Medway LTC Support **20/06/2023**

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MEDWAY LTC SUPPORT

LOWER THAMES CROSSING IMPACT ASSESSMENT

SYSTRA

MEDWAY LTC SUPPORT

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1.1 SYSTRA has been commissioned by Medway Council (the Council) to assess the impact of the proposed Lower Thames Crossing (LTC) on the local traffic network in Medway, for the opening year of 2030 and the forecasting year of 2037.

1.1.2 The LTC is a proposed vehicular connection across the River Thames between the A2 and M2 in Kent to the south and the M25 to the north, crossing the river via two bored tunnels. The proposed development boundary of the LTC sits adjacent to Medway's administrative boundary.

1.1.3 Technical assessment of the impacts of LTC in Medway has been carried out using the Lower Thames Area Model (LTAM) supplied by National Highways (NH) and the Medway Aimsun Model (MAM) supplied by the Council, as discussed further later in this document. As part of the Development Consent Order (DCO) submission for LTC, a Transport Assessment (TA) has been prepared on behalf of NH, which provides an operational impact assessment of the LTC on the surrounding highway network, including within Medway. This Technical Report has taken into consideration the outputs presented in the TA; however, it is noted that this report is an independent document that has been prepared by SYSTRA to provide support to the Council, and is not intended to directly inform or respond to the DCO application.

1.1.4 The Council had previously used the MAM to inform Medway's Strategic Transport Assessment (STA) in September 2021. A selection of the scenarios developed for the STA were used to inform the current technical assessment of the LTC within the MAM. A review of the existing MAM scenarios was undertaken at the early stages of the project to confirm which of the existing scenarios to process alongside new scenarios to develop.

1.1.5 This Technical Report describes the methodology that was followed to review the LTAM model and extract necessary inputs to feed into the MAM model. Next, the report outlines the methodology followed to match the LTAM to MAM in order to transfer the additional vehicular demand associated with the LTC to MAM.

1.1.6 The report outlines the scenario runs that were undertaken, providing Level of Service (LoS) outputs for the junctions of interest, including main junctions and roundabouts in the Medway local or strategic network. Journey times and network statistics are also provided for a general comparison between the scenarios.

1.1.7 Based on the outputs, six mitigation schemes were identified and tested in the locations subject to the most adverse impacts following implementation of the LTC. Assessments both with and without mitigation have been undertaken to allow comparison of LoS outputs with and without the mitigation schemes.

1.1.8 Technical work has been informed by discussions with the Council and NH throughout the lifespan of the commission.

2. MODELLING METHODOLOGY

2.1 LTAM Overview

2.1.1 The LTAM is a strategic SATURN model with detailed representation of the highway network in the area surrounding the proposed LTC route. The model was developed by NH.

2.1.2 A cordoned area of the LTAM has been provided to the Council by NH to enable an informed assessment of the potential impacts of the LTC scheme on the road network in Medway.

2.1.3 The LTAM outputs were interrogated by SYSTRA in summer 2022 to inform the consultation feedback in autumn 2022.

2.1.4 The model scenarios provided by NH include:

- Do Minimum (DoM) (no LTC scheme); and
- Do Something (DoS) (with the LTC Scheme).

2.1.5 The model base year is 2016, and the opening year is modelled as 2030 with additional future years of 2037, 2045 and 2051 also assessed.

2.1.6 For the purposes of looking at the roads within Medway, the 2030 opening year and 2037 forecasting year have been used throughout SYSTRA's assessments. The 2037 year was chosen to align with the lifespan of the Medway Local Plan update.

2.1.7 Overall, the results of the LTAM model runs showed that:

- Changes in traffic flow are concentrated on the strategic road network, with the forecast changes on local roads much lower; and
- The locations where junctions are likely to struggle as a result of the LTC are concentrated on the strategic roads and roads on the boundary of Medway.

2.1.8 Detailed results of LTAM assessment work are provided in Appendix A.

2.2 MAM Overview

2.2.1 The MAM is an Aimsun Next model, developed by the Council, comprising the whole of the Medway local authority area and extending southwards to incorporate junctions 4 to 6 of the M20 motorway. It also includes a surrounding buffer area that provides route choice into the main area of the model.

2.2.2 The overall network in MAM is organised into subnetworks to cover areas that are expected to come under pressure. Subnetworks 1 to 8 were previously developed and contained in the model, while SYSTRA developed a new subnetwork (subnetwork 9) as a part of the LTC assessment following discussions with the Council. Subnetwork 9 covers the Cuxton and Halling area. The locations of the subnetworks are detailed in Table 1 and shown in Figure 1.

Table 1. Medway Aimsun Model Subnetworks

SUBNETWORK	LOCATION
1	Four Elms Hill / Four Elms Roundabout
2	Pier Road / A2
3	A2 (Mierscourt Road to Otterham Quay Lane / Meresborough Road section)
4	Strood and Chatham Town Centres
5	M2 Junctions 2 to 4
6	Gillingham Town Centre
7	Lower Rainham Road
8	A249 (A2 to M20)
9	A228 Cuxton & Halling

Figure 1. Medway Aimsun Model Subnetwork Locations

2.2.3 Subnetwork 9 was developed to include a stretch of A228 on the western edge of Medway from Cuxton in the north to Snodland in the south, as the Council expects adverse impacts associated with traffic generated by the LTC on this section of the A228.

2.2.4 The MAM incorporated scenarios for 2026 and 2037; however, to align with LTAM model years, assessment work within the MAM was carried out for 2030 (opening year for the LTC) and 2037 (forecast year). Four scenarios were tested as part of this study, each covering the standard network peak hours:

- 2030 & 2037 LTAM Core without LTC – the scenarios comprise Do Minimum demand from LTAM and the network includes committed highway improvements for the relevant year;
- 2030 & 2037 LTAM Core with LTC – the scenarios comprise Do Something demand from LTAM and the network includes committed highway improvements for the relevant year;
- 2030 & 2037 Local Plan (LP) without LTC – the scenarios comprise Local Plan demand from MAM (including the residential, employment and education allocations proposed as part of the Local Plan) and the network includes committed highway improvements for the relevant year. The 2037 scenarios include currently proposed highway mitigations based on the Local Plan; and
- 2030 & 2037 Local Plan (LP) with LTC – the scenarios comprise Local Plan demand from MAM (including the residential, employment and education allocations proposed as part of the Local Plan) with the addition of the LTAM difference demand between the Do Something and the Do Minimum. The network includes committed highway improvements for the relevant year. The 2037 scenarios include currently proposed highway mitigations based on the Local Plan.

2.2.5 MAM already contained Local Plan demands without LTC. Scenarios 2030 & 2037 Local Plan with LTC, 2030 & 2037 LTAM Core without LTC and 2030 & 2037 LTAM Core with LTC were created in the model by SYSTRA, for the purpose of this study. Mitigation schemes as included in the STA were coded in to MAM for the 2037 scenarios.

2.2.6 The model period is 08:00 to 09:00 for the morning peak and 17:00 to 18:00 for the evening, and also includes a 15-minute warm up and 60-minute cool down.

2.2.7 This study preserves the MAM static route choice methodology with macroscopic static assignments utilising volume delay and turn penalty functions. A Method of Successive Averages (MSA) assignment was used for the macroscopic model runs. The MSA static assignment will converge when either the maximum number of iterations or the desired relative gap are reached. A path assignment was created from each macroscopic scenario which was used by vehicles in the microscopic model. A Stochastic Route Choice was assigned in the microscopic level scenarios, with up to 15% of vehicles following the dynamic paths, allowing them to reroute around congestion. The relative gap was maintained from the MAM.

2.3 Demand Development

2.3.1 Demand for LTAM Core with / without LTC scenarios for 2030 and 2037 was inserted from the LTAM matrices, by matching the LTAM zones with corresponding MAM zones. The Do Minimum demand was used for the LTAM Core without LTC scenarios. The Do Something demand was used for the LTAM Core with LTC scenarios.

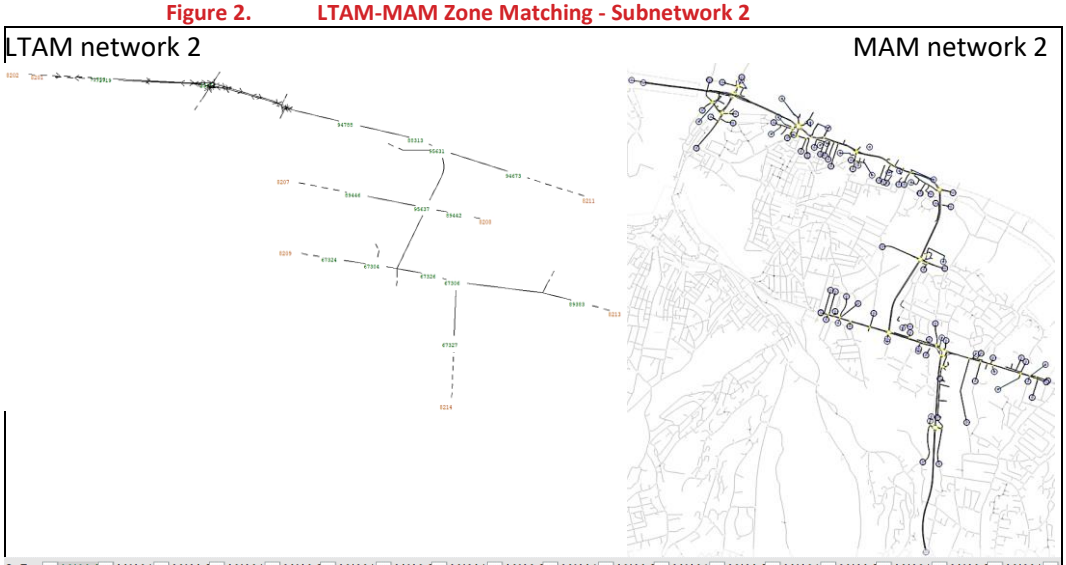
2.3.2 Demand for LP without LTC scenarios was taken directly from the existing MAM Local Plan demand.

2.3.3 Demand for LP with LTC scenarios was created by adding the flow differences between LTAM Do Something and Do Minimum to MAM Local Plan demand. The process is discussed further in this section.

2.3.4 The 2026 MAM demand was updated to 2030. The MAM model did not include a 2030 scenario, so linear interpolation was used to estimate the likely build-up of traffic to the LTC opening year of 2030. Previous MAM testing was focused on 2037 as the 'end of Plan' year, so this has been carried forward to the current model testing.

2.3.5 LTAM and MAM zones for each subnetwork were matched based on their geographic location. LTAM zones were less detailed than MAM zones resulting, in some cases, in matching one LTAM zone with multiple MAM zones. Figure 2 as an example shows 16 LTAM zones matched with 100 MAM zones. Wherever possible, a breakdown from MAM Base was used to balance the demand between adjacent zones to ensure that traffic covers the entire network, especially the local roads that do not exist in the strategic model. Nonetheless, it should be noted that during this process it has not always been possible to match the granularity of the microsimulation model.

Figure 2. LTAM-MAM Zone Matching - Subnetwork 2



SatZone	MAM_C	MAM_li	MAM_C	MAM_li	MAM_C	MAM_li	MAM_C	MAM_li	MAM_C	MAM_li	MAM_C	MAM_li	MAM_C	MAM_li	MAM_C	MAM_li	MAM_C	MAM_li
7133	60192	59942	60182	59916	60139	60139												
7136	60149	59885																
8201	60151																	
8202		59966																
8203	60220	60066	60157	59897	60211	59987	60156	59893	60148	59884	60203	59953	60094	60094				
8204	60212	60067	60155	59892	60078	60078												
8205	60091	60091	60075	60075														
8206	60159	59899	60154	59889	60219	60064	60073	60073	60071	60071	60158	59898	60089	60089				
8207	60206	60068																
8208	60196	59947	60205	59955	60072	60072												
8209	60177	59911	60178	59912	60214	59990	60185	59919	60179	59913	60207	59944	60202	59952	60194	60194	60181	59915
8210	60150	60069																
8211	60213	59989																
8212	60188	59925																
8213	60077	60077	60187	59923	60218	60038	60175	59905	60174	59904								
8214	60079	60079			60147	59883	60230	59882	60184	59918	60204	59954						

2.3.6 For some of the subnetworks, MAM had multiple zone configurations for different scenarios resulting in different zone ID numbers across scenarios for the same MAM zone. Similarly some of the LTAM networks had different IDs for the same zone across different scenarios. In such cases, the matching shown in Figure 2 was carried out multiple times.

2.3.7 The seven MAM user classes were matched to ten LTAM user classes as summarised in Table 2.

Table 2. LTAM-MAM User Class Matching

MAM USER CLASS	DESCRIPTION	LTAM USER CLASS
1	Car (Home Base Work (HBW))	b. Cars – Commute Low Income c. Cars – Commute Medium Income d. Cars – Commute High Income

MAM USER CLASS	DESCRIPTION	LTAM USER CLASS
2	LGV (HBW)	33% h. Light Goods Vehicles
3	Car (Non-Home Based Work (NHBW))	a. Cars – Employers Business
4	LGV (NHBW)	34% h. Light Goods Vehicles
5	HGV (NHBW)	i. Heavy Goods Vehicles – Non-Port j. Heavy Goods Vehicles – Port
6	Car (Home Base Other + Non-Home Based Other (HBO+NHBO))	e. Cars – Other Low Income f. Cars – Other Medium Income g. Cars – Other High Income
7	LGV (HBO+NHBO)	33% h. Light Goods Vehicles

2.3.8 MAM subnetwork limits were drawn into LTAM to export cordon matrices. The DoM and DoS demands extracted from LTAM were imported in the MAM Core without LTC and Core with LTC scenarios respectively, based on the zone matching exercise described above.

2.3.9 Demand from MAM's base Local Plan scenario was used for Local Plan without LTC scenarios.

2.3.10 To determine Local Plan with LTC scenario demand, the difference between Do Something and Do Minimum scenario demands from LTAM was calculated. The zone translation and balancing as discussed above was applied to the LTAM difference and this matrix was added to the LP without LTC matrices. Any zone pairs where the end result was a negative number of trips were ignored, resulting in a difference of 4% of trips for 2030 and 7% for 2037 across all subnetworks, morning and evening combined.

2.3.11 The profile or 'peakiness' of the demand across the modelled hours as available in MAM was retained through the process and the final demand used for the four scenarios discussed in this report was profiled accordingly.

2.4 MAM Scenarios

2.4.1 Table 3 provides an overview of all the scenarios tested in MAM. Figure 3 provides a detailed breakdown of the resulting 144 scenarios tested in MAM, classified by subnetwork and year.

Table 3. MAM Scenarios Overview

SCENARIO		YEAR/PERIODS	DEMAND	NETWORK
LTAM Core	Without LTC	2030 AM/PM	DoM Demand from LTAM	Committed highway improvements
		2037 AM/PM	DoM Demand from LTAM	Committed highway improvements
	With LTC	2030 AM/PM	DoS Demand from LTAM	Committed highway improvements
		2037 AM/PM	DoS Demand from LTAM	Committed highway improvements

Local Plan	Without LTC	2030 AM/PM	LP Demand	Committed highway improvements
		2037 AM/PM	LP Demand	Committed highway improvements + 2037 LP mitigations
	With LTC	2030 AM/PM	LP Demand + LTAM Demand	Committed highway improvements
		2037 AM/PM	LP Demand + LTAM Demand	Committed highway improvements + 2037 LP mitigations

Figure 3. MAM Scenarios Detailed Breakdown

Subnetwork	Scenarios	Core without LTC				Core with LTC				LP without LTC				LP with LTC			
	Year	2030		2037		2030		2037		2030		2037		2030		2037	
	Period	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	Geometry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Demand	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Static routes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Micro Scenario	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Results	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Geometry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Demand	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Static routes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Micro Scenario	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Results	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Geometry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Demand	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Static routes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Micro Scenario	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Results	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Geometry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Demand	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Static routes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Micro Scenario	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Results	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Geometry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Demand	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Static routes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Micro Scenario	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Results	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	Geometry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Demand	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Static routes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Micro Scenario	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Results	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	Geometry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Demand	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Static routes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Micro Scenario	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Results	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	Geometry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Demand	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Static routes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Micro Scenario	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Results	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	Geometry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Demand	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Static routes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Micro Scenario	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Results	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

2.4.2 Table 4 provides an overview of the total demand (number of trips) for all vehicle user classes per scenario.

Table 4. Total number of trips per scenario

SUBNETWORK	YEAR	CORE WITHOUT LTC		CORE WITH LTC		LP WITHOUT LTC		LP WITH LTC	
		AM	PM	AM	PM	AM	PM	AM	PM
1	2030	8,776	9,824	9,047	9,932	16,438	14,570	16,745	14,757
	2037	9,955	10,046	9,776	10,806	20,579	17,046	21,817	18,134
2	2030	15,389	17,690	15,367	17,642	21,214	21,508	21,151	21,643
	2037	16,008	18,227	16,015	16,766	21,951	21,476	22,840	31,985
3	2030	3,785	4,326	3,787	4,350	5,144	5,309	5,118	5,455
	2037	3,920	4,537	3,927	4,555	5,013	5,083	5,223	5,428
4	2030	16,213	18,167	16,321	18,257	21,933	23,800	22,848	24,453
	2037	16,876	18,507	16,914	17,357	22,372	23,171	24,605	25,030
5	2030	21,235	23,364	24,148	26,100	27,722	32,660	32,270	37,382
	2037	22,944	24,635	25,726	27,251	29,673	35,053	37,132	41,766
6	2030	2,482	2,742	2,504	2,650	3,733	3,563	3,769	3,565
	2037	2,545	2,857	2,533	2,736	4,144	3,496	4,248	3,608
7	2030	7,091	8,428	7,110	8,445	11,931	11,494	11,908	11,499
	2037	7,348	8,739	7,351	8,723	12,076	11,654	12,392	12,035
8	2030	25,699	26,525	26,111	26,899	23,688	25,605	22,909	24,942
	2037	27,769	28,314	28,223	28,681	25,283	27,452	28,463	30,148
9	2030	4,306	4,888	4,699	5,119	4,315	5,439	4,945	5,650
	2037	4,507	5,140	4,919	5,332	4,833	6,212	5,895	6,842

3. MODELLING OUTPUTS

3.1 Level of Service

3.1.1 For consistency with previous Local Plan assessment undertaken by the Council, the Level of Service (LoS) metric as defined in the Highway Capacity Manual was used to review the average junction delay for the junctions of interest.

3.1.2 In order to define the LoS of a junction, the flow (vehicles per hour) and the queue delay (amount of time that vehicles remain under queueing status measured in seconds per vehicle) for each approach is calculated. The LoS of the junction is subsequently calculated as the average of the queue delay on each approach weighted by the flow on each approach.

3.1.3 Letters from A to F are used to evaluate the operational performance by junction type, with A being the best and F being the most adverse as summarised in Table 5. The junctions types can be either signalised or unsignalised.

Table 5. Level of Service Description for signalised and Unsignalised Junctions

LOS	CONTROL DELAY (SEC / VEHICLE) SIGNALISED	CONTROL DELAY (SEC / VEHICLE) UNSIGNALISED	DESCRIPTION
A	≤ 10	≤ 10	Free Flow
B	10-20	10-15	Stable Flow (slight delays)
C	20-35	15-25	Stable Flow (acceptable delays)
D	35-55	25-35	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	55-80	35-50	Unstable flow (congested and queues fail to clear)
F	>80	>50	Forced Flow (congested and queues fail to clear)

3.1.4 The results from MAM interrogations were processed to report the LoS at key junctions identified for each subnetwork as presented overleaf in Figure 4. Reported LoS for each subnetwork and each scenario is presented in Table 6.

3.1.5 It should be noted that within each subnetwork the model includes detailed interaction between junctions. This can mean that if one junction 'fails' then a downstream junction may appear to operate well, as less traffic reaches the downstream location due to the upstream failure. As such, some junctions can report a higher LoS than would occur in reality, including a better LoS in the 'with LTC' scenario compared to 'without LTC' scenario. The operation of each subnetwork should be considered holistically.

Figure 4. Junctions Analysed from MAM Interrogations

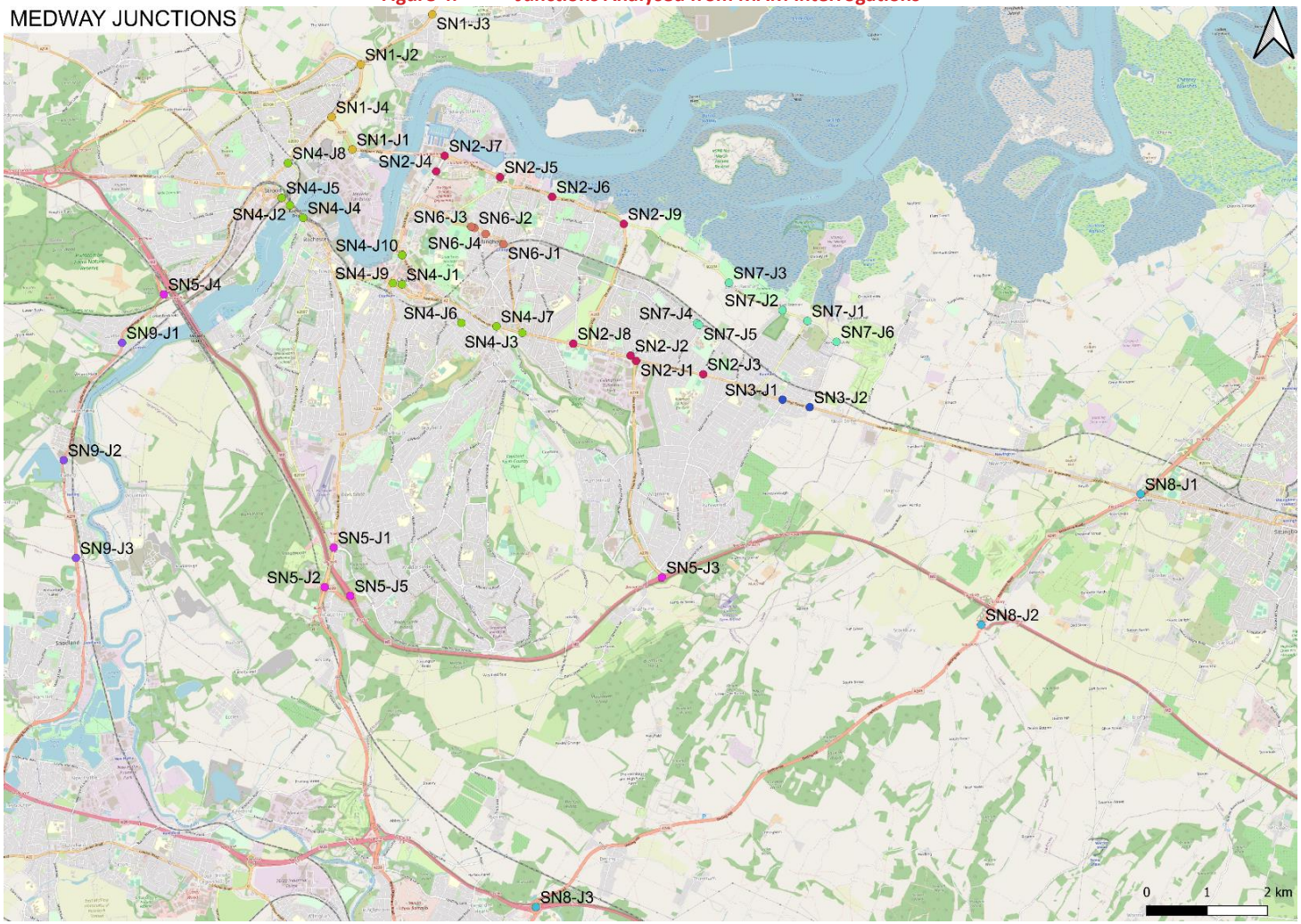


Table 6. LoS at Key Junctions (All Subnetworks & All Scenarios)

Subnetwork 1 - Four Elms Hill / Four Elms Roundabout									
AM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN1-J1	Anthony's Way Roundabout	A	A	A	A	D	C	E	F
SN1-J2	Four Elms Roundabout	F	F	F	F	F	A	F	F
SN1-J3	Main Hoo Road	A	B	A	B	B	F	F	F
SN1-J4	Sans Pareil Roundabout	A	A	A	A	B	B	C	F
PM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN1-J1	Anthony's Way Roundabout	F	F	F	F	E	C	F	F
SN1-J2	Four Elms Roundabout	F	F	F	F	F	E	F	F
SN1-J3	Main Hoo Road	A	A	A	A	A	F	F	F
SN1-J4	Sans Pareil Roundabout	B	A	A	C	E	A	D	F
Subnetwork 2 - Pier Road / A2									
AM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN2-J1	Bowater Roundabout	F	F	E	F	C	C	D	D
SN2-J2	Eastcourt Lane / South Avenue Junction	F	F	F	F	F	A	F	F
SN2-J3	London Road /Bloors Lane Junction	D	E	E	E	D	D	D	C
SN2-J4	Pembroke / Dock Road / Western Avenue / Maritime Way Roundabout	A	A	A	A	A	A	A	A
SN2-J5	Pier Road /Gillingham Gate Road Roundabout	D	D	C	D	D	C	D	B
SN2-J6	Pier Road/Church Street/Strand Junction	B	B	B	B	C	B	C	B
SN2-J7	Pier Road/Maritime Way Roundabout	F	F	F	F	F	F	F	F

SN2-J8	Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction	F	F	F	F	D	D	D	F
SN2-J9	Yokosuka Way Roundabout	F	F	F	F	A	D	A	D

PM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN2-J1	Bowater Roundabout	F	F	F	F	F	C	F	F
SN2-J2	Eastcourt Lane / South Avenue Junction	B	B	C	E	F	A	F	F
SN2-J3	London Road /Bloors Lane Junction	E	F	E	F	C	E	C	C
SN2-J4	Pembroke / Dock Road / Western Avenue / Maritime Way Roundabout	C	C	C	C	C	A	C	D
SN2-J5	Pier Road /Gillingham Gate Road Roundabout	D	D	D	F	D	B	D	E
SN2-J6	Pier Road/Church Street/Strand Junction	B	B	C	D	C	B	C	C
SN2-J7	Pier Road/Maritime Way Roundabout	F	F	F	F	F	F	F	F
SN2-J8	Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction	F	F	F	C	C	D	C	F
SN2-J9	Yokosuka Way Roundabout	F	F	F	C	A	D	A	F

Subnetwork 3 - A2 (Mierscourt Road to Otterham Quay Lane / Meresborough Road section)

AM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN3-J1	Mierscourt Road / High Street Junction	F	E	F	E	C	C	C	D
SN3-J2	Otterham Quay Lane/Meresborough Road/ Moor Street Junction	F	F	F	F	F	B	F	C

PM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN3-J1	Mierscourt Road / High Street Junction	F	F	F	F	D	C	D	D
SN3-J2	Otterham Quay Lane/Meresborough Road/ Moor Street Junction	F	F	F	F	E	B	F	D

Subnetwork 4 - Strood and Chatham Town Centres									
AM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN4-J1	Best Street / Clover Street Junction	B	B	B	C	D	C	C	D
SN4-J2	Canal Road / Esplanade / High Street Junction	B	B	B	B	E	F	B	D
SN4-J3	Canterbury Street / Rainham Road /Watling Street Junction	B	B	C	C	C	C	B	C
SN4-J4	High Street / Esplanade / Corporation Street Junction	C	C	C	C	D	F	C	D
SN4-J5	High Street / Station Road Junction	F	E	F	F	D	F	D	C
SN4-J6	Luton Road / Castle Road / Constitution Hill Junction	F	F	F	F	E	D	D	F
SN4-J7	Rock Avenue / Rainham Road / Chatham Hill Junction	A	B	A	B	C	D	A	E
SN4-J8	Station Road / Frindsbury Road Junction	E	B	D	D	C	F	C	D
SN4-J9	The Paddock / Gibraltar Hill / New Road / New Road Avenue Junction	F	F	F	F	E	D	F	C
SN4-J10	Whiffen's Avenue / The Brook Junction	F	F	E	F	D	C	F	F

PM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN4-J1	Best Street / Clover Street Junction	C	B	B	C	B	B	C	E
SN4-J2	Canal Road / Esplanade / High Street Junction	A	A	B	D	E	B	E	D
SN4-J3	Canterbury Street / Rainham Road /Watling Street Junction	B	A	B	A	B	B	B	D
SN4-J4	High Street / Esplanade / Corporation Street Junction	D	C	D	D	E	C	E	D
SN4-J5	High Street / Station Road Junction	F	C	D	E	E	A	E	D
SN4-J6	Luton Road / Castle Road / Constitution Hill Junction	F	B	B	B	D	D	D	F
SN4-J7	Rock Avenue / Rainham Road / Chatham Hill Junction	A	B	B	B	C	C	C	F
SN4-J8	Station Road / Frindsbury Road Junction	E	B	B	A	C	B	C	D
SN4-J9	The Paddock / Gibraltar Hill / New Road / New Road Avenue Junction	F	F	F	D	D	D	E	E
SN4-J10	Whiffen's Avenue / The Brook Junction	F	E	E	C	B	C	B	F

Subnetwork 5 - M2 Junctions 2 to 4									
AM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN5-J1	Bridgewood Roundabout	D	F	F	F	B	B	E	E
SN5-J2	Lord Lees Roundabout	A	C	D	D	B	C	E	E
SN5-J3	M2 J4	A	C	A	A	A	A	A	C
SN5-J4	Sundridge Hill Roundabout	A	A	A	A	A	A	A	A
SN5-J5	Taddington Roundabout	D	D	D	D	C	D	D	D
PM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN5-J1	Bridgewood Roundabout	F	F	C	E	D	F	F	F
SN5-J2	Lord Lees Roundabout	B	C	B	C	C	A	F	F
SN5-J3	M2 J4	A	A	A	A	A	A	A	A
SN5-J4	Sundridge Hill Roundabout	A	A	A	A	A	A	A	A
SN5-J5	Taddington Roundabout	D	C	D	D	C	C	D	D
Subnetwork 6 - Gillingham Town Centre									
AM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN6-J1	A231 / Railway Street / High Street	C	C	C	C	D	C	C	D
SN6-J2	A231 Brompton Road / Marlborough Road	A	A	A	A	C	E	C	F
SN6-J3	A231 Brompton Road / Mill Road	A	A	A	A	D	E	D	E
SN6-J4	A231 Jeffrey Street / Skinner Street	D	D	D	D	C	B	B	C

PM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN6-J1	A231 / Railway Street / High Street	C	C	C	C	D	D	D	C
SN6-J2	A231 Brompton Road / Marlborough Road	A	A	A	A	A	A	A	A
SN6-J3	A231 Brompton Road / Mill Road	A	A	A	A	E	C	E	A
SN6-J4	A231 Jeffrey Street / Skinner Street	D	D	D	D	C	B	C	D

Subnetwork 7 - Lower Rainham Road

AM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN7-J1	B2004 Lower Rainham Road / B2004 Station Road	F	F	F	F	A	E	A	F
SN7-J2	B2004 Lower Rainham Road / Berengrave Lane	B	B	B	B	A	B	A	C
SN7-J3	B2004 Lower Rainham Road / Pump Lane	F	F	F	F	A	D	A	F
SN7-J4	Beechings Way / Pump Lane (North)	A	A	A	A	A	A	A	A
SN7-J5	Beechings Way / Pump Lane (South)	F	F	F	F	A	A	A	A
SN7-J6	Lower Rainham Road / Otterham Quay Lane	A	A	A	A	A	A	A	D

PM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN7-J1	B2004 Lower Rainham Road / B2004 Station Road	F	F	F	F	A	A	A	A
SN7-J2	B2004 Lower Rainham Road / Berengrave Lane	A	A	A	A	A	A	A	A
SN7-J3	B2004 Lower Rainham Road / Pump Lane	F	F	F	F	A	A	A	A
SN7-J4	Beechings Way / Pump Lane (North)	A	A	A	A	A	A	A	A
SN7-J5	Beechings Way / Pump Lane (South)	F	F	F	F	A	A	A	A
SN7-J6	Lower Rainham Road / Otterham Quay Lane	A	B	A	A	A	A	A	A

Subnetwork 8 - A249 (A2 to M20)									
AM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN8-J1	Keycol Roundabout	F	F	F	F	F	F	F	F
SN8-J2	M2 J5	A	A	A	A	C	F	D	F
SN8-J3	M20 J7	D	E	E	E	B	B	C	C
PM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN8-J1	Keycol Roundabout	F	F	F	F	F	F	F	F
SN8-J2	M2 J5	A	A	A	A	D	F	C	F
SN8-J3	M20 J7	E	E	E	E	C	C	C	C

Subnetwork 9 - A228 Cuxton & Halling									
AM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN9-J1	A228/ Bush Rd Junction	F	F	E	E	E	F	D	A
SN9-J2	A228/ Kent Rd Roundabout	A	A	A	A	A	A	A	A
SN9-J3	A228/ Peter's Brg Roundabout	A	A	A	A	A	A	F	F
PM		Core without LTC		Core with LTC		LP without LTC		LP with LTC	
		2030	2037	2030	2037	2030	2037	2030	2037
SN9-J1	A228/ Bush Rd Junction	E	E	E	E	D	D	A	A
SN9-J2	A228/ Kent Rd Roundabout	A	A	A	A	A	A	A	A
SN9-J3	A228/ Peter's Brg Roundabout	A	A	A	A	A	A	F	F

3.2 Journey Times

3.2.1 This section provides a summary of the journey times for a number of key routes. The routes cover the main roads with journey times identified for each subnetwork. The journey times are calculated as the sum of the average travel time on each consecutive section.

3.2.2 Table 7 presents journey times for 2037 Local Plan and Core with and without LTC scenarios for both morning and evening periods.

Table 7. Journey Times at Key Routes (All Subnetworks & All Scenarios for 2037)

Subnetwork 1 - Four Elms Hill / Four Elms Roundabout					
AM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
Hoo Road-Grain Road	EB	00:06:18	00:06:34	00:22:19	00:35:25
Hasted Road - Medway Tunnel	SB	00:12:27	00:10:21	00:22:15	00:25:03
Hasted Road - Medway Tunnel	NB	00:04:29	00:04:29	00:21:43	00:31:28
PM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
Hoo Road-Grain Road	EB	00:05:01	00:05:06	00:19:25	00:16:31
Hasted Road - Medway Tunnel	SB	00:24:48	00:20:57	00:22:27	00:24:37
Hasted Road - Medway Tunnel	NB	00:11:19	00:14:23	00:23:47	00:25:00
Subnetwork 2 - Pier Road / A2					
AM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
Sovereign Boulevard - Watling Street	WB	00:14:59	00:14:06	00:07:32	00:13:43
PM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
Sovereign Boulevard - Watling Street	WB	00:20:43	00:18:50	00:07:35	00:20:01
Subnetwork 3 - A2 (Mierscourt Road to Otterham Quay Lane / Meresborough Road section)					

AM		Core without LTC	Core with LTC	LP without LTC	LP with LTC
Sovereign BLV - Moor Street	EB	00:14:33	00:15:07	00:05:53	00:07:30
Station Road - Orchard Road	NB	00:06:58	00:06:17	00:01:52	00:03:10
Station Road - Orchard Road	SB	00:03:50	00:03:46	00:01:43	00:02:39
PM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
Sovereign BLV - Moor Street	EB	00:28:34	00:28:24	00:05:47	00:07:30
Station Road - Orchard Road	NB	00:09:35	00:08:27	00:03:27	00:03:10
Station Road - Orchard Road	SB	00:05:46	00:05:49	00:02:18	00:02:39

Subnetwork 4 - Strood and Chatham Town Centres

AM		Core without LTC	Core with LTC	LP without LTC	LP with LTC
Frindsbury Hill - Cuxton road	NB	00:16:05	00:27:51	00:23:41	00:26:06
City Way/Start Hill - London road	WB	00:19:58	00:22:15	00:11:11	00:10:40
PM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
Frindsbury Hill - Cuxton road	NB	00:46:33	00:24:31	00:11:32	00:21:14
City Way/Start Hill - London road	WB	00:12:32	00:13:56	00:12:38	00:10:53

Subnetwork 5 - M2 Junctions 2 to 4

AM		Core without LTC	Core with LTC	LP without LTC	LP with LTC
M2 South to M2 North	NB	00:13:14	00:16:19	00:13:35	00:26:50
M2 North to M2 South	SB	00:16:05	00:14:11	00:20:03	00:19:08
A229 South to A229 North	NB	00:57:31	00:52:38	00:06:21	00:13:56
A229 North to A229 South	SB	00:52:31	00:43:03	00:15:37	00:19:24

PM		Core without LTC	Core with LTC	LP without LTC	LP with LTC
M2 South to M2 North	NB	00:11:51	00:13:02	00:11:37	00:31:26
M2 North to M2 South	SB	00:15:08	00:17:17	00:13:31	00:18:51
A229 South to A229 North	NB	00:44:23	00:41:23	00:08:08	00:14:33
A229 North to A229 South	SB	00:39:17	00:27:06	00:16:04	00:19:56

Subnetwork 6 - Gillingham Town Centre

AM		Core without LTC	Core with LTC	LP without LTC	LP with LTC
A231 Brompton Road To Balmoral Road	WB	00:10:00	00:10:06	00:04:36	00:08:01
A231 Balmoral Road to Brompton Road	EB	00:22:31	00:22:51	00:03:18	00:07:58
Canterbury Street To James Street	NB	00:03:42	00:03:42	00:01:36	00:03:53
James Street To Canterbury Street	SB	00:08:15	00:08:20	00:02:36	00:04:40
PM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
A231 Brompton Road To Balmoral Road	WB	00:11:24	00:11:16	00:09:31	00:10:36
A231 Balmoral Road to Brompton Road	EB	00:17:23	00:19:00	00:02:54	00:21:24
Canterbury Street To James Street	NB	00:04:00	00:04:04	00:01:38	00:04:02
James Street To Canterbury Street	SB	00:08:00	00:07:44	00:02:04	00:08:31

Subnetwork 7 - Lower Rainham Road

AM		Core without LTC	Core with LTC	LP without LTC	LP with LTC
Lower Rainham Road	EB	00:31:25	00:31:02	00:08:52	00:41:23
Otterham Quay Lane	NB	00:02:09	00:02:35	00:01:52	00:03:39
Otterham Quay Lane	SB	00:02:37	00:02:42	00:02:21	00:03:42

Pump Lane	SB	00:01:37	00:01:37	00:01:42	00:01:41
PM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
Lower Rainham Road	EB	00:10:25	00:10:13	00:07:02	00:37:22
Otterham Quay Lane	NB	00:02:55	00:02:16	00:01:48	00:38:39
Otterham Quay Lane	SB	00:02:41	00:02:35	00:02:17	00:04:18
Pump Lane	SB	00:01:35	00:01:38	00:01:39	00:01:39
Subnetwork 8 - A249 (A2 to M20)					
AM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
A249 East to A249 West	WB	00:19:40	00:21:44	00:10:14	00:10:21
A249 West to A249 East	EB	00:13:47	00:14:32	00:21:18	00:20:04
A2 East to A2 West	WB	00:03:58	00:04:01	00:04:48	00:04:50
A2 West to A2 East	EB	00:15:27	00:15:13	00:04:42	00:06:24
M2 East to M2 West	WB	00:02:39	00:02:42	00:02:38	00:02:36
M2 West to M2 East	EB	00:02:35	00:02:42	00:03:31	00:07:48
M20 East to M20 West	WB	00:02:29	00:02:41	00:02:25	00:03:19
M20 West to M20 East	EB	00:03:51	00:03:48	00:02:02	00:02:09
PM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
A249 East to A249 West	WB	00:19:57	00:19:15	00:10:14	00:10:21
A249 West to A249 East	EB	00:19:19	00:20:02	00:24:20	00:31:35
A2 East to A2 West	WB	00:04:36	00:04:36	00:05:28	00:05:28
A2 West to A2 East	EB	00:13:31	00:13:30	00:10:09	00:10:16
M2 East to M2 West	WB	00:02:32	00:02:35	00:03:02	00:02:54
M2 West to M2 East	EB	00:05:55	00:06:37	00:10:00	00:10:56

M20 East to M20 West	WB	00:02:24	00:02:33	00:02:22	00:02:22
M20 West to M20 East	EB	00:03:43	00:03:55	00:04:09	00:04:45
Subnetwork 9 - A228 Cuxton & Halling					
AM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
A228 South to A228 North	NB	00:05:10	00:05:17	00:05:05	00:20:52
A228 North to A228 South	SB	00:06:57	00:07:55	00:10:50	00:07:25
Bush Road Westbound	WB	00:02:59	00:03:02	00:03:01	00:03:02
PM		**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
A228 South to A228 North	NB	00:05:20	00:05:19	00:06:14	00:17:20
A228 North to A228 South	SB	00:09:29	00:09:43	00:12:01	00:08:32
Bush Road Westbound	WB	00:03:03	00:02:59	00:03:07	00:02:56

3.3 Network Statistics

3.3.1 Network performance for each scenario within the nine subnetworks has been assessed for 2037, for both morning and evening peaks. The analysis presented in Table 8 includes the following indicators:

- Average Delay (seconds per km travelled);
- Mean queue (vehicles);
- Average speed (km per hour); and
- Stop time (seconds per km).

Table 8. Network Statistics (All Subnetworks & All Scenarios for 2037)

Subnetwork 1 - Four Elms Hill / Four Elms Roundabout				
AM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	00:48	00:40	02:05	02:53
Mean queue (veh)	119	90	710	891
Average speed (km/h)	43	45	33	28
Stop time (sec/km)	35	28	113	155
Vehicles waiting to enter (veh)	209	164	423	548
PM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	01:44	01:44	02:10	02:13
Mean queue (veh)	178	178	633	695
Average speed (km/h)	31	32	31	29
Stop time (sec/km)	81	81	116	118
Vehicles waiting to enter (veh)	320	431	161	258
Subnetwork 2 - Pier Road / A2				
AM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	02:12	02:19	01:18	01:36
Mean queue (veh)	353	388	201	452
Average speed (km/h)	25	25	31	30
Stop time (sec/km)	113	121	67	83
Vehicles waiting to enter (veh)	483	507	295	518
PM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	03:00	02:35	01:13	03:48
Mean queue (veh)	442	361	190	837
Average speed (km/h)	19	23	32	21
Stop time (sec/km)	155	133	62	208
Vehicles waiting to enter (veh)	641	419	275	1920

Subnetwork 3 - A2 (Mierscourt Road to Otterham Quay Lane / Meresborough Road section)				
AM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	07:56	07:54	01:53	03:24
Mean queue (veh)	80	80	19	34
Average speed (km/h)	9	9	19	17
Stop time (sec/km)	451	449	101	187
Vehicles waiting to enter (veh)	202	200	2	17
PM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	09:29	09:12	02:45	05:21
Mean queue (veh)	85	84	25	72
Average speed (km/h)	8	8	19	13
Stop time (sec/km)	542	524	150	301
Vehicles waiting to enter (veh)	351	337	14	64
Subnetwork 4 - Strood and Chatham Town Centres				
AM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	03:40	04:07	04:30	04:49
Mean queue (veh)	412	440	427	457
Average speed (km/h)	18	17	17	16
Stop time (sec/km)	204	231	253	271
Vehicles waiting to enter (veh)	1035	1064	822	987
PM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	04:02	03:38	02:21	04:49
Mean queue (veh)	334	273	182	466
Average speed (km/h)	16	15	20	16
Stop time (sec/km)	225	199	124	271
Vehicles waiting to enter (veh)	1234	997	252	924
Subnetwork 5 - M2 Junctions 2 to 4				
AM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	01:05	01:27	00:35	00:59
Mean queue (veh)	403	481	325	574
Average speed (km/h)	55	52	54	43
Stop time (sec/km)	53	72	26	41
Vehicles waiting to enter (veh)	413	614	304	933
PM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	00:37	00:51	00:30	01:10
Mean queue (veh)	282	354	220	703

Average speed (km/h)	61	54	56	43
Stop time (sec/km)	25	35	21	54
Vehicles waiting to enter (veh)	337	596	412	1498

Subnetwork 6 - Gillingham Town Centre

AM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	08:32	08:45	02:32	04:25
Mean queue (veh)	33	33	18	29
Average speed (km/h)	9	8	17	14
Stop time (sec/km)	486	500	137	244
Vehicles waiting to enter (veh)	193	195	16	76

PM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	08:40	08:46	03:17	08:55
Mean queue (veh)	34	34	22	34
Average speed (km/h)	8	8	18	8
Stop time (sec/km)	494	499	185	508
Vehicles waiting to enter (veh)	267	238	54	248

Subnetwork 7 - Lower Rainham Road

AM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	02:53	02:59	00:52	01:55
Mean queue (veh)	211	211	85	216
Average speed (km/h)	28	28	33	33
Stop time (sec/km)	152	156	44	104
Vehicles waiting to enter (veh)	137	138	0	102

PM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	01:34	01:31	00:58	02:01
Mean queue (veh)	158	155	17	253
Average speed (km/h)	34	34	35	34
Stop time (sec/km)	80	77	49	110
Vehicles waiting to enter (veh)	303	295	4	189

Subnetwork 8 - A249 (A2 to M20)

AM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	00:56	01:16	00:28	00:53
Mean queue (veh)	199	236	161	224
Average speed (km/h)	60	58	64	59
Stop time (sec/km)	43	61	20	40
Vehicles waiting to enter (veh)	213	206	65	167

PM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	00:43	00:49	00:37	00:45
Mean queue (veh)	280	302	297	369
Average speed (km/h)	59	57	59	56
Stop time (sec/km)	28	33	27	34
Vehicles waiting to enter (veh)	278	317	218	433

Subnetwork 9 - A228 Cuxton & Halling				
AM	**Core without LTC**	**Core with LTC**	**LP without LTC**	**LP with LTC**
Average Delay (sec/km)	00:50	01:34	00:33	00:40
Mean queue (veh)	48	111	20	23
Average speed (km/h)	38	27	45	44
Stop time (sec/km)	38	78	23	29
Vehicles waiting to enter (veh)	80	243	29	89

PM	Core without LTC	Core with LTC	LP without LTC	LP with LTC
Average Delay (sec/km)	01:05	01:41	00:45	00:44
Mean queue (veh)	117	145	28	27
Average speed (km/h)	38	30	44	45
Stop time (sec/km)	52	82	32	31
Vehicles waiting to enter (veh)	151	211	62	84

3.4 Results Discussion

3.4.1 LoS outputs, journey times and general network statistics have been used to assess the LTC impact on the Medway highway network within the modelled nine subnetworks. As seen from the results, the **Local Plan with LTC** and **Core with LTC** scenarios show the most adverse impacts in most of the subnetworks. This can be explained by the increased load of traffic that will traverse through Medway to access the LTC. The subnetworks where most of the impacts are seen are:

- Subnetwork 1 Four Elms Hill / Four Elms Roundabout;
- Subnetwork 2 Pier Road / A2;
- Subnetwork 4 Strood and Chatham Town Centres;
- Subnetwork 5 M2 Junctions 2 to 4; and
- Subnetwork 9 A228 Cuxton & Halling.

3.4.2 In some instances, certain junctions appear to operate better in the scenarios with LTC compared to the scenarios without LTC. The primary reason for this is because, with the addition of the LTC traffic, some upstream junctions may become more congested holding back the traffic from downstream junctions which therefore appear to be operating better. Furthermore, in some of the scenarios with LTC, there is a higher number of vehicles waiting to enter the network which means that the full impact of the additional delay cannot be seen during the peak hours because it also spills in the cooldown period – this is the equivalent to on-street delays extending into a longer peak period.

3.4.3 The Planning Inspectorate's Scoping Opinion, dated December 2017, required the Environmental Statement to consider the Council's emerging Local Plan. The Council has raised concerns about the assumptions for future development in traffic modelling since the 2018 Statutory Consultation.

3.4.4 The 'Traffic Modelling Update' as part of the 2020 'Supplementary Consultation' noted that "growth associated with government housing targets which have not yet fully progressed through the planning system is not included." However, the Council intends to meet its development needs, including the government's assessment of Local Housing Need according to the Standard Method, through an emerging Local Plan. The Council will consult on options for future growth in a Regulation 18 document in 2023.

3.4.5 It is understood that the LTC transport model was built following the principles and processes set out in the Department for Transport's (DfT) Transport Analysis Guidance. Growth within the transport model is capped in line with DfT traffic forecasts (TEMPro 7.2) and adjusted locally to account for developments close to the project that are under construction, have a planning application and planning permission (as of 30 September 2021). This comprises the Core Scenario.

3.4.6 The DfT traffic forecasts do not reflect the full scale of Medway's development needs and this presents a challenge for local plan-making. Despite the early stage of Medway's emerging Local Plan, following the government's announcement in November 2019 of upfront infrastructure funding under the Housing Infrastructure Fund, there is more certainty for growth on the Hoo Peninsula, including 10,600 new homes. However, it is understood that these homes would have been excluded from the Core Scenario, given their planning stage. Therefore, the Core Scenario is unlikely to reflect the spatial distribution of Medway's future growth.

3.4.7 The Local Impact Report (LIR) will be concerned with identifying relevant positive, negative and neutral local impacts based on the Core Scenario. This is considered to be appropriate, given the early stage of the emerging Local Plan, to avoid contesting the LIR. However, additional scenarios which reflect the full scale of Medway's development needs have been presented to demonstrate the challenge for local plan-making.

4. PROPOSED MITIGATIONS

4.1.1 Based on the model assessment results presented in Table 6, Table 7 and Table 8 and a visual check of junction operation in microscopic simulations in the 2037 Core with LTC scenario, six junctions with severe congestion have been identified that may be considered appropriate for mitigation; these are listed in Table 9.

4.1.2 The outputs for all subnetworks in all scenarios have been discussed with the Council. It was agreed to focus on the subnetworks with the most adverse impacts for the mitigations, those being subnetworks 1, 2, 4, 5 and 9. The documentation submitted by NH as part of the DCO application, including within the TA, identify the same subnetworks as the most critical locations. It is noted that, for subnetworks 5 and 9, the network statistics in the with LTC scenarios are considerably worse than the without LTC scenarios; this demonstrates subnetwork-wide impacts associated with LTC.

4.1.3 The comparison between the with and without mitigations was operated on the 2037 Core with LTC Scenario. It was agreed with the Council to focus the mitigations only on the Core with LTC scenario, due to uncertainties associated with the LP with LTC scenario.

4.1.4 Whilst mitigation measures have been considered at six junctions only, it should be noted that additional locations exist across Medway that are subject to severe delays and negative impacts in the 'with LTC' scenarios. Consideration of six junctions at this stage should not be taken as implying that other junctions operate satisfactorily.

Table 9. Junctions Proposed for Mitigation

NO	JUNCTION NAME	MITIGATION
SN1-J2	Four Elms roundabout	Transform to hamburger roundabout for north-south movement and add in segregated left turn to north of junction.
SN2-J7	Pier Road / Maritime Way roundabout	Provide a walking / cycle route round one side of the junction to avoid having a stop line on the exit arm.
SN4-J5	High Street / Station Road junction	Optimise signals.
SN4-J9	The Paddock / Gibraltar Hill / New Road / New Road Avenue junction	Ban turns / cut off The Paddock.
SN5-J1	Bridgewood roundabout	Change lane markings at southern and western arms to allow entrance in the roundabout from 3 lanes instead of 2.
SN9-J1	A228 / Bush Road junction	Add signals.

4.1.5 Considering the space constraints at most junctions, the proposed mitigations generally focus on signal optimisation, lane capacity management, and prioritising / restricting certain vehicular movements. An exception to this approach is at SN1-J2 Four Elms roundabout,

where infrastructure upgrades are suggested. Layouts of the proposed mitigations are contained in Appendix B.

4.1.6 The proposed mitigations were tested on Core with LTC scenario for 2037 and the resulting LoS in comparison with corresponding LoS without mitigation are presented in Table 10, covering subnetworks 1, 2, 4, 5 and 9. The junctions with mitigation incorporated can be seen in grey within Table 10.

Table 10. LoS at Key Junctions for 2037 Core with LTC (with & without Mitigations)

Subnetwork 1 - Four Elms Hill / Four Elms Roundabout			
AM		Core with LTC	Core with LTC + Mitigation
SN1-J1	Anthony's Way Roundabout	A	D
SN1-J2	Four Elms Roundabout	F	E
SN1-J3	Main Hoo Road	B	A
SN1-J4	Sans Pareil Roundabout	A	F
PM		Core with LTC	Core with LTC + Mitigation
SN1-J1	Anthony's Way Roundabout	F	E
SN1-J2	Four Elms Roundabout	F	C
SN1-J3	Main Hoo Road	A	A
SN1-J4	Sans Pareil Roundabout	C	C
Subnetwork 2 - Pier Road / A2			
AM		Core with LTC	Core with LTC + Mitigation
SN2-J1	Bowater Roundabout	F	F
SN2-J2	Eastcourt Lane / South Avenue Junction	F	F
SN2-J3	London Road /Bloors Lane Junction	E	D
SN2-J4	Pembroke / Dock Road / Western Avenue / Maritime Way Roundabout	A	A
SN2-J5	Pier Road /Gillingham Gate Road Roundabout	D	D
SN2-J6	Pier Road/Church Street/Strand Junction	B	B
SN2-J7	Pier Road/Maritime Way Roundabout	F	E
SN2-J8	Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction	F	F
SN2-J9	Yokosuka Way Roundabout	F	F
PM		Core with LTC	Core with LTC + Mitigation
SN2-J1	Bowater Roundabout	F	F
SN2-J2	Eastcourt Lane / South Avenue Junction	E	A

SN2-J3	London Road /Bloors Lane Junction	F	D
SN2-J4	Pembroke / Dock Road / Western Avenue / Maritime Way Roundabout	C	C
SN2-J5	Pier Road /Gillingham Gate Road Roundabout	F	F
SN2-J6	Pier Road/Church Street/Strand Junction	D	D
SN2-J7	Pier Road/Maritime Way Roundabout	F	F
SN2-J8	Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction	C	F
SN2-J9	Yokosuka Way Roundabout	C	A

Subnetwork 4 - Strood and Chatham Town Centres			
AM		**Core with LTC**	**Core with LTC + Mitigation**
SN4-J1	Best Street / Clover Street Junction	C	B
SN4-J2	Canal Road / Esplanade / High Street Junction	B	B
SN4-J3	Canterbury Street / Rainham Road /Watling Street Junction	C	C
SN4-J4	High Street / Esplanade / Corporation Street Junction	C	C
SN4-J5	High Street / Station Road Junction	F	C
SN4-J6	Luton Road / Castle Road / Constitution Hill Junction	F	F
SN4-J7	Rock Avenue / Rainham Road / Chatham Hill Junction	B	A
SN4-J8	Station Road / Frindsbury Road Junction	D	D
SN4-J9	The Paddock / Gibraltar Hill / New Road / New Road Avenue Junction	F	F
SN4-J10	Whiffen's Avenue / The Brook Junction	F	F

PM		**Core with LTC**	**Core with LTC + Mitigation**
SN4-J1	Best Street / Clover Street Junction	C	B
SN4-J2	Canal Road / Esplanade / High Street Junction	D	A
SN4-J3	Canterbury Street / Rainham Road /Watling Street Junction	A	A
SN4-J4	High Street / Esplanade / Corporation Street Junction	D	C
SN4-J5	High Street / Station Road Junction	E	A
SN4-J6	Luton Road / Castle Road / Constitution Hill Junction	B	B
SN4-J7	Rock Avenue / Rainham Road / Chatham Hill Junction	B	B

SN4-J8	Station Road / Frindsbury Road Junction	A	A
SN4-J9	The Paddock / Gibraltar Hill / New Road / New Road Avenue Junction	D	D
SN4-J10	Whiffen's Avenue / The Brook Junction	C	C

Subnetwork 5 - M2 Junctions 2 to 4

AM		Core with LTC	Core with LTC + Mitigation
SN5-J1	Bridgewood Roundabout	F	F
SN5-J2	Lord Lees Roundabout	D	D
SN5-J3	M2 J4	A	A
SN5-J4	Sundridge Hill Roundabout	A	A
SN5-J5	Taddington Roundabout	D	C

PM		Core with LTC	Core with LTC + Mitigation
SN5-J1	Bridgewood Roundabout	E	F
SN5-J2	Lord Lees Roundabout	C	F
SN5-J3	M2 J4	A	A
SN5-J4	Sundridge Hill Roundabout	A	A
SN5-J5	Taddington Roundabout	D	E

Subnetwork 9 - A228 Cuxton & Halling

AM		Core with LTC	Core with LTC + Mitigation
SN9-J1	A228/ Bush Rd Junction	E	B
SN9-J2	A228/ Kent Rd Roundabout	A	A
SN9-J3	A228/ Peter's Brg Roundabout	A	A

PM		Core with LTC	Core with LTC + Mitigation
SN9-J1	A228/ Bush Rd Junction	E	C
SN9-J2	A228/ Kent Rd Roundabout	A	A
SN9-J3	A228/ Peter's Brg Roundabout	A	A

4.1.7 It can be seen that, in most cases, the proposed mitigations improve the LoS for the junctions where they are applied. However, in some cases the proposed mitigation does not provide the expected LoS improvement or the rest of the subnetwork becomes more congested. This could be due to some adjacent junctions in the network becoming worse with the application of the mitigations due to traffic being released from an upstream junction blocking the downstream junction.

4.1.8 The Four Elms roundabout upgrade to a hamburger junction in Subnetwork 1 leads to a slightly better level of service with the roundabout operating at LoS E in the morning peak and C in the evening peak instead of F before the junction upgrade was applied. The improvement at Four Elms releases traffic which causes some adverse impacts at downstream junctions; this will require further consideration if the proposed mitigation is taken forward.

4.1.9 In Subnetwork 2, the removal of the eastern pedestrian crossing at Pier Road/ Maritime Way roundabout does not provide the expected level of improvement with the junction still operating at LoS F in the evening peak and LoS E in the morning peak. Further investigation of potential improvements is required for this subnetwork.

4.1.10 In Subnetwork 4, the traffic signals optimisation at High Street/ Station Road junction provides high gains with the LoS improving to C in the morning peak and A in the evening peak compared to F and E in the morning and evening peak respectively. The Paddock / Gibraltar Hill / New Road / New Road Avenue junction changes do not have any change at the LoS. Nonetheless, the overall network operation is becoming better, especially in the evening peak, as can be seen from the LoS of the rest of the junctions.

4.1.11 The Bridgewood roundabout upgrade in Subnetwork 5 includes lane marking changes allowing traffic to enter in the roundabout via three lanes instead of two for the southern and western arm. This change did not improve the LoS in this subnetwork. Especially in the evening peak, the model is quite congested and the LoS for Bridgewood roundabout reduces from E to F due to the higher amount of traffic being able to queue at the roundabout approaches. Before the lane changes, vehicles were queuing only in two lanes whereas with the lane increase to three, so with the scheme there are more vehicles occupying the roundabout approach, thus higher delay.

4.1.12 The signalisation of the A228 and Bush Road junction in Subnetwork 9 improves the LoS from E to B in the morning peak and from E to C in the evening peak. The rest of the subnetwork remains unaffected.

5. PROPOSED MITIGATIONS 2.0

5.1.1 Following discussions with the Council and the LTC team in May 2023, it was agreed to investigate possible mitigation opportunities at three further locations on Medway's highway network where such mitigation would be likely required as a result of the impact of the LTC.

5.1.2 In June 2023, SYSTRA reviewed the locations that may be considered for mitigation following the same methodology as described in **Chapter 4**. The methodology is based on the model assessment results presented in Table 6, Table 7 and Table 8 and a visual check of junction operation in microscopic simulations in the 2037 Core with LTC scenario.

5.1.3 The comparison between the with and without mitigations was made for the 2037 Core with LTC Scenario. It was agreed with the Council to focus the mitigations only on the Core with LTC scenario, due to uncertainties associated with the LP with LTC scenario.

5.1.4 A full list of the locations impacted by LTC, where the LoS is worse in the Core 'with' than 'without' LTC scenario for 2037 is provided below in Table 11.

Table 11. Locations impacted by LTC based on LoS for 2037 Core with & without LTC

Junction		Core without LTC 2037		Core with LTC 2037	
		AM	PM	AM	PM
SN1-J4	Sans Pareil Roundabout	A	A	A	C
SN2-J2	Eastcourt Lane / South Avenue Junction	F	B	F	E
SN2-J5	Pier Road /Gillingham Gate Road Roundabout	D	D	D	F
SN2-J6	Pier Road/Church Street/Strand Junction	B	B	B	D
SN4-J1	Best Street / Clover Street Junction	B	B	C	C
SN4-J2	Canal Road / Esplanade / High Street Junction	B	A	B	D
SN4-J3	Canterbury Street / Rainham Road /Watling Street Junction	B	A	C	A
SN4-J4	High Street / Esplanade / Corporation Street Junction	C	C	C	D
SN4-J5	High Street / Station Road Junction	E	C	F	E
SN5-J2	Lord Lees Roundabout	C	C	D	C
SN5-J5	Taddington Roundabout	D	C	D	D

5.1.5 A selection of junctions for further assessment from the above locations was made considering the LoS severity, the interaction between junctions and the space constraints. It was observed that many junctions in Subnetwork 2 (Figure 5) were affecting each other with queues spilling upstream and exit blocking. For this reason, efforts were focused on Subnetwork 2, where three junctions have worse LoS in the Core with than without LTC scenario. These are locations where it was visually observed that more junctions are affected due to junction interaction.

5.1.6 At most junctions, the proposed mitigations generally focus on signal optimisation and lane capacity management. The overall routing was also improved to allow for more sensible route choice based on the signal coordination. Layouts of the proposed mitigations are contained in Appendix B.

5.1.7 The list of the groups of junctions that were mitigated in Subnetwork 2 along with the observed issues and the proposed mitigation are shown in Table 12. Maps of the two groups of junctions are presented in Figure 6 and Figure 7.

5.1.8 The proposed mitigations in Subnetwork 2 were tested using the Core with LTC 2037 scenario and the resulting LoS in comparison with corresponding LoS without mitigation are presented in Table 13 for the AM and Table 14 for the PM peak. The junctions with mitigation incorporated can be seen in grey within the tables.

5.1.9 Besides the LoS (A-F), the control delay (seconds/ vehicle) which the LoS calculation is based upon is also provided for more clear representation of the mitigation improvements. (For reference, the LoS calculation basis is explained in Table 5.)

Table 12. Junctions Proposed for Mitigation in Subnetwork 2

NO	JUNCTION NAME	ISSUE	MITIGATION
SN2-J1	Bowaters Roundabout	Long queues at western and south-eastern arms of SN2-J1 roundabout. As a result, traffic of the western arm spilling upstream to SN2-J10 and rerouting on South Avenue of SN2-J2 to avoid the queues.	Signal coordination improved on the SN2-J1 roundabout to release traffic from all arms.
SN2-J2	Eastcourt Lane / South Avenue Junction		All the signals (pedestrian and junction control) between SN2-J3 to SN2-J10 coordinated for smoother traffic flows.
SN2-J3	London Road /Bloors Lane Junction		
SN2-J10	Will Adams Roundabout		The 2-lane circulatory section at SN2-J10 changed to 3-lane to provide more capacity for traffic from east. The lane markings at the eastern arm were changed to allow two lanes heading from A2 to A289.
SN2-J5	Pier Road /Gillingham Gate Road Roundabout	Long queues on SN2-J7 western, eastern, and southern approach arms. As a result, the whole corridor up to SN2-J6 had knock-on congestion.	Signal coordination at SN2-J7 improved to release traffic from all arms.
SN2-J6	Pier Road/Church Street/Strand Junction		The pedestrian signals on the southern and eastern exits coordinated for better operation of the SN2-J7 roundabout.
SN2-J7	Pier Road/Maritime Way Roundabout		All the signals (pedestrian and junction control) between SN2-J7 to SN2-J9 coordinated for smoother traffic flow.

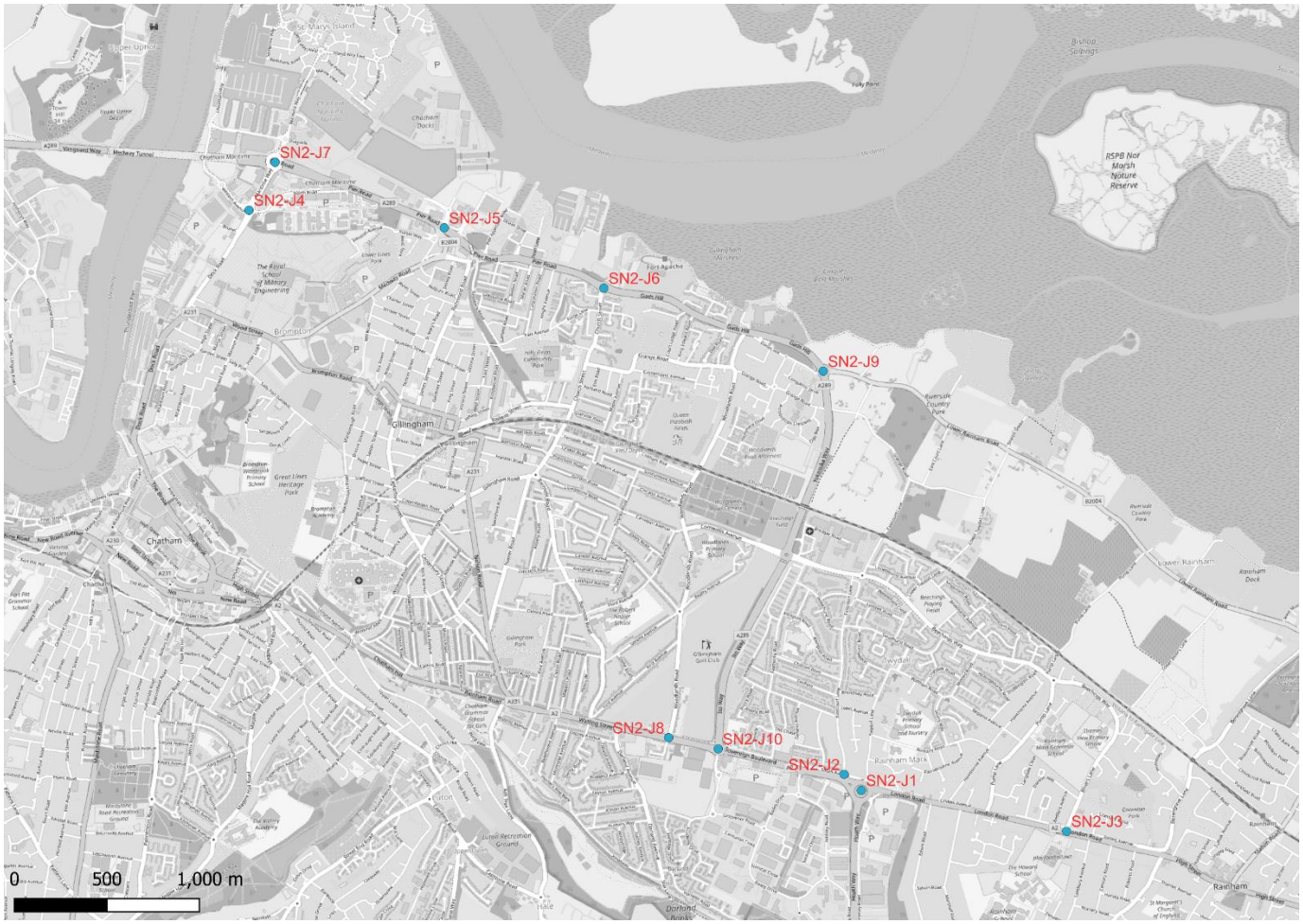


Figure 5. Subnetwork 2 Junction Locations

Figure 6. Subnetwork 2 – Group of Junctions 1,2,3,8,10

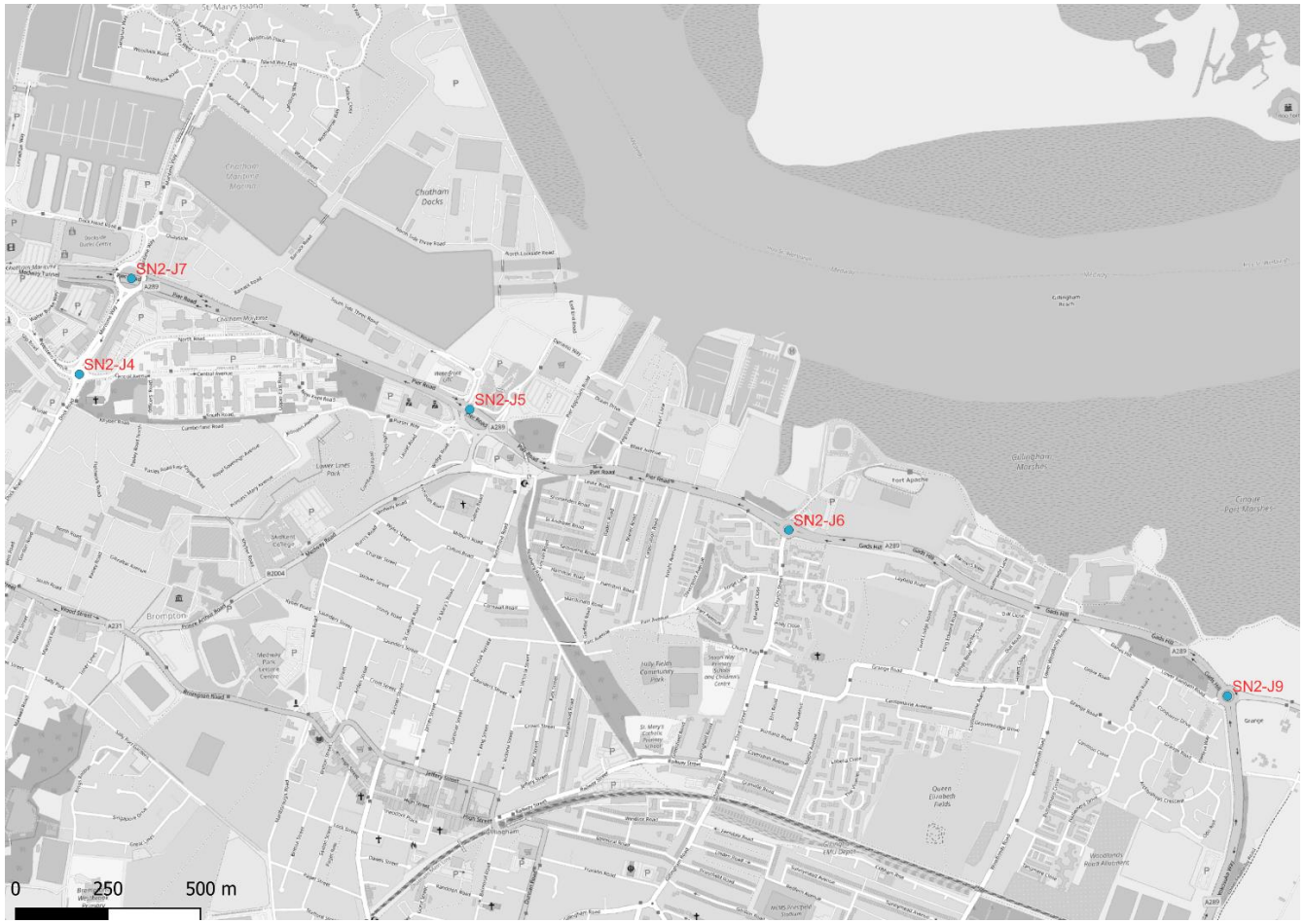


Figure 7. Subnetwork 2 – Group of Junctions 4,5,6,7,9

5.1.10 In previous chapters, reporting of network operation has focussed on the LoS, as defined in Table 5 above. This provides a useful overview and is maintained within the assessment work set out below. However, it is important to note that the definition of LoS "F" is a delay of **more than** 50 seconds per vehicle (or 80 for a signalised junction). In severely congested networks, it does not differentiate (for instance) between a delay of two minutes and a delay of five minutes. To provide an additional level of detail for junctions which are forecast to operate beyond capacity in the future year, the actual delay is also provided below.

Table 13. LoS for 2037 Core without and with LTC and with LTC + Mitigation - AM

AM		LoS			Control delay (sec / vehicle)		
		Core without LTC	Core with LTC	Core with LTC + Mitigation	Core without LTC	Core with LTC	Core with LTC + Mitigation
SN2-J1	Bowater Roundabout	F	F	C	116	94	30
SN2-J2	Eastcourt Lane / South Avenue Junction	F	F	F	390	336	198
SN2-J3	London Road /Bloors Lane Junction	E	E	D	57	60	38
SN2-J4	Pembroke / Dock Road / Western Avenue / Maritime Way Roundabout	A	A	A	4	4	6
SN2-J5	Pier Road /Gillingham Gate Road Roundabout	D	D	C	37	43	20
SN2-J6	Pier Road/Church Street/Strand Junction	B	B	A	12	14	9
SN2-J7	Pier Road/Maritime Way Roundabout	F	F	F	137	163	90
SN2-J8	Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction	F	F	F	98	101	99
SN2-J9	Yokosuka Way Roundabout	F	F	F	80	131	80
SN2-J10	Ito Way/Sovereign Blvd/Wiill Adams Way/Sovereign Blvd	F	F	E	87	85	45

Table 14. LoS for 2037 Core without and with LTC and with LTC + Mitigation - PM

PM		LoS			Control delay (sec / vehicle)		
		Core without LTC	Core with LTC	Core with LTC + Mitigation	Core without LTC	Core with LTC	Core with LTC + Mitigation
SN2-J1	Bowater Roundabout	F	F	C	150	137	22
SN2-J2	Eastcourt Lane / South Avenue Junction	B	E	A	12	37	0
SN2-J3	London Road /Bloors Lane Junction	F	F	D	81	83	44
SN2-J4	Pembroke / Dock Road / Western Avenue / Maritime Way Roundabout	C	C	D	21	19	32
SN2-J5	Pier Road /Gillingham Gate Road Roundabout	D	F	D	52	107	39
SN2-J6	Pier Road/Church Street/Strand Junction	B	D	C	19	41	20
SN2-J7	Pier Road/Maritime Way Roundabout	F	F	E	120	198	78
SN2-J8	Rotary Gardens / Woodlands Road / Sovereign Boulevard Junction	F	C	F	173	35	103
SN2-J9	Yokosuka Way Roundabout	F	C	A	102	15	8
SN2-J10	Ito Way/Sovereign Blvd/Wiill Adams Way/Sovereign Blvd	C	C	B	20	16	11

5.1.11 In the AM peak, it can be seen that in most cases, the proposed mitigations improve the LoS not only for the specific junctions where the mitigation is proposed, but also at junctions interacting with them. At SN2-J2, SN2-J7, SN2-J8 and SN2-J9, the LoS with mitigation remains F; however, the control delay reduces. This means that there is improvement but further mitigations would be necessary to bring the junction under capacity.

5.1.12 In the PM peak it can be seen that, in most cases, the proposed mitigations improve the LoS not only for the junctions where they are applied, but also for the junctions interacting with them. However, in some cases the proposed mitigation does not provide the expected LoS improvement, such as SN2-J4 and SN2-J8.

5.1.13 The reasoning for this at SN2-J4 is that improved conditions at SN2-J7 mean that more traffic is flowing southbound towards J4. South of J4, many vehicles are turning right from Dock Road to Brunel Way, which causes a queue spilling upstream and causing J4 to operate with higher delays.

5.1.14 The reasoning for SN2-J8 is that improved conditions at J10 heading from the A2 to the A289 allow less gaps for vehicles on the western A2 arm to enter the roundabout, thus queues from J10 western arm spill upstream to J8. The same effect is not observed in the AM peak, due to higher demand going eastbound on A2 in the PM peak.

6. CONCLUSIONS

6.1.1 This report presents the impacts of Lower Thames Crossing (LTC) on the local traffic network in Medway, for the opening year 2030 and the forecasting year 2037 within nine subnetworks contained within the Medway Aimsun Model (MAM). It focuses on the Core with and without LTC Scenarios which are a reflection of the Core Scenarios (Do Minimum and Do Something) from the Lower Thames Area Model (LTAM) and the Local Plan with and without LTC Scenarios which reflect the expected traffic situation based on Medway's emerging Local Plan.

6.1.2 The modelling outputs are presented in the format of Level of Service (LoS) for the junctions of interest, journey times on key routes and general network statistics. The key adverse transport issues as a result of the LTC were identified in subnetworks 1 (Four Elms Hill / Four Elms Roundabout), 2 (Pier Road / A2), 4 (Strood and Chatham Town Centres), 5 (M2 Junctions 2 to 4) and 9 (A228 Cuxton & Halling).

6.1.3 The report also outlines potential mitigations at junctions subject to significant impacts to help address the significant adverse traffic related impacts. The LoS outputs were recalculated for the scenarios with the mitigation schemes and compared to the scenarios without the mitigations for the Core with LTC 2037 Scenario.

6.1.4 In most cases, the proposed mitigations improve the LoS for the junctions where they are applied. However, in some cases some adjacent junctions in the network are becoming worse with the application of the mitigations due to traffic being released from an upstream junction blocking the downstream junction. This situation is unsurprising due to the high amount of traffic that is present in most of the subnetworks.

6.1.5 The mitigations have been focussed on the Core with LTC scenarios as this is in compliance with the LTAM Do Something Scenario. This does not mean that the Local Plan with LTC scenario does not require mitigations, but due to uncertainty around the Local Plan development sites, this was considered more appropriate at this point.

6.1.6 It is recommended to re-evaluate the LTC impact to the Medway network in conjunction with the updated Medway Local Plan to ensure the LTC scheme does not impact the delivery of the Local Plan.

7. APPENDIX A – LTAM TECHNICAL NOTE

TECHNICAL NOTE

LOWER THAMES CROSSING

MODELLING ANALYSIS TECHNICAL NOTE

IDENTIFICATION TABLE	
Client/Project owner	Medway Council
Project	Lower Thames Crossing
Title of Document	Modelling Analysis Technical Note
Type of Document	Technical Note
Date	25/08/2022
Number of pages	19

TABLE OF CONTENTS

1. INTRODUCTION

1.1.1 This note provides details of the Lower Thames Area Model outputs provided to Medway Council in summer 2022. It includes analysis completed to help understand the impacts of the Lower Thames Crossing (LTC) Scheme on roads within Medway.

1.1.2 It includes the following sections:

- LTC Models – details of the models outputs provided
- Model Matrices – details of the changes in total cordoned demand between the models
- Flow Differences – maps and text relating to the changes in flows on Medway roads and the likely re-routing due to LTC
- Junction Hotspots – locations where the junctions are shown to have capacity constraints in the future over and above what is expected without the LTC scheme

2. LTC MODELS

2.1 Cordoned Model

2.1.1 A cordoned area of the LTAM has been provided to Medway Council to interrogate and help them understand if the impacts of the LTC scheme cause any areas of concern on their road network.

2.1.2 The models were interrogated by SYSTRA Ltd in summer 2022 to inform the consultation feedback in Autumn 2022.

2.1.3 The models provided include the following:

- Do Minimum (no LTC scheme)
- Do Something (with the LTC Scheme)

2.1.4 The model base year is 2016 and the opening year is modelled as 2030 with additional future years being 2037, 2045 and 2051.

2.1.5 For the purposes of looking at the roads within Medway the 2030 opening year and 2037 forecasting year have been used throughout. The 2037 year was chosen to compliment the Medway Local Plan update.

2.1.6 A review of the model outputs was completed with no major causes for concern noted.

2.2 GIS Shapefiles

2.2.1 In addition to the cordoned SATURN model, Medway were also provided with QGIS shapefiles for all of the model runs. These shapefiles include the following information:

- Total Passenger Car Units (pcu) flows by link;
- Volume to capacity ratio by link;
- Net speed on link (kph);
- Number of cars;
- Number of light goods vehicles;
- Number of Heavy goods vehicles;

- Percentage of Heavy goods vehicles; and
- Time along the link

2.2.2 The shapefiles have been utilised to produce maps showing the changes in flows on roads within Medway as the outputs can be better displayed for interpretation as a map background can be included. These maps are also supplemented with SATURN plots.

3. MODEL MATRICES

3.1.1 The matrices for each of the cordon models were extracted in order to be able to compare the demand totals for the different scenarios and check the levels of growth between model years. Whilst it was only possible to do this for the cordoned area rather than the model as a whole it does allow the trend in this cordoned area to be checked.

3.1.2 Table 1 shows both the growth in demand between 2030 and 2037 and the changes comparing the Do Something run to the Do Minimum.

Table 1. Matrix Comparisons

SCENARIO	% GROWTH 2030 TO 2037	% CHANGE VS DO MINIMUM 2030	% CHANGE VS DO MINIMUM 2037
Do Minimum	6.0%		
Do Something	6.2%	1.7%	1.9%

3.1.3 As can be seen the level of demand growth between 2030 and 2037 is consistent between the Do Minimum and Do Something.

3.1.4 The changes in demand between the with and without LTC also seem sensible with a small increase as a result of the scheme.

4. FLOW DIFFERENCES

4.1.1 The plots include both GIS plots from the shapefiles provided for the LTAM model and also SATURN plots for the Medway cordon area. Both plot types show the change in actual flows in pcus.

4.1.2 For the SATURN plots a green line represents an increase in flow on the link and a blue line represents a reduction in expected flows.

4.1.3 For the GIS plots changes in flow show where there is either additional traffic or reduced traffic on the links. Increases are shown in yellow, orange and red while decreases are green and blue. The links that are grey show small levels of change.

4.2 Do Something vs Do Minimum 2030

4.2.1 The plots in Figure 1 to Figure 4 show the difference in flows in PCUs between the Do Something and Do Minimum runs.

Figure 1. Do Something vs Do Minimum 2030 AM – GIS Plot

Figure 2. Do Something vs Do Minimum 2030 AM – SATURN Plot

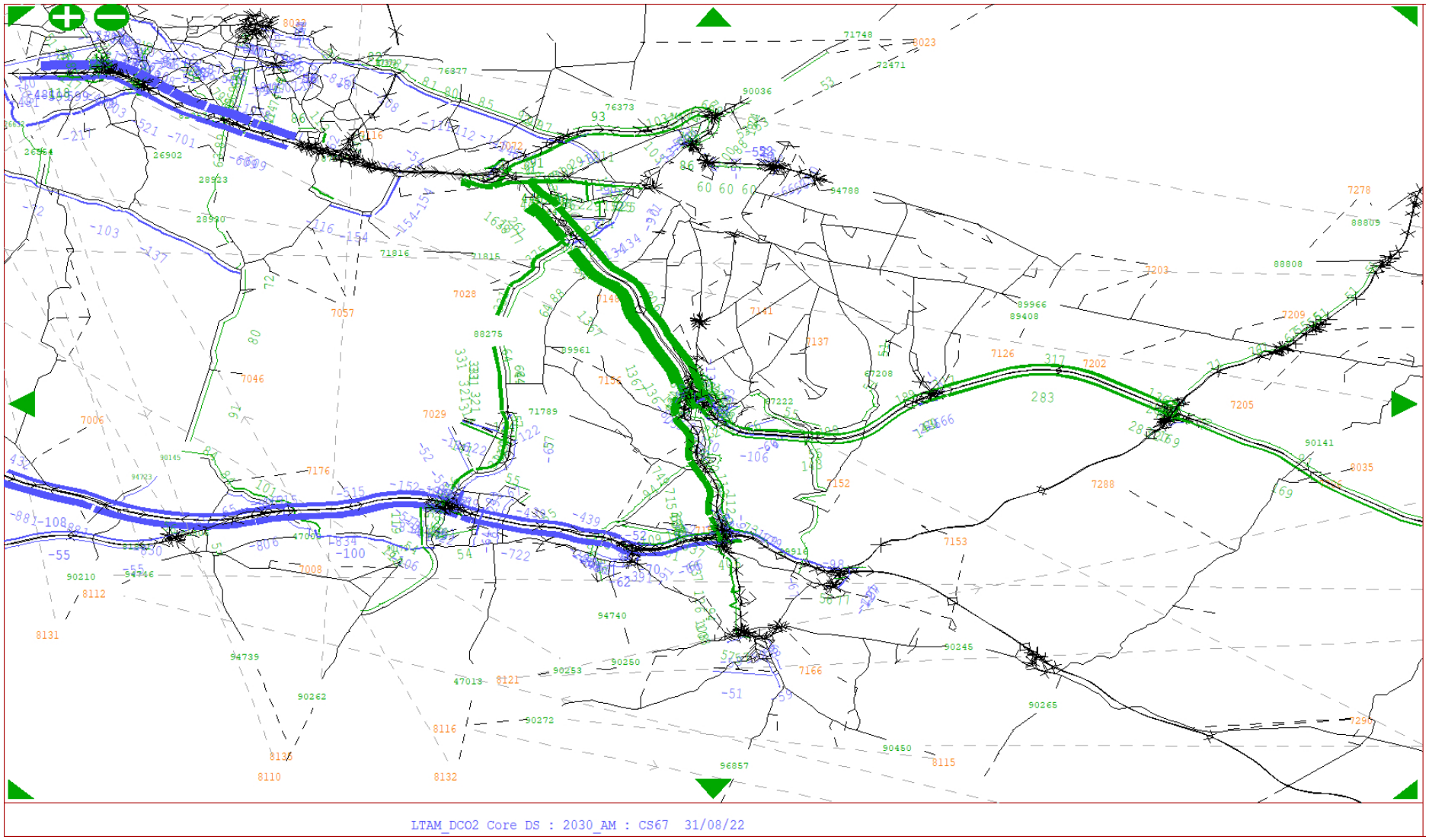
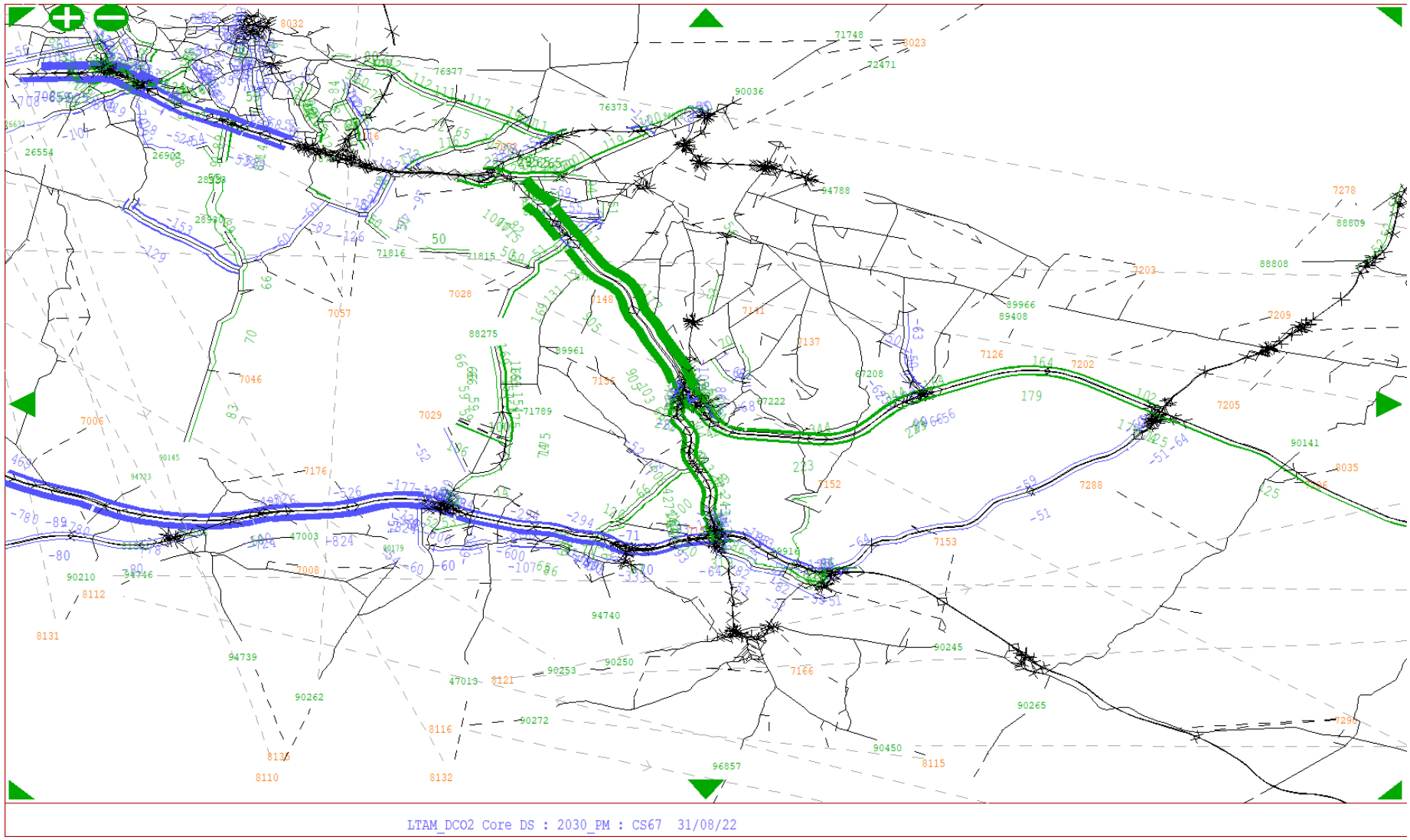


Figure 3. Do Something vs Do Minimum 2030 PM – GIS Plot

Figure 4. Do Something vs Do Minimum 2030 PM – SATURN Plot



4.2.2 Looking at the maps for the Do Something versus the Do Minimum scenario for 2030 shows that the changes as expected are mostly close to the LTC scheme and on trunk roads leading to the scheme.

4.2.3 During the AM peak it can be seen that the LTC is resulting in a reduction in traffic along the A2 beyond the new LTC junction with approximately 1,000 less vehicles travelling eastbound to the M2 and 600 vehicles travelling westbound.

4.2.4 Flows on the M2 increase, particularly in a northbound direction (approximately 1350 vehicles and 800 southbound). These vehicles appear to be heading to the new LTC link which has northbound flows of approximately 4,500 vehicles and 3,500 southbound.

4.2.5 There is also a notable decrease in expected vehicle numbers on the M20, particularly to the west of the A229 junction. This is due to traffic using the new LTC and not needing to cross via the Dartford crossing.

4.2.6 The A289 between the M2 and Wainscott also sees an increase in expected flows of up to approximately 400 pcus southbound and 100 pcus northbound. The A2 between the M2 and central Strood also see an expected increase of approximately 450 pcus westbound with traffic heading to the LTC. Finally, the A228 and A229 both northbound see increases of 375 pcus and 715 pcus respectively (with southbound flows of approximately 90 pcus and 110 pcus).

4.2.7 During the PM peak the re-routing of traffic is similar, although as would be expected there is some change in directionality of the changes. On the M2 flows increase more in a southbound direction (approximately 1,100 pcus) rather than northbound (approximately 900 pcus). Meanwhile the reduction in flows on the A2 is lower in the PM peak and less varied by direction (approximately -600 pcus eastbound and -500 pcus westbound).

4.2.8 On the M20 there is again a noticeable reduction in flows both east and westbound to the west of the A229 junction. The impacts on the A289 are less noteworthy in the PM peak although the A228 and A229 both see increases in expected traffic of a similar scale to the AM peak (A228 170 pcus southbound and 70 pcus northbound, A229 340 pcus southbound and 430 pcus northbound).

4.3 Do Something versus Do Minimum 2045

4.3.1 Figure 5 to Figure 8 show the changes in flows for 2037 for the do something compared to the Do Minimum.

Figure 5. Do Something versus Do Minimum 2037 AM – GIS Plot

Figure 6. Do Something versus Do Minimum 2037 AM – SATURN Plot

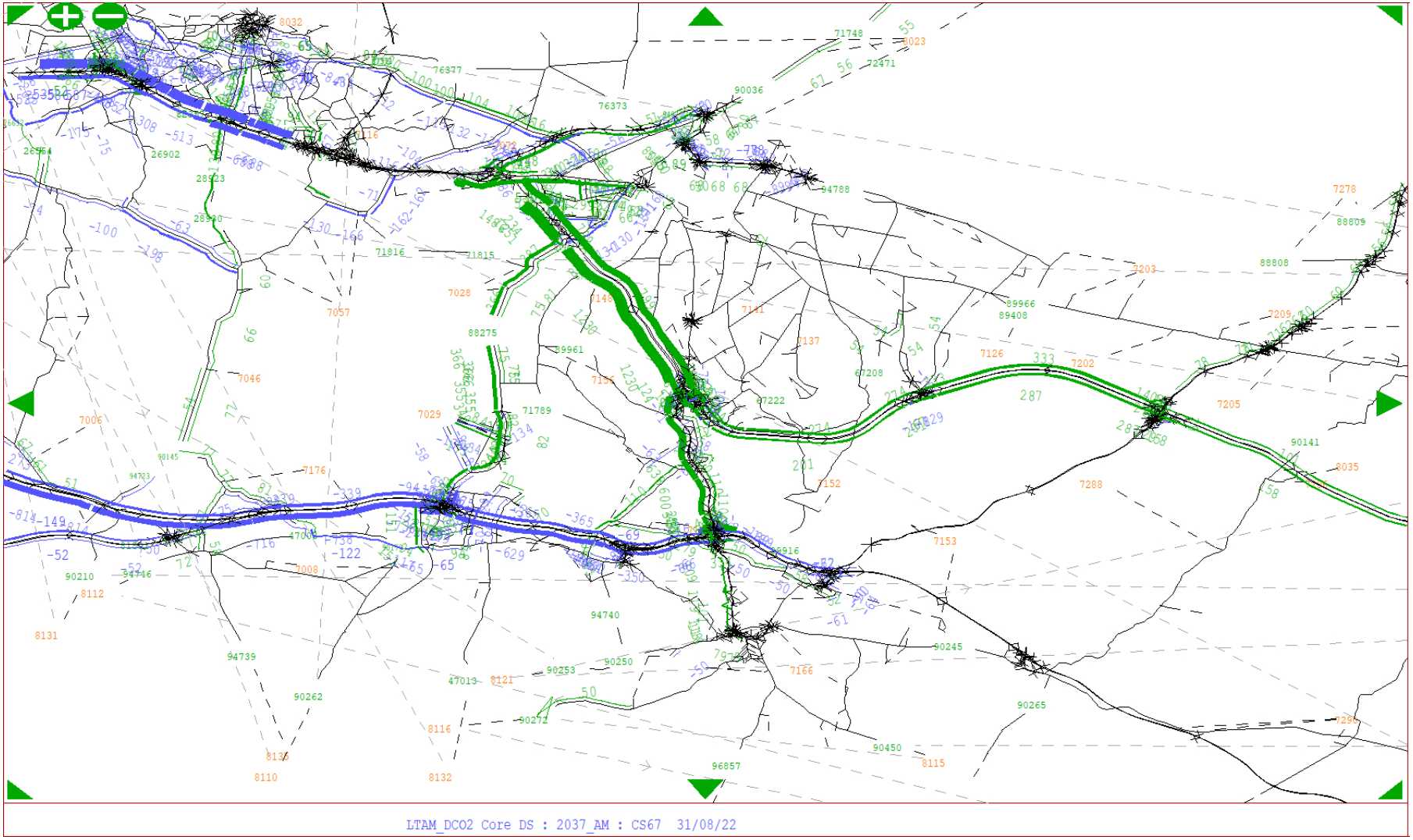
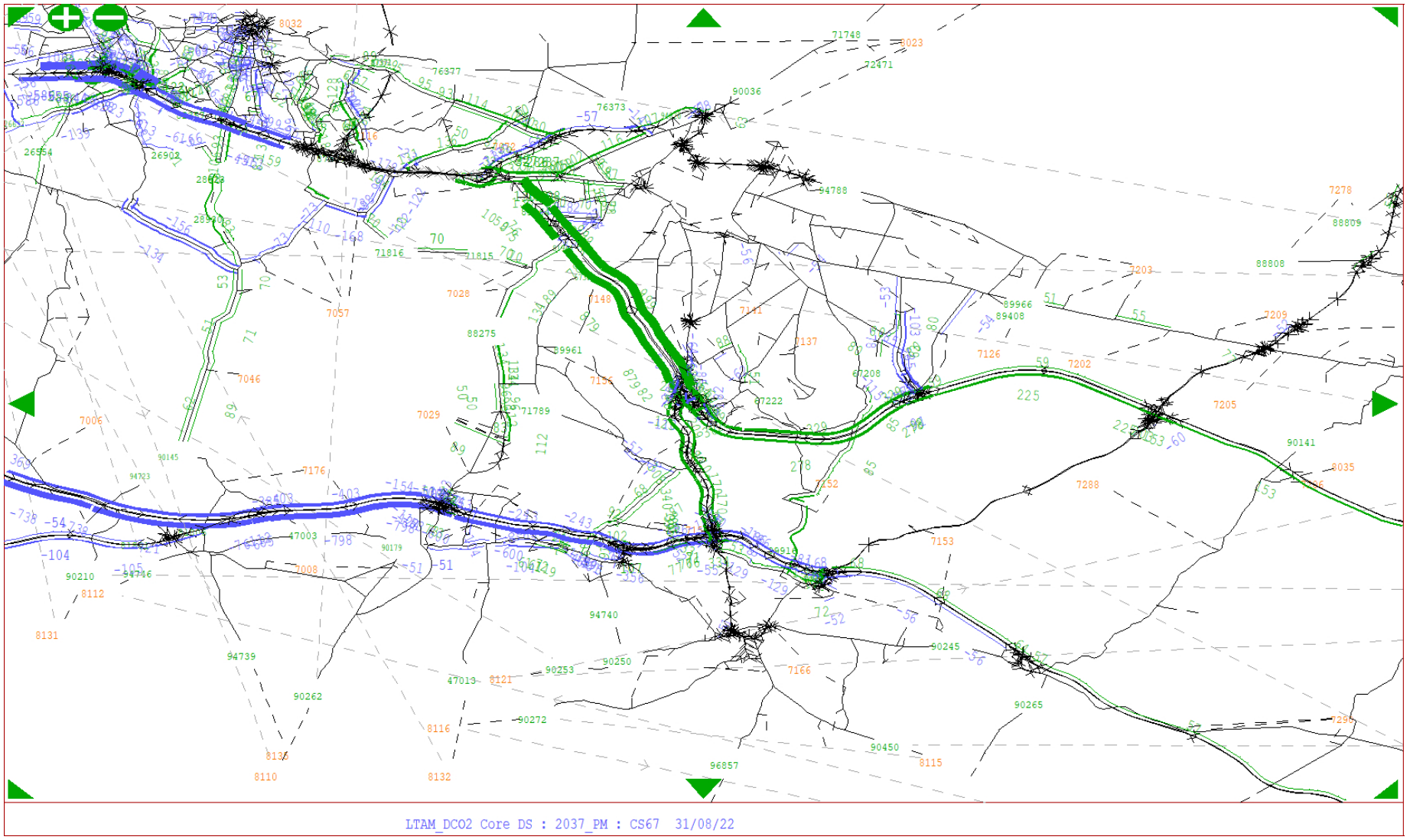


Figure 7. Do Something versus Do Minimum 2037 PM – GIS Plot

Figure 8. Do Something versus Do Minimum 2037 PM – SATURN Plot



4.3.2 As with the 2030 opening year, the 2037 forecast year shows very similar trends in flow changes between the do something scenario and the do minimum.

4.3.3 In the AM peak, most of the main routes show a slightly lesser impact in 2037 than in 2030. There are again reductions in flow on the A2 west of the LTC scheme (approximately -1050 pcus eastbound and -690 pcus westbound).

4.3.4 The reductions on the M20 west of the A229 are approximately -630 pcus westbound and -370 pcus eastbound.

4.3.5 Flows on the M2 are expected to still be greater with the LTC scheme in place with increases of approximately 800 pcus southbound and 1230 pcus northbound. Both the A228 and A229 see flow increases especially northbound (A228 approximately 370 pcus northbound and 80 pcus southbound, 229 approximately 750 pcus northbound and 10 pcus southbound).

4.3.6 Finally for the AM peak, the A289 towards the A2 / M2 sees an increase in flows of up to approximately 340 pcus.

4.3.7 During the PM peak the reductions in flow along the A2 are approximately 390 pcus eastbound and 610 pcus westbound while the M20 west of the A228 sees a slightly larger reduction in expected flows of approximately 400 pcus eastbound and 800 pcus westbound.

4.3.8 Increase in flow are again observed in the M2 (approximately 1,000 pcus southbound and 880 pcus northbound), the A228 (approximately 50 pcus northbound and 130 pcus southbound) and the A229 (approximately 340 pcus northbound and 170 pcus southbound).

4.3.9 All the observed changes in flows appear reasonable and as would be expected given both the location and nature of the LTC scheme being tested.

5. HOTSPOTS

5.1.1 Locations where junctions in the network struggle have been identified as hotspots. These are locations where the highway is most likely to struggle to cope with increased flows as a result of the LTC scheme.

5.1.2 Figure 9 and Figure 10 show change in ratio of flow to capacity (RFC) between the Do Something and Do Minimum scenarios which has been calculated to identify locations where the forecast junction performance deterioration is most pronounced in terms of junction performance. The following criteria has been applied to identify junctions where operational performance worsens:

- One of the arms both exceeds a RFC of 95% **and**
- This RFC has increased by more than 10% compared to the Do Minimum scenario.

Figure 9. Junction Hotspots Severe 2037 AM

Figure 10. Junction Hotspots Severe 2037 PM

5.1.3 Most of the hotspots are located close to the boundary of Medway or on the trunk roads within Medway.

5.1.4 The junctions shown in the maps are also listed below in Table 2. Note that number 10 and 17 are intentionally excluded from the list as they are not included on the maps.

Table 2. Junction Hotspot Locations

JUNCTION ID	LOCATION	CLASSIFICATION
1	Valley Drive SB between Stanley Crescent	PM Severe
2	B262 Springhead Rd SB at Hall Road roundabout	PM Severe
3	Hall Road WB at Springhead Rd roundabout	PM Severe
4	Trottiscliffe Road SB at A20 London Road junction	AM Severe
5	Sandling Ln EB to Boxley Road roundabout	PM Severe
6	A229 on slip northbound from Cobtree roundabout	PM Severe
7	A229 on slip northbound from Cobtree roundabout	PM Severe
8	M20 EB off slip at junction 7	PM Severe
9	A229 NB Sandling Interchange between roundabouts (M20 J6)	AM & PM Severe
11	M20 J6 WB off-slip at A229 roundabout (Sandling Interchange)	AM Severe
12	M2 NB off slip J3	PM Severe
13	M2 J5 WB merge with on-slip	AM Severe
14	M2 J4 on slip EB at merge	PM Severe
15	M2 J2 SB off slip at A228	PM Severe
16	M2 SB off slip J3	PM Severe

JUNCTION ID	LOCATION	CLASSIFICATION
18	M2 EB off slip onto A289 NB	AM severe
19	Bligh Way NB at junction with A2 Watling Street	AM Severe
20	Zone access onto A228 / Malling Road roundabout	AM Severe

6. VOLUME OVER CAPACITY CHANGES

6.1.1 In addition to the hotspot junctions being identified maps showing the change in volume over capacity (VoC) between the Do Minimum and Do Something scenario were also created. These were created from the GIS information so also show a wider area than just the SATURN cordon.

6.1.2 Figure 11 and Figure 12 show the changes in VoC in 2037 for the do something compared to do minimum scenarios.

Figure 11. Change in VoC Do Something vs Do Minimum 2037 AM

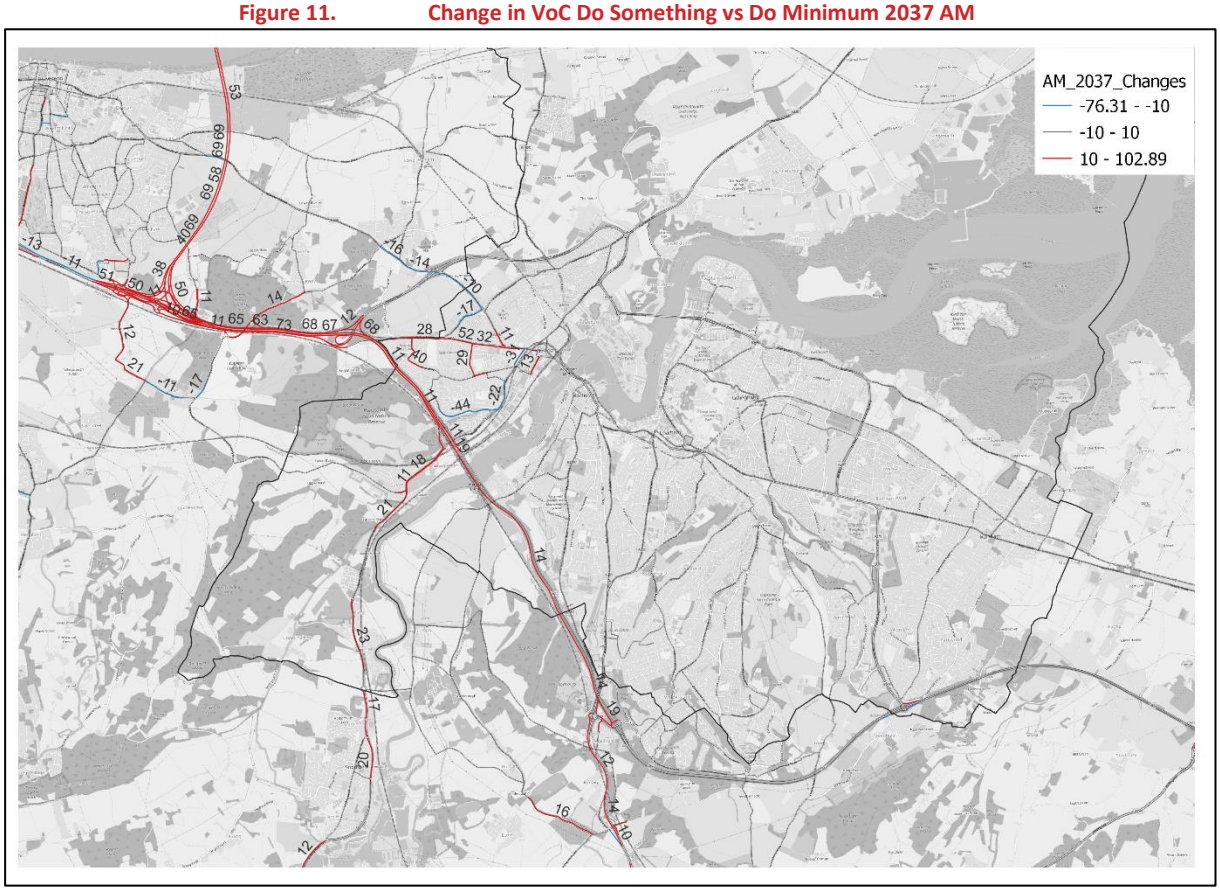
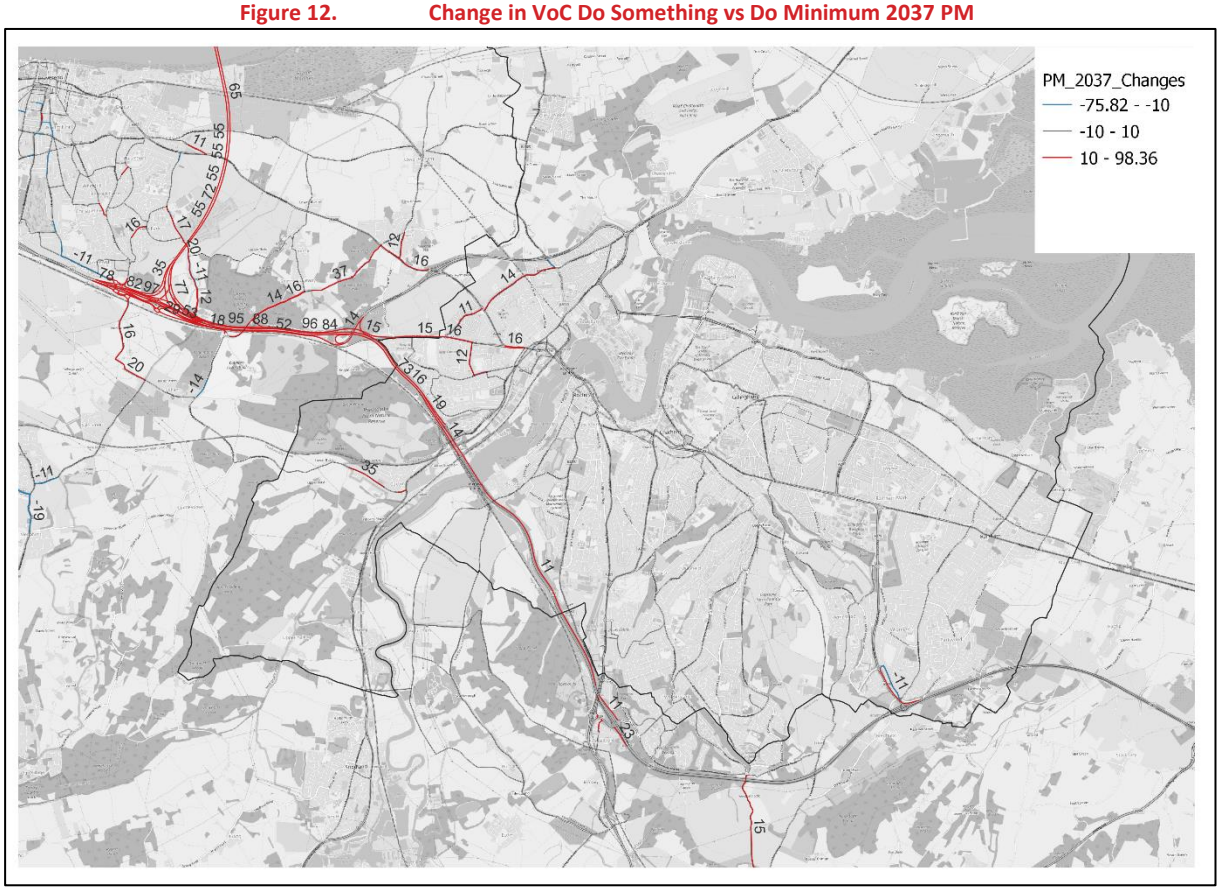


Figure 12. Change in VoC Do Something vs Do Minimum 2037 PM



6.1.3 As can be seen from the VoC difference plots most of the area has either an increase in the VoC or no change (grey). The largest changes in VoC are associated with locations where the links are new (i.e. the LTC route).

6.1.4 For the AM peak, other than the increase on the A2 and M2 the main area that is expected to see changes in VoC is Rochester on the west of the River Medway. There are increases in VoC on the A2 between the M2 and Rochester (up to 52% increase) but also decreases on Cuxton Road (-22%) and Sycamore Road (-44%). There is also an increase in the VoC along the A228 (up to 23%).

6.1.5 For the PM peak there are no decreases of more than 10%. As in the AM peak the main increases are along the M2 and A2 and the new links associated with the LTC. There are increases along the B2108 (up to 14%). There is also an increase of 35% on Bush Road for traffic travelling towards Sundridge Hill.

7. CONCLUSIONS AND FOLLOW UP

7.1.1 Overall, the results of the LTAM model runs showed that:

- Changes in traffic flow are concentrated on the strategic roads with the expected changes on local roads much lower.
- The locations where junctions are likely to struggle as a result of the LTC scheme are also concentrated on the strategic roads and roads on the boundary of Medway.

8. APPENDIX B - PROPOSED MITIGATIONS

Appendix B - Core with LTC 2037 Mitigations

NO	JUNCTION NAME	MITIGATION	FIGURE
SN1-J2	Four Elms roundabout	Transform to hamburger roundabout for North-South movement and add in segregated left turn to north of junction.	1
SN2-J7	Pier Road / Maritime Way roundabout	Provide a walking / cycle route round one side of the junction to avoid having a stop line on the exit arm.	2
SN4-J5	High Street / Station Road junction	Optimise signals	-
SN4-J9	The Paddock / Gibraltar Hill / New Road / New Road Avenue junction	Ban turns / cut off Paddock.	3
SN5-J1	Bridgewood roundabout	Change lane markings	-
SN9-J1	A228 / Bush Road junction	Add signals	4
SN2-J10	Will Adams Roundabout	Change lane markings and change 2-lane circulatory section to 3-lane.	5

SN1-J2 Four Elms roundabout

- Introduce a segregated left turn lane from north to east.
- Introduce straight ahead through the roundabout to facilitate the north-south movements.
- All arms to become signalised.

Figure 1 SN1-J2 Four Elms roundabout Mitigation

SN2-J7 Pier Road / Maritime Way roundabout

- Remove eastern crossings across Pier Rd.

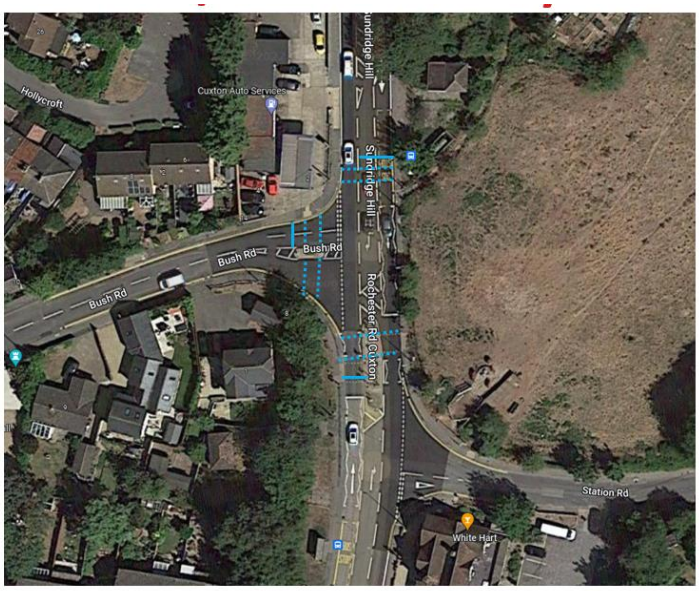
Figure 2 SN2-J7 Pier Road / Maritime Way roundabout

SN4-J9The Paddock / Gibraltar Hill / New Road / New Road Avenue junction

- Make The Paddock one way out only, tighten the southern kerb and shift the stop line closer to the junction
- Right-turn only out of Gibraltar Hill into New Rd Avenue
- Vehicles that were performing the left turn out of Gibraltar Hill into New Rd Avenue will need to use New Cut instead

Figure 3 SN4-J9 The Paddock / Gibraltar Hill / New Road / New Road Avenue junction

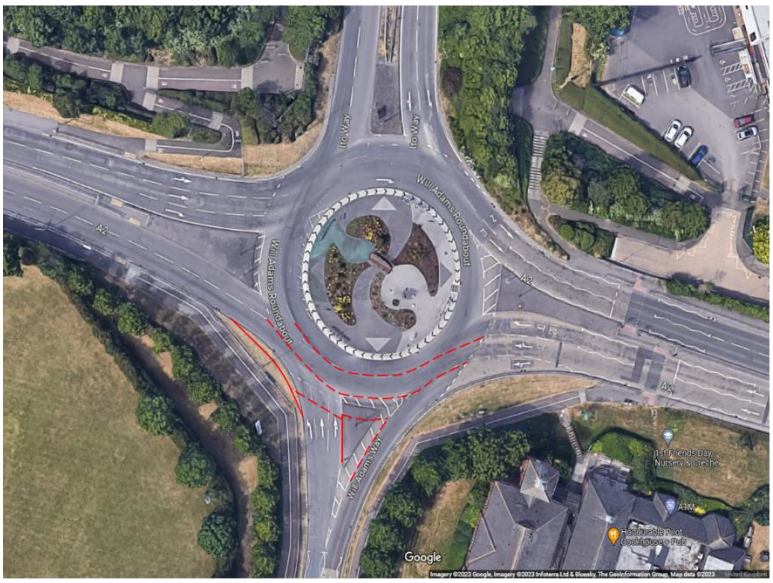
SN9-J1A228 / Bush Road junction



- Signalise the priority T-junction between Rochester Rd Cuxton and Bush Rd.
- Along the signalisation, introduce also pedestrian crossing on the northern and western arm
- Change the staggered crossing into a one single crossing which allows to move the stop line closer to the junction

Figure 4 SN9-J1 A228 / Bush Road junction

SN2- Will Adams Roundabout



- The 2-lane circulatory section changed to 3-lane to provide more capacity for traffic from east.
- The lane markings at the eastern arm were changed to allow two lanes heading from A2 to A289.

Figure 5 Will Adams Roundabout

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Birmingham – Newhall Street
5th Floor, Lancaster House, Newhall St,
Birmingham, B3 1NQ
T: +44 (0)121 393 4841

Birmingham – Edmund Gardens
1 Edmund Gardens, 121 Edmund Street,
Birmingham B3 2HJ
T: +44 (0)121 393 4841

Dublin
2nd Floor, Riverview House, 21-23 City Quay
Dublin 2,Ireland
T: +353 (0) 1 566 2028

Edinburgh – Thistle Street
Prospect House, 5 Thistle Street, Edinburgh EH2 1DF
United Kingdom
T: +44 (0)131 460 1847

Glasgow – St Vincent St
Seventh Floor, 124 St Vincent Street
Glasgow G2 5HF United Kingdom
T: +44 (0)141 468 4205

Leeds
100 Wellington Street, Leeds, LS1 1BA
T: +44 (0)113 360 4842

Liverpool
5th Floor, Horton House, Exchange Flags, Liverpool,
United Kingdom, L2 3PF
T: +44 (0)151 607 2278

London
3rd Floor, 5 Old Bailey, London EC4M 7BA United Kingdom
T: +44 (0)20 3855 0079

Manchester – 16th Floor, City Tower
16th Floor, City Tower, Piccadilly Plaza
Manchester M1 4BT United Kingdom
T: +44 (0)161 504 5026

Newcastle
Floor B, South Corridor, Milburn House, Dean Street, Newcastle, NE1 1LE
United Kingdom
T: +44 (0)191 249 3816

Perth
13 Rose Terrace, Perth PH1 5HA
T: +44 (0)131 460 1847

Reading
Soane Point, 6-8 Market Place, Reading,
Berkshire, RG1 2EG
T: +44 (0)118 206 0220

Woking
Dukes Court, Duke Street
Woking, Surrey GU21 5BH United Kingdom
T: +44 (0)1483 357705

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SYSTRA

Appendix F

MEDWAY LOWER THAMES CROSSING SUPPORT TRANSPORT ASSESSMENT REVIEW

1.1 Introduction

1.1.1 SYSTRA Ltd (SYSTRA) has been commissioned by Medway Council (the Council) to undertake a high-level technical review of the transport related documents on behalf of Highways England in support of the proposed A122 Lower Thames Crossing (LTC) Development Consent Order (DCO) application.

1.1.2 SYSTRA has undertaken a technical review of the **Transport Assessment** prepared and submitted as part of the DCO application for the LTC. This work is intended to identify and confirm positive, negative and neutral impacts of the Lower Thames Crossing on Medway during the operational phase (i.e. following construction and opening).

1.1.3 As part of this work, an assessment has been undertaken to confirm whether the impacts set out within the Transport Assessment correspond with those identified by SYSTRA in technical work undertaken on behalf of Medway Council over the previous year, as set out within the SYSTRA Technical Report dated 6 December 2022.

1.1.4 Technical assessment undertaken by SYSTRA of the impacts of LTC in Medway has been carried out using the Lower Thames Area Model (LTAM) supplied by National Highways (NH) and the Medway Aimsun Model (MAM) supplied by the Council, as discussed further later in this document.

1.1.5 The Transport Assessment presents the forecast impacts of the crossing on the performance of the transport network. For the purposes of this technical work, focus has been placed on impacts on the highway network within Medway.

1.1.6 Operational impacts of the crossing are set out for two future years:

- 2030 (the opening year); and
- 2045 (the design year).

1.2 Development & Highway Interventions

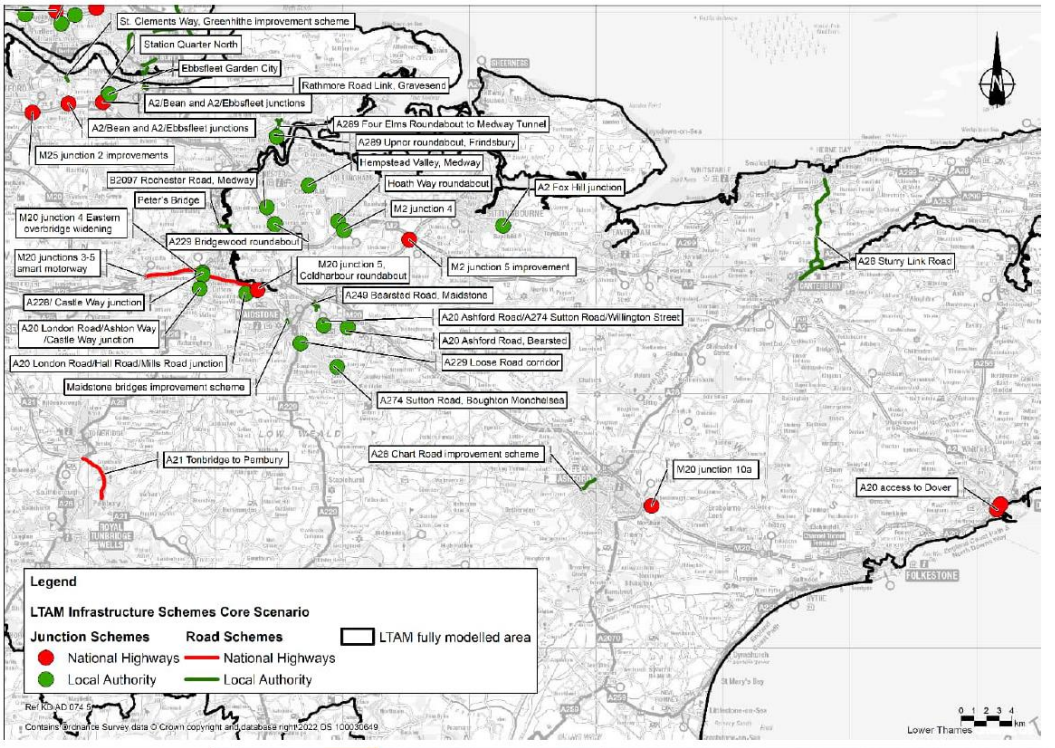
1.2.1 A number of major developments have been included within the LTAM for 2030 and 2045. Such developments that are included in the future year trip matrices are set out in the Uncertainty Log, submitted as part of the DCO application. This includes a number within Medway. The Uncertainty Log has not been updated since the end of September 2021. This is noted as being due to the length of time required to build trip matrices for use in LTAM.

1.2.2 It is noted that there are two proposed developments that, although they met the set out criteria for inclusion in the Uncertainty Log, have not been included. Paragraph 5.7.20 notes that this is due to the developments not including appropriate highway interventions that “would maintain the integrity of the road network”.

1.2.3 The developments are Highsted Park and Medway One. Whilst the former is located in Swale, its relative proximity to Medway is likely to increase vehicular trips within the Medway boundary. The Transport Assessment confirms that National Highways is working with the respective development partners to “consider potential ways forward”.

1.2.4 Highway improvement / mitigation schemes that are expected to be delivered regardless of the progression of the Lower Thames Crossing are included in the modelling assessment, and are as of the position in September 2021. A number within Medway are included.

Figure 1: Highway Improvement Works included within LTAM



Medway Development

1.2.5 Medway's annual housing need, as determined by the standard method, is 1,667. The new Local Plan will provide for **28,339** homes up to 2040. The most recent Employment Land Needs Assessment identified a need for at least 62 hectares of employment land.

1.2.6 The DfT traffic forecasts do not reflect the full scale of Medway's development needs, with the Core Scenario is unlikely to reflect the spatial distribution of Medway's future growth. As well as the Medway One development noted above, there is additional growth planned on the Hoo Peninsula, including 10,600 new homes. Funding is secured for this through the Housing Infrastructure Fund, providing greater certainty for delivery.

1.2.7 Development identified within TEMPro has been ascertained and confirmed. TEMPro identifies that the number of households within Medway will increase by 23,728 between the LTC assessment base year (2016) and future year (2040).

High Growth Scenario

1.2.8 In addition to the Core Scenario, used for the assessment work set out within the Transport Assessment, consideration is given to a **High Growth** Scenario and **Low Growth** Scenario.

1.2.9 Details of how these have been developed are set out within Appendix C (Transport Forecasting Package) of the Combined Modelling and Appraisal Report.

1.2.10 Paragraph 4.2.33 notes that the high growth scenario is provided to understand whether, under high demand assumptions, the LTC remains effective. The High Growth scenario utilises the NTEM plus TAG High Growth Increment.

1.2.11 The methodology used to develop the High Growth scenario is explained in paragraph 8.6.1, replicated below:

> The TAG high and low growth increment is defined according to TAG guidance (Unit M4 Section 4.2 (DfT, 2019)). This involves adding/subtracting a proportion of the base year traffic to/from the demand from the core scenario.
>
> For highway trips the formula applied is as follows:
>
> $$2.5\% \times \sqrt{(Forecast\ Year - Base\ Year)}$$

1.3 Changes in Traffic Flow

1.3.1 Change in traffic flow between the 2045 "Do Minimum" (i.e. without the construction of the Lower Thames Crossing) and the 2045 "Do Something" (i.e. with the crossing) are shown graphically within the Transport Assessment (plate 7.10 for the AM peak, plate 7.12 for the interpeak and plate 7.14 for the PM peak).

1.3.2 Changes in traffic flows are shown only for particular routes that comprise the strategic highway network. Changes in flows on a number of roads within Medway are not shown. However, it can be seen that additional traffic movements are expected on routes including the M2, A2, A289 and other roads to the north of the River Medway. This is the case during the AM, interpeak and PM periods.

1.3.3 Increases in traffic flow in excess of 40% are identified on roads around the northwest of Strood during the AM peak. The PM peak shows percentage increases of between 20 and 40% on the same roads. It is unclear whether there are no identified impacts on roads across the River Medway (A2) or whether this has not been subject to assessment.

Figure 2: AM Peak

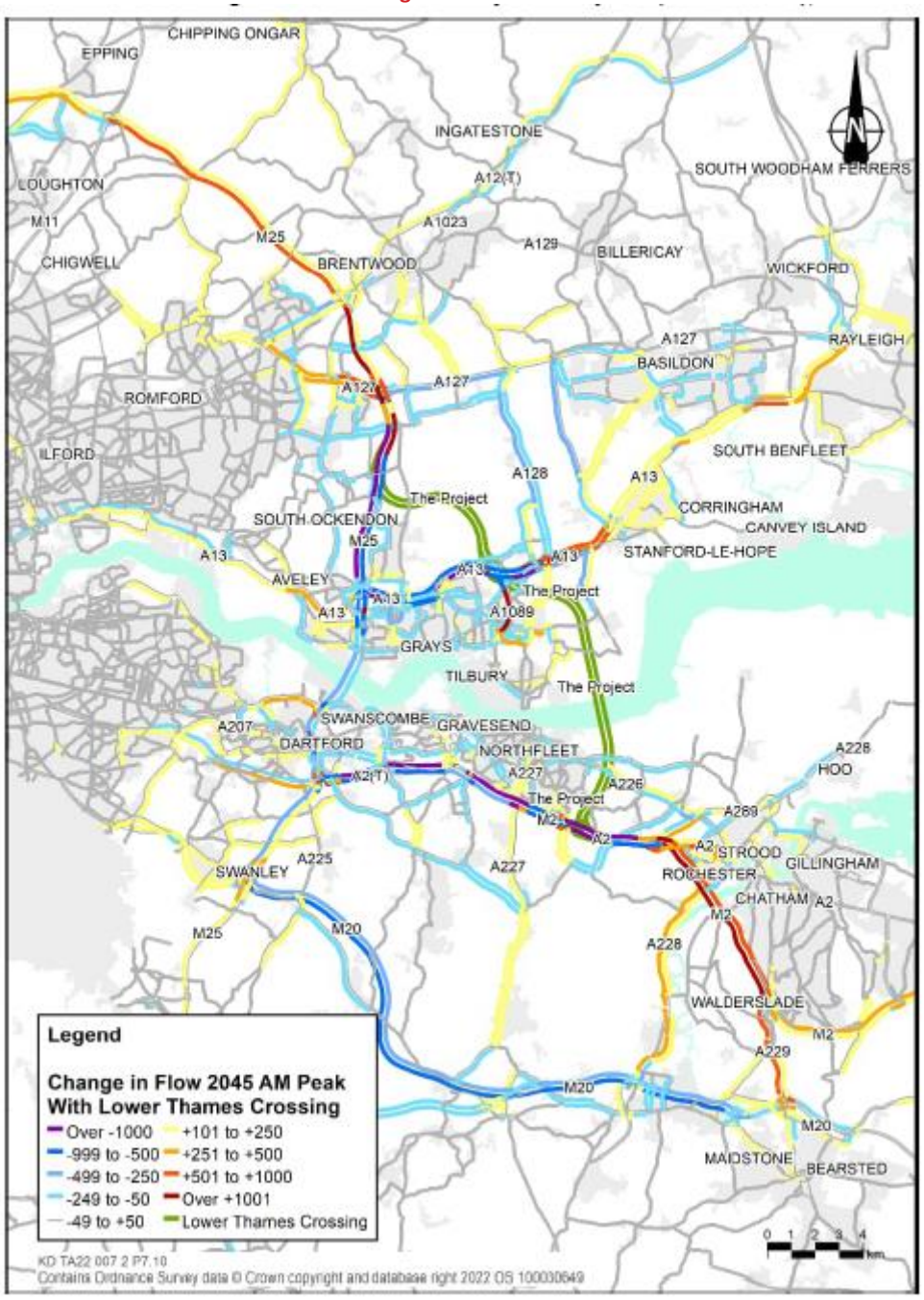


Figure 3: Interpeak

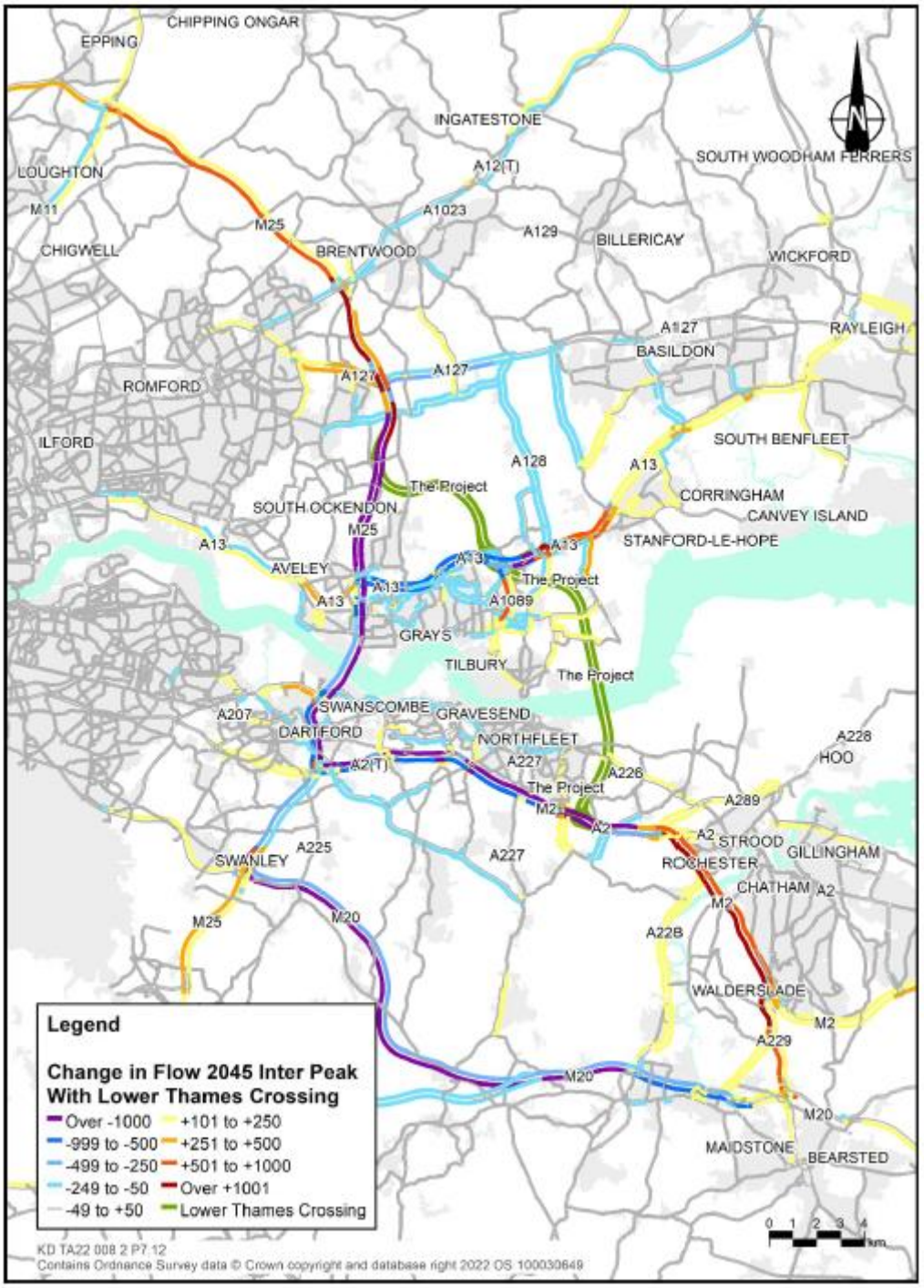
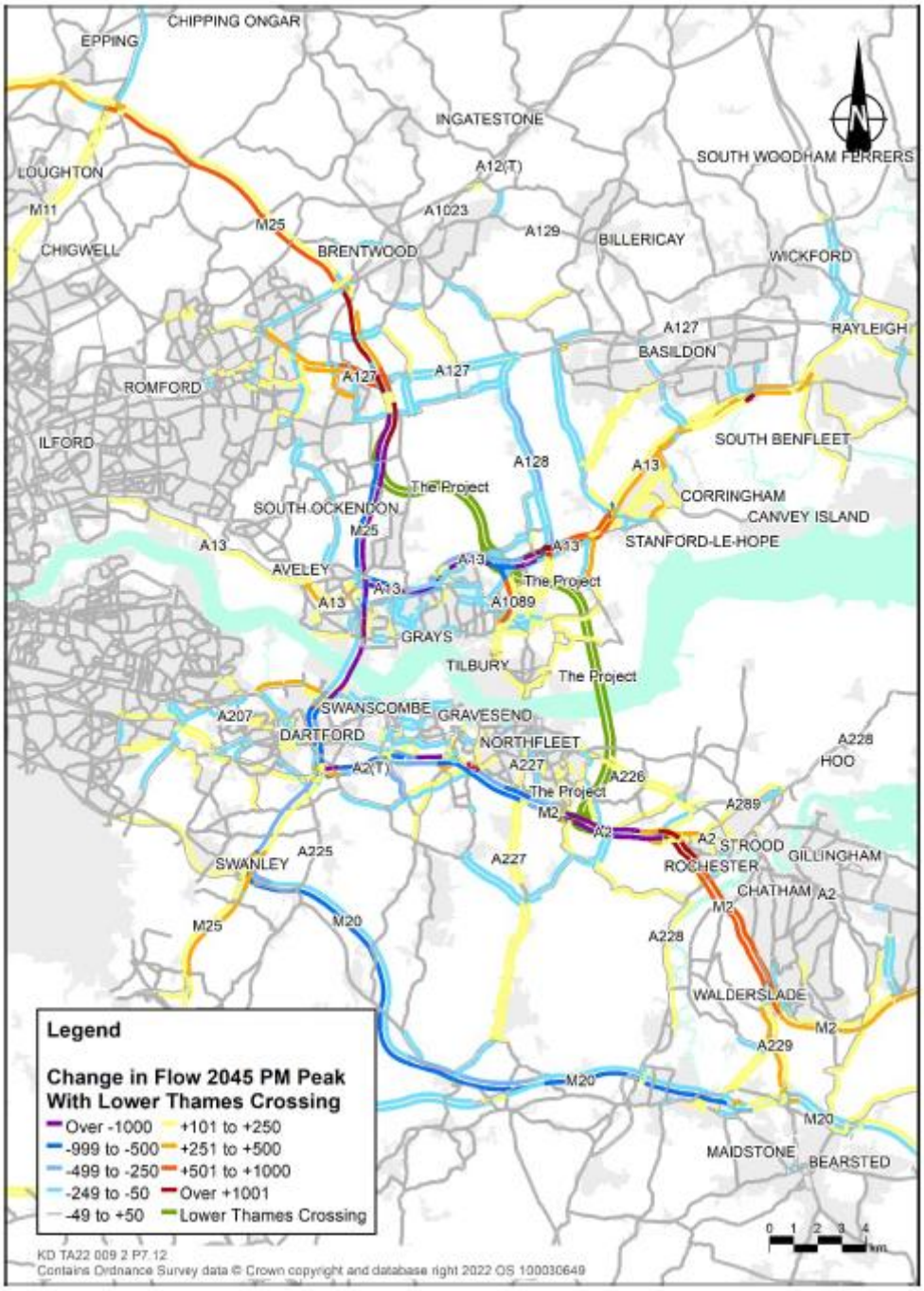


Figure 4: PM Peak



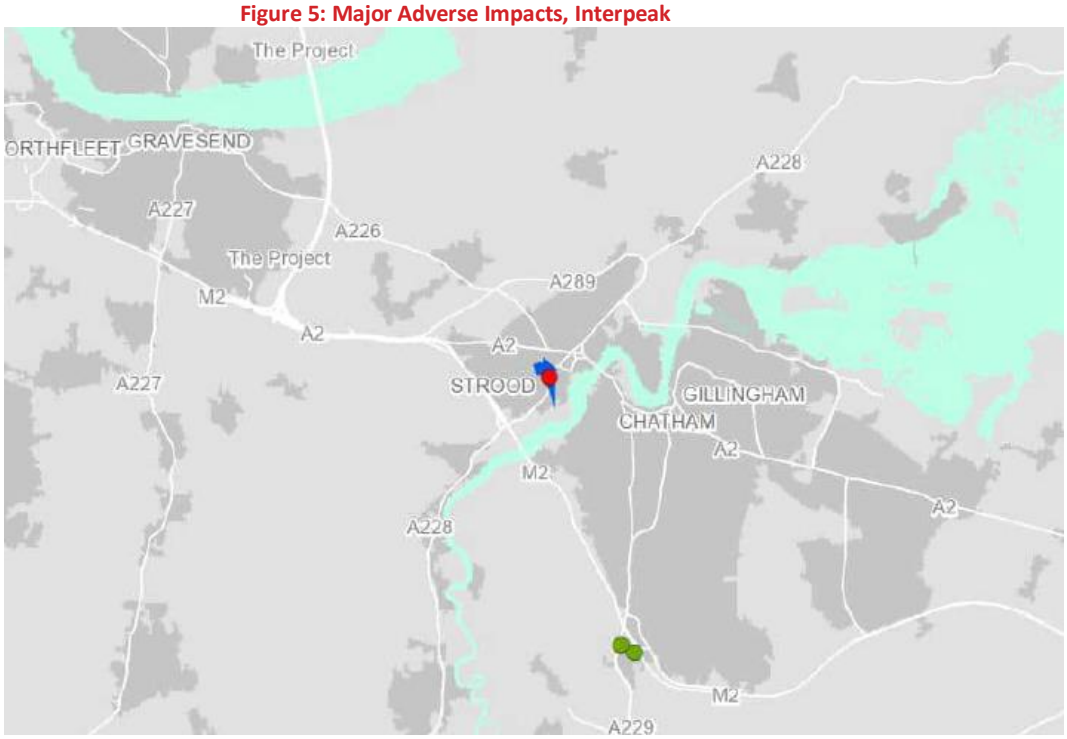
1.3.4 Paragraph 7.5.18 notes that "in a number of areas, the percentage of volume to capacity on some roads increases, particularly those close to the Project". It is recognised that the future year network is expected to reach or exceed capacity without construction of the LTC, including around Rochester and Gillingham.

1.3.5 Traffic volumes as a percentage of road capacity increase to beyond 95% on roads including the A228 in the AM peak (plate 7.20). During the PM peak, the A228 already operates close to capacity; however, conditions are shown to worsen as a result of implementation of the LTC (plate 7.24).

1.3.6 Plates 7.28 to 7.30 identify a number of locations, both links and turning nodes, in Medway where adverse impacts are identified. The majority of these are defines as Minor

Adverse or Moderate Adverse, however there are Major Adverse impacts identified in the interpeak period (Figure 5).

Figure 5: Major Adverse Impacts, Interpeak



1.3.7 The number of locations where adverse impacts are reported in the High Growth scenario (Appendix D) is greater.

1.3.8 Some minor beneficial impacts are set out in the Medway boundary. It is not entirely clear as to how these have been defined / identified.

1.4 Journey Times

1.4.1 A total of 28 journey time routes have been assessed within the Transport Assessment. Three are of significance for Medway:

- **No. 3**: A228 M20 to Strood;
- **No. 5**: A289; and
- **No. 25**: A2 (Strood).

1.4.2 Reported journey time changes between the Do Minimum and Do Something scenarios for the 2030 period are replicated in Table 1 overleaf for information.

Table 1. Journey Time Changes (Time in Minutes)

ROUTE		DIR	CORE GROWTH SCENARIO			
			DO MIN	DO SOME	DS-DM	% CHANGE
AM PEAK						
3	A228 (M20 to Strood)	NB	14.3	15.3	1.0	6.9%
		SB	18.1	19.8	1.7	9.3%
5	A289	EB	4.0	4.3	0.3	7.1%
		WB	7.6	6.5	-1.1	-15.3%
25	A2 (Strood)	EB	7.5	7.7	0.2	3.3%
		WB	8.9	8.4	-0.5	-5.8%
INTERPEAK						
3	A228 (M20 to Strood)	NB	14.1	14.7	0.6	4.0%
		SB	14.7	15.3	0.6	3.6%
5	A289	EB	3.9	3.9	0.0	1.3%
		WB	4.4	5.2	0.7	16.6%
25	A2 (Strood)	EB	7.1	6.9	-0.2	-3.3%
		WB	7.0	7.1	0.1	1.7%
PM PEAK						
3	A228 (M20 to Strood)	NB	19.8	14.7	-5.1	-25.9%
		SB	15.2	15.3	0.1	0.5%
5	A289	EB	6.7	3.9	-2.8	-41.1%
		WB	5.0	5.2	0.2	3.3%
25	A2 (Strood)	EB	8.6	7.1	-1.5	-17.4%
		WB	8.2	7.1	-1.1	-13.7%

1.4.3 It can be seen that journey time increases are forecast on the A228 and A289 during the morning and interpeak periods. The percentage change in improvements to journey time on the A286 eastbound in the PM peak is considerable (41.1% improvement).

1.4.4 Route based journey time analysis is presented in Appendix B of the Transport Assessment. This shows differences in journey times between twelve locations to the

north and south of the LTC, including Rochester. An assessment of changes to journey times from Rochester to the following locations north of the River Thames is presented for the 2030 scenario:

- Cheshunt;
- Romford;
- Brentwood;
- Basildon;
- Tilbury Port; and
- DP World.

1.4.5 As would be expected, the introduction of the LTC reduces journey times to each of these locations during the AM, interpeak and PM periods. Similar results are shown for the 2045 scenario, set out in Appendix C.

1.4.6 Appendices B and C do not however present an assessment of route-based journey times from Rochester to other locations south of the LTC. Increases in traffic movements on roads in Medway and its vicinity, as a result of vehicles travelling to utilise the LTC, may increase journey times for such routes.

1.5 Mitigation & Monitoring

1.5.1 Paragraph 10.2.13 notes that:

> National Highways has assessed the wider network impacts of the Project and has considered these against the requirements set out in the National Policy Statement for National Networks (DfT, 2014) and other relevant policies, and **considers that the adverse impacts are acceptable under this policy.**