

Mr Grahame Kean
Examining Authority
National Infrastructure
Temple Quay House
2 The Square
Bristol BS1 6PN
BY EMAIL ONLY

Our Ref: 19/505549/NSIP
Your Ref: EN010083
Date: 6th August 2020

Dear Mr Kean

TOWN AND COUNTRY PLANNING ACT 1990 (AS AMENDED)

Re: Application by Wheelabrator Technologies Inc. for an Order Granting Development Consent for the Wheelabrator Kemsley Generating Station (K3) and Wheelabrator Kemsley North (WKN) Waste to Energy Facility Development Consent Order (DCO)

Response to the Examining Authority's further written questions and requests for information (ExQ4)

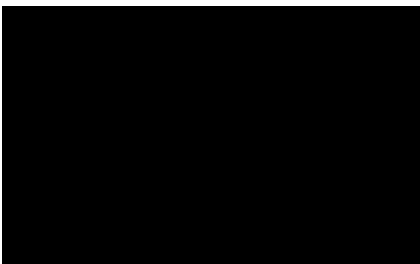
This representation from Swale Borough Council (SBC) is in response to the further written questions and requests for information from the Examining Authority, and specifically those questions directed to Swale Borough Council.

Q4.11.12 – A copy of the SWECO highway modelling report is attached with this letter as requested.

Q4.13.1 – SBC agrees that the dDCO could be separated out to cover the potential scenario that one project (K3), but not both, may be found acceptable.

Q4.14.4 – the submission by Ms Spicer reinforces the concerns raised by SBC in its representation dated 5th May 2020 that significant HGV movements and adverse climate change and air quality impacts would arise in the Borough from the operational need to draw in waste from beyond the boundaries of the borough and the wider Kent area.

Yours sincerely,



James Freeman
Head of Planning

t 01795 417309

ejamesfreeman@swale.gov.uk

SWALE HIGHWAY MODEL

LOCAL PLAN MODEL RERUN SUMMARY REPORT- DRAFT



20TH APR 2020

SWECO UK LIMITED

Change List

VER.	DATE	STATUS	PREPARED	REVIEWED	APPROVED
1	16/04/20	DRAFT	SL		
2	19/04/20	DRAFT	SL	WW	
3	20/04/20	DRAFT	SL	WW	WW
4	28/04/20	COMMENTS FROM KCC ADDRESSED	SL	WW	WW
5	11/05/20	TABLE 8-3 AND 8-4 UPDATED	SL	WW	WW

Table of Contents

1	Introduction	6
1.1	Background	6
1.2	Purpose of the Report	6
2	Reference Case and Previous 2037 Swale Local Plan Option Tests	7
2.1	Uncertainty Log- Reference Case	7
2.2	Previous Local Plan Option Tests	9
3	2037 Swale Local Plan Rerun Scenarios	12
4	Transport Network Review and Updates	13
4.1	Network Review	13
4.2	Transport Schemes in the Updated Scenarios	14
5	Local Plan Rerun Scenarios- Developments Allocation	15
5.1	Introduction	15
5.2	776 Scenario	15
5.3	1054 Scenario	16
6	Forecast Demand	19
6.1	Overview	19
6.2	Trip Rates for Housing Developments	19
6.3	Trip Generation	22
6.4	Matrix Building	25
6.4.1	Growth Factors	25
6.4.2	Unconstrained growth scenarios within Swale	26
6.4.3	Trip Distribution	26
6.4.4	Matrix Totals	27
7	Forecast Supply	30
7.1	Cost coefficients	30
7.2	Network changes for the transport mitigations	30
8	LP Model Results	31
8.1	Forecast Network Overall Performance	31
8.2	Traffic Flows	33
8.3	Network Delays and Congestion	38
9	Mitigation Measures	44
9.1	Demand Mitigations	44
9.1.1	Queenborough / Rushenden	45
9.1.2	Sittingbourne Town Centre	45
9.1.3	East of Faversham	46

9.2	Transport Mitigations	48
9.2.1	Mitigations package Isle of Sheppey	48
9.2.2	Mitigations package Faversham	48
9.2.3	Mitigations package Sittingbourne	49
9.3	Wider Mitigations	49
9.4	1054 Scenario with Mitigation Test	49
9.4.1	Network Statistics	49
9.4.2	Traffic Flow	51
9.4.3	Average Junction Delays (1054 Scenario AM)	53
10	Conclusions	55

Table of Figures

Figure 2-1	2027 housing developments	8
Figure 2-2	2037 housing developments	8
Figure 2-3	Transport schemes in Reference Case	9
Figure 4-1	Network refinement in Faversham town centre	13
Figure 4-2	Schematic layout and Network Coding for the M2 J7	14
Figure 5-1	Development Site Distribution in 1054 Scenario	18
Figure 6-1	Two-Way Car Hourly Trip Rate Comparison – TRICS, TEMPro and Uplifted	22
Figure 6-2	Additional Development Car Tripends_776 Scenario AM	23
Figure 6-3	Additional Development Car Tripends_776 Scenario PM	23
Figure 6-4	Additional Development Car Tripends_1054 Scenario AM	24
Figure 6-5	Additional Development Car Tripends_1054 Scenario PM	24
Figure 6-6	TEMPRO regions	26
Figure 6-7	Swale Highway Model Zones	29
Figure 8-1	Simulation Network speed (kph)	32
Figure 8-2	Total travel time (PCU hrs)	32
Figure 8-3	Total travel distance (PCU kms)	33
Figure 8-4	Model flow difference- the 1054 scenario vs previous LP Scenario 1 – AM	34
Figure 8-5	Model flow difference- the 1054 scenario vs previous LP Scenario 1 - PM	34
Figure 8-6	Model flow difference between 776 scenarios with and without 2 schemes - AM	35
Figure 8-7	Model flow difference between 776 scenarios with and without 2 schemes - PM	36
Figure 8-8	Model flow difference between 1054 scenarios vs 776 scenarios with 2 schemes-AM	37
Figure 8-9	Model flow difference between 1054 scenarios vs 776 scenarios with 2 schemes-PM	37
Figure 8-10	Junctions within the model for V/C analysis	38
Figure 8-11	Scenario 1054 Junction and Link V/C Plot – AM Peak	43
Figure 8-12	Scenario 1054 Junction and Link V/C Plot – PM Peak	43
Figure 9-1	key Swale LP mitigation measures-1054 scenario	44
Figure 9-2	Development location (Green) of Queensborough in comparison to MSOA(Red) and Output Area (Blue) Census zones	45
Figure 9-3	Development location (Green) of Sittingbourne in comparison to MSOA(Red) and Output Area (Blue) Census zones	46
Figure 9-4	Development location (Green) of Faversham in comparison to MSOA(Red) and Output Area (Blue) Census zones	47
Figure 9-5	Simulation Network Speed comparison between 1054 Scenario with and without mitigation	50
Figure 9-6	Total Travel Time comparison between 1054 Scenario with and without mitigation	51
Figure 9-7	Total Travel Distance comparison between 1054 Scenario with and without mitigation	51
Figure 9-8	Flow difference plots between 1054 Scenario with and without mitigation - AM	52
Figure 9-9	Flow difference plots between 1054 Scenario with and without mitigation - PM	52
Figure 9-10	Flow difference plots between 1054 Scenario with and without mitigation (M2 J5) - PM	53
Figure 9-11	1054 Scenario 2037 AM without mitigation vs. with mitigation – Overall	53
Figure 9-12	1054 Scenario 2037 AM without mitigation vs. with mitigation – Faversham	54
Figure 9-13	1054 Scenario 2037 AM without mitigation vs. with mitigation – A249 Corridor	54
Figure 9-14	1054 Scenario 2037 AM without mitigation vs. with mitigation – Isle of Sheppey	54

Table of Tables

Table 2-1 Swale housing growth per year- Reference Case.....	7
Table 2-2 Previous 2037 Scenario 1 additional housing	10
Table 2-3 Previous 2037 Scenario 1 additional employment	10
Table 3-1 Scenarios to be tested for the Swale LP model rerun	12
Table 5-1 776 Scenario Additional Housing	15
Table 5-2 776 Scenario Additional Employment.....	15
Table 5-3 Total housing each year from 2018 to 2037 for the 776 Scenario	16
Table 5-4 1054 Scenario Additional Housing.....	16
Table 5-5 1054 Scenario Additional Employment.....	17
Table 5-6 Total housing each year from 2018 to 2037 for the 1054 Scenario	18
Table 6-1 Uplifting Factors by TEMPro Zones.....	19
Table 6-2 2037 AM Housing Car Trip Rates - Uplifted.....	20
Table 6-3 2037 PM Housing Car Trip Rates - Uplifted.....	21
Table 6-4 Two-Way Car Hourly Trip Rate Comparison – TRICS, TEMPro and Uplifted.....	22
Table 6-5 NTEM v7.2 growth factors for 2017-2037 for AM and PM peak hours	25
Table 6-6 LGV and HGV NTM factors 2037	26
Table 6-7 Demand Matrix total comparisons by user class (2037 AM Peak hour)	28
Table 6-8 Demand Matrix total comparisons by user class (2037 PM Peak hour)	28
Table 6-9 Demand Matrix total comparisons by zone type (2037 AM Peak hour).....	29
Table 6-10 Demand Matrix total comparisons by zone type (2037 PM Peak hour)	29
Table 7-1 PPK and PPM values (2010 prices, 2037 values).....	30
Table 8-1 Network performance AM Peak.....	31
Table 8-2 Network Performance PM Peak	31
Table 8-3 Summary of the congestions (weighted junction V/C).....	39
Table 8-4 Summary of the congestions (highest junction V/C)	41
Table 9-1 Network statistics comparison between 1054 Scenario with and without mitigation	50

1 Introduction

1.1 Background

The Swale Highway Model (SHM) was developed by Sweco for 2017 (base year), 2027 and 2037 reference case (forecast years) to test the traffic impacts of both new developments and transport infrastructure across Swale. Following the Local Plan Option Test, which was delivered in May 2019, Sweco was appointed by Swale Borough Council (SBC) to use the model to support the assessment of the Local Plan with a set of new development assumptions and mitigation measures. The work was also involved in a series of technical discussions with Kent County Council (KCC) for the key modelling assumptions such as trip rates, house allocation and future transport infrastructure.

1.2 Purpose of the Report

This Report is intended to document all key aspects of the future year traffic forecast for each scenario and sets out the assumptions on which these forecasts have been based on. It is intended that the Local Plan Model Rerun Summary Report is a free-standing document that covers all aspects of the forecasting for the Local Plan Model Rerun. However, more detailed aspects of the modelling process can be found in the appropriate reports and technical notes prepared during the study, including:

- Technical note for modelling key assumptions, ref: Swale LP TN_Key modelling input assumptions_v4_Sensitivity Test.docx
- Technical notes for mitigation measures ref: Mitigations Swale Highway Model v2(Wallend Farm changes) for SBC(no TC).docx

Meanwhile, the report of “Swale Highway Model- Local Plan Option Testing Report- Final Draft” (dated 20th May 2019) is also available for further information on the development of the previous Local Plan Option Testing.

2 Reference Case and Previous 2037 Swale Local Plan Option Tests

2.1 Uncertainty Log- Reference Case

The uncertainty log has been developed following the 'Local Plan' information in the existing Reference Case scenarios provided by KCC. It has been agreed with KCC and SBC to use the following assumptions for housings in the development of the Reference Case:

- I) Keep the housing projections to 2022 as shown in Table 7 of "Statement of Housing Land Supply 2016/2017- Partial Update December 2017";
- II) From 2023 to 2031 allow for an additional 278 units per year which is the difference between 1054 dwellings per annum and 776 per annum as stated for the OAN target (Objectively Assessed Need). This growth (i.e. 278 units) has been applied proportionally to all allocated sites between 2017 and 2031 in the Housing Land Supply document; and
- III) From 2032 to 2037 allow 1054 per year. This growth has been applied proportionally to all sites allocated between 2017 and 2031.

Table 2-1 below shows the total housing each year from 2018 until 2037. It should be noted that for the Local Plan scenarios, the additional housing allocations in II and III were replaced by the new development allocations provided by KCC and SBC.

Table 2-1 Swale housing growth per year- Reference Case

Year	Based on Table 7 of the Housing Land supply 2016/17							Target as agreed on 7/8/2018		
	Completed	Allocated LP	Permitted	Pending	Windfalls	Total by year	Total Cumulative	Additional per year	Total by year	Total Cumulative
2017	1830					1830	1830	0	1830	1830
2018		0	432	0	0	432	2262	0	432	2262
2019		50	337	0	0	387	2649	0	387	2649
2020		207	402	1	0	610	3259	0	610	3259
2021		998	355	21	0	1374	4633	0	1374	4633
2022		1427	282	24	0	1733	6366	0	1733	6366
2023		937	189	0	110	1236	7602	278	1514	7880
2024		947	181	0	110	1238	8840	278	1516	9396
2025		842	110	0	110	1062	9902	278	1340	10736
2026		628	74	0	110	812	10714	278	1090	11826
2027		590	19	0	110	719	11433	278	997	12823
2028		595	4	0	110	709	12142	278	987	13810
2029		612	4	0	110	726	12868	278	1004	14814
2030		554	0	0	110	664	13532	278	942	15756
2031		435	0	0	110	545	14077	278	823	16579
2032		0	0	0	0	0	0	1054	1054	17633
2033		0	0	0	0	0	0	1054	1054	18687
2034		0	0	0	0	0	0	1054	1054	19741
2035		0	0	0	0	0	0	1054	1054	20795
2036		0	0	0	0	0	0	1054	1054	21849
2037		0	0	0	0	0	0	1054	1054	22903

Figure 2-1 and Figure 2-2 show the developments identified as the Bearing Fruit developments in year 2027 and 2037 respectively.

Figure 2-1 2027 housing developments

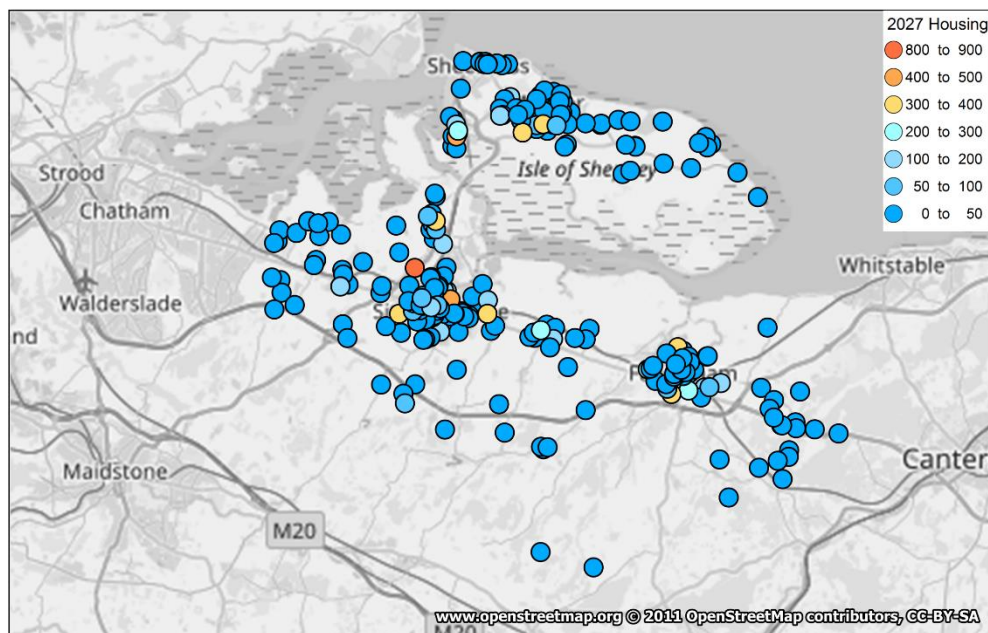
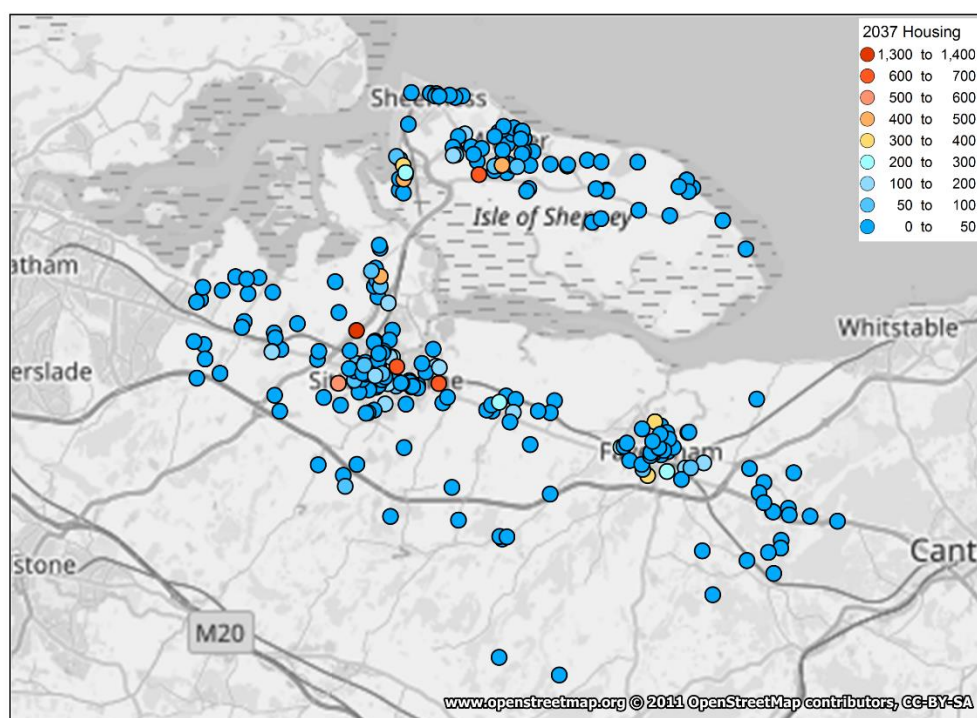


Figure 2-2 2037 housing developments

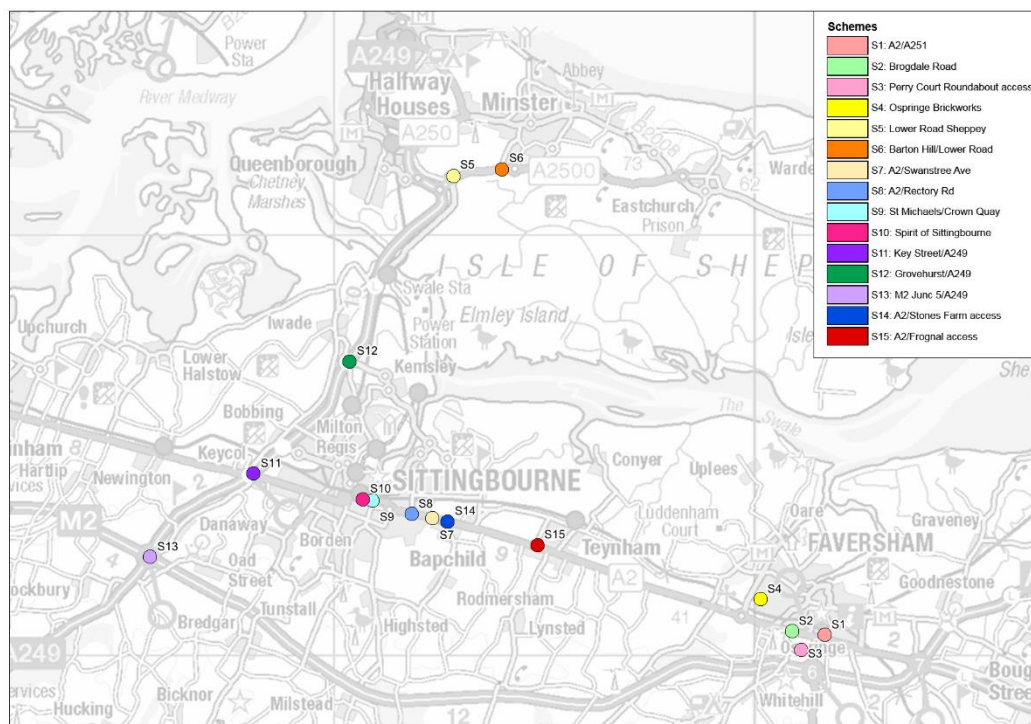


From the uncertainty log the following transport schemes have been identified as either 'Near certain' or 'More than likely' and have hence been included in the Reference Case scenario. These are listed below and can be seen in Figure 2-3:

- A2/A251;
- Brogdale Road;

- Perry Court Roundabout access;
- Ospringe Brickworks access;
- Lower Road Sheppey;
- Barton Hill/Lower Road;
- A2/Swanstree Ave;
- A2/Rectory Rd;
- St Michaels/Crown Quay;
- Spirit of Sittingbourne;
- Key Street/A249;
- Grovehurst/A249;
- M2 Junction 5/A249;
- A2/Stones Farm access Bapchild; and
- A2/Frognaal access Teynham.

Figure 2-3 Transport schemes in Reference Case



2.2 Previous Local Plan Option Tests

Four Local Plan scenarios as below for weekday AM and PM peak hour were carried out in the Local Plan Option Test delivered in May 2019.

- Scenario 1 “Do-Minimum” (DM) Weighted Sittingbourne;
- Scenario 2 “Do-Something Weighted Sittingbourne”;
- Scenario 3 “Do-Something Weighted Faversham”; and

- Scenario 4: “Do-Something New Settlement approach”

The previous Scenario 1, which included all Bearing Fruits Local Plan developments plus new development allocations post 2022 shown in Table 2-2 and Table 2-3, will be used as reference scenario to be compared against for the Local Plan model rerun scenarios.

Table 2-2 Previous 2037 Scenario 1 additional housing

Ref	Description	Area	Additional Houses 2022- 2037
1	Duchy Fav	Faversham	1940
2	Duchy Fav	Faversham	430
3	East Lady Dane, Fav, SHLAA 18/091	Faversham	1100
4	Boughton SHLAA 18/210 & 150	Faversham	50
5	Dunkirk SHLAA 18/155 & 162	Faversham	160
6	Waterham, Fav	Faversham	0
7	Sittg A2 North	Sittingbourne	0
8	Sittg A2 North QE North	Sittingbourne	250
9	Sittg A2 North QE North	Sittingbourne	300
10	Sittg A2 North QE North	Sittingbourne	300
11	West Frognal Lane	Sittingbourne	0
12	West Frognal La Teynham SHLAA 18/183	Sittingbourne	295
13	South A2 Teynham SHLAA 18/055	Sittingbourne	320
14	Bobbing, Crabtree	Sittingbourne	2000
15	Bobbing	Sittingbourne	50
16	Coleshall Iwade south west SHLAA 18/105	Sittingbourne	650
17	Wallend Farm Sheppey	Isle of Sheppey	0
18	Scocles Farm, East Scocles Rd, Sheppey SHLAA 18/038	Isle of Sheppey	610
19	Leysdown, Sheppey	Isle of Sheppey	100
20	Eastchurch, Sheppey, SHLAA 18/063	Isle of Sheppey	100
21	Pond Farm, Newington SHLAA 18/229	Sittingbourne	340
22	Bredgar, SHLAA 18/084	Sittingbourne	250
Total plan period			9245

Table 2-3 Previous 2037 Scenario 1 additional employment

Ref	Area	Additional Employment (sqm)*	
		2022-2027	2022-2037
1	Duchy Fav	200	300
2	Duchy Fav	0	2500

3	Waterham, Fav	24000	24000
4	Sittg A2 North (Eurolink, Tonge Road)	49000	49000
5	West Frognal Lane	28000	42000
6	Bobbing (Crabtree)	3500	10500
7	Wallend Farm Sheppey	35000	95700

*It has been agreed that all employments sites will be B1:B2:B8 33%:33%:34% except Wallend Farm B1:B8 10%:90%

Since the pervious LP scenario 1 is close to the modelling assumptions for the LP model rerun work, it has been used as the model performance base for the modelled scenario output comparisons.

3 2037 Swale Local Plan Rerun Scenarios

It was agreed with SBC to undertake two options of “Do-Min” test for weekday AM and PM peak hour in the forecast year 2037 as follows:

- **“776 Scenario Do-Minimum (DM)”**: This is the test at a growth level of Swale’s preferred platform of 776 OAN with all Bearing Fruits Local Plan developments plus new development allocations post 2022 as provided by SBC (see Section 4). Apart from existing local committed schemes, no further transport mitigations included; The scenarios will also consider two variations for with and without the following two transport schemes, including:
 - Brenley Corner Junction Improvement;
 - Grovehurst/A249 and Key Street/A249 junction improvement;
- **“1054 Scenario Do-Minimum (DM)”**: This is the test at a growth level of the government’s requirement of 1054 OAN with all Bearing Fruits Local Plan developments plus new development allocations post 2022 as provided by SBC (see Section 4). Apart from existing local committed schemes already included in the RC and the Brenley Corner Junction Improvement, no further transport mitigations included;
- **“1054 Scenario Do-Something (DS)”**: Based on the 1054 Scenario Do-Minimum (DM), a set of mitigation measure will be identified, along with the potential trip reduction for certain development zone due to modal shift as a result of the provision for public transport and active travels;

These model tests are aimed to form a comparable and most importantly, defensible, evidence base to form an opinion on both which options are preferable and whether the higher OAN can be reached. A summary of the scenarios to be tested is shown in Table 3-1.

Table 3-1 Scenarios to be tested for the Swale LP model rerun

ID	Scenario description	Two schemes	Additional Mitigation	Trip reduction
1	776 Scenario Do-Minimum (DM)-without two schemes	No	No	No
2	776 Scenario Do-Minimum (DM)-with two schemes	Yes	No	No
3	1054 Scenario Do-Minimum (DM)	Yes	No	No
4	1054 Scenario Do-Something (DS)	Yes	Yes	Yes

Note: two schemes including Brenley Corner, and Grovehurst/A249 and Key Street/A249 Junction improvement)

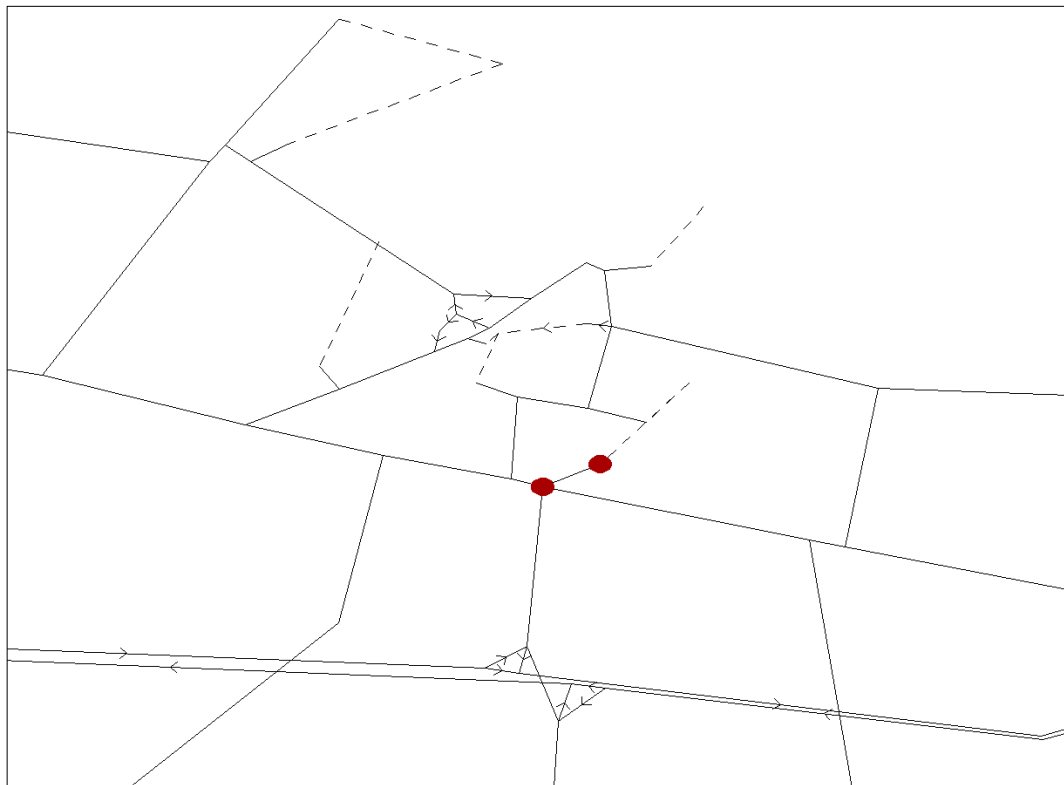
4 Transport Network Review and Updates

4.1 Network Review

Model checks have been carried out in the Sittingbourne town centre and the major corridors within the simulation area. Network refinement and coding issues found if relevant were updated, as below:

- Free flow speed for some links was coded either inaccurate or inconsistent by direction;
- Give-way gap values for some priority junctions and roundabouts were reset based on HE 's Regional Traffic Models Network Coding Manual;
- The network and zone structure were not detailed enough in the Faversham town centre, and the network refinement, as shown in Figure 4-1, has been done to allow traffic to be loaded onto the network at different locations;
- Routing check by Select Link Analysis on key corridor sections;
- Sense check on total demand changes across all scenarios; and
- Centroid connector update for the zones with additional housing and employment.

Figure 4-1 Network refinement in Faversham town centre



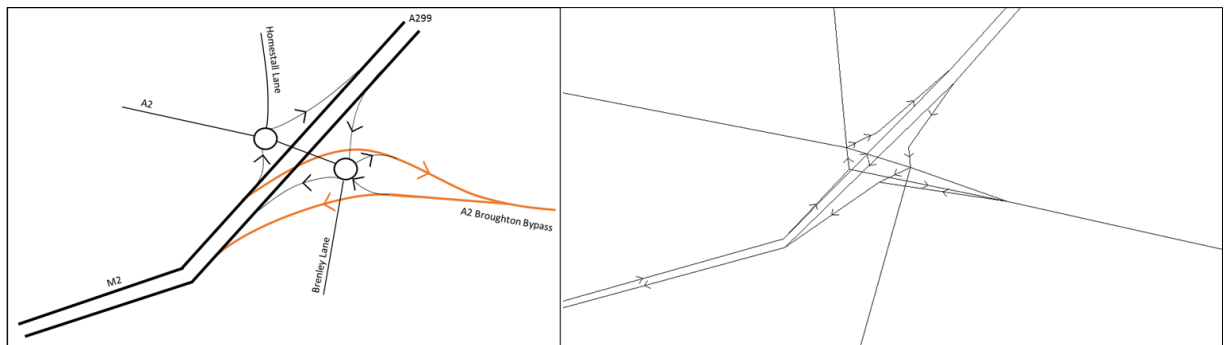
4.2 Transport Schemes in the Updated Scenarios

As mentioned in section 1, it was agreed with SBC that two scenarios will be running under the 776 scenario and only the “with2schemes” network will be running under the 1054 scenario:

- **“no_2schemes” Network:** All the transport scheme that have been identified as either ‘Near certain’ or ‘More than likely’ from the Uncertainty Log have been included in the network except Brenley Corner Improvement, Key Street/A249 (see Figure 2-3, S11) and Grovehurst/A249 (see Figure 2-3, S12) junction improvements;
- **“with2schemes” Network:** The Key Street/A249 and Grovehurst/A249 junction improvements, Brenley Corner Improvement have been included in the network.

The Brenley Cordon Improvement including M2 Junction 7 which is shown in Figure 4-2 and A251/A2 junction improvement which changed from a priority junction to a signalised junction.

Figure 4-2 Schematic layout and Network Coding for the M2 J7



Note that the Sittingbourne Northern Relief Road (SNRR), Sittingbourne Southern Relief Road (SSRR) and M2 J5a are not included in any of the Swale LP model rerun scenarios.

5 Local Plan Rerun Scenarios- Developments Allocation

5.1 Introduction

Comparing to previous Swale Local Plan Scenario 1 in section 2, in addition to the Local Plan Bearing Fruit allocation, the totals of the additional housing development in Sittingbourne, Isle of Sheppey and Faversham are 4660 and 8865 for the 776 and 1054 scenario respectively. For the employment development, the Sittingbourne A2 North (49,000 sq meters) and Bobbing (10,500 sq meters) sites have been removed and replaced by:

- Sittingbourne Industrial estate: 15,000 sq meters;
- Lamberhurst Farm: 15,000 sq meters;
- Bobbing site reallocation: 30,000 sq meters.

Also, the Wallend Farm Sheppey site has been reduced from 95,700 sq meters to 10,000sq meters.

5.2 776 Scenario

The additional housing and employment sites as provided SBC included in 776 Scenario for the whole model period 2017 -2037 are shown in Table 5-1 and Table 5-2 below:

Table 5-1 776 Scenario Additional Housing

Ref	Description	Area	Additional Houses 2022- 2037
1	Duchy Fav	Faversham	2000
2	Duchy Fav	Faversham	500
3	Sittingbourne Town Centre	Sittingbourne	750
4	Windfall		1080
5	Selling	Faversham	100
6	Park Homes	Isle of Sheppey and Sittingbourne	150
7	Lamberhurst Farm	Faversham	80
Total in planning period			4660

Table 5-2 776 Scenario Additional Employment

Ref	Area	Additional Employment (sqm)* 2022-2037
1	Duchy Fav	300
2	Duchy Fav	2500
3	Waterham, Fav	24000
4	West Frognal Lane	42000
5	Lamberhurst Farm	15000

6	Sittingbourne Industrial estate	15000
7	Bobbing site reallocation	30000
8	Wallend Farm Sheppey	10000
Total in planning period		138800

*It has been agreed previously that all employments sites will be B1:B2:B8 33%:33%:34% except Wallend Farm B1:B8 10%:90%

Table 5-3 below shows the total house allocation for each year from 2017 to 2037 in the 776 scenario.

Table 5-3 Total housing each year from 2018 to 2037 for the 776 Scenario

Year	Based on Table 7 of the Housing Land supply 2016/17								Target as agreed on 7/8/2018		
	Completed	Allocated LP	Permitted	Pending	Windfalls	Total by year	Total Cumulative	Ave per year	Additional per year	Total by year	Total Cumulative
2017	1830					1830	1830		0	1830	1830
2018		0	432	0	0	432	2262		0	432	2262
2019		50	337	0	0	387	2649		0	387	2649
2020		207	402	1	0	610	3259		0	610	3259
2021		998	355	21	0	1374	4633		0	1374	4633
2022		1427	282	24	0	1733	6366	1061	0	1733	6366
2023		937	189	0	110	1236	7602		0	1236	7602
2024		947	181	0	110	1238	8840		0	1238	8840
2025		842	110	0	110	1062	9902		0	1062	9902
2026		628	74	0	110	812	10714		0	812	10714
2027		590	19	0	110	719	11433		0	719	11433
2028		595	4	0	110	709	12142		0	709	12142
2029		612	4	0	110	726	12868		0	726	12868
2030		554	0	0	110	664	13532		0	664	13532
2031		435	0	0	110	545	14077	1564	0	545	14077
2032		0	0	0	180	180	180		597	777	14854
2033		0	0	0	180	180	360		597	777	15631
2034		0	0	0	180	180	540		597	777	16408
2035		0	0	0	180	180	720		597	777	17185
2036		0	0	0	180	180	900		597	777	17962
2037		0	0	0	180	180	1080	180	597	777	18739
Total					2070	14077			3582	17659	18739

5.3 1054 Scenario

The additional housing and employment sites as provided by SBC included in the 1054-Scenario for the model period from 2017 to 2037 are shown in Table 5-4 and Table 5-5 respectively. Note that the employment allocation in the 1054 scenario is the same as the 776 scenario.

Table 5-4 1054 Scenario Additional Housing

Ref	Description	Area	Additional Houses 2022- 2037
1	Duchy Fav	Faversham	2000
2	Duchy Fav	Faversham	500
3	Queenborough and Rushenden – SHLAA P10	Isle of Sheppey	670
4	Sittingbourne Town Centre	Sittingbourne centre	800
5	East Lady Dane, Fav, SHLAA 18/091	Faversham	1100

6	West Frognal La Teynham SHLAA 18/183	Sittingbourne	295
7	South A2 Teynham SHLAA 18/055	Sittingbourne	320
8	Bredgar, SHLAA 18/084	Sittingbourne	250
9	Sheppey/Brownfield	Isle of Sheppey	500
10	Windfall		1080
11	Selling	Faversham	200
12	Park Homes	Isle of Sheppey and Sittingbourne	500
13	Lamberhurst Farm	Faversham	300
14	Villages	south of M2, including Bredgar, Milstead, EastlingSheldwich, Selling, Boughton, Upchurch, Iwade and Newington	300
15	Lynstead	Sittingbourne	50
Total plan period			8865

Table 5-5 1054 Scenario Additional Employment

Ref	Area	Additional Employment (sqm)* 2022-2037
1	Duchy Fav	300
2	Duchy Fav	2500
3	Waterham, Fav	24000
4	West Frognal Lane	42000
5	Lamberhurst Farm	15000
6	Sittingbourne Industrial estate	15000
7	Bobbing site reallocation	30000
8	Wallend Farm Sheppey	10000
Total plan period		138800

*It has been agreed that all employments sites will be B1:B2:B8 33%:33%:34% except Wallend Farm B1:B8 10%:90%

Since some of the development zones are rather large and span across several Swale model zones, the distributions of house quantum have been followed SBC's instructions to ensure a sensible zone split following the Local Plan. The development site distribution for housing and employment in the 1054 scenario is shown in Figure 5-1.

Figure 5-1 Development Site Distribution in 1054 Scenario

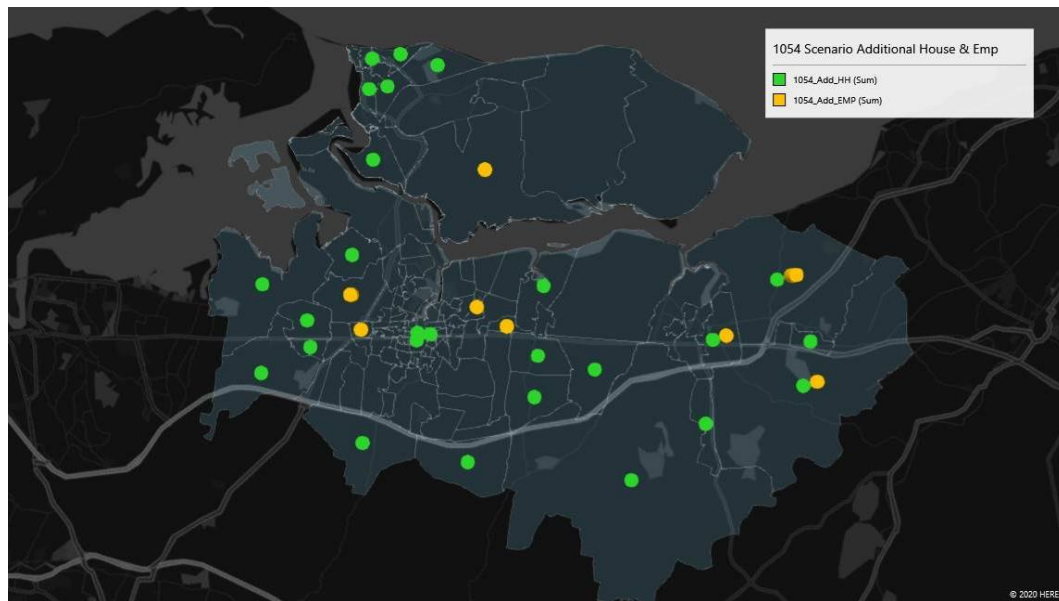


Table 5-6 below shows the total house allocation for each year from 2017 to 2037 in the 1054 scenario.

Table 5-6 Total housing each year from 2018 to 2037 for the 1054 Scenario

Year	Based on Table 7 of the Housing Land supply 2016/17								Target as agreed on 7/8/2018		
	Completed	Allocated LP	Permitted	Pending	Windfalls	Total by year	Total Cumulative	Ave per year	Additional per year	Total by year	Total Cumulative
2017	1830					1830	1830		0	1830	1830
2018		0	432	0	0	432	2262		0	432	2262
2019		50	337	0	0	387	2649		0	387	2649
2020		207	402	1	0	610	3259		0	610	3259
2021		998	355	21	0	1374	4633		0	1374	4633
2022		1427	282	24	0	1733	6366	1061	0	1733	6366
2023		937	189	0	110	1236	7602		197	1433	7799
2024		947	181	0	110	1238	8840		197	1435	9234
2025		842	110	0	110	1062	9902		197	1259	10493
2026		628	74	0	110	812	10714		197	1009	11502
2027		590	19	0	110	719	11433		197	916	12418
2028		595	4	0	110	709	12142		197	906	13324
2029		612	4	0	110	726	12868		197	923	14247
2030		554	0	0	110	664	13532		197	861	15108
2031		435	0	0	110	545	14077	1564	197	742	15850
2032		0	0	0	180	180	180		1002	1182	17032
2033		0	0	0	180	180	360		1002	1182	18214
2034		0	0	0	180	180	540		1002	1182	19396
2035		0	0	0	180	180	720		1002	1182	20578
2036		0	0	0	180	180	900		1002	1182	21760
2037		0	0	0	180	180	1080	180	1002	1182	22942
Total					2070	14077			7785	21862	22942

6 Forecast Demand

6.1 Overview

It has also agreed that the model will be updated by the unconstrained TEMPro growth method as applied in the previous LP model work, but the car trip rates for the housing development will be based on the TEMPro rather than TRICS. Job trip rates for car were derived from NTEM v7.2 which follows the same method as previous Local Plan Option Testing. LGV and HGV trip rates were derived from TRICS and LGV/HGV growth factors derived from the Department for Transport (DfT) National Transport Model (NTM) database, which follows the same method as previous Local Plan Option Testing as well.

6.2 Trip Rates for Housing Developments

As agreed with KCC/SBC, the predicted trip rates for housing development have been changed from TRICS housing trip rates provided by KCC to the housing trip rates derived from NTEM v7.2. However, the trip rates from NTEM v7.2 are 42%–51% lower than those from TRICS and the reason could be the different size and range of the surveys they are based on.

- The TRICS housing trip rates are provided by KCC and based on Transport Assessments from recent actual developments;
- The trip rates from NTEM v7.2 are calculated by dividing the expected NTEM v7.2 output number of trips by the nominated households for each of the areas identified. Trip rates within the NTEM v7.2 are based upon the national travel survey (NTS), a household survey designed to monitor long-term trends in personal travel.

Following the suggestion from the KCC and SBC, a set of uplifting factors by TEMPro zones as shown in Table 6-1 have been applied to the trip rates from NTEM v7.2 to increase the trip rates to the level between NTEM v7.2 and TRICS.

Table 6-1 Uplifting Factors by TEMPro Zones

TEMPro Zones	AM	IP	PM
Medway 025	1.93	1.93	1.99
Medway 032	1.39	1.59	1.5
Swale 001	2.52	2.18	2.19
Swale 002	2.65	2.13	2.27
Swale 003	1.64	1.43	1.47
Swale 004	1.61	1.53	1.47
Swale 005	1.7	1.55	1.67
Swale 006	1.43	1.17	1.36
Swale 007	1.45	1.62	1.66
Swale 008	1.42	1.45	1.61
Swale 009	1.55	1.63	1.61
Swale 010	2.2	1.87	1.94
Swale 011	1.67	1.62	1.63
Swale 012	1.5	1.32	1.37

Swale 013	1.37	1.4	1.53
Swale 014	1.47	1.45	1.51
Swale 015	1.71	1.69	1.74
Swale 016	1.6	1.62	1.8
Swale 017	1.55	1.59	1.75

The breakdown of the uplifted car housing trip rates by TEMPro zones are shown in Table 6-2 and Table 6-3 in the AM and PM peak respectively. Note that following the previous model assumptions, the trip rates for housing development are only applied for the home-based trip purposes.

Table 6-2 2037 AM Housing Car Trip Rates - Uplifted

Area	TEMPro Zone	2037 AM Housing Car Trip Rates - Uplifted									
		HBW		HBEB		HBO		NHBEB		NHBO	
		O	D	O	D	O	D	O	D	O	D
GB	GB	0.116	0.006	0.015	0.001	0.043	0.014	0.000	0.000	0.000	0.000
Region	SE	0.135	0.007	0.017	0.001	0.049	0.016	0.000	0.000	0.000	0.000
County	Kent	0.132	0.007	0.017	0.001	0.048	0.015	0.000	0.000	0.000	0.000
MSOA	Medway 025	0.243	0.014	0.028	0.001	0.084	0.026	0.000	0.000	0.000	0.000
	Medway 032	0.255	0.014	0.030	0.002	0.072	0.023	0.000	0.000	0.000	0.000
Local Authority	Swale	0.135	0.007	0.017	0.001	0.051	0.015	0.000	0.000	0.000	0.000
MSOA	Swale 001	0.220	0.013	0.027	0.001	0.082	0.027	0.000	0.000	0.000	0.000
	Swale 002	0.210	0.013	0.026	0.001	0.092	0.029	0.000	0.000	0.000	0.000
	Swale 003	0.217	0.012	0.028	0.001	0.086	0.026	0.000	0.000	0.000	0.000
	Swale 004	0.229	0.013	0.029	0.002	0.075	0.023	0.000	0.000	0.000	0.000
	Swale 005	0.211	0.011	0.029	0.002	0.092	0.027	0.000	0.000	0.000	0.000
	Swale 006	0.198	0.010	0.027	0.001	0.105	0.029	0.000	0.000	0.000	0.000
	Swale 007	0.243	0.012	0.033	0.002	0.080	0.024	0.000	0.000	0.000	0.000
	Swale 008	0.231	0.011	0.033	0.002	0.092	0.027	0.000	0.000	0.000	0.000
	Swale 009	0.242	0.013	0.028	0.001	0.077	0.024	0.000	0.000	0.000	0.000
	Swale 010	0.199	0.012	0.022	0.001	0.077	0.024	0.000	0.000	0.000	0.000
	Swale 011	0.224	0.013	0.026	0.001	0.076	0.024	0.000	0.000	0.000	0.000
	Swale 012	0.199	0.012	0.023	0.001	0.077	0.023	0.000	0.000	0.000	0.000
	Swale 013	0.229	0.011	0.032	0.002	0.090	0.026	0.000	0.000	0.000	0.000
	Swale 014	0.190	0.011	0.024	0.001	0.068	0.021	0.000	0.000	0.000	0.000
	Swale 015	0.192	0.011	0.023	0.001	0.066	0.021	0.000	0.000	0.000	0.000
	Swale 016	0.243	0.012	0.034	0.002	0.099	0.029	0.000	0.000	0.000	0.000
	Swale 017	0.249	0.012	0.035	0.002	0.099	0.028	0.000	0.000	0.000	0.000

Table 6-3 2037 PM Housing Car Trip Rates - Uplifted

Area	TEMPro Zone	2037 PM Housing Car Trip Rates - Uplifted									
		HBW		HBEB		HBO		NHBEB		NHBO	
		O	D	O	D	O	D	O	D	O	D
GB	GB	0.008	0.071	0.002	0.009	0.044	0.062	0.000	0.000	0.000	0.000
Region	SE	0.009	0.082	0.002	0.011	0.049	0.069	0.000	0.000	0.000	0.000
County	Kent	0.009	0.081	0.002	0.011	0.047	0.066	0.000	0.000	0.000	0.000
MSOA	Medway 025	0.020	0.156	0.004	0.019	0.089	0.123	0.000	0.000	0.000	0.000
	Medway 032	0.020	0.168	0.004	0.021	0.085	0.114	0.000	0.000	0.000	0.000
Local Authority	Swale	0.009	0.082	0.002	0.011	0.048	0.068	0.000	0.000	0.000	0.000
MSOA	Swale 001	0.016	0.122	0.003	0.015	0.078	0.108	0.000	0.000	0.000	0.000
	Swale 002	0.015	0.115	0.002	0.014	0.081	0.114	0.000	0.000	0.000	0.000
	Swale 003	0.014	0.121	0.003	0.016	0.079	0.109	0.000	0.000	0.000	0.000
	Swale 004	0.015	0.130	0.003	0.017	0.076	0.103	0.000	0.000	0.000	0.000
	Swale 005	0.012	0.124	0.003	0.018	0.074	0.111	0.000	0.000	0.000	0.000
	Swale 006	0.011	0.115	0.003	0.017	0.077	0.118	0.000	0.000	0.000	0.000
	Swale 007	0.014	0.164	0.004	0.024	0.083	0.119	0.000	0.000	0.000	0.000
	Swale 008	0.013	0.155	0.004	0.023	0.087	0.128	0.000	0.000	0.000	0.000
	Swale 009	0.019	0.156	0.004	0.019	0.084	0.115	0.000	0.000	0.000	0.000
	Swale 010	0.016	0.112	0.003	0.013	0.070	0.097	0.000	0.000	0.000	0.000
	Swale 011	0.018	0.136	0.003	0.017	0.077	0.106	0.000	0.000	0.000	0.000
	Swale 012	0.015	0.114	0.003	0.014	0.068	0.096	0.000	0.000	0.000	0.000
	Swale 013	0.013	0.153	0.004	0.023	0.084	0.124	0.000	0.000	0.000	0.000
	Swale 014	0.014	0.121	0.002	0.016	0.074	0.101	0.000	0.000	0.000	0.000
	Swale 015	0.015	0.122	0.003	0.015	0.074	0.101	0.000	0.000	0.000	0.000
	Swale 016	0.014	0.163	0.004	0.024	0.093	0.137	0.000	0.000	0.000	0.000
	Swale 017	0.014	0.167	0.004	0.025	0.094	0.138	0.000	0.000	0.000	0.000

The comparisons of the two-way car hourly trip rate for housing development are illustrated in Figure 6-1 and tabulated in Table 6-4.

Figure 6-1 Two-Way Car Hourly Trip Rate Comparison – TRICS, TEMPro and Uplifted

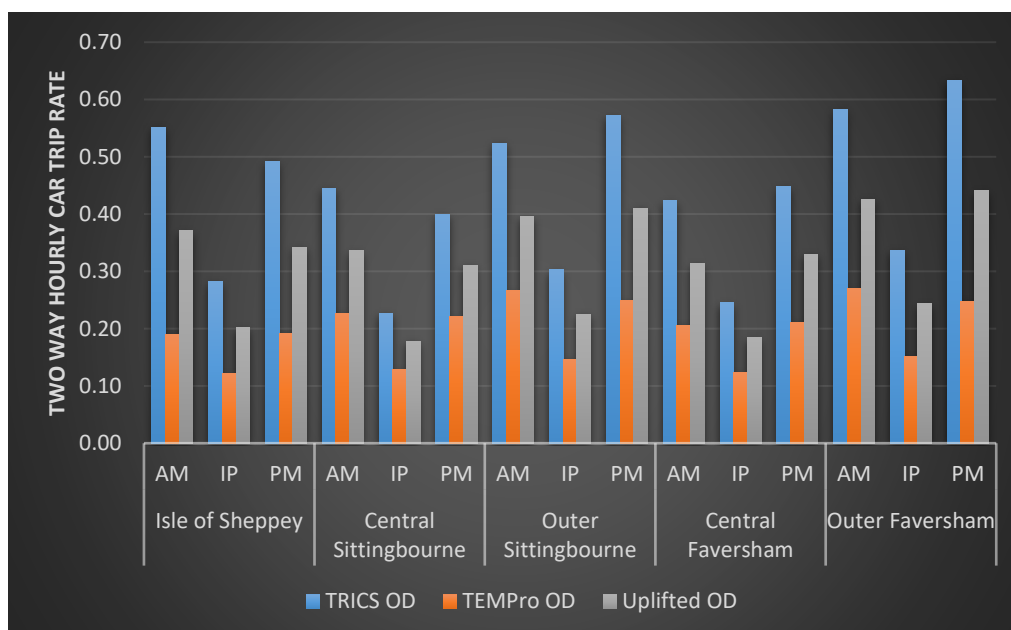


Table 6-4 Two-Way Car Hourly Trip Rate Comparison – TRICS, TEMPro and Uplifted

Area	Time Period	TRICS OD	TEMPro OD	Uplifted OD
Isle of Sheppey	AM	0.552	0.190	0.371
	IP	0.282	0.121	0.202
	PM	0.492	0.192	0.342
Central Sittingbourne	AM	0.445	0.227	0.336
	IP	0.227	0.128	0.178
	PM	0.400	0.221	0.311
Outer Sittingbourne	AM	0.524	0.266	0.395
	IP	0.303	0.147	0.225
	PM	0.572	0.249	0.410
Central Faversham	AM	0.423	0.206	0.314
	IP	0.245	0.123	0.184
	PM	0.448	0.211	0.330
Outer Faversham	AM	0.582	0.270	0.426
	IP	0.337	0.151	0.244
	PM	0.634	0.248	0.441

6.3 Trip Generation

The new trips generated from the proposed developments were calculated by applying the uplifted NTEM v7.2 trip rates to the proposed developments. The trip ends for employment development sites follows the same method as previous Local Plan work. The target trip ends were then obtained by adding the existing trip ends to the new trips from the proposed developments.

The car trip ends of the additional housing and employment development for all the model scenarios are shown in the 3D plots in Figure 6-2 to Figure 6-5 below. A sense check on additional house and development demand by time period, land use, site distribution, origin and destination across modelled scenarios has been undertaken. Overall, it is found the trip ends produced are logical.

Figure 6-2 Additional Development Car Tripends_776 Scenario AM

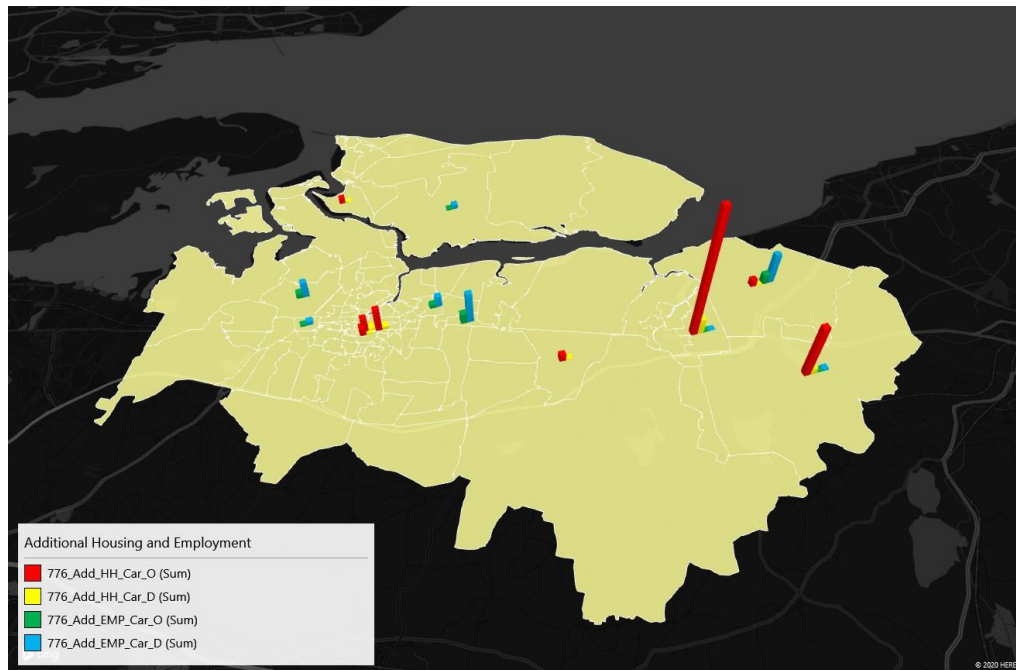


Figure 6-3 Additional Development Car Tripends_776 Scenario PM

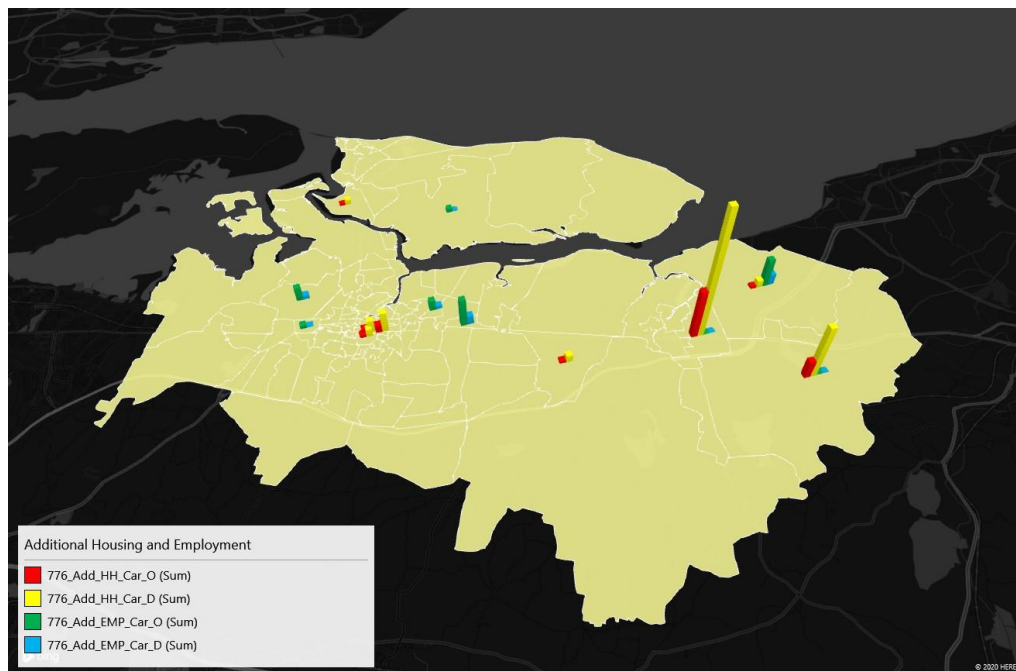


Figure 6-4 Additional Development Car Tripends_1054 Scenario AM

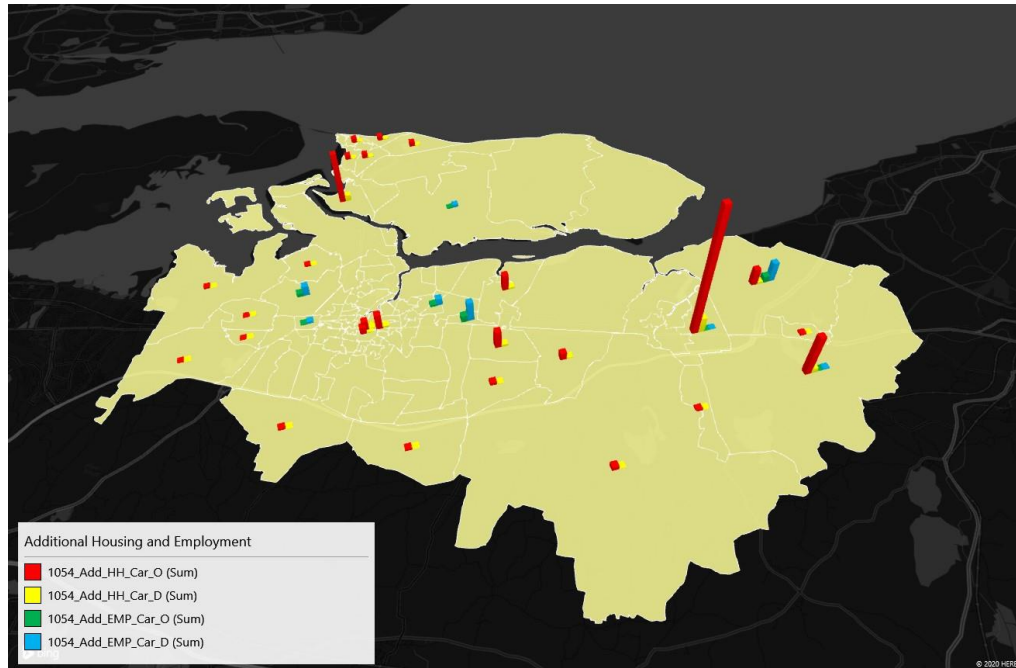
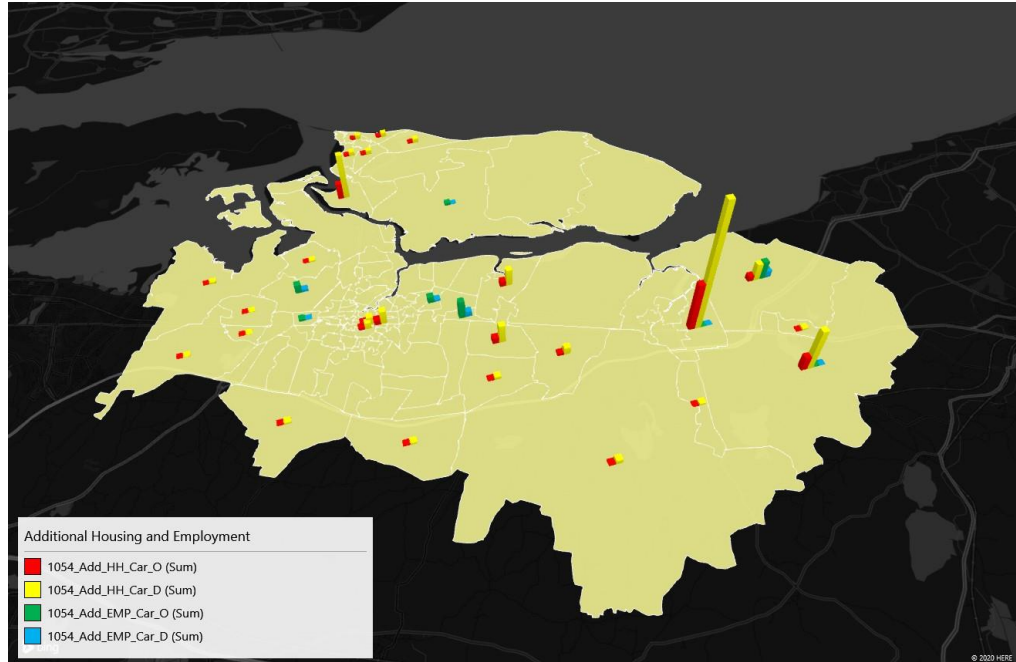


Figure 6-5 Additional Development Car Tripends_1054 Scenario PM



6.4 Matrix Building

6.4.1 Growth Factors

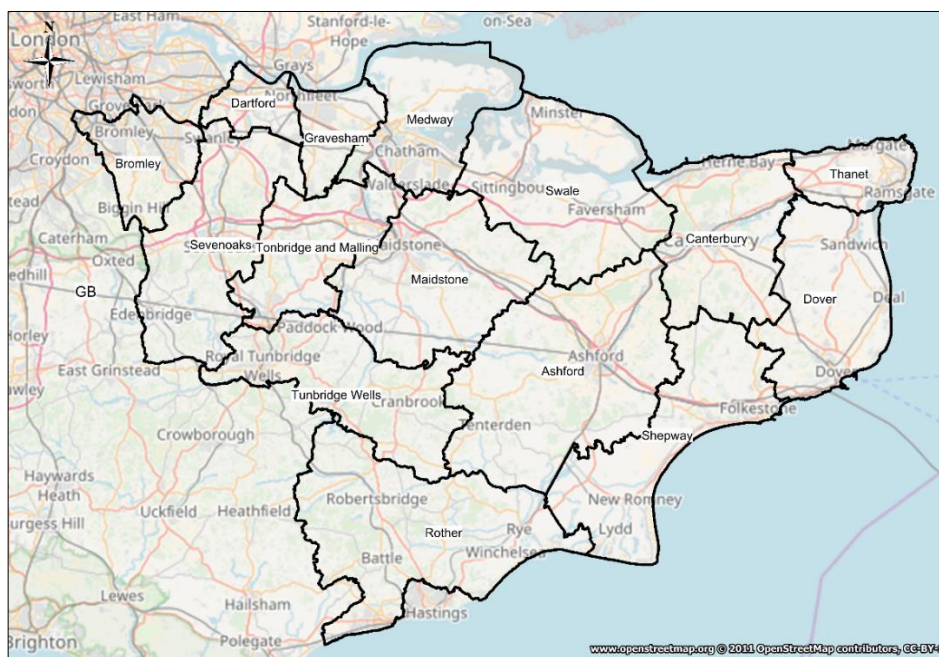
Car background growth factors across the entire modelled area were derived from TEMPRO and split by purpose and time period. Table 6-5 below shows a summary of the NTEM v7.2 growth factors for 2037 AM and PM.

Table 6-5 NTEM v7.2 growth factors for 2017-2037 for AM and PM peak hours

Area	2017-2037 AM						2017-2037 PM					
	EMP		Work		Other		EMP		Work		Other	
	O	D	O	D	O	D	O	D	O	D	O	D
GB	1.143	1.143	1.137	1.137	1.121	1.121	1.139	1.139	1.124	1.124	1.192	1.192
Bromley	1.086	1.142	1.076	1.131	1.137	1.136	1.137	1.093	1.124	1.065	1.226	1.201
Rother	1.143	1.152	1.131	1.143	1.132	1.132	1.149	1.142	1.130	1.121	1.212	1.214
Ashford	1.187	1.142	1.188	1.132	1.180	1.179	1.144	1.179	1.123	1.179	1.273	1.305
Canterbury	1.159	1.139	1.156	1.129	1.164	1.163	1.139	1.152	1.120	1.145	1.246	1.260
Dartford	1.176	1.142	1.188	1.132	1.166	1.167	1.148	1.170	1.129	1.176	1.273	1.274
Dover	1.132	1.139	1.118	1.127	1.165	1.163	1.136	1.130	1.115	1.108	1.240	1.258
Gravesham	1.122	1.137	1.117	1.127	1.148	1.148	1.139	1.125	1.121	1.106	1.243	1.234
Maidstone	1.131	1.139	1.119	1.128	1.159	1.158	1.135	1.129	1.116	1.109	1.233	1.247
Medway	1.115	1.137	1.099	1.126	1.148	1.145	1.132	1.113	1.113	1.088	1.215	1.220
Sevenoaks	1.030	1.133	0.995	1.121	1.109	1.107	1.120	1.037	1.104	0.984	1.164	1.147
Shepway	1.060	1.135	1.028	1.123	1.139	1.136	1.124	1.064	1.107	1.017	1.190	1.187
Swale	1.086	1.135	1.064	1.124	1.140	1.139	1.127	1.089	1.109	1.055	1.204	1.209
Thanet	1.069	1.135	1.042	1.123	1.130	1.127	1.126	1.073	1.106	1.027	1.191	1.184
Tonbridge and Malling	1.115	1.137	1.101	1.126	1.149	1.148	1.133	1.116	1.115	1.091	1.226	1.236
Tunbridge Wells	1.073	1.135	1.046	1.123	1.136	1.133	1.127	1.076	1.110	1.033	1.200	1.195

A tiered approach to growth factors has been applied. Growth factors have been adopted at a district level for Swale, and for the rest of the south east. External zones have TEMPRO factors for GB applied to them. This structure is displayed in Figure 6-6.

Figure 6-6 TEMPRO regions



Growth factors calculated from the Department for Transport (DfT) National Transport Model (NTM) database was used to forecast growth in LGV and HGV for 2037. These can be found in Table 6-6 below.

Table 6-6 LGV and HGV NTM factors 2037

Vehicle Class	Growth	Factor
LGV	52.0%	1.520
HGV	14.6%	1.146

6.4.2 Unconstrained growth scenarios within Swale

Within the TEMPRO Swale district trip end forecasts were calculated based on the development assumptions in the uncertainty log and the trip rates defined in section 6.2. To be able to assess the impact of the local plan with different quantum and distribution of housing in Swale, it has been agreed with KCC and SBC that the growth within Swale should be unconstrained. This means that growth within Swale is determined by the new trips generated from the new developments in the uncertainty log, without having to constrain the growth to TEMPRO as required by WebTAG. Growth for areas outside of Swale have been based on TEMPRO growth factors.

6.4.3 Trip Distribution

The future forecast matrices were created through the SATURN Furness process to output the 776 Scenario and 1054 Scenarios in 2037. The Furness process attempts to match the target trip ends for each zone for both Origins and Destinations and as such it goes through several iterations until the total trip ends are balanced. Therefore, it is possible that when there are more new housings (mainly origins in AM peak) than new jobs then the destination trips are factored up accordingly in the process until the trip ends are balanced.

The distribution of future developments was based on the existing distribution for the associated zone. In rare occurrences where the base zone was empty, a nearby zone with a similar travel pattern was chosen to distribute the development trips. The same approach has been adopted when development trips were missing in the base year matrices, and in that case, a distribution taken from a nearby similar zone was used. This tended to occur where new development was allocated in the post-2022 period where there was very little other development in the zone (such as for the new settlements). The results were also 'sense checked' for how the model was allocating trips from such development to the network and adjusted if necessary.

6.4.4 Matrix Totals

The comparisons of demand matrix totals in the forecast year 2037 by user class for the 776 and 1054 scenarios against the RC and the previous LP Scenario 1 are shown in

Table 6-7 and Table 6-8 in the AM Peak hour (08:00-09:00) and PM Peak hour (17:00-18:00) respectively. It is found that the trip total for the 1054 scenario is reduced by 1.0 % in the AM and 0.8% in the PM Peak.

Table 6-9 and Table 6-10 show the changes in matrix totals of the Swale and non-Swale model zones in the detailed simulation area, and the buffer zones against the previous LP Scenario 1. Figure 6-7 shows the Swale and non-Swale model zones in the detailed simulation area, and the buffer zones.

In general, the changes are sensible, and the demand reductions are due to some factors, as summarised below:

- The quantum of additional house allocation and site plan between the LP 776 and 1054 scenarios;
- Different car trip rates between RC & previous LP Scenario 1 (TRICS based) and 776 & 1054 scenario (uplifted TEMPro based); and
- Trip balancing by Furness in the trip distribution process.
- Small discrepancy in the additional employment quantum.

Table 6-7 Demand Matrix total comparisons by user class (2037 AM Peak hour)

User Class	Reference case	Previous LP Scen1	Scen1 vs. RC (% Diff)	776 Scenario	776s vs. Scen1 (% Diff)	1054 Scenario	1054s vs. Scen1 (% Diff)
Car Business	19225	19231	0.0%	18926	-1.6%	19044	-1.0%
Car Commute	79818	79915	0.1%	77284	-3.3%	78175	-2.2%
Car Other	113436	113439	0.0%	112615	-0.7%	112967	-0.4%
LGV	26805	26759	-0.2%	26770	0.0%	26770	0.0%
HGV	15643	15741	0.6%	15614	-0.8%	15614	-0.8%
Total	254928	255084	0.1%	251208	-1.5%	252570	-1.0%

Table 6-8 Demand Matrix total comparisons by user class (2037 PM Peak hour)

User Class	Reference case	Previous LP Scen1	Scen1 vs. RC (% Diff)	776 Scenario	776s vs. Scen1 (% Diff)	1054 Scenario	1054s vs. Scen1 (% Diff)
Car Business	17660	17677	0.1%	17495	-1.0%	17574	-0.6%
Car Commute	60302	60503	0.3%	58801	-2.8%	59360	-1.9%
Car Other	135412	135526	0.1%	134411	-0.8%	134890	-0.5%
LGV	25797	25763	-0.1%	25772	0.0%	25772	0.0%
HGV	10367	10421	0.5%	10355	-0.6%	10355	-0.6%
Total	249537	249890	0.1%	246834	-1.2%	247952	-0.8%

Figure 6-7 Swale Highway Model Zones

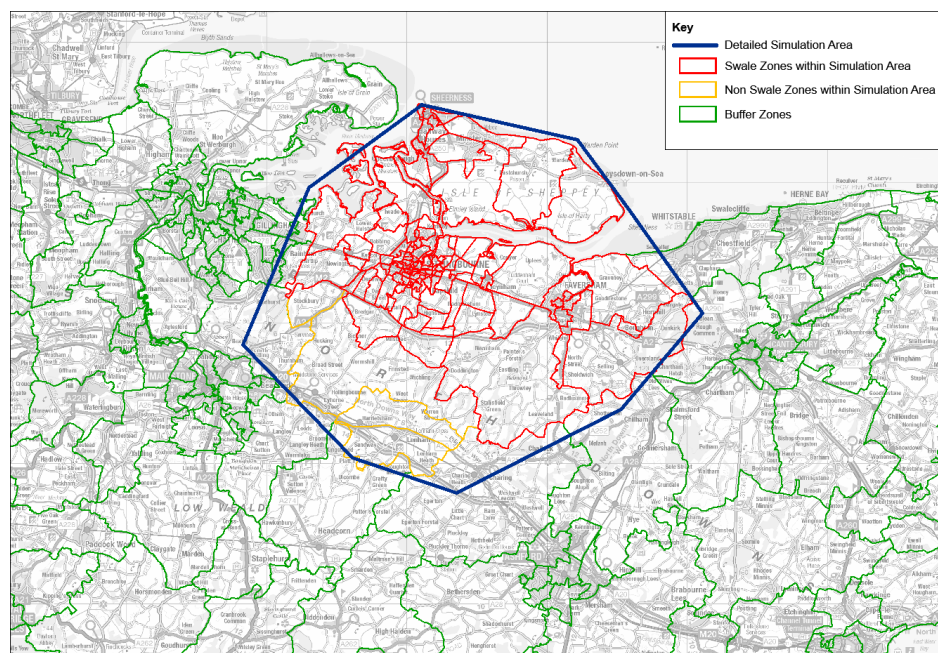


Table 6-9 Demand Matrix total comparisons by zone type (2037 AM Peak hour)

Zones	Previous LP Scen1		776 Scenario		776s vs. Scen1 (% Diff)		1054 Scenario		1054s vs. Scen1 (% Diff)	
	O	D	O	D	O	D	O	D	O	D
Swale zones (red)	30105	22721	26308	21810	-12.6%	-4.0%	27618	22073	-8.3%	-2.9%
Other Zones (yellow and green)	224979	232363	224900	229398	0.0%	-1.3%	224952	230497	0.0%	-0.8%
Total	255084	255084	251208	251209	-1.5%	-1.5%	252570	252571	-1.0%	-1.0%

Table 6-10 Demand Matrix total comparisons by zone type (2037 PM Peak hour)

	Previous LP Scen1		776 Scenario		776s vs. Scen1 (% Diff)		1054 Scenario		1054s vs. Scen1 (% Diff)	
	O	D	O	D	O	D	O	D	O	D
Swale zones (red)	24422	29113	23109	26095	-5.4%	-10.4%	23569	27169	-3.5%	-6.7%
Other Zones (yellow and green)	225467	220776	223725	220738	-0.8%	0.0%	224383	220783	-0.5%	0.0%
Total	249889	249890	246834	246834	-1.2%	-1.2%	247952	247951	-0.8%	-0.8%

7 Forecast Supply

7.1 Cost coefficients

The Value of Time (VoT) and Vehicle Operating Cost (VOC) in the forecast year networks are the same as the values applied in the previous Local Plan Option Tests.

Table 7-1 below details the highway generalised cost coefficients used for 2037 in pence per minute (PPM) and pence per kilometre (PPK).

Table 7-1 PPK and PPM values (2010 prices, 2037 values)

User Class	PPM		PPK
	AM	PM	same for all time periods)
Car - Employer's Business	42.32	42.93	11.87
Car - Commuting	28.38	28.48	5.26
Car - Other	19.58	20.51	5.26
LGV	29.91	29.91	13.78
HGV	69.85	69.85	47.65

7.2 Network changes for the transport mitigations

The network changes for the 1054 scenarios with proposed transport mitigation measures are detailed in chapter 9.

8 LP Model Results

8.1 Forecast Network Overall Performance

Table 8-1 to Table 8-2 summarise the overall performance of the network in the AM and PM peaks over different scenarios (776 scenarios with and without 2 sets of schemes, and 1054 scenario without mitigations) within the simulation area including the key roads such as A249, A2, M2, M20 etc.:

- Total travel time, PCU hrs: The sum of all time taken for all vehicles to travel across the simulation network for all link and junctions;
- Total travel distance, PCU, kms: The sum of all distance travelled in the simulation network; and
- Simulation network speed, kph: Defined by total simulation distance / total simulation time.

Table 8-1 Network performance AM Peak

metrics	Reference Case	Previous LP Scen1	776 Scenario no2schemes	776 Scenario with2schemes	1054 Scenarios with2schemes
Simulation network Speed (kph)	46	45	57	58	56
Total travel time (PCU hrs)	73125	73482	67268	66863	68223
Total travel distance (PCU kms)	4214230	4214705	4102157	4097678	4132168

Table 8-2 Network Performance PM Peak

metrics	Reference Case	Previous LP Scen1	776 Scenario no2schemes	776 Scenario with2schemes	1054 Scenarios with2schemes
Simulation network Speed (kph)	52	53	59	60	59
Total travel time (PCU hrs)	69708	69736	66435	66208	67020
Total travel distance (PCU kms)	4123867	4133841	4038375	4037650	4065898

Figure 8-1 to Figure 8-3 show the average simulation network speeds, total travel time, and total travel distances graphically, for the different scenarios tested.

The comparisons of the model outputs have the following findings:

- The average network speed in the simulation area is quite similar between the Local Plan Model Rerun scenarios which is higher than the RC and previous LP Scenario 1, with 776 Scenario with2schemes having the highest average speed

within the simulation area (58kph in the AM and 60kph in the PM), largely due to the less demand being assigned to the local network;

- Total travel distance and total travel time the Local Plan Model Rerun scenarios are lower than the RC and the previous LP Scenario 1, which is lowest in 776 Scenario with2schemes, and highest in 1054 Scenario.

Overall, the outputs of the network performance statistics are sensible.

Figure 8-1 Simulation Network speed (kph)

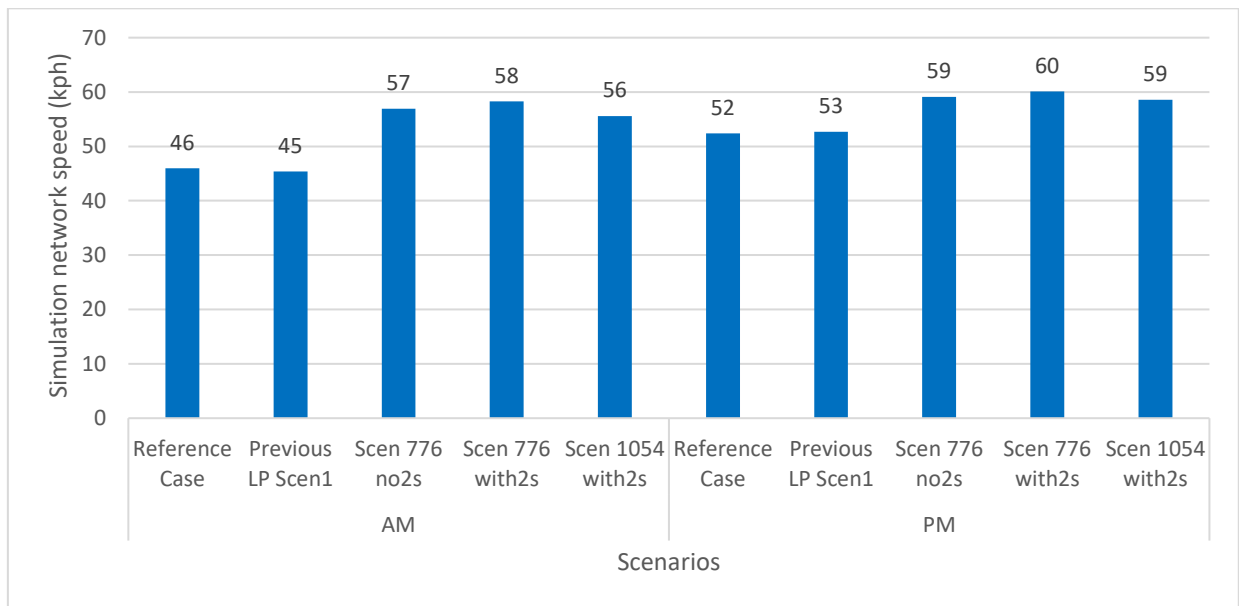


Figure 8-2 Total travel time (PCU hrs)

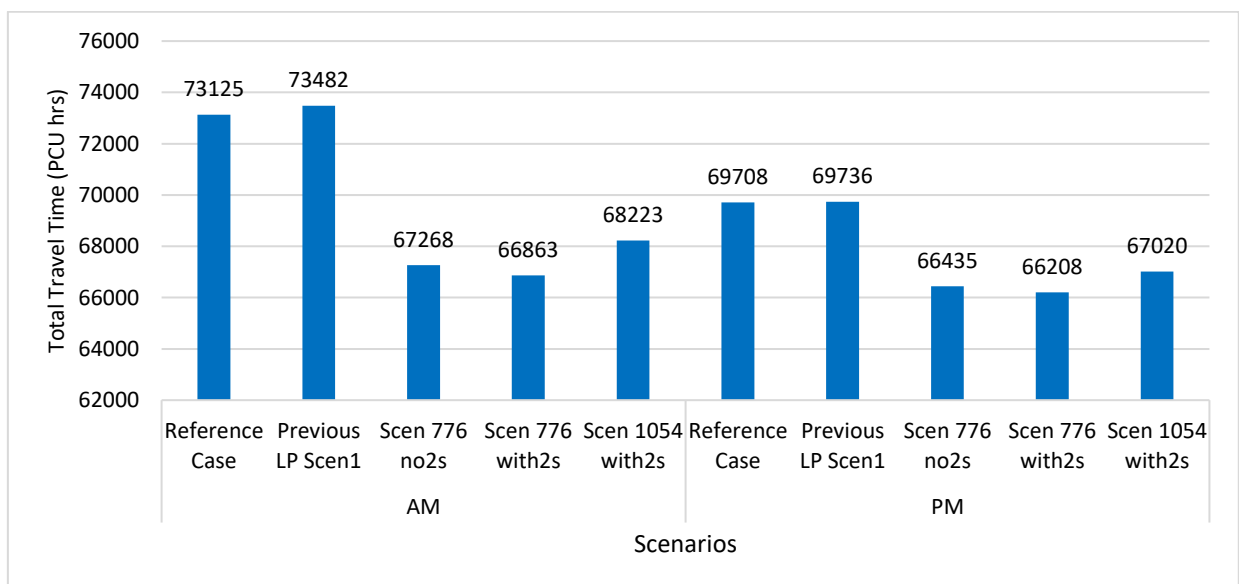
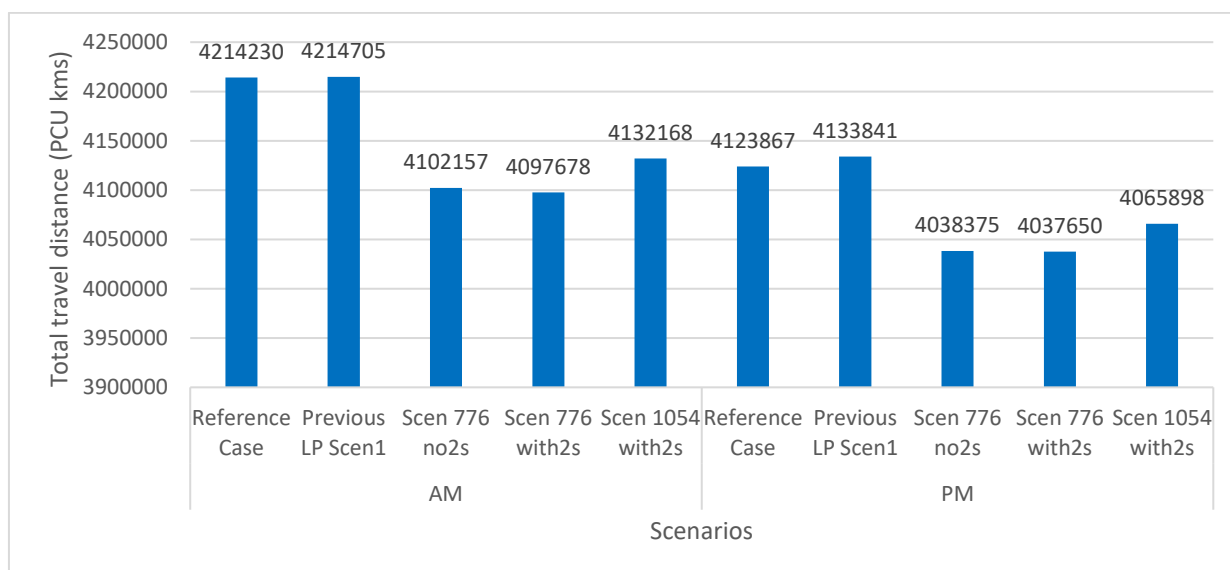


Figure 8-3 Total travel distance (PCU kms)



8.2 Traffic Flows

Figure 8-4 to Figure 8-9 below show the total flow (PCU) difference plots for the following scenarios:

- Between the 1054 scenarios (without mitigation) vs previous LP Scenario 1
- Between the 776 scenarios with and without 2 schemes
- Between the 1054 scenarios (without mitigation) vs 776 scenarios (with 2 schemes)

In the figures, the green bars indicate an increase in modelled flow, and blue bars indicate a decrease. The figures show the area around Sittingbourne, Faversham and Isle of Sheppey.

The 1054 scenario vs previous LP Scenario 1

The flow differences between the 1054 scenarios (with 2 set of schemes) and the previous LP Scenario 1 are shown in the Figure 8-4 and Figure 8-5 in the AM and PM peak respectively.

In the 1054 scenario AM Peak, flows are increased in Sittingbourne Town Centre and Faversham Town Centre, and on the A2 WB from M2 J7 to Sittingbourne. There are decreases along A249 between M2 J5 and B2005/Grovehurst Road. The PM flow shows a similar pattern as there is an increase in flows around Sittingbourne and Faversham in the 1054 scenario. There is also wider reassignment of traffic from the M20 in both directions to the M2, resulting in increased flows along the M2 in both directions. One of the reasons is that the Brenley corner schemes were not included in the previous LP scenario 1 model.

Figure 8-4 Model flow difference- the 1054 scenario vs previous LP Scenario 1 – AM

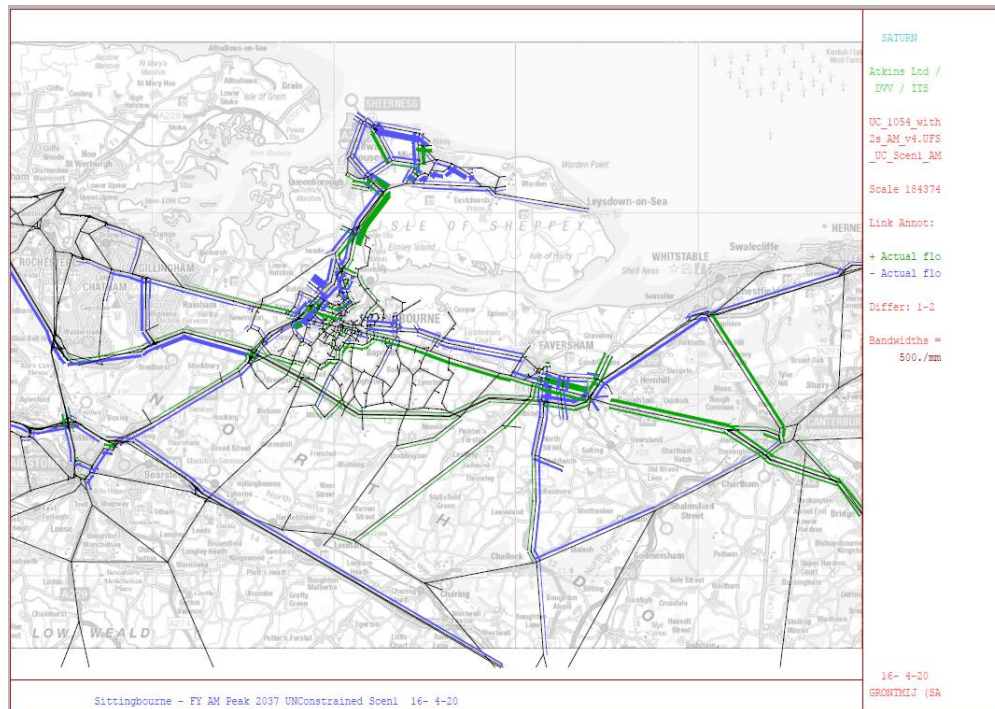
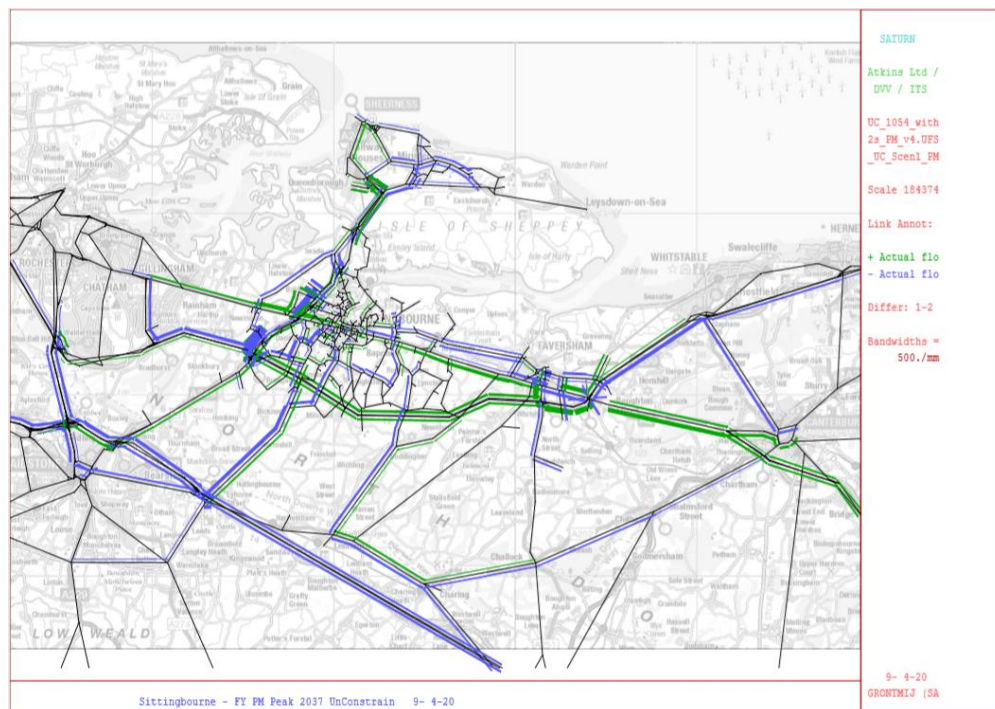


Figure 8-5 Model flow difference- the 1054 scenario vs previous LP Scenario 1 - PM



The 776 scenarios with and without 2 schemes

The flow differences between the 776 scenarios with and without 2 set of schemes are show in the Figure 8-6 and Figure 8-7 in the AM and PM peak respectively.

The 776 scenarios with and without 2 schemes have the same additional housing allocations. The only difference between the two scenarios is the network: Brenley Corner Junction Improvement, Grovehurst/A249 and Key Street/A249 junction improvement. In the 776 scenario without 2 schemes, the M2 J7 is overloaded. With the Brenley Corner scheme in place in the 776 Scenario with 2 scheme, the traffic condition at the junction has improved significantly. There is also wider reassignment of traffic from the M20 to the M2.

Figure 8-6 Model flow difference between 776 scenarios with and without 2 schemes - AM

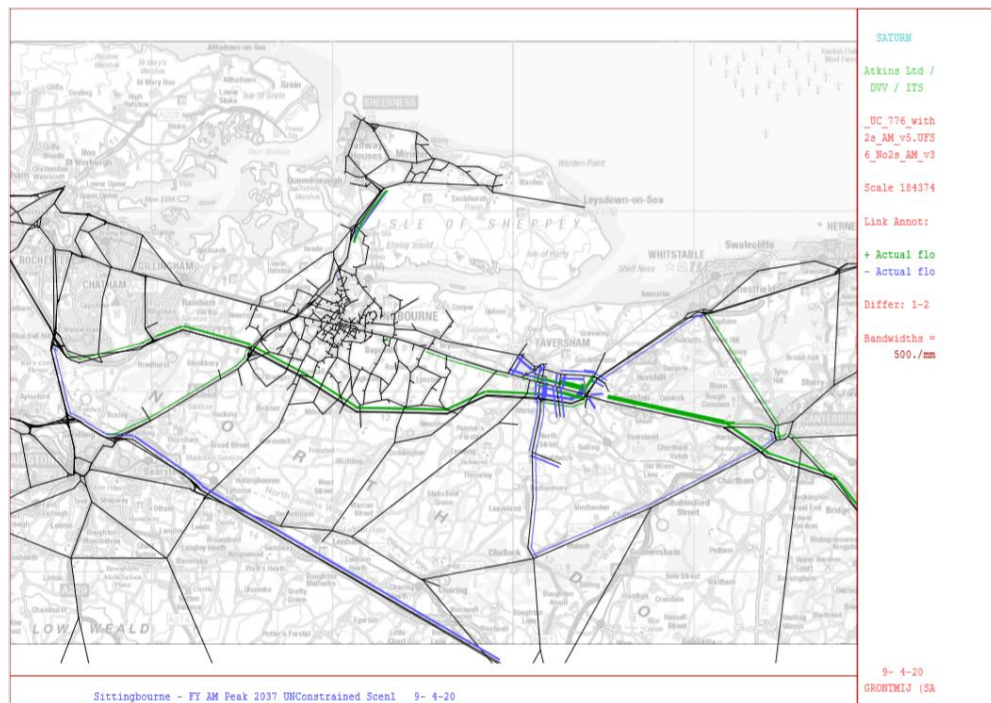
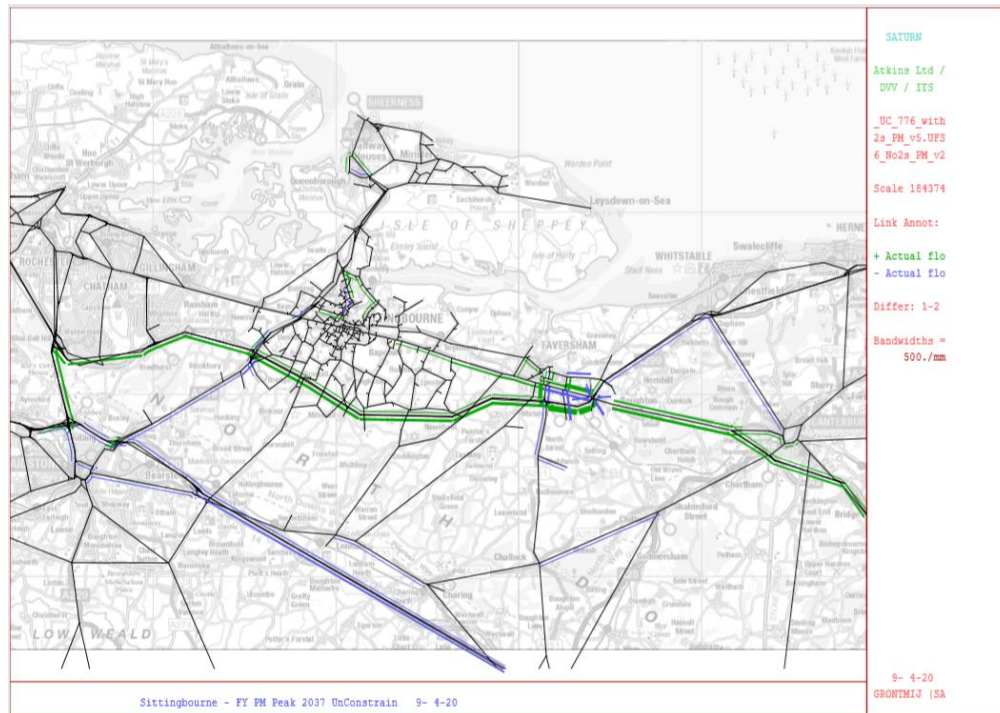


Figure 8-7 Model flow difference between 776 scenarios with and without 2 schemes - PM



The 1054 scenarios vs 776 scenarios with 2 schemes

The flow differences between the 776 and 1054 scenarios, both with 2 set of schemes , are show in the Figure 8-8 and Figure 8-9 in the AM and PM peak respectively.

The 1054 scenarios and 776 scenarios with 2 schemes have the same networks, but 1054 scenarios have more additional housing developments. In the 1054 scenario, it is found that flows are increased slightly in Faversham Town Centre, Isle of Sheppey and along A249, as well as on the west of M2 J5.

Figure 8-8 Model flow difference between 1054 scenarios vs 776 scenarios with2scheams-AM

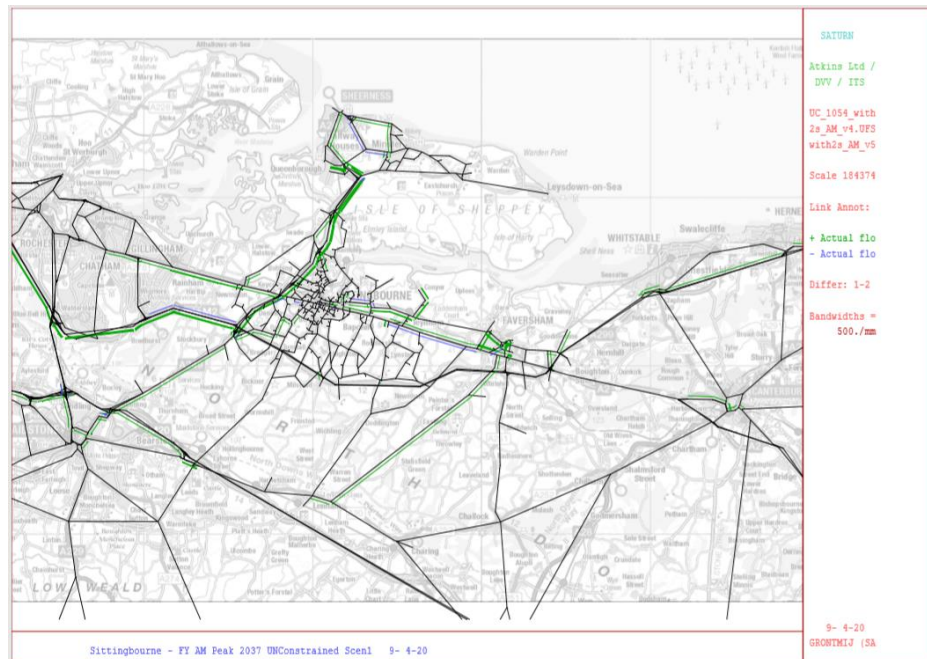
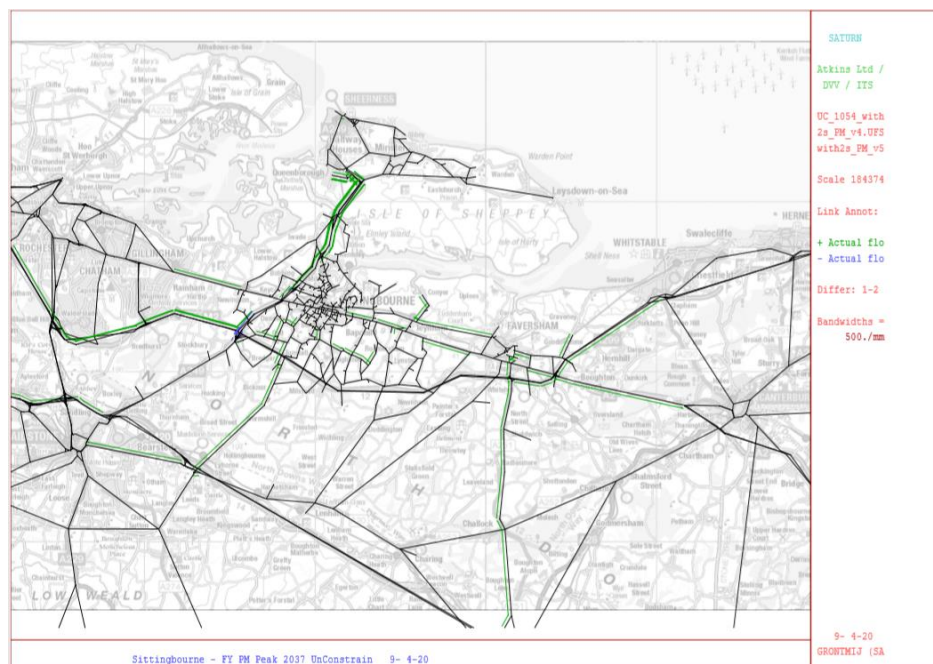


Figure 8-9 Model flow difference between 1054 scenarios vs 776 scenarios with2scheams-PM



8.3 Network Delays and Congestion

Volume over Capacity ratio (V/C, also known as Degree of Saturation) can provide useful indication of network delays and congestions at key junctions and links. Figure 8-10 below shows the locations of the 85 junctions with the V/C analysis.

Figure 8-10 Junctions within the model for V/C analysis

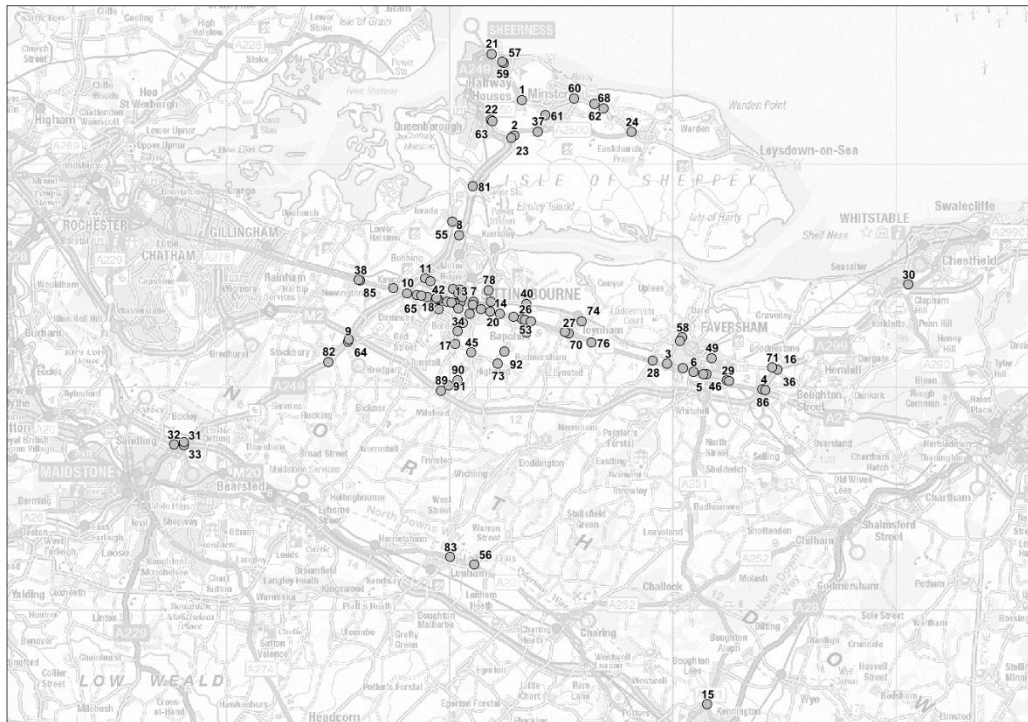


Table 8-3 and Table 8-4 show a summary of the congestion (weighted V/C% and highest V/C% respectively) comparisons in the AM and PM peak across the scenarios in a tabular form with different colours representing degree of congestions as defined below:

- Overloaded (>100%);
- Above practical capacity (95-100%);
- At practical capacity (90-95%);
- Exceeding capacity threshold (85-90%);
- Approaching capacity threshold (80-85%); and
- Below 80% capacity.

The heat diagrams shown in Figure 8-11 and Figure 8-12 below show the degree of saturation analysed for the highest V/C (i.e. highest V/C on any of the approach arms to the junction) at the 93 key junctions in Swale for the 1054 scenarios (without mitigations).

It is found that several junctions in Isle of Sheppey, Sittingbourne town centre and Faversham town centre, also junctions along A249 and Head Hill/Whitstable Road/Staple St Road junction show heavy congestion, especially in the AM Peak, in all scenarios.

Table 8-3 Summary of the congestions (weighted junction V/C)

		Weighted									
JunctionID	Description	Scenario 1		Scenario 776 no2s		Scenario 776 with2s		Scenario 1054 DM		Scenario 1054 DS	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	Minster Road/ A250 Halfway Road	122.3	96.3	90.1	89.6	90.2	89.4	97.0	91.1	80.3	85.4
2	A250 Lower Road/Sheppey Way	123.7	104.2	82.0	63.8	77.0	53.9	77.3	55.4	77.1	55.8
3	A2 London Road/Western Link	89.3	88.8	79.8	81.1	73.8	87.5	82.7	90.7	73.2	88.3
4	M2 Junction 7	87.4	99.3	81.9	92.1	49.4	49.9	51.5	51.0	46.5	44.8
5	A2/A251 Ashford Road	98.8	99.3	98.6	99.8	74.4	91.6	74.4	96.1	36.6	56.4
6	A2/Brogdale Road	78.5	71.0	66.4	63.2	62.1	66.7	72.7	69.5	63.2	69.2
7	B2006 Eurolink Way/Crown Quay Lane	80.0	80.3	76.3	78.1	76.0	77.6	77.9	77.4	78.1	80.1
8	Grovehurst/ Swale Way/B2005	67.9	61.9	81.9	81.2	55.3	57.1	56.2	58.3	59.1	64.1
9	M2 Junction 5	20.4	78.3	20.1	70.1	19.6	68.8	18.6	72.4	44.2	74.8
10	A2 Key Street/A249	60.0	65.0	79.6	76.1	73.3	70.2	74.7	69.0	78.2	69.3
11	A249/B2006	80.3	74.5	83.4	76.9	83.1	75.3	82.8	75.0	73.2	72.3
12	A2 Canterbury Road/Murston Road/Rectory Road	81.6	76.1	79.8	73.5	80.4	73.4	81.5	74.7	80.4	74.4
13	A2 Dover Street/Milton Road	81.1	84.1	60.1	66.0	60.4	65.8	61.7	66.7	60.6	67.3
14	A2 Canterbury Road/Swanstree Avenue	68.4	80.4	69.7	64.8	71.4	64.3	74.7	66.1	72.4	65.4
15	A2042 Faversham Road/Trinity Road	104.9	87.7	103.4	84.5	102.7	84.3	103.5	86.1	105.1	85.0
16	A299 Thanet Way/Staple St	67.5	90.1	64.2	77.3	58.8	75.1	58.6	77.4	58.0	76.5
17	Tunstall Rd/Woodstock Rd	70.5	66.3	77.3	66.2	79.0	64.5	79.8	65.6	77.2	65.8
18	A2 London Road/Wises Lane	61.3	55.8	57.6	58.1	57.7	57.9	56.8	57.3	56.8	56.0
19	B2006/ B2005	79.3	90.3	82.8	90.5	83.3	91.3	83.5	91.2	80.5	90.5
20	A2 St Michael's Road/East Street	64.3	60.3	61.9	66.9	62.8	66.1	62.8	66.8	62.6	67.6
21	A250 Millenium Way/High Street	84.0	85.4	76.2	79.8	76.1	79.2	77.6	83.0	73.8	74.7
22	A249 Brielle Way /B2007	48.0	50.7	41.0	50.8	41.0	51.2	43.8	52.8	46.5	53.9
23	A249/A2500	95.4	94.0	88.8	68.5	84.9	62.2	90.8	67.5	91.3	71.3
24	Lower Road/East Church Road	57.4	65.9	56.0	60.2	56.3	60.1	57.2	59.8	54.0	61.8
25	B2006 Staplehurst Road/Chalkwell Road	60.5	87.4	67.2	82.4	66.9	84.2	66.4	84.6	62.5	83.1
26	A2 London Road/Hempstead Lane	66.6	75.0	75.1	72.3	77.2	76.5	77.3	76.5	78.3	77.4
27	A2 London Road/Station Road (Teynham)	51.3	49.2	51.1	56.0	51.7	59.4	53.5	65.6	65.8	72.7
28	A2 London Road/Faversham Road	48.5	58.1	50.9	60.2	52.6	64.3	53.4	65.9	53.7	66.4
29	A2 Canterbury Road/Selling Road	22.9	69.9	42.7	65.2	40.0	52.3	40.0	53.7	37.4	50.6
30	A299 Thanet Way/Clapham Hill	7.2	23.2	6.1	23.4	6.1	23.4	6.6	23.3	6.4	23.4
31	M20 J7	106.9	100.4	104.2	97.4	104.2	104.1	105.7	103.9	106.1	102.5
32	M20J7 Onslip WB	100.8	83.4	100.5	93.2	100.8	91.9	100.8	91.8	100.8	89.5
33	M20J7 Offslip EB	66.5	90.0	67.1	89.4	69.5	89.7	68.6	89.7	68.7	89.9
34	Gore Court Road/Bell Road/Park Avenue	63.3	72.0	68.8	58.1	70.7	58.8	70.3	62.1	71.6	59.7
35	Bell Road/Capel Road/Brenchley Road	58.3	49.7	62.4	48.8	64.5	48.0	65.0	48.6	64.8	46.5
36	A299 Thanet Way/Whitstable Road	69.0	61.0	69.3	65.5	77.1	66.5	78.3	67.4	82.5	67.3
37	A2500 Lower Road/Barton Hill Drive	90.5	97.0	89.4	88.8	89.5	88.6	90.1	89.0	87.7	80.7
38	A2 High Street/Church Lane (Newington)	54.1	28.6	48.6	39.1	47.8	38.4	54.1	38.4	50.0	37.9
39	B2006 Mill Way/ExitCarpark	80.7	88.7	80.7	89.6	81.2	89.5	82.0	88.9	79.7	88.9
40	Church Road/Lomas Road	57.5	66.9	36.2	67.5	36.3	66.7	32.5	68.5	36.4	65.7
41	Bell Road/Stanhope Avenue	83.6	80.8	84.9	81.8	85.4	82.1	85.4	81.9	85.4	81.1
42	A2 London Road/Adelaide Drive	50.4	42.5	52.2	52.6	52.3	52.1	50.2	51.4	49.7	49.8
43	B2006/Sonora Way	67.9	80.2	64.2	80.9	64.7	82.0	62.6	82.5	52.7	81.0
44	Borden Lane/Homewood Avenue	72.7	57.4	73.1	67.4	73.4	63.7	72.6	65.8	71.2	63.6
45	Cromer Road/Highsted Road	63.0	72.5	60.5	69.8	58.1	70.1	58.7	74.5	59.1	74.8
46	A2 Canterbury Road/B2041	84.3	81.9	86.1	75.3	85.2	73.6	86.8	76.0	86.1	83.2
47	A2 St Michael's Road/Crown Quay Lane	91.4	81.7	85.4	81.0	85.6	80.6	88.5	82.1	87.7	81.4
48	A2 London Road/Hawthorn Road	64.9	56.7	66.6	59.0	67.2	58.1	67.1	58.7	67.1	56.9
49	East Street/B2040 (Faversham)	102.3	96.8	93.6	86.3	87.1	81.9	98.0	88.0	88.0	92.1
50	A2/Westlands Avenue	54.6	45.6	52.2	52.6	52.3	52.1	50.2	51.4	49.7	49.8

		Weighted									
JunctionID	Description	Scenario 1		Scenario 1054		Scenario 1054		Scenario 1054 DM		Scenario 1054 DS	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
51	A2/Chalkwell Road	59.9	50.3	57.1	50.2	57.6	50.9	58.6	50.6	58.8	47.6
52	A2/Burley Road	73.8	61.6	75.2	64.3	74.7	64.5	74.6	64.7	76.2	61.4
53	A2/School Lane	67.0	85.3	67.7	79.2	69.5	79.2	72.6	81.8	71.0	80.4
54	A2/B2040 South Road	86.4	92.0	77.7	69.7	69.2	73.1	78.7	77.2	74.5	79.0
55	Sheppey Way/Grovehurst Road	48.8	34.9	36.2	22.0	38.4	22.2	42.0	22.5	28.4	23.0
56	A20 Ashford Road/Hubbards Hill	40.0	39.6	39.8	40.4	39.0	39.9	42.2	39.8	39.5	40.2
57	Invicta Road/Cavour Rd Sheppey	109.4	27.4	13.7	27.0	13.7	28.2	15.9	27.5	13.8	26.4
58	Western Link Road/Bysing Wood Road	69.8	49.1	64.8	44.7	49.2	46.8	61.9	49.1	39.1	42.7
59	Cavour Road/Alma Road Sheppey	101.1	21.5	6.9	23.4	7.2	24.3	6.3	23.4	7.1	23.0
60	Minster Road/Back Lane Sheppey	83.2	37.7	68.9	30.3	68.9	30.3	69.7	29.6	61.7	31.9
61	Barton Hill Drive/Plover Road	76.3	60.7	53.4	47.2	52.4	47.2	57.6	47.6	69.6	59.3
62	Chequers Road/Elm Lane	80.8	35.4	49.2	28.8	49.2	28.8	50.2	27.9	46.7	30.0
63	A250/Queenborough Road	49.3	36.3	39.2	23.7	39.1	23.9	46.3	27.3	38.3	34.4
64	M2J5	84.7	68.3	78.6	59.9	79.2	60.3	82.8	60.1	78.9	66.8
65	A2/Sandford Road	61.4	51.9	58.2	60.9	58.3	60.3	56.3	59.4	56.6	57.6
66	A2/Staplehurst Road	54.1	44.6	54.2	49.8	54.4	49.3	53.7	48.6	54.5	47.2
67	Staplehurst Road/Gadby Road	66.5	12.5	22.0	13.5	22.1	13.5	22.2	13.5	21.6	13.7
68	Chequers Road/East Church Road	80.6	38.1	49.3	29.8	49.3	29.8	50.3	29.0	46.8	31.0
69	A2/Panteny Road	44.1	45.2	47.6	43.4	48.4	43.7	49.9	45.0	48.7	44.6
70	A2/Lynsted Lane	45.6	46.8	48.2	48.4	49.6	51.1	49.8	53.0	48.4	51.9
71	Whitstable Road/Head Hill	53.9	48.9	55.4	44.4	59.1	43.8	66.2	47.4	23.4	20.9
72	A2/Love Lane	49.5	58.1	60.3	53.3	54.3	56.3	55.2	57.1	50.0	45.4
73	Church Street/Connecting Road	23.6	59.0	23.2	36.5	22.8	36.9	23.3	43.9	25.2	42.2
74	The Crescent/Conyer Road	44.7	24.3	21.2	15.6	20.7	15.4	36.0	20.8	32.6	20.1
75	Western Link/Bysing Wood Road W	36.9	29.5	36.3	24.2	31.1	26.2	36.0	26.7	23.0	23.4
76	A2/Lewson Street	45.3	52.2	46.8	55.9	47.6	58.9	49.8	61.8	49.7	62.7
77	Tonge Road/Church Road	60.6	58.3	54.8	54.1	54.7	55.6	53.9	56.4	54.5	60.7
78	Castle Road/Dolphin Road	76.7	63.8	66.8	61.7	67.6	63.4	70.5	64.9	69.0	68.5
79	Eurolink Way/Milton Road	76.8	74.4	76.3	74.5	76.8	75.5	77.1	75.4	76.7	76.7
80	Park Road/Albany Road	69.5	73.4	75.2	65.7	77.1	66.3	77.5	67.5	76.5	72.0
81	Sheppey Way/Old Ferry Road	41.8	39.9	29.5	39.8	29.4	39.3	31.2	38.9	29.7	41.1
82	A249/S Green	60.6	79.0	55.7	81.0	56.3	80.2	57.9	80.8	58.5	80.4
83	A20 Ashford Road/ Faversham Road	83.0	89.7	82.8	82.6	83.7	81.5	88.5	81.6	83.5	82.0
84	A2/Rook Lane	53.0	29.1	50.7	46.3	49.4	45.6	53.6	44.8	51.2	45.3
85	A2/Bull Lane	58.9	69.2	53.8	62.3	52.9	63.1	57.7	69.3	53.2	54.9

Bolded- Major junctions with link capacity issue

Key

Overloaded (>100%)

Above practical capacity (95-100%)

At practical capacity (90-95%)

Exceeding capacity threshold (85-90%)

Approaching capacity threshold (80-85%)

Below 80% capacity

Table 8-4 Summary of the congestions (highest junction V/C)

		Highest									
JunctionID	Description	Scenario 1		Scenario 776 no2s		Scenario 776 with2s		Scenario 1054 DM		Scenario 1054 DS	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	Minster Road/ A250 Halfway Road	143.0	108.2	95.1	100.0	95.7	100.1	102.9	100.3	101.3	100.5
2	A250 Lower Road/Sheppey Way	172.1	115.7	109.1	75.7	109.4	61.9	113.1	61.5	100.6	68.8
3	A2 London Road/Western Link	122.4	99.0	101.5	88.7	83.1	92.8	104.7	96.1	79.4	102.5
4	M2 Junction 7	142.1	123.9	121.6	121.3	88.2	90.1	100.5	101.9	69.8	102.2
5	A2/A251 Ashford Road	110.6	117.9	101.9	111.1	89.0	99.5	86.8	103.1	37.1	64.6
6	A2/Brogdale Road	136.4	110.4	87.1	87.6	71.1	96.4	87.2	103.1	75.5	85.6
7	B2006 Eurolink Way/Crown Quay Lane	97.3	100.3	90.7	97.2	90.4	94.4	95.5	95.5	93.0	94.0
8	Grovehurst/ Swale Way/B2005	105.9	91.2	105.6	106.1	105.0	76.6	105.6	79.3	91.4	94.5
9	M2 Junction 5	24.2	107.0	24.1	96.5	23.4	94.9	20.9	100.1	62.3	106.3
10	A2 Key Street/A249	82.7	120.9	101.8	110.9	101.7	111.2	103.3	113.2	104.8	108.9
11	A249/B2006	113.4	90.0	105.0	84.7	104.9	81.8	105.1	85.5	105.4	85.0
12	A2 Canterbury Road/Murston Road/Rectory Road	112.1	107.8	103.3	103.2	103.1	103.0	107.2	104.5	104.5	103.1
13	A2 Dover Street/Milton Road	102.9	100.0	73.7	88.7	73.7	87.6	75.7	88.1	73.1	87.9
14	A2 Canterbury Road/Swanstree Avenue	96.2	102.7	96.1	83.0	96.8	80.7	96.4	82.4	96.7	80.9
15	A2042 Faversham Road/Trinity Road	137.2	111.1	137.2	110.5	137.2	110.5	137.2	110.7	137.2	110.6
16	A299 Thanet Way/Staple St	136.9	92.7	119.1	101.3	87.1	79.2	94.9	77.5	94.7	76.6
17	Tunstall Rd/Woodstock Rd	92.3	94.4	95.6	93.8	96.0	91.9	94.6	94.0	88.0	95.3
18	A2 London Road/Wises Lane	82.6	94.8	83.4	79.6	84.1	80.7	87.9	83.2	83.2	88.9
19	B2006/ B2005	99.9	100.4	100.2	100.3	100.2	99.0	100.1	99.6	99.9	99.5
20	A2 St Michael's Road/East Street	68.6	72.6	68.3	73.4	68.9	72.6	69.2	74.2	69.8	74.5
21	A250 Millenium Way/High Street	100.5	101.4	97.1	91.2	97.0	90.9	97.6	94.0	95.7	85.6
22	A249 Brielle Way /B2007	64.6	96.1	50.4	88.1	50.2	89.7	54.4	90.2	55.5	89.1
23	A249/A2500	124.6	123.7	105.3	83.8	104.2	76.1	104.8	84.3	105.3	90.7
24	Lower Road/East Church Road	102.7	96.2	99.9	89.9	100.5	89.7	100.5	89.6	101.0	89.9
25	B2006 Staplehurst Road/Chalkwell Road	78.2	100.1	81.8	92.6	81.4	97.1	80.2	98.0	78.3	95.9
26	A2 London Road/Hempstead Lane	118.9	103.7	101.1	102.3	100.7	101.6	105.0	103.1	102.0	102.4
27	A2 London Road/Station Road (Teynham)	118.4	92.9	98.5	95.4	96.4	95.0	105.1	97.7	100.0	96.7
28	A2 London Road/Faversham Road	58.6	114.2	53.8	104.8	62.3	105.8	57.8	109.5	73.0	102.3
29	A2 Canterbury Road/Selling Road	38.6	116.0	64.2	106.7	45.8	68.8	46.4	74.6	44.3	61.8
30	A299 Thanet Way/Clapham Hill	23.7	137.6	20.9	137.5	20.9	137.4	22.2	137.6	21.6	137.7
31	M20 J7	123.4	112.2	120.6	109.7	120.6	109.2	123.4	110.3	123.8	110.8
32	M20J7 Onslip WB	102.9	84.0	101.8	102.3	102.7	101.2	102.9	101.1	102.8	96.9
33	M20J7 Offslip EB	80.3	100.0	81.0	100.0	83.9	100.0	82.8	100.0	82.8	100.0
34	Gore Court Road/Bell Road/Park Avenue	81.9	95.8	93.2	73.0	95.9	74.7	96.4	79.7	97.6	78.2
35	Bell Road/Capel Road/Brenchley Road	78.9	62.2	83.7	58.4	88.0	57.0	90.1	59.3	88.9	56.3
36	A299 Thanet Way/Whitstable Road	144.1	96.9	123.4	97.4	96.1	86.3	101.1	86.7	97.6	75.4
37	A2500 Lower Road/Barton Hill Drive	103.7	111.7	102.2	109.3	102.5	108.9	103.4	109.8	100.5	103.7
38	A2 High Street/Church Lane (Newington)	94.6	33.7	58.5	39.8	57.0	39.4	82.7	40.4	65.7	38.8
39	B2006 Mill Way/ExitCarpark	90.3	103.1	88.8	103.7	89.4	102.8	90.0	102.6	89.8	101.5
40	Church Road/Lomas Road	92.5	122.0	58.9	105.1	58.9	105.6	47.7	108.3	58.7	106.0
41	Bell Road/Stanhope Avenue	103.5	97.4	104.1	101.2	104.7	100.8	105.3	100.7	105.0	98.6
42	A2 London Road/Adelaide Drive	66.1	67.7	96.4	58.6	96.6	57.8	92.4	58.0	87.9	57.7
43	B2006/Sonora Way	102.0	94.4	82.6	89.7	84.0	93.0	81.5	93.9	67.5	93.4
44	Borden Lane/Homewood Avenue	95.2	69.4	93.2	92.3	94.0	87.1	95.3	92.4	91.0	85.6
45	Cromer Road/Highsted Road	78.8	102.7	77.1	90.5	74.0	90.6	74.7	96.9	75.1	96.1
46	A2 Canterbury Road/B2041	124.5	100.3	127.4	104.1	122.9	90.8	122.9	96.3	97.8	94.5
47	A2 St Michael's Road/Crown Quay Lane	102.5	99.7	94.5	96.4	94.9	95.8	96.4	98.1	95.2	96.0
48	A2 London Road/Hawthorn Road	81.1	71.5	83.4	71.3	83.8	70.4	84.3	71.1	83.0	69.1
49	East Street/B2040 (Faversham)	103.9	118.6	103.6	98.8	103.6	98.7	103.6	106.9	103.5	102.1
50	A2/Westlands Avenue	100.3	63.4	96.4	58.6	96.6	57.8	92.4	58.0	87.9	57.7

		Highest									
JunctionID	Description	Scenario 1		Scenario 1054		Scenario 1054		Scenario 1054 DM		Scenario 1054 DS	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
51	A2/Chalkwell Road	104.0	57.4	94.5	55.3	96.5	55.1	97.5	56.8	98.2	51.7
52	A2/Burley Road	93.6	81.4	96.0	77.0	95.2	78.4	94.9	81.7	97.4	81.6
53	A2/School Lane	102.3	109.8	102.2	104.0	102.2	104.5	102.8	107.0	102.8	105.7
54	A2/B2040 South Road	146.8	107.9	115.1	92.2	107.8	85.3	112.9	85.8	96.2	94.9
55	Sheppey Way/Grovehurst Road	89.7	36.7	47.3	23.2	50.0	23.2	54.9	23.7	35.7	24.3
56	A20 Ashford Road/Hubbards Hill	45.6	40.9	44.9	46.5	44.5	47.1	72.2	46.7	44.9	46.8
57	Invicta Road/Cavour Rd Sheppey	116.0	29.6	18.1	29.2	18.2	30.4	20.5	29.6	18.3	28.5
58	Western Link Road/Bysing Wood Road	115.8	75.8	104.0	70.9	67.4	73.0	97.7	75.3	63.3	64.6
59	Cavour Road/Alma Road Sheppey	104.0	27.4	7.6	32.0	7.9	33.3	7.0	31.9	7.8	31.6
60	Minster Road/Back Lane Sheppey	102.0	44.3	85.7	33.4	85.8	33.5	87.1	33.0	79.1	35.0
61	Barton Hill Drive/Plover Road	101.3	73.1	61.7	53.0	60.9	52.9	68.1	52.9	81.4	73.3
62	Chequers Road/Elm Lane	92.8	40.7	58.7	34.4	58.7	34.3	59.8	33.3	56.3	35.8
63	A250/Queenborough Road	66.5	50.1	46.8	32.3	46.5	32.8	54.8	33.5	52.4	42.6
64	M2J5	97.4	83.0	90.2	70.6	90.7	71.0	95.0	70.6	90.5	75.1
65	A2/Sandford Road	90.3	62.1	62.2	61.6	62.3	61.1	59.6	61.3	57.9	61.0
66	A2/Staplehurst Road	101.0	56.7	89.6	55.4	90.0	53.9	92.7	55.8	94.7	54.4
67	Staplehurst Road/Gadby Road	100.3	15.1	40.7	17.2	40.8	17.2	40.9	17.2	39.8	17.3
68	Chequers Road/East Church Road	92.3	44.0	58.5	35.3	58.6	35.2	59.7	34.2	56.2	36.7
69	A2/Panteny Road	93.3	104.0	94.0	97.9	94.8	98.9	93.6	101.9	95.1	100.7
70	A2/Lynsted Lane	55.7	96.1	55.7	66.6	60.9	67.5	64.9	81.1	66.7	75.2
71	Whitstable Road/Head Hill	84.8	76.9	87.9	72.3	93.4	70.5	103.9	76.4	32.2	34.2
72	A2/Love Lane	81.0	97.6	105.7	93.1	100.0	81.1	102.0	82.4	83.1	66.9
73	Church Street/Connecting Road	31.7	76.2	35.3	45.9	34.5	46.1	35.7	56.5	37.5	53.5
74	The Crescent/Conyer Road	85.5	29.5	41.7	19.2	40.2	19.2	69.9	25.9	55.7	25.4
75	Western Link/Bysing Wood Road W	70.0	81.2	41.1	26.6	34.4	27.8	40.7	31.5	49.6	27.6
76	A2/Lewson Street	59.0	93.0	75.6	95.4	77.9	103.4	92.1	104.5	97.1	103.9
77	Tonge Road/Church Road	101.1	96.6	100.7	70.1	100.6	78.6	100.9	80.0	100.9	94.7
78	Castle Road/Dolphin Road	108.6	92.4	95.8	90.7	96.8	91.5	103.7	95.6	98.3	97.4
79	Eurolink Way/Milton Road	93.9	89.1	92.7	88.5	94.1	91.0	94.9	89.3	93.6	91.4
80	Park Road/Albany Road	71.6	81.4	79.0	71.6	81.2	72.4	82.3	74.5	79.4	81.1
81	Sheppey Way/Old Ferry Road	91.2	48.2	33.3	47.4	33.3	46.6	33.7	45.5	33.4	48.3
82	A249/S Green	109.3	106.0	85.4	106.0	85.0	104.5	95.7	105.1	98.3	106.5
83	A20 Ashford Road/ Faversham Road	106.0	103.8	110.8	98.7	115.6	96.5	119.1	96.4	106.9	97.6
84	A2/Rook Lane	107.8	33.8	59.5	53.5	62.3	52.7	68.9	52.1	75.4	52.2
85	A2/Bull Lane	87.3	105.3	69.7	84.2	67.7	85.8	76.8	95.3	70.2	72.9

Bolded- Major junctions with link capacity issue

Key

- Overloaded (>100%)
- Above practical capacity (95-100%)
- At practical capacity (90-95%)
- Exceeding capacity threshold (85-90%)
- Approaching capacity threshold (80-85%)
- Below 80% capacity

Figure 8-11 Scenario 1054 Junction and Link V/C Plot – AM Peak

1054 Scenario Do-Minimum (DM) - AM

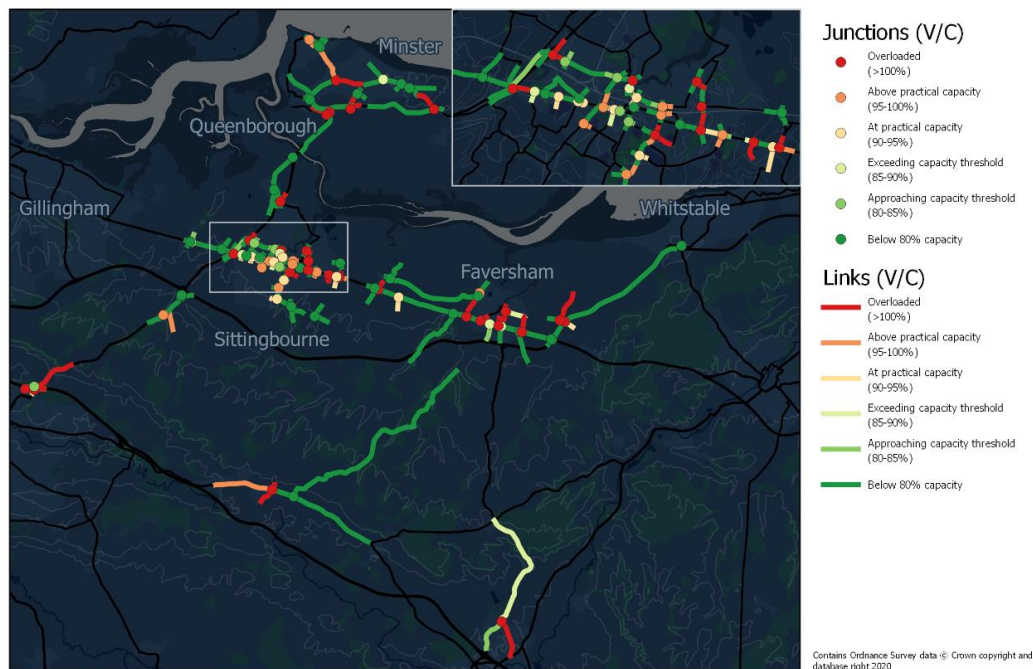
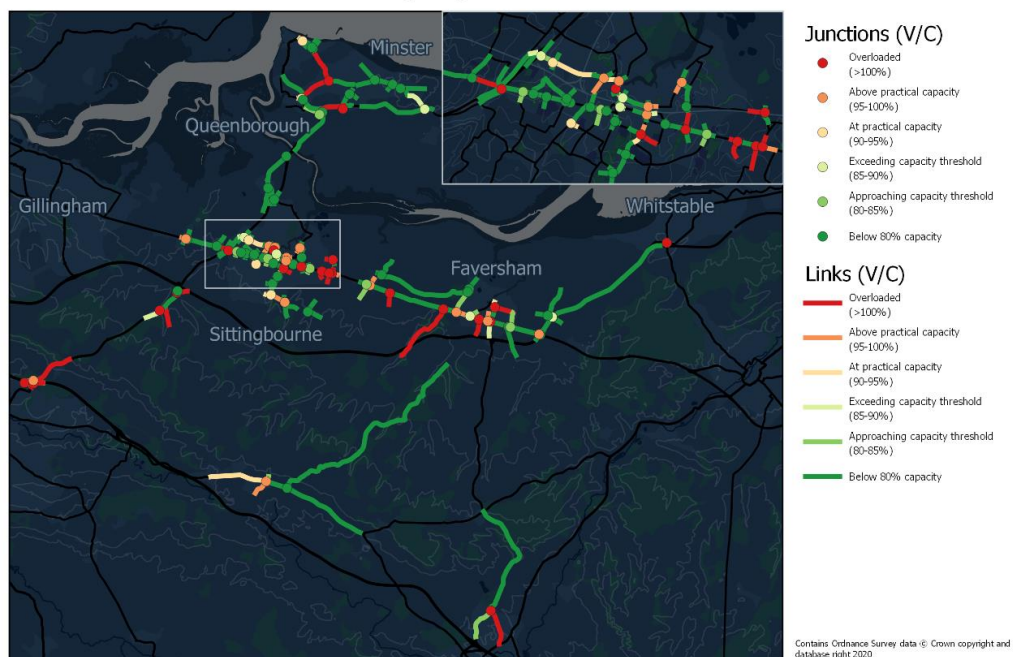


Figure 8-12 Scenario 1054 Junction and Link V/C Plot – PM Peak

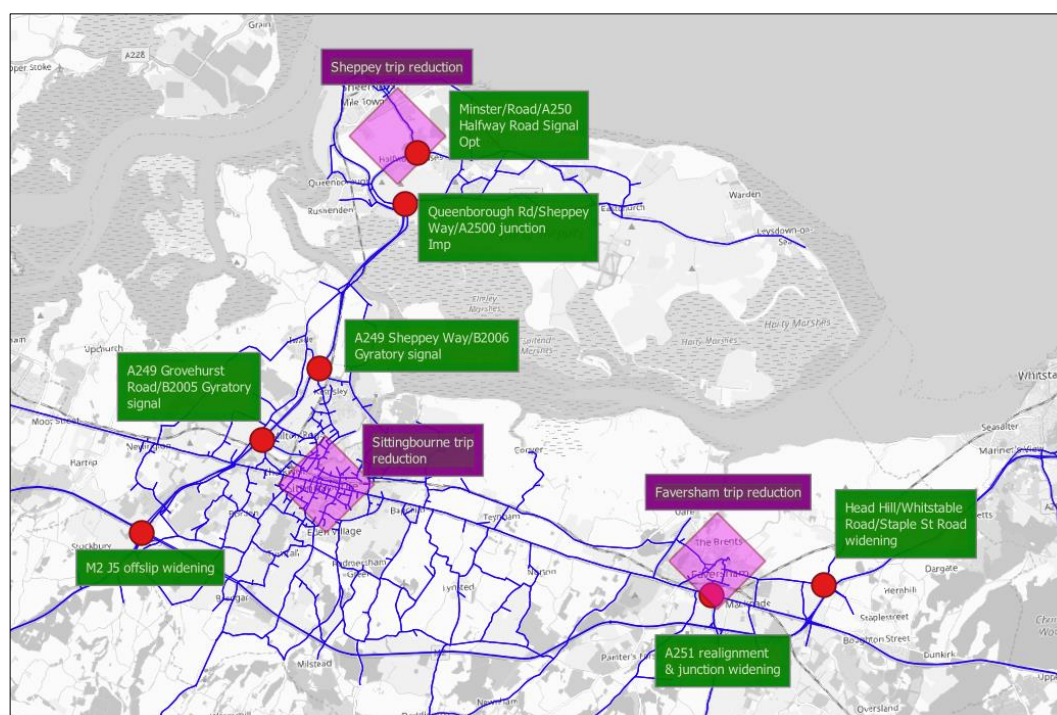
1054 Scenario Do-Minimum (DM) - PM



9 Mitigation Measures

Based on the results of 1054 Scenario DM (without mitigations), potential transport mitigation measure to offset the additional vehicle trips generated by the new Local Plan developments were identified, along with the potential trip reduction for certain development zone due to modal shift as a result of the provision for public transport and active travels. The key mitigation measures for the Swale LP 2054 scenario in the year 2037 is illustrated in Figure 9-1.

Figure 9-1 key Swale LP mitigation measures-1054 scenario



The mitigation packages identified follow a pragmatic approach, considering scheme implementation, land & scheme cost constraints. Note that they are not aimed to solve all the traffic issue. They should be working in conjunction with the demand reduction as a result of internalisation and modal shift.

9.1 Demand Mitigations

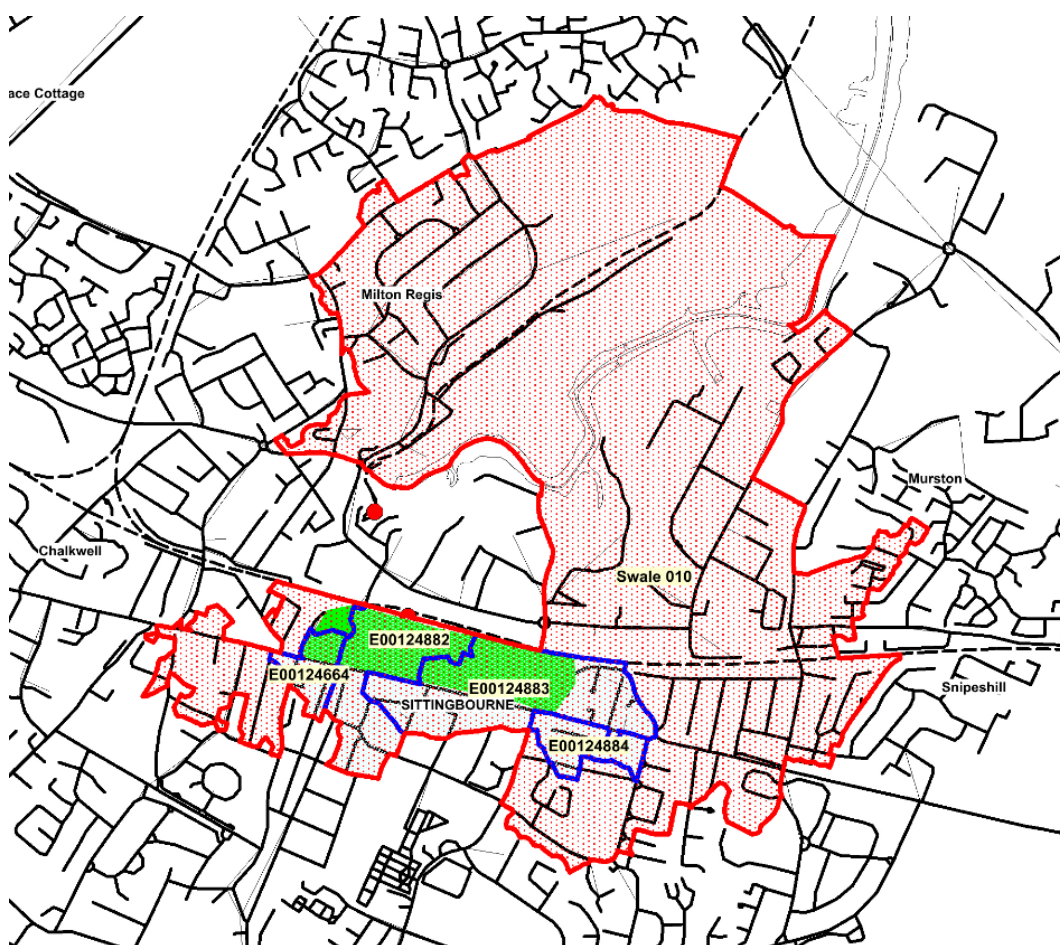
From the data of the additional houses in section 5 that there are several big Local Plan house development sites for the 1054 scenario, including:

- Queenborough / Rushenden
- Sittingbourne two centre
- East of Faversham (East Lady Dane, Duchy Fav)

Of these developments, Queenborough / Rushenden and East of Faversham fall within larger TEMPro zones that cover trips both for urban periphery and rural hinterland. A more localised trip rate may be appropriate as these developments are being planned as a mix of urban infill/extension rather than standalone. For Sittingbourne two centre, there may be scope for more ambition non-car trip rates when taking account of the sites compact nature close to the town centre and key transport hubs.

Census Output Area zones, it is found that the mode share for cars is 45%, a 21% drop on this MSOA value. Further analysis of specific output area zones in the area sees a car mode share of between 44%-47%. The analysis shows that a lower car trip mode share than the average for MSOA zone 010 is achievable for this area if the development has the right conditions. A trip rate reduction of 20% on currently modelled car trip rates would be suggested for the development.

Figure 9-3 Development location (Green) of Sittingbourne in comparison to MSOA(Red) and Output Area (Blue) Census zones



9.1.3 East of Faversham

The key sites East of Faversham comprise of a total of 3,600 homes (2,500 Duchy development and 1,100 East Lady Dane). These developments are located within census MSOA zone Swale 015 and MSOA zone Swale 017. The approximate location of the development sites related to the census MSOA and Output Area zones is shown in Figure 9-4.

The latest 2011 car trip mode shares for these zones are 60.9% (Swale zone 15) and 77% (Swale zone 17). The existing plans for the development focus on the development of urban extensions to the east of Faversham. Upon review of the mode share for the Census Output Areas on the eastern edge of Faversham Town, it is found that the mode share for cars is 69%. This is an increase on MSOA zone 15 car trip rate but a reduction of 10% on car trips for MSOA zone 017. It is noted that though MSOA zone 015 already

9.2 Transport Mitigations

9.2.1 Mitigations package Isle of Sheppey

The key interventions are as follows:

- Queenborough Rd/Sheppey Way/A2500 Roundabout, widening the approach arm from A2500 Lower Road from 1 lane to 2 lanes to increase the turning capacity— **directly modelled in highway model**;
- Review signal staging at the junction 1 Minster Road/ A250 Halfway Road junction based on the newly committed scheme;
- Build a new cycle and pedestrian crossing across the A249 to improve the connection between Rushenden / Neats Court Retail Park and the Sheppey Way / Queenborough Road cycling corridor. This will also connect with the ongoing cycle/walk upgrades along the A2500 Lower Road. – Reflect within lower car trips generated from new Local Plan developments in model;
- Invest in Sheerness Way walk and cycle route to improve connectivity from Rushenden/Queenborough to Sheerness and rest of the Isle of Sheppey. Key location for improvement is connections across the railway from Queenborough around Cromwell Road. Existing crossing bridge narrow. Potential opportunities for a wider bridge further north between Cromwell Road and New Road. – Reflect within lower car trips generated from new Local Plan developments in the model;
- Financial support for turn up and go level bus service (3-4 buses an hour) linking Rushenden/Queenborough to Sheerness. Potentially designate Whiteway Road as bus-only through access to Queenborough. Maintain bus link to Sittingbourne. – Reflect within lower car trips generated from new Local Plan developments in the model;
- Ensure all stations on Sheerness rail branch are step free and stations are accessible to all non-car modes to enable people to connect to the local rail by non-car modes – Reflect within lower car trips generated from new Local Plan developments in the model.

These interventions will particularly support the connectivity and accessibility for sustainable transport modes for the new Local Plan developments at Rushenden / Queenborough.

9.2.2 Mitigations package Faversham

The key interventions are as follows:

- Realign A251 and connect it to B2041 directly, widen approach arms from the A2 EB, A2 WB and A251 NB to 3 lanes by appropriate turning lane allocation, and optimise signal setting and phases - **directly modelled in the highway model**;
- Widen the approach arms from 1 lane to 2 lanes for SB, EB and WB arm at the Head Hill/Whitstable Road/Staple St Road- **directly modelled in the highway model**;
- Create a cohesive, comprehensive network of walk and cycle paths both within new Local Plan developments and connecting the new development to central Faversham and railway station – Reflect within lower car trips generated from new Local Plan developments in the model;
- Pay for bus extension from central Faversham to new developments to provide turn up and go connection to the town centre – Reflect within lower car trips generated from new Local Plan developments in the model.

The new Local Plan residential development to the East of Faversham are significant in scale. There will be a need to reduce car trips from this area to ensure there is enough capacity on the surrounding highway links and junctions.

9.2.3 Mitigations package Sittingbourne

The key interventions are as follows:

- A249 Sheppey Way/B2006 Gyratory, signalise SB approach arm from A249 SB offslip road (junction 11) - **directly modelled in highway model**;
- A249 Grovehurst Road/B2005 Gyratory, signalise SB approach arm from A249 SB offslip road (junction 8)- **directly modelled in highway model**;
- A249 to M2 J5 SB offslip road widening-lane drop diverge-- **directly modelled in highway model**;
- M2 J5 EB offslip widening-lane drop diverge-- **directly modelled in highway model**;
- Develop high quality segregated cycle link along B2205 / B2006 corridor between Iwade, Kemsley, and Sittingbourne to support the local walk and cycle trips in the area. This will help reduce local car trip demand for commuting, retail, and education trips including from new Local Plan developments in Sittingbourne Town Centre. - – Reflect within lower car trips generated from the new Local Plan developments in the model.

9.3 Wider Mitigations

There are a number of key wider mitigations that can be designed as a result of the new development in the Local Plan. The three primary initiatives are summarised below. They complement the largest house developments proposed through the Local Plan. They are summarised as follows:

- Upgrade Sheppey Way link to increase bus and cycle demand linking between Sheerness and Sittingbourne;
- Develop an east-west cycle corridor parallel to the A2 linking Sittingbourne to Faversham using existing side roads;
- Work with developers east of Faversham to develop a comprehensive local walk, cycle, and bus priority network to link the new developments to Faversham town centre.

9.4 1054 Scenario DS (with mitigation) Test

9.4.1 Network Statistics

Table 9-1 summarises the overall performance of the network in the AM and PM peaks between the 1054 scenarios with mitigation and without mitigation within the simulation area including the key roads such as A249, A2, M2, M20 etc.

Table 9-1 Network statistics comparison between 1054 Scenario with and without mitigation

Metrics	AM		PM	
	Scenario 1054 without mitigation	Scenario 1054 with mitigation	Scenario 1054 without mitigation	Scenario 1054 with mitigation
Simulation network Speed (kph)	56	59	59	60
Total travel time (PCU hrs)	68223	67239	67020	66629
Total travel distance (PCU kms)	4132168	4122536	4065898	4062482

Figure 9-5 to Figure 9-7 show the average simulation network speeds, total travel time, and total travel distances graphically between the 1054 scenarios with mitigation and without mitigation.

Figure 9-5 Simulation Network Speed comparison between 1054 Scenario with and without mitigation

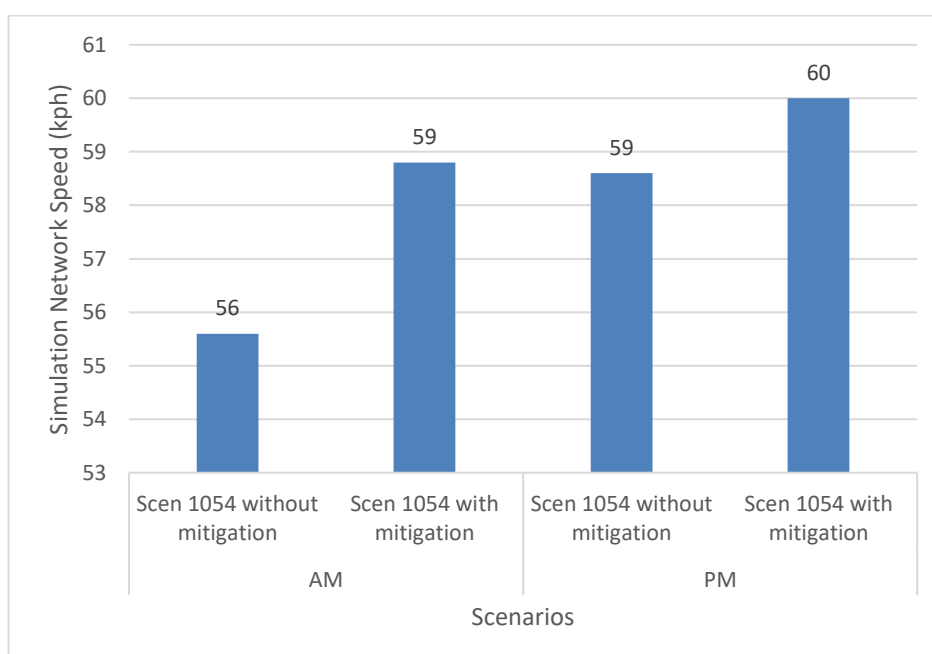


Figure 9-6 Total Travel Time comparison between 1054 Scenario with and without mitigation

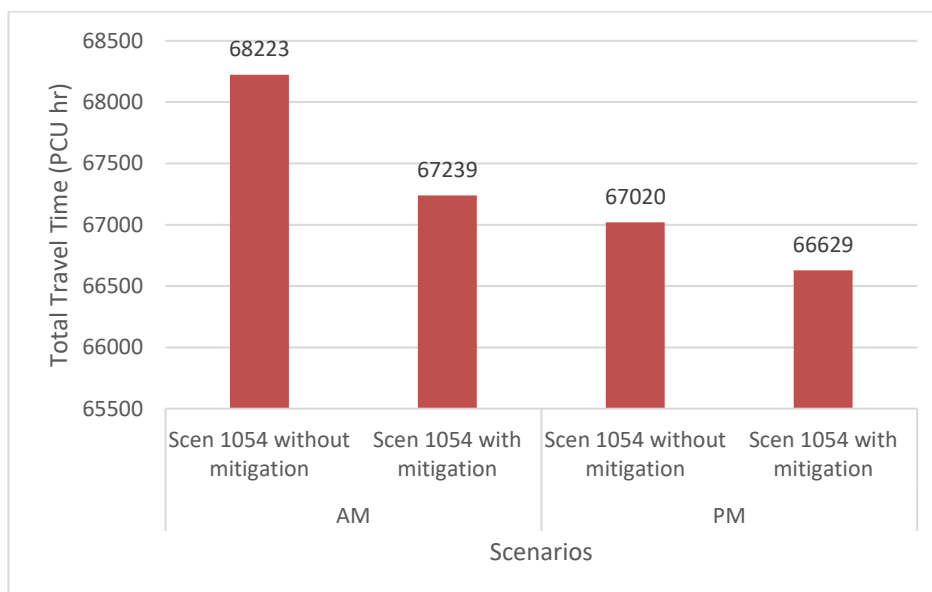
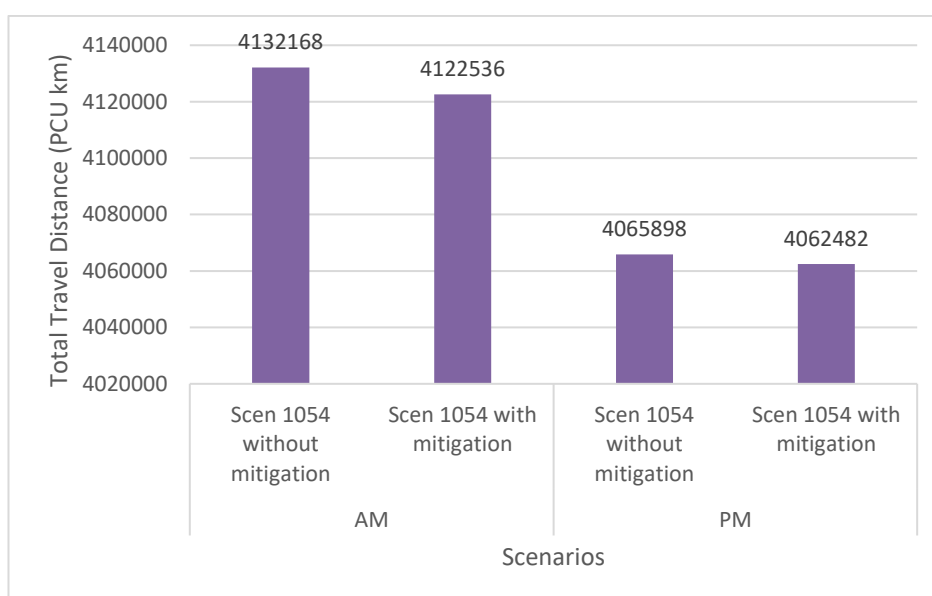


Figure 9-7 Total Travel Distance comparison between 1054 Scenario with and without mitigation



The average network speed in the simulation area in the 1054 scenarios with mitigation is higher than the 1054 scenarios without mitigation. Total travel distance and total travel time in the 1054 scenarios with mitigation are lower than the 1054 scenarios without mitigation. Overall, the results are sensible.

9.4.2 Traffic Flow

Figure 9-8 and Figure 9-9 below show the total flow (PCU) difference plots between the 1054 scenarios with mitigation and without mitigation. The green bars indicate an increase in modelled flow, and blue bars indicate a decrease. The figures show the areas around Sittingbourne, Faversham and Isle of Sheppey.

Figure 9-8 Flow difference plots between 1054 Scenario with and without mitigation - AM

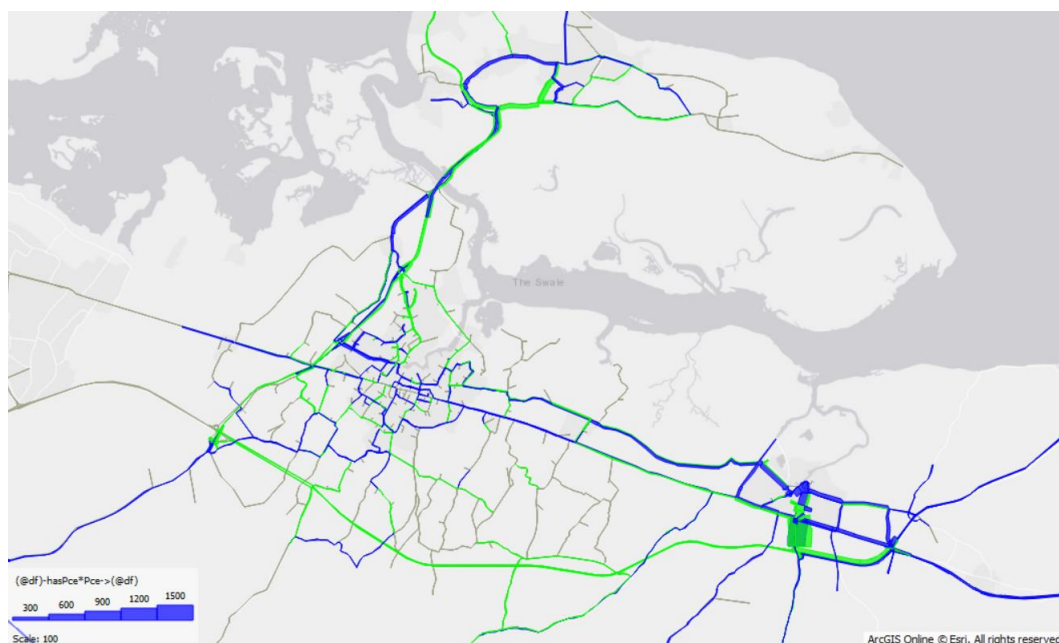
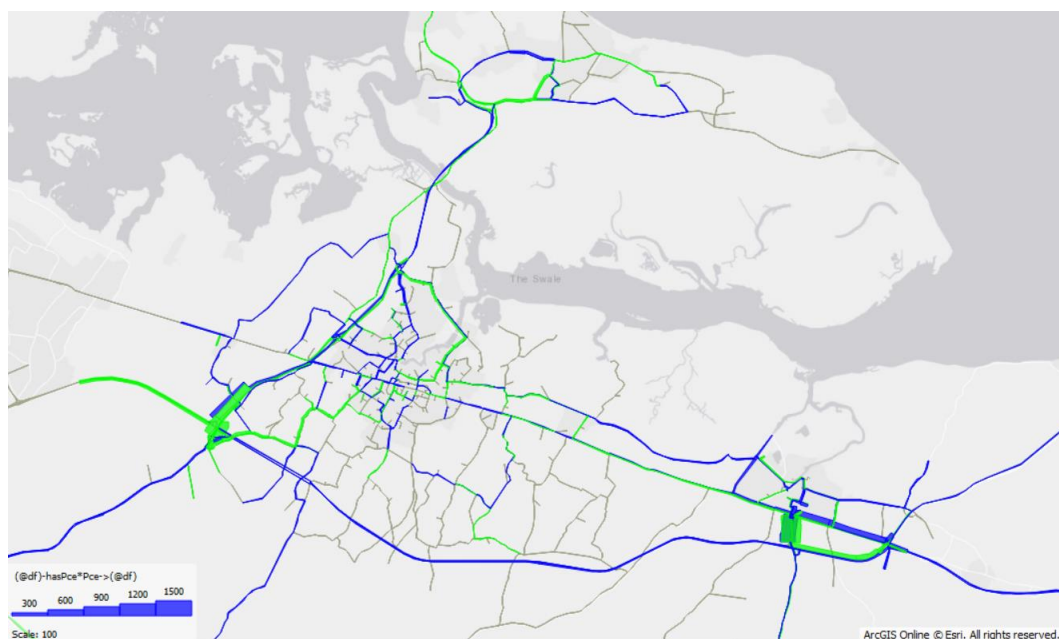


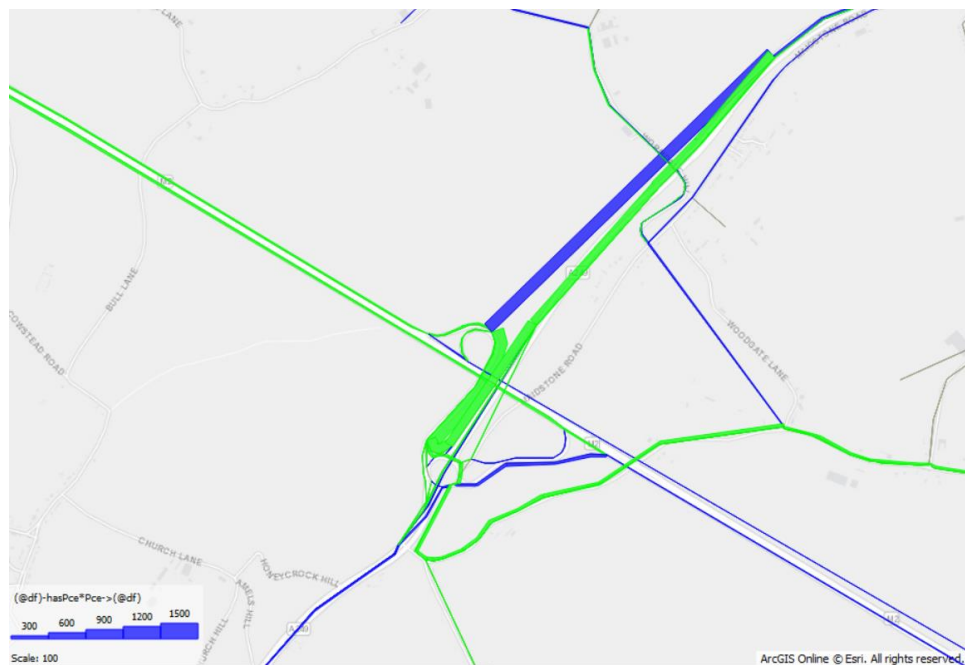
Figure 9-9 Flow difference plots between 1054 Scenario with and without mitigation - PM



In the 1054 scenario with mitigation AM Peak, the flow increases along A249 between M2 J5 and A2500, M2 and Faversham. There is a reassignment of traffic from the A2 WB to Lower Road WB between Sittingbourne and Faversham, resulting in decreased flows along the Lower Road WB. In the Faversham town centre, significant flow reassignment was found between the A251 and the Canterbury Road towards M2 J7, largely due to the mitigation measures of the A251 realignment scheme. In the PM Peak, it is found the dedicated on-slip road from M2 EB to A249 NB is overcapacity in the 1054 Scenario with mitigation measure, resulting in a traffic reassignment onto the A249 mainline section though the current roundabout in the south, as shown in Figure 9-10. This also attributes to the slight flow decrease between the M2 J5 and J6, as well as the A249 in the north

close to the isle of Sheppey. The rest of the network in the PM flow show a similar pattern as the AM peak.

Figure 9-10 Flow difference plots between 1054 Scenario with and without mitigation (M2 J5) - PM



9.4.3 Average Junction Delays (1054 Scenario AM)

The comparison of the congestion (weighted V/C% and highest V/C% respectively) between 1054 Scenario DS with other scenarios are shown in **Error! Reference source not found.** and **Error! Reference source not found.**

Figure 9-11 to Figure 9-14 show the comparison of the average junction delay between 1054 Scenario without and with demand and transport mitigations in 2037 AM. The average junction delay focusing on the magnitude of delay time weighted by the arrival flow at each junction approach arm. This highlights where are the largest delay occurs in the model. In the 1054 Scenario with mitigation AM, the average junction delays reduced significantly in Isle of Sheppey, Faversham town centre, and along A249.

Figure 9-11 1054 Scenario 2037 AM without mitigation vs. with mitigation – Overall

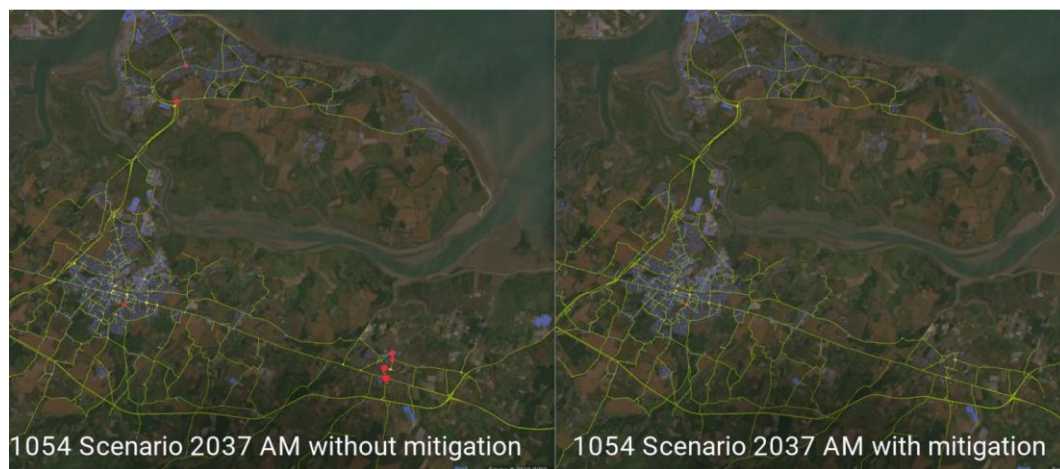


Figure 9-12 1054 Scenario 2037 AM without mitigation vs. with mitigation – Faversham



Figure 9-13 1054 Scenario 2037 AM without mitigation vs. with mitigation – A249 Corridor

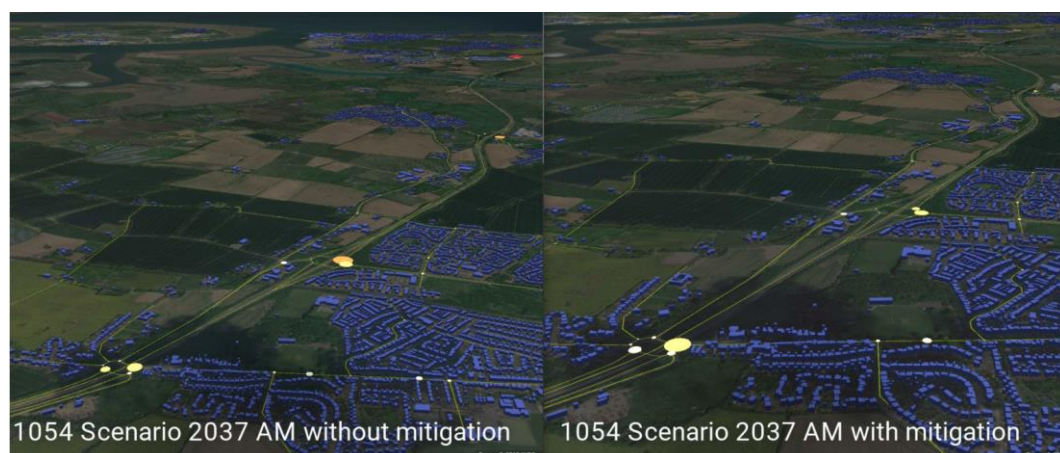


Figure 9-14 1054 Scenario 2037 AM without mitigation vs. with mitigation – Isle of Sheppey



10 Conclusions

The Swale Local Plan model rerun was carried out in accordance with DfT's TAG guidance. The forecasts described above appear to show reasonable and plausible results that are in line with expectations about how the different housing and employment allocations for the Local Plan scenarios impact on the highway network. During the process, a good understanding of the model strengths and weaknesses was obtained which will help SBC to enhance the model platform/application in the future.