813	945
Preferred LP + 30% shift	922	1,476	813	925

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	936	1,137	908	987
Preferred LP	1,002	1,153	919	1,033
Preferred LP + 15% shift	991	1,142	919	1,038
Preferred LP + 30% shift	986	1,248	919	1,040

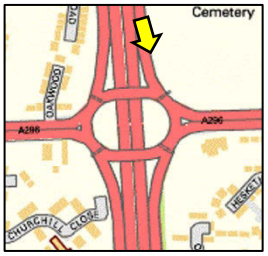
3.2.7 Transferring the above traffic flows on to CDD122 Figure 3.12b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	D	D	1	2	1
Reference	UNDER*	D	1	2	1
Preferred LP	UNDER*	D	1	2	1
Preferred LP + 15% shift	UNDER*	D	1	2	1
Preferred LP + 30% shift	UNDER*	D	1	2	1

** Flows are less than those shown on Figure 3.12b in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	D	D	1	2	1
Reference	D	D	1	2	1
Preferred LP	D	D	1	2	1
Preferred LP + 15% shift	D	D	1	2	1
Preferred LP + 30% shift	D	D	1	2	1

3.2.8 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.



Southbound A282 diverge

3.2.9 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	7,463	558	7,509	573
Preferred LP	7,691	573	7,618	566
Preferred LP + 15% shift	7,658	571	7,568	563
Preferred LP + 30% shift	7,653	568	7,543	560

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,768	571	6,280	824
Preferred LP	6,857	582	6,402	777
Preferred LP + 15% shift	6,840	579	6,333	803

Preferred LP + 30% shift	6,836	576	6,306	809

3.2.10 Transferring the above traffic flows on to CDD122 Figure 3.26b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	A	A	5	5	1
Preferred LP	A	A	5	5	1
Preferred LP + 15% shift	A	A	5	5	1
Preferred LP + 30% shift	A	A	5	5	1

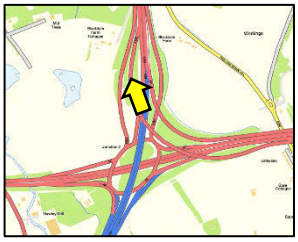
Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	C	A	5	4	1
Preferred LP	C	C	5	4	1
Preferred LP + 15% shift	C	A	5	4	1
Preferred LP + 30% shift	C	A	5	4	1

3.2.11 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario in the “no LTC” scenario.

3.2.12 With respect to the “with LTC” scenario, the PM category changes from A to C when the Local Plan is implemented. This category reverts back to category A when the 15% and 30% mode shift scenarios are considered.

3.3 Junction 2

3.3.1 The Stage 3 modelling demonstrates that the Reference Case and Local Plan Scenarios do not include any entry turning movements where V/C > 100%. A review of merge and diverge movements has been completed for this junction as summarised below.



Northbound A282 merge (from A2 filter)

3.3.2 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,193	2,123	4,225	1,818

Preferred LP	4,212	2,181	4,266	1,965
Preferred LP + 15% shift	4,205	2,164	4,286	1,901
Preferred LP + 30% shift	4,209	2,144	4,301	1,871

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,534	1,184	4,166	899
Preferred LP	4,556	1,190	4,252	1,008
Preferred LP + 15% shift	4,560	1,177	4,280	970
Preferred LP + 30% shift	4,560	1,222	4,293	954

3.3.3 Transferring the above traffic flows on to CDD122 Figure 3.12b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	D	D	4	3	1
Reference	E	E	3	4	2
Preferred LP	E	E	3	4	2
Preferred LP + 15% shift	E	E	3	4	2
Preferred LP + 30% shift	E	E	3	4	2

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	D	D	4	3	1
Reference	D	B	3	4	1
Preferred LP	D	B	3	4	1
Preferred LP + 15% shift	D	B	3	4	1
Preferred LP + 30% shift	D	B	3	4	1

3.3.4 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

Northbound A282 merge (from roundabout)

3.3.5 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,316	94	3,904	370
Preferred LP	4,178	39	3,974	336
Preferred LP + 15% shift	4,177	32	3,988	343
Preferred LP + 30% shift	4,176	37	3,992	356

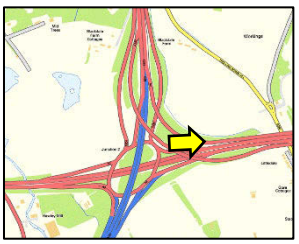
Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	3,754	935	3,686	600
Preferred LP	3,815	890	3,729	654
Preferred LP + 15% shift	3,819	889	3,729	688
Preferred LP + 30% shift	3,823	847	3,738	693

3.3.6 Transferring the above traffic flows on to CDD122 Figure 3.12b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	A	A	3	3	1
Preferred LP	A	A	3	3	1
Preferred LP + 15% shift	A	A	3	3	1
Preferred LP + 30% shift	A	A	3	3	1

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	B	A	3	3	1
Preferred LP	B	A	3	3	1
Preferred LP + 15% shift	B	A	3	3	1
Preferred LP + 30% shift	A	A	3	3	1

3.3.7 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.



Eastbound A2 merge (from roundabout)

3.3.8 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	3,377	1,590	4,351	1,512
Preferred LP	3,514	1,598	4,407	1,581
Preferred LP + 15% shift	3,518	1,591	4,403	1,556
Preferred LP + 30% shift	3,522	1,586	4,399	1,540

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	3,350	1,647	4,460	1,675
Preferred LP	3,480	1,684	4,557	1,691
Preferred LP + 15% shift	3,482	1,674	4,528	1,697
Preferred LP + 30% shift	3,485	1,671	4,521	1,700

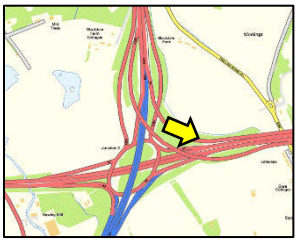
3.3.9 Transferring the above traffic flows on to CDD122 Figure 3.12b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	3	3	1
Reference	E	E	3	4	2
Preferred LP	E	E	3	4	2
Preferred LP + 15% shift	E	E	3	4	2
Preferred LP + 30% shift	E	E	3	4	2

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	3	3	1
Reference	E	E	3	4	2

Preferred LP	E	E	3	4	2
Preferred LP + 15% shift	E	E	3	4	2
Preferred LP + 30% shift	E	E	3	4	2

3.3.10 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.



Eastbound A2 merge (from M25)

3.3.11 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,626	1,996	6,742	2,713
Preferred LP	5,791	2,085	6,886	2,784
Preferred LP + 15% shift	5,789	2,039	6,853	2,727
Preferred LP + 30% shift	5,788	2,029	6,830	2,697

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,656	896	6,749	1,396
Preferred LP	5,846	793	6,874	1,486
Preferred LP + 15% shift	5,838	763	6,847	1,403
Preferred LP + 30% shift	5,837	755	6,843	1,370

3.3.12 Transferring the above traffic flows on to CDD122 Figure 3.12b results in the layout outputs summarised in the table below.

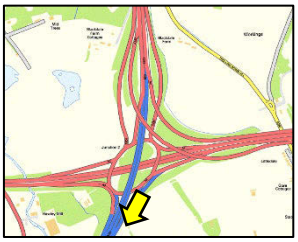
Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	E	E	3	4	2
Reference	E	EXCEEDS*	4	5	2
Preferred LP	E	EXCEEDS*	4	5	2
Preferred LP + 15% shift	E	EXCEEDS*	4	5	2
Preferred LP + 30% shift	E	EXCEEDS*	4	5	2

** exceeds the limit of Figure 3.12b in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	E	E	3	4	2
Reference	D	EXCEEDS*	4	5	1
Preferred LP	D	EXCEEDS*	4	5	1
Preferred LP + 15% shift	D	EXCEEDS*	4	5	1
Preferred LP + 30% shift	D	EXCEEDS*	4	5	1

** exceeds the limit of Figure 3.12b in CD122*

3.3.13 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.



Southbound M25 merge

3.3.14 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,966	3,591	4,538	2,988
Preferred LP	5,043	3,652	4,578	3,077
Preferred LP + 15% shift	5,047	3,648	4,573	3,083
Preferred LP + 30% shift	5,047	3,648	4,573	3,082

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,032	2,987	4,208	3,043
Preferred LP	5,164	2,994	4,245	3,136
Preferred LP + 15% shift	5,183	2,976	4,245	3,136
Preferred LP + 30% shift	5,191	2,968	4,246	3,135

3.3.15 Transferring the above traffic flows on to CDD122 Figure 3.12b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	E	E	3	4	2
Reference	F	F	3	5	2

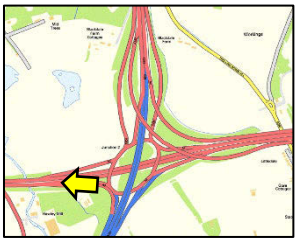
Preferred LP	EXCEEDS*	F	3	5	2
Preferred LP + 15% shift	EXCEEDS*	F	3	5	2
Preferred LP + 30% shift	EXCEEDS*	F	3	5	2

** exceeds the limit of Figure 3.12b in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	E	E	3	4	2
Reference	F	F	3	5	2
Preferred LP	F	F	3	5	2
Preferred LP + 15% shift	F	F	3	5	2
Preferred LP + 30% shift	F	F	3	5	2

3.3.16 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario for the "with LTC" scenario.

3.3.17 With respect to the "no LTC" scenario, the AM category changes from F to "Exceeds" when the Local Plan is implemented. This is on the basis that the Reference Case and Local Plan scenarios are both borderline F and "Exceeds".



Westbound A2 merge

3.3.18 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,926	2,060	3,675	1,878
Preferred LP	5,013	2,153	3,798	1,899
Preferred LP + 15% shift	5,004	2,160	3,796	1,900
Preferred LP + 30% shift	4,996	2,167	3,798	1,898

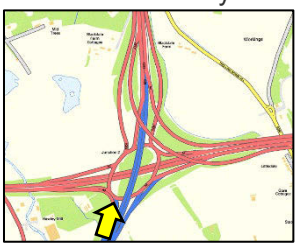
Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,809	2,095	3,781	1,947
Preferred LP	4,873	2,231	3,903	1,967
Preferred LP + 15% shift	4,863	2,236	3,902	1,967
Preferred LP + 30% shift	4,860	2,236	3,902	1,963

3.3.19 Transferring the above traffic flows on to CDD122 Figure 3.12b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	2
Reference	E	E	4	5	2
Preferred LP	E	E	4	5	2
Preferred LP + 15% shift	E	E	4	5	2
Preferred LP + 30% shift	E	E	4	5	2

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	2
Reference	E	E	4	5	2
Preferred LP	E	E	4	5	2
Preferred LP + 15% shift	E	E	4	5	2
Preferred LP + 30% shift	E	E	4	5	2

3.3.20 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.



Northbound M25 diverge

3.3.21 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	2,581	4,111	2,722	3,904
Preferred LP	2,600	4,178	2,775	3,974
Preferred LP + 15% shift	2,601	4,177	2,761	3,988
Preferred LP + 30% shift	2,602	4,176	2,757	3,992

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	2,529	3,754	2,683	3,686
Preferred LP	2,555	3,815	2,763	3,729
Preferred LP + 15% shift	2,551	3,819	2,762	3,729
Preferred LP + 30% shift	2,547	3,823	2,753	3,738

3.3.22 Transferring the above traffic flows on to CDD122 Figure 3.26b results in the layout outputs summarised in the table below.

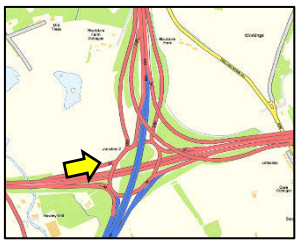
Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	C	C	4	3	3
Reference	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP + 15% shift	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP + 30% shift	EXCEEDS*	EXCEEDS*	0	0	0

** exceeds the limit of Figure 3.26b in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	C	C	4	3	3
Reference	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP + 15% shift	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP + 30% shift	EXCEEDS*	EXCEEDS*	0	0	0

** exceeds the limit of Figure 3.26b in CD122*

3.3.23 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.



Eastbound A2 diverge

3.3.24 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	3,377	2,134	4,351	2,109
Preferred LP	3,514	2,118	4,407	2,262
Preferred LP + 15% shift	3,518	2,112	4,403	2,262
Preferred LP + 30% shift	3,522	2,107	4,399	2,263

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	3,350	2,140	4,460	2,151

Preferred LP	3,480	2,126	4,557	2,268
Preferred LP + 15% shift	3,482	2,122	4,528	2,296
Preferred LP + 30% shift	3,485	2,117	4,521	2,298

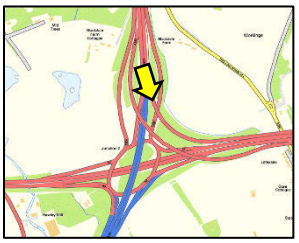
3.3.25 Transferring the above traffic flows on to CDD122 Figure 3.26b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	2
Reference	D	E	5	3	2
Preferred LP	D	E	5	3	2
Preferred LP + 15% shift	D	E	5	3	2
Preferred LP + 30% shift	D	E	5	3	2

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	2
Reference	D	E	5	3	2
Preferred LP	D	E	5	3	2
Preferred LP + 15% shift	D	E	5	3	2
Preferred LP + 30% shift	D	E	5	3	2

3.3.26 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

Southbound M25 diverge to A2 eastbound



3.3.27 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	1,612	1,535	2,170	2,170
Preferred LP	1,684	1,604	2,227	2,227
Preferred LP + 15% shift	1,647	1,568	2,182	2,182
Preferred LP + 30% shift	1,639	1,561	2,157	2,157

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	717	717	1,164	1,164
Preferred LP	641	610	1,238	1,238
Preferred LP + 15% shift	616	587	1,169	1,169
Preferred LP + 30% shift	610	581	1,142	1,142

3.3.28 Transferring the above traffic flows on to CDD122 Figure 3.26b results in the layout outputs summarised in the table below.

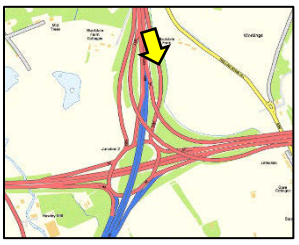
Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	3	3	2
Reference	UNDER*	D	3	2	2
Preferred LP	UNDER*	D	3	2	2
Preferred LP + 15% shift	UNDER*	D	3	2	2
Preferred LP + 30% shift	UNDER*	D	3	2	2

** Flows are less than those shown in Figure 3.26b in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	3	3	2
Reference	UNDER*	UNDER*	0	0	0
Preferred LP	UNDER*	UNDER*	0	0	0
Preferred LP + 15% shift	UNDER*	UNDER*	0	0	0
Preferred LP + 30% shift	UNDER*	UNDER*	0	0	0

** Flows are less than those shown in Figure 3.26b in CD122*

3.3.29 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.



Southbound M25 diverge to roundabout

3.3.30 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,578	843	6,708	800

Preferred LP	6,727	918	6,805	813
Preferred LP + 15% shift	6,694	919	6,755	813
Preferred LP + 30% shift	6,686	922	6,731	813

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,785	936	5,372	908
Preferred LP	5,805	1,002	5,483	919
Preferred LP + 15% shift	5,799	991	5,414	919
Preferred LP + 30% shift	5,801	986	5,387	919

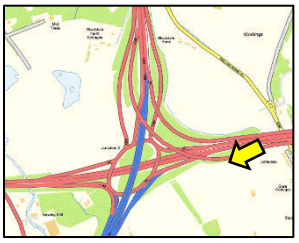
3.3.31 Transferring the above traffic flows on to CDD122 Figure 3.26b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	C	C	4	3	1
Reference	C	C	5	4	1
Preferred LP	C	C	5	4	1
Preferred LP + 15% shift	C	C	5	4	1
Preferred LP + 30% shift	C	C	5	4	1

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	C	C	4	3	1
Reference	A	C	4	4	1
Preferred LP	A	A	4	4	1
Preferred LP + 15% shift	A	A	4	4	1
Preferred LP + 30% shift	A	C	4	4	1

3.3.32 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario for the “no LTC” scenario.

3.3.33 With respect to the "with LTC" scenario, the PM category changes from C to A when the Local Plan is implemented and reverts back to C at 30% mode shift.



Westbound A2 diverge to M25 northbound

3.3.34 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,852	1,930	5,359	1,731
Preferred LP	6,922	1,983	5,527	1,872
Preferred LP + 15% shift	6,922	1,967	5,528	1,811
Preferred LP + 30% shift	6,917	1,949	5,536	1,782

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,766	1,127	5,660	856
Preferred LP	6,845	1,133	5,865	960
Preferred LP + 15% shift	6,837	1,121	5,849	924
Preferred LP + 30% shift	6,837	1,111	5,836	908

3.3.35 Transferring the above traffic flows on to CDD122 Figure 3.26b results in the layout outputs summarised in the table below.

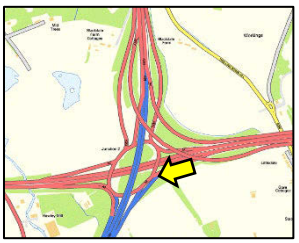
Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	D	D	4	3	2
Reference	EXCEEDS*	D	5	4	2
Preferred LP	EXCEEDS*	D	5	4	2
Preferred LP + 15% shift	EXCEEDS*	D	5	4	2
Preferred LP + 30% shift	EXCEEDS*	D	5	4	2

** exceeds the limit of Figure 3.26b in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	D	D	4	3	2
Reference	A	C	5	5	1

Preferred LP	A	C	5	5	1
Preferred LP + 15% shift	A	C	5	5	1
Preferred LP + 30% shift	A	C	5	5	1

3.3.36 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.



Westbound A2 diverge to roundabout

3.3.37 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,926	1,926	3,675	1,685
Preferred LP	5,013	1,910	3,798	1,729
Preferred LP + 15% shift	5,004	1,918	3,796	1,733
Preferred LP + 30% shift	4,996	1,921	3,798	1,738

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,809	1,957	3,781	1,880
Preferred LP	4,873	1,972	3,903	1,962
Preferred LP + 15% shift	4,863	1,974	3,902	1,947
Preferred LP + 30% shift	4,860	1,977	3,902	1,933

3.3.38 Transferring the above traffic flows on to CDD122 Figure 3.26b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	D	D	5	4	2
Preferred LP	D	D	5	4	2
Preferred LP + 15% shift	D	D	5	4	2
Preferred LP + 30% shift	D	D	5	4	2

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	D	D	5	4	2
Preferred LP	D	D	5	4	2
Preferred LP + 15% shift	D	D	5	4	2
Preferred LP + 30% shift	D	D	5	4	2

3.3.39 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

4 A2 corridor

4.1 A2 / A2018

4.1.1 The Stage 3 modelling demonstrates that the Reference Case includes the following entry turning movements where V/C > 100%

- A2 eastbound off slip during the evening peak hour (with and without LTC).
- Old Bexley Lane (north) for both peak hours (with and without LTC).
- A2 westbound off slip during the morning peak hour (with and without LTC).

4.1.2 The Stage 3 modelling demonstrates that the Preferred Local Plan scenario includes the following entry turning movements where V/C > 100%

- A2 eastbound off slip during the evening peak hour (with and without LTC).
- Old Bexley Lane (north) for both peak hours (with and without LTC).

4.1.3 Detailed modelling of this junction may be required as Local Plan development that would affect its operation comes forward. A review of merge and diverge movements has been completed for this junction as summarised below.

Eastbound A2 merge

4.1.4 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,084	1,427	5,709	752
Preferred LP	4,202	1,429	5,914	755
Preferred LP + 15% shift	4,204	1,426	5,914	751
Preferred LP + 30% shift	4,206	1,424	5,914	747

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,072	1,418	5,845	766
Preferred LP	4,190	1,416	6,046	779
Preferred LP + 15% shift	4,190	1,414	6,046	777
Preferred LP + 30% shift	4,190	1,412	6,045	774

4.1.5 Transferring the above traffic flows on to CDD122 Figure 3.12a results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	E	D	4	5	2
Preferred LP	E	D	4	5	2
Preferred LP + 15% shift	E	D	4	5	2
Preferred LP + 30% shift	E	D	4	5	2

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	E	D	4	5	2
Preferred LP	E	D	4	5	2
Preferred LP + 15% shift	E	D	4	5	2
Preferred LP + 30% shift	E	D	4	5	2

4.1.6 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

Westbound A2 merge

4.1.7 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,932	836	4,548	785
Preferred LP	6,083	940	4,694	811
Preferred LP + 15% shift	6,087	936	4,695	810
Preferred LP + 30% shift	6,086	936	4,695	810

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,940	717	4,669	793
Preferred LP	6,070	838	4,811	823
Preferred LP + 15% shift	6,070	838	4,811	823
Preferred LP + 30% shift	6,070	838	4,811	823

4.1.8 Transferring the above traffic flows on to CDD122 Figure 3.12a results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	D	D	4	5	1
Preferred LP	D	D	4	5	1
Preferred LP + 15% shift	D	D	4	5	1
Preferred LP + 30% shift	D	D	4	5	1

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	D	D	4	5	1
Preferred LP	D	A	4	5	1
Preferred LP + 15% shift	D	A	4	5	1
Preferred LP + 30% shift	D	A	4	5	1

4.1.9 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario in the "no LTC" scenario.

4.1.10 With respect to the "with LTC" scenario, the PM category changes from D to A when the Local Plan is implemented. This is on the basis that the Reference Case and Local Plan scenarios are both borderline D and A.

Eastbound A2 diverge

4.1.11 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,084	1,427	5,709	752
Preferred LP	4,202	1,429	5,914	755
Preferred LP + 15% shift	4,204	1,426	5,914	751
Preferred LP + 30% shift	4,206	1,424	5,914	747

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,072	1,418	5,845	766
Preferred LP	4,190	1,416	6,046	779
Preferred LP + 15% shift	4,190	1,414	6,046	777
Preferred LP + 30% shift	4,190	1,412	6,045	774

4.1.12 Transferring the above traffic flows on to CDD122 Figure 3.26a results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	D	C	5	4	2
Preferred LP	D	C	5	4	2
Preferred LP + 15% shift	D	C	5	4	2
Preferred LP + 30% shift	D	C	5	4	2

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	D	C	5	4	2
Preferred LP	D	C	5	4	2
Preferred LP + 15% shift	D	C	5	4	2
Preferred LP + 30% shift	D	C	5	4	2

4.1.13 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

Westbound A2 diverge

4.1.14 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,932	836	4,548	785
Preferred LP	6,083	940	4,694	811
Preferred LP + 15% shift	6,087	936	4,695	810

Preferred LP + 30% shift	6,086	936	4,695	810

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,940	717	4,669	793
Preferred LP	6,070	838	4,811	823
Preferred LP + 15% shift	6,070	838	4,811	823
Preferred LP + 30% shift	6,070	838	4,811	823

4.1.15 Transferring the above traffic flows on to CDD122 Figure 3.26a results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	C	C	5	4	1
Preferred LP	C	C	5	4	1
Preferred LP + 15% shift	C	C	5	4	1
Preferred LP + 30% shift	C	C	5	4	1

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	3	3	1
Reference	C	C	5	4	1
Preferred LP	C	A	5	4	1
Preferred LP + 15% shift	C	A	5	4	1
Preferred LP + 30% shift	C	A	5	4	1

4.1.16 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario in the “no LTC” scenario.

4.1.17 With respect to the “with LTC” scenario, the PM category changes from C to A when the Local Plan is implemented. This is on the basis that the Reference Case and Local Plan scenarios are both borderline C and A.

4.2 A2 Bean Junction

4.2.1 The Stage 3 modelling demonstrates that the Reference Case includes the following entry turning movements where V/C > 100%

- South roundabout entry from bridge (with and without LTC)

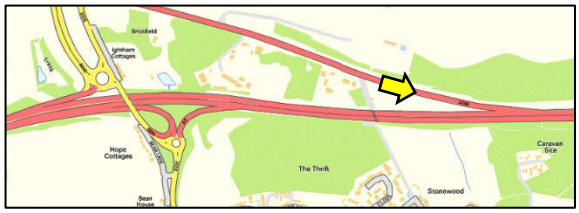
- South roundabout A2 westbound on slip (with and without LTC)

4.2.2 The Stage 3 modelling demonstrates that the Preferred Local Plan scenario includes the following entry turning movements where V/C > 100%

- South roundabout entry from bridge (with and without LTC)
- South roundabout A2 westbound on slip (with and without LTC)

4.2.3 Detailed modelling of this junction may be required as Local Plan development that would affect it's operation comes forward. A review of merge and diverge movements has been completed for this junction as summarised below.

Eastbound A2 merge



4.2.4 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,289	689	6,619	1,294
Preferred LP	5,372	726	6,732	1,351
Preferred LP + 15% shift	5,336	716	6,699	1,297
Preferred LP + 30% shift	5,327	716	6,695	1,320

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,462	623	5,888	1,417
Preferred LP	4,406	809	5,989	1,414
Preferred LP + 15% shift	4,365	762	5,949	1,395
Preferred LP + 30% shift	4,357	766	5,934	1,385

4.2.5 Transferring the above traffic flows on to CDD122 Figure 3.12a results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	A	!	5	5	2
Preferred LP	B	EXCEEDS*	4	4	1
Preferred LP + 15% shift	B	EXCEEDS*	4	4	1
Preferred LP + 30% shift	B	EXCEEDS*	4	4	1

! minimum layout is Layout C for rural roads or Layout A Option 2 for urban roads.
** exceeds the limit of Figure 3.12a in CD122*

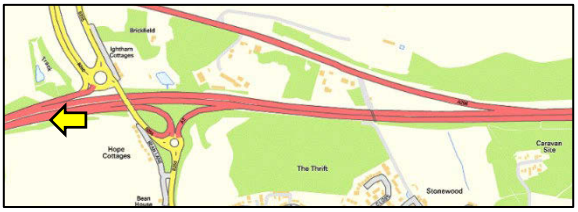
Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	D	E	4	5	2
Preferred LP	D	E	4	5	2
Preferred LP + 15% shift	D	E	4	5	2
Preferred LP + 30% shift	D	E	4	5	2

4.2.6 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario in the "with LTC" scenario.

4.2.7 With respect to the "no LTC" scenario, the AM category changes from A to B when the Local Plan is implemented. This is on the basis that the Reference Case and Local Plan scenarios are both borderline A and B.

Westbound A2 merge

4.2.8 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.



Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,707	2,075	5,549	1,542
Preferred LP	6,787	2,118	5,658	1,741
Preferred LP + 15% shift	6,774	2,116	5,615	1,724
Preferred LP + 30% shift	6,755	2,110	5,591	1,727

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,958	1,936	5,061	1,455
Preferred LP	6,027	1,951	5,183	1,642
Preferred LP + 15% shift	6,019	1,939	5,137	1,637
Preferred LP + 30% shift	6,011	1,936	5,108	1,636

4.2.9 Transferring the above traffic flows on to CDD122 Figure 3.12a results in the layout outputs summarised in the table below.

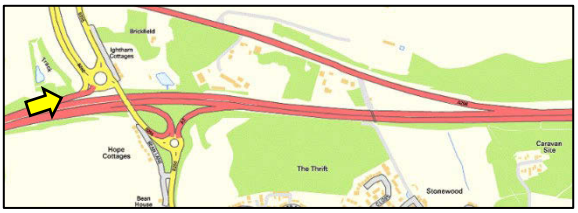
Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	E	E	3	4	2
Reference	EXCEEDS*	E	4	5	2
Preferred LP	EXCEEDS*	E	4	5	2
Preferred LP + 15% shift	EXCEEDS*	E	4	5	2
Preferred LP + 30% shift	EXCEEDS*	E	4	5	2

** exceeds the limit of Figure 3.12a in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	E	E	3	4	2
Reference	E	E	4	5	2
Preferred LP	E	E	4	5	2
Preferred LP + 15% shift	E	E	4	5	2
Preferred LP + 30% shift	E	E	4	5	2

4.2.10 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

Eastbound A2 diverge



4.2.11 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,289	1,138	6,619	1,414
Preferred LP	5,372	1,267	6,732	1,483
Preferred LP + 15% shift	5,336	1,266	6,699	1,442
Preferred LP + 30% shift	5,327	1,267	6,695	1,401

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,462	1,173	5,888	1,411
Preferred LP	4,406	1,288	5,989	1,497
Preferred LP + 15% shift	4,365	1,298	5,949	1,445

Preferred LP + 30% shift	4,357	1,300	5,934	1,429

4.2.12 Transferring the above traffic flows on to CDD122 Figure 3.26a results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	C	C	4	3	1
Reference	C	EXCEEDS*	5	4	1
Preferred LP	D	EXCEEDS*	5	4	2
Preferred LP + 15% shift	D	EXCEEDS*	5	4	2
Preferred LP + 30% shift	D	EXCEEDS*	5	4	2

** exceeds the limit of Figure 3.26a in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	C	C	4	3	1
Reference	C	D	5	4	2
Preferred LP	D	D	5	4	2
Preferred LP + 15% shift	D	D	5	4	2
Preferred LP + 30% shift	C	D	5	4	2

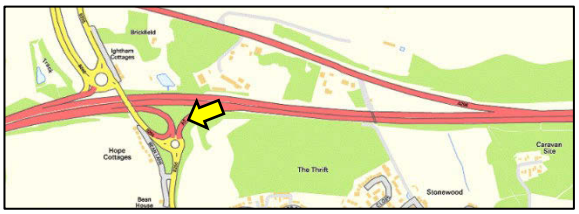
4.2.13 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario for the PM peak.

4.2.14 With respect to the AM "no LTC" scenario, the AM category changes from C to D when the Local Plan is implemented. This is on the basis that the Reference Case and Local Plan scenarios are both borderline C and D.

4.2.15 With respect to the AM "with LTC" scenario, the AM category changes from C to D when the Local Plan is implemented and this reverts back to C with a 30% mode shift.

Westbound A2 diverge

4.2.16 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.



Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,707	1,310	5,549	1,391
Preferred LP	6,787	1,309	5,658	1,411
Preferred LP + 15% shift	6,774	1,288	5,615	1,383

Preferred LP + 30% shift	6,755	1,289	5,591	1,372

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,958	1,358	5,061	1,512
Preferred LP	6,027	1,358	5,183	1,593
Preferred LP + 15% shift	6,019	1,341	5,137	1,547
Preferred LP + 30% shift	6,011	1,343	5,108	1,512

4.2.17 Transferring the above traffic flows on to CDD122 Figure 3.26a results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	D	D	4	3	2
Reference	B	D	5	5	2
Preferred LP	EXCEEDS*	D	5	4	2
Preferred LP + 15% shift	EXCEEDS*	D	5	4	2
Preferred LP + 30% shift	EXCEEDS*	D	5	4	2

** exceeds the limit of Figure 3.26a in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	D	D	4	3	2
Reference	D	D	5	4	2
Preferred LP	D	D	5	4	2
Preferred LP + 15% shift	D	D	5	4	2
Preferred LP + 30% shift	D	D	5	4	2

4.2.18 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario for the "With LTC" scenario.

4.2.19 With respect to the AM "no LTC" scenario, the AM category changes from B to "Exceeds" when the Local Plan is implemented. This is on the basis that the Reference Case and Local Plan scenarios are both borderline B and "Exceeds".

4.3 A2 Ebbsfleet Junction

4.3.1 The Stage 3 modelling demonstrates that the Reference Case includes the following entry turning movements where V/C > 100%

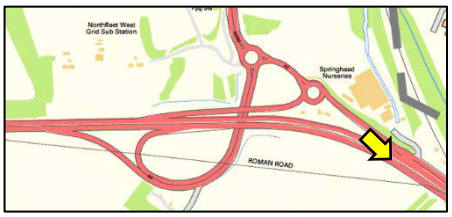
- East roundabout – access road serving Ebbsfleet during the evening peak hour (with and without LTC).

4.3.2 The Stage 3 modelling demonstrates that the Preferred Local Plan scenario includes the following entry turning movements where V/C > 100%

- East roundabout – access road serving Ebbsfleet during the evening peak hour (with and without LTC).

4.3.3 The findings show that the principal issue with this junction relates to the east roundabout access road serving the Ebbsfleet development. Further detailed studies of this junction will be carried out as the Ebbsfleet development comes forward to ensure that there is sufficient capacity at this junction to serve the planned development without causing significant adverse effect on the strategic road network.

4.3.4 A review of merge and diverge movements has been completed for this junction as summarised below.



Eastbound A2 merge

4.3.5 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,751	454	6,711	804
Preferred LP	4,704	468	6,789	827
Preferred LP + 15% shift	4,641	478	6,740	835
Preferred LP + 30% shift	4,863	476	6,750	848

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	3,647	492	5,885	871
Preferred LP	3,810	515	5,999	858
Preferred LP + 15% shift	3,741	529	5,928	892
Preferred LP + 30% shift	3,728	531	5,903	930

4.3.6 Transferring the above traffic flows on to CDD122 Figure 3.12a results in the layout outputs summarised in the table below.

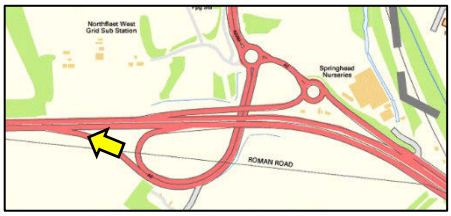
Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	D	B	5	5	1

Preferred LP	D	B	5	5	1
Preferred LP + 15% shift	D	B	5	5	1
Preferred LP + 30% shift	A	B	5	5	1

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	A	D	4	5	1
Preferred LP	A	D	4	5	1
Preferred LP + 15% shift	A	D	4	5	1
Preferred LP + 30% shift	A	D	4	5	1

4.3.7 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

Westbound A2 merge



4.3.8 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	7,394	1,905	6,113	1,867
Preferred LP	7,454	1,937	6,188	1,942
Preferred LP + 15% shift	7,441	1,910	6,156	1,891
Preferred LP + 30% shift	7,430	1,900	6,141	1,866

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,727	1,758	5,379	1,936
Preferred LP	6,793	1,774	5,550	1,990
Preferred LP + 15% shift	6,770	1,768	5,504	1,932
Preferred LP + 30% shift	6,771	1,760	5,497	1,866

4.3.9 Transferring the above traffic flows on to CDD122 Figure 3.12a results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	EXCEEDS*	E	4	5	2
Preferred LP	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP + 15% shift	EXCEEDS*	EXCEEDS*	0	0	0
Preferred LP + 30% shift	EXCEEDS*	EXCEEDS*	0	0	0

** exceeds the limit of Figure 3.12a in CD122*

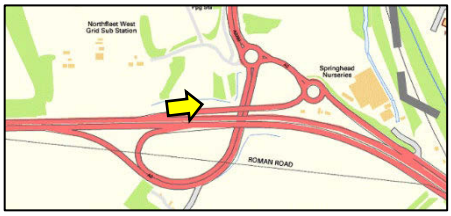
Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	EXCEEDS*	E	4	5	2
Preferred LP	EXCEEDS*	E	4	5	2
Preferred LP + 15% shift	EXCEEDS*	E	4	5	2
Preferred LP + 30% shift	EXCEEDS*	E	4	5	2

** exceeds the limit of Figure 3.12a in CD122*

4.3.10 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario in the "with LTC" scenario.

4.3.11 With respect to the "with LTC" scenario, the PM category changes from E to "Exceeds" when the Local Plan is implemented. This is on the basis that the Reference Case and Local Plan scenarios are both borderline E and "Exceeds".

Eastbound A2 diverge



4.3.12 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,751	2,146	6,711	2,179
Preferred LP	4,704	2,168	6,789	2,273
Preferred LP + 15% shift	4,641	2,149	6,740	2,231
Preferred LP + 30% shift	4,863	2,138	6,750	2,173

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	3,647	2,097	5,885	2,193

Preferred LP	3,810	2,117	5,999	2,250
Preferred LP + 15% shift	3,741	2,085	5,928	2,227
Preferred LP + 30% shift	3,728	2,075	5,903	2,206

4.3.13 Transferring the above traffic flows on to CDD122 Figure 3.26a results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	E	EXCEEDS*	5	3	2
Preferred LP	E	EXCEEDS*	5	3	2
Preferred LP + 15% shift	E	EXCEEDS*	5	3	2
Preferred LP + 30% shift	D	EXCEEDS*	5	4	2

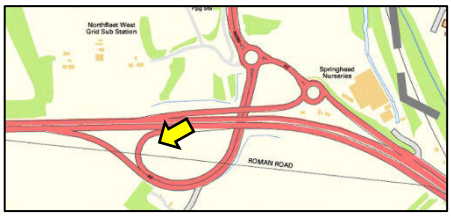
** exceeds the limit of Figure 3.26b in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	D	EXCEEDS*	4	3	2
Preferred LP	D	EXCEEDS*	4	3	2
Preferred LP + 15% shift	D	EXCEEDS*	4	3	2
Preferred LP + 30% shift	D	EXCEEDS*	4	3	2

** exceeds the limit of Figure 3.26b in CD122*

4.3.14 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

Westbound A2 diverge



4.3.15 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	7,394	642	6,113	645
Preferred LP	7,454	726	6,188	670
Preferred LP + 15% shift	7,441	717	6,156	660
Preferred LP + 30% shift	7,430	718	6,141	656

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,727	668	5,379	540
Preferred LP	6,793	748	5,550	575
Preferred LP + 15% shift	6,770	742	5,504	554
Preferred LP + 30% shift	6,771	738	5,497	541

4.3.16 Transferring the above traffic flows on to CDD122 Figure 3.26a results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	EXCEEDS*	C	5	4	1
Preferred LP	EXCEEDS*	C	5	4	1
Preferred LP + 15% shift	EXCEEDS*	C	5	4	1
Preferred LP + 30% shift	EXCEEDS*	C	5	4	1

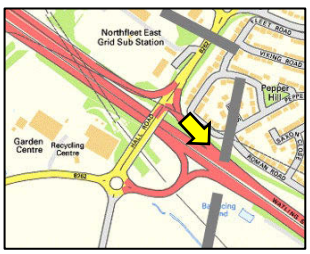
** exceeds the limit of Figure 3.26a in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	A	A	5	5	1
Preferred LP	A	A	5	5	1
Preferred LP + 15% shift	A	A	5	5	1
Preferred LP + 30% shift	A	A	5	5	1

4.3.17 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.

4.4 A2 Pepper Hill Junction

4.4.1 The Stage 3 modelling demonstrates that the Reference Case and Local Plan Scenarios do not include any entry turning movements where V/C > 100%. A review of merge and diverge movements has been completed for this junction as summarised below.



Eastbound A2 merge

4.4.2 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,979	845	7,515	1,263
Preferred LP	5,172	862	7,616	1,272
Preferred LP + 15% shift	5,118	872	7,576	1,281
Preferred LP + 30% shift	5,107	875	7,598	1,278

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	4,139	802	6,756	1,336
Preferred LP	4,325	839	6,857	1,344
Preferred LP + 15% shift	4,271	840	6,820	1,345
Preferred LP + 30% shift	4,259	843	6,834	1,353

4.4.3 Transferring the above traffic flows on to CDD122 Figure 3.12a results in the layout outputs summarised in the table below.

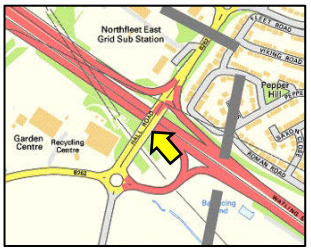
Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	B	EXCEEDS*	4	4	1
Preferred LP	B	EXCEEDS*	4	4	1
Preferred LP + 15% shift	B	EXCEEDS*	4	4	1
Preferred LP + 30% shift	B	EXCEEDS*	4	4	1

** exceeds the limit of Figure 3.12a in CD122*

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	D	EXCEEDS*	3	4	1
Preferred LP	D	EXCEEDS*	3	4	1
Preferred LP + 15% shift	D	EXCEEDS*	3	4	1
Preferred LP + 30% shift	D	EXCEEDS*	3	4	1

** exceeds the limit of Figure 3.12a in CD122*

4.4.4 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario.



Westbound A2 merge

4.4.5 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,444	627	5,312	649
Preferred LP	6,539	669	5,461	589
Preferred LP + 15% shift	6,544	643	5,421	592
Preferred LP + 30% shift	6,540	640	5,416	580

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,857	661	4,707	722
Preferred LP	5,938	718	4,868	753
Preferred LP + 15% shift	5,942	688	4,829	728
Preferred LP + 30% shift	5,944	682	4,825	713

4.4.6 Transferring the above traffic flows on to CDD122 Figure 3.12a results in the layout outputs summarised in the table below.

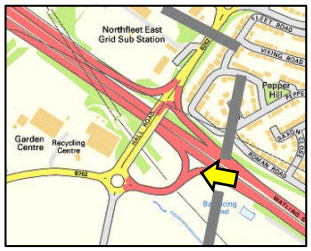
Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	A	A	5	5	1
Preferred LP	A	A	5	5	1
Preferred LP + 15% shift	A	A	5	5	1
Preferred LP + 30% shift	A	A	5	5	1

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	B	B	4	4	1
Reference	D	D	4	5	1

Preferred LP	D	A	4	5	1
Preferred LP + 15% shift	D	A	4	5	1
Preferred LP + 30% shift	D	A	4	5	1

4.4.7 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario in the "no LTC" scenario.

4.4.8 With respect to the "with LTC" scenario, the PM category changes from D to A when the Local Plan is implemented. This is on the basis that the Reference Case and Local Plan scenarios are both borderline D and A.



Westbound A2 diverge

4.4.9 The tables below summarise the flows (factored) which have been assessed for this slip road for the "no LTC" scenario and "With LTC" scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	6,444	866	5,312	788
Preferred LP	6,539	881	5,461	786
Preferred LP + 15% shift	6,544	859	5,421	783
Preferred LP + 30% shift	6,540	858	5,416	780

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	5,857	1,005	4,707	962
Preferred LP	5,938	1,016	4,868	943
Preferred LP + 15% shift	5,942	991	4,829	935
Preferred LP + 30% shift	5,944	989	4,825	937

4.4.10 Transferring the above traffic flows on to CDD122 Figure 3.26a results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	A	A	5	5	1
Preferred LP	A	A	5	5	1
Preferred LP + 15% shift	A	A	5	5	1
Preferred LP + 30% shift	A	A	5	5	1

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	A	A	4	4	1
Reference	C	C	5	4	1
Preferred LP	C	A	5	4	1
Preferred LP + 15% shift	C	A	5	4	1
Preferred LP + 30% shift	C	A	5	4	1

4.4.11 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario in the “no LTC” scenario.

4.4.12 With respect to the “with LTC” scenario, the PM category changes from C to A when the Local Plan is implemented. This is on the basis that the Reference Case and Local Plan scenarios are both borderline C and A.

5 Local road network – A roads

5.1.1 The following section considers each of the A road junctions identified within the Stage 3b report as potentially requiring mitigation as a result of the Preferred Local Plan scenario being implemented.

5.1.2 For each junction considered, a standalone junction model has been created using Junctions 10, for roundabout and priority junctions, or LinSig, for signal controlled junctions. Each of the models adopts the traffic flows from the LTAM SATURN model and on-site geometry calculated and recorded from aerial photography.

5.1.3 As a worst-case assessment the 0% mode shift traffic flows have been used to represent the Local Plan scenario traffic flows.

5.2 A206 / Galleon Boulevard

5.2.1 The A206 / Galleon Boulevard junction is a four-arm roundabout located in the northern area of Dartford near Newton's Court. The following table shows the geometry of the roundabout, as recorded from aerial photography.

	Galleon Blvd (N)	A206 Crossways Blvd (E)	Galleon Blvd (S)	A206 Crossways Blvd (W)
Approach road half-width (m)	4.02	9.16	3.15	7.49
Entry width (m)	7.13	10.89	6.58	9.36
Effective flare length (m)	6.8	26.9	8.7	4.9
Entry radius (m)	30.2	26.8	31.3	32.0
Inscribed circle diameter (m)	61.0	61.0	61.0	61.0
Conflict (entry) angle (deg)	35.7	45.1	42.1	50.8

5.2.2 The model was constructed using the geometry values above and the demand flows and percentage HGVs extracted from the LTAM SATURN models. The results output from the model were reviewed to check whether the junction was still predicted to require mitigation using this software.

5.2.3 The junction was predicted to require mitigation based upon the LTAM traffic flows and the table below summarises the geometry for a potential mitigation scheme at the junction.

	Galleon Blvd (N)	A206 Crossways Blvd (E)	Galleon Blvd (S)	A206 Crossways Blvd (W)
Approach road half-width (m)	4.02	9.16	3.15	7.49
Entry width (m)	9.00	10.89	7.50	9.36
Effective flare length (m)	25.0	26.9	15.0	4.9
Entry radius (m)	30.2	26.8	31.3	32.0
Inscribed circle diameter (m)	61.0	61.0	61.0	61.0

Conflict (entry) angle (deg)	35.7	45.1	42.1	50.8

5.2.4 From the above tables, the changes to the geometry can be summarised as follows and as illustrated at Appendix C:

- Increased Entry Width on Galleon Blvd (N) from 7.13m to 9.00m
- Increased Flare Length on Galleon Blvd (N) from 6.80 to 25.00m,
- Increased Entry Width on Galleon Blvd (S) from 6.58m to 7.50m,
- Increased Flare Length on Galleon Blvd (S) from 8.70 to 15.0m.

5.2.5 Whilst there appears to be verge width and highway boundary to achieve the above upgrades, this would be subject to checking with KCC highway boundary data and OS mapping data.

5.2.6 The following tables show the results for the Reference Case, the Preferred Local Plan scenario and Preferred Local Plan with mitigation. The top table summarises the results without LTC whilst the bottom table includes the LTC.

	AM			PM		
	Queue (Veh)	**Delay (s)**	**RFC**	**Queue (Veh)**	**Delay (s)**	**RFC**
Ref no LTC (Existing Layout)						
Galleon Blvd (N)	1.1	9.05	0.52	45.7	269.97	**1.18**
A206 Crossways Blvd (E)	4.1	6.89	0.81	0.7	2.32	0.42
Galleon Blvd (S)	0.2	7.94	0.18	49.8	211.08	**1.12**
A206 Crossways Blvd (W)	2.1	5.50	0.67	6.5	16.21	0.87
Pref no LTC (Existing Layout)						
Galleon Blvd (N)	5.3	29.74	0.86	161.3	804.46	**1.59**
A206 Crossways Blvd (E)	4.8	8.10	0.83	0.8	2.38	0.43
Galleon Blvd (S)	0.2	9.93	0.15	17.9	97.25	1.00
A206 Crossways Blvd (W)	3.1	7.49	0.76	14.2	33.72	0.95
Pref no LTC (Mitigation Layout)						
Galleon Blvd (N)	1.4	7.20	0.58	12.6	58.27	0.96
A206 Crossways Blvd (E)	4.8	8.12	0.83	0.8	2.62	0.45
Galleon Blvd (S)	0.1	7.29	0.12	8.3	47.29	0.92
A206 Crossways Blvd (W)	3.1	7.49	0.76	15.2	36.06	0.96

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
Ref with LTC (Existing Layout)						
Galleon Blvd (N)	1.0	8.13	0.50	32.0	181.91	**1.09**
A206 Crossways Blvd (E)	3.6	6.19	0.78	0.6	2.23	0.38
Galleon Blvd (S)	0.2	7.24	0.16	47.3	192.18	**1.11**
A206 Crossways Blvd (W)	1.8	4.98	0.64	4.2	11.14	0.81
Pref with LTC (Existing Layout)						
Galleon Blvd (N)	7.0	39.38	0.89	139.7	677.22	**1.49**
A206 Crossways Blvd (E)	4.1	7.24	0.81	0.8	2.45	0.45
Galleon Blvd (S)	0.2	9.13	0.14	20.9	113.04	**1.02**
A206 Crossways Blvd (W)	3.9	8.97	0.80	7.7	19.39	0.90
Pref no LTC (Mitigation Layout)						
Galleon Blvd (N)	1.5	7.83	0.60	9.0	41.46	0.92
A206 Crossways Blvd (E)	4.2	7.27	0.81	0.9	2.69	0.47
Galleon Blvd (S)	0.1	6.83	0.11	8.6	49.66	0.92
A206 Crossways Blvd (W)	3.9	8.97	0.80	8.2	20.69	0.90

5.2.7 The full output for models before and after mitigation can be found in Appendix D and E respectively.

5.2.8 It is noted that the mitigation measures considered bring the operation of the junction back to Reference Case operation and / or within theoretical maximum capacity. An assumption of 15% to 30% mode switching would be expected improve the operation of the junction further.

5.3 A225 Lowfield Street / B2174 Princes Road

5.3.1 The A225 Lowfield Street / B2174 Princes Road is a 4-arm signal-controlled junction located to the west of Dartford centre.

5.3.2 The model was set up using the same parameters for phasing, stages, and timings as per the LTAM SATURN model scenarios. This assumes a cycle time of 94s for all scenarios and results in negative PRC values for all of the scenarios.

5.3.3 To mitigate this, the cycle time and phases and stages within the model, as well as the signal timings have been analysed within the 94s cycle time. To mitigate the impact, a filter phase has been added to the westbound traffic arm, and the stages have been changed accordingly

to allow the westbound arm to have a filter lane running whilst the northbound arm runs its right turning traffic.

5.3.4 The following tables report the existing cycle time results against the mitigation cycle time.

	AM		PM	
	PRC (%)	Delay (PCUhrs)	PRC (%)	Delay (PCUhrs)
Reference Case (no LTC)	**55.6**	253.63	**74.1**	322.65
Preferred Local Plan (no LTC)	**55.5**	262.58	**76.6**	329.38
Preferred Local Plan (no LTC) – OPT	-16.6	128.85	-25.1	230.56

	AM		PM	
	PRC (%)	Delay (PCUhrs)	PRC (%)	Delay (PCUhrs)
Reference Case (with LTC)	**71.5**	304.52	**75.1**	324.71
Preferred Local Plan (with LTC)	**66.7**	295.25	**77.7**	334.69
Preferred Local Plan (with LTC) - OPT	-21.9	162.54	-24.2	235.72

5.3.5 The full output for models before and after mitigation can be found in Appendix F and G respectively.

5.3.6 It is noted from the above table that the adjusted cycle time, stages and optimisation brings the traffic effects of the Preferred Local Plan scenario below that of the Reference Case or within capacity.

5.4 A225 / Parsonage Lane

5.4.1 The A225 / Parsonage Lane junction is a three-arm mini roundabout located in Sutton at Hone, to the southwest of Dartford. The following table shows the geometry of the mini roundabout, as recorded from aerial photography.

	A225 (N)	Parsonage Lane	A225 (S)
Approach road half-width (m)	2.85	2.67	3.06
Minimum approach road half-width (m)	2.59	2.67	2.96
Entry width (m)	4.04	4.65	4.61
Effective flare length (m)	2.8	2.8	7.8
Distance to next arm (m)	10.80	8.85	16.16
Entry corner kerb line distance (m)	7.57	6.86	16.01

5.4.2 The model was constructed using the geometry values above and the demand flows and percentage HGVs extracted from the LTAM SATURN models. The results output from the model were reviewed to check whether the junction was still predicted to require mitigation using this software.

5.4.3 The junction was predicted to require mitigation based upon the LTAM traffic flows and the table below summarises the geometry for a potential mitigation scheme at the junction.

	A225 (N)	Parsonage Lane	A225 (S)
Approach road half-width (m)	2.85	2.67	3.06
Minimum approach road half-width (m)	2.59	2.67	2.96
Entry width (m)	4.50	5.00	5.00
Effective flare length (m)	5.0	5.0	10.0
Distance to next arm (m)	10.80	8.85	16.16
Entry corner kerb line distance (m)	7.57	6.86	16.01

5.4.4 From the above tables, the changes to the geometry can be summarised as follows and as illustrated at Appendix H:

- Increased Entry Width on A225 (N) from 4.04m to 4.50m,
- Increased Flare Length on A225 (N) from 2.80m to 5.00m,
- Increased Entry Width on Parsonage Lane from 4.65m to 5.00m,
- Increased Flare Length on Parsonage Lane from 2.80m to 5.00m,
- Increased Entry Width on A225 (S) from 4.61m to 5.00m,
- Increased Flare Length on A225 (S) from 7.80m to 10.00m.

5.4.5 Whilst there appears to be verge width and highway boundary to achieve the above upgrades, this would be subject to checking with KCC highway boundary data and OS mapping data.

5.4.6 The following tables show the results for the Reference Case, the Preferred Local Plan scenario and Preferred Local Plan with mitigation. The top table summarises the results without LTC whilst the bottom table includes the LTC.

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
Ref no LTC (Existing Layout)						
A225 (N)	144.9	653.45	**1.31**	19.8	69.59	1.00
Parsonage Lane	292.9	1723.16	**1.57**	701.4	3674.87	**2.13**
A225 (S)	2.9	18.15	0.75	6.9	40.32	0.89

Pref no LTC (Existing Layout)						
A225 (N)	147.1	663.17	**1.32**	21.4	102.96	**1.01**
Parsonage Lane	298.3	1756.27	**1.58**	709.4	3723.64	**2.14**
A225 (S)	3.3	19.77	0.77	7.4	42.93	0.90
Pref no LTC (Mitigation Layout)						
A225 (N)	104.6	445.34	**1.23**	11.0	56.53	0.94
Parsonage Lane	233.0	1298.71	**1.47**	624.8	3027.33	**1.97**
A225 (S)	2.9	17.66	0.75	6.5	37.85	0.88

	AM			**PM**		
	Queue (Veh)	**Delay (s)**	**RFC**	**Queue (Veh)**	**Delay (s)**	**RFC**
Ref with LTC (Existing Layout)						
A225 (N)	155.8	706.58	**1.34**	10.4	54.21	0.94
Parsonage Lane	242.5	1406.50	**1.49**	665.0	3330.27	**2.06**
A225 (S)	3.4	20.72	0.78	5.9	33.91	0.87
Pref with LTC (Existing Layout)						
A225 (N)	161.9	731.67	**1.35**	12.8	64.62	0.96
Parsonage Lane	240.0	1384.67	**1.49**	678.1	3408.50	**2.08**
A225 (S)	3.8	22.85	0.80	6.5	37.50	0.89
Pref no LTC (Mitigation Layout)						
A225 (N)	114.7	503.21	**1.25**	7.2	37.03	0.90
Parsonage Lane	183.0	972.67	**1.38**	589.4	2740.64	**1.91**
A225 (S)	3.4	20.22	0.78	5.9	33.48	0.87

5.4.7 The full output for models before and after mitigation can be found in Appendix I and J respectively.

5.4.8 It is noted that the mitigation measures considered bring the operation of the junction back to Reference Case and / or within theoretical maximum capacity. An assumption of 15% to 30% mode switching would be expected improve the operation of the junction further.

5.5 A226 / Park Road

5.5.1 The A226 / Park Road junction is a three-arm mini roundabout located to the east of Dartford town centre. The following table shows the geometry of the mini roundabout, as recorded from aerial photography.

	The Brent	Park Road	East Hill
Approach road half-width (m)	3.55	3.77	3.46
Minimum approach road half-width (m)	2.46	3.54	3.16
Entry width (m)	4.89	3.84	3.71
Effective flare length (m)	1.6	0.4	4.5
Distance to next arm (m)	7.22	9.56	10.62
Entry corner kerb line distance (m)	3.36	8.30	10.12

5.5.2 The model was constructed using the geometry values above and the demand flows and percentage HGVs extracted from the LTAM SATURN models. The results output from the model were reviewed to check whether the junction was still predicted to require mitigation using this software.

5.5.3 The junction was predicted to require mitigation based upon the LTAM traffic flows and the table below summarises the geometry for a potential mitigation scheme at the junction.

	The Brent	Park Road	East Hill
Approach road half-width (m)	3.55	3.77	3.46
Minimum approach road half-width (m)	2.46	3.54	3.16
Entry width (m)	4.89	4.60	4.80
Effective flare length (m)	3.3	4.5	5.0
Distance to next arm (m)	7.22	9.56	10.62
Entry corner kerb line distance (m)	3.36	8.30	10.12

5.5.4 From the above tables, the changes to the geometry can be summarised as follows and as illustrated at Appendix K:

- Increased Entry Width on Park Road from 3.84m to 4.60m,
- Increased Entry Width on East Hill from 3.71m to 4.80m,
- Increased Flare Length on the Brent to 3.3m, Park Road to 4.5n, and East Hill to 5.0m

5.5.5 Whilst there appears to be footway width and highway boundary to achieve the above upgrades, this would be subject to checking with KCC highway boundary data and OS mapping data.

5.5.6 The following tables show the results for the Reference Case, the Preferred Local Plan scenario and Preferred Local Plan with mitigation. The top table summarises the results without LTC whilst the bottom table includes the LTC.

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
Ref no LTC (Existing Layout)						
The Brent	344.5	1885.42	**1.70**	165.4	951.31	**1.38**
Park Road	1.2	11.66	0.55	6.0	42.39	0.88
East Hill	36.7	131.14	**1.05**	199.9	753.05	**1.34**
Pref no LTC (Existing Layout)						
The Brent	378.5	2176.62	**1.73**	177.0	1037.04	**1.40**
Park Road	1.9	15.04	0.66	14.6	86.80	0.98
East Hill	62.0	218.37	**1.12**	216.1	831.56	**1.37**
Pref no LTC (Mitigation Layout)						
The Brent	302.9	1564.11	**1.62**	136.9	731.22	**1.31**
Park Road	1.4	11.46	0.59	6.4	39.22	0.88
East Hill	32.1	113.09	**1.03**	149.3	555.28	**1.27**

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
Ref with LTC (Existing Layout)						
The Brent	341.0	1849.48	**1.70**	124.8	700.51	**1.30**
Park Road	1.0	10.76	0.49	3.3	25.17	0.78
East Hill	27.0	98.57	**1.02**	200.1	721.88	**1.32**
Pref with LTC (Existing Layout)						
The Brent	367.5	2048.01	**1.71**	161.6	949.50	**1.38**
Park Road	1.3	12.66	0.58	9.1	56.98	0.93
East Hill	55.1	179.98	**1.09**	221.9	813.99	**1.36**
Pref no LTC (Mitigation Layout)						
The Brent	292.2	1488.09	**1.60**	123.6	673.50	**1.29**

Park Road	1.1	10.12	0.52	4.6	28.70	0.84
East Hill	26.4	92.08	**1.01**	152.5	541.09	**1.26**

5.5.7 The full output for models before and after mitigation can be found in Appendix L and M respectively.

5.5.8 It is noted that the mitigation measures considered bring the operation of the junction back to Reference Case and / or within theoretical maximum capacity. An assumption of 15% to 30% mode switching would be expected improve the operation of the junction further.

5.6 A226 / Great Queen Street

5.6.1 The A226 / Great Queen Street junction is a priority junction located to the east of Dartford Town Centre. The following table shows the geometry of the junction, as recorded from aerial photography.

Major arm	
Width of Carriageway (m)	6.41
Has Kerbed Central Reserve	FALSE
Has Right-Turn Storage	FALSE
Width for Right Turn Storage (m)	-
Visibility for Right Turn (m)	100.9
Blocks?	TRUE
Blocking Queue (PCU)	0.00
Minor arm	
Minor Arm Type	One Lane
Lane Width (m)	2.20
Visibility to Left (m)	18
Visibility to Right (m)	13

5.6.2 The model was constructed using the geometry values above and the demand flows and percentage HGVs extracted from the LTAM SATURN models. The results output from the model were reviewed to check whether the junction was still predicted to require mitigation using this software.

5.6.3 The following tables show the results for the Reference Case and the Preferred Local Plan scenario. The top table summarises the results without LTC whilst the bottom table includes the LTC.

	AM			**PM**		
	Queue (Veh)	**Delay (s)**	**RFC**	**Queue (Veh)**	**Delay (s)**	**RFC**
Ref no LTC (Existing Layout)						

Great Queen Street	0.0	0.00	0.00	0.0	0.00	0.00
Right turn to Grt Queen St	117.6	530.00	**1.29**	163.3	827.90	**1.45**
Pref no LTC (Existing Layout)						
Great Queen Street	0.0	0.00	0.00	60.2	Inf	**Inf**
Right turn to Grt Queen St	153.3	724.03	**1.38**	195.0	1145.41	**1.58**

	AM			**PM**		
	Queue (Veh)	**Delay (s)**	**RFC**	**Queue (Veh)**	**Delay (s)**	**RFC**
Ref with LTC (Existing Layout)						
Great Queen Street	0.0	0.00	0.00	0.0	0.00	0.00
Right turn to Grt Queen St	66.3	240.41	**1.13**	144.7	736.02	**1.41**
Pref with LTC (Existing Layout)						
Great Queen Street	0.0	0.00	0.00	95.7	Inf	**Inf**
Right turn to Grt Queen St	92.3	369.58	**1.21**	176.7	1073.05	**1.56**

5.6.4 The full output for models before and after mitigation can be found in Appendix N and O respectively.

5.6.5 It is noted that the strategic transport modelling indicates that the Local Plan exacerbates the capacity issue at this junction. Closer inspection reveals that Great Queen Street is a constrained side road and there is little clear prospect of achieving capacity upgrades at this junction through physical measures due to the constraints. It is possible that excessive use of this junction is a LTAM route assignment issue.

5.6.6 Detailed consideration of this junction would need to be given by Transport Assessments supporting future planning applications that generate traffic passing through this junction. This could be supported by empirical survey data. This would be a matter for discussion during the pre-application scoping exercise and if capacity issues are confirmed mitigation could include supporting additional sustainable transport measures to secure a further modal shift away from private vehicle use.

5.7 A226 / Cotton Lane

5.7.1 The A226 / Cotton Lane junction is a 3-arm signal controlled junction within Stone, to the east of Dartford and west of Bluewater shopping centre.

5.7.2 The junction was modelled using Linsig software and set up using the same parameters for phasing, stages, and timings as per the LTAM SATURN model scenarios. This assumes a cycle time of 76s for all scenarios and results in negative PRC values for some of the scenarios.

5.7.3 To mitigate this, the cycle time and signal timings have been analysed and reconfigured to an updated cycle time of 80s, allowing the signals to also optimise within that period. The following table reports the existing 76s cycle time results against the mitigation 80s cycle time.

	AM		PM	
	PRC (%)	Delay (PCUhrs)	PRC (%)	Delay (PCUhrs)
Reference Case (no LTC)	2.8	16.97	-0.8	16.80
Preferred Local Plan (no LTC) (76s)	-4.8	20.63	-0.4	16.99
Preferred Local Plan (no LTC) (80s)	0.6	18.54	12.6	15.75

	AM		PM	
	PRC (%)	Delay (PCUhrs)	PRC (%)	Delay (PCUhrs)
Reference Case (with LTC)	6.6	16.28	21.1	14.26
Preferred Local Plan (with LTC) (76s)	1.9	18.03	13.9	13.87
Preferred Local Plan (with LTC) (80s)	4.7	17.22	24.9	13.96

5.7.4 The full output for models before and after mitigation can be found in Appendix P and Q respectively.

5.7.5 It is noted from the above table that the longer cycle time and optimisation brings the traffic effects of the Preferred Local Plan scenario below that of the Reference Case or within capacity.

5.8 A226 / Hillhouse Road

5.8.1 The A226 / Hillhouse Road is a priority junction with a right turn bay for eastbound traffic on the A226 to turn into Hillhouse Road. It is located within Stone, to the east of Dartford and west from Bluewater shopping centre. The following table shows the geometry of the junction.

Major arm	
Width of Carriageway (m)	7.60
Has Kerbed Central Reserve	FALSE
Has Right-Turn Storage	TRUE
Width for Right Turn Storage (m)	2.47
Visibility for Right Turn (m)	108.0
Blocks?	TRUE
Blocking Queue (PCU)	2.00

Minor arm	
Minor Arm Type	One Lane
Lane Width (m)	2.88
Visibility to Left (m)	21
Visibility to Right (m)	16

5.8.2 The following tables show the results for the Reference Case and the Preferred Local Plan scenario. The top table summarises the results without LTC whilst the bottom table includes the LTC.

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
Ref no LTC (Existing Layout)						
Hillhouse Road to A226	64.6	563.42	**1.29**	11.8	140.24	0.99
Right turn to Hillhouse Rd	0.4	10.66	0.28	0.4	10.53	0.27
Pref no LTC (Existing Layout)						
Hillhouse Road to A226	69.3	619.30	**1.32**	8.8	110.12	0.95
Right turn to Hillhouse Rd	0.5	11.07	0.30	0.3	10.56	0.23

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
Ref with LTC (Existing Layout)						
Hillhouse Road to A226	107.0	1080.67	**1.52**	6.6	87.91	0.91
Right turn to Hillhouse Rd	0.5	11.12	0.30	0.6	11.14	0.35
Pref with LTC (Existing Layout)						
Hillhouse Road to A226	109.5	1109.66	**1.53**	4.7	63.06	0.85
Right turn to Hillhouse Rd	0.5	11.28	0.32	0.3	9.55	0.21

5.8.3 The full model output can be found in Appendix R.

5.8.4 The junction is predicted to require mitigation based upon the LTAM traffic flows as the strategic transport modelling indicates that the Local Plan traffic exacerbates the capacity issue at this junction. Closer inspection reveals that Hillhouse Road is a constrained side road and there appears little clear prospect of achieving capacity upgrades at this junction through

physical measures due to the constraints as a priority junction. It is possible that excessive use of this junction is a LTAM route assignment issue.

5.8.5 Detailed consideration of this junction would need to be given by Transport Assessments supporting future planning applications that generate traffic passing through this junction. This could be supported by empirical survey data. This would be a matter for discussion during the pre-application scoping exercise.

5.8.6 If capacity issues are confirmed and mitigation measures required then this may need to consider conversion of the junction to signal control, a mini roundabout and / or one-way operation of Hillhouse Road. If such measures still prove to be impractical then mitigation could include supporting additional sustainable transport measures to secure a further modal shift away from private vehicle use.

5.9 A2018 Shepherds Lane / B2174 Princes Road

5.9.1 The A2018 Shepherds Lane / B2174 Princes Road is a 4-arm signal-controlled junction located to the west of Dartford centre.

5.9.2 The model was set up using the same parameters for phasing, stages, and timings as per the LTAM SATURN model scenarios. This assumes a cycle time of 110s for all scenarios and results in negative PRC values for some of the scenarios.

5.9.3 To mitigate this, the cycle time and signal timings have been analysed and reconfigured to an updated cycle time of 110s, allowing the signals to also optimise within that period. Signal phases have been updated to allow the eastbound and westbound signals to have a filter phase, and a physical change allows the northbound left turning traffic to be permanently on green until a pedestrian phase is called.

5.9.4 In addition, a further physical change has been assumed whereby the short lanes have been extended, utilising a small section of the widened footways for car parking. These physical changes are illustrated at Appendix T.

5.9.5 The following tables report the existing cycle time results against the mitigation cycle time.

	AM		PM	
	PRC (%)	Delay (PCUhrs)	PRC (%)	Delay (PCUhrs)
Reference Case (no LTC)	**53.8**	143.44	**59.3**	243.56
Preferred Local Plan (no LTC)	**58.3**	160.07	**58.7**	265.60
Preferred Local Plan (no LTC) – OPT	-17.6	109.75	-23.6	159.63

	AM		PM	
	PRC (%)	Delay (PCUhrs)	PRC (%)	Delay (PCUhrs)
Reference Case (with LTC)	**51.0**	143.86	**62.0**	225.81
Preferred Local Plan (with LTC)	**57.3**	167.95	**56.9**	242.50

Preferred Local Plan (with LTC) - OPT	-20.8	131.04	-23.1	164.68

5.9.6 The full output for models before and after mitigation can be found in Appendix U and V respectively.

5.9.7 It is noted from the above table that the adjusted cycle time, stages and optimisation brings the traffic effects of the Preferred Local Plan scenario below that of the Reference Case or within capacity.

6 Local road network – B roads

6.1.1 The following section considers each of the B road junctions identified within the Stage 3b report as potentially requiring mitigation as a result of the preferred Local Plan being implemented.

6.1.2 For each junction considered, a stand alone junction model has been created using Junctions 10, for roundabout and priority junctions, or LinSig, for signal controlled junctions. Each of the models adopts the traffic flows from the LTAM SATURN model and on-site geometry calculated and recorded from aerial photography.

6.1.3 As a worst case assessment the 0% mode shift traffic flows have been used to represent the Local Plan scenario traffic flows.

6.2 B255 / Castlebridge Drive

6.2.1 The B255 / Castlebridge Drive is a 3-arm signal controlled junction within Greenhithe, located to the north of Bluewater shopping centre.

6.2.2 The junction was modelled using Linsig software and set up using the same parameters for phasing, stages, and timings as per the LTAM SATURN model scenarios. This assumes a cycle time of 90s for all scenarios and results in negative PRC values for some of the scenarios.

6.2.3 To mitigate this, the cycle time and signal timings have been analysed and reconfigured to allow the signals to optimise within that period. The following table reports the existing 90s cycle time results against the mitigation optimised 90s cycle time.

	AM		PM	
	PRC (%)	Delay (PCUhrs)	PRC (%)	Delay (PCUhrs)
Reference Case (no LTC)	**16.5**	78.4	**0.9**	28.88
Preferred Local Plan (no LTC)	**17.5**	85.47	**8.7**	41.94
Preferred Local Plan (no LTC) – OPT	52.0	6.24	61.6	5.96

	AM		PM	
	PRC (%)	Delay (PCUhrs)	PRC (%)	Delay (PCUhrs)
Reference Case (with LTC)	**13.5**	58.31	10.3	21.94
Preferred Local Plan (with LTC)	**14.2**	63.31	**2.3**	28.79
Preferred Local Plan (with LTC) - OPT	56.3	6.08	71.5	5.39

6.2.4 The full output for models before and after mitigation can be found in Appendix W and X respectively.

6.2.5 It is noted from the above table that the optimised cycle time brings the traffic effects of the Preferred Local Plan scenario below that of the Reference Case or within capacity.

6.3 B255 / Mounts Road

6.3.1 The B255 / Mounts Road junction is a 3-arm signal controlled junction within Greenhithe, located to the north of Bluewater shopping centre.

6.3.2 The junction is configured to run more as a give-way from Mounts Road onto the B255 with the signals along the B255 giving priority to bus movements when required.

6.3.3 The junction was modelled using Linsig software and set up using the same parameters for phasing, stages, and timings as per the LTAM SATURN model scenarios. This assumes a cycle time of 90s for all scenarios and results in negative PRC values for some of the scenarios.

6.3.4 To mitigate this, the cycle time and signal timings have been analysed and reconfigured to allow the signals to optimise within that period. The following table reports the existing 90s cycle time results against the mitigation optimised 90s cycle time.

	AM		PM	
	PRC (%)	Delay (PCUhrs)	PRC (%)	Delay (PCUhrs)
Reference Case (no LTC)	**228.3**	180.65	**139.6**	109.94
Preferred Local Plan (no LTC)	**233.1**	184.60	**209.6**	166.51
Preferred Local Plan (no LTC) – OPT	43.8	11.48	18.8	15.06

	AM		PM	
	PRC (%)	Delay (PCUhrs)	PRC (%)	Delay (PCUhrs)
Reference Case (with LTC)	**215.8**	170.43	**80.7**	62.28
Preferred Local Plan (with LTC)	**225.5**	178.41	**195.0**	154.46
Preferred Local Plan (with LTC) - OPT	45.9	11.25	25.4	13.48

6.3.5 The full output for models before and after mitigation can be found in Appendix Y and Z respectively.

6.3.6 It is noted from the above table that the optimised cycle time brings the traffic effects of the Preferred Local Plan scenario below that of the Reference Case or within capacity.

6.4 B255 Southbound to Bean

6.4.1 This has not been modelled as it is not a junction which can be assessed using Junctions 10 or LinSig, but rather a junction exit arm leading to a merge. To analyse the current layout of this junction, a merge assessment has been completed similar to that completed earlier in this report.

6.4.2 The tables below summarise the flows (factored) which have been assessed for this slip road for the “no LTC” scenario and “With LTC” scenario.

Scenario (no LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	1,830	165	1,782	781
Preferred LP	1,901	222	1,908	824
Preferred LP + 15% shift	1,883	213	1,871	793
Preferred LP + 30% shift	1,876	206	1,852	771

Scenario (with LTC)	AM peak hour		PM peak hour	
	Upstream	Merge / Diverge flow	Upstream	Merge / Diverge flow
Reference	1,719	171	1,734	778
Preferred LP	1,844	236	1,843	829
Preferred LP + 15% shift	1,826	224	1,831	810
Preferred LP + 30% shift	1,814	216	1,831	799

6.4.3 Transferring the above traffic flows on to CDD122 Figure 3.12b results in the layout outputs summarised in the table below.

Scenario (no LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	F	F	2	4	2
Reference	A	A	2	2	1
Preferred LP	A	A	2	2	1
Preferred LP + 15% shift	A	A	2	2	1
Preferred LP + 30% shift	A	A	2	2	1

Scenario (with LTC)	Merge / Diverge layout		Upstream mainline	Downstream mainline	Connector road lanes
	AM	PM			
Current layout	F	F	2	4	2
Reference	A	A	2	2	1
Preferred LP	A	A	2	2	1
Preferred LP + 15% shift	A	A	2	2	1
Preferred LP + 30% shift	A	A	2	2	1

6.4.4 It is noted from the tables above that the inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario in the "with LTC" scenario. The result of this analysis shows that the capacity is much higher than what is currently modelled to go through this area of the model.

6.5 B260 / Darenth Hill

6.5.1 The B260 / Darenth Hill junction is a three-arm mini-roundabout located to the south east of Dartford Town Centre, located between Darenth and Lane End. The following table shows the mini geometry of the roundabout, as recorded from aerial photography.

	B260 (N)	B260 (S)	Darenth Hill
Approach road half-width (m)	3.31	2.56	3.11
Minimum approach road half-width (m)	3.31	2.56	3.11
Entry width (m)	3.93	4.20	3.26
Effective flare length (m)	3.5	4.7	27.4
Distance to next arm (m)	11.84	13.34	11.40
Entry corner kerb line distance (m)	10.15	10.40	8.37

6.5.2 The model was constructed using the geometry values above and the demand flows and percentage HGVs extracted from the LTAM SATURN models. The results output from the model were reviewed to check whether the junction was still predicted to require mitigation using this software.

6.5.3 The junction was predicted to require mitigation based upon the LTAM traffic flows and the table below summarises the geometry for a potential mitigation scheme at the junction.

	B260 (N)	B260 (S)	Darenth Hill
Approach road half-width (m)	3.31	2.56	3.11
Minimum approach road half-width (m)	3.31	2.56	3.11
Entry width (m)	4.50	4.50	4.50
Effective flare length (m)	15.0	4.7	27.4
Distance to next arm (m)	11.84	13.34	11.40
Entry corner kerb line distance (m)	10.15	10.40	8.37

6.5.4 From the above tables, the changes to the geometry can be summarised as follows and as illustrated at Appendix AA:

- Increased Entry Width on B260 (N) from 3.93m to 4.50m,
- Increased Flare Length on B260 (N) from 3.5m to 15m,
- Increased Entry Width on B260 (S) from 4.2m to 4.5m,
- Increased Entry Width on Darenth Hill from 3.26m to 4.50m.

6.5.5 Whilst there appears to be verge width and highway boundary to achieve the above upgrades, this would be subject to checking with KCC highway boundary data and OS mapping data.

6.5.6 The following tables show the results for the Reference Case, the Preferred Local Plan scenario and Preferred Local Plan with mitigation. The top table summarises the results without LTC whilst the bottom table includes the LTC.

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
Ref no LTC (Existing Layout)						
B260 (N)	37.7	163.52	**1.07**	202.7	1103.97	**1.42**
B260 (S)	264.8	1150.14	**1.45**	108.8	498.33	**1.23**
Darenth Hill	287.4	1751.37	**1.58**	628.5	3892.07	**2.13**
Pref no LTC (Existing Layout)						
B260 (N)	40.8	173.89	**1.08**	215.3	1178.48	**1.44**
B260 (S)	269.4	1167.23	**1.46**	112.8	514.70	**1.24**
Darenth Hill	295.6	1799.52	**1.60**	640.1	3963.60	**2.15**
Pref no LTC (Mitigation Layout)						
B260 (N)	23.0	103.30	**1.01**	193.3	1015.05	**1.39**
B260 (S)	260.4	1090.12	**1.44**	106.6	485.04	**1.23**
Darenth Hill	101.5	486.50	**1.22**	385.5	1863.20	**1.63**

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
Ref with LTC (Existing Layout)						
B260 (N)	22.1	106.65	**1.01**	162.5	829.17	**1.34**
B260 (S)	197.1	828.46	**1.37**	95.4	429.26	**1.20**
Darenth Hill	269.9	1580.97	**1.54**	621.6	3804.43	**2.12**
Pref with LTC (Existing Layout)						
B260 (N)	26.1	121.56	**1.03**	178.0	918.44	**1.37**
B260 (S)	202.4	847.93	**1.37**	99.4	449.21	**1.21**

Darenth Hill	276.3	1625.00	**1.55**	639.5	3891.20	**2.14**
Pref no LTC (Mitigation Layout)						
B260 (N)	13.9	69.23	0.97	153.0	752.76	**1.32**
B260 (S)	192.2	798.33	**1.36**	95.3	424.28	**1.20**
Darenth Hill	91.9	424.11	**1.20**	381.2	1811.01	**1.62**

6.5.7 The full output for models before and after mitigation can be found in Appendix AB and AC respectively.

6.5.8 It is noted that the mitigation measures considered bring the operation of the junction back to Reference Case and / or within theoretical maximum capacity. An assumption of 15% to 30% mode switching would be expected improve the operation of the junction further.

6.6 B262 / Springhead Road

6.6.1 The B262 / Springhead Road junction is a four-arm roundabout located in Springhead, Northfleet to the east of Dartford. The following table shows the geometry of the roundabout, as recorded from aerial photography.

	Springhead Road	Hall Road (E)	Hall Road (S)	Supermarket Access
Approach road half-width (m)	3.52	3.04	6.48	5.15
Entry width (m)	7.05	10.40	11.34	7.94
Effective flare length (m)	9.1	12.7	29.9	5.5
Entry radius (m)	29.6	53.7	21.3	29.7
Inscribed circle diameter (m)	49.6	49.8	49.9	49.8
Conflict (entry) angle (deg)	22.4	37.6	27.5	28.3

6.6.2 The model was constructed using the geometry values above and the demand flows and percentage HGVs extracted from the LTAM SATURN models. The results output from the model were reviewed to check whether the junction was still predicted to require mitigation using this software.

6.6.3 The junction was predicted to require mitigation based upon the LTAM traffic flows and the table below summarises the geometry for a potential mitigation scheme at the junction.

	Springhead Road	Hall Road (E)	Hall Road (S)	Supermarket Access
Approach road half-width (m)	3.52	3.04	6.48	5.15
Entry width (m)	7.05	10.40	11.34	7.94
Effective flare length (m)	12.0	15.0	29.9	8.0
Entry radius (m)	29.6	53.7	21.3	29.7
Inscribed circle diameter (m)	49.6	49.8	49.9	49.8

Conflict (entry) angle (deg)	22.4	37.6	27.5	28.3

6.6.4 From the above tables, the changes to the geometry can be summarised as follows and as illustrated at Appendix AD:

- Increased Flare Length on Springhead Road from 9.1m to 12m,
- Increased Flare Length on Hall Road (E) from 12.7m to 15m,
- Increased Flare Length on Supermarket access from 5.5m to 8m.

6.6.5 Whilst there appears to be verge width and highway boundary to achieve the above upgrades, this would be subject to checking with KCC highway boundary data and OS mapping data.

6.6.6 The following tables show the results for the Reference Case, the Preferred Local Plan scenario and Preferred Local Plan with mitigation. The top table summarises the results without LTC whilst the bottom table includes the LTC.

	AM			PM		
	Queue (Veh)	**Delay (s)**	**RFC**	**Queue (Veh)**	**Delay (s)**	**RFC**
Ref no LTC (Existing Layout)						
Springhead Road	7.3	31.28	0.89	112.3	572.36	**1.35**
Hall Road (E)	46.2	132.61	**1.07**	12.4	52.40	0.95
Hall Road (S)	2.3	4.37	0.70	4.6	7.19	0.82
Supermarket Access	0.1	5.76	0.12	38.0	277.45	**1.19**
Pref no LTC (Existing Layout)						
Springhead Road	10.2	42.77	0.93	135.9	667.77	**1.36**
Hall Road (E)	55.2	155.64	**1.09**	12.7	53.49	0.95
Hall Road (S)	2.6	4.72	0.72	5.1	7.89	0.84
Supermarket Access	0.1	6.13	0.13	53.9	388.28	**1.31**
Pref no LTC (Mitigation Layout)						
Springhead Road	5.0	20.36	0.84	86.8	357.86	**1.25**
Hall Road (E)	9.6	32.10	0.92	5.3	22.03	0.85
Hall Road (S)	2.6	4.76	0.73	5.1	7.89	0.84
Supermarket Access	0.1	5.44	0.12	25.2	186.63	**1.09**

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
Ref with LTC (Existing Layout)						
Springhead Road	4.8	21.69	0.84	109.4	553.88	**1.30**
Hall Road (E)	21.8	71.11	1.00	12.8	51.77	0.95
Hall Road (S)	2.4	4.39	0.71	4.8	7.42	0.83
Supermarket Access	0.1	5.77	0.12	55.3	374.23	**1.29**
Pref with LTC (Existing Layout)						
Springhead Road	8.7	37.52	0.91	125.8	629.62	**1.31**
Hall Road (E)	34.2	103.71	**1.04**	12.5	50.47	0.95
Hall Road (S)	2.7	4.74	0.73	5.5	8.30	0.85
Supermarket Access	0.1	6.16	0.13	73.7	503.29	**1.44**
Pref no LTC (Mitigation Layout)						
Springhead Road	4.5	18.88	0.83	77.4	347.47	**1.21**
Hall Road (E)	6.6	22.42	0.88	5.3	21.15	0.85
Hall Road (S)	2.7	4.76	0.73	5.5	8.30	0.85
Supermarket Access	0.1	5.44	0.12	41.9	277.87	**1.19**

6.6.7 The full output for models before and after mitigation can be found in Appendix AE and AF respectively.

6.6.8 It is noted that the mitigation measures considered bring the operation of the junction back to Reference Case and / or within theoretical maximum capacity. An assumption of 15% to 30% mode switching would be expected improve the operation of the junction further.

7 Summary

7.1.1 DBC has been provided with the Dartford Cordon of the Lower Thames Area Model (DCLTAM) by National Highways and this forms a key component of the Local Plan strategic transport modelling appointment.

7.1.2 Stantec has been appointed by DBC to provide strategic modelling evidence in support of their emerging Local Plan. Stantec's remit is to review and update the DCLTAM to create a base year model and forecast year model and use this for Local Plan option testing.

7.1.3 This report has been prepared to consider the output from the Stage 3 modelling with respect to the junctions it identifies that may require consideration for mitigation as Local Plan development comes forward.

7.1.4 The assessment completed provides an overview of the traffic movements within the Borough as a result of the various scenarios tested. The outputs allow identification of locations where the operation of particular junctions is expected to deteriorate as a result of the Local Plan scenario being considered and is hence valuable in determining locations where mitigation measures may be required.

7.2 Strategic Road Network

7.2.1 With respect to the SRN, the Stage 3b report identifies a number of key findings in relation to the M25 / A282 corridor and A2 corridor. Detailed junction modelling of the SRN junctions may be required as Local Plan development sites come forward. This will need to be determined through a scoping exercise with the highway authority, as is typical. At the request of NH this was considered appropriate to review the merge / diverge movements predicted by the Stage 3 strategic modelling work.

7.2.2 Document CD122 has been used to adjust the assessment vehicle flows (from the LTAM modelling) to allow for uphill gradients and percentage of HGV flow. By using the resulting factored flows, analysis is completed for each of the junction merges and diverges. In general terms, the merge / diverge analysis showed the following:

7.2.3 M25 / A282 Junction 1a - The inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario for any of the merges or diverges.

7.2.4 M25 / A282 Junction 1b - The inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario for the merges or diverges with the exception of the following :

- Northbound A282 merge – The PM "no LTC" scenario changes from D to E when the Local Plan is implemented.
- Southbound A282 diverge – The PM "with LTC" scenario changes from A to C when the Local Plan is implemented. This category reverts back to category A when the 15% and 30% mode shift scenarios are considered.

7.2.5 M25 / A282 Junction 2 - The inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario for the merges or diverges with the exception of the following :

- Southbound M25 merge The AM "no LTC" scenario changes from F to "Exceeds" when the Local Plan is implemented.

- Southbound M25 diverge to roundabout – The PM "with LTC" scenario changes from C to A when the Local Plan is implemented and reverts back to A at 30% mode shift.

7.2.6 A2 / A2018 - The inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario for the merges or diverges with the exception of the following :

- Westbound A2 merge – The PM "with LTC" scenario changes from D to A when the Local Plan is implemented.
- Westbound A2 diverge – The PM "with LTC" scenario, the PM category changes from C to A when the Local Plan is implemented.

7.2.7 A2 Bean Junction - The inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario for the merges or diverges with the exception of the following :

- Eastbound A2 merge – The AM "with LTC" scenario changes from A to B when the Local Plan is implemented.
- Eastbound A2 diverge - The AM "no LTC" scenario changes from C to D when the Local Plan is implemented. The AM "with LTC" scenario changes from C to D when the Local Plan is implemented and this reverts back to C with a 30% mode shift.
- Westbound A2 diverge - The AM "no LTC" scenario changes from B to "Exceeds" when the Local Plan is implemented.

7.2.8 A2 Ebbsfleet Junction - The inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario for the merges or diverges with the exception of the following :

- Westbound A2 merge – The PM "with LTC" scenario changes from E to "Exceeds" when the Local Plan is implemented.

7.2.9 A2 Pepper Hill Junction - The inclusion of the Local Plan does not alter the layout category when compared to the Reference Case scenario for the merges or diverges with the exception of the following :

- Westbound A2 merge – The PM "with LTC" scenario changes from D to A when the Local Plan is implemented.
- Westbound A2 diverge – The PM "with LTC" scenario changes from C to A when the Local Plan is implemented.

7.3 Local Road Network

7.3.1 With respect to the LRN (A roads and B roads) the Stage 3b report identifies a number of junctions that require further consideration. Further modelling analysis demonstrates the following:

- A206 / Galleon Boulevard – adjustments to the geometry would provide mitigation to offset the effects of Local Plan traffic.
- A225 Lowfield Street / B2174 Princes Road - adjusted cycle time, stages and optimisation brings the traffic effects of the Preferred Local Plan scenario below that of the Reference Case or within capacity.

- A225 / Parsonage Lane – adjustments to the geometry would provide mitigation to offset the effects of Local Plan traffic.
- A226 / Park Road – adjustments to the geometry would provide mitigation to offset the effects of Local Plan traffic.
- A226 / Great Queen Street - Great Queen Street is a constrained side road. It is possible that excessive use of this junction is a LTAM route assignment issue. Detailed consideration of this junction would need to be given by Transport Assessments supporting future planning applications.
- A226 / Cotton Lane - longer cycle time and optimisation brings the traffic effects of the Preferred Local Plan scenario below that of the Reference Case or within capacity.
- A226 / Hillhouse Road – Hillhouse Road is a constrained side road. It is possible that excessive use of this junction is a LTAM route assignment issue. Detailed consideration of this junction would need to be given by Transport Assessments supporting future planning applications.
- A2018 Shepherds Lane / B2174 Princes Road - adjusted cycle time, stages and optimisation brings the traffic effects of the Preferred Local Plan scenario below that of the Reference Case or within capacity.
- B255 / Castlebridge Drive – an optimised cycle time brings the traffic effects of the Preferred Local Plan scenario below that of the Reference Case or within capacity.
- B255 / Mounts Road - an optimised cycle time brings the traffic effects of the Preferred Local Plan scenario below that of the Reference Case or within capacity.
- B255 Southbound to Bean - This has not been modelled as it is not a junction which can be assessed using Junctions 10 or LinSig, but rather a junction exit arm leading to a merge.
- B260 / Darenth Hill – adjustments to the geometry would provide mitigation to offset the effects of Local Plan traffic.
- B262 / Springhead Road – adjustments to the geometry would provide mitigation to offset the effects of Local Plan traffic.

7.3.2 The above is subject to confirming highway boundary data with KCC and using OS mapping data.

7.4 Conclusions

7.4.1 On the basis of the strategic modelling of the transport impacts of the Preferred Local Plan scenario it is considered that in general, across both the strategic and local road networks, the Preferred Local Plan scenario is unlikely to have a significant impact when compared with the Reference Case.

7.4.2 However, it is recognised that the use of the strategic LTAM model, to determine the location and magnitude of a scenario's effect, would need to be supplemented with more detailed modelling to confirm whether mitigation is indeed required at a specific location and the extent of that mitigation. It is also recognised that there are complexities associated with both the strategic and local road networks within the Borough where more detailed modelling may be necessary, for example the possible interaction between junctions or the impact of constraints on the network.

7.4.3 On the strategic road network further detailed studies may be necessary for the M25(A282) Junction 1a, A2/A2018 junction and the A2 Bean Interchange to demonstrate the ability to serve planned development for both the Reference Case and Local Plan scenarios. Detailed consideration of these junctions would also need to be given by Transport Assessments supporting future planning applications that generate traffic passing through these junctions. This would be a matter for discussion during the pre-application scoping exercise and would need to be supported with empirical survey data. If capacity issues are confirmed and mitigation measures required these would need to be considered in conjunction with the cumulative impacts of other proposed developments to ensure that an effective solution is delivered.

7.4.4 The additional review of the merge / diverge movements on the strategic road network showed that there were limited instances where it was indicated that the layout under Local Plan Preferred scenario may need to change when compared with the Reference Case. In a number of cases, however, this needs to be set within the context of the existing current layout.

7.4.5 On the local road network it is anticipated that the impact of the Local Plan Preferred scenario on those junctions that were identified as being over capacity could be mitigated such that the capacity was improved to that of the Reference Case or better. The exceptions were the A226/Great Queen Street and A226/Hillhouse Road junctions where constraints mean that there is little prospect of achieving physical capacity upgrades. Detailed consideration of these junctions would also need to be given by Transport Assessments supporting future planning applications that generate traffic passing through these junctions. This could be supported by empirical survey data. This would be a matter for discussion during the pre-application scoping exercise. Associated development may (as required) suitably support sustainable transport measures, to secure a further modal shift away from private vehicle use, where physical capacity improvements may be neither achievable or effective.

7.4.6 The impact of modal shift on the identified junctions on the local road network was not specifically tested, but in general considered to have a beneficial effect in addition to the mitigation measures that were tested.

7.4.7 The impact of a wider application of modal shift has not been assessed at this stage although it is understood that DBC is pursuing a more sustainable approach to development through the location of development predominantly within the major urban centres of Central Dartford and Ebbsfleet Garden City and through the promotion of a sustainable transport strategy.

7.4.8 For those junctions on the local road network that are approaching their capacity, the application of a wider modal shift, as a result of implementing a Borough wide sustainable transport strategy could have beneficial impacts on both these junctions and those already identified.