

Tendring Local Plan Modelling Support

Highways

10/12/15

Document Control Sheet

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Executive Summary

A range of local plan development proposals in Tendring District were assessed using junction modelling software. The forecast traffic flows arising from the development proposals were calculated using trip generation data from TRICS and using Census journey to work data for the trip distribution. Additionally, count data, factored up using adjusted TEMPro factors, were used to provide the background growth along with the development.

Using Junctions 8 and LinSig software, models of 28 junctions were built, taking junction geometries from high definition aerial images. The forecast traffic flows were added to the junction models and an assessment of junction performance, given those flows, was made.

The outputs from the junction modelling highlighted a number of junctions which would be adversely impacted by trip generation from the emerging Local Plan developments. The scale and location of impact varied according to the development scenario tested.

The potential to mitigate the impacts at certain junctions was explored through the use of existing data sources (such as Transport Assessments) or through assumed changes to the junction geometries. These identified the potential for significant mitigation to be achieved through junction improvements.

1 Introduction

Jacobs was commissioned by Essex County Council (ECC) to provide traffic modelling support to Tendring District Council (TDC) in respect of their emerging Local Plan proposals.

The development proposals for the Local Plan are not yet fixed therefore TDC identified a number of development scenarios, containing varying iterations of the housing and employment developments, for testing.

In the absence of an existing transport model covering Tendring District, bespoke spreadsheet and junction models were created; these were used to test the transport impact of the development proposals.

This report describes the development scenarios, the methodology used to assess the transport impacts of the scenarios, and the outcomes of the transport modelling.

2 Development Scenarios

Tendring District Council identified four different scenarios for land development, including:

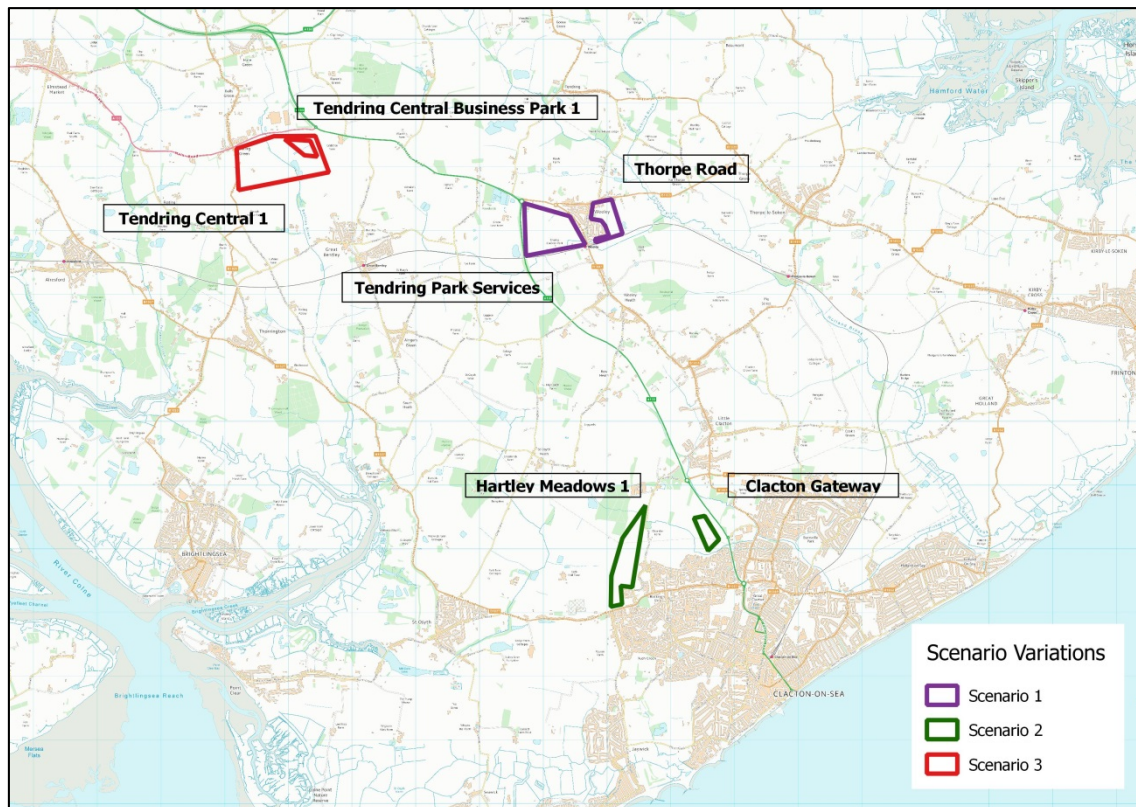
- Full Scenario – Maximum development up to Schedule 2047
- Scenario One – Development at Colchester Fringe and Weeley, 2032
- Scenario Two – Development at Colchester Fringe and Hartley Meadows, 2032
- Scenario Three – Development at Colchester Fringe and Tendring Central, 2032

The full development scenario was devised to provide an indication of the ‘worst case’ for the transport system in which all known potential development options in the district are realised. It was considered unlikely, but possible, that such a scenario would occur, therefore it was important to TDC that the impacts of this option on the transport network were considered in full. The scenario reflected a forecast year of 2047.

Scenarios one to three describe additional development scenarios, which include developments that have a greater certainty of being allocated to the emerging Local Plan.

Each scenario has approximately the same amount of development across the district as a whole, but the locations of the development sites vary. In scenario one the development was focussed around Weeley, in scenario two around Hartley Meadows and in scenario three around Frating (also known as Tendring Central). In all of these scenarios the Colchester Fringe development is assumed to come forward. The locations of these specific developments are illustrated below:

Figure 1: Scenario Variations



The impact of each of these development scenarios on the transport network has been assessed.

Each scenario is described in more detail in the following sections.

In addition to the scenarios listed above, a 'no development' scenario was also modelled to provide a reference case for the transport impacts. This scenario assumed that none of the developments listed in the following sections were to come forward, and that the junction flows were based on the base year traffic flows increasing in line with background growth.

2.1 Full Development Scenario

The full development scenario comprises of both residential developments with dwellings ranging from 200 to 3,000 and B1, B2, and B8 employment sites. A

number of the planned residential developments also include schools and community facilities. These developments are listed below:

Table 1: Full Development Scenario

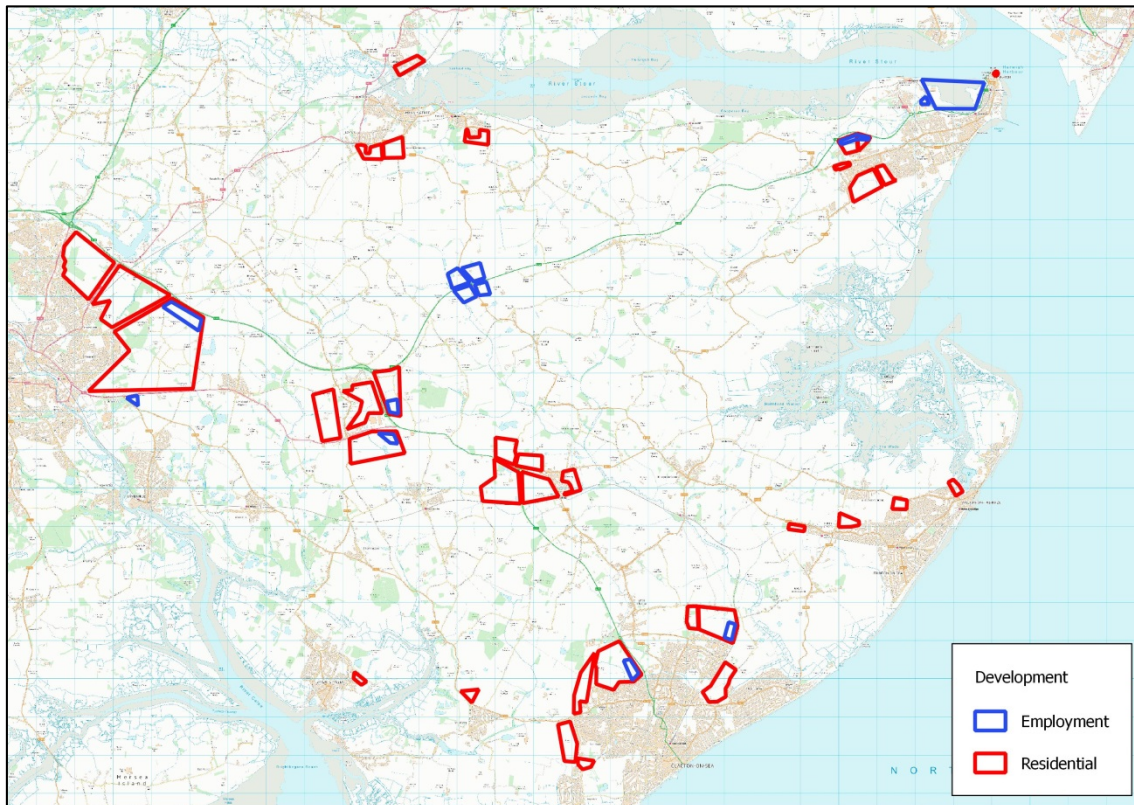
Site	Purpose	Development Scale / Type
Rouses Farm, Clacton	Residential	800 dwellings, a primary school and medical/community facilities
Coastal Academy, Clacton	Residential	300 dwellings
Oakwood Park, Clacton	Residential	1,400 dwellings, a primary school and medical/community facilities
Hartley Meadows 1, Clacton	Residential	1,300 dwellings, a primary school and medical/community facilities
Hartley Meadows 2, Clacton	Residential	1,500 dwellings
Sladbury's Lane, Clacton	Residential	700 dwellings, a primary school and medical/community facilities
Harwich Valley, Harwich	Residential	300 dwellings
Mayes Lane, Harwich	Residential	200 dwellings
Low Road, Harwich	Residential	400 dwellings
Navyard Wharf, Harwich	Residential	400 dwellings
Oakley Road, Harwich	Residential	1,100 dwellings and a primary school
Martello, Walton	Residential	300 dwellings
Turpins Farm, Frinton	Residential	300 dwellings
Halstead Road, Kirby	Residential	300 dwellings
Bromley Road/Long Road, Lawford	Residential	700 dwellings
Harwich Road, Mistley	Residential	300 dwellings
Brantham	Residential	320 dwellings
Robinson Road, Brightlingsea	Residential	200 dwellings

Colchester Fringe 1	Residential	3,000 dwellings
Colchester Fringe 2	Residential	1,500 dwellings
Colchester Fringe 3	Residential	1,500 dwellings
Tendring Park Services, Weeley	Residential	800 dwellings, a primary school and community/medical facilities
Thorpe Road, Weeley	Residential	400 dwellings
Hawk Farm, Weeley	Residential	400 dwellings
Weeley Phase 2 South	Residential	1,200 dwellings, a primary school and a secondary school
Weeley Phase 2 North	Residential	500 dwellings
Tendring Central 1	Residential	1,500 dwellings, a primary school, a secondary school and community/medical facilities
Tendring Central 2	Residential	1,200 dwellings and a primary school
Tendring Central 3	Residential	1,200 dwellings and a primary school
Tendring Central 4	Residential	1,500 dwellings and a primary school
Wellwick Site	Residential	200 dwellings
Telford Road	Employment	7500 m ² B2
Clacton Gateway	Employment	7432 m ² A1 Food, 730 m ² A3, 2021 m ² D2
Bathside Bay	Employment	Container port
Stanton Europark	Employment	7200 m ² B2, 15886 m ² B8
Harwich Valley	Employment	6422 m ² A1 Food, 6352 m ² A1 Non-Food, 2138 m ² A3, 651 m ² A4, 651 m ² A5, 2607 m ² B1, 12035.5 m ² B2, 12035.5 m ² B8, 2463 m ² C1, 2509 m ² D2
Business Park 1 Frating	Employment	25000 m ² B2, 25000 m ² B8
Business Park 2 Frating	Employment	25000 m ² B2, 25000 m ² B8

Tendring Europark 1	Employment	18690 m ² B2, 7070 m ² B8, 2520 m ² Other
Tendring Europark 2	Employment	18690 m ² B2, 7070 m ² B8, 2520 m ² Other
Tendring Europark 3	Employment	18690 m ² B2, 7070 m ² B8, 2520 m ² Other
Tendring Europark 4	Employment	18690 m ² B2, 7070 m ² B8, 2520 m ² Other
A120 Business Park	Employment	33333.3 m ² B1, 33333.3 m ² B2, 33333.3 m ² B8
Knowledge Gateway 2	Employment	50000 m ² Other

The locations of these developments within Tendring are shown below:

Figure 2: Full Development Map



The total scale of planned new development in this scenario is 25,720 dwellings, 24,376 m² of A1/A3/A4/A5, 360,304 m² of B1/B2/B8 and 67,073 m² of other land uses.

This scenario envisaged full build out of all development by the year 2047. This scenario represents a 'worst case' in terms of impact on the existing transport network.

2.2 Scenario One – Colchester Fringe and Weeley 2032

The first alternative development scenario removes some developments from the full scenario which are considered less likely to come forward, or those which are not envisaged to be completed before 2032.

The scenario assumes that there will be no development at Hartley Meadows or Tendring Central, but there will be development at Weeley. The proposed residential developments and employment sites for the scenario are listed below.

Table 2: Scenario One Developments

Site	Purpose	Development Scale/Type
Rouses Farm Clacton	Residential	800 dwellings, a primary school and medical/community facilities
Coastal Academy Clacton	Residential	300 dwellings
Oakwood Park Clacton	Residential	1,400 dwellings, a primary school and medical/community facilities
Harwich Valley Harwich	Residential	300 dwellings
Mayes Lane Harwich	Residential	200 dwellings
Low Road Harwich	Residential	400 dwellings
Martello Walton	Residential	300 dwellings
Turpins Farm Frinton	Residential	300 dwellings
Halstead Road Kirby	Residential	300 dwellings
Bromley Road/Long Road Lawford	Residential	700 dwellings
Brantham	Residential	320 dwellings
Robinson Road Brightlingsea	Residential	200 dwellings
Colchester Fringe 1	Residential	3,000 dwellings
Tendring Park Services Weeley	Residential	800 dwellings, a primary school and community/medical facilities
Thorpe Road Weeley	Residential	400 dwellings
Wellwick Site	Residential	200 dwellings
Telford Road	Employment	7500 m ² B2
Stanton Europark	Employment	7200 m ² B2, 15886 m ² B8

Tendring Europark 1	Employment	18690 m ² B2, 7070 m ² B8, 2520 m ² Other
Tendring Europark 2	Employment	18690 m ² B2, 7070 m ² B8, 2520 m ² Other
A120 Business Park	Employment	33333.3 m ² B1, 33333.3 m ² B2, 33333.3 m ² B8
Knowledge Gateway 2	Employment	50000 m ² Other

The difference between this scenario and the “full development” scenario is therefore 16,000 fewer dwellings, 178,198 m² less B1/B2/B8 land use and 12,033 m² less of other land uses area.

2.3 Scenario Two – Colchester Fringe and Hartley Meadows 2032

Scenario two differs from scenario one in that development at Weeley is not anticipated to come forward, and development instead takes place at Hartley Meadows. The proposed residential developments and employment sites for the scenario are listed below.

Table 3: Scenario Two Developments

Site	Purpose	Development Scale/Type
Rouses Farm Clacton	Residential	800 dwellings, a primary school and medical/community facilities
Coastal Academy Clacton	Residential	300 dwellings
Oakwood Park Clacton	Residential	1,400 dwellings, a primary school and medical/community facilities
Hartley Meadows 1 Clacton	Residential	1,300 dwellings, a primary school and medical/community facilities
Harwich Valley Harwich	Residential	300 dwellings
Mayes Lane Harwich	Residential	200 dwellings
Low Road Harwich	Residential	400 dwellings
Martello Walton	Residential	300 dwellings
Turpins Farm Frinton	Residential	300 dwellings

Halstead Road Kirby	Residential	300 dwellings
Bromley Road/Long Road Lawford	Residential	700 dwellings
Brantham	Residential	320 dwellings
Robinson Road Brightlingsea	Residential	200 dwellings
Colchester Fringe 1	Residential	3,000 dwellings
Wellwick Site	Residential	200 dwellings
Telford Road	Employment	7500 m ² B2
Clacton Gateway	Employment	7432 m ² A1 Food, 730 m ² A3, 2021 m ² D2
Stanton Europark	Employment	7200 m ² B2, 15886 m ² B8
Tendring Europark 1	Employment	18690 m ² B2, 7070 m ² B8, 2520 m ² Other
Tendring Europark 2	Employment	18690 m ² B2, 7070 m ² B8, 2520 m ² Other
A120 Business Park	Employment	33333.3 m ² B1, 33333.3 m ² B2, 33333.3 m ² B8
Knowledge Gateway 2	Employment	50000 m ² Other

The difference between this scenario and the “full development” scenario is 15,900 fewer dwellings, 16,214 m² less A1/A3/A4/A5 area, 178,198 m² less B1/B2/B8 area and 10,012 m² less of other land uses area.

2.4 Scenario Three – Colchester Fringe and Tendring Central 2032

The last scenario assumes the same development as scenarios one and two except that instead of development proceeding at either Weeley or Hartley Meadows, development takes place at Tendring Central. The proposed residential developments and employment sites for the scenario are listed below.

Table 4: Scenario Three Developments

Site	Purpose	Development Scale/Type
Rouses Farm Clacton	Residential	800 dwellings, a primary school and medical/community facilities
Coastal Academy Clacton	Residential	300 dwellings
Oakwood Park Clacton	Residential	1,400 dwellings, a primary school and medical/community facilities
Hartley Meadows 1 Clacton	Residential	1,300 dwellings, a primary school and medical/community facilities
Harwich Valley Harwich	Residential	300 dwellings
Mayes Lane Harwich	Residential	200 dwellings
Low Road Harwich	Residential	400 dwellings
Martello Walton	Residential	300 dwellings
Turpins Farm Frinton	Residential	300 dwellings
Halstead Road Kirby	Residential	300 dwellings
Bromley Road/Long Road Lawford	Residential	700 dwellings
Brantham	Residential	320 dwellings
Robinson Road Brightlingsea	Residential	200 dwellings
Colchester Fringe 1	Residential	3,000 dwellings
Wellwick Site	Residential	200 dwellings
Telford Road	Employment	7500 m ² B2
Clacton Gateway	Employment	7432 m ² A1 Food, 730 m ² A3, 2021 m ² D2
Stanton Europark	Employment	7200 m ² B2, 15886 m ² B8
Tendring Europark 1	Employment	18690 m ² B2, 7070 m ² B8, 2520 m ² Other

Tendring Europark 2	Employment	18690 m ² B2, 7070 m ² B8, 2520 m ² Other
A120 Business Park	Employment	33333.3 m ² B1, 33333.3 m ² B2, 33333.3 m ² B8
Knowledge Gateway 2	Employment	50000 m ² Other

The difference between this scenario and the full development scenario is 15,700 fewer dwellings, 128,198 m² less B1/B2/B8 area, 12,033 m² less of other land used area and no A1/A3/A4/A5 development.

2.5 Summary

The total planned development considered is shown below.

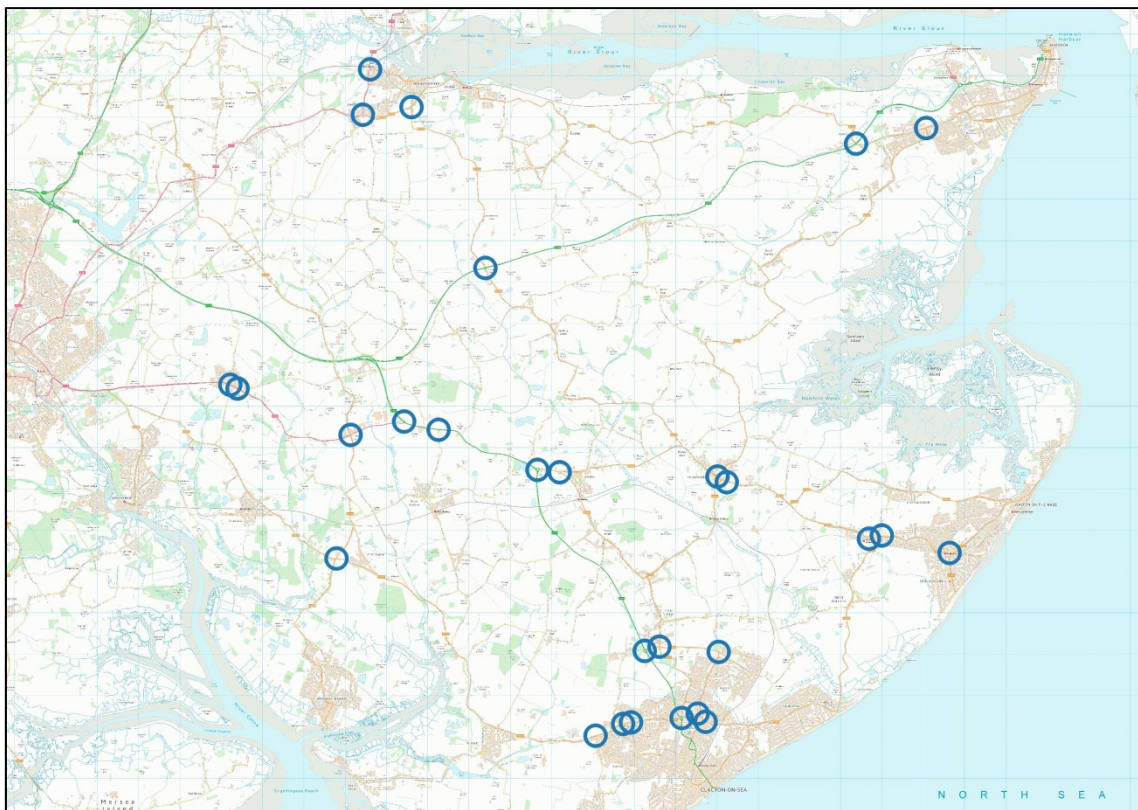
Table 5: Development summary for all scenarios

Scenario	Dwellings	A1/A3/A4/A5 m ²	B1/B2/B8 m ²	Other m ²
Full Development	25,720	24,376	360,304	67,073
Scenario 1	9,720	0	182,106	55,040
Scenario 2	9,820	8,162	182,106	57,061
Scenario 3	10,020	0	232,106	55,040

3 Key Junctions

The primary concern of TDC in terms of transport impacts of the development scenarios is the effect of additional traffic at key junctions within the district. An assessment of key junctions in Tendring potentially affected by the trip generation of the new developments has been conducted. The image below shows the locations of the 28 junctions considered sensitive to additional trip generation.

Figure 3: Junctions Under Assessment



The junctions are located either in the vicinity of new development or on main routes within the district. These routes are ;A137 to the north, A120 to the west and north-west and A133 together with B1027 to the west. These routes are key corridors into and out of Tendring.

4 Methodology

4.1 Overview

The impact of development in each scenario on the aforementioned junctions was assessed by calculating the likely traffic volumes through the junctions in the future, and utilising junction modelling to identify the effect of these flows in terms of the ratio of flow to capacity (RFC) and queuing on each arm of the junctions.

Detailed CAD (Computer Aided Design) drawings and aerial photographs of each junction were obtained, and used to measure the specific junction geometries required by relevant modelling software.

To calculate future traffic volumes through the development, in the absence of an existing traffic assignment model, a two stage approach was necessary. First, the peak hour traffic volumes currently using the junctions was ascertained from a series of classified turning count surveys. Background growth (i.e. growth in traffic due to factors other than the specific modelled developments) was applied to the count data using TEMPro forecasts. Secondly, trips generated by the developments listed in section 2 were calculated and added to the turning flows.

The additional traffic generated from the developments was calculated by applying TRICS¹ trip rates to each development and then applying an appropriate distribution to the generated trips. This identified the origin and destination locations for the trips generated by the development. On the basis of the trip origin and destination, an assessment of the most likely route taken through Tendring by that trip was made. The combined movement of all the development trips through the district thereby allowed identification of the turning movements through the assessed junctions.

Each step in the process is described in more detail in the following sections.

4.2 Traffic Counts

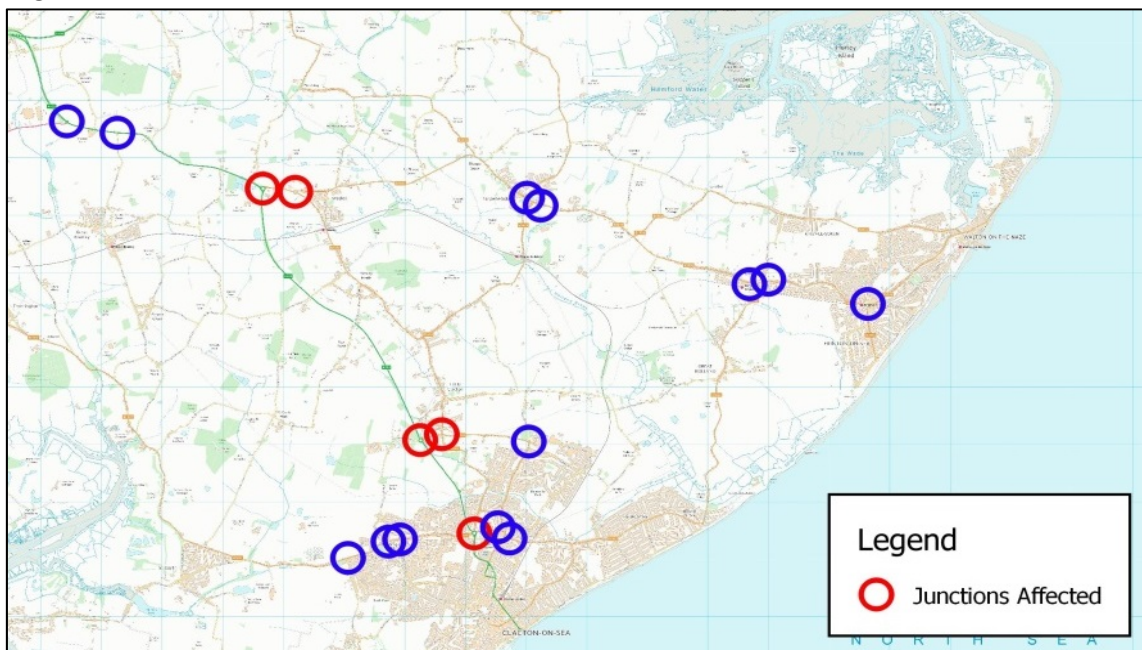
Manual classified counts for 24 of the 28 junctions were conducted on Tuesday 12th May 2015 and the remaining four on Thursday 11th June 2015 (there was insufficient resource to conduct all the surveys on the same day). Each

¹ TRICS 7.13 National standard system of trip generation and analysis in the UK and Ireland.

individual site was surveyed continuously over a single day, between 06:00 and 19:00. Data was aggregated into fifteen minute intervals, and full vehicle classification data was collected.

It should be noted that a traffic accident occurred on Tuesday 12th May resulting in the A133 being closed in both directions between B1442 Progress Way and B1027 St John's Road from 15:30 to 19:00. The closure and resulting traffic diversion which resulted from the crash invalidated the PM peak traffic counts at five locations. These junctions were not assessed for the PM peak hour. The locations of the affected junctions are illustrated below:

Figure 4: Affected Junctions



4.3 Background Growth

Background traffic growth within Tendring was estimated using TEMPro with NTEM version 6.2 data. The full development scenario has a forecast year of 2047, which is beyond the TEMPro horizon year of 2041. Therefore a 2041 growth factor was used instead of 2047. Extrapolating the TEMPro growth to 2047 was considered, however given the potential uncertainty in the resulting figures, this option was not taken. The alternative development scenarios have a forecast year of 2032.

Given the age of the dataset, TDC were consulted as to an appropriate level of background household and job increases in the future. In this case, “background” refers to committed development anticipated to come forward separately from the emerging local plan. The background increase in households in the district was found to be equivalent to around 400 dwellings per annum, which was consistent with the growth targets from the superseded East of England Plan. TDC currently anticipate background housing growth of around 4,800 dwellings (not including any of the increases from developments identified in section 2) up to 2032, and nothing beyond that. Therefore, the growth factor for 2032 and 2041 was based on an assumed increase of 4,800 dwellings from 2015.

For the increase in jobs data, TDC advised that the East of England Forecasting Model assumes an increase of 142 jobs a year in Tendring, and that this was an appropriate assumption for background growth. This assumption was therefore adopted in the calculation of the growth factor.

The growth for Tendring was therefore calculated in TEMPro by using the “apply alternative assumptions” facility. The default assumptions, and the alternative assumptions used for each forecast year are summarised below:

Table 6: TEMPro Background Growth Assumptions for Tendring

Year	Assumption	Households	Jobs	HH increase from 2015	Jobs increase from 2015
2015	Default	67,678	50,329	-	-
2032	Default	75,121	52,754	7,442	2,425
2032	Alternative	72,479	52,743	4,800	2,414
2041	Default	78,927	54,480	11,248	4,150
2041	Alternative	72,479	54,021	4,800	3,692

As the table above illustrates, the alternative adjustments applied serve to decrease the levels of background growth in Tendring from their default TEMPro levels. However, it should be noted that when the development data described in section 2 is included in the modelled scenario, the total growth

from specific developments and background growth is far in excess of TEMPro levels.

Also, because the growth factor is being used outside of a strategic model, the NTM Traffic Growth Calculations were used, in line with TAG unit M4 section 9.1². The NTM dataset has a horizon year of 2035, so for the 2041 growth factor, the same adjustment that would be applied in 2035 was applied for the 2041 growth.

The final traffic growth factor used for each forecast year is given below:

Table 7: Tending Growth

Year	AM peak	PM peak
2032	1.23	1.25
2041	1.29	1.31

The growth factors above were applied to the base year traffic count data to derive the background forecast traffic growth.

4.4 Development Trip Generation

4.4.1 Trip Rates

Development trip generation was calculated by applying trip rates (i.e. the amount of trips generated per unit of land use) to the development quanta. Trip rates were derived from TRICS 7.1.3. The trip rate is expressed in terms of a given unit of land development. For residential developments this unit is one dwelling, and for employment developments the unit is typically 100m² of gross floor area (GFA) or one job. The employment trip rate differs depending on the type of employment. Trip rates were extracted for all transport modes.

The trip rates extracted from TRICS for residential developments, expressed as number of person trips per dwelling, are summarised below:

² <https://www.gov.uk/government/publications/webtag-tag-unit-m4-forecasting-and-uncertainty-november-2014>

Table 8: Trip Rates Summary for Residential Developments

Residential	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
AM peak Arrivals	0.002	0.213	0.046	0.002	0.001
AM peak Departures	0.017	0.599	0.186	0.018	0.022
PM peak Arrivals	0.011	0.497	0.088	0.013	0.009
PM peak Departures	0.006	0.312	0.055	0.004	0.001

As detailed in section 2, there are a variety of employment land use types; the following table summarises the TRICS development category selected for each land use:

Table 9: Land Uses

Land Use Class	Categories
A1	Food Superstores / Non Food Retail
A3	Restaurant
A4	Pub – Restaurant
A5	Fast Food / Take Away / Drive Through Restaurant
B1	Office / Business Park
B2	Industrial Estate
B8	Warehousing
C1	Hotel
D2	Multiplex Cinema / Leisure Centre / Sports Centre

Even though GFA is a valid unit for trip rates, it was considered more meaningful and easier to interpret if the rates were expressed in terms of jobs. It

was therefore essential to calculate the number of jobs or FTE (Full time Employee) at each of the employment developments identified in section 2.

TDC provided information on employment sites either in terms of GFA, in square metres, or total plot size, in hectares. In the latter case, plot size required converting to GFA before the number of jobs could be calculated. This was done by assuming a plot ratio (i.e. the ratio of plot size to GFA) of 0.5 based on a TDC document “Tendring Employment Land Review”, October 2013³. Using this ratio, it converts a 1 hectare plot to 5,000sqm of GFA.

Then for all developments, the GFA was converted to jobs using employment densities taken from the Homes and Communities Agency’s “Employment Densities Guide”, 2nd edition, December 2010⁴. The employment densities taken from the report and used as part of this work are summarised below:

3

<http://www.tendringdc.gov.uk/sites/default/files/documents/planning/planning%20policy/Tendring%20Employment%20Land%20Review%202013.pdf>

⁴ <https://www.gov.uk/government/publications/employment-densities-guide>

Table 10: Employment Densities

Categories	Use Class	Use Type	Area per FTE (m ²)
Industrial	B2	General	36
	B1(c)	Light Industry (Business Park)	47
Warehouse & Distribution	B8	General	70
	B8	Large Scale and High Bay Warehousing	80
Office	B1(a)	General Office	12
	B1(a)	Business Park	10
Retail	A1	Food Superstores	17
	A1	Other Superstores/ Retail Warehouses	90
	A3	Restaurants & Cafes	18
Leisure & Visitor Attractions	C1	Hotels	100
	D2	Cinemas	90

Applying these employment densities leads to the following jobs totals by land use:

Table 11: Jobs Per Use Class

Scenario	A1/A3/A4/A5	B1/B2/B	Other
Full Scenario	1117	10123	5075
Scenario 1	0	6056	5000
Scenario 2	478	6056	5022
Scenario 3	0	7107	5000

The trip rates used for the employment sites are detailed in Appendix A.

4.4.2 Trip Rate Adjustments

The trip rates described in the previous section were derived from the TRICS database without any filtering based on location; this was in order to maximise the amount of available data. It is acknowledged however that Tendring District, which has relatively little public transport infrastructure is likely to have a mode share which differs from the average for the whole country.

To ensure that the development trip generation is appropriate for the location of the development, an adjustment was made to make the trip rates and mode share more appropriate for Tendring. Journey to work data from Census 2011 was used to adjust the mode share from a national average to be Tendring specific. It should be noted that although the census data only covers commuting trips, it is considered that the relative difference in mode share between the national average and Tendring is consistent across all trip purposes.

To apply the adjustment, the observed mode share at a national and local (i.e. Tendring) level was extracted, and the difference between the two was applied to the mode share derived from TRICS data. An example of this is illustrated below for the residential trip rate for AM peak departures.

Table 12: Mode Share Adjustment

Residential AM peak Departures	TRICS mode share	National Census	Tendring Census	Adjusted mode share
Vehicle Occupants	70.89%	68.05%	76.00%	74.31%
Cyclists	2.01%	2.88%	3.33%	2.19%
Pedestrians	22.01%	11.49%	11.80%	21.23%
Bus/Tram Passengers	2.49%	8.22%	2.46%	0.70%
Rail Passengers	2.60%	8.75%	5.65%	1.58%

As the table above demonstrates, census data showed that nationally, 68.05% of all trips were made in a private vehicle (either as a driver or passenger). Within Tendring, this mode share increases to 76%. From the TRICS trip rates, the mode share was 70.89%, which, when adjusted by the change observed from the census data, becomes 74.31%.

The same adjustment was applied for all other trip rates, and used to recalculate the trip generation of each development.

4.4.3 Conversion From Vehicle Occupants to Vehicles

The TRICS rates were used to generate trips by vehicle occupants, and these were used to infer a mode share which was then adjusted based on Census journey to work data. To assess the highway impacts of development, vehicle trip generation is needed. Average vehicle occupancies were taken from the TAG data book to convert from vehicle occupants to vehicles.

4.4.4 Total Trip Generation

Using the adjusted TRICS trip rates, and converting to vehicles, the total vehicular trip generation for residential and employment developments in each scenario are summarised below:

Table 13: Residential Developments' Vehicle Trip Generation

Scenario	Dwellings	Origin AM peak	Destination AM peak	Origin PM peak	Destination PM peak
Full Scenario	25720	11062	3832	5352	8634
Scenario 1	9720	4181	1448	2022	3263
Scenario 2	9820	4224	1463	2043	3296
Scenario 3	10020	4310	1493	2085	3364

Table 14: Employment Developments' Vehicle Trip Generation

Scenario	Jobs	Origin AM peak	Destination AM peak	Origin PM peak	Destination PM peak
Full Scenario	16315	1604	4359	4971	2350

Scenario 1	11056	682	2769	2600	585
Scenario 2	11556	879	3045	3259	1227
Scenario 3	12107	815	3031	2848	685

Comparing the residential and employment trip generation, it is apparent that the residential developments generate a greater number of trips than the employment developments, and this is particularly the case for the full development scenario, in which 11,062 AM peak origins from residential areas are generated, but there are only 4,359 destinations at employment sites.

4.5 Development Trip Distribution

4.5.1 Overview

The methodology used to distribute the trips generated by the proposed developments varies by trip purpose. Trips generated by the residential developments were categorised into trips to school, or trips elsewhere (commuting and all other trips). For trips to school, the distribution was calculated by finding the nearest school or schools to the development and assuming that the trips would go to that school(s).

The trip distribution for commuting and other trips was derived from the 2011 census journey to work data. This data is representative of commuting trips, and is also acceptable for other non-commuting trips (e.g. shopping, personal business).

The calculation of education and commuting and other trips is described in more detail in the following subsections.

4.5.2 Commuting and Other Trips

The 2011 census journey to work data provides information about the usual location of home and work. This data is aggregated at different levels, with the finest level of detail provided in the Middle Super Output Areas (MSOA).

Tendring District consists of 18 MSOAs. Two major movements were identified, trip distribution for people who live within the district, and trip distribution for people who work within the district. The former was used to distribute trips generated by the residential development, and the latter for trips generated by

the employment development. For trips which had a work or residential location which was outside the district, the likely entry/exit point, in terms of road on the district boundary, was identified. Thus a base pattern of trips for people living or working in the district was established.

However, it was anticipated that the trip distribution will change in the future due to the presence of new residential or employment development within the district. For example, if a sufficiently large employment development was built within the district, then all else being equal, that development would attract more trips to the MSOA in which the development lies, thus adjusting the distribution for trips from residential areas in Tendring.

The future trip distribution was therefore adjusted according to future developments. For trips arriving at an employment location from a residential location, the proportion of trips arriving from each MSOA was adjusted according to the increases in housing in the MSOA. So, if new development resulted in the MSOA experiencing a 10% increase in the number of houses, then the proportion of trips arriving at an employment site from that MSOA was increased by 10%. This was done for all MSOAs within the district. The following tables show the census distribution, and the adjusted future distribution, for a selection trips arriving at an employment location:

Table 15: Base Distribution for Trips Arriving at an Employment Site

Home end	Work end				
	Tendring 001	Tendring 002	Tendring 003	Tendring 004	Tendring 005
Babergh 010	0.94%	0.84%	5.83%	0.52%	1.82%
Tendring 001	10.16%	16.95%	2.53%	13.45%	0.68%
Tendring 002	23.70%	20.25%	4.81%	22.59%	1.59%
Tendring 003	4.72%	5.13%	23.35%	3.62%	6.55%
Tendring 004	30.08%	24.65%	5.54%	31.55%	1.76%
Tendring 005	0.63%	0.58%	2.49%	0.86%	8.08%
Tendring 006	0.79%	0.89%	0.94%	1.03%	1.08%
Tendring 007	2.05%	1.52%	2.65%	2.07%	1.59%
Tendring 008	2.44%	1.78%	2.57%	2.76%	0.91%
Tendring 009	1.02%	1.15%	1.92%	1.21%	5.58%
Tendring 010	0.47%	0.94%	0.94%	1.03%	1.20%
Tendring 011	0.87%	0.89%	1.67%	0.34%	3.36%
Tendring 012	0.87%	0.84%	0.69%	1.03%	0.46%
Tendring 013	1.18%	1.05%	1.06%	0.52%	1.37%
Tendring 014	0.55%	0.63%	1.18%	0.69%	1.08%
Tendring 015	0.79%	0.37%	1.39%	0.52%	1.02%
Tendring 016	0.08%	0.42%	0.49%	0.52%	0.68%
Tendring 017	0.79%	0.84%	0.81%	0.34%	0.85%
Tendring 018	0.63%	0.89%	0.90%	0.34%	0.68%
A120	9.13%	10.94%	15.32%	10.17%	30.22%
A133	1.81%	2.77%	6.23%	2.24%	19.75%
A137	6.30%	5.70%	16.71%	2.59%	9.68%
B1027	0.00%	0.00%	0.00%	0.00%	0.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

So, for example, the census data showed that of the people working in the MSOA Tendring 001, 30.08% of them came from a residence in Tendring 004. In the 2011 Census, Tendring 004 had 3,904 dwellings. In the full development scenario, 2,000 additional dwellings are expected, an increase of 51%. The 30.08% figure therefore increases to 45%. Similar increases occur for other MSOAs with residential development, such that the total no longer adds up to 100%. Therefore, once factored up, the totals are adjusted once more by factoring all the percentages down so that they add up to 100%. The resulting trip distribution is below:

Table 16: Base Distribution for Trips Arriving at an Employment Site

Home end	Work end				
	Tendring 001	Tendring 002	Tendring 003	Tendring 004	Tendring 005
Babergh 010	0.9%	0.8%	5.6%	0.5%	2.4%
Tendring 001	9.8%	16.8%	2.6%	12.7%	1.0%
Tendring 002	20.2%	17.7%	4.3%	18.9%	2.0%
Tendring 003	6.2%	6.9%	32.2%	4.6%	12.4%
Tendring 004	38.7%	32.6%	7.5%	39.8%	3.3%
Tendring 005	2.3%	2.2%	9.6%	3.1%	43.1%
Tendring 006	0.7%	0.8%	0.9%	0.9%	1.4%
Tendring 007	3.3%	2.5%	4.5%	3.3%	3.7%
Tendring 008	2.3%	1.7%	2.5%	2.5%	1.2%
Tendring 009	1.7%	1.9%	3.3%	1.9%	13.3%
Tendring 010	0.7%	1.3%	1.4%	1.4%	2.4%
Tendring 011	0.8%	0.8%	1.6%	0.3%	4.3%
Tendring 012	0.7%	0.7%	0.6%	0.9%	0.6%
Tendring 013	2.1%	1.9%	1.9%	0.9%	3.4%
Tendring 014	0.5%	0.5%	1.1%	0.6%	1.3%
Tendring 015	0.7%	0.3%	1.3%	0.5%	1.4%
Tendring 016	0.1%	0.4%	0.4%	0.4%	0.8%
Tendring 017	0.7%	0.7%	0.7%	0.3%	1.1%
Tendring 018	0.6%	0.8%	0.8%	0.3%	0.9%
A120	3.9%	4.8%	6.9%	4.2%	0.0%
A133	0.8%	1.2%	2.8%	0.9%	0.0%
A137	2.7%	2.5%	7.5%	1.1%	0.0%
B1027	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

After factoring, the proportion of trips at employment sites in Tendring 001 arriving from Tendring 004 is 38.7%. For MSOAs which have no, or relatively little residential development, the proportions decrease, reflecting the fact they will generate relatively fewer trips compared to the MSOAs which have significant development.

Similar adjustments for trips distributed from residential developments were also made, using the change in the number of jobs within an MSOA as the basis of the trip proportion adjustments.

A further adjustment was made to reflect the observation made in section 4.4.4 that the residential trip generation is much higher than the employment trip generation. The logical conclusion of this is that an increasing proportion of the

trips generated by the residential developments will travel outside of the district (e.g. to a workplace, since the increase in households is greater than the increase in jobs). Conversely, for the trips travelling to new employment sites, the proportion that come from outside the district will decrease, since there is an ample supply of trip generation (from households) within the district. The adjusted proportions for external trips to employment sites can be seen in the tables above.

The adjusted trip distributions identify, for each new development trip, which MSOA the trip will go to or come from. It does not distinguish whether that opposite end of the trip is itself a new development, or is part of the existing land uses within the MSOA. Therefore, an assumption has been made, that a proportion of these trips will be going to or coming from a new development within the MSOA, rather than from existing development. The trip would therefore be between two new developments. The proportion has been estimated from the relative size of a development within its MSOA.

For trips leaving a new residential development and distributed to an MSOA using the adjusted census trip distribution, if the MSOA contains one or more employment sites, then the volume of trips assumed to travel to the new development (as opposed to existing development within the MSOA) is based on the ratio of the development's employment to the total employment in the MSOA. Similarly, for trips arriving at a residential development, which have come from a particular MSOA according to the adjusted distribution, the proportion assumed to have arrived from a new employment development within the MSOA, as opposed to existing land use, is also based on the ratio of the development's employment to the total employment in the MSOA (from existing and new development).

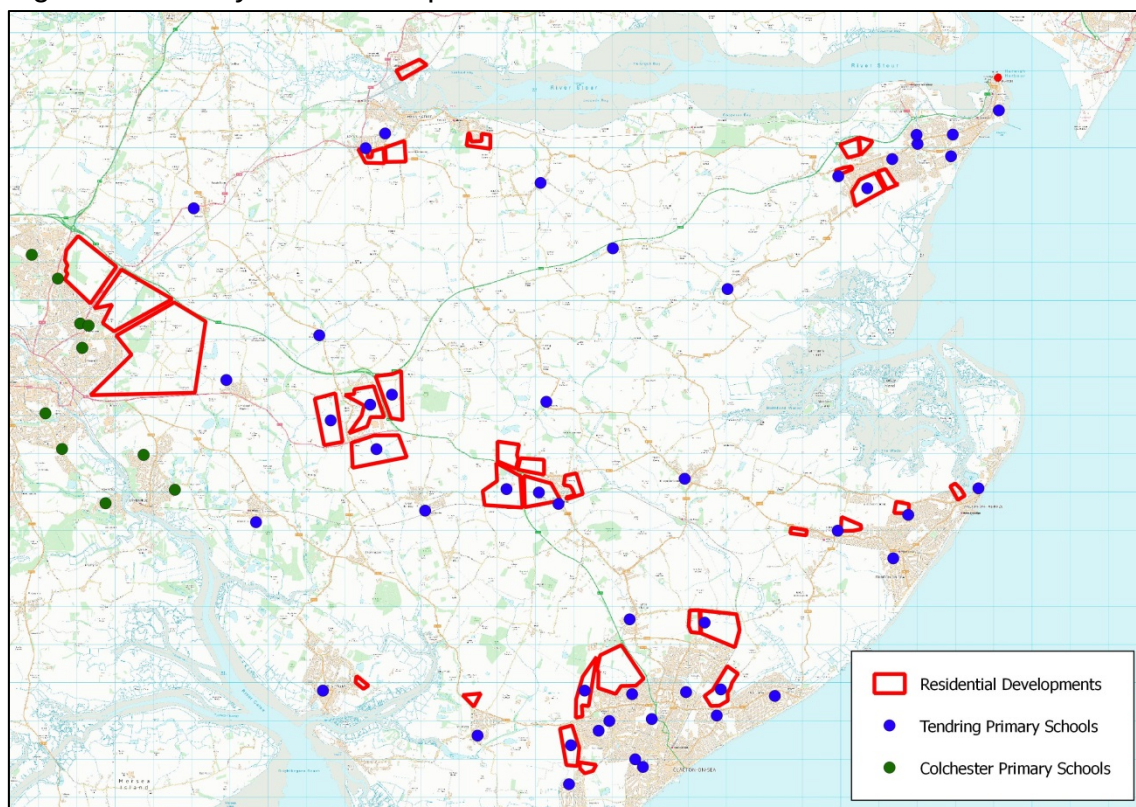
Following this calculation, the total trip generation at each development is constrained to the original trip generation totals (calculated before trip distribution was applied).

4.5.3 School Trips

A proportion of trips were assumed to be dedicated to education purposes i.e. escorting pupils to school. To establish the likely proportion of residential trip generation that were education trips, the National Travel Survey was used. This showed that, 50% of AM peak trips are for education purposes and 42% of these trips were made by car. Therefore, we assumed that 21% of the trip

generation from residential developments would be education trips (the remainder were commuting and other trips). It was assumed that the same number of trips would return to the residential starting point within the AM Peak hour. These trips were distributed to the nearest schools (either within or outside the new developments). If more than one school was identified, trips were distributed equally to all schools. The location of local schools with respect to the residential developments is illustrated below.

Figure 5: Primary Schools Map



4.5.4 Bathside Bay Port

The trip distribution for the new development of Bathside Bay Port was calculated separately, as a Transport Assessment has already been conducted and the results are publicly available on the planning portal for TDC⁵. In

⁵ <https://idox.tendringdc.gov.uk/online-applications/search.do%3b>

essence, there were two type of trips generated by the port; 1) movements of site workers at the start and end of shift, and 2) movement of freight vehicles. The Transport Assessment also specified the trip distribution, but only in terms of the local authority district that workers would travel from. For trips specified as coming from Tendring, the data was disaggregated to MSOA level using census journey to work proportions for the MSOA in which the port is located. Trips from districts other than Tendring were allocated to a specific entry/exit point on the road network at the district boundary. It was assumed that all freight trips would continue through the district along the A120.

4.6 Development Trip Routing

Having established the number of trips between developments and MSOAs, the trips then required assignment to the highway network in order to establish the flows through the 28 key junctions. This process was automated by using strategic highway modelling software to speed up the process. A very simple model of the Tendring highway network was created.

The modelled network was created using an OpenStreetMap dataset⁶ representing the road network of the area as links and nodes. It contained details of the characteristics of each road including, amongst others, the speed limit for every link. The network was loaded into the strategic modelling package VISUM, which converted it into a series of links and nodes appropriate for determining route choice. The developments and MSOAs were also added to the model as zones, which would load trips on to the network via zone loaders. The trips were added to the model as a trip matrix.

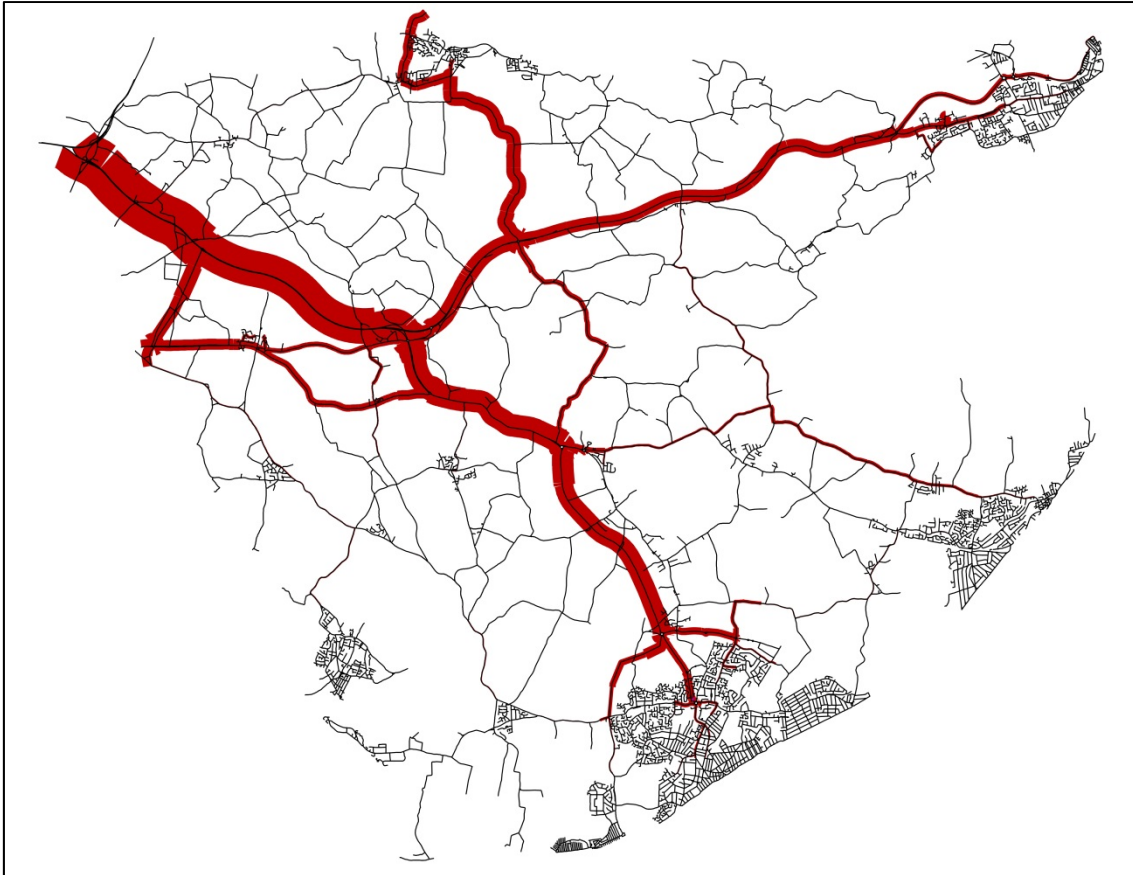
The model determined the most appropriate route for each trip to take, using the link speed limit to identify which route would give the shortest travel time, and assuming that would be the actual route chosen by the trips. The resulting route choice was sense checked and verified through the use of route planning software in both Google Maps and the AA travel planner website⁷. In only a few cases the route determined differed from the route suggested by the route planners. This was rectified by making some minor adjustments to the link speeds in the model. The model was adjusted by increasing or decreasing link speeds appropriately.

⁶ www.openstreetmap.org

⁷ <http://www.theaa.com/route-planner/index.jsp>

The image below illustrates the relative traffic flows on the highway network in Tendring due to new development. The red bands indicate traffic flows, with the wider the band, the greater the traffic flow.

Figure 6: Major Flows



Links which have the highest traffic flows, are the routes to the major population centres in the district, Clacton, Harwich and Manningtree, as well as routes to Colchester.

4.7 Development Flows Through Junctions

The 28 junctions being considered in this study were represented within the modelled network as single nodes (priority and signalised junctions) or as a set of nodes (roundabouts). VISUM assigned a path to every trip and having already identified the location of the key junctions within the network, the flows through these nodes were extracted for processing. For junctions modelled as single nodes, this was extracted simply for each turn at the node. For those modelled by a set of nodes a select link analysis on each arm of the junction was required.

4.8 Junction Modelling

4.8.1 Model Construction

Models for each of the 28 junctions identified in section 3 were built using appropriate software. For roundabouts and priority junctions, Junctions 8 software was used (Arcady and Picady respectively). Signalised junctions were tested using LinSig.

Junction geometries were measured in AutoCAD using high resolution aerial photography scaled against an OS MasterMap background.

For signalised junctions no signal timing data was available, therefore, timings which would best accommodate the traffic flows at the junctions were used.

4.8.2 Traffic Flows

The final flows for the junction modelling are the sum of the development traffic flows extracted from VISUM, and the base year traffic counts multiplied by the appropriate background growth factor. These hourly flows were input to the junction models, and the results produced. The detail of the model output is provided in Appendix B.

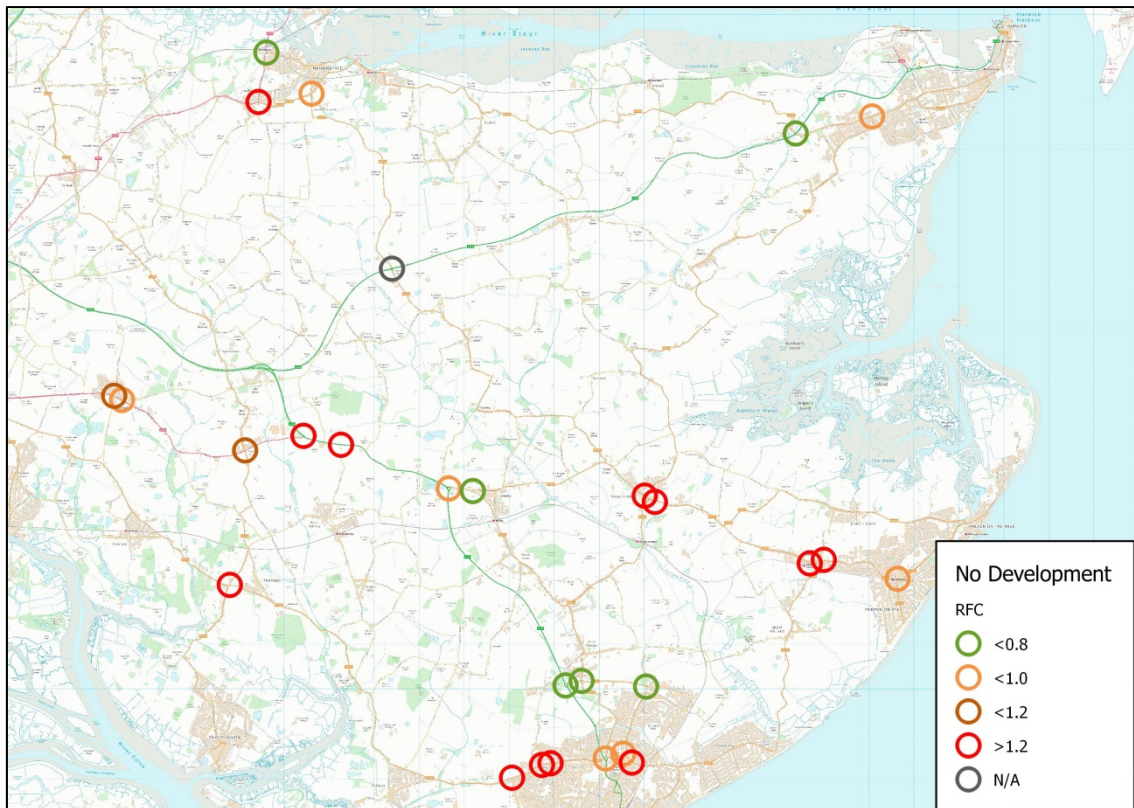
5 Junction Modelling Results

5.1 No Development Scenario

In the “No Development” Scenario, traffic flow through the junctions is assumed to be based on the base year traffic counts, factored up for background growth. The ratio of flow to capacity (RFC) on each arm of a junction was used in order to identify junctions which operate close to or above capacity. If the ratio is less than 0.8 the junction is considered to be performing within capacity. In cases where the ratio is between 0.8 and 1.0 the junction is performing near or at capacity. Additional traffic will increase the RFC and therefore impact on the performance of the junction. Junctions which have a RFC above 1.0 are effectively operating above the junction’s theoretical capacity, resulting in greater delays and queues. The results of the junction modelling are provided in Appendix B.

The image below identifies the maximum RFC for each junction in either time period:

Figure 7: No Development Scenario Junction Impact



The image illustrates that even without the construction of the developments considered in this study, the impact of background growth in the district is that many of the junctions operate with one or more arms over capacity and several have an RFC exceeding 1.2. The red circles in the figure above show that the following junctions are modelled as having at least one arm operating at least 20% over capacity:

- B1033 Frinton Road/Halstead Road
- B1033 Frinton road/B1033 Thorpe Road/B1032 Kirby Road
- B1033 Abbey Street/B1414 Station Road
- B1027 St John's Road/B1027 Valley Road/B1369 Old Road
- B1027 St John's Road/Cloes Lane/Woodrows Lane
- B1027 St John's Road/Little Clacton Road
- B1027 St John's Road/Jaywick Lane
- B1027 Clacton Road/B1029 Station Road/B1027 Tenpenny Hill/B1029 Brightlingsea Road
- A133 Colchester Road/Heckford's Road
- A133 Main Road/Colchester Road/A133 to A120

- A137 Cox's Hill/A137 Wignall Street/B1352 Long road

In addition, the following junctions have at least one arm operating up to 20% above capacity:

- A133 Main Road/B1029 Great Bentley Road/B1029 Bromley Road
- A133 Clacton road/A133 Colchester Road/Church Road/School Road

The following junctions are all modelled as having at least one arm operating close to capacity:

- B1033 Frinton Road/Elm Tree Avenue/B1336 Walton Road/B1033 Connaught Avenue
- A133/B1027 St John's Road/A133 London Road
- B1027 St John's Road/B1369 North road
- A133 Colchester Road/B1033 Colchester Road
- A133 Clacton Road/Bromley Road
- B1352 Long Road/B1035 Clacton Road/B1352 New Road/Trinity Road
- Oakley Road/B1352 Main road/B1352 Ramsey Road

Meanwhile, the junctions listed below are all modelled as operating within capacity.

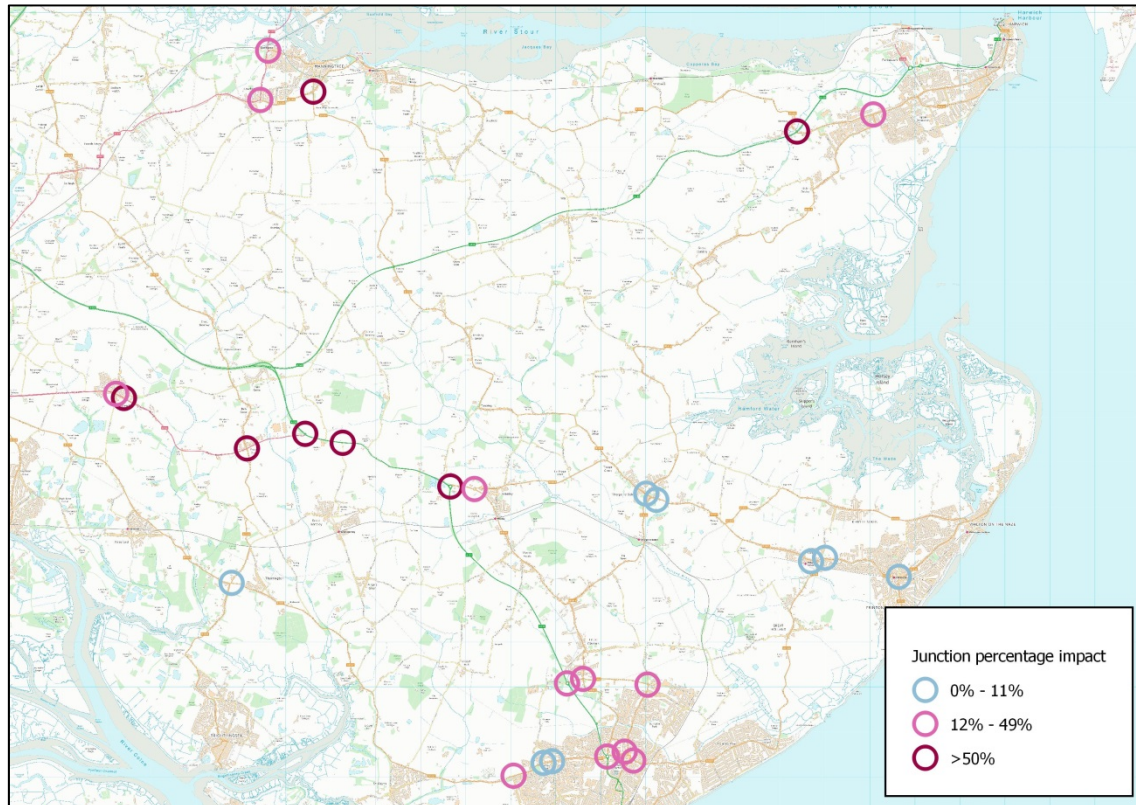
- B1033 Colchester Road/B1441 Weeley bypass
- B1352 Church Hill/A120 Tinker Street/B1352 Wrabness Road
- B1369 Thorpe Road/Stephenson Road West/Thorpe Road/B1442 Centenary Way
- B1442 Progress Way/St Osyth Road/A133
- B1442 Centenary Way/B1441 London Road/B1442 Progress Way
- A137 Cox's Hill/B1352 Station Road/Cotman Avenue

5.2 Full Development Scenario

The full development scenario, in which all development listed in section 2.1 is assumed to come forward, inevitably increases traffic flow through the junctions.

The percentage increase in total traffic flow across the AM and PM peak is illustrated below:

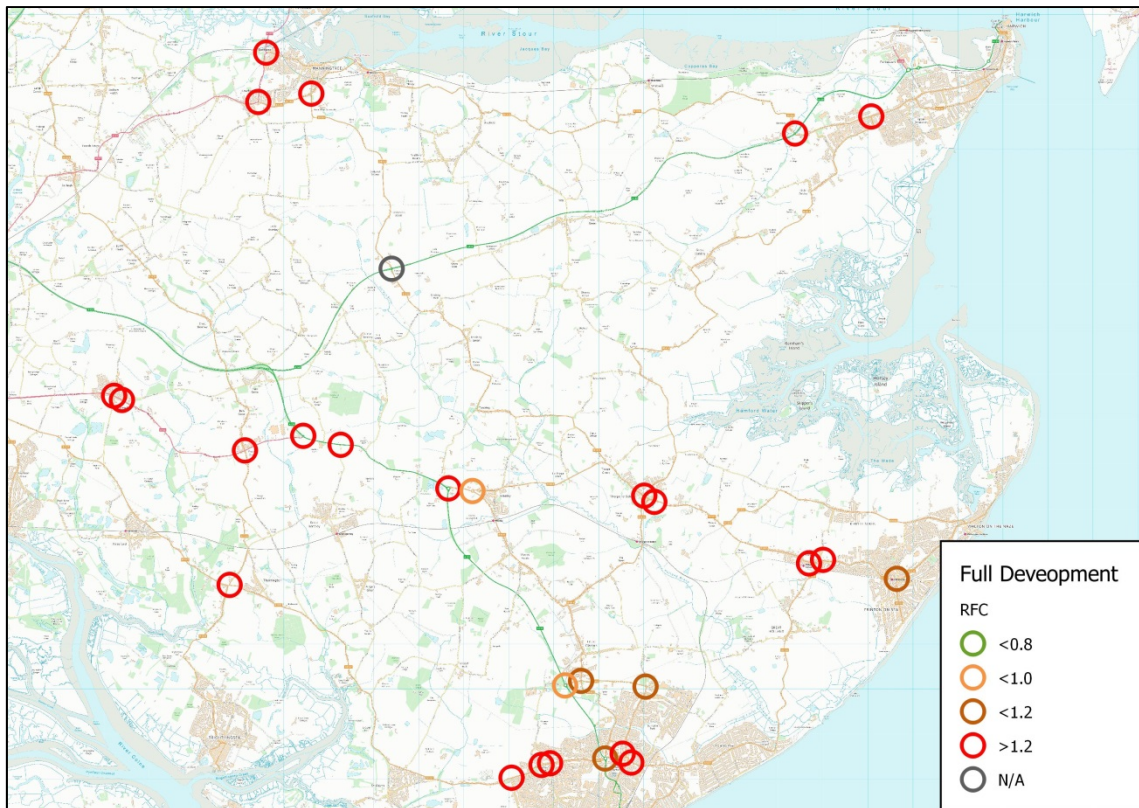
Figure 8: Full Development Percentage Impact



The junctions with the highest increase in traffic flow are on those routes, with almost every junction on the A133 between Weeley and Colchester experiencing traffic increases (above the no development scenario) of greater than 50%. Also notable for traffic increases are junctions in Manningtree and Harwich. Junctions in the direction of Frinton, which has relatively low levels of development, and around the Clacton North-West Relief Road, have the lowest increases in traffic. This accords with Figure 6 which showed development traffic flow is forecast to be highest along the A120 and A133 to the west of the district.

The effect of this additional traffic on junction performance is summarised in the image below. This shows that all of the junctions modelled have at least one arm which is either close to, or over, capacity.

Figure 10: Full Development Junction Impact



6 Potential Junction Mitigation Measures

6.1 Junctions Assessed

There is a need to mitigate the impact of the emerging development at the junctions which have the highest RFC. The junctions where mitigation was considered to be a priority were agreed with both ECC and TDC and include the following:

1. A133 Main Road/B1029 Great Bentley Road/B1029 Bromley Road
2. A133 Main Road/Colchester Road/A133 to A120
3. A133 Colchester Road/B1033 Colchester Road
4. A137 Cox's Hill/B1352 Station Road/Cotman Avenue
5. B1033 Frinton Road/B1033 Thorpe Road/B1032 Kirby Road
6. B1033 Frinton Road/Halstead Road
7. A137 Cox's Hill/A137 Wignall Street/B1352 Long Road
8. A120 Tinker Street/B1352 Wrabness Road/B1352 Church Hill
9. A133/B1442 Progress Way/St Osyth Road
10. A133/B1027 St John's Road/A133 London Road

These junctions were agreed upon as they roughly accord with ECC's priority route network. Notable exclusions from the list are the junctions of the A133 around Elmstead Market and priority junctions of the A133 between Frating and Weeley. For these junctions, the strategic traffic on the A133 has priority over other movements, and therefore is unaffected by delays at these junctions. Whilst there are impacts for vehicles turning from the minor arms at those junctions, they do not impede movement of the more strategic through trips, and were therefore considered less critical junctions.

6.2 Identified Junction Improvements

Of the listed junctions, B1033 Frinton Road/B1033 Thorpe Road/B1032 Kirby Road and B1033 Frinton Road/Halstead Road, have both previously been assessed as part of a transport assessment, and the mitigation measures are therefore based on the data in that report⁸. Similarly, A137 Cox's Hill/A137 Wignall Street/B1352 Long Road has previously been examined as part of a

⁸ Halstead Road Kirby Cross, Proposed Access Arrangements, Stage 1 Road Safety Audit – GM Traffic Consultants – July 2015.

Transport Assessment⁹ for a nearby development, and the proposed improvements therein were used as the mitigation measures in this case.

Additionally, Main Road/Colchester Road/A133 to A120 has been previously examined as part of ECC feasibility work, and that work was used as the mitigation measure for that junction.

The drawings for all four junction improvements are included in Appendix C.

For the junctions that weren't previously examined as a part of a transport assessment or the feasibility study, mitigation measures have been proposed based on assumptions of what might reasonably be deliverable. The mitigation measures were tested by changing the parameters used in the junction models, or in the case of signalised junctions, optimising signal timings. Aspects such as land ownership, utilities and road safety issues were not considered as part of this exercise. Typical mitigation measures at roundabout and priority junctions included changes to geometric measurements i.e. entry width, approach half width, flare length, entry angle etc., addition of dedicated lanes, and an extra lane on the congested arm. These are considered to be lower cost schemes. The changes made were considered only to be indicative of what could potentially be achieved without any assessment of the deliverability of the measures.

6.3 Improvements Arising from Mitigation Measures

The proposed mitigation measures have in general improved the performance of the junctions albeit not always to the extent to which all arms of a junction are performing within the satisfactory level of service. The performance of a junction could be considered satisfactory if the ratio of flow to capacity (RFC) on all arms is below 0.8. An RFC ranging from 0.8 to 1.0 indicates that the arm is reaching its theoretical capacity, whilst an RFC greater than 1.0 indicates that the arm is operating above capacity, and is likely to experience heavy congestion.

For four of the junctions for which drawings relating to the mitigation measures were available, namely- A133 Main Road/Colchester Road/A133 to A120, B1033 Frinton Road/B1033 Thorpe Road/B1032 Kirby Road, B1033 Frinton Road/Halstead Road, and A137 Cox's Hill/A137 Wignall Street/B1352 Long Road, the performance has improved compared to a scenario without mitigation

⁹ Transport Assessment, Tendring Farms Ltd. Long Road, Mistley – Journey Transport Planning – May 2015

measures in place. However, even after applying the proposed mitigation measures there were some junctions for which certain arms were still operating above capacity. In some cases improvements focussed on one arm had a detrimental impact on the performance of another arm at the same junction that was otherwise performing adequately. For example: the RFC of the Wignall Street arm of the A137 Cox's Hill/A137 Wignall Street/B1352 Long Road junction in the AM peak period increased from 1.22 to 1.4 after the application of mitigation measures. This increase occurred because improvements at a different arm of the junction increased capacity, allowing more traffic through in opposition to the flows on Wignall Street.

For those junctions where detailed drawings were not available, the outputs generated after applying the mitigation measures indicate a significant improvement on the performance of the junction. However, although the performance is improved markedly compared to the unmitigated scenario, this still falls below the level of service expected of those junctions in most cases. In a small number of cases, such as in A133/ Progress Way/St Osyth Road junction, the RFC of all arms are below 0.85 in both AM and PM peak period. Detailed model outputs for all junctions and for all scenarios are provided in Appendix D of this document.

In summary, the table below shows the highest RFC (or the equivalent % DoS (Degree of Saturation) for signalised junctions) for each junction before and after mitigation. For comparison, the RFC value in the scenario with no development is also included:

Table 17: Summary of RFCs for Junction Mitigation Measures

Junction	Highest RFC with no development	Highest RFC before mitigation	Highest RFC after mitigation
1. A133 Main Road/B1029 Great Bentley Road/B1029 Bromley Road	106.6% DoS	198.3% DoS	189.7% DoS
2. A133 Main Road/Colchester Road/A133 to A120	1.37	3.51	2.41
3. A133 Colchester Road/B1033 Colchester Road	0.83	2.85	1.53
4. A137 Cox's Hill/B1352 Station Road/Cotman Avenue	0.72	1.39	0.94
5. B1033 Frinton Road/B1033 Thorpe Road/B1032 Kirby Road	1.53	1.7	1.62
6. B1033 Frinton Road/Halstead Road	1.46	1.66	64.1% DoS

7. A137 Cox's Hill/A137 Wignall Street/B1352 Long road	1.37	2.77	2.28
8. A120 Tinker Street/B1352 Wrabness Road/B1352 Church Hill	0.49	9.69	0.97
9. A133/B1442 Progress Way/St Osyth Road	0.63	0.99	0.84
10. A133/B1027 St John's Road/A133 London Road	0.82	1.14	0.97

Within the table, the RFC values have been colour coded according to the RFC value using the scheme in figure 10 above. The table shows that the mitigation measures modelled reduce the RFC value in all cases, however, only for one junction (B1033 Frinton Road/Halstead Road) do the improvements lead to an RFC as good as or better than the no development case.

It should be noted that the RFC values for the 'before mitigation' case in the table above are in some cases extremely high. In reality, were such a situation to occur it is likely that some traffic would reassign away from the junction.

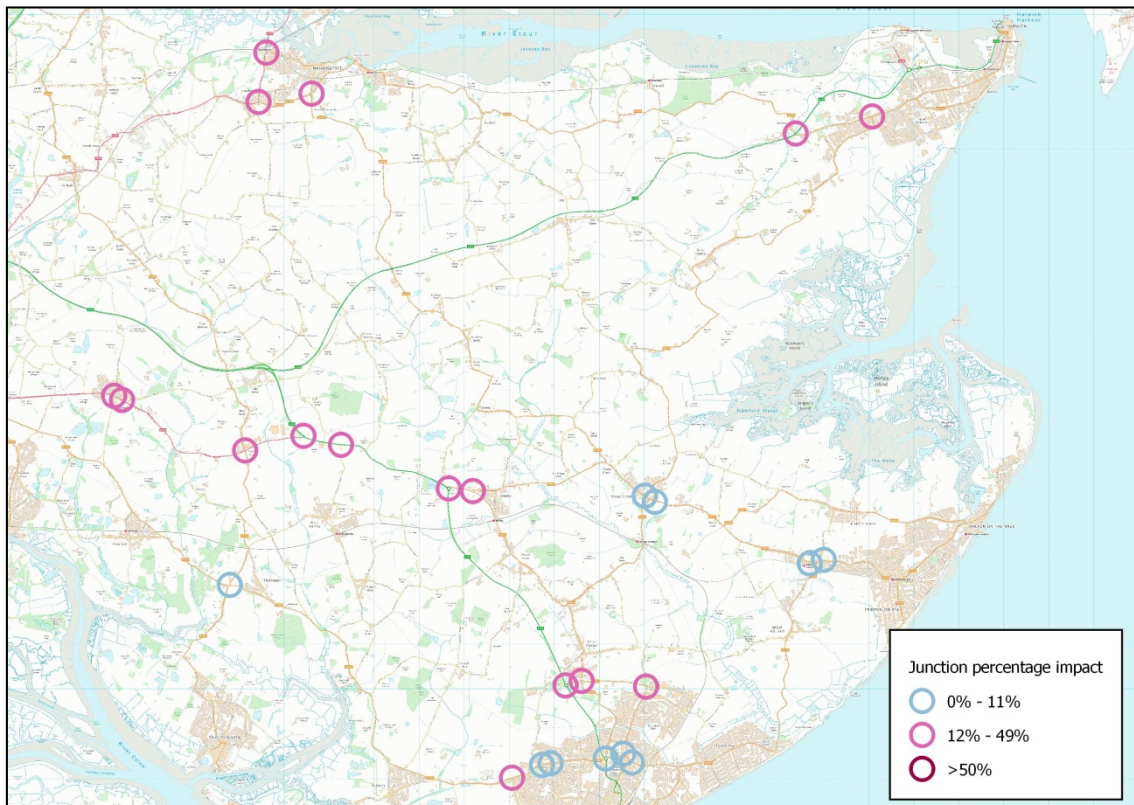
7 Alternative Development Scenarios

7.1 Scenario 1

As identified in section 2.2, the first alternative development scenario removes certain developments from the full scenario which are considered less likely to come forward, or those which are not envisaged to be completed before 2032. It assumes that there will not be any development at Hartley Meadows or Tendring Central, but there will be development at Weeley.

The percentage increases in traffic at the key junctions, over and above 2032 background growth, is illustrated below:

Figure 10: Scenario 1 Percentage Impact



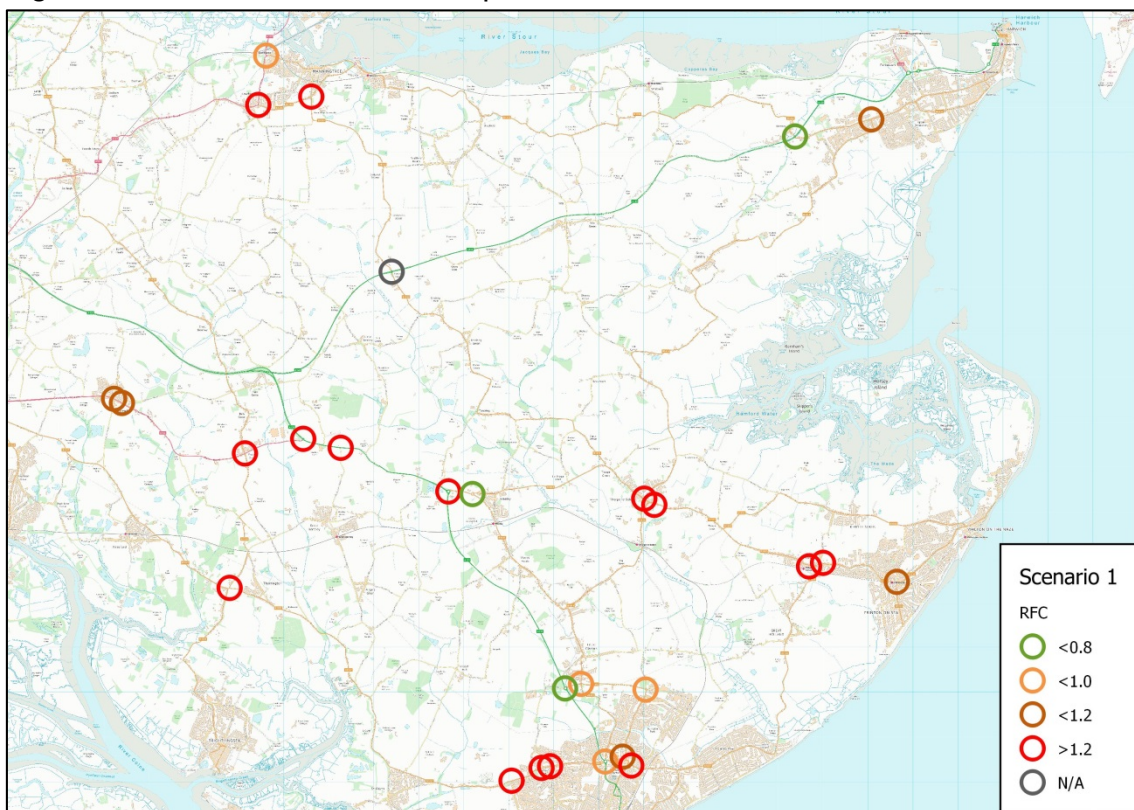
The lower level of development results in junction impacts, in terms of traffic flows that are less pronounced than in the full development scenario. No junction experiences an increase in traffic of more than 50%, whilst for a

number of junctions, notably around Clacton, the increases in traffic are relatively small, at less than 11%.

7.1.1 Junction Modelling Results

Full detailed results of the junction modelling for scenario 1 are included in Appendix B. The image below summarises the RFCs for the junctions considered in this assessment:

Figure 12: Scenario 1 Junction Impact



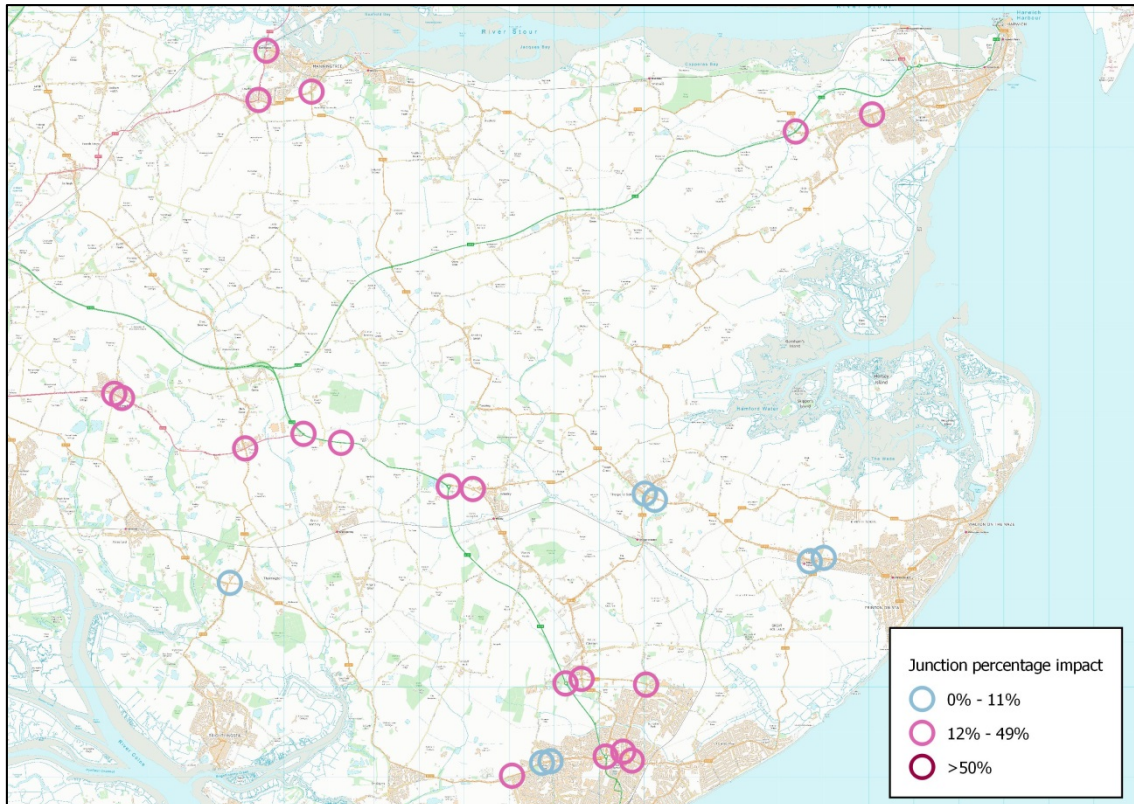
Compared to the full development scenario, a number of junctions show less severe impact, albeit most junctions remain over capacity.

7.2 Scenario 2

Scenario 2 has a similar level of development to scenario 1, except that development at Weeley is not included, but the development at Hartley Meadows, near Clacton is considered.

The percentage impact on the key junctions is shown below:

Figure 12: Scenario 2 Percentage Impact:

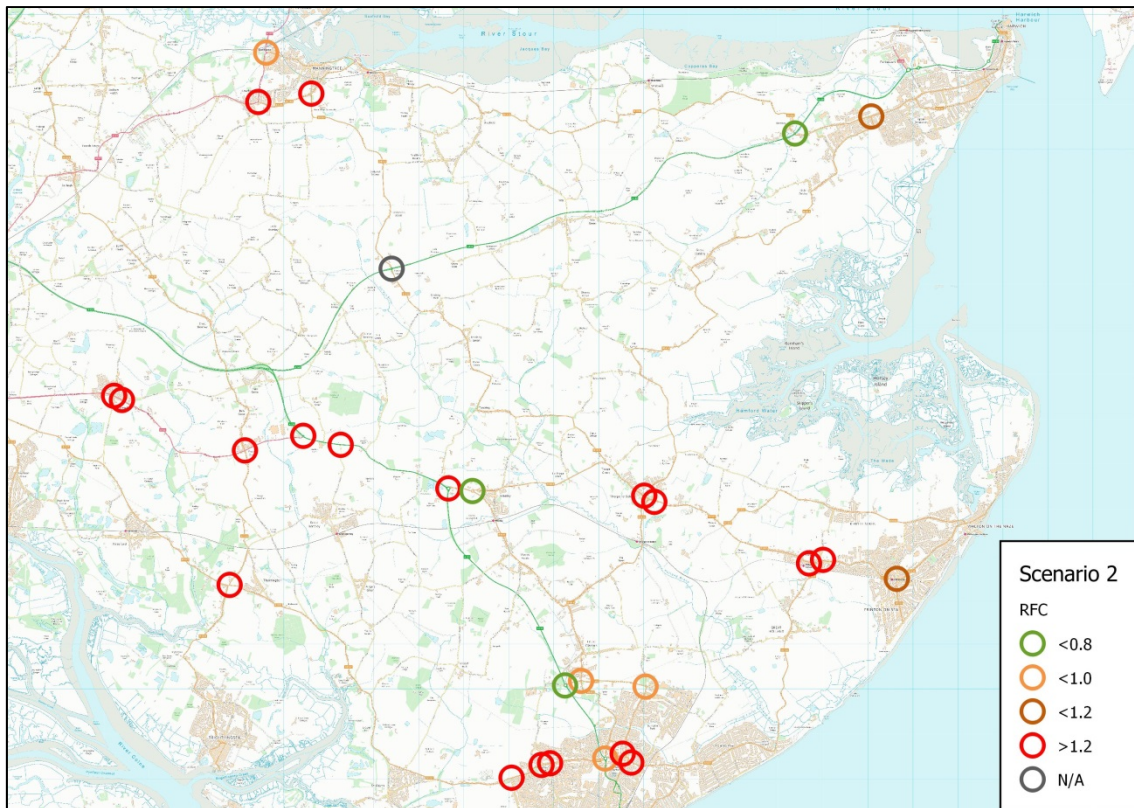


Contrasting this image with that of scenario 1, the only differences are that three junctions around Clacton, which in scenario 1 have an increase in flows of less than 11%, now have an increase of up to 49%. These junctions are all on or to the east of, the A133. This occurs as a result of the change in development location.

7.2.1 Junction Modelling Results

A summary of the modelling results is shown below. Detailed outputs are in Appendix B.

Figure 13: Scenario 2 Junction Impact

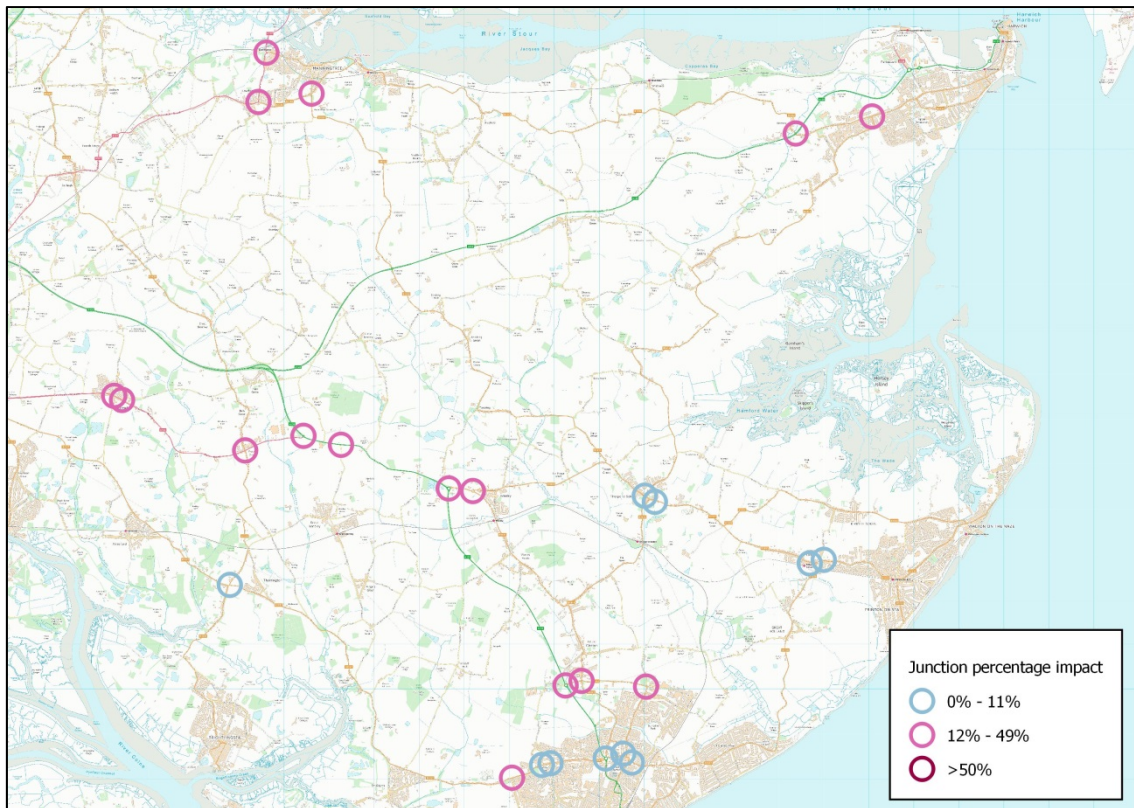


A review of the modelling results from scenario 2 and scenario 1 shows there the results are comparable. However, the junctions on the A133 in Elmstead Market change from being slightly over capacity to being severely over capacity in scenario 2.

7.3 Scenario 3

In scenario 3, development occurs at Tendring Central, rather than around Weeley or Clacton. The percentage increase in traffic is illustrated below:

Figure 15: Scenario 3 Percentage Impact

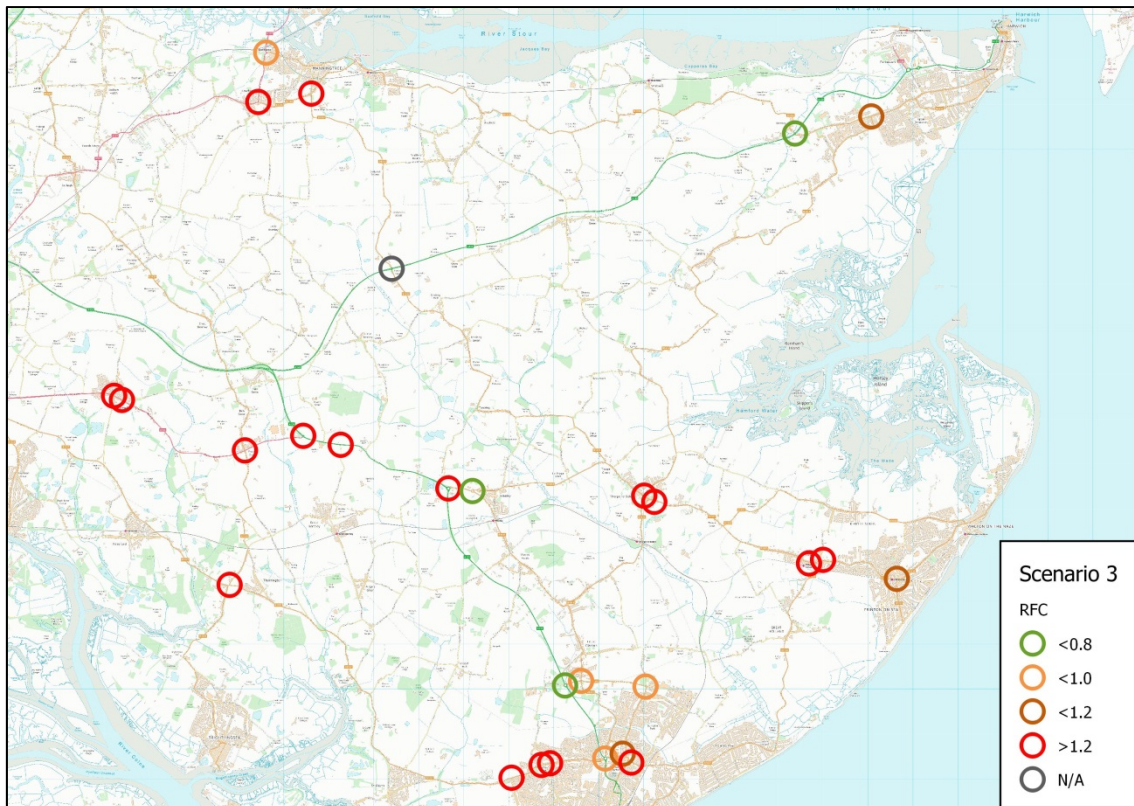


This image shows that there is a comparable level of traffic increase in scenario 3, compared with scenario 1. This suggests that traffic impact, in terms of percentage traffic increase, is similar for the developments at Tendring Central and Weeley.

7.3.1 Junction Modelling Results

A summary of the junction modelling results is shown below. Detailed results are in given in Appendix B.

Figure 16: Scenario 3 Junction Impact



The impacts at the junctions in scenario 3 are in essence the same as in scenario 2. There is one difference, that of the junction of St Johns Road and North Road in Clacton which has reduced slightly to less than 1.2.

7.4 Effects of Junction Mitigation

The full details of the effect of the mitigation measures in these scenarios are given in Appendix D. A summary of the impacts is given below along with the no development values, as a reference:

Table 18: Summary of Junction Mitigation Measures for Scenarios 1 to 3

Junction	Highest RFC with no development	Highest RFC before mitigation - Scenario 1	Highest RFC after mitigation - Scenario 1	Highest RFC before mitigation - Scenario 2	Highest RFC after mitigation - Scenario 2	Highest RFC before mitigation - Scenario 3	Highest RFC after mitigation - Scenario 3
1. A133 Main Road/B1029 Great Bentley Road/B1029 Bromley Road	106.6% DoS	135.0% DoS	101.0% DoS	139.8% DoS	103.3% DoS	156.6% DoS	114.9% DoS
2. A133 Main Road/Colchester Road/A133 to A120	1.37	2.17	1.51	2.18	1.52	2.18	1.65
3. A133 Colchester Road/B1033 Colchester Road	0.83	1.64	0.75	1.76	0.81	1.52	0.7
4. A137 Cox's Hill/B1352 Station Road/Cotman Avenue	0.72	0.96	0.54	0.96	0.54	0.96	0.54
5. B1033 Frinton Road/B1033 Thorpe Road/B1032 Kirby Road	1.53	1.6	1.42	1.62	1.47	1.6	1.42
6. B1033 Frinton Road/Halstead Road	1.46	1.52	87.5% DoS	1.58	89.8% DoS	1.52	87.8% DoS
7. A137 Cox's Hill/A137 Wignall Street/B1352 Long road	1.37	1.9	1.61	1.9	1.61	1.91	1.62
8. A120 Tinker Street/B1352 Wrabness Road/B1352 Church Hill	0.49	0.66	0.55	0.67	0.55	0.67	0.55
9. A133/B1442 Progress Way/St Osyth Road	0.63	0.73	0.65	0.74	0.66	0.72	0.65
10. A133/B1027 St John's Road/A133 London Road	0.82	0.9	0.68	0.85	0.76	0.92	0.71

The table demonstrates that the junctions of A133 Main Road/Colchester Road/A133 to A120, B1033 Frinton Road/B1033 Thorpe Road/B1032 Kirby Road and A137 Cox's Hill/A137 Wignall Street/B1352 Long Road have relatively high RFC values even with mitigation measures applied, and these values are higher than in the no development scenario. For the A133 Main Road/B1029 Great Bentley Road/B1029 Bromley Road, the mitigation measures bring the junction almost to within capacity, and to a comparable level as in the no development scenario. For all other junctions however, the mitigation measures work to reduce RFC values to less than 1, and at a level comparable with the no development scenario.

8 Summary

8.1 Key Findings

The modelling indicates that a number of junctions in Tendring District will experience high levels of congestion, with 13 junctions forecast to have one or more arms with an RFC greater than 1.0. This is expected to occur even without the emerging local plan developments.

If the full level of development was expected to come forward, then every single key junction assessed has been modelled as showing at least one arm of the junction which is close to, or above capacity in either AM or PM peak hour (or both). In some cases, the junctions are significantly over capacity. For the 13 junctions that are modelled as overcapacity even without development, the development trips exacerbate the situation. Junctions which operate within capacity in the absence of development all operate over capacity in the full development scenario.

The alternative development scenarios all show improved junction performance compared to the full development scenario; however, there is still forecast to be a significant number of junctions operating over capacity during the peak hours.

A sub-set of the junctions were assessed to identify what lower cost junction improvements could do to mitigate the impacts of development. The mitigation measures have shown that there is scope to improve junction performance at identified junctions. In the full development scenario, except for the Frinton Road/Halstead Road and A133/Progress Way/St Osyth Road junctions, all have a RFC above the threshold level of service in either AM or PM peak period, although this performance is better in comparison to the scenario where no mitigation measures were in place.

For the alternative development scenarios, the mitigation measures are largely successful in bringing junction performance to within acceptable levels, with the exception of A133 Main Road/Colchester Road/A133 to A120, B1033 Frinton Road/B1033 Thorpe Road/B1032 Kirby Road and A137 Cox's Hill/A137 Wignall Street/B1352 Long Road.

The modelling work conducted indicates that in general, the local plan proposals are expected to have a detrimental impact on junctions within Tendring. However, there is significant scope to mitigate some of these

impacts, through alternative development scenarios, and/or improvements to junctions.

8.2 Limitations of Work and Potential for Further Work

The assessment undertaken as part of this study utilises a combination of techniques and data, including TRICS trip rates, 2011 national census data including census journey to work data and posted speed limits, and is a robust use of the available data. However, there is currently no strategic traffic model available and therefore a number of caveats apply to the work.

Because there was no demand model available for use in the assessment, the effects of peak spreading (changing travel times to outside of the peak period), and mode shift, which would serve to lower the forecast year traffic flows, have not been encapsulated in the model. Also, the lack of availability of an assignment model means that the potential for changes in route choice, in which for example a trip may divert or 'rat-run' to avoid areas of congestion, have not been encapsulated. Were an assignment model available, it is likely that as a result of reassignment, certain congested junctions would have reduced traffic flows at the expense of increased traffic flows in quieter parts of the road network.

It is possible that as a result of the lack of a demand and assignment model, therefore, that traffic flows, and by extension, congestion, may be overestimated for certain junctions. The results presented in this report therefore arguably represent a worst case.

The mitigation measures that were tested for some of the junctions have demonstrated that there is the potential for traffic impacts for new development to be mitigated. The measures that have been tested for the purposes of this assessment are only indicative measures designed to identify the potential for junction improvements.

As a consideration for further work, refinements to the development scenarios, and refinements to the junction mitigation measures may go some way to alleviating the junction congestion problems identified from the current work.

Appendix A Trip Rates for Employment Sites

Office – B1	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
AM peak Arrival	0.004	0.171	0.031	0.028	0.051
AM peak Departure	0	0.028	0.007	0	0
PM peak Arrival	0	0.022	0.005	0.001	0.002
PM peak Departure	0.004	0.152	0.029	0.025	0.046

Business Park – B1, B2, B8	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
AM peak Arrival	0.005	0.311	0.016	0.024	0.002
AM peak Departure	0	0.038	0.005	0.002	0
PM peak Arrival	0.001	0.045	0.003	0.002	0
PM peak Departure	0.005	0.291	0.017	0.021	0.002

Industrial estate – B2	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
AM peak Arrival	0.011	0.349	0.017	0.006	0
AM peak Departure	0	0.2	0.004	0	0
PM peak Arrival	0.002	0.13	0.002	0	0
PM peak Departure	0.012	0.317	0.017	0.002	0

Warehouse – B8	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
AM peak Arrival	0.009	0.149	0.016	0.014	0.003
AM peak Departure	0	0.042	0.002	0	0
PM peak Arrival	0	0.061	0.003	0.002	0
PM peak Departure	0.008	0.156	0.007	0.012	0.002

Food Store – A1	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
AM peak Arrival	0.004	0.713	0.115	0.011	0.013
AM peak Departure	0.002	0.51	0.126	0.004	0.002
PM peak Arrival	0.011	1.521	0.198	0.015	0.011
PM peak Departure	0.007	1.555	0.21	0.019	0.006

Non Food Retail – A1	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
AM peak Arrival	0.047	0.404	0.339	0	0
AM peak Departure	0	0.187	0.333	0	0
PM peak Arrival	0.029	0.409	0.111	0	0
PM peak Departure	0.058	0.509	0.111	0.012	0

Cinema – D2	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
AM peak Arrival	0	0	0	0	0
AM peak Departure	0	0	0	0	0
PM peak Arrival	0	0.789	0.237	0.316	0
PM peak Departure	0	1.105	0.237	0.211	0

Hotel – C1	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
AM peak Arrival	0.008	0.261	0.089	0.011	0.013
AM peak Departure	0.002	0.466	0.201	0.025	0.04
PM peak Arrival	0.005	0.409	0.214	0.019	0.043
PM peak Departure	0.002	0.319	0.155	0.008	0.022

Restaurant – A3	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
AM peak Arrival	0	0	0	0	0
AM peak Departure	0	0	0	0	0
PM peak Arrival	0	0.757	0.057	0.014	0
PM peak Departure	0	0.729	0.029	0	0

Drive Through – A5	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
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AM peak Arrival	0	0.3	0.283	0.1	0
AM peak Departure	0	0.217	0.267	0	0
PM peak Arrival	0	1.722	0.264	0.056	0
PM peak Departure	0	1.611	0.208	0	0

Pub/Restaurant – A4	Cyclists	Vehicle Occupants	Pedestrians	Bus / Tram Passengers	Rail Passengers
AM peak Arrival	0	0	0	0	0
AM peak Departure	0	0	0	0	0
PM peak Arrival	0	0.508	0.798	0.105	0.903
PM peak Departure	0	0.395	0.46	0.032	0.379

Appendix B Junction Model Outputs

A137 Wignall St / A137 Cox's Hill / B1352 Long Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 – Full Development			
Arm A	915.13	3889.44	2.1	F
Arm B	87.96	479.55	1.22	F
Arm C	347.78	1781.79	1.61	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 – Full development			
Arm A	273.91	1153.88	1.44	F
Arm B	254.35	1425.16	1.51	F
Arm C	1358.09	6654.22	2.77	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	239.69	1143.07	1.42	F
Arm B	6.52	37.11	0.88	E
Arm C	101.86	525.83	1.27	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	9.81	49.52	0.93	E
Arm B	55.16	213.47	1.13	F
Arm C	556.93	2886.93	1.9	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	231.77	1100.58	1.41	F

Arm B	6.44	36.69	0.88	E
Arm C	104.18	537.45	1.27	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	10.6	52.92	0.94	F
Arm B	57.23	221.67	1.13	F
Arm C	559.64	2914.59	1.9	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	244.64	1162.94	1.43	F
Arm B	6.66	37.93	0.89	E
Arm C	107.46	553	1.28	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	10.83	53.88	0.94	F
Arm B	57.94	224.49	1.14	F
Arm C	563.71	2939.91	1.91	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	11.66	64.22	0.96	F
Arm B	2.48	13.59	0.72	B
Arm C	14.09	80.91	0.97	F

	PM			
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	Queue (Veh)	Delay (s)	RFC	LOS
A1 - No Development				
Arm A	1.56	12.54	0.61	B
Arm B	5.39	23.91	0.85	C
Arm C	140.79	734.07	1.37	F

A120 Tinker St / B1353 Wrabness Rd / B1352 Church Hill

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - Full Development				
Arm A	1.24	5.1	0.56	A
Arm B	8.7	23.22	0.91	C
Arm C	1.82	5.24	0.65	A
Arm D	0.65	14.81	0.4	B

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - Full Development				
Arm A	1.36	6.07	0.58	A
Arm B	1.48	5.11	0.6	A
Arm C	196.21	324.16	1.18	F
Arm D	207.88	34175.87	9.69	F

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 1				
Arm A	0.51	3.11	0.34	A
Arm B	1.1	4.16	0.53	A
Arm C	0.61	2.95	0.38	A
Arm D	0.27	6.47	0.22	A

PM				
	Queue (Veh)	Delay (s)	RFC	LOS

	A1 - With Development Scenario 1			
Arm A	0.5	3.36	0.33	A
Arm B	0.34	2.46	0.25	A
Arm C	1.94	5.15	0.66	A
Arm D	1.17	19.33	0.54	C

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	0.52	3.11	0.34	A
Arm B	1.11	4.19	0.53	A
Arm C	0.61	2.95	0.38	A
Arm D	0.27	6.48	0.22	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	0.5	3.39	0.33	A
Arm B	0.35	2.48	0.26	A
Arm C	2	5.25	0.67	A
Arm D	1.22	20.14	0.56	C

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	0.53	3.13	0.35	A
Arm B	1.12	4.22	0.53	A
Arm C	0.61	2.95	0.38	A
Arm D	0.27	6.49	0.22	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	0.5	3.37	0.33	A

Arm B	0.34	2.46	0.25	A
Arm C	1.99	5.23	0.67	A
Arm D	1.21	19.98	0.55	C

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.42	2.82	0.29	A
Arm B	0.5	2.87	0.33	A
Arm C	0.42	2.58	0.3	A
Arm D	0.23	5.45	0.19	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.33	2.64	0.25	A
Arm B	0.18	2.11	0.15	A
Arm C	0.96	3.42	0.49	A
Arm D	0.57	9.36	0.37	A

B1352 Ramsey Rd / B1352 Main Rd / Oakley Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	5.19	21.16	0.85	C
Arm B	77.84	427.22	1.26	F
Arm C	8.44	47	0.92	E

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	15	55.14	0.96	F
Arm B	30.92	176.53	1.08	F

Arm C	427.56	1902.81	1.67	F
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	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	1.99	9.92	0.67	A
Arm B	8.17	52.35	0.92	F
Arm C	2.96	19.62	0.76	C

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	1.75	9.7	0.64	A
Arm B	2.48	17.68	0.72	C
Arm C	54.07	211.02	1.12	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	1.99	9.92	0.67	A
Arm B	8.17	52.35	0.92	F
Arm C	2.96	19.62	0.76	C

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	1.75	9.7	0.64	A
Arm B	2.48	17.68	0.72	C
Arm C	54.07	211.02	1.12	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	1.99	9.92	0.67	A

Arm B	8.17	52.35	0.92	F
Arm C	2.96	19.62	0.76	C

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	1.75	9.7	0.64	A
Arm B	2.48	17.68	0.72	C
Arm C	54.07	211.02	1.12	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	1.44	7.94	0.59	A
Arm B	1.8	15.24	0.65	C
Arm C	1.81	13.12	0.65	B

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	1.18	7.33	0.54	A
Arm B	1.46	12.15	0.6	B
Arm C	11.8	61.08	0.95	F

A120 to A133 / A133 Main Rd / A133 Colchester Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	3718.34	8912.8	3.51	F
Arm B	293.15	1049.53	1.38	F
Arm C	16.82	31.48	0.96	D

	PM			
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	Queue (Veh)	Delay (s)	RFC	LOS
A1 - Full Development				
Arm A	1558.56	3816.03	2.09	F
Arm B	539.87	1839.62	1.61	F
Arm C	2235.9	3623.45	2.04	F

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 1				
Arm A	1681.76	3868.1	2.17	F
Arm B	5.13	22.99	0.85	C
Arm C	2.56	6.07	0.72	A

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 1				
Arm A	251.68	608.28	1.28	F
Arm B	9.55	40.16	0.92	E
Arm C	335.7	537.81	1.29	F

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 2				
Arm A	1702.35	3914.27	2.18	F
Arm B	5.71	25.29	0.86	D
Arm C	2.68	6.33	0.73	A

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 2				
Arm A	304.63	722.87	1.32	F
Arm B	11.64	47.46	0.94	E

Arm C	379.92	603.59	1.31	F
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	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	1560.93	3758.59	2.18	F
Arm B	148.72	515.22	1.23	F
Arm C	3.08	6.89	0.76	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	316.11	861.06	1.36	F
Arm B	87.57	266.49	1.14	F
Arm C	475.99	752.72	1.34	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	344	798.58	1.37	F
Arm B	3.15	15.03	0.77	C
Arm C	1.57	4.31	0.61	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	4.86	15.32	0.84	C
Arm B	1.49	7.87	0.6	A
Arm C	3.63	7.37	0.79	A

A133 Colchester Rd / Tendring Park Services

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS

	A1 - Full Development			
Arm A	193.57	395.96	1.26	F
Arm B	255.68	1E+10	1E+10	F
Arm C	2523.52	8087.13	2.85	F
Arm D	0.04	35.33	0.04	E
Arm E	38.36	51.19	1	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	6.03	14.28	0.86	B
Arm B	45.78	572.87	1.55	F
Arm C	524.93	1411.09	1.64	F
Arm D	0	0	0	A
Arm E	2.88	5.39	0.74	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	2.25	6.68	0.69	A
Arm B	7.55	111.53	0.94	F
Arm C	741.3	1816.36	1.76	F
Arm D	0	0	0	A
Arm E	3.25	5.95	0.77	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	2.11	6.26	0.68	A
Arm B	4.59	70.42	0.85	F
Arm C	427.39	1063.56	1.52	F
Arm D	0	0	0	A
Arm E	2.96	5.53	0.75	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.96	3.67	0.49	A
Arm B	0.97	13.95	0.5	B
Arm C	4.55	14.77	0.83	B
Arm D	0	0	0	A
Arm E	1.77	3.89	0.64	A

Note: PM models were not run for this junction due to erroneous traffic count data

Colchester Rd / Thorpe Rd / Weeley Bypass

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	6.07	21.69	0.87	C
Arm B	0.57	4.66	0.36	A
Arm C	0.61	2.62	0.38	A
Arm D	0	0	0	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	3.41	13.22	0.78	B
Arm B	0.49	4.22	0.33	A
Arm C	0.42	2.32	0.3	A
Arm D	0	0	0	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	2.22	9.59	0.69	A

Arm B	0.43	3.91	0.3	A
Arm C	0.42	2.31	0.3	A
Arm D	0	0	0	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	2.28	9.77	0.7	A
Arm B	0.43	3.92	0.3	A
Arm C	0.42	2.3	0.3	A
Arm D	0	0	0	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.87	5.51	0.47	A
Arm B	0.37	3.33	0.27	A
Arm C	0.34	2.17	0.26	A
Arm D	0	0	0	A

Note: PM models were not run for this junction due to erroneous traffic count data

B1414 Landermere Rd / B1033 Abbey St

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	39.53	125.96	1.05	F
Arm B	3.31	20.74	0.78	C
Arm C	25.56	200.58	1.09	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	6.59	27.34	0.88	D
Arm B	218.40	901.98	1.42	F

Arm C	7.61	97.44	0.93	F
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	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	16.87	63.85	0.98	F
Arm B	2.62	17.00	0.73	C
Arm C	9.33	89.62	0.95	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	3.66	16.42	0.79	C
Arm B	140.39	588.97	1.29	F
Arm C	3.77	57.30	0.81	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	16.87	63.84	0.98	F
Arm B	2.64	17.09	0.73	C
Arm C	9.42	90.40	0.95	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	3.68	16.50	0.79	C
Arm B	141.29	592.28	1.29	F
Arm C	3.77	57.33	0.81	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	16.87	63.84	0.98	F
Arm B	2.64	17.09	0.73	C
Arm C	9.42	90.40	0.95	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	3.68	16.50	0.79	C
Arm B	141.29	592.28	1.29	F
Arm C	3.77	57.33	0.81	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	12.03	48.16	0.95	E
Arm B	2.43	15.97	0.71	C
Arm C	7.03	70.81	0.91	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	3.12	14.44	0.76	B
Arm B	120.77	509.56	1.26	F
Arm C	3.12	49.84	0.78	E

B1033 Thorpe Rd / B1033 Frinton Rd / B1032 Kirby Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	480.81	2160.34	1.7	F
Arm B	97.3	603.65	1.26	F
Arm C	17.58	122.47	1.01	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	211.25	957.66	1.38	F
Arm B	198.79	1194.73	1.45	F
Arm C	93.83	616.98	1.27	F

	AM			
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	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 1				
Arm A	381.22	1729.46	1.6	F
Arm B	53.96	328.59	1.15	F
Arm C	10.84	82.64	0.96	F

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 1				
Arm A	109.51	507.97	1.23	F
Arm B	118.02	699.57	1.31	F
Arm C	62.3	408.65	1.19	F

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 2				
Arm A	406.29	1836.7	1.62	F
Arm B	65.02	406.86	1.19	F
Arm C	11.38	86.5	0.96	F

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 2				
Arm A	154.16	689.86	1.3	F
Arm B	157.37	926.78	1.37	F
Arm C	66.9	450.05	1.2	F

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 3				
Arm A	381.22	1729.46	1.6	F
Arm B	53.96	328.59	1.15	F
Arm C	10.84	82.64	0.96	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	109.51	507.97	1.23	F
Arm B	118.02	699.57	1.31	F
Arm C	62.3	408.65	1.19	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	321.32	1473.48	1.53	F
Arm B	42.09	245.8	1.11	F
Arm C	9.95	76.19	0.95	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	79.98	361.42	1.18	F
Arm B	78.75	491.74	1.23	F
Arm C	55.89	353.91	1.17	F

Halstead Rd / B1033 Frinton Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	379.6	1739.92	1.63	F
Arm B	228.23	967.21	1.39	F
Arm C	1.1	16.41	0.53	C

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	107.23	495.98	1.24	F

Arm B	499.25	2039.57	1.66	F
Arm C	0.71	12.63	0.42	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	284.54	1321.05	1.51	F
Arm B	148.19	625.19	1.28	F
Arm C	1.02	15.65	0.51	C

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	45.98	183.9	1.09	F
Arm B	348.56	1450.09	1.52	F
Arm C	0.65	12.08	0.4	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	307.62	1424.76	1.54	F
Arm B	167	696.49	1.31	F
Arm C	1.02	15.73	0.51	C

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	72.72	311.94	1.16	F
Arm B	412.36	1700.97	1.58	F
Arm C	0.65	12.21	0.4	B

	AM			
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	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 3				
Arm A	284.54	1321.05	1.51	F
Arm B	148.19	625.19	1.28	F
Arm C	1.02	15.65	0.51	C

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 3				
Arm A	45.98	183.9	1.09	F
Arm B	348.56	1450.09	1.52	F
Arm C	0.65	12.08	0.4	B

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - No Development				
Arm A	253.1	1138.48	1.46	F
Arm B	123.13	530.18	1.24	F
Arm C	0.72	13.31	0.42	B

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - No Development				
Arm A	30.81	130.06	1.04	F
Arm B	285.19	1190.86	1.45	F
Arm C	0.54	11.56	0.35	B

Elm Tree Ave / B1336 Walton Rd / B1033 Frinton Rd

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - Full Development				
Arm A	32.96	122.35	1.04	F
Arm B	0.77	9.29	0.44	A

Arm C	27.31	256.55	1.14	F
Arm D	2.19	11.7	0.69	B

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	28.92	113.81	1.03	F
Arm B	0.47	7.28	0.32	A
Arm C	1.94	23.1	0.67	C
Arm D	4.21	19.27	0.82	C

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	15.05	65.34	0.97	F
Arm B	0.69	8.61	0.41	A
Arm C	14.17	144.37	1.02	F
Arm D	1.88	10.59	0.66	B

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	12.38	57.27	0.95	F
Arm B	0.42	6.83	0.3	A
Arm C	1.53	18.92	0.61	C
Arm D	2.88	14.07	0.75	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	16.56	70.61	0.98	F
Arm B	0.69	8.68	0.41	A
Arm C	15.12	152.88	1.03	F
Arm D	1.92	10.7	0.66	B

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	14.55	65.45	0.97	F
Arm B	0.42	6.92	0.3	A
Arm C	1.58	19.61	0.62	C
Arm D	3.1	14.89	0.76	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	15.05	65.34	0.97	F
Arm B	0.69	8.61	0.41	A
Arm C	14.17	144.37	1.02	F
Arm D	1.88	10.59	0.66	B

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	12.38	57.27	0.95	F
Arm B	0.42	6.83	0.3	A
Arm C	1.53	18.92	0.61	C
Arm D	2.88	14.07	0.75	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	11.74	53.15	0.95	F
Arm B	0.67	8.39	0.4	A
Arm C	11.73	122.27	0.99	F
Arm D	1.85	10.5	0.65	B

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS

	A1 - No Development			
Arm A	10.48	49.78	0.94	E
Arm B	0.41	6.73	0.29	A
Arm C	1.47	18.2	0.6	C
Arm D	2.6	13.02	0.73	B

B1029 Brightlingsea Rd / B1027 Tenpenny Hill / B1027 Clacton Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	188.43	772.67	1.36	F
Arm B	783.93	6185.38	2.61	F
Arm C	6.22	39.68	0.88	E

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	307.36	1204.82	1.45	F
Arm B	111.19	718.2	1.31	F
Arm C	442.44	2293.05	1.73	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	108.99	461.31	1.24	F
Arm B	681.42	5545.17	2.48	F
Arm C	4.41	29	0.83	D

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	204.94	772.23	1.33	F
Arm B	60.65	407.5	1.19	F

Arm C	360.21	1847.06	1.63	F
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	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	109.02	461.53	1.24	F
Arm B	682.2	5558.65	2.48	F
Arm C	4.4	28.96	0.83	D

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	204.88	771.89	1.33	F
Arm B	60.28	405.03	1.19	F
Arm C	360.9	1849.28	1.63	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	122.86	525.81	1.26	F
Arm B	709.75	5698.92	2.51	F
Arm C	4.71	30.92	0.84	D

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	229.67	876.55	1.36	F
Arm B	68.13	461.79	1.21	F
Arm C	367.96	1899.87	1.64	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			

Arm A	61.24	222.26	1.12	F
Arm B	524.8	3976.5	2.19	F
Arm C	3.65	25.12	0.8	D

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	61.24	222.26	1.12	F
Arm B	524.8	3976.5	2.19	F
Arm C	3.65	25.12	0.8	D

B1029 Brightlingsea Rd / B1027 Tenpenny Hill / B1027 Clacton Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	6.72	69.29	0.91	F
Arm B	27.23	126.13	1.04	F
Arm C	27.45	97.65	1.02	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	237.59	1947.84	1.8	F
Arm B	9.05	46.86	0.92	E
Arm C	54.8	170.69	1.09	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	2.68	32.55	0.74	D
Arm B	10.2	54.9	0.94	F
Arm C	10.18	43.24	0.93	E

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	145.56	1158.31	1.61	F
Arm B	6.09	32.62	0.88	D
Arm C	20.46	76.67	0.99	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	2.65	32.24	0.74	D
Arm B	10.25	55.06	0.94	F
Arm C	10.18	43.24	0.93	E

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	145.16	1156.92	1.61	F
Arm B	6.13	32.8	0.88	D
Arm C	20.45	76.64	0.99	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	3.37	38.81	0.79	E
Arm B	12.15	64.59	0.96	F
Arm C	13.69	55.78	0.96	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	171.17	1329.05	1.67	F

Arm B	6.2	33.29	0.88	D
Arm C	25.11	90.21	1.01	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	2.21	27.6	0.7	D
Arm B	4.77	28.05	0.84	D
Arm C	6.35	28.37	0.88	D

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	83.79	619.48	1.38	F
Arm B	4.8	27.25	0.84	D
Arm C	7.17	31.32	0.89	D

A133 / St Osyth Rd / Progress Way

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	19.65	58.31	0.99	F
Arm B	3.08	10.36	0.76	B
Arm C	3.22	20.38	0.77	C
Arm D	11.5	24.31	0.93	C

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	2.21	8.24	0.69	A
Arm B	1.33	5.37	0.57	A
Arm C	1.34	8.61	0.58	A
Arm D	2.69	6.81	0.73	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	2.48	9.08	0.72	A
Arm B	1.53	5.82	0.61	A
Arm C	1.43	9.22	0.59	A
Arm D	2.84	7.13	0.74	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	2.21	8.2	0.69	A
Arm B	1.46	5.67	0.59	A
Arm C	1.4	9.04	0.59	A
Arm D	2.56	6.57	0.72	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.66	4.02	0.4	A
Arm B	0.84	3.67	0.46	A
Arm C	0.83	5.33	0.46	A
Arm D	1.69	4.93	0.63	A

Note: PM models were not run for this junction due to erroneous traffic count data

Progress Way / London Rd / Centenary Way

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	109.13	345.52	1.2	F
Arm B	1.45	14.75	0.6	B

Arm C	23.42	79.43	1	F
Arm D	5.36	26.09	0.86	D

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	7.24	29.86	0.89	D
Arm B	0.99	10.48	0.5	B
Arm C	2.95	13.7	0.75	B
Arm D	2.04	10.71	0.68	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	9.16	36.87	0.92	E
Arm B	1.03	10.96	0.51	B
Arm C	3.58	16	0.79	C
Arm D	2.2	11.54	0.69	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	7.37	30.34	0.89	D
Arm B	0.99	10.52	0.5	B
Arm C	2.79	13.16	0.74	B
Arm D	2	10.5	0.67	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	1	6.89	0.5	A
Arm B	0.59	6.18	0.37	A
Arm C	1.72	9.34	0.64	A
Arm D	1.67	8.7	0.63	A

Note: PM models were not run for this junction due to erroneous traffic count data

Thorpe Rd / Centenary Way / Stephenson Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	0.35	5.04	0.26	A
Arm B	2.49	8.9	0.72	A
Arm C	2.29	8.89	0.7	A
Arm D	70.21	217.98	1.13	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	6.23	33.09	0.88	D
Arm B	3.37	13.23	0.78	B
Arm C	48.94	118.57	1.06	F
Arm D	59.43	174.61	1.1	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	0.3	4.52	0.23	A
Arm B	1.12	5.41	0.53	A
Arm C	1.13	5.62	0.53	A
Arm D	12.48	48.4	0.95	E

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	2.11	11.27	0.68	B
Arm B	1.08	5.98	0.52	A
Arm C	3.14	11.41	0.76	B

Arm D	5.36	20.39	0.85	C
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	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	0.31	4.62	0.23	A
Arm B	1.16	5.56	0.54	A
Arm C	1.26	5.96	0.56	A
Arm D	17.51	64.5	0.98	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	2.41	12.96	0.71	B
Arm B	1.21	6.56	0.55	A
Arm C	4.08	14.12	0.81	B
Arm D	7.98	29.26	0.9	D

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	0.29	4.48	0.23	A
Arm B	1.13	5.44	0.53	A
Arm C	1.09	5.53	0.52	A
Arm D	11.85	46	0.94	E

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	2.08	11.15	0.68	B
Arm B	1.04	5.86	0.51	A
Arm C	3.08	11.26	0.76	B
Arm D	5.33	20.22	0.85	C

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.19	3.14	0.16	A
Arm B	0.73	3.68	0.42	A
Arm C	0.77	4.59	0.43	A
Arm D	0.77	5.98	0.44	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	1.12	6.17	0.53	A
Arm B	0.55	3.85	0.35	A
Arm C	0.71	4.38	0.42	A
Arm D	1.28	6.98	0.56	A

B1027 St Johns Rd / Jaywick Ln (3 arm)

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	113.49	657	1.29	F
Arm B	11.95	85.38	0.96	F
Arm C	94.13	381.96	1.2	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	330.43	1811.53	1.6	F
Arm B	72.9	509.62	1.23	F
Arm C	384.24	1537.5	1.54	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS

	A1 - With Development Scenario 1			
Arm A	113.49	657	1.29	F
Arm B	11.95	85.38	0.96	F
Arm C	94.13	381.96	1.2	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	330.43	1811.53	1.6	F
Arm B	72.9	509.62	1.23	F
Arm C	384.24	1537.5	1.54	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	148.26	870.84	1.38	F
Arm B	50.08	321.89	1.15	F
Arm C	270.51	1169.82	1.45	F
Arm D	0.56	13.1	0.36	B

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	528.5	3410.65	2.15	F
Arm B	221.86	1616.94	1.57	F
Arm C	575.71	2293.06	1.72	F
Arm D	5.35	57.78	0.87	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	113.23	655.3	1.29	F
Arm B	11.76	84.29	0.96	F

Arm C	93.56	379.08	1.2	F
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	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	330.06	1808.92	1.6	F
Arm B	72.16	504.99	1.22	F
Arm C	383.12	1533.55	1.54	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	102.41	586.6	1.27	F
Arm B	8.03	61.4	0.92	F
Arm C	48.32	174.63	1.09	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	248.99	1378.92	1.49	F
Arm B	47.04	311.22	1.14	F
Arm C	311.86	1273.29	1.48	F

B1027 St Johns Rd / Cloes Ln

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	76.94	406.44	1.19	F
Arm B	48.8	232.42	1.12	F
Arm C	231.53	1388.95	1.51	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS

	A1 - Full Development			
Arm A	176.65	916.34	1.36	F
Arm B	24.02	127.19	1.03	F
Arm C	405.87	2071.54	1.72	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	62.36	324.04	1.15	F
Arm B	25.78	128.65	1.04	F
Arm C	133.95	756.85	1.35	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	141.57	726.92	1.31	F
Arm B	9.11	58.06	0.93	F
Arm C	289.87	1495.07	1.58	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	56.12	277.47	1.13	F
Arm B	32.86	156.94	1.06	F
Arm C	194.38	1116.93	1.46	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	135.43	690.2	1.3	F
Arm B	15.78	91.51	0.99	F
Arm C	353.81	1835.98	1.68	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	56.98	284.01	1.14	F
Arm B	26.76	132.94	1.04	F
Arm C	186.06	1048.94	1.44	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	137.08	701.2	1.3	F
Arm B	9.29	59.16	0.93	F
Arm C	329.86	1686.51	1.63	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	56.47	287.2	1.14	F
Arm B	24.81	124.28	1.03	F
Arm C	134.03	757.16	1.35	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	88.99	477.96	1.22	F
Arm B	7.94	50.72	0.91	F
Arm C	289.88	1494.82	1.58	F

A133 / B1027 St Johns Rd / A133 London Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			

Arm A	36.02	160.7	1.08	F
Arm B	2.89	10.31	0.75	B
Arm C	105.57	220.51	1.14	F
Arm D	68.59	128.37	1.07	F
Arm E	8.34	61.65	0.93	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	3.35	19.32	0.78	C
Arm B	1.57	6.21	0.61	A
Arm C	8.12	23.62	0.9	C
Arm D	3.46	10.39	0.78	B
Arm E	2.08	15.49	0.68	C

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	5.13	28.71	0.85	D
Arm B	1.87	7.25	0.66	A
Arm C	25.9	65.66	1	F
Arm D	4.91	13.83	0.84	B
Arm E	2.52	18.95	0.73	C

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	4.6	26.66	0.84	D
Arm B	1.71	6.74	0.63	A
Arm C	9.84	28.32	0.92	D
Arm D	5.5	15.36	0.85	C
Arm E	2.73	20.63	0.74	C

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	2.16	13.37	0.69	B
Arm B	1.38	5.6	0.58	A
Arm C	4.5	13.73	0.82	B
Arm D	2.39	7.67	0.71	A
Arm E	1.65	12.19	0.63	B

Note: PM models were not run for this junction due to erroneous traffic count data

B1027 St John's Road / B1027 Valley Road / B1369 Old Road

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	138.14	833.72	1.34	F
Arm B	33.2	261.69	1.11	F
Arm C	480.57	1864.65	1.62	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	196.21	1190.14	1.45	F
Arm B	228.51	1948	1.64	F
Arm C	251.74	951.48	1.38	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	70.7	430.65	1.2	F
Arm B	10.44	98.5	0.96	F
Arm C	267.19	1033.16	1.42	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	90.04	524.67	1.24	F
Arm B	69.24	614.14	1.27	F
Arm C	82.1	302.21	1.15	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	84.08	516.45	1.23	F
Arm B	16.1	138.27	1.01	F
Arm C	300.31	1175.97	1.45	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	131.32	750.56	1.32	F
Arm B	115.9	1013.27	1.4	F
Arm C	137.62	530.24	1.25	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	72.12	439.74	1.2	F
Arm B	11.48	106.29	0.97	F
Arm C	262.03	1011.35	1.41	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	89.32	521.05	1.24	F
Arm B	65.64	585.58	1.26	F

Arm C	83.49	308.71	1.16	F
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	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	50.29	275.08	1.13	F
Arm B	6.17	65.16	0.89	F
Arm C	156.28	606.77	1.28	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	61.39	330.49	1.16	F
Arm B	18.6	163.99	1.04	F
Arm C	44.8	153.26	1.07	F

A137 Cox's Hill/A137/B1352 Station Road/Cotman Avenue

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	1.65	11.09	0.63	B
Arm B	0.5	6.73	0.34	A
Arm C	13.34	28.83	0.94	D
Arm D	2.32	6.95	0.7	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	37.83	209.43	1.09	F
Arm B	0.36	8.86	0.26	A
Arm C	3.39	8.07	0.78	A
Arm D	434.2	850.06	1.39	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	1.03	7.21	0.51	A
Arm B	0.35	4.94	0.26	A
Arm C	1.34	4.45	0.57	A
Arm D	1.22	4.61	0.55	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	6.42	39.82	0.89	E
Arm B	0.26	6.89	0.21	A
Arm C	1.07	3.79	0.52	A
Arm D	15.55	36.46	0.96	E

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	1.04	7.24	0.51	A
Arm B	0.35	4.96	0.26	A
Arm C	1.32	4.41	0.57	A
Arm D	1.23	4.63	0.55	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	6.48	40.25	0.89	E
Arm B	0.26	6.91	0.21	A

Arm C	1.08	3.81	0.52	A
Arm D	15.83	37.02	0.96	E

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	1.04	7.28	0.51	A
Arm B	0.35	4.98	0.26	A
Arm C	1.36	4.49	0.58	A
Arm D	1.25	4.65	0.56	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	6.59	40.9	0.89	E
Arm B	0.27	6.93	0.21	A
Arm C	1.09	3.82	0.52	A
Arm D	16.25	37.88	0.96	E

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.82	5.76	0.45	A
Arm B	0.3	4.16	0.23	A
Arm C	0.54	2.92	0.35	A
Arm D	0.73	3.57	0.42	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	1.72	10.59	0.64	B

Arm B	0.17	4.55	0.15	A
Arm C	0.55	2.81	0.36	A
Arm D	2.54	7.57	0.72	A

A133 Colchester Rd / Church Rd / School Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Stream B-CD	89.55	1E+10	1E+10	F
Stream B-AD	21.72	1E+10	1E+10	F
Stream A-BCD	61.66	185.34	1.17	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	176.4	1E+10	1E+10	F
Stream D-BC	191.09	1E+10	1E+10	F
Stream C-ABD	136.72	295.56	1.15	F
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Stream B-CD	58.44	1E+10	1E+10	F
Stream B-AD	14.55	1E+10	1E+10	F
Stream A-BCD	1157.85	1E+10	1E+10	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	94.4	1E+10	1E+10	F
Stream D-BC	83.58	1E+10	1E+10	F
Stream C-ABD	1025.05	1E+10	1E+10	F
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-CD	0.29	12.41	0.23	B
Stream B-AD	0.24	27.86	0.2	D
Stream A-BCD	0.8	5.1	0.24	A
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	14.47	357.94	1.17	F
Stream D-BC	15.88	347.94	1.16	F
Stream C-ABD	0.87	4.59	0.24	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-CD	0.1	10.05	0.09	B
Stream B-AD	0.09	22.14	0.09	C
Stream A-BCD	3.69	10.09	0.64	B
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	0.33	15.98	0.25	C
Stream D-BC	0.9	43.93	0.49	E
Stream C-ABD	0.89	4.55	0.23	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			

Stream B-CD	0.57	23.57	0.37	C
Stream B-AD	0.81	109.55	0.5	F
Stream A-BCD	1.33	5.62	0.31	A
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	45.22	1853.83	2.15	F
Stream D-BC	48.81	1847.7	2.16	F
Stream C-ABD	1.75	4.53	0.36	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Stream B-CD	0.66	55.8	0.42	F
Stream B-AD	0.73	161.28	0.49	F
Stream A-BCD	33.15	80.87	0.99	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	11.1	426.07	1.35	F
Stream D-BC	9.79	457.52	1.34	F
Stream C-ABD	2.04	5.12	0.35	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Stream B-CD	245.58	1E+10	1E+10	F
Stream B-AD	25.36	1E+10	1E+10	F
Stream A-BCD	72.31	441.52	1.27	F

Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	781.67	1E+10	1E+10	F
Stream D-BC	55.02	1E+10	1E+10	F
Stream C-ABD	0.14	7.23	0.08	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Stream B-CD	199.08	1E+10	1E+10	F
Stream B-AD	11.38	1E+10	1E+10	F
Stream A-BCD	239.57	1337.99	1.58	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	911.95	1E+10	1E+10	F
Stream D-BC	54.31	1E+10	1E+10	F
Stream C-ABD	0.32	22.31	0.13	C
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-CD	0.29	12.41	0.23	B
Stream B-AD	0.24	27.86	0.2	D
Stream A-BCD	0.8	5.1	0.24	A
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	14.47	357.94	1.17	F
Stream D-BC	15.88	347.94	1.16	F

Stream C-ABD	0.87	4.59	0.24	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-CD	0.1	10.05	0.09	B
Stream B-AD	0.09	22.14	0.09	C
Stream A-BCD	3.69	10.09	0.64	B
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	0.33	15.98	0.25	C
Stream D-BC	0.9	43.93	0.49	E
Stream C-ABD	0.89	4.55	0.23	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

A133 Colchester Rd / Heckfords Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Stream B-C	434.95	9999999999	1E+10	F
Stream B-A	11.01	9999999999	1E+10	F
Stream C-A	-	-	-	-
Stream C-B	199.58	9999999999	1E+10	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Stream B-C	271.16	9999999999	1E+10	F

Stream B-A	6.88	9999999999	1E+10	F
Stream C-A	-	-	-	-
Stream C-B	239.47	4083.24	1E+10	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Stream B-CD	0.57	23.69	0.37	C
Stream B-AD	0.82	111	0.5	F
Stream A-BCD	1.33	5.65	0.31	A
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	45.81	1893.13	2.17	F

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Stream B-CD	0.54	45.13	0.36	E
Stream B-AD	0.63	132.43	0.43	F
Stream A-BCD	31.04	74.58	0.98	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	9.76	373.75	1.26	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Stream B-C	375.76	9999999999	1E+10	F
Stream B-A	9.63	9999999999	1E+10	F
Stream C-A	-	-	-	-
Stream C-B	69.66	1938.58	1E+10	F

Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Stream B-C	206.46	9999999999	1E+10	F
Stream B-A	6.88	9999999999	1E+10	F
Stream C-A	-	-	-	-
Stream C-B	17.21	230.34	1.08	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Stream B-C	377.14	9999999999	1E+10	F
Stream B-A	9.63	9999999999	1E+10	F
Stream C-A	-	-	-	-
Stream C-B	60.31	1394.74	1E+10	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Stream B-C	203.71	9999999999	1E+10	F
Stream B-A	6.88	9999999999	1E+10	F
Stream C-A	-	-	-	-
Stream C-B	6.04	90.33	0.9	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-C	207.68	9999999999	1E+10	F
Stream B-A	7.09	9999999999	1E+10	F
Stream C-A	-	-	-	-
Stream C-B	0.6	26.48	0.38	D
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-C	64.14	1488.71	1E+10	F
Stream B-A	2.81	1487.99	1E+10	F
Stream C-A	-	-	-	-
Stream C-B	0.75	14.58	0.43	B
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

B1033 Abbey St / Station Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Stream B-C	120.75	1600.01	2.3	F
Stream B-A	50.97	1654.48	2.26	F
Stream C-AB	81.86	330.44	1.19	F
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM
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	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Stream B-C	369.07	1E+10	1E+10	F
Stream B-A	92.17	1E+10	1E+10	F
Stream C-AB	291.71	1102.8	1.47	F
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Stream B-C	375.76	1E+10	1E+10	F
Stream B-A	9.63	1E+10	1E+10	F
Stream C-A	-	-	-	-
Stream C-B	68.05	1877.55	1E+10	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Stream B-C	206.46	1E+10	1E+10	F
Stream B-A	6.88	1E+10	1E+10	F
Stream C-A	-	-	-	-
Stream C-B	11.6	162.52	1.01	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Stream B-C	53.66	587.82	1.49	F

Stream B-A	24.7	616.99	1.46	F
Stream C-AB	40.75	160.65	1.06	F
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Stream B-C	127.14	1702.4	2.64	F
Stream B-A	35.76	1758.48	2.54	F
Stream C-AB	174.77	651.88	1.31	F
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Stream B-C	53.66	587.82	1.49	F
Stream B-A	24.7	616.99	1.46	F
Stream C-AB	40.75	160.65	1.06	F
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Stream B-C	127.14	1702.4	2.64	F
Stream B-A	35.76	1758.48	2.54	F
Stream C-AB	174.77	651.88	1.31	F

Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-C	39.86	444.02	1.34	F
Stream B-A	20.1	481.24	1.31	F
Stream C-AB	28.05	114.24	1.02	F
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-C	68.67	772.05	1.75	F
Stream B-A	21.13	821.32	1.67	F
Stream C-AB	136.9	513.73	1.25	F
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

B1027 St Johns Rd / Lt Clacton Rd

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Stream B-C	33.35	589.65	1.41	F
Stream B-A	35.62	588.02	1.4	F
Stream C-AB	8.71	30.45	0.85	D
Stream C-A	-	-	-	-

Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Stream B-C	80.62	2363.98	2.37	F
Stream B-A	110.85	2346.11	2.38	F
Stream C-AB	7.1	17.26	0.77	C
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Stream B-C	53.3	581.38	1.48	F
Stream B-A	24.54	611.88	1.45	F
Stream C-AB	40.04	158.09	1.06	F
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Stream B-C	126.7	1700.7	2.64	F
Stream B-A	35.74	1756.71	2.54	F
Stream C-AB	174.77	651.88	1.31	F
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Stream B-C	20.1	356.91	1.19	F
Stream B-A	21.37	351.82	1.19	F
Stream C-AB	5.54	19.88	0.77	C
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Stream B-C	57.74	1491.11	1.88	F
Stream B-A	79.05	1473.55	1.89	F
Stream C-AB	4.63	12.22	0.68	B
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Stream B-C	20	355.05	1.19	F
Stream B-A	21.26	349.95	1.19	F
Stream C-AB	5.5	19.72	0.77	C
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Stream B-C	57.44	1479.68	1.88	F
Stream B-A	78.64	1462.16	1.89	F
Stream C-AB	4.57	12.14	0.68	B
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-C	17.83	316.68	1.15	F
Stream B-A	18.92	311.34	1.15	F
Stream C-AB	4.63	17.12	0.74	C
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-C	48.85	1092.05	1.7	F
Stream B-A	66.79	1083	1.71	F
Stream C-AB	3.32	10.41	0.61	B
Stream C-A	-	-	-	-
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

B1027 St John's Road / B1369 North road

	AM
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	Queue (Veh)	Delay (s)	RFC	LOS
A1 - Full Development				
Stream B-C	117.91	951.83	1.63	F
Stream B-A	10.06	1081.32	1.53	F
Stream C-A	2.12	12.33	0.68	B
Stream C-B	10.92	105.56	0.97	F
Stream A-BC	1.22	4.43	0.55	A

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - Full Development				
Stream B-C	124.92	1651.68	2.11	F
Stream B-A	26.63	1767.13	2.03	F
Stream C-A	6.26	29	0.88	D
Stream C-B	52.12	356.53	1.2	F
Stream A-BC	1	3.91	0.5	A

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 1				
Stream B-C	46.17	294.79	1.2	F
Stream B-A	5.34	487.39	1.14	F
Stream C-A	1.61	8.4	0.55	A
Stream C-B	4.97	54.53	0.87	F
Stream A-BC	0.86	3.7	0.46	A

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 1				
Stream B-C	35.67	303.78	1.2	F
Stream B-A	9.03	401.71	1.14	F
Stream C-A	1.89	11.16	0.66	B
Stream C-B	15.04	114.87	0.99	F

Stream A-BC	0.64	3.2	0.39	A
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	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Stream B-C	50.35	323.32	1.23	F
Stream B-A	5.19	530.77	1.16	F
Stream C-A	1.84	9.33	0.59	A
Stream C-B	5.45	59.38	0.89	F
Stream A-BC	0.92	3.83	0.48	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Stream B-C	57.41	525.01	1.38	F
Stream B-A	12.86	617.87	1.32	F
Stream C-A	2.98	15.5	0.75	C
Stream C-B	22.25	162.66	1.05	F
Stream A-BC	0.79	3.5	0.44	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Stream B-C	45.72	291.67	1.2	F
Stream B-A	5.31	484.39	1.13	F
Stream C-A	1.66	8.53	0.56	A
Stream C-B	4.93	54.22	0.87	F
Stream A-BC	0.85	3.68	0.46	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			

Stream B-C	35.49	302.18	1.2	F
Stream B-A	8.99	400.3	1.13	F
Stream C-A	1.83	10.93	0.65	B
Stream C-B	15.24	116.24	1	F
Stream A-BC	0.64	3.21	0.39	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-C	7.19	60	0.91	F
Stream B-A	0.87	138.76	0.52	F
Stream C-A	1.45	7.44	0.51	A
Stream C-B	3.5	42.09	0.82	E
Stream A-BC	0.75	3.48	0.43	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-C	2.32	24.37	0.71	C
Stream B-A	0.69	56.63	0.42	F
Stream C-A	1.7	8.66	0.57	A
Stream C-B	5.37	51.81	0.88	F
Stream A-BC	0.58	3.08	0.37	A

B1352 Long Road / B1035 Clacton Road / B1352 New Road / Trinity Road

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Stream B-CD	552.36	1E+10	1E+10	F
Stream B-AD	35.96	1E+10	1E+10	F
Stream A-BCD	337.32	2211.62	1.73	F
Stream A-B	-	-	-	-

Stream A-C	-	-	-	-
Stream D-AB	2013.13	1E+10	1E+10	F
Stream D-BC	68.65	1E+10	1E+10	F
Stream C-ABD	127.52	0	1E+10	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Stream B-CD	507.9	1E+10	1E+10	F
Stream B-AD	14.6	1E+10	1E+10	F
Stream A-BCD	1103.8	7635.56	2.85	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	1995.75	1E+10	1E+10	F
Stream D-BC	75.85	1E+10	1E+10	F
Stream C-ABD	166.53	1E+10	1E+10	F
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Stream B-CD	234.38	1E+10	1E+10	F
Stream B-AD	22.35	1E+10	1E+10	F
Stream A-BCD	67.54	410.86	1.26	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	802.22	1E+10	1E+10	F
Stream D-BC	48.09	1E+10	1E+10	F
Stream C-ABD	0.14	7.15	0.08	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Stream B-CD	199.06	1E+10	1E+10	F
Stream B-AD	11.35	1E+10	1E+10	F
Stream A-BCD	233.26	1301.12	1.57	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	885.67	1E+10	1E+10	F
Stream D-BC	54.55	1E+10	1E+10	F
Stream C-ABD	0.27	20.85	0.12	C
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Stream B-CD	241.19	1E+10	1E+10	F
Stream B-AD	22.39	1E+10	1E+10	F
Stream A-BCD	70.36	430.58	1.26	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	801.87	1E+10	1E+10	F
Stream D-BC	48.28	1E+10	1E+10	F
Stream C-ABD	0.14	7.22	0.08	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			

Stream B-CD	213.63	1E+10	1E+10	F
Stream B-AD	11.46	1E+10	1E+10	F
Stream A-BCD	235.78	1315.85	1.57	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	924.89	1E+10	1E+10	F
Stream D-BC	54.41	1E+10	1E+10	F
Stream C-ABD	0.29	21.41	0.13	C
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Stream B-CD	245.58	1E+10	1E+10	F
Stream B-AD	25.36	1E+10	1E+10	F
Stream A-BCD	72.31	441.52	1.27	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	781.67	1E+10	1E+10	F
Stream D-BC	55.02	1E+10	1E+10	F
Stream C-ABD	0.14	7.23	0.08	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Stream B-CD	199.08	1E+10	1E+10	F
Stream B-AD	11.38	1E+10	1E+10	F
Stream A-BCD	239.57	1337.99	1.58	F
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-

Stream D-AB	911.95	1E+10	1E+10	F
Stream D-BC	54.31	1E+10	1E+10	F
Stream C-ABD	0.32	22.31	0.13	C
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-CD	0.12	10.22	0.11	B
Stream B-AD	0.2	13.73	0.17	B
Stream A-BCD	1.29	14.22	0.56	B
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	5.43	44.11	0.86	E
Stream D-BC	0.94	35.35	0.5	E
Stream C-ABD	0.07	5.3	0.05	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Stream B-CD	0.19	10.68	0.16	B
Stream B-AD	0.2	11.88	0.17	B
Stream A-BCD	2.41	19.52	0.72	C
Stream A-B	-	-	-	-
Stream A-C	-	-	-	-
Stream D-AB	0.95	11.81	0.49	B
Stream D-BC	0.32	15.26	0.24	C
Stream C-ABD	0.04	6.35	0.03	A
Stream C-D	-	-	-	-
Stream C-A	-	-	-	-

Clacton Road/Bromley Road (Signalised)

Full Development, PM	Deg Sat (%)	Max Queue (PCU)
Bromley Road Left Right	181.8%	195.4
A355 Clacton Road South Right Ahead	180.3 : 180.3%	260.5
A355 Clacton Road North Left Ahead	179.7%	432.4

Scenario 1, AM	Deg Sat (%)	Max Queue (PCU)
Bromley Road Left Right	119.1%	57.6
A355 Clacton Road South Right Ahead	117.3 : 117.3%	86.8
A355 Clacton Road North Left Ahead	118.7%	108.9

Scenario 1, PM	Deg Sat (%)	Max Queue (PCU)
Bromley Road Left Right	113.8%	46.4
A355 Clacton Road South Right Ahead	111.9 : 111.9%	55.1
A355 Clacton Road North Left Ahead	114.2%	104.7

Scenario 2, AM	Deg Sat (%)	Max Queue (PCU)
Bromley Road Left Right	116.2%	53.6
A355 Clacton Road South Right Ahead	120.2 : 120.2%	94.8
A355 Clacton Road North Left Ahead	119.2%	111.1

Scenario 2, PM	Deg Sat (%)	Max Queue (PCU)
Bromley Road Left Right	113.9%	48.6
A355 Clacton Road South Right Ahead	116.2 : 116.2%	67.2
A355 Clacton Road North Left Ahead	116.7%	115.2

Scenario 3, AM	Deg Sat (%)	Max Queue (PCU)
Bromley Road Left Right	127.2%	74.9
A355 Clacton Road South Right Ahead	124.6 : 124.6%	119.2
A355 Clacton Road North Left Ahead	127.6%	140.1

Scenario 3, PM	Deg Sat (%)	Max Queue (PCU)
Bromley Road Left Right	121.6%	62.8
A355 Clacton Road South Right Ahead	121.6 : 121.6%	85.2
A355 Clacton Road North Left Ahead	122.1%	141.2

No Development, AM	Deg Sat (%)	Max Queue (PCU)
Bromley Road Left Right	94.0%	15.6
A355 Clacton Road South Right Ahead	97.3 : 97.3%	25.5
A355 Clacton Road North Left Ahead	97.1%	37.2

No Development, PM	Deg Sat (%)	Max Queue (PCU)
Bromley Road Left Right	89.5%	13.9
A355 Clacton Road South Right Ahead	89.0 : 89.0%	16.9
A355 Clacton Road North Left Ahead	88.7%	25.0

A133 Main Road/B1029 Great Bentley Road/B1029 Bromley Road

No Development, AM	Deg Sat (%)	Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	105.7%	15.8
A133 Colchester Road E Right Left Ahead	112.8%	57.3
Great Bentley Road S Ahead Right Left	113.5%	45.4
A133 Main Road W Left Ahead Right	115.1%	49.9

No Development, PM	Deg Sat (%)	Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	111.0%	29.9
A133 Colchester Road E Right Left Ahead	110.9%	61.3
Great Bentley Road S Ahead Right Left	113.7%	30.0

A133 Main Road W Left Ahead Right	114.3%	41.6
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Scenario 1, AM	Deg Sat (%)	Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	118.9%	24.9
A133 Colchester Road E Right Left Ahead	132.4%	133.3
Great Bentley Road S Ahead Right Left	134.3%	82.8
A133 Main Road W Left Ahead Right	129.4%	78.6

Scenario 1, PM	Deg Sat (%)	Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	129.5%	51.3
A133 Colchester Road E Right Left Ahead	135.0%	142.5
Great Bentley Road S Ahead Right Left	130.7%	49.6
A133 Main Road W Left Ahead Right	134.8%	99.7

Scenario 2, AM	Deg Sat (%)	Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	118.9%	24.9
A133 Colchester Road E Right Left Ahead	132.4%	133.3
Great Bentley Road S Ahead Right Left	134.3%	82.8
A133 Main Road W Left Ahead Right	132.6%	85.6

Scenario 2, PM	Deg Sat (%)	Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	129.5%	51.3
A133 Colchester Road E Right Left Ahead	139.5%	158.3
Great Bentley Road S Ahead Right Left	130.7%	49.6

A133 Main Road W Left Ahead Right	139.8%	112.2
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Scenario 3, AM	Deg Sat (%)	Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	118.9%	24.9
A133 Colchester Road E Right Left Ahead	153.4%	214.7
Great Bentley Road S Ahead Right Left	156.6%	129.4
A133 Main Road W Left Ahead Right	156.2%	132.2

Scenario 3, PM	Deg Sat (%)	Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	155.4%	74.3
A133 Colchester Road E Right Left Ahead	150.8%	212.6
Great Bentley Road S Ahead Right Left	153.1%	79.4
A133 Main Road W Left Ahead Right	152.7%	144.4

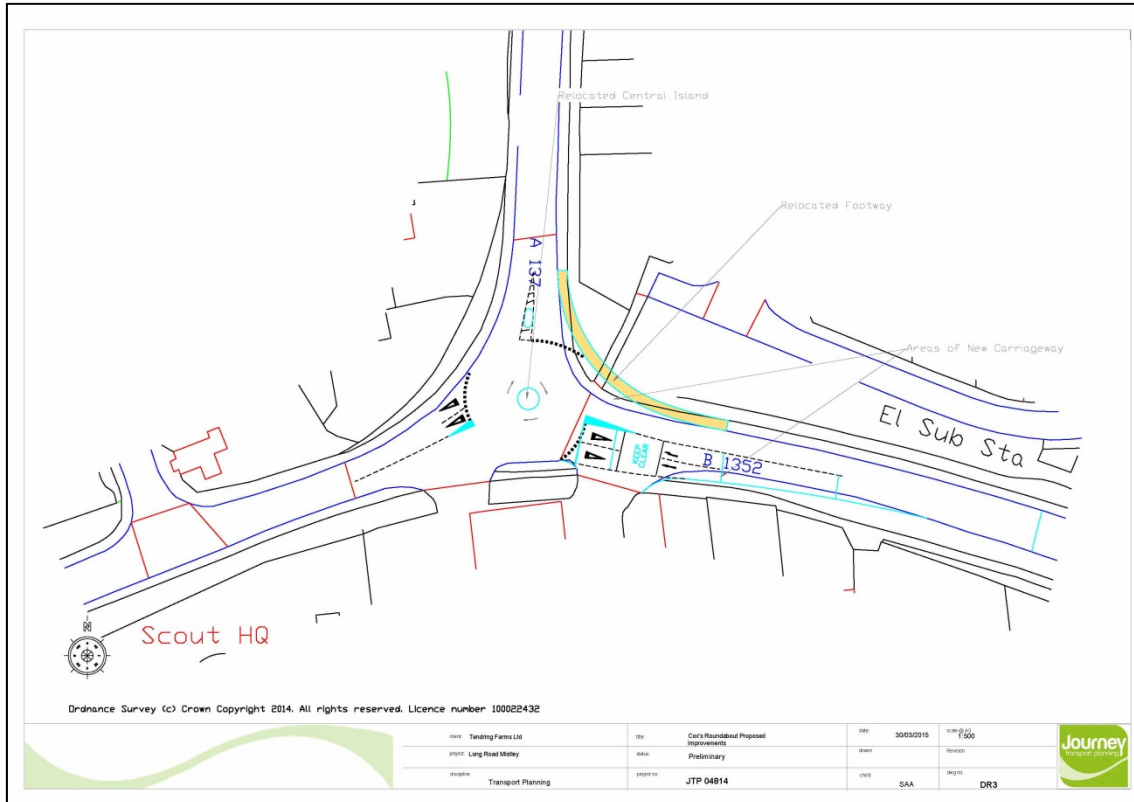
Full development, AM	Deg Sat (%)	Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	193.8%	108.9
A133 Colchester Road E Right Left Ahead	196.0%	400.1
Great Bentley Road S Ahead Right Left	187.4%	171.2
A133 Main Road W Left Ahead Right	187.2%	189.4

Full development, PM	Deg Sat (%)	Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	207.8%	138.6
A133 Colchester Road E Right Left Ahead	212.1%	410.4

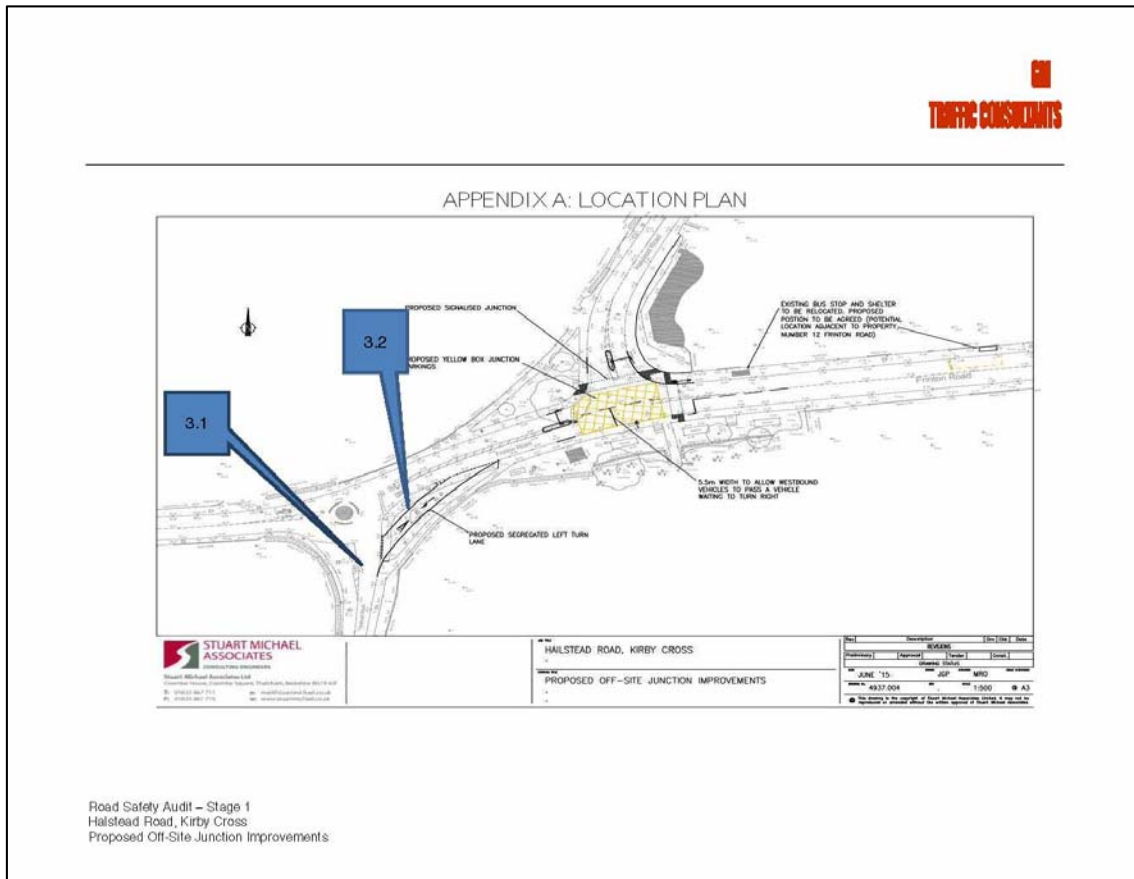
Great Bentley Road S Ahead Right Left	193.5%	121.9
A133 Main Road W Left Ahead Right	208.2%	339.7

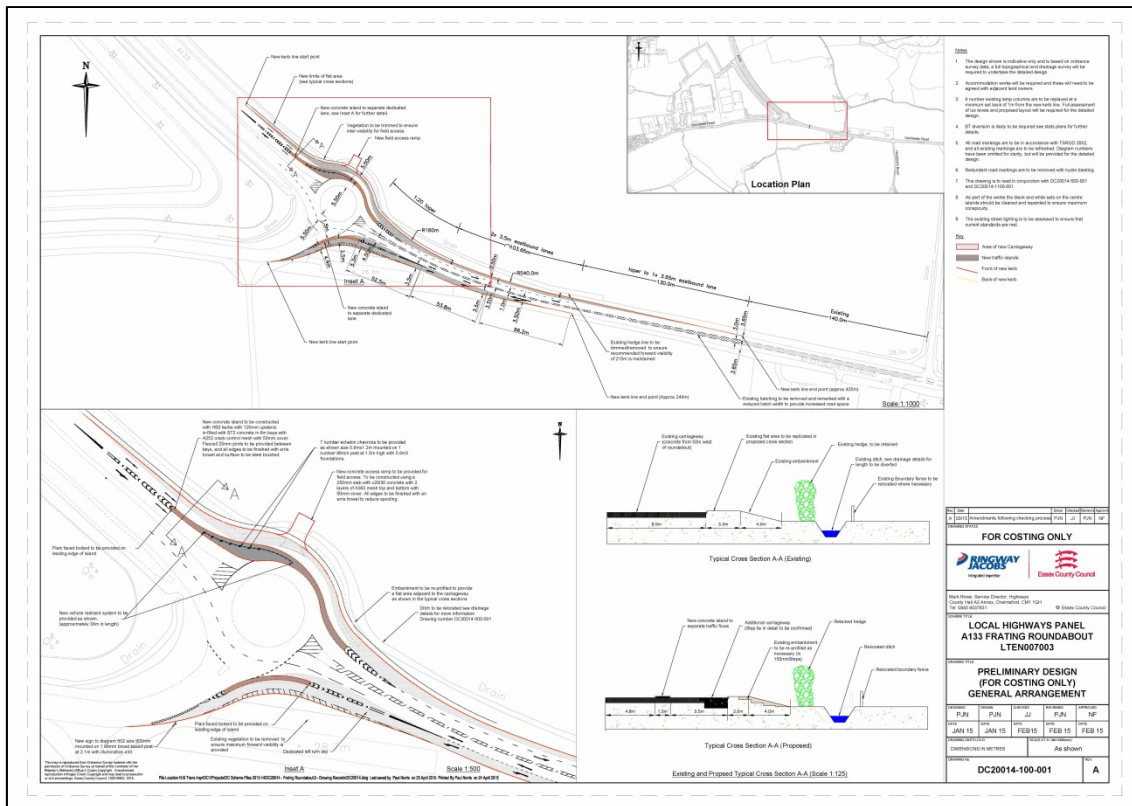
Appendix C Junction Drawings for Mitigation

A137 Cox's Hill/ A137 Wignall Street/ B1352 Long Road



B1033 Frinton Road/ B1033 Thorpe Road/ B1032 Kirby Road and B1033 Frinton Road/Halstead Road





Appendix D Junction Performance with Mitigation Measures

A133/A120 Frating Roundabout (Outputs after applying mitigation measures)

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	2099.68	4652.38	2.41	F
Arm B	662.2	3080.3	1.81	F
Arm C	0.91	6.92	0.48	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	763.73	1916.42	1.77	F
Arm B	749.76	3059.98	1.78	F
Arm C	6.59	29.85	0.88	D

	AM			
	A1 - With Development Scenario 1			
Arm A	578.84	1282.34	1.51	F
Arm B	67.5	341.86	1.15	F
Arm C	0.46	5.42	0.32	A

	PM			
	A1 - With Development Scenario 1			
Arm A	13.58	36.13	0.95	E
Arm B	48.71	172.2	1.1	F

Arm C	0.76	6.56	0.43	A
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	AM			
	A1 - With Development Scenario 2			
Arm A	595.08	1321.46	1.52	F
Arm B	75.56	389.68	1.17	F
Arm C	0.46	5.44	0.32	A

	PM			
	A1 - With Development Scenario 2			
Arm A	18.03	46.11	0.97	E
Arm B	66.81	230.07	1.16	F
Arm C	0.76	6.54	0.43	A

	AM			
	A1 - With Development Scenario 3			
Arm A	460.32	1037.29	1.46	F
Arm B	471.71	2232.5	1.65	F
Arm C	0.78	6.34	0.44	A

	PM			
	A1 - With Development Scenario 3			
Arm A	34.3	90	1.03	F
Arm B	175.07	599.66	1.33	F
Arm C	3.87	17.88	0.8	C

	AM			
	A1 - No Development			
Arm A	10.15	26.97	0.92	D
Arm B	13.02	62.79	0.96	F
Arm C	0.45	5.42	0.31	A

	PM			
	A1 - No Development			
Arm A	1.33	5.47	0.57	A
Arm B	1.43	7.55	0.59	A
Arm C	0.6	5.54	0.37	A

A133/B1033 (Outputs after applying mitigation measures)

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	13.14	29.08	0.94	D
Arm C	760.13	1066.6	1.53	F
Arm D	6.88	1E+10	1E+10	F
Arm E	7.6	11.01	0.89	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	1.82	4.47	0.65	A
Arm C	2.89	5.86	0.75	A
Arm D	0	0	0	A
Arm E	1.79	3.46	0.64	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	1.03	3.32	0.51	A
Arm C	4.3	7.3	0.81	A
Arm D	0	0	0	A
Arm E	1.95	3.66	0.66	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	0.99	3.18	0.5	A
Arm C	2.3	4.53	0.7	A
Arm D	0	0	0	A
Arm E	1.79	3.45	0.64	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.53	2.29	0.35	A
Arm C	0.62	2.05	0.38	A
Arm D	0	0	0	A
Arm E	1.17	2.67	0.54	A

(PM outputs for this junction is not included in this report as the PM flows were considered to be erroneous due to some ongoing construction work)

A137/B1352 Station Road in Manningtree (Outputs after applying mitigation measures)

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	0.62	4.14	0.38	A
Arm B	0.5	6.74	0.34	A
Arm C	7.55	16.03	0.89	C
Arm D	0.8	2.37	0.44	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	9.57	57.17	0.94	F
Arm B	2.35	62.3	0.74	F
Arm C	2.81	6.66	0.74	A
Arm D	6.65	10.54	0.87	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	0.48	3.33	0.32	A
Arm B	0.35	4.95	0.26	A
Arm C	1.17	3.9	0.54	A
Arm D	0.54	2.01	0.35	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	1.06	6.17	0.52	A
Arm B	0.27	6.99	0.21	A
Arm C	0.95	3.37	0.49	A
Arm D	1.51	3.36	0.6	A

	AM
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	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 2				
Arm A	0.48	3.33	0.33	A
Arm B	0.35	4.96	0.26	A
Arm C	1.16	3.86	0.54	A
Arm D	0.54	2.01	0.35	A

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 2				
Arm A	1.06	6.19	0.52	A
Arm B	0.27	7.01	0.21	A
Arm C	0.96	3.39	0.49	A
Arm D	1.52	3.36	0.6	A

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 3				
Arm A	0.48	3.34	0.33	A
Arm B	0.36	4.98	0.26	A
Arm C	1.19	3.92	0.54	A
Arm D	0.54	2.02	0.35	A

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 3				
Arm A	1.06	6.21	0.52	A
Arm B	0.27	7.04	0.21	A
Arm C	0.97	3.4	0.49	A
Arm D	1.53	3.37	0.61	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.42	2.91	0.29	A
Arm B	0.3	4.16	0.23	A
Arm C	0.5	2.67	0.33	A
Arm D	0.36	1.78	0.27	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.65	3.98	0.4	A
Arm B	0.17	4.55	0.15	A
Arm C	0.51	2.57	0.34	A
Arm D	0.83	2.44	0.45	A

Frinton Road/Kirby Road/Thorpe Road (outputs after applying mitigation measures)

	AM			
	Queue (Veh)	Delay (min)	RFC	LOS
	A1 - Full Development			
Arm A	2.57	0.29	0.73	C
Arm B	190.9	21.05	1.62	F
Arm C	6.92	0.85	0.9	F

	PM			
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	Queue (Veh)	Delay (s)	RFC	LOS
A1 - Full Development				
Arm A	1.06	9.61	0.52	A
Arm B	240	1418.38	1.61	F
Arm C	73.88	486.69	1.2	F

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 1				
Arm A	2.18	15.3	0.69	C
Arm B	118.2	788.65	1.42	F
Arm C	5.47	42.1	0.86	E

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 1				
Arm A	0.96	9.12	0.49	A
Arm B	139.9	817.18	1.4	F
Arm C	52.21	343.82	1.14	F

AM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 2				
Arm A	2.18	15.3	0.69	C
Arm B	137.92	901.66	1.47	F
Arm C	5.52	42.46	0.87	E

PM				
	Queue (Veh)	Delay (s)	RFC	LOS
A1 - With Development Scenario 2				
Arm A	0.96	9.11	0.49	A

Arm B	187.29	1083.19	1.5	F
Arm C	54.06	359.79	1.15	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	2.18	15.3	0.69	C
Arm B	118.2	788.65	1.42	F
Arm C	5.47	42.1	0.86	E

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	0.96	9.12	0.49	A
Arm B	139.9	817.18	1.4	F
Arm C	52.21	343.82	1.14	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	2.14	15.09	0.69	C
Arm B	93.03	638.67	1.35	F
Arm C	5.46	41.99	0.86	E

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.95	9.07	0.49	A
Arm B	93.92	572.93	1.3	F
Arm C	48.39	310.34	1.13	F

A137/B1352 Long Road in Manningtree/Lawford (outputs after applying mitigations measures)

	AM			
	Queue (Veh)	Delay (min)	RFC	LOS
	A1 - Full Development			
Arm A	682.3	41.17	1.77	F
Arm B	170.08	17.36	1.4	F
Arm C	186.94	13.04	1.34	F

	PM			
	Queue (Veh)	Delay (min)	RFC	LOS
	A1 - Full Development			
Arm A	120.38	7.13	1.21	F
Arm B	371.45	39.58	1.79	F
Arm C	1147.02	77.82	2.28	F

	AM			
	Queue (Veh)	Delay (min)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	100.58	6.45	1.2	F
Arm B	13.87	1.29	0.97	F
Arm C	40.65	2.69	1.08	F

	PM			
	Queue (Veh)	Delay (min)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	3.41	0.28	0.78	C
Arm B	57.53	3.72	1.13	F
Arm C	389.33	29.26	1.61	F

	AM			
	Queue (Veh)	Delay (min)	RFC	LOS
	A1 - With Development Scenario 2			

Arm A	95.92	6.11	1.19	F
Arm B	13.56	1.26	0.97	F
Arm C	42.14	2.77	1.08	F

	PM			
	Queue (Veh)	Delay (min)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	3.55	0.29	0.79	C
Arm B	59.92	3.87	1.14	F
Arm C	391.92	29.55	1.61	F

	AM			
	Queue (Veh)	Delay (min)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	103.12	6.63	1.2	F
Arm B	14.41	1.34	0.98	F
Arm C	43.91	2.87	1.09	F

	PM			
	Queue (Veh)	Delay (min)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	3.58	0.29	0.79	C
Arm B	60.73	3.93	1.14	F
Arm C	395.82	29.87	1.62	F

	AM			
	Queue (Veh)	Delay (min)	RFC	LOS
	A1 - No Development			
Arm A	3.11	0.28	0.76	C
Arm B	2.52	0.23	0.72	B
Arm C	4.54	0.44	0.83	D

	PM			
	Queue (Veh)	Delay (min)	RFC	LOS
	A1 - No Development			
Arm A	1.07	0.14	0.52	A
Arm B	5.39	0.4	0.85	C
Arm C	66.2	4.47	1.16	F

A120/B1352/Church Hill outside of Harwich (outputs after applying mitigating measures)

	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	0.51	3.11	0.34	A
Arm B	1.1	4.16	0.53	A
Arm C	0.45	2.2	0.31	A
Arm D	0.05	2.04	0.05	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	0.5	3.36	0.33	A
Arm B	0.34	2.46	0.25	A
Arm C	1.2	3.17	0.55	A
Arm D	0.11	2.86	0.1	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			

Arm A	0.52	3.11	0.34	A
Arm B	1.11	4.19	0.53	A
Arm C	0.46	2.2	0.31	A
Arm D	0.05	2.04	0.05	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	0.5	3.39	0.33	A
Arm B	0.35	2.48	0.26	A
Arm C	1.23	3.21	0.55	A
Arm D	0.11	2.89	0.1	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	0.53	3.13	0.35	A
Arm B	1.12	4.22	0.53	A
Arm C	0.46	2.2	0.31	A
Arm D	0.05	2.05	0.05	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	0.5	3.37	0.33	A
Arm B	0.34	2.46	0.25	A
Arm C	1.22	3.2	0.55	A
Arm D	0.11	2.88	0.1	A

	AM			
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	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.42	2.82	0.29	A
Arm B	0.5	2.87	0.33	A
Arm C	0.33	1.98	0.25	A
Arm D	0.05	1.87	0.04	A

	PM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.33	2.64	0.25	A
Arm B	0.18	2.11	0.15	A
Arm C	0.68	2.42	0.4	A
Arm D	0.09	2.31	0.08	A

A133/Progress Way/St Oysth Road, just north of Clacton (outputs after applying mitigating measures)

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	4.94	14.95	0.84	B
Arm B	3.19	10.71	0.77	B
Arm C	3.38	21.39	0.78	C
Arm D	4.81	9.82	0.83	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	1.45	5.35	0.59	A

Arm B	1.33	5.37	0.57	A
Arm C	1.34	8.61	0.58	A
Arm D	1.88	4.73	0.65	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	1.58	5.71	0.61	A
Arm B	1.53	5.82	0.61	A
Arm C	1.43	9.22	0.59	A
Arm D	1.96	4.88	0.66	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	1.45	5.33	0.59	A
Arm B	1.46	5.67	0.59	A
Arm C	1.4	9.04	0.59	A
Arm D	1.81	4.61	0.65	A

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	0.52	3.16	0.34	A
Arm B	0.84	3.67	0.46	A
Arm C	0.83	5.33	0.46	A
Arm D	1.28	3.73	0.56	A

(PM outputs for this junction is not included in this report as the PM flows were considered to be erroneous due to some ongoing construction work)

A133/B1027 in Clacton (outputs after applying mitigation measures)

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - Full Development			
Arm A	10.36	52.62	0.94	F
Arm B	3.27	11.7	0.77	B
Arm C	6.15	14.9	0.87	B
Arm D	10.48	23.22	0.92	C
Arm E	11.45	81.11	0.97	F

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 1			
Arm A	1.74	9.84	0.64	A
Arm B	1.57	6.22	0.61	A
Arm C	2.14	5.92	0.68	A
Arm D	1.8	5.3	0.64	A
Arm E	1.48	10.9	0.6	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 2			
Arm A	2.27	12.21	0.7	B
Arm B	1.88	7.27	0.66	A
Arm C	3.04	7.86	0.76	A
Arm D	2.27	6.22	0.7	A
Arm E	1.76	13.03	0.64	B

	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - With Development Scenario 3			
Arm A	2.09	11.71	0.68	B
Arm B	1.72	6.76	0.63	A
Arm C	2.29	6.25	0.7	A
Arm D	2.36	6.4	0.71	A

Arm E	1.82	13.47	0.65	B
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	AM			
	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - No Development			
Arm A	1.3	7.94	0.57	A
Arm B	1.38	5.6	0.58	A
Arm C	1.66	4.94	0.63	A
Arm D	1.4	4.45	0.59	A
Arm E	1.23	9.05	0.56	A

(PM outputs for this junction is not included in this report as the PM flows were considered to be erroneous due to some ongoing construction work)

A133/B1029/Great Bentley Road (Signalised)

Full Development AM	Deg Sat (%)	Mean Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	137.5 : 137.5%	66.9
A133 Colchester Road E Left Ahead	143.7%	137.9
A133 Colchester Road E Right Ahead	143.7%	137.9
Great Bentley Road S Ahead Right Left	138.8%	116.7
A133 Main Road W Left Ahead	141.4%	67.1
A133 Main Road W Ahead Right	141.4%	67.1

Full Development PM	Deg Sat (%)	Mean Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	146.8 : 146.8%	92.6
A133 Colchester Road E Left Ahead	151.9%	144.3
A133 Colchester Road E Right Ahead	151.9%	144.3
Great Bentley Road S Ahead Right Left	151.7%	95.0
A133 Main Road W Left Ahead	150.9%	121.3
A133 Main Road W Ahead Right	150.9%	121.3

Scenario 1 AM	Deg Sat (%)	Mean Max
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		Queue (PCU)
B1029 Bromley Road N Left Ahead Right	87.0 : 87.0%	8.3
A133 Colchester Road E Left Ahead	89.4%	20.8
A133 Colchester Road E Right Ahead	89.4%	20.8
Great Bentley Road S Ahead Right Left	90.6%	23.8
A133 Main Road W Left Ahead	89.1%	14.2
A133 Main Road W Ahead Right	89.1%	14.2

Scenario 1 PM	Deg Sat (%)	Mean Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	101.0 : 101.0%	20.2
A133 Colchester Road E Left Ahead	100.1%	25.2
A133 Colchester Road E Right Ahead	99.9%	24.7
Great Bentley Road S Ahead Right Left	100.9%	20.0
A133 Main Road W Left Ahead	99.3%	18.3
A133 Main Road W Ahead Right	99.3%	18.3

Scenario 2 AM	Deg Sat (%)	Mean Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	87.0 : 87.0%	8.3
A133 Colchester Road E Left Ahead	89.4%	20.8
A133 Colchester Road E Right Ahead	89.4%	20.8
Great Bentley Road S Ahead Right Left	90.6%	23.8
A133 Main Road W Left Ahead	91.4%	15.2
A133 Main Road W Ahead Right	91.1%	15.0

Scenario 2 PM	Deg Sat (%)	Mean Max Queue (PCU)
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B1029 Bromley Road N Left Ahead Right	101.0 : 101.0%	20.2
A133 Colchester Road E Left Ahead	103.3%	30.4
A133 Colchester Road E Right Ahead	103.3%	30.4
Great Bentley Road S Ahead Right Left	100.9%	20.0
A133 Main Road W Left Ahead	103.2%	22.6
A133 Main Road W Ahead Right	102.9%	22.2

Scenario 3 AM	Deg Sat (%)	Mean Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	102.8 : 91.0%	12.7
A133 Colchester Road E Left Ahead	113.3%	53.1
A133 Colchester Road E Right Ahead	113.1%	52.5
Great Bentley Road S Ahead Right Left	114.5%	62.7
A133 Main Road W Left Ahead	110.2%	29.3
A133 Main Road W Ahead Right	110.2%	29.3

Scenario 3 PM	Deg Sat (%)	Mean Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	110.9 : 110.9%	32.2
A133 Colchester Road E Left Ahead	114.9%	56.7
A133 Colchester Road E Right Ahead	114.9%	56.7
Great Bentley Road S Ahead Right Left	112.3%	37.6
A133 Main Road W Left Ahead	112.6%	36.0
A133 Main Road W Ahead Right	112.3%	35.5

No Development AM	Deg Sat (%)	Mean Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	86.8 : 86.8%	6.9
A133 Colchester Road E Left Ahead	88.4%	13.0
A133 Colchester Road E Right	88.4%	13.0

Ahead		
Great Bentley Road S Ahead Right Left	88.1%	17.4
A133 Main Road W Left Ahead	85.7%	10.3
A133 Main Road W Ahead Right	85.7%	10.3

No Development PM	Deg Sat (%)	Mean Max Queue (PCU)
B1029 Bromley Road N Left Ahead Right	89.6 : 89.6%	13.0
A133 Colchester Road E Left Ahead	88.7%	15.0
A133 Colchester Road E Right Ahead	88.5%	14.9
Great Bentley Road S Ahead Right Left	87.9%	12.4
A133 Main Road W Left Ahead	89.7%	10.0
A133 Main Road W Ahead Right	89.3%	9.9

Thorpe Road/Halstead Road Mini Roundabout (Signalised)

Full Development AM	Deg Sat (%)	Mean Max Queue (PCU)
B1033	84.1%	12.9
Halstead Road	57.9%	2.7
Frinton Road	88.6%	14.8

Full development PM	Deg Sat (%)	Mean Max Queue (PCU)
B1033	84.1%	12.9
Halstead Road	57.9%	2.7
Frinton Road	88.6%	14.8

Scenario 1 AM	Deg Sat (%)	Mean Max Queue
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		(PCU)
B1033	84.6%	21.4
Halstead Road	84.1%	7.3
Frinton Road	87.2%	23.5

Scenario 1 PM	Deg Sat (%)	Mean Max Queue (PCU)
B1033	87.5%	30.6
Halstead Road	87.0%	7.9
Frinton Road	57.3%	12.1

Scenario 2 AM	Deg Sat (%)	Mean Max Queue (PCU)
B1033	85.4%	23.1
Halstead Road	81.9%	7.2
Frinton Road	87.8%	24.9

Scenario 2 PM	Deg Sat (%)	Mean Max Queue (PCU)
B1033	89.8%	35.2
Halstead Road	86.1%	8.1
Frinton Road	60.1%	13.9

Scenario 3 AM	Deg Sat (%)	Mean Max Queue (PCU)
B1033	84.6%	21.4
Halstead Road	84.1%	7.3
Frinton Road	87.2%	23.5

Scenario 3 PM	Deg Sat (%)	Mean Max Queue (PCU)
B1033	87.2%	30.5
Halstead Road	87.8%	8.1
Frinton Road	57.0%	12.1

No Development AM	Deg Sat (%)	Mean Max Queue (PCU)
B1033	82.8%	17.8
Halstead Road	86.0%	6.1
Frinton Road	87.1%	20.7

No Development PM	Deg Sat (%)	Mean Max Queue (PCU)
B1033	86.5%	25.0
Halstead Road	82.3%	5.8
Frinton Road	57.4%	10.6