Colchester Local Plan Traffic Modelling

Technical Report

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integrated expertise

Essex County Council

Document Control Sheet

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Executive Summary

This report contains updated and detailed transport modelling evidence for Colchester Borough Council's (CBC's) emerging Local Plan proposals, as of July 2016. The model used was based on the existing Colchester Area SATURN (CAS) model, and a variable demand model developed specifically for the task.

A reference case containing allocated development and five local plan development scenarios were tested; the 'a' scenarios representing 2032 Local Plan growth assumptions, and the 'b' scenarios representing Local Plan growth assumptions extended to 2047 levels for some development. The scenarios tested were as follows:

- Scenario 0a (2032): Current allocated development – Reference Case
- Scenario 1a (2032): Development centred on East and West Colchester, assumes 2,500 dwellings in each.
- Scenario 2a (2032): Development centred on West Colchester only, for which 2,500 dwellings are assumed.
- Scenario 3a (2032): Development centred on East and North Colchester, assumes 2,500 dwellings in each.
- Scenario 1b (2047): As scenario 1a, but with a total 9,000 dwellings at East Colchester and 20,000 at West Colchester, and 3,000 further dwellings of 'background growth'.
- Scenario 3b (2047): As scenario 3a, but with a total 9,000 dwellings at East Colchester and 8,000 at North Colchester, and 3,000 further dwellings of 'background growth'.

For each scenario a list of junctions and links for which demand exceeded capacity has been produced. In each case, the volume to capacity ratio has been identified, along with the resulting delays which occur.

The network wide summary statistic results, show that, following changes to highway trip generation in response to congestion, the 2032 local plan development scenarios experience a reduction in average network speed with a corresponding increase in congestion and delay when compared against the 'current allocated development' scenario.

Within the 2032 scenarios, the development proposed as part of scenario 2a indicated the greatest reduction in highway trip generation predicted by the variable demand model; however this is in part due to the provision of new highway infrastructure as part of development within scenarios 1a and 3a in the form of the A133/A120 link road.

The summary modelling results for the 2047 scenarios show a significantly greater reduction in average network speed and increases in queuing times when compared against the 'current allocated development' scenario.

Key localised impacts identified as part of the model runs are as follows:

- In 2032, scenarios 1a, 2a, and 3a show additional overcapacity links along the A12 between the A134 and Ipswich Rd in the AM peak compared to the current allocated scenario
- In scenarios 1a and 3a, extra overcapacity links are indicated at the A133/B1028 because of traffic associated with development to the East of Colchester and the attractiveness of the new A133/A120 link road in the PM peak for scenarios.
- For scenarios 1a and 3a, the junction analysis shows more delays at the A12 junction 28 in the AM peak but no notable change in PM in scenarios
- In scenario 2a, junction analysis shows Ipswich Rd/St John's Rd is operating at overcapacity in PM

For 2047, the links and junctions retain the impacts as outlined in 2032 but also then include the following additional impacts:

- Both scenarios 1b and 3b have overcapacity links at the two ends of the new A133/A120 link road in the AM peak
- In the PM peak, both scenarios have extra overcapacity links along the A133/A120 link road as well as on the A12 West of Colchester.
- In addition, for scenario 3b, links on the A12 north of Colchester operate in excess of capacity. In the PM peak, scenario 3b also has overcapacity conditions on Dedham Rd connecting to the A12.

1 Introduction

1.1 Background

In June 2015, Colchester Borough Council (CBC) asked Essex County Council (ECC) to provide transport modelling evidence to support their emerging Local Plan proposals. Essex Highways subsequently requested Jacobs to carry out that work. Subsequently, Essex Highways have requested Jacobs carry out further modelling work for revised scenarios and more detailed model data extraction.

1.2 Scope of Work

The modelling was commissioned to give a strategic context for potential spatial options and give a comparison between the general locations to inform the local plan. The results of this modelling do not obviate the need for more detailed assessment and the submission of transport assessments will be required with planning applications.

The scope of the project can be summarised as:

- Produce revised forecast models reflecting updated development scenarios.
- Add two scenarios representing growth to the year 2047.
- Produce network summary statistics for the updated models.
- Identify links and junctions within the model which have capacity and delay issues.
- Produce a summary of key findings based on the model output.

The methodology for producing the models to assess the local plan developments is consistent with previous work. As such, only the AM and PM peak hours have been assessed.

The original scenarios have been revised and new forecasts for scenarios 1a, 2a, and 3a have been produced. A forecast detailing the current allocated development scenario has also been produced as a reference case. In these scenarios, the total level of development (from specifically identified development and TEMPro background growth) is maintained at 2032 TEMPro levels, as with the original modelling work.

Scenarios 1b and 3b have also been produced which were the same as 1a and 3a, except with growth at year 2047 levels for East, West and North Colchester with the new forecast models developed. A list of junctions and links for which demand exceeded capacity has been produced for each scenario. In each case, the volume to capacity ratio has been identified, along with the resulting delays which occur.

The forecast scenarios have also been compared with each other to identify the relative impacts using a set of network summary statistics. On this basis, and the junction impacts described above, a summary of key findings from the modelling work has been produced, alongside further interpretation of what the model data is showing. This is summarised in Chapters 5 and 6.

The scope of work detailed in this report does not include potential mitigation measures on links or junctions that have been found to be at overcapacity after the modelling has been undertake. As a result, any work that is required to look at additional capacity measures on links and at junctions that have been found to be overcapacity after the model runs will need to be addressed in any future scoping work.

2 Development Scenarios

2.1 Overview

The year 2032 scenarios 1a, 2a, and 3a have been developed to represent the revised local plan assumptions. The current allocated development scenario which is used as the reference case is also modified to account for updated background growth assumptions.

The year 2047 scenario 1b was modelled with the same level of development as scenario 1a, but with an additional 9,000 dwellings for East Colchester and 20,000 for West Colchester. The 2047 Scenario 3b was modelled with maximum values of 9,000 dwellings for East Colchester and 8,000 dwellings for North Colchester to represent a year 2047 local plan scenario.

In summary, the six scenarios tested are listed below:

- Scenario 0a (2032): Current allocated development.
- Scenario 1a (2032): Development centred on East and West Colchester, assumes 2,500 dwellings in each.
- Scenario 2a (2032): Development centred on West Colchester only, for which 2,500 dwellings are assumed.
- Scenario 3a (2032): Development centred on East and North Colchester, assumes 2,500 dwellings in each.
- Scenario 1b (2047): As scenario 1a, but with a total 9,000 dwellings at East Colchester and 20,000 at West Colchester, and 3,000 further dwellings of ‘background growth’.
- Scenario 3b (2047): As scenario 3a, but with a total 9,000 dwellings at East Colchester and 8,000 at North Colchester, and 3,000 further dwellings of ‘background growth’.

2.2 Current allocated development scenario

A scenario which did not include any of the Emerging Local Plan development (scenario 0a) was modelled to provide a reference case for all the ‘with development’ scenarios.

A full list of housing development assumed for this scenario is contained in Appendix A. A total of 12,263 dwellings, 164,600sqm GFA employment and

49,400sqm retail have been included in the 'current allocated development scenario'.

2.3 Development summary

The total amount of Local Plan development in each scenario (in addition to the committed and LDF developments) is summarised below in Table 1:

Table 1 Local Plan development summary

Scenario	Dwellings	Employment (sqm)	Retail (sqm)
Current allocated development	n/a	n/a	n/a
Scenario 1a (E&W)	7,270	40,000	5,500
Scenario 2a (W)	6,310	39,000	3,000
Scenario 3a (E&N)	7,100	32,000	5,000
Scenario 1b (E&W)	34,270	40,000	5,500
Scenarios 3b (E&N)	22,100	32,000	5,000

Employment and retail development are assumed to remain the same for the post-2032 scenarios (1b and 3b) as CBC only has detailed information on these land uses up to 2032. Note that alongside these development increases, Tempro growth will be used to set the background growth in dwellings and employment (including retail sites).

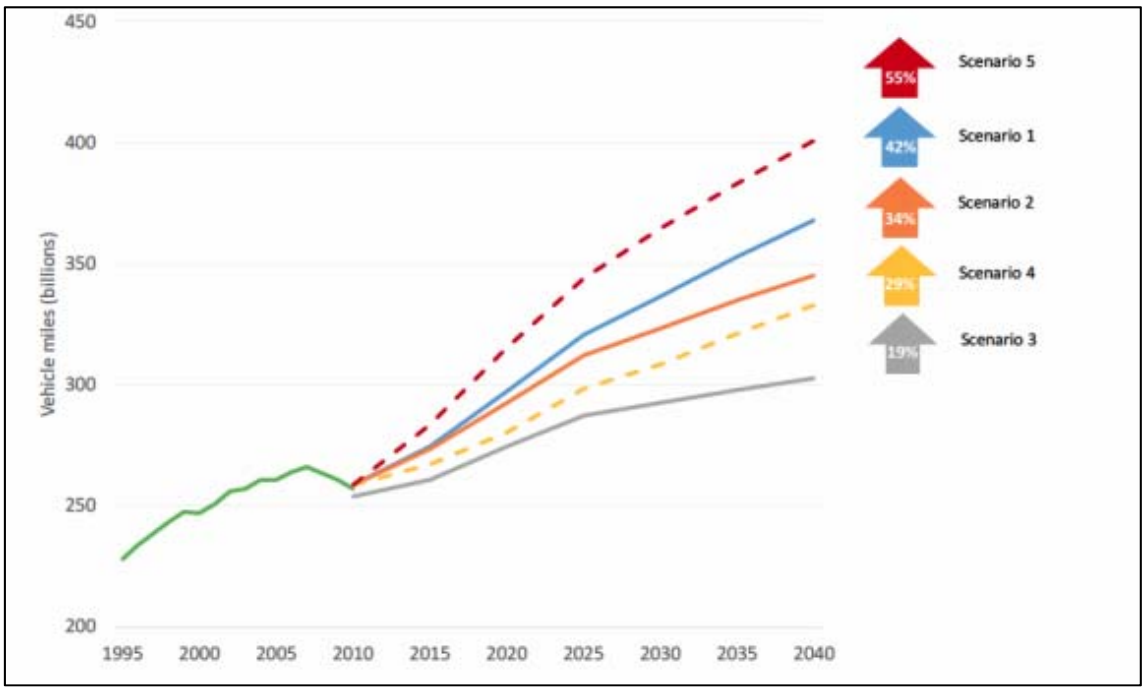
The housing assumptions for each scenario are identified in Appendix A.

2.4 National Traffic Forecasts/Tempro Growth

National traffic growth forecasts were published in 2015 by the government.

This work produced outputs based on 5 different scenarios about the future and assumptions on trip rates, economic growth, and income as shown in Figure 1 . This national work showed that traffic growth will continue to occur. The modelling work for Colchester needs to be considered against this background of predicted national traffic growth.

Figure 1 National Traffic Growth Forecasts



3 Modelling Methodology

3.1 Models Used

The transport models used for this assessment are derived from the original assessment commissioned by ECC in June 2015.

3.2 Demand Calculation

Although the same demand calculation methodology was used, different adjustments were applied to the TEMPro NTEM v6.2 database due to a different quantum of development in the revised scenarios. The total level of growth in scenarios 1a, 2a, and 3a remains consistent with NTEM forecasts. For scenarios 1b and 3b, the additional growth at East, West, and North Colchester, plus the 3,000 dwelling background growth, was not discounted from NTEM, thus those scenarios a net growth level significantly in excess of 2032 NTEM levels. It therefore follows that the total trip volume in the model in scenarios 1b and 3b will exceed TEMPro forecasts for 2032..

3.3 Network Modelling

Comparing the base network with the previous modelling work, a small change was undertaken for all scenarios with the Stanway Western Bypass Extension removed.

3.4 Variable Demand Model

The same demand model was used as with the previous analysis. Based on the convergence results, 10 iterations are used for the AM models, 13 – 30 iterations are used for the PM models, varying by scenario.

4 Results

4.1 Initial Demand

The trip totals in Passenger Car Units (PCUs) across all 5 scenarios are summarised below in Table 2. The table includes intra-zonal trips in the total. For comparison purposes, the base year demand and current allocated development demand are also included. The information presented in this section exclude the impacts of any measures that might be proposed to mitigate the impacts of development.

Table 2 Full development NTEM adjustment

Scenario	Time period	Year	No. of trips	Increase from base	Increase from 0a
Base year	AM	2007	42,535	n/a	n/a
Scenario 0a*		2032	55,831	13,296	n/a
Scenario 1a (E&W)			58,449	15,914	2,618
Scenario 2a (W)			58,271	15,736	2,440
Scenario 3a (E&N)			58,393	15,858	2,562
Scenario 1b (E&W)		2047	65,901	23,366	10,070
Scenario 3b (E&N)			63,303	20,768	7,472
Base year	PM	2007	39,234	n/a	n/a
Scenario 0a*		2032	52,384	13,150	n/a
Scenario 1a (E&W)			55,089	15,855	2,705
Scenario 2a (W)			54,812	15,578	2,428
Scenario 3a (E&N)			55,203	15,969	2,819
Scenario 1b (E&W)		2047	62,036	22,802	9,652
Scenario 3b (E&N)			59,578	20,344	7,194

** Scenario 0a – Current Allocated Development*

In both AM and PM, approximately 2,500 additional trips are generated as a result of the land use in scenarios 1a, 2a, and 3a. In scenario 1b, about 10,000 additional trips are generated due to development in East and West Colchester up to 2047. In scenario 3b, around 7,000 additional trips are produced as result of development in East and North Colchester up to 2047.

4.2 Assignment of initial demand

The matrices referred to in the previous section were assigned to the model networks for each scenario.

4.2.1 Summary statistics

The standard SATURN assignment summary statistics for scenarios 1a, 2a, and 3a are given in Table 3.

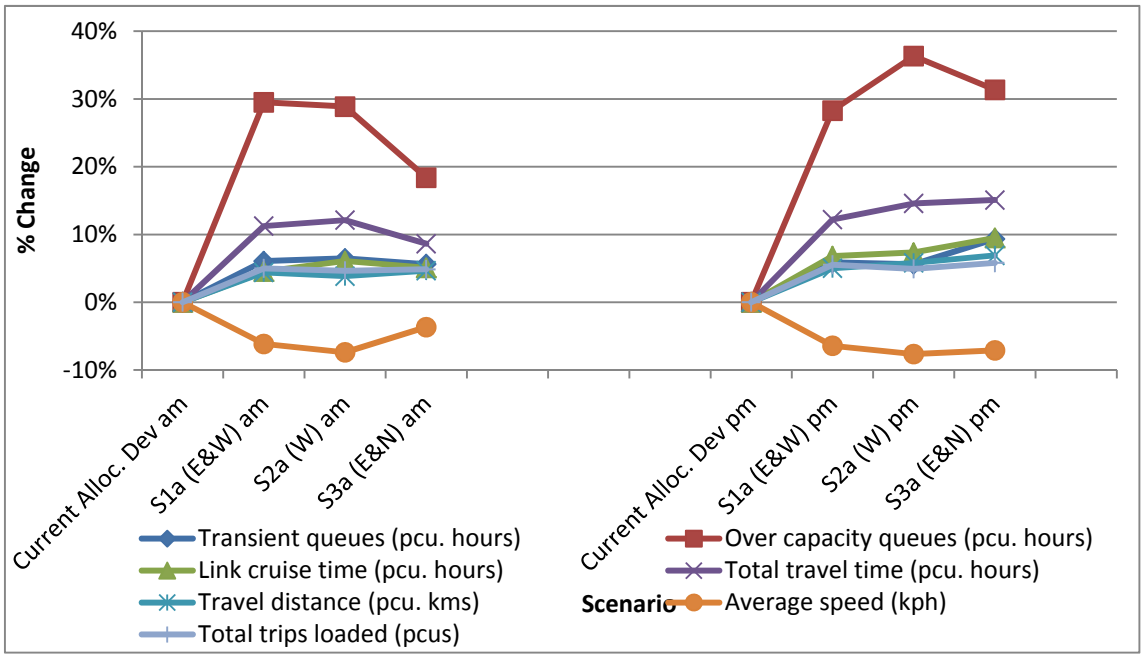
Table 3 Summary statistics for initial assignment scenarios 1a-3a

Attribute	AM				PM			
	0a	1a (E & W)	2a (W)	3a (E & N)	0a	1a (E & W)	2a (W)	3a (E & N)
Transient queues (pcu.hrs)	2,262	2,399	2,408	2,389	2,298	2,433	2,427	2,513
Over capacity queues (pcu.hrs)	6,211	8,043	8,005	7,353	5,948	7,630	8,108	7,813
Link cruise time (pcu.hrs)	15,150	15,837	16,072	15,922	15,005	16,026	16,106	16,431
Total travel time (pcu.hrs)	23,623	26,279	26,486	25,664	23,251	26,090	26,641	26,757
Travel distance (pcu.kms)	992,717	1,036,410	1,030,807	1,038,934	997,084	1,047,031	1,055,102	1,065,971
Average speed (kph)	42	39	39	40	43	40	40	40
Total trips loaded (pcus)	53,037	55,685	55,495	55,613	49,991	52,757	52,451	52,900
Intrazonals (pcus)	2,794	2,765	2,776	2,780	2,394	2,331	2,361	2,302
Combined total trips loaded & intrazonals (pcus)	55,831	58,449	58,271	58,393	52,384	55,089	54,812	55,203

Scenario 0a = Current Allocated Development

Figure 2 displays the percentage change in summary statistics, for scenarios 1a, 2a, and 3a, when compared against the 'current allocated development' scenario for the initial assignment.

Figure 2 % change in Summary Statistics compared to Current Allocated Development Scenario for the initial assignment scenarios 1a-3a



The standard SATURN assignment summary statistics for scenarios 1b and 3b are given in Table 4.

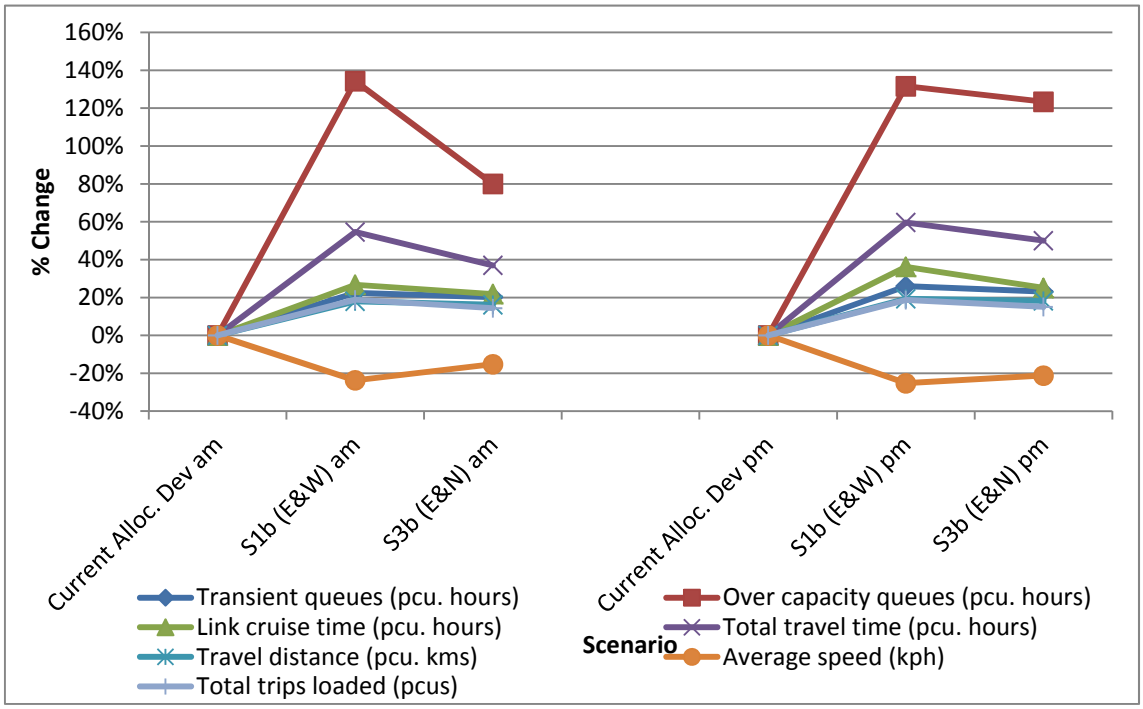
Table 4 Summary statistics for initial assignment scenarios 1b and 3b

Attribute	AM			PM		
	0a	1b (E&W)	3b (E&N)	0a	1b (E&W)	3b (E&N)
Transient queues (pcu.hrs)	2,262	2,769	2,718	2,298	2,896	2,828
Over capacity queues (pcu.hrs)	6,211	14,553	11,181	5,948	13,774	13,287
Link cruise time (pcu.hrs)	15,150	19,204	18,457	15,005	20,441	18,774
Total travel time (pcu.hrs)	23,623	36,526	32,356	23,251	37,112	34,890
Travel distance (pcu.kms)	992,717	1,170,960	1,152,845	997,084	1,189,465	1,178,600
Average speed (kph)	42	32	36	43	32	34
Total trips loaded (pcus)	53,037	63,049	60,656	49,991	59,324	57,513
Intrazonals (pcus)	2,794	2,852	2,647	2,394	2,712	2,065
Combined total trips loaded & intrazonals (pcus)	55,831	65,901	63,303	52,384	62,036	59,578

Scenario 0a = Current Allocated Development

Figure 3 displays the percentage change in summary statistics, for scenarios 1b and 3b, when compared against the 'current allocated development' scenario for the initial assignment.

Figure 3 % change in Summary Statistics compared to Current Allocated Development Scenario for the initial assignment scenarios 1b and 3b



Comparing the different scenarios, as expected, the current allocated development scenario displays the lowest levels of congestion. Scenarios 1a, 2a, and 3a generally indicate a decrease of 2-3kph in average speed. As shown by the figures, in the AM peak, despite more demand in 3a than 2a, 3a performs better in terms of overcapacity queues. It indicates that trips from North Colchester result in less overall delays than other scenarios. In the PM peak, despite less demand in 2a than scenarios 1a and 3a, 2a performs worst in terms of congestion levels. It indicates that highway trips from West Colchester result in a greater level of delay compared to the other scenarios. As expected, scenarios 1b and 3b, which encapsulate a significant increase in trips in 2047 relative to the forecast for 2032, result in greater levels of congestion. The data indicated scenario 3b has less congestion, primarily a result of the lower levels of demand in this scenario.

4.3 Demand Model Outputs

The variable demand model, described in Section 3.4 was utilised for each of the 'with development' scenarios. Given the levels of congestion described in the initial assignments, over and above the current allocated development reference case, some switching of trips away is to be expected.

4.3.1 Demand model convergence

The number of iterations, and the final %GAP value for each scenario, is summarised in Table 5.

Table 5 Demand model convergence

Scenario	Time period	Number of Iterations	Final %GAP
Scenario 1a (E&W)	AM	10	0.080
Scenario 2a (W)		10	0.117
Scenario 3a (E&N)		10	0.056
Scenario 1b (E&W)		10	0.080
Scenario 3b (E&N)		10	0.056
Scenario 1a (E&W)	PM	14	0.078
Scenario 2a (W)		30	0.084
Scenario 3a (E&N)		13	0.152
Scenario 1b (E&W)		15	0.070
Scenario 3b (E&N)		14	0.124

For all scenarios, the %GAP value is below 0.2, which is considered an acceptable level of convergence as specified in WebTAG Unit M2. Note that the PM peak required more iterations than the AM to reach convergence.

4.4 Assignment of final demand

The peak hour variable demand model developed as part of the original modelling work was re-run for the new scenarios. The effect of the variable demand model is to forecast the change in highway trip generation as a result of transfer to alternative modes, and changes in trip frequency (including peak spreading) as a result of increased highway congestion relative to other modes of travel. With the reduction in highway trips predicted by the demand model, the finalised matrices were assigned to the network to derive the final assessment of the impact of development. The practical implications of the

mode shift results from the demand model would require further consideration, in particular where modal shift impacts have the potential to be significant.

4.4.1 Network summary statistics

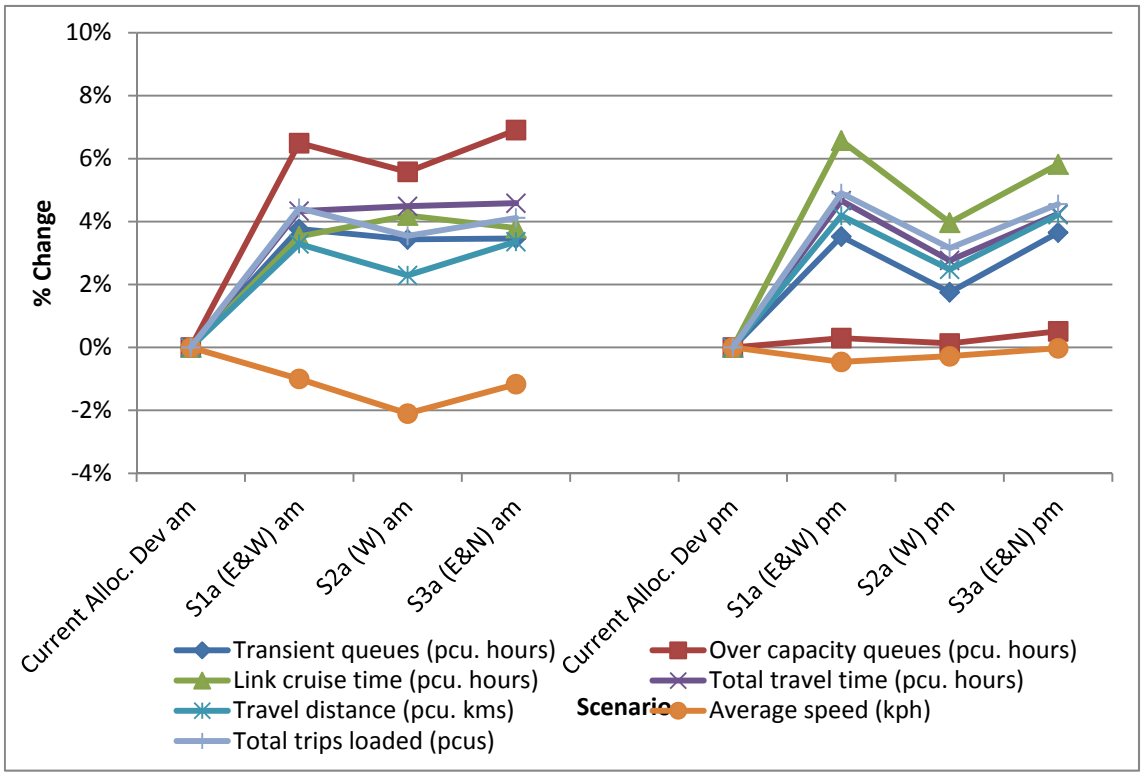
The overall network statistics from the final, post variable demand assignments for scenarios 1a, 2a, and 3a are summarised in Table 6.

Table 6 Summary statistics for final assignment scenarios 1a-3a

Attribute	AM				PM			
	Current allocated development	1a (E & W)	2a (W)	3a (E & N)	Current allocated development	1a (E & W)	2a (W)	3a (E & N)
Transient queues (pcu.hrs)	2,262	2,347	2,340	2,340	2,298	2,379	2,339	2,382
Over capacity queues (pcu.hrs)	6,211	6,615	6,558	6,640	5,948	5,965	5,955	5,978
Link cruise time (pcu.hrs)	15,150	15,684	15,785	15,725	15,005	15,991	15,600	15,878
Total travel time (pcu.hrs)	23,623	24,646	24,683	24,706	23,251	24,336	23,894	24,239
Travel distance (pcu.kms)	992,717	1,025,358	1,015,450	1,026,093	997,084	1,038,815	1,021,798	1,039,157
Average speed (kph)	42	42	41	42	43	43	43	43
Total trips loaded (pcus)	53,037	55,385	54,919	55,220	49,991	52,439	51,567	52,268

Figure 4 displays the percentage change in summary statistics, for scenarios 1a, 2a, and 3a, when compared against 'current allocated development' scenario for the final assignment.

Figure 4 % change in Summary Statistics compared to Current Allocated Development Scenario for the final assignment scenarios 1a-3a



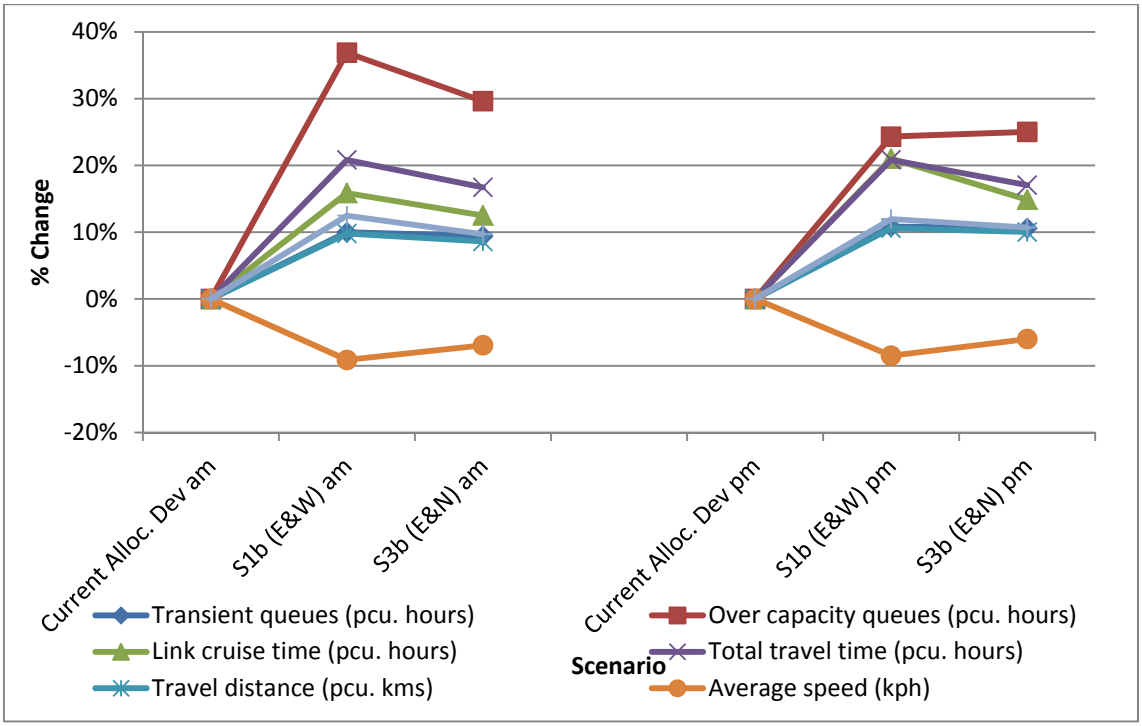
The overall network statistics from the final assignments for scenarios 1b and 3b are summarised in Table 7.

Table 7 Summary statistics for final assignment scenarios 1b and 3b

Attribute	AM			PM		
	Current allocated development	1b (E&W)	3b (E&N)	Current allocated development	1b (E&W)	3b (E&N)
Transient queues (pcu.hrs)	2,262	2,488	2,475	2,298	2,547	2,542
Over capacity queues (pcu.hrs)	6,211	8,502	8,051	5,948	7,394	7,436
Link cruise time (pcu.hrs)	15,150	17,554	17,045	15,005	18,158	17,237
Total travel time (pcu.hrs)	23,623	28,543	27,571	23,251	28,099	27,215
Travel distance (pcu.kms)	992,717	1,089,917	1,078,250	997,084	1,102,673	1,096,994
Average speed (kph)	42	38	39	43	39	40
Total trips loaded (pcus)	53,037	59,657	58,180	49,991	55,978	55,340

Figure 5 displays the percentage change in summary statistics, for scenarios 1b and 3b, when compared against 'current allocated development' scenario for the final assignment.

Figure 5 % change in Summary Statistics compared to Current Allocated Development Scenario for the final assignment scenarios 1b and 3b



Through the variable demand modelling process, the highway demand was reduced based on the level of network congestion. In the AM peak, 300-500 trips were not loaded in scenarios 1a, 2a, and 3a and in the PM, 318, 884, 632 trips were not loaded for scenarios 1a, 2a, and 3a respectively. For scenarios 1b and 3b, around 3,000 trips were not loaded in both AM and PM.

Following completion of the variable demand modelling, the resulting finalised assignments indicate that the overall impacts of Scenarios 1a, 2a, and 3a still have the effect of reducing network average speeds by a small amount, and increasing congestion, when compared with the 'current allocated development' scenario. The variable demand model has a bigger effect in PM than AM which brought the overcapacity queues down to almost same as in the current allocate scenario. In terms of scenarios 1b and 3b, an average speed decrease still exists but has been reduced to 3-4 kph from 10kph in the initial assignment.

However, the most notable change from the initial assignment is that of Scenario 2a, which now performs slightly better than Scenarios 1a and 3a, in congestion terms. In both the AM and PM peak, Scenario 2a has the lowest over capacity queues in total. This may indicate that scenario 2a includes land use that has a greater potential for achieving modal shift however, this result also reflects the link road infrastructure provision in scenarios 1a and 3a which has the effect of encouraging highway trips.

5 Link and Junction Analysis

5.1 Link Analysis

In the Colchester Area model, there are 31,440 links. For the link analysis, all links with traffic volume in excess of capacity were analysed. In the 'current allocate development scenario', 71 links are operating above capacity while among all the local development scenarios, there are 105 links performing overcapacity. The locations of the links are highlighted in red in Figure 6 - 17 below.

It should be noted that the figures below highlight only links that are forecast as overcapacity and not the areas of network that may experience congestion related to other factors such as junction delay. For the local plan developments scenarios, the additional links which are over capacity compared to the allocated development scenario are mainly located on the A12 between the A134 and Ipswich Rd.

Figure 6 Locations of Overcapacity Links the Current Allocated Development Scenario – AM

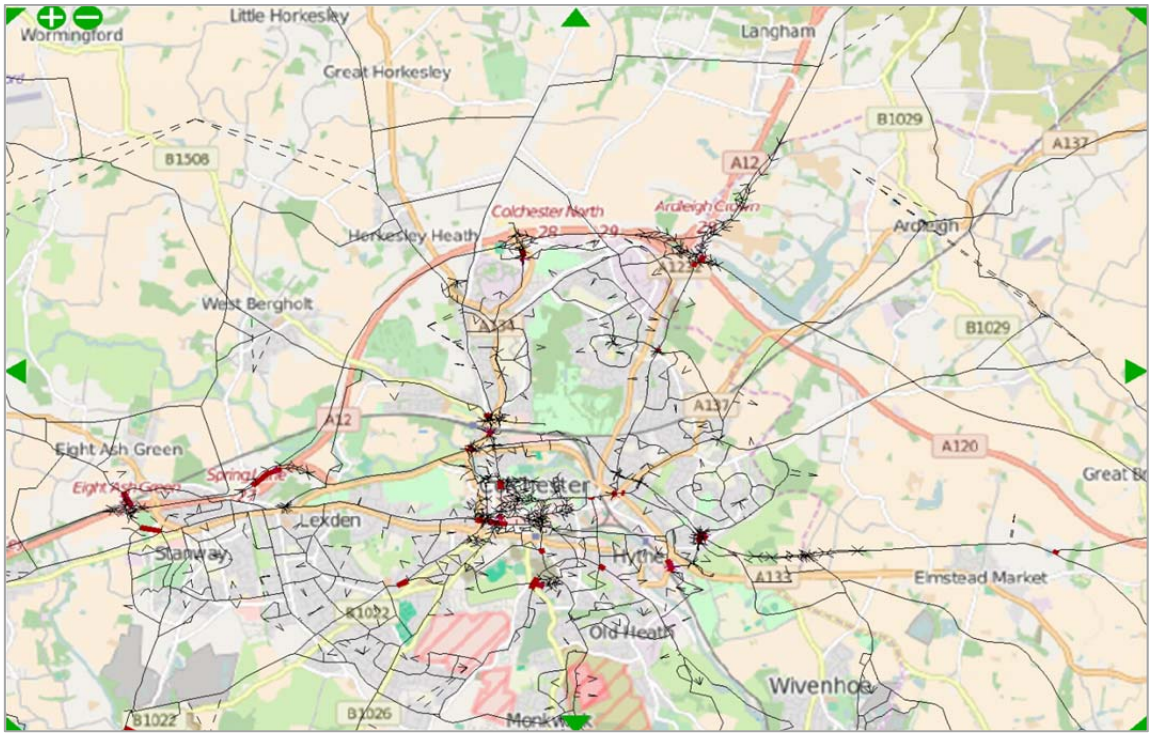


Figure 7 Locations of Overcapacity Links Scenario 1a(E&W) Post-VDM – AM

Figure 8 Locations of Overcapacity Links Scenario 2a (W) Post-VDM – AM

Figure 9 Locations of Overcapacity Links Scenario 3a (E&N) Post-VDM – AM

Figure 10 Locations of Overcapacity Links the Current Allocated Development Scenario – PM

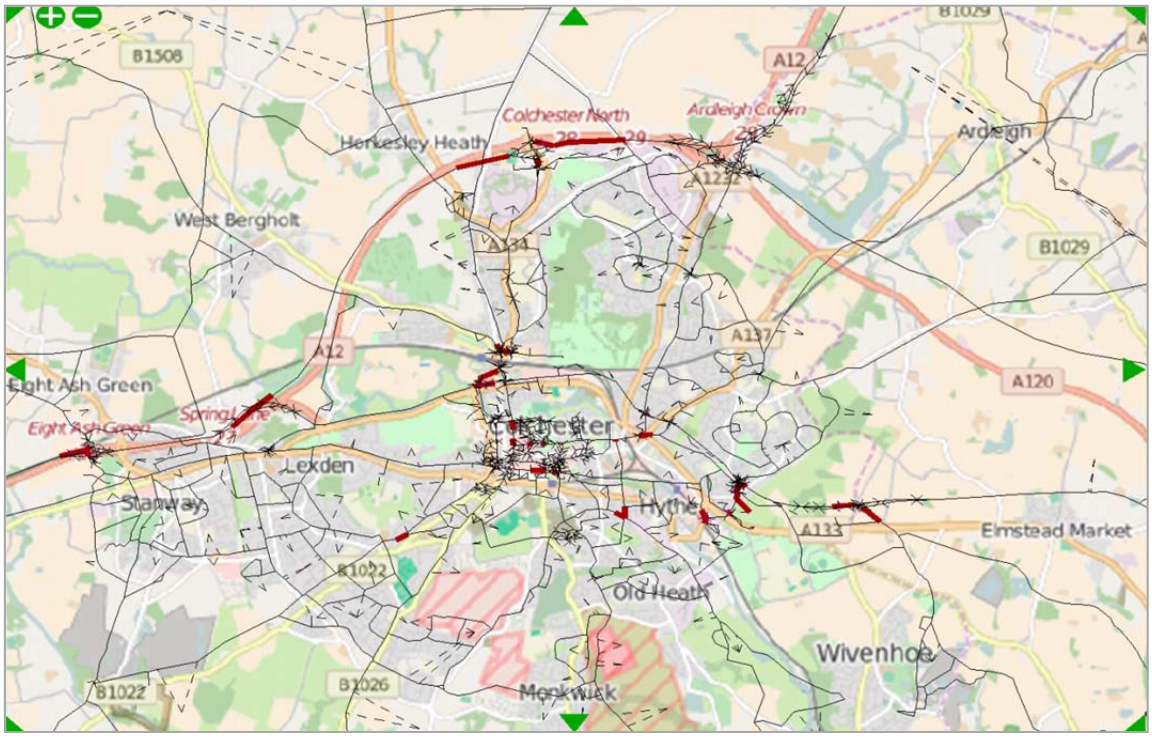


Figure 11 Locations of Overcapacity Links Scenario 1a (E&W) Post-VDM – PM

Figure 12 Locations of Overcapacity Links Scenario 2a (W) Post-VDM – PM

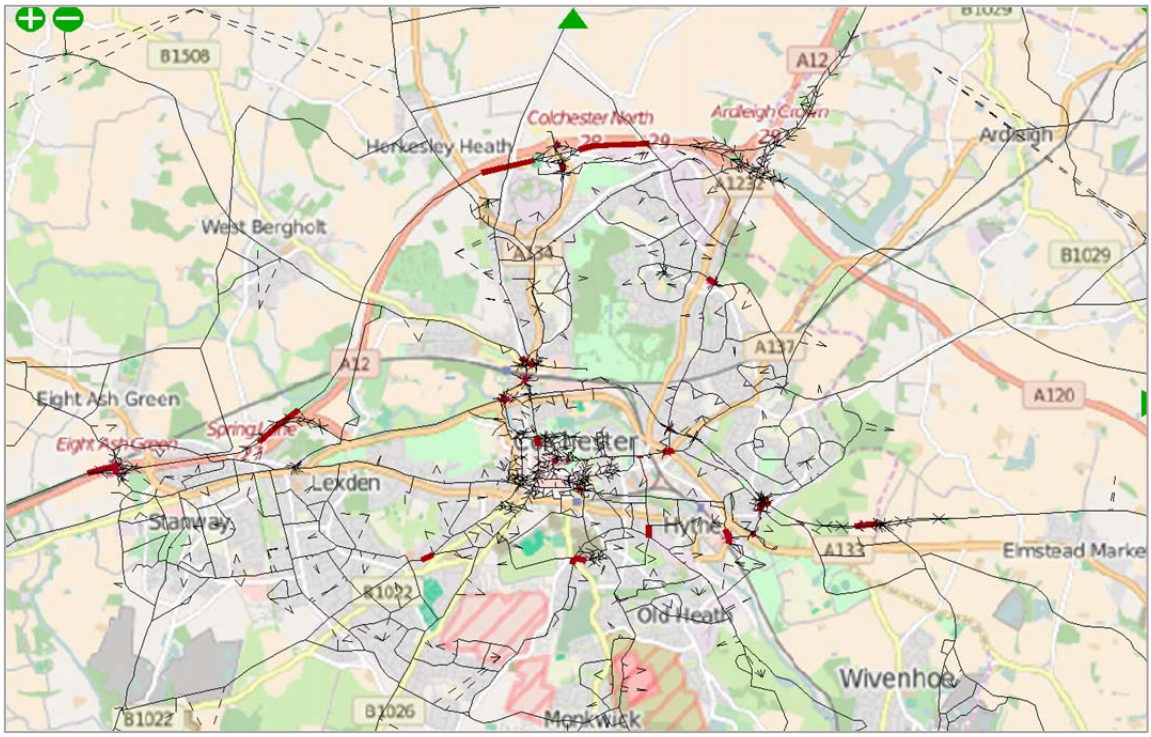


Figure 13 Locations of Overcapacity Links Scenario 3a (E&N) Post-VDM – PM

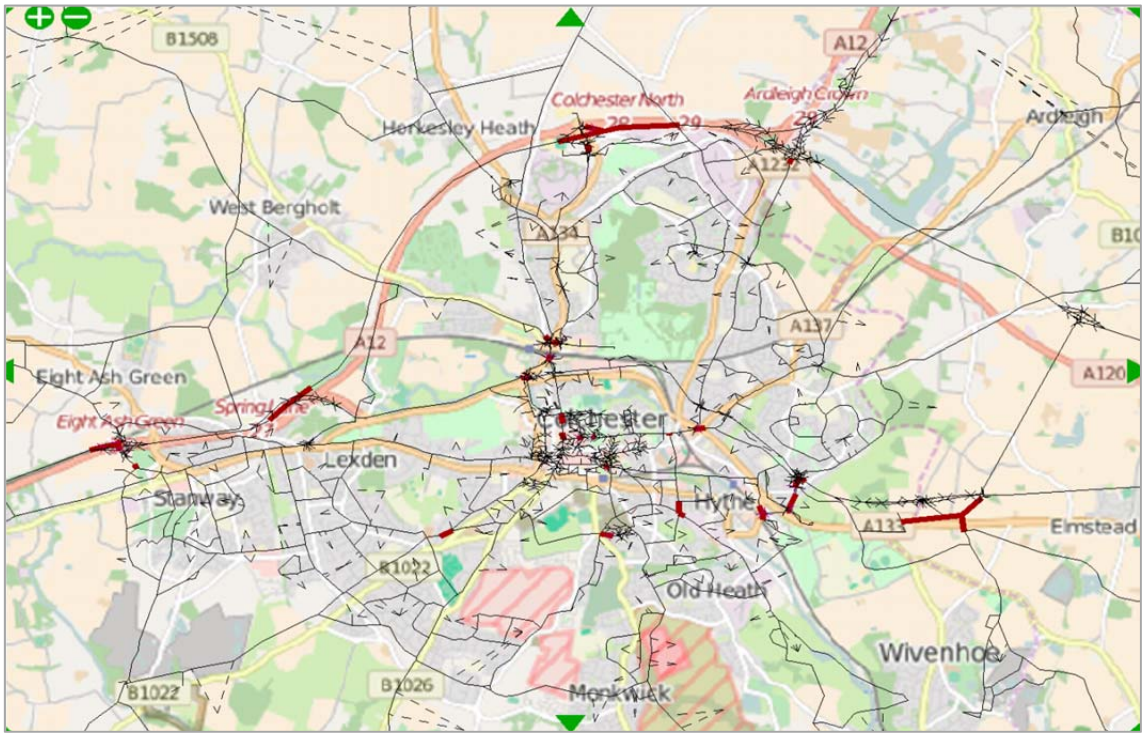


Figure 14 Locations of Overcapacity Links Scenario 1b (E&W) Post-VDM – AM

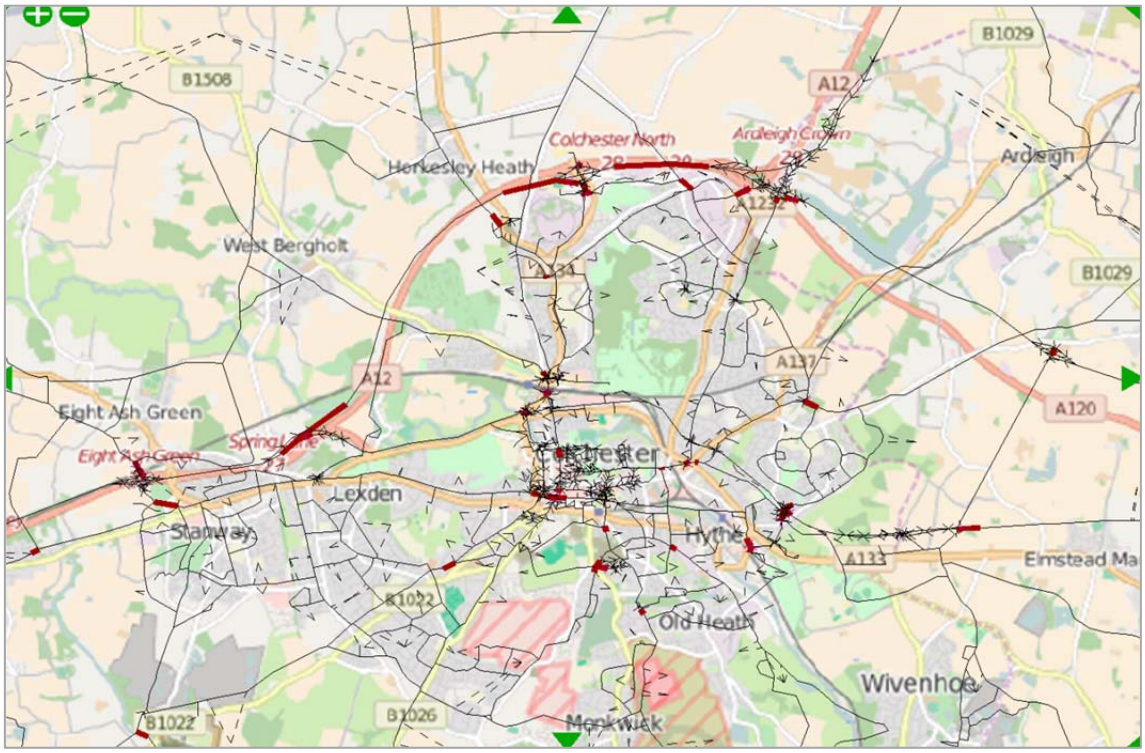


Figure 15 Locations of Overcapacity Links Scenario 3b (E&N) Post-VDM – AM

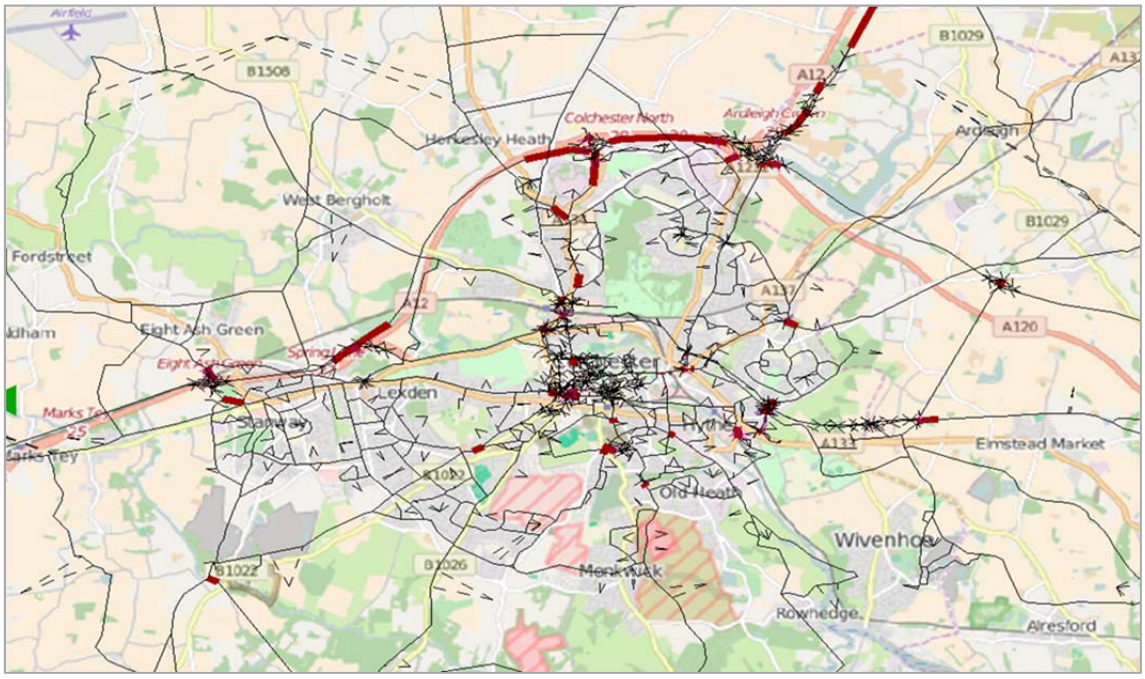


Figure 16 Locations of Overcapacity Links Scenario 1b (E&W) Post-VDM – PM

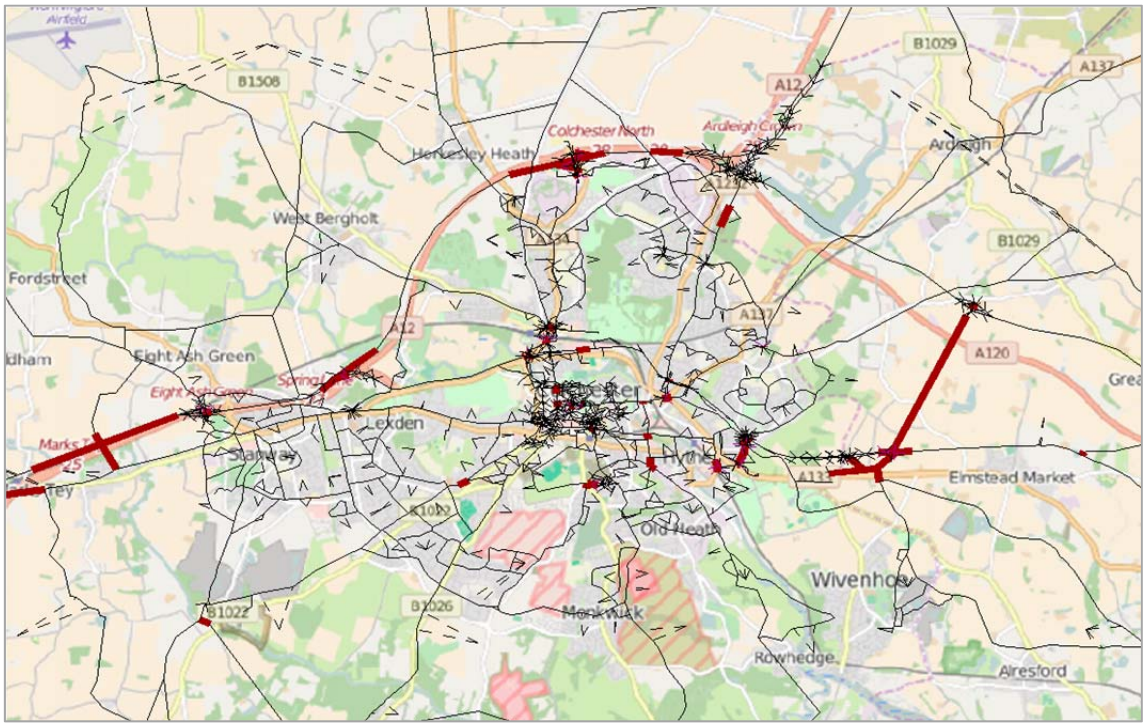
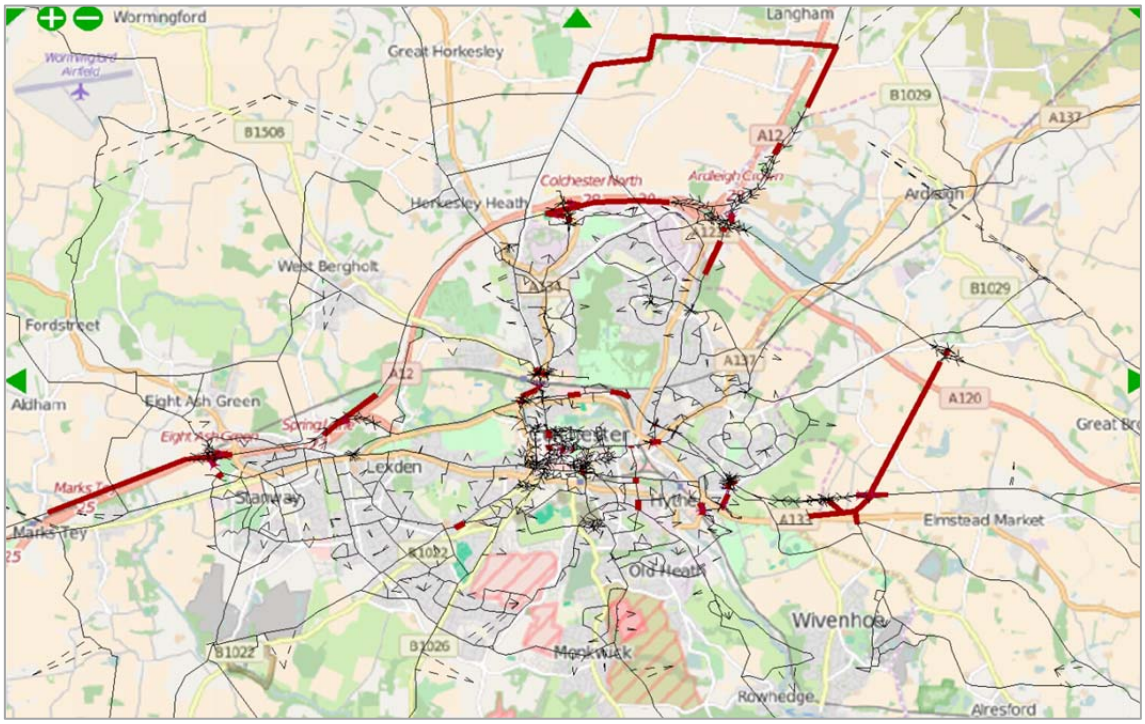


Figure 17 Locations of Overcapacity Links Scenario 3b (E&N) Post-VDM – PM



Comparing against the 2032 scenarios, the increase in delay in the year 2047 scenarios associated with the increase in demand is quantified.

It is notable that for scenarios 1b and 3b in the PM peak, the A120/A133 link road is modelled as being over capacity. This is most likely due to the extra level of trip generation caused by the additional 9,000 dwellings assumed to the east of Colchester in those models.

5.2 Junction Analysis

For the purposes of this report, average volume / capacity (v/c) and delay among all the approaches to a junction are used to represent junction performance. In the Colchester Area model, there are 2,554 junctions within the model simulation area. Within Colchester town, the locations of over-capacity junctions in the current allocated scenario and the local development scenarios are shown in Figures 18- 29. In the current allocated development scenario, there are 16 junctions operating in excess of capacity while in all development scenarios, there are up to 23 junctions operating at overcapacity. The figures indicate junctions that may experience capacity issues as a result of the additional land use development.

Figure 18 Locations of Overcapacity Junctions Current Allocated Development Scenario – AM

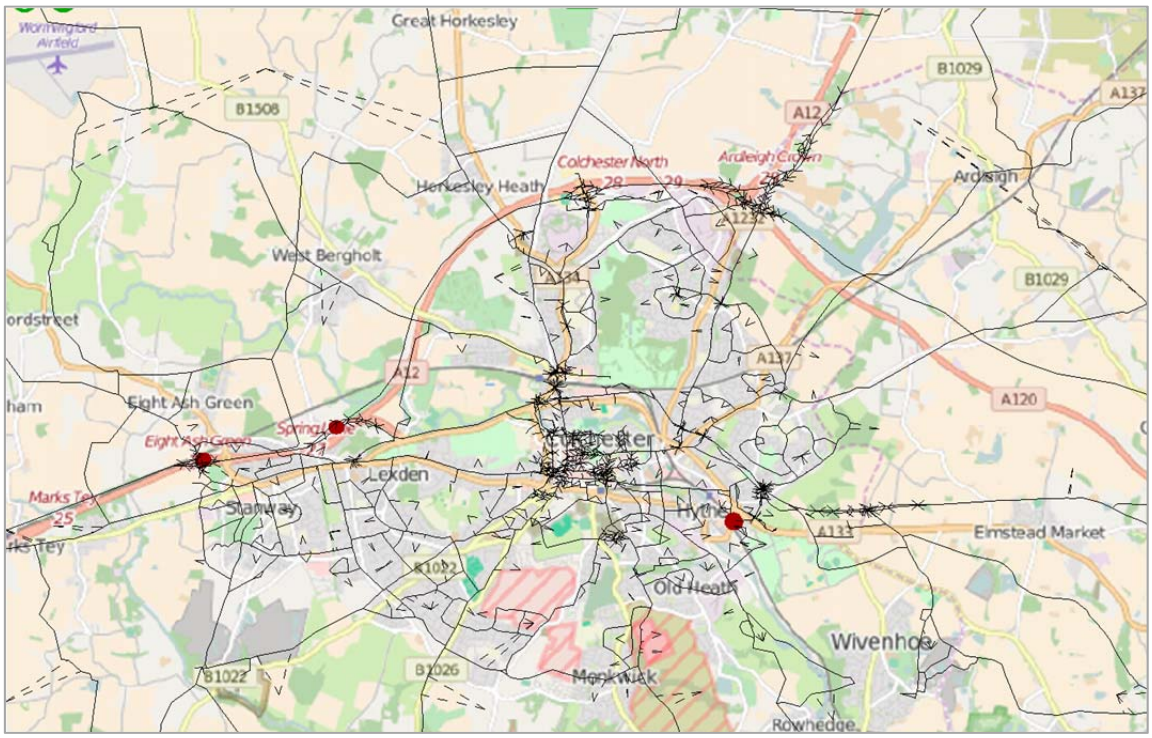


Figure 19 Locations of Overcapacity Junctions Scenario 1a (E&W) Post-VDM – AM

Figure 20 Locations of Overcapacity Junctions Scenario 2a(W) Post-VDM – AM

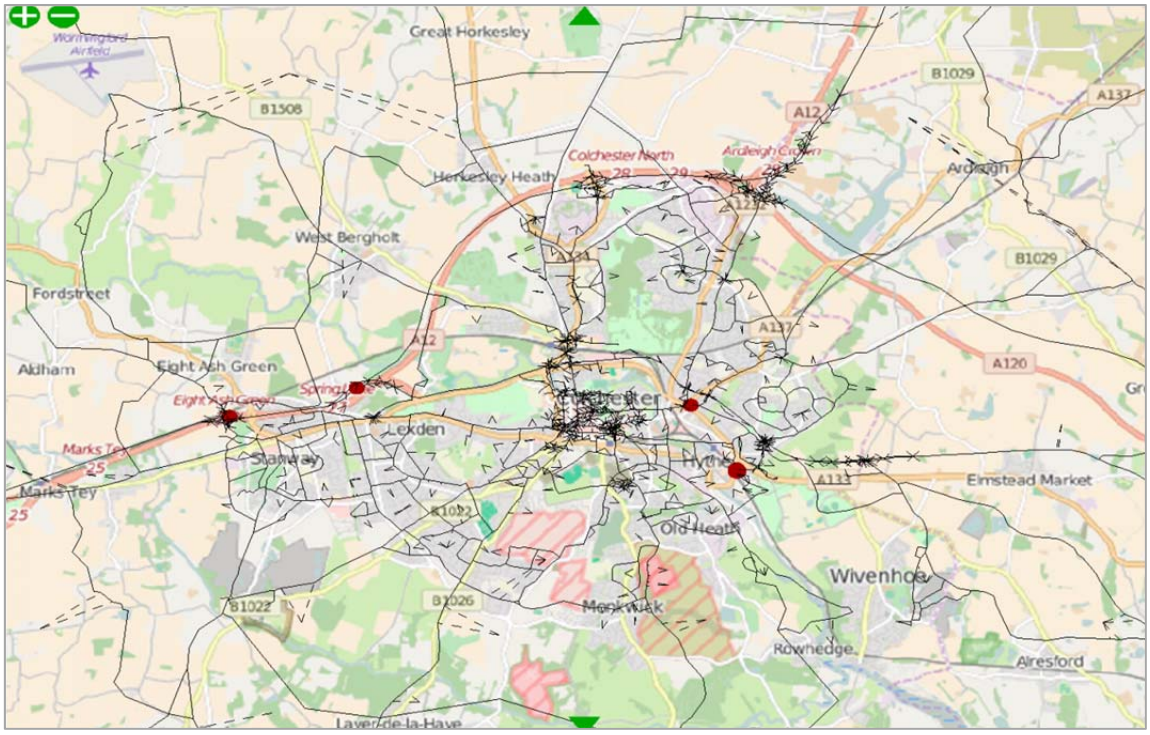


Figure 21 Locations of Overcapacity Junctions Scenario 3a(E&N) Post-VDM – AM

Figure 22 Locations of Overcapacity Junctions Current Allocated Development Scenario – PM

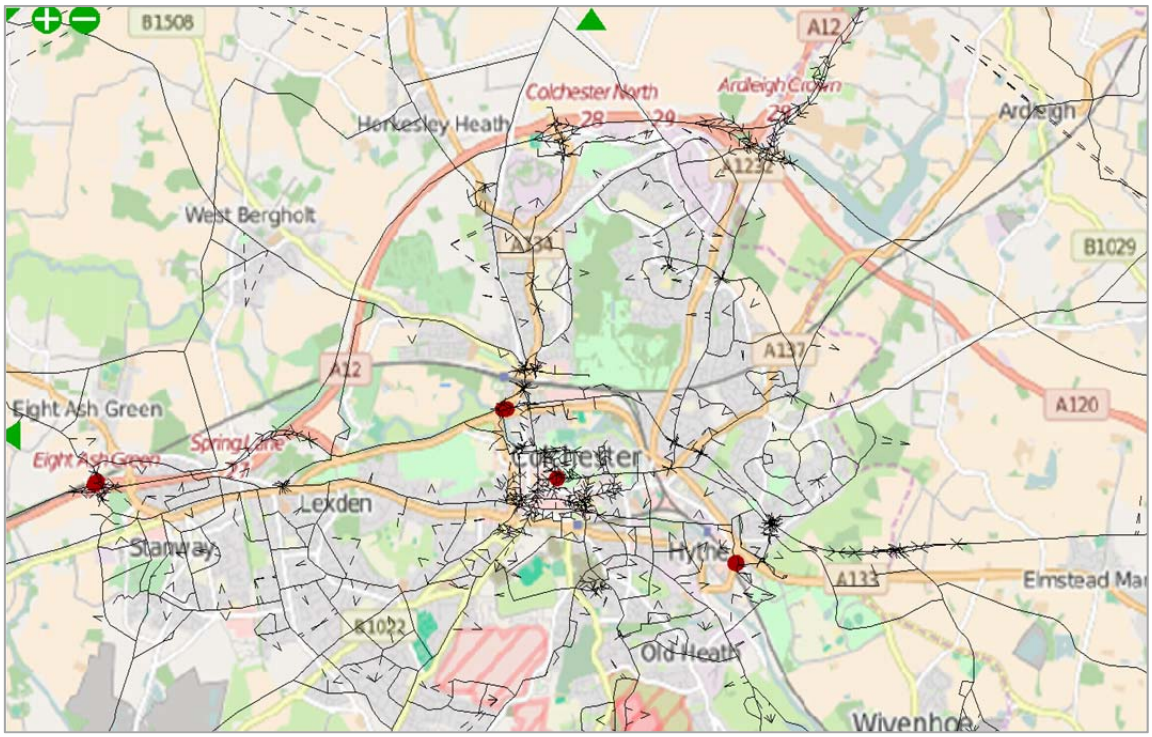


Figure 23 Locations of Overcapacity Junctions Scenario 1a (E&W) Post-VDM – PM

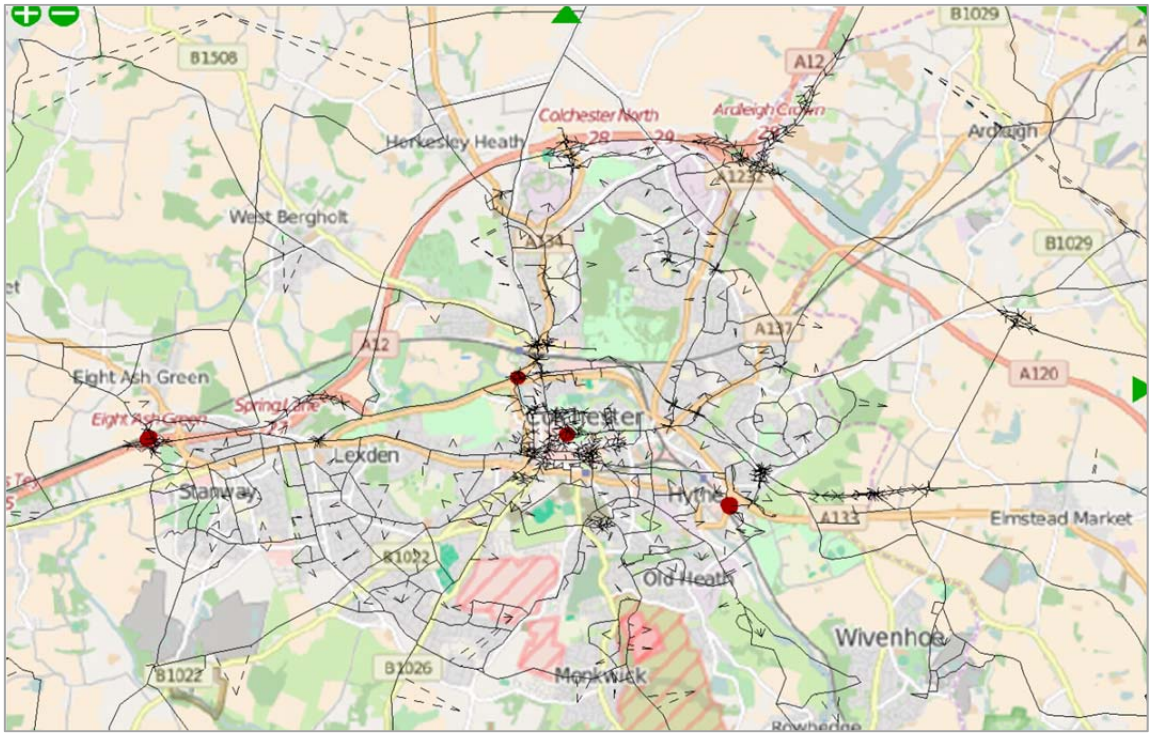


Figure 24 Locations of Overcapacity Junctions Scenario 2a (W) Post-VDM – PM

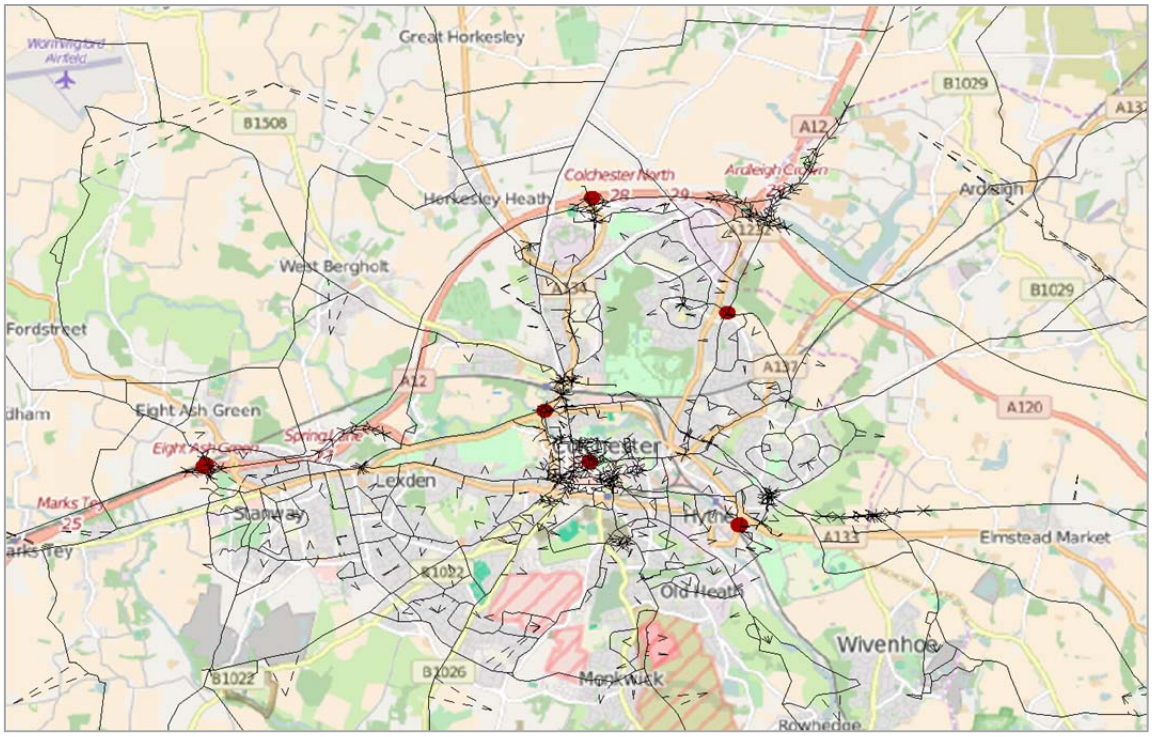


Figure 25 Locations of Overcapacity Junctions Scenario 3a (E&N) Post-VDM – PM

Figure 26 Locations of Overcapacity Junctions Scenario 1b (E&W) Post-VDM – AM

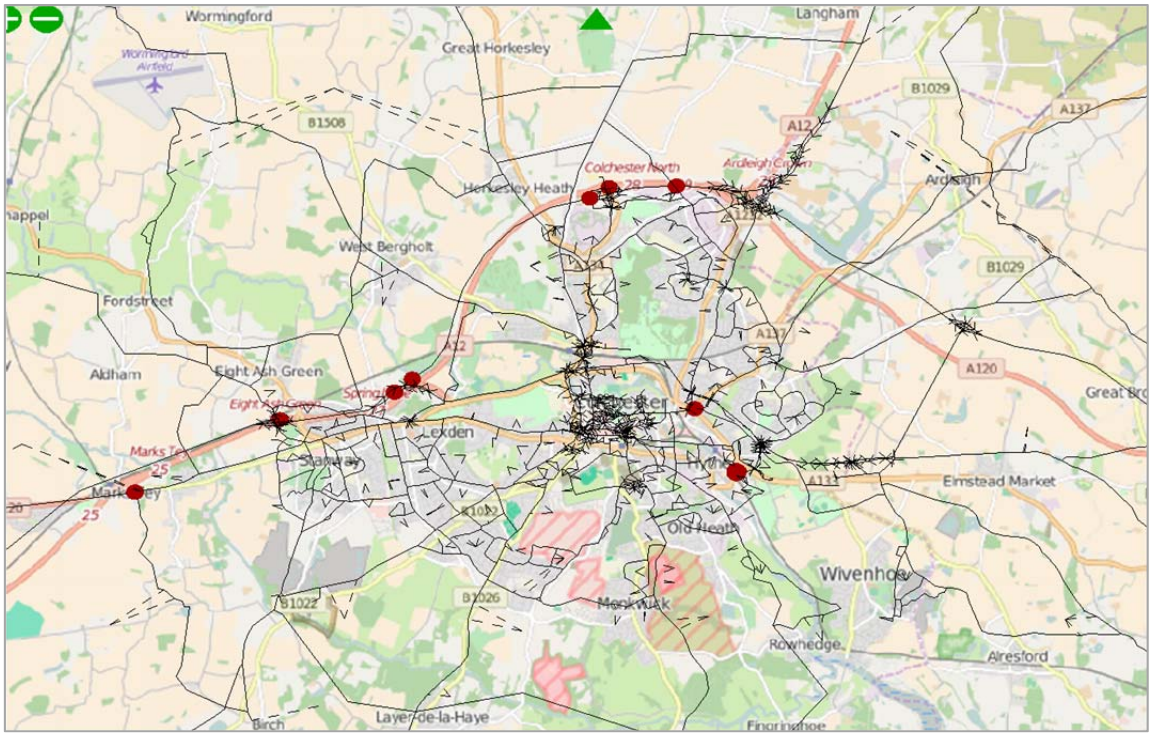


Figure 27 Locations of Overcapacity Junctions Scenario 3b (E&N) Post-VDM – AM

Figure 28 Locations of Overcapacity Junctions Scenario 1b (E&W) Post-VDM – PM

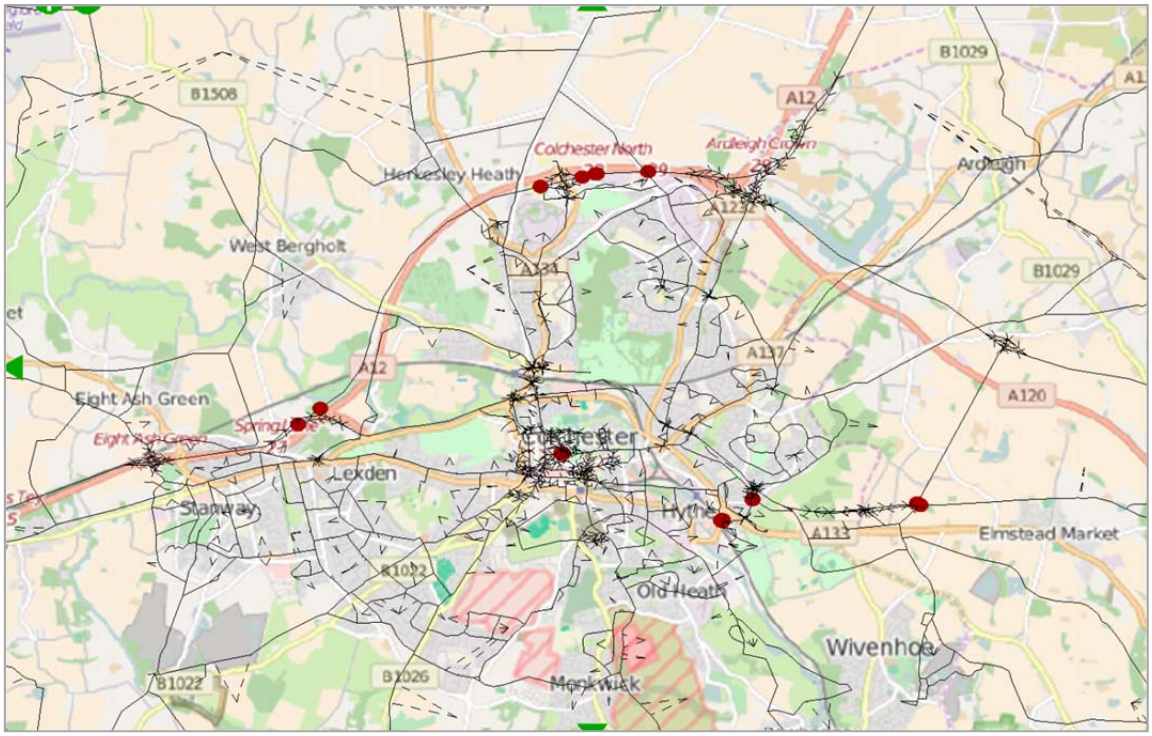
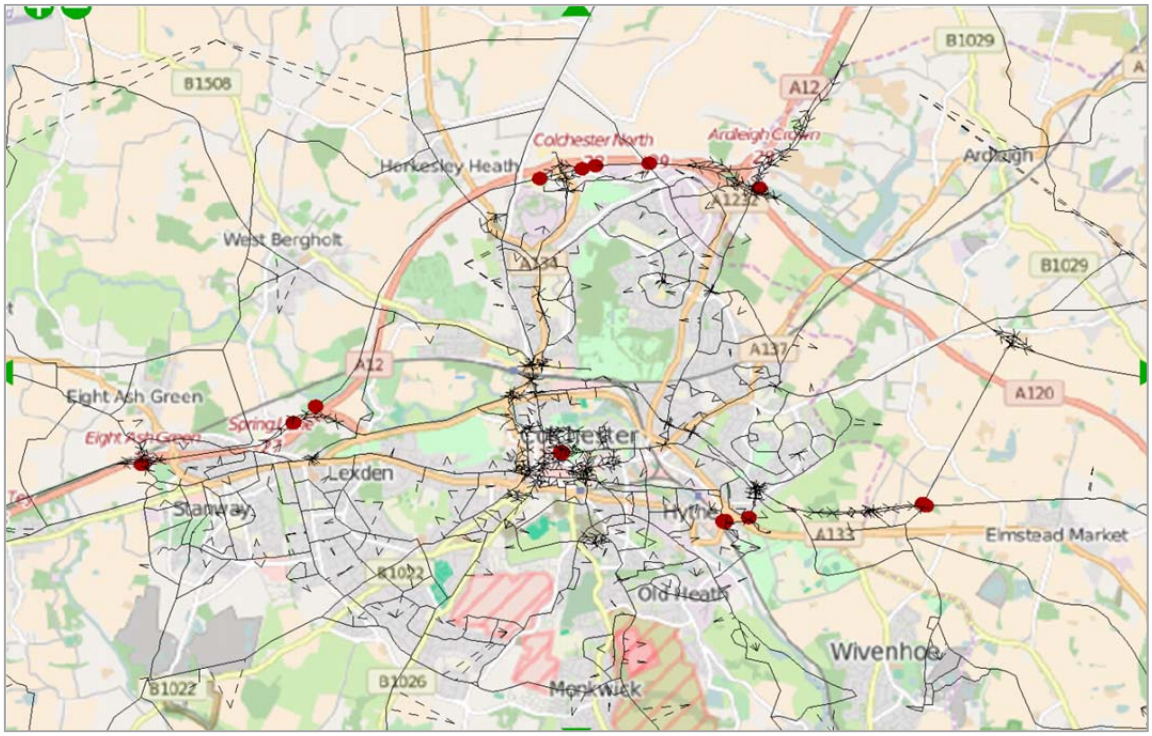
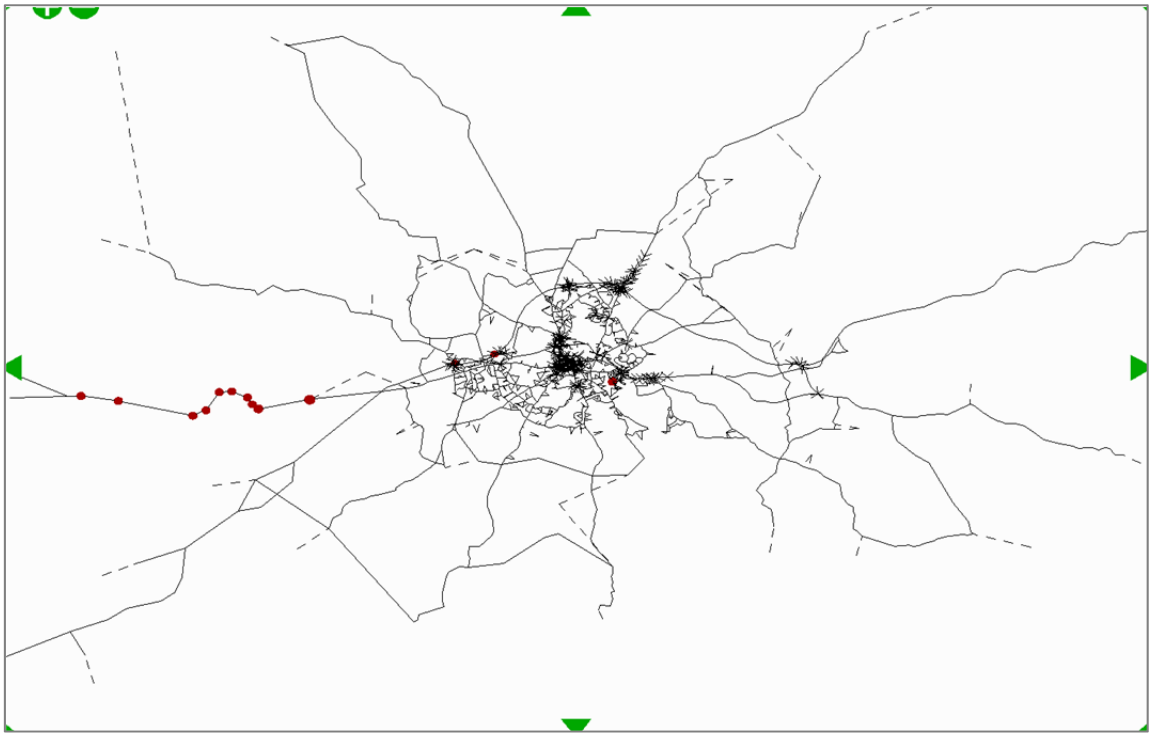


Figure 29 Locations of Overcapacity Junctions Scenario 3b (E&N) Post-VDM – PM



In addition to the junctions above, a number of junctions located along the A120 west of Colchester are also operating overcapacity, which is common to all scenarios. They are displayed in Figure 30.

Figure 30 Overcapacity Junctions along A120 West of Colchester



6 Key Findings

The summary statistic results, for the final assignment, show that scenarios 1a, 2a, and 3a result in a small reduction in average network speed with a corresponding increase in congestion and delay when compared against the 'current allocated development' scenario. However, the modelling results for scenarios 1b and 3b show a greater reduction in average network speed and increases in queuing times when compared against the 'current allocated development' scenario.

6.1 Scenario 1a (East and West)

The results for Scenario 1a show an increase in over capacity queues of around 30% in each peak hour, and a reduction in average speed from 42kph to 39kph in the AM peak, and from 43kph to 40kph in the PM peak compared to the allocated development scenario. Of the three development scenarios with 2032 levels of growth, the scenario is the poorest performing in the AM peak, but the best performing in the PM peak, however, in terms of the average speed, the differences between each scenario, at a strategic level may be considered modest.

The variable demand model reduces the number of highway trips by 300 in the AM peak and 318 in the PM peak, which is sufficient to bring the level of queueing to within 6% of the allocated demand scenario in the AM peak. In the PM peak, the demand reductions bring the queueing level down almost to the same as the allocated development scenario.

In terms of localised link impacts, scenario 1a shows additional overcapacity links along A12 between A134 and Ipswich Rd in AM compared to the current allocated scenario. In the PM peak, extra overcapacity links are indicated at A133/B1028 because of traffic associated with development to the East of Colchester and the attractiveness of the new A133/A120 link road. Consistent with the link impacts, junction analysis shows more delays at the A12 J28n the AM peak but no notable change in PM.

6.2 Scenario 2a (West Only)

The results for Scenario 2a shows an increase in over capacity queues of 30% in AM and 36% in PM, and a reduction in average speed from 42kph to 39kph in the AM peak and from 43kph to 40kph in the PM peak compared to the allocated development scenario. Of the three development scenarios with 2032 levels of growth, the scenario is the poorest performing in the PM peak.

The variable demand model reduces the number of highway trips by 576 trips in the AM peak and 884 trips in the PM peak, which is sufficient to bring the level of queueing to within 6% of the allocated demand scenario in the AM peak. In the PM peak, the demand reductions bring the queueing level down almost to the same as the allocated development scenario. In both the AM and PM peak, Scenario 2a has the lowest over capacity queue after the variable demand model.

Scenario 2a shows additional overcapacity links along A12 between A134 and Ipswich Rd in AM compared to the current allocated scenario, but no obvious change in PM. In terms of junctions, Ipswich Rd/St John's Rd is operating at overcapacity in PM.

6.3 Scenario 3a (East and North)

Scenario 3a shows an increase in over capacity queues of 18% in AM and 31% in PM, and a reduction in average speed from 42kph to 40kph in the AM peak and from 43kph to 40kph in the PM peak compared to the allocated development scenario. Of the three development scenarios with 2032 levels of growth, the scenario is the best performing in the AM peak.

The variable demand model reduces the number of highway trips by 393 in the AM peak and 632 in the PM peak, which is sufficient to bring the level of queueing to within 7% of the allocated demand scenario in the AM peak and 1% in the PM.

Similar to the impacts of scenario 1a, scenario 3a shows additional overcapacity links along A12 between A134 and Ipswich Rd in AM compared to the current allocated scenario. In the PM peak, extra overcapacity links are shown at A133/B1028 because of the new A133/A120 link road. Consistent with the link impacts, junction analysis shows more delays at A12/A134 in AM but no notable change in PM.

6.4 Scenario 1b (East and West) – 2047

Due to the level of traffic demand increase, scenario 1b shows a very high increase in over capacity queues of around 130% in each peak hour, and a reduction in average speed from 42kph to 32kph in the AM peak and from 43kph to 32kph in the PM peak compared to the allocated development scenario.

The variable demand model reduces the number of highway trips by 3,392 in the AM peak and 3,346 in the PM peak, which is sufficient to bring the level of

queueing to within 37% of the allocated demand scenario in the AM peak and 24% in the PM peak.

In terms of localised link impacts, in addition to the impacts same as in scenario 1a, scenario 1b also has overcapacity links at the two ends of new A133/A120 link road in AM. In PM, extra overcapacity links display along the A133/A120 link road as well as A12 West of Colchester. Consistent with the link impacts, junction analysis shows more delays at A12/A134, new A133/A120 link road and A12 West of Colchester in both AM and PM.

6.5 Scenario 3b (East and North) – 2047

Due to the level of traffic demand increase, scenario 3b shows a very high increase in over capacity queues of 80% in AM and 123% in PM, and a reduction in average speed from 42kph to 36kph in the AM peak and from 43kph to 34kph in the PM peak compared to the allocated development scenario. Compared to scenario 1b, scenarios 3b performs better in both peak periods.

The variable demand model reduces the number of highway trips by 2,476 in the AM peak and 2,173 in the PM peak, which is sufficient to bring the level of queueing to within 30% of the allocated demand scenario in the AM peak and 25% in the PM peak.

In terms of localised link impacts, in addition to the impacts described in scenario 3a, scenario 3b also has overcapacity links at the two ends of new A133/A120 link road in the AM peak. In the PM peak, additional links that are overcapacity are indicated along the A133/A120 link road, as well as A12 West of Colchester. In contrast to scenario 1b, scenario 3b has additional links on A12 north of Colchester that are operating at overcapacity. In PM, overcapacity conditions also exist on Dedham Rd, connecting to the A12.

Consistent with the link impacts, junction analysis shows more delays at A12/A134, the new A133/A120 link road, and A12 West in both AM and PM peaks.

6.6 Summary

In summary, the overall differences between scenarios 1a-3a could be considered as relatively modest in terms of both transient queues and average speed. In terms of overcapacity queues, scenario 3a performs best in the AM peak despite a higher level of highway trips than 2a. This indicates that development in scenario 3a causes least highway impact relative to the number

of trips during the AM peak. In the PM peak, scenario 2a results in the highest level of overcapacity queues despite a lower level of highway trips than scenario 1a. This indicates that development in scenario 2a results in the highest level of highway delay. Scenario 2a includes development in West Colchester, but also up to 1,600 dwellings in East Colchester (which come forward but not as a Garden Community, and without a link road). Scenario 1a has the lowest level of overcapacity queues, but a similar level to scenario 3a. These results do not take into account the potential improvements that could be gained from a package of highway mitigation measures.

The VDM assessment indicates the level of modal shift, and highway trip changes that may occur in each scenario. The VDM for these scenarios shows that small changes in demand can result in large changes in network performance. Overall, it indicated a reduction in highway demand and congestion in each scenario to a similar level, as a result of modal shift to public transport. The development proposed as part of scenario 2a indicated the highest level of mode shift; however this is in part due to the provision of new highway infrastructure as part of scenarios 1a and 3a in the form of the A133/A120 link road, which in turn encourages highway trips.

For the year 2047 scenarios, there are 29,000 more dwellings in 1b compared to 1a and 17,000 more dwellings in 3b compared to 1b. Therefore, 1b and 3b would be expected to perform worse in terms of congestion. 3b is shown to perform better than 1b in terms of all the indictors in both AM and PM because of the lower level of demand. However, the scenarios display the same level of congestion after VDM due to the impacts of mode change to public transport.

Appendices

Appendix A: List of Development

Table A.1 Committed and LDF Development – Housing

SATURN Zone	Proposed LDF Housing Sites	No. of dwellings used for scenario
115	Jarmin Road Former Cbc Depot	57
120	Ipswich Road	3
121	Cowdray Avenue	38
121	Bypass Nursery, Cowdray Avenue	81
122	Cowdray Centre, Cowdray Avenue	200
123	Clarendon Way	88
126	St Botolphs	121
127	Britannia Car Park	200
133	Bay Mill	54
209	Garrison Development - J	501
209	Garrison Development - H	41
209	Garrison Development - K1/2	14
306	Paxmans Former Club, Hythe Hill	40
306	Paxmans Main Site, Port Lane	184
312	Gas Works Site, Hythe Quay	84
314	Brook Street	80
314	Land Rear Of Brook Street	30
315	Garrison Central 2	537
316	Garrison Central 3 - B1b	116
316	Garrison Central 3 - B1a	11
316	Garrison Central 3 - C2	30
403	University, Salary Brook Meadows	200
403	Land West Of Boundary Road, U of E	5
416	Hawkins Road	46
416	Hawkins Road	175
416	Hawkins Road	57
416	Hawkins Road	303
417	Hythe Quays	142
501	Flakt Woods Site, Braiswick	342
514	Cuckoo Point, Severalls Lane	173
515	Royal London Mill Road	163
517	Severalls Hospital	1167

518	NGAUE SW (Golf Course Site)	200
518	NGAUE Core Strategy Allocation	1600
523	Turner Village	472
604	Betts Factory, Ipswich Road	128
902	Railway Sidings Site, Halstead Road	123
912	Winstree Road, Stanway	111
914	Church Lane	400
915	West Colchester	700
1001	Land Between A12/London Road, Stanway (Wyvern Farm)	358
1103	Layer Road Football Stadium	80
1109	Garrison Central 4 - L/N	266
1109	Garrison Central 4 - P1	203
1109	Garrison Central 4 - O	38
1110	Breachfield	261
1205	Garrison Development - s1	212
1205	Garrison Development - s2n	163
1205	Garrison Development - s2nw	48
1205	Garrison Development - s2sw	21
1205	Garrison Development - s2s	146
1211	Garrison Development - Q	46
1601	Cooks Shipyard, Wivenhoe	77
1701	East Road, West Mersea	37
1702	Rowhedge Port At End Of High St.	170
1704	Core Strategy Allocation Tiptree	103
1704	Petrol Station, Maypole Road, Tip	28
1704	Jam Factory Site, Tiptree	244
1711	Tile House Farm, Gt. Horkesley	145

Table A.2 Housing by Local Plan Scenarios

Location	Model Zone	Scenario 1a (E&W)	Scenario 2a (W)	Scenario 3a (E&N)	Scenario 1b (E&W)	Scenario 3b (E&N)
Tiptree	1704	570	500	500	570	500
West Mersea	1702	150	150	150	150	150
Wivenhoe and East Colchester	1601	900	480	900	900	900
East Colchester and Elmstead Market	1811	560	0	560	7060	7060
East Colchester and Ardleigh	1804	400	135	400	400	400
East Colchester & Welshwood Park	602	200	175	200	200	200
East Colchester	603	270	520	270	270	270
East Colchester & Land north of Bromley Road	407	170	300	170	170	170
Langham & Dedham	1712	100	100	2500	100	8000
Great Horkesley, Boxted & Worrmingford	1711	100	100	100	100	100
West Colchester 1	1002	500	500	0	500	-
West Colchester 2	1708	1400	1400	0	1400	-
West Colchester 3	1713	300	300	0	300	-
West Colchester 4	1727	300	300	0	300	-
West Bergholt	1710	100	100	100	100	100
Eight Ash Green	1709	150	150	150	150	150
Stanway	1001	750	750	750	750	750
Northern Gateway	502	350	350	350	350	350
Marks Tey Tempro zone	-				17,500	-
Background Tempro growth	-				3,000	3,000
Total		7,270	6,310	7,100	34,270	22,100