

# Access to Canvey



## Document Control Sheet

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## 1 Introduction

During the 2015/16 ECC financial year a VISSIM model was developed to capture traffic operations along Canvey Way and Somnes Avenue on Canvey Island. Congestion and queuing is a specific problem in the afternoon peak period. The model was originally built for the AM but has been extended to cover an inter-peak period and a PM period too. A 2033 TEMPro growth scenario was also created. Junction models were also created for the Waterside junction and for the Somnes Avenue/Elsinor Avenue junction, using LINSIG and Junctions9 (ARCADY) as appropriate. The brief was extended to also cover a proposed improvement to the exit from the Sadlers Farm junction onto Canvey Way (Section 3 of this note) and then further to also cover the junctions along Long Road (Section 5 of the note).

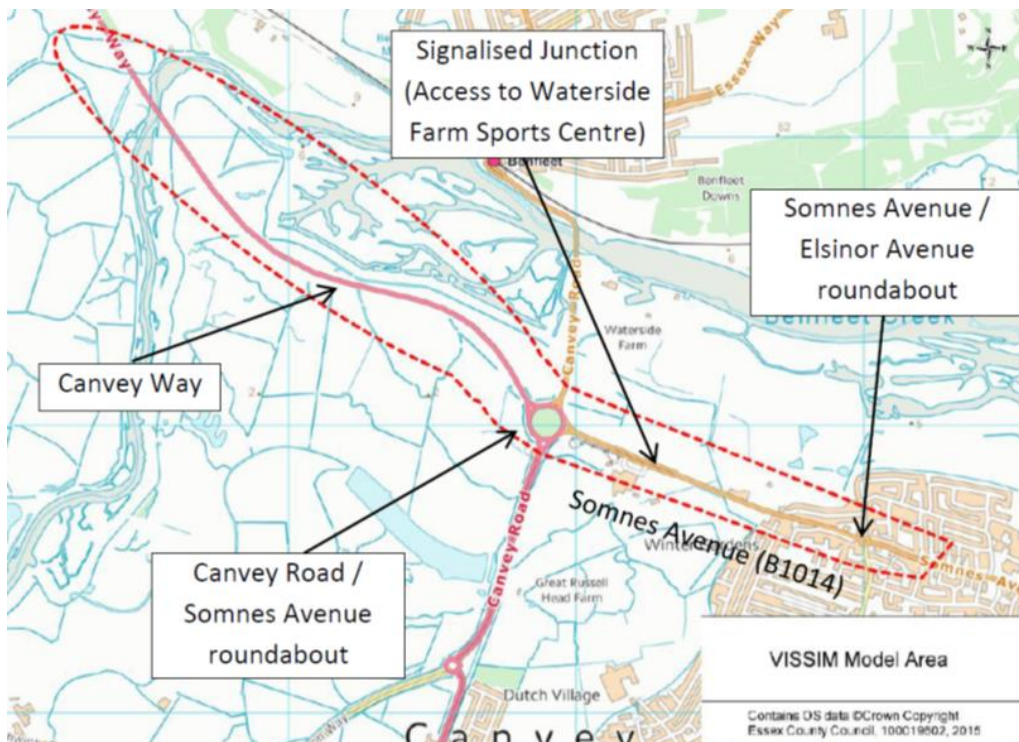


Figure 1: Location plan showing original extent of Vissim Model

Essex Highways were initially asked to review the access to Canvey Island during both peak periods, to ascertain traffic delay. The extent of current problems are illustrated on Figure 2 and Figure 3 below, comparing speed during peak hours as a percentage of free flow speed from Trafficmaster GPS journey time data.

There is significant delay experienced in the PM peak on the A130 Canvey Way eastbound approach to the Waterside junction (A130/Canvey Road/B1014 Somnes Avenue) and at the exit from Sadlers Farm Roundabout (A130/A13 London Road/B1464) on to Canvey Way. In addition to this, the Trafficmaster data is indicating congestion along Long Road, inhibiting route choice to and from the eastern end of the Island. The three elements are reported separately in this technical note.



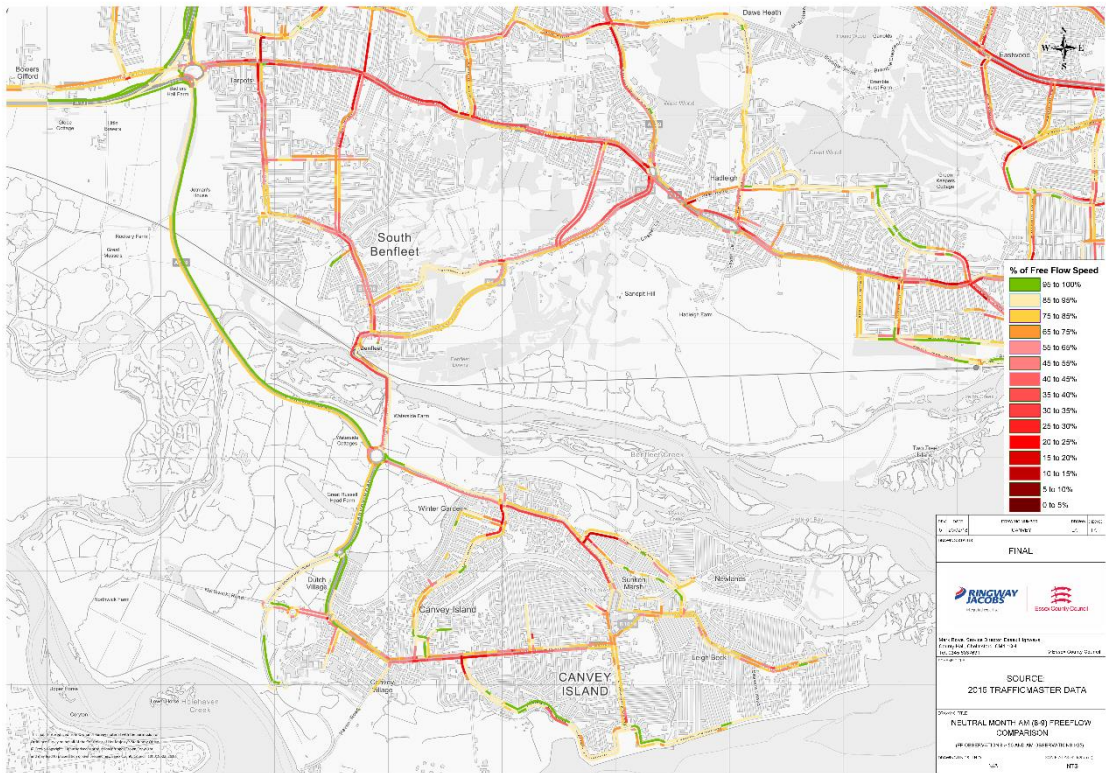


Figure 2: Canvey congestion AM peak

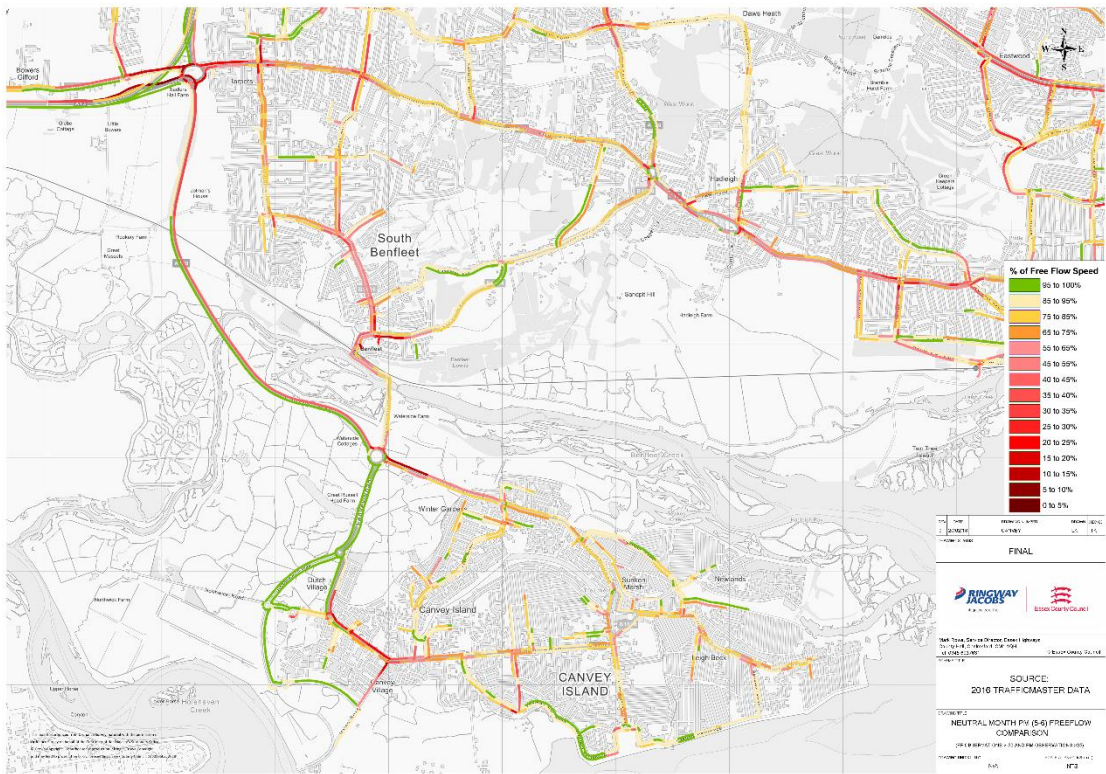


Figure 3: Canvey congestion PM peak

In order to determine the capacity of the junction of B1014 Somnes Avenue / Elsinor Avenue / Link Road an ARCADY (Junctions 9) model has been prepared for the existing roundabout scenario and a LinSig model has also been produced to model proposed signalised junction options prior to incorporation within the Vissim model.

Additionally, a high level link capacity analysis has been carried out for A130 Canvey Way. A CRF (congestion reference factor) has been calculated for the link based upon its geometric parameters and the traffic flow on the link.

This technical note discusses the results of modelling undertaken to assess potential schemes to alleviate the congestion experienced at this location.

## **2 A130 Canvey Way eastbound approach to the Waterside junction**

It has been identified that congestion on Canvey Way is a result of eastbound headed traffic blocking back from the merge point on Somnes Avenue which decreases from two to one lane. There is a possibility that these issues can be addressed by localised improvements to B1014 carriageway or improvements to the existing roundabout of Somnes Avenue / Elsinor Avenue.

In order to determine the efficacy of the options proposed they need to be compared to the base situation, best achieved using a traffic model.

The review is based on the Base Year Vissim Models produced to best replicate the existing situation being experienced on the A130 Canvey Way and B1014 Somnes Avenue.

The Vissim software package has been used to model the area outlined in Figure 1, including the B1014 between the Canvey Road and Elsinor Avenue roundabouts for initial option testing.

### **2.1 Vissim modelling**

#### **2.1.1 Traffic Surveys and Data Processing**

Traffic data has been collected from various sources, including surveys commissioned for this study, existing Automatic Traffic Counts (ATC), Automatic Number Plate Recognition (ANPR), Manual Classified Counts (MCC) and Trafficmaster GPS journey time data. Video surveys were also available which were used to compare current traffic conditions against the base model. This includes:

- September 2015 - B1014 Somnes Ave – ATC
- May 2014 – Waterside Roundabout - ANPR
- September 2015 - Somnes Ave / Elsinor Ave - MCC
- September 2015 - B1014 Somnes Ave / Leisure Centre – MCC
- 2013 / 2014 - Trafficmaster data
- September 2015 - Elsinor Avenue roundabout - Video survey
- September 2015 – Somnes Ave / Leisure Centre Access - Video survey

The data from all these surveys was combined together to create a matrix of movements through the network for use with the Vissim model.

### 2.1.2 The Vissim model

Vissim is a micro-simulation traffic modelling tool. Vissim models each vehicle individually and looks at the interaction between vehicles replicating as closely as possible real life traffic behaviours.

The Vissim model covers the area shown on the location plan and covers the PM peak period only. Junction models as described in Section 2.1.4 have addressed the AM peak period too.

The Vissim model has been calibrated against observed journey times from Sadlers Farm to Waterside roundabout (eastbound) and from Waterside roundabout to Elsinor Avenue roundabout. The graphs of journey time against distance shown in Figure 4 show the close correlation of observed against modelled.

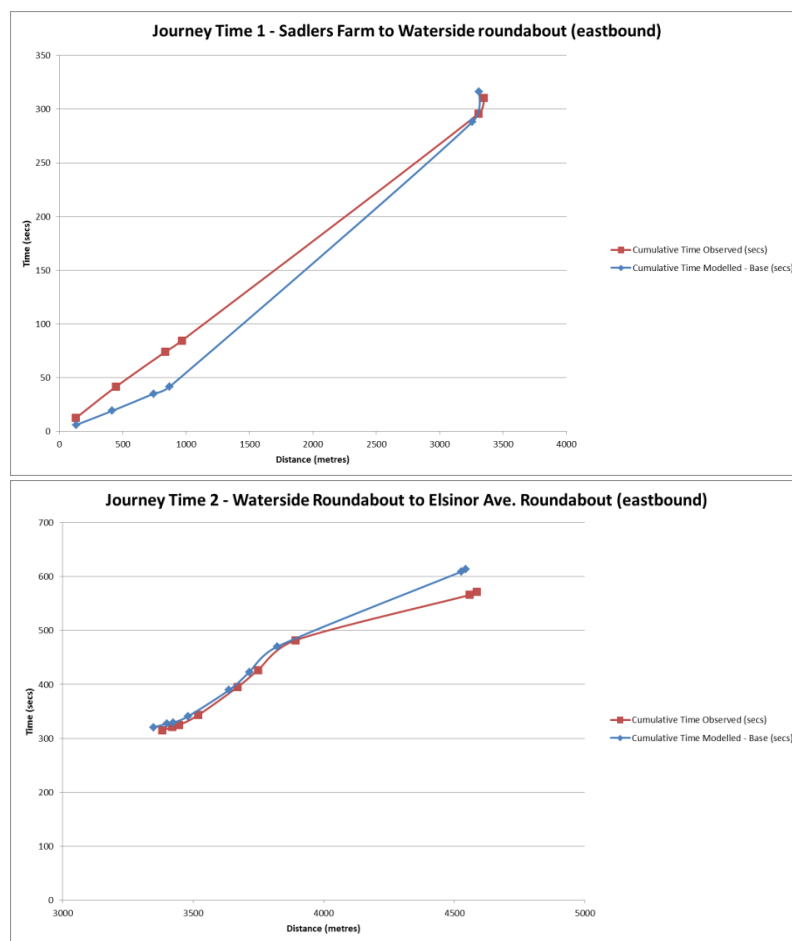


Figure 4: Journey time comparison Observed (Blue) v Modelled (Red)

### 2.1.3 Options tested

Two options have been tested:

- Option 1 – Extension of eastbound merge on Somnes Avenue
- Option 2 - Two lanes eastbound from Waterside roundabout to Elsinor Avenue roundabout and change at Somnes Avenue / Elsinor Avenue roundabout to signalised junction

### 2.1.4 Results of modelling

Vissim modelling can provide a variety of information about the operation of the highway network. Of particular interest in this situation is the journey time from Sadlers Farm roundabout through to Elsinor Avenue.

The results of the journey time output are shown graphically in Figure 5. The red line shows the cumulative observed journey time, blue line represents the cumulative time modelled, green line for modelled Option 1, and purple line for modelled Option 2.



Figure 5: Journey time comparison Option 1 (Green) and Option 2 (Purple)

Options 1 and 2 both provide some benefits for the A130 Canvey Way approach to Waterside roundabout and Somnes Avenue, although in Option 2 not including the possible disbenefit to other approaches at the Somnes Avenue / Elsinor Avenue junction. Figure 5 shows the predicted reductions in journey time from the Vissim modelling.



Table 1: VISSIM PM peak hour journey time savings per vehicle

	Average PM Peak hour Journey time saving per vehicle	
	A130 Canvey Way between Sadlers Farm roundabout and Waterside roundabout	B1014 Somnes Avenue between Waterside roundabout and Elsinor Avenue
Option 1	60 seconds	30 seconds
Option 2	60 seconds	140 seconds

For Somnes Avenue between Waterside roundabout and Elsinor Avenue roundabout both options provide some improvement in journey time from Waterside roundabout until about halfway along the link when traffic begins to slow for the Elsinor Avenue roundabout. This slowing is more pronounced for Option 1 when traffic meets the single lane section of Somnes Avenue, Option 2 appears to offer significant improvement but does not take into account the increased delay caused to other approaches to the proposed traffic signal junction at Somnes Avenue / Elsinor Avenue / Link Road.

LinSig modelling of that junction shows that a signal junction would operate at its practical capacity with no room for growth during the PM peak period but would be over capacity during the AM peak period resulting in significant delays and queuing.

Table 2: LinSig results for Somnes Ave, Elsinor Ave, Link Road

Lane Description	AM 2015			PM 2015		
	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Somnes Avenue West Ahead & Left	51.60%	17.1	8.9	86.10%	30.1	30.1
Somnes Avenue West Right	106.50%	244.5	15.6	90.00%	74	18.7
Somnes Avenue East	107.90%	187.6	77.6	90.10%	57.4	25.9
Elsinor Avenue	48.20%	43.4	3.7	27.50%	42.3	3.2
Link Road	109.40%	227	44.5	89.40%	59.5	17.3

Table 2 shows the results of the LinSig modelling, the fields included are:

- Deg Sat degree of saturation, a value of 100% would mean the approach is fully used, 90% is considered to be the desirable maximum, values above this implies that any fluctuation in flow can cause queues and delays to develop.
- Av Delay average delay per pcu (car equivalent) (seconds)
- Mean max queue average queue length at start of green signal.

Provision of traffic signals at this location would need to include pedestrian facilities which within current highway space requirements would need to run as an all red to traffic stage, Pedestrian flows are such that this stage would be run every other cycle during the PM peak hour but would need to run every cycle during the AM peak hour.

Conversely the existing roundabout modelling within ARCADY shows that the roundabout operates at capacity during the AM peak hour and just within capacity during the PM peak hour.



Table 3: Arcady results for Somnes Ave, Elsinor Ave, Link Road

Approach	AM 2015				PM 2015			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
Somnes Avenue West	0.7	3.4	0.4	A	4.4	3.4	0.82	B
Somnes Avenue East	7.0	25.9	0.88	D	2.3	25.9	0.7	B
Elsinor Avenue	0.2	5.1	0.18	A	0.3	5.1	0.23	B
Link Road	1.7	11.1	0.63	B	0.8	11.1	0.45	A

Table 3 shows the results of the Arcady modelling, the fields included are:

- Q average queue (pcu)
- Delay average delay per vehicle (seconds)
- RFC ratio of flow to capacity, a value of 1 would mean the approach is fully used, values above 0.85 implies that the approach is 85% utilised and any fluctuation in flow can cause queues and delays to develop.
- LOS Level of service, A being no issues through to F being fail

### 3 Exit from Sadlers Farm Roundabout on to Canvey Way

Concern has been expressed about continued PM peak hour queuing occurring at the recently reconfigured Sadlers Farm roundabout, particularly on the exit to Canvey Way.

The VISSIM model has been extended to capture the operations of the proposed southbound left turn slip at the Sadlers Farm roundabout and report on its relative merits and contribution to alleviating current congestion levels.

The extent of the network covered by the VISSIM model and the extension are shown on Figure 6.

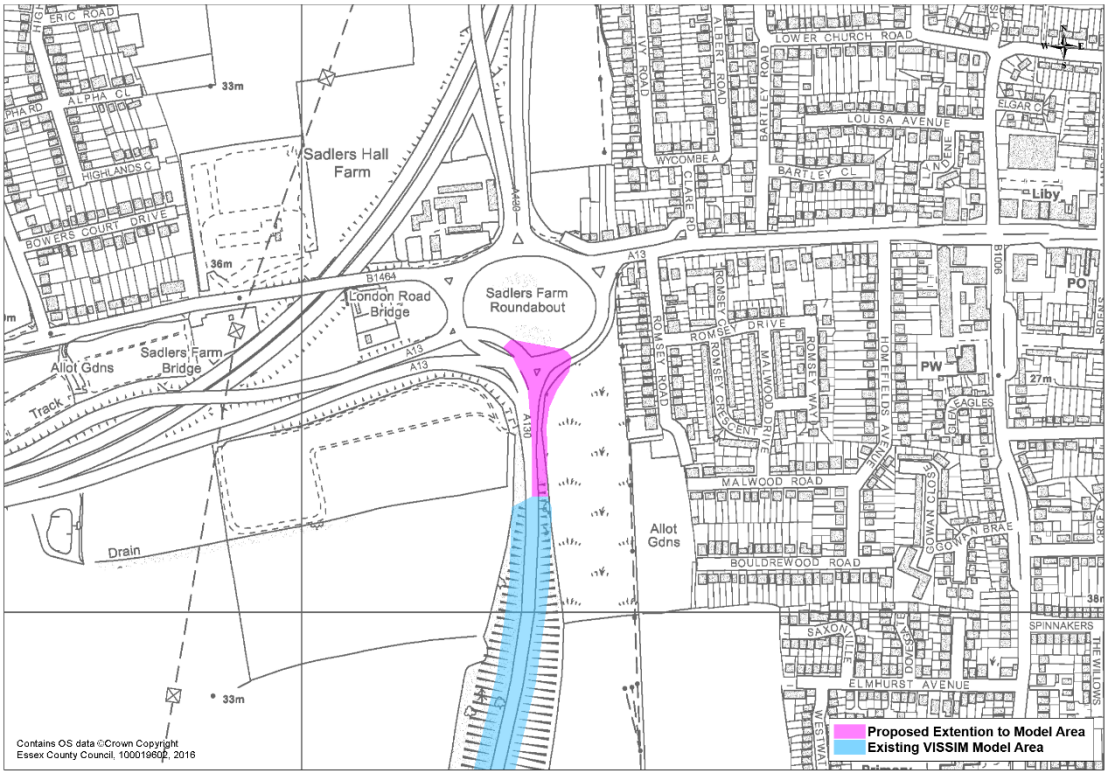
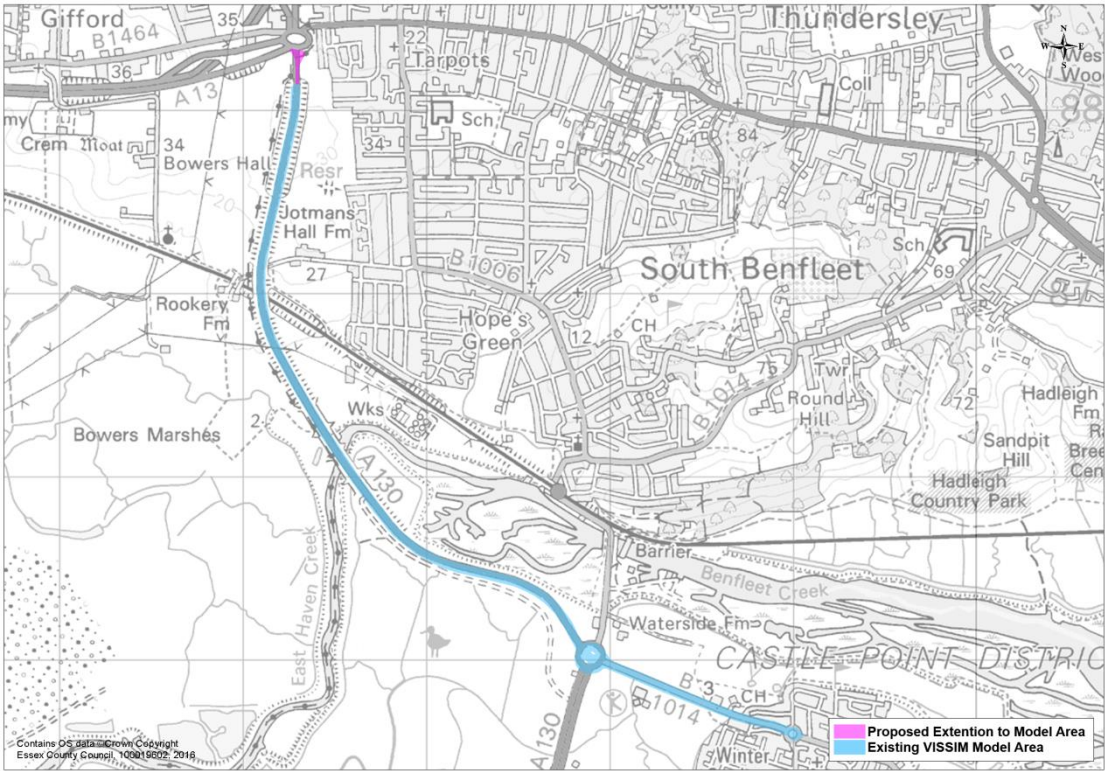


Figure 6: Extents of Model Area

### 3.1 Vissim modelling

#### 3.1.1 Options tested

Two options have been tested:

- Canvey Way Merge Option 1 – Extension of the merge south of Sadlers Farm Roundabout, traffic still signal controlled
- Canvey Way Merge Option 2 - Additional extension of the merge south of Sadlers Farm Roundabout, with traffic from the circulatory carriageway of Sadlers Farm, Roundabout able to merge freely with traffic from London direction

#### 3.1.2 Results of modelling

Vissim modelling can provide a variety of information about the operation of the highway network. Of particular interest in this situation is the journey time from Sadlers Farm roundabout through to Waterside Farm Roundabout.

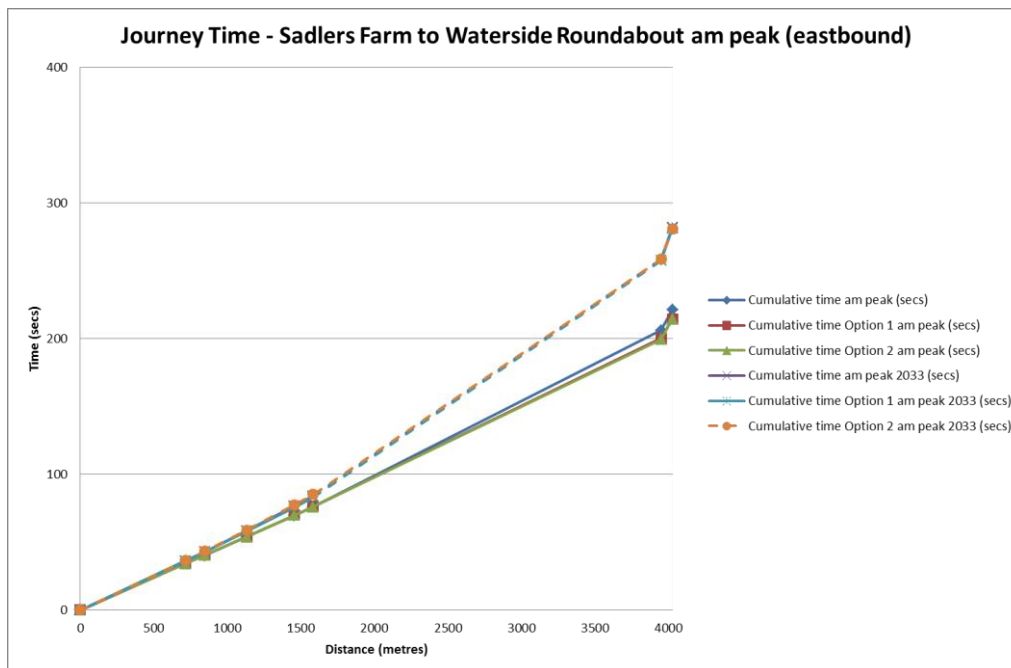


Figure 7: Journey time comparison AM peak hour Option 1 (Red) and Option 2 (Green)

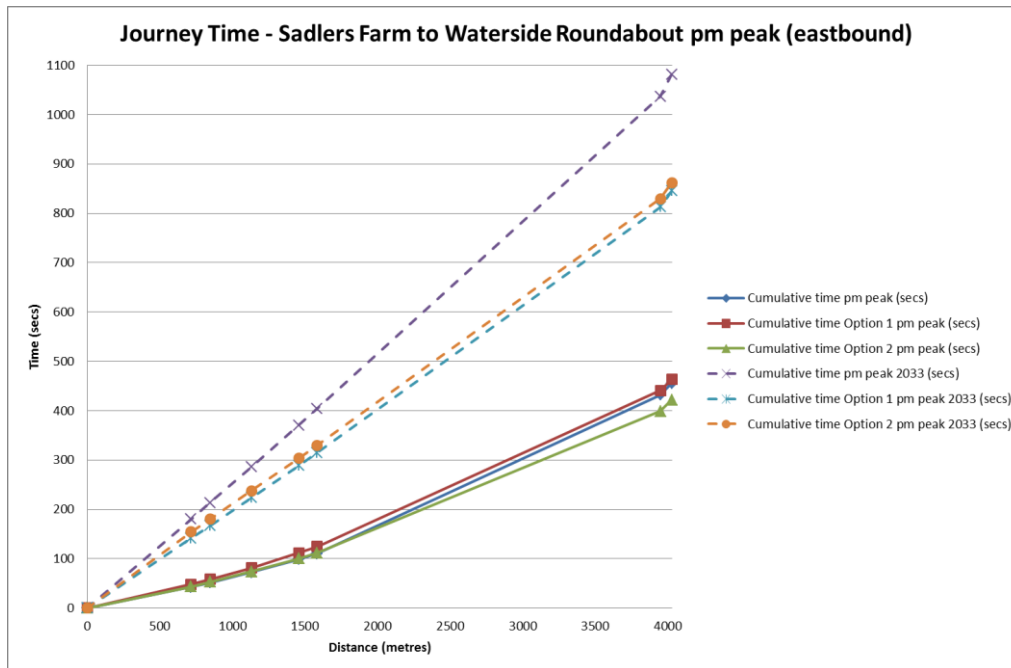


Figure 8: Journey time comparison PM peak hour Option 1 (Red) and Option 2 (Green)

Neither Option 1 nor Option 2 for the merge on Convey Way at Sadlers Farm, offer significant benefit, it is not until 2033 during the PM peak when benefits occur as flows increase.

## 4 Link Capacity Convey Way

The average weekday flow pattern on Convey Way from a continuous counter (81018102) is shown in Figure 9. The convention used is that Direction 1 is Northbound and Direction 2 Southbound.

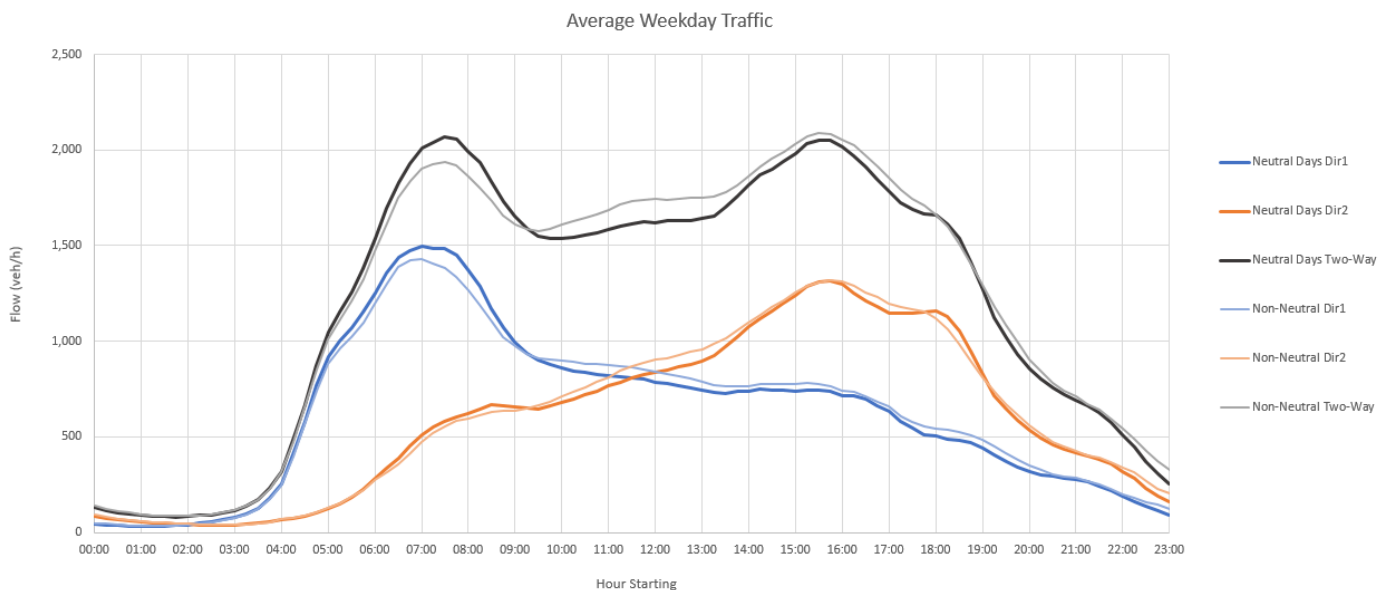


Figure 9: Average Weekday flow pattern on Convey Way



As shown, the PM inbound period of high flow is over a long period starting as early as 15:00 up to 18:30, but lower in hourly demand than the northbound AM peak. This could be indicative of the effect of the inbound congestion encouraging peak spreading. It also shows that the AM outbound flow will apply to capacity analysis of the link.

Using the methodology of DMRB Vol 5, Section 1 Part 3 TA 46/97, but informed by the estimated width (7.54m) and peak hour heavy vehicle percentage (1.8%) from actual observation, the one-way Congestion Reference Flow of Canvey Way is estimated at 1,400 vehicles per hour per direction. That indicates an AM northbound congestion reference of 1.07, indicating a link flow over theoretical capacity, and 0.94 for the inbound PM peak. This further indicates the effect of downstream blocking as the root of the current southbound PM problem rather than the link capacity of Canvey Way itself.

## 5 Long Road junctions

Long Road is classified as the A130 for its entire length. It is a single carriageway urban road with mixed use frontage with numerous residential side roads joining it. Canvey County Infants and Junior School and William Read Primary School both have their access points on to Long Road. The road is subject to a 30 mph speed limit. The significant junctions along Long Road have been modelled to assess their capacity.

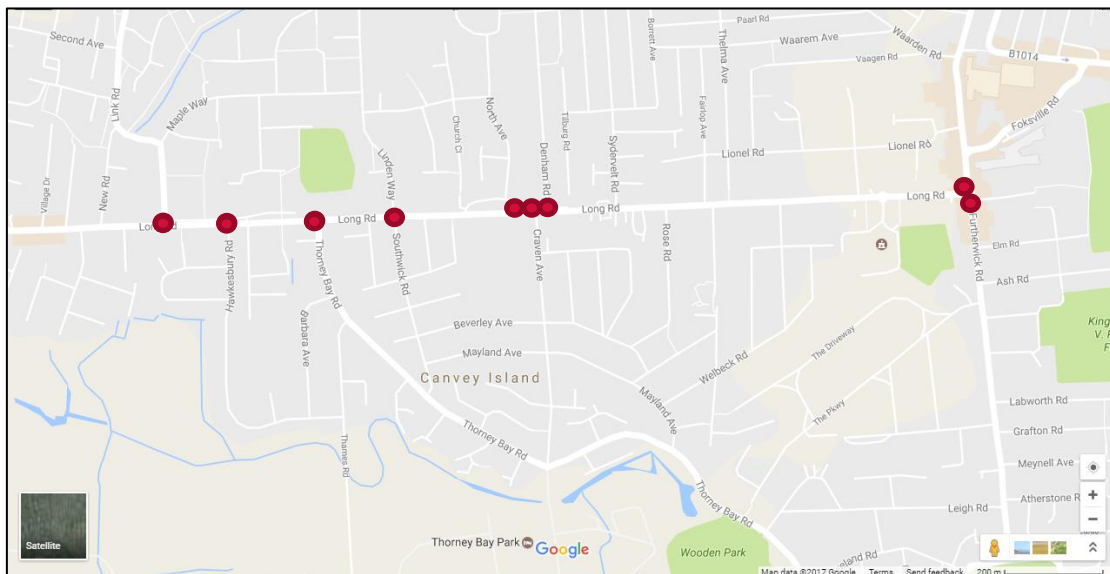


Figure 10: A130 Long Road – Junctions modelled

## 5.1 Junction modelling

### 5.1.1 Long Road / Maple Way

- T-junction
- No capacity issues AM or PM peak hours
- Has a right turn ghost island

Table 4: Picady results for Long Road / Maple Way

Approach	AM 2016				PM 2016			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
A130 Long Road West ahead and left	0	0.0	0	A	0	0.0	0	A
Maple Way	1.9	19.4	0.67	C	1.2	19.3	0.56	C
A130 Long Road East ahead	0	0.0	0	A	0	0.0	0	A
A130 Long Road East right	0.5	10.2	0.33	B	1	18.6	0.50	C

### 5.1.2 Long Road / Hawkesbury Road

- T-junction
- No capacity issues AM or PM peak hours
- Has no right turn lane
- Right turning traffic may get held up by westbound traffic that is held behind bus using adjacent stop

Table 5: Picady results for Long Road / Hawkesbury Road

Approach	AM 2016				PM 2016			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
A130 Long Road East ahead and left	0	0.0	0	A	0	0.0	0	A
Hawkesbury Road	0.9	15.7	0.49	C	0.1	11.8	0.10	B
A130 Long Road West ahead and right	0.1	8.7	0.07	A	0.1	7.5	0.09	A

Solution: Provide 'KEEP CLEAR' marking across junction

### 5.1.3 Long Road / Thorney Bay Road

- 3-arm mini-roundabout
- No capacity issues AM peak hour
- PM peak hour capacity issues, Long Road west approach failing, RFC=1, delay=64 seconds
- Widening challenging due to close proximity of Electric sub-station.

Table 6: Arcady results for Long Road / Thorney Bay Road

Approach	AM 2016				PM 2016			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
A130 Long Road West ahead and right	3.4	15.8	0.78	C	18.7	64.1	1.00	F
Thorney Bay Road	2.5	14.6	0.73	B	1.4	10.7	0.59	B
A130 Long Road East ahead and left	1	11.7	0.51	B	0.5	7.8	0.33	A

Solution: Thorney Bay Road give way line could be pulled forwards to improve visibility

Provide traffic signals (without a pedestrian phase, a remote pedestrian facility exists to the West in a more suitable location adjacent to the school)

#### 5.1.4 Long Road / Southwick Road / Linden Way

- 4-arm crossroads junction
- Long Road is the priority route
- No capacity issues AM or PM peak hours
- Has no right turn lanes
- The junction has an alternative PM peak hour at 15:00 to 16:00 because of the close proximity to Midway Junior & Primary schools.
- This still does not give capacity issues

Table 7: Picady results for Long Road / Southwick Road / Linden Way

Approach	AM 2016				PM 2016				PM 2016 (15:00-16:00)			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
A130 Long Road West	0	7.8	0.05	A	0.1	7.1	0.06	A	0.1	7.3	0.06	A
Linden Way	0.2	10.5	0.19	B	0.2	11.3	0.15	B	0.3	11.7	0.22	B
A130 Long Road East	0.5	7.9	0.29	A	0.1	7.8	0.09	A	0.1	7.7	0.11	A
Southwick Road	0.3	14.4	0.26	B	0.1	10.7	0.07	B	0.2	10.5	0.14	B

Solution: School travel plans / safer journeys to school intervention to discourage trips to school by car.

#### 5.1.5 Long Road / Thameside Crescent

- T-junction
- No capacity issues AM or PM peak hours
- Has no right turn lanes
- The junction has an alternative PM peak hour at 15:00 to 16:00 because of the close proximity to Midway Junior & Primary schools.
- This still does not give capacity issues

Table 8: Picady results for Long Road / Thameside Crescent

Approach	AM 2016				PM 2016				PM 2016 (15:00-16:00)			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
A130 Long Road West ahead	0	0.0	0	A	0	0.0	0	A	0	0.0	0	A
Thameside Crescent	0.5	12.4	0.33	B	0.2	9.5	0.15	A	0.7	13.7	0.41	B
A130 Long Road East ahead	0	0.0	0	A	0	0.0	0	A	0	0.0	0	A

Solution: School travel plans / safer journeys to school intervention to discourage trips to school by car.

### 5.1.6 Long Road / Craven Avenue

- T-junction with controlled pedestrian facility on Eastern arm
- No capacity issues AM or PM peak hours
- Has no right turn lanes
- The junction has an alternative PM peak hour at 15:00 to 16:00 because of the close proximity to Midway Junior & Primary schools.
- This still does not give capacity issues

Table 9: Picady results for Long Road / Craven Avenue

Approach	AM 2016				PM 2016				PM 2016 (15:00-16:00)			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
A130 Long Road East ahead and left	0.9	5.1	0.48	A	0.5	3.2	0.32	A	0.7	4.3	0.40	A
Craven Avenue	0.7	16.6	0.42	C	0.3	12.1	0.23	B	0.6	15.8	0.39	C
A130 Long Road West ahead and right	0.2	8.3	0.13	A	0.3	7.4	0.19	A	0.2	7.7	0.16	A

Solution: School travel plans / safer journeys to school intervention to discourage trips to school by car.

### 5.1.7 Long Road / Denham Road

- T-junction with controlled pedestrian facility on Western arm
- No capacity issues AM or PM peak hours
- Has no right turn lanes
- The junction has an alternative PM peak hour at 15:00 to 16:00 because of the close proximity to Midway Junior & Primary schools.
- This still does not give capacity issues

Table 10: Picady results for Long Road / Denham Road

Approach	AM 2016				PM 2016				PM 2016 (15:00-16:00)			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
A130 Long Road West ahead and left	0.8	4.3	0.45	A	0.6	3.5	0.38	A	0.7	3.7	0.41	A
Denham Road	0.4	15.9	0.31	C	0.2	13.7	0.19	B	0.3	15.6	0.26	C
A130 Long Road East ahead and right	0	7.5	0.03	A	0.1	7.1	0.05	A	0.1	7.4	0.05	A

Solution: School travel plans / safer journeys to school intervention to discourage trips to school by car.



### 5.1.8 Long Road / Furtherwick Road

- 3-arm mini-roundabout
- No capacity issues AM or PM peak hours
- The junction has an alternative PM peak hour at 15:00 to 16:00 because of the close proximity to Midway Junior & Primary schools.
- This still does not give capacity issues

Table 11: Arcady results for Long Road / Furtherwick Road

Approach	AM 2016				PM 2016				PM 2016 (15:00-16:00)			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
Furtherwick Road North	1.6	11.1	0.61	B	1.6	10.6	0.62	B	1.6	10.8	0.62	B
Furtherwick Road South	0.6	7.2	0.39	A	0.5	6.2	0.33	A	0.6	6.7	0.38	A
A130 Long Road West	1.7	10.5	0.64	B	1.2	8.4	0.55	A	1.2	8.5	0.55	A

Solution: School travel plans / safer journeys to school intervention to discourage trips to school by car.

### 5.1.9 Furtherwick Road / Oak Road

- T-junction
- No capacity issues AM or PM peak hours
- The junction has an alternative PM peak hour at 15:00 to 16:00 because of the close proximity to Midway Junior & Primary schools.
- This still does not give capacity issues

Table 12: Picady results for Furtherwick Road / Oak Road

Approach	AM 2016				PM 2016				PM 2016 (15:00-16:00)			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
Furtherwick Road North ahead and left	0	0.0	0	A	0	0.0	0	A	0	0.0	0	A
Oak Road	0.1	0.1	0.13	A	0.1	9.7	0.13	A	0.2	10.4	0.17	A
Furtherwick Road South ahead and right	0.1	7.1	0.06	A	0	7.3	0.02	A	0	7.3	0.02	A

Solution: School travel plans / safer journeys to school intervention to discourage trips to school by car.

## 6 Conclusions

1. Either Option 1 Extension of eastbound merge on Somnes Avenue, or Option 2 - Two lanes eastbound from Waterside roundabout to Elsinor Avenue roundabout and change at Somnes Avenue / Elsinor Avenue roundabout to signalised junction offers improvements for AM journey times on A130 Canvey Way by minimising the exit blocking of Waterside roundabout. However, the assessment of Option 2 does not take into account the PM flows, where the LINSIG model showed significant congestion with a signalised option. On balance, it would be preferable to maintain the roundabout junction at Somnes Avenue / Elsinor Avenue / Link Road because this offers greater capacity than a signalised junction could unless there is significant land acquisition.
2. With current flows there is no requirement to widen Canvey Way or to signalise the entry to Waterside roundabout as clearing the exit blocking means that Waterside roundabout should operate within capacity.
3. Negligible benefits can be achieved by widening the exit from Sadlers Farm on to Canvey Way; the link capacity of Canvey Way controls the capacity rather than the merge. To achieve greater flow exiting Sadlers Farm would require the widening of the entire length of Canvey Way although this may lead to the network beyond Waterside roundabout being unable to cope with the demand placed upon them.
4. To assist in alleviation of congestion improvements should be undertaken at junctions along Long Road as follows:
  - Long Road / Hawkesbury Road Provide 'KEEP CLEAR' marking across junction
  - Long Road / Thorney Bay Road Thorney Bay Road give way line could be pulled forwards to improve visibility, or better, provide traffic signals (without a pedestrian phase)
  - Long Road / Southwick Road / Linden Way, Long Road / Thameside Crescent, Long Road / Craven Avenue, Long Road / Denham Road, Long Road / Furtherwick Road, Furtherwick Road / Oak Road School travel plans / safer journeys to school intervention to discourage trips to school by car.

## 7 Recommendations

1. Progress the widening of Somnes Avenue to provide two lanes between Waterside roundabout and Elsinor Avenue roundabout with a view to early implementation.
2. Provide 'KEEP CLEAR' marking across junction of Long Road / Hawkesbury Road.
3. Provide traffic signals at the junction of Long Road / Thorney Bay Road
4. Instigate school travel plans / safer journeys to school intervention to discourage trips to school by car at Canvey Junior School, Canvey Island Infant School, William Read Primary School and Castle View School.

