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Southern Access Road

Wisbech Access Study

August 2017

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Cambridgeshire County Council / Fenland District Council

August 2017

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1 Introduction

Wisbech Access Study

This assessment forms part of the first phase of the Wisbech Access Study. The Wisbech Access Study consists of two distinct phases. The first phase is a series of individual scheme assessments, and the second phase of the study consists of a packaging assessment, as shown in Figure 1.1 beneath. Note that this assessment is highlighted in green to demonstrate its relationship to the wider study.

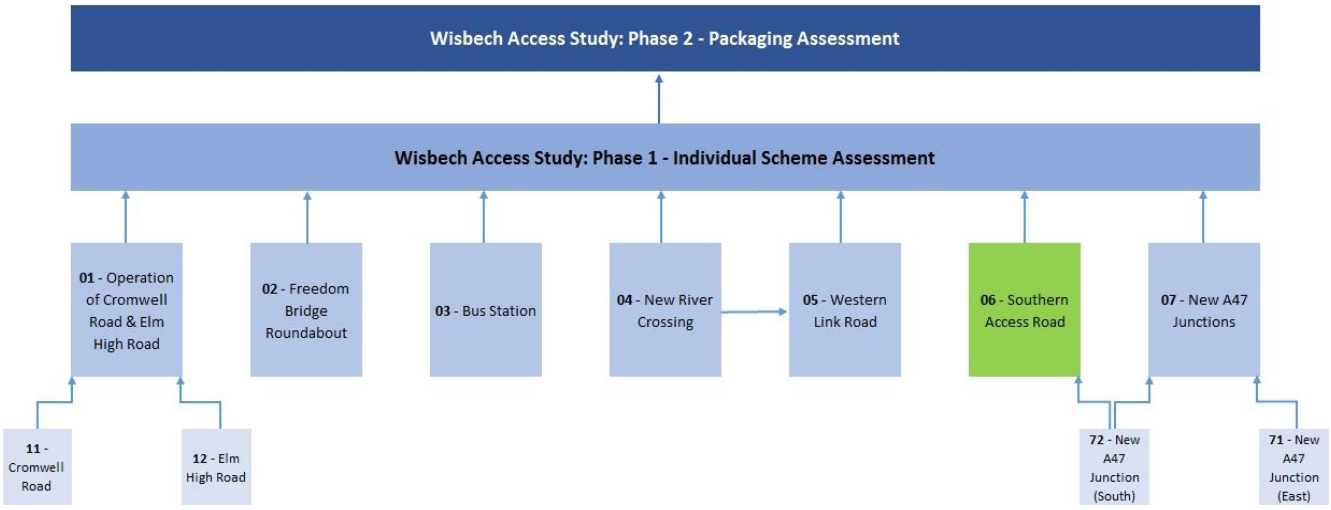

Figure 1.1: Wisbech Access Study Components

Southern Access Road

The Southern Access Road is one of the nine individual scheme areas included within the wider Wisbech Access Study. This study focuses on the creation of an east to west link through the Wisbech South Development area, to provide access to the development site and to alleviate congestion from alternative routes. The Wisbech South extension is outlined in the Fenland Local Plan (2014), specifically Policy LP8 for Wisbech.

Although this phase of the study focuses on individual scheme assessments, there will be significant overlap between each of the scheme areas. This will be especially true for the Southern Access Road in relation to improvements along Cromwell Road, Elm High Road and a new A47 junction south of the Wisbech South Development area.

The second phase of the study will consider how combining options for these different areas could maximise benefits and improve the operation of the wider network. Therefore the full benefits of these options for each of the individual schemes will not become fully apparent until the packaging assessment has been completed in Phase 2 of the Wisbech Access Study.

Scheme Location

The scheme is located to the South of Wisbech in the area enclosed by Weasenham Lane to the north, A1101 Elm High Road to the east, the A47 to the south and B198 Cromwell Road to the west. Figure 1.2 highlights the scheme area.

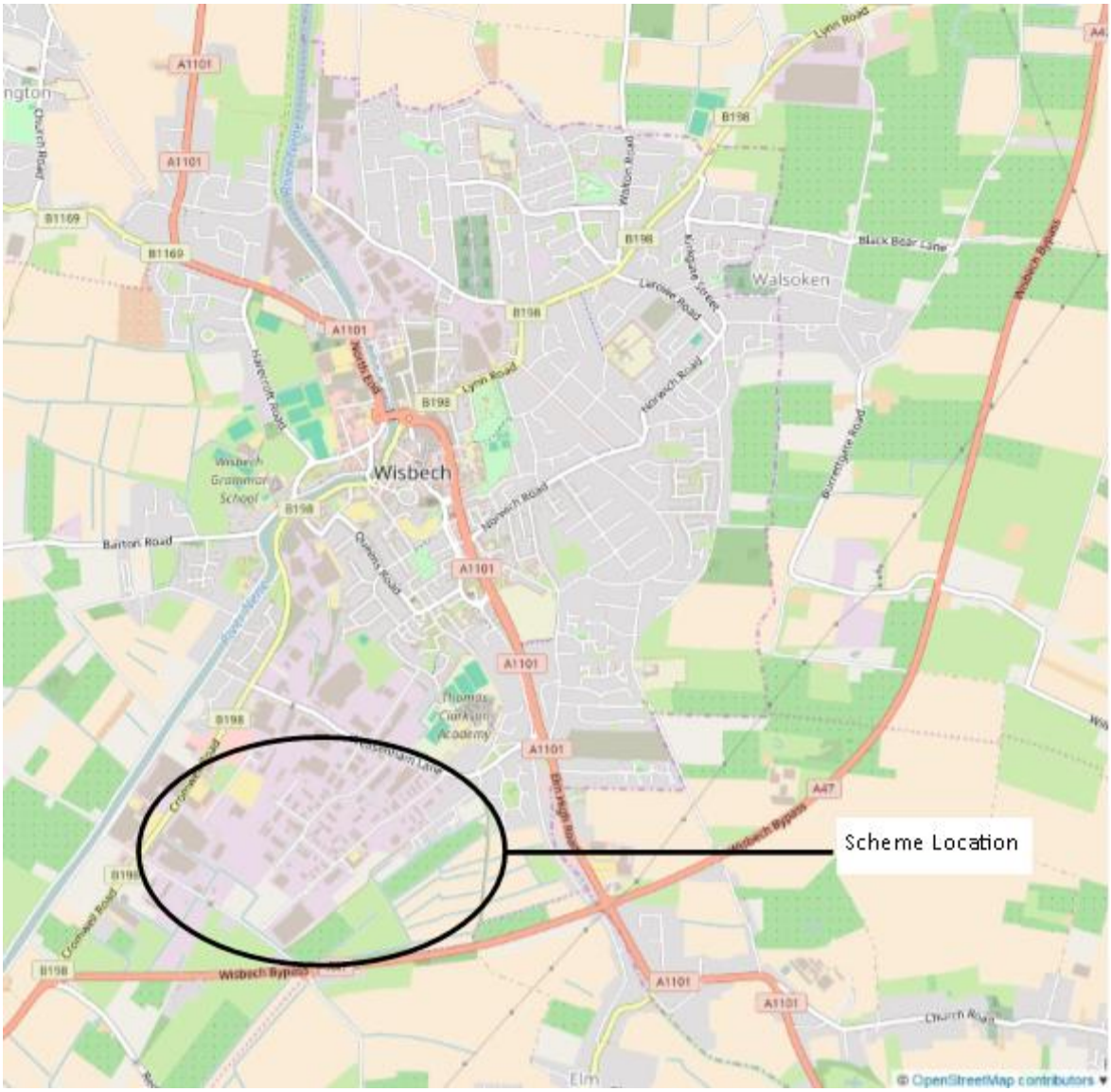

Figure 1.2: Broad location of the Southern Access Road Study Area

Figure 1.3 beneath shows the approximate outline of the Wisbech South Development. This is discussed in more detail in Chapter 3.

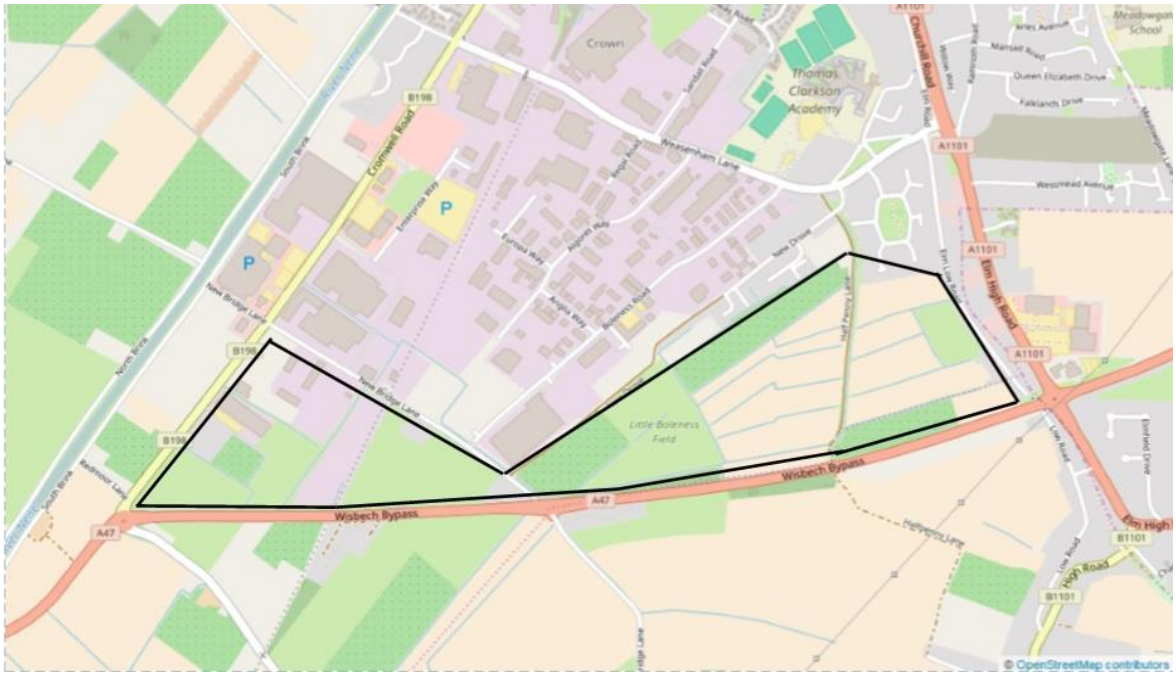

Figure 1.3: Wisbech South Development Location

The study area already consists of a mix of land uses, with some infrastructure already in place. New Bridge Lane and Boleness Road are the two main access routes to the current industry. The Southern Access Road proposal will consider linking these two roads and creating a new through route providing further development access in the process.

Figure 1.4: Proposed Route of the Southern Access Road

Several options have been assessed for creating the Southern Access Road, each with differing levels of connectivity. The impact of each of these options has then been considered on the wider highway network.

2 Existing Conditions

This chapter considers the existing conditions within the study area, including:

- Current Land Use;
- Traffic Flows;
- Accident Data;
- Flood Risk;
- Environmental Issues;
- Site Visit Observations; and,
- Congestion and Delay at Cromwell Road Roundabout and Elm High Road Roundabout.

Current Land Use and Key Features

The current make up of South Wisbech is predominantly industrial and commercial units. The land to the south of New Bridge Lane is currently fields and is where the majority of the new development proposals will be built. The different land uses of the existing area, including several key features, are shown in Figure 2.1 beneath, where:

- White represents existing industrial and commercial areas;
- Yellow represents fields and disused space identified for development;
- Blue represents the Thomas Clarkson Academy;
- Red represents the Wisbech Recycling Centre (household waste); and,
- Green represents the disused railway level crossing, which currently prevents vehicular access along New Bridge Lane on either side of the crossing.

Figure 2.1: Existing Land Use in South Wisbech

Education

The Thomas Clarkson Academy is the main Secondary School within Wisbech and has approximately 1,350 pupils (2016). The main point of vehicle access to the school is from Weasenham Lane, broadly opposite to the junction with Boleness Road. Consequently this section of Weasenham Lane becomes busy with school traffic during the AM peak hour, and again between 3pm and 4pm when the school day finishes. Traffic associated with the school will have an impact on the operation of Boleness Road and specifically the eastern end of Weasenham Lane, particularly during the AM peak hour.

Recycling Centre

The Wisbech Recycling Centre is located on the eastern side of Boleness Road. The centre is open to the public seven days a week between 8am and 5pm. Occasionally the recycling centre is closed for short periods of time (typically 15 minutes) whilst the waste is removed. During these periods queues of cars waiting to access the recycling centre can form on Boleness Road, causing an obstruction to two way traffic. Figure 2.2 beneath shows the number and duration of closures during 2015.

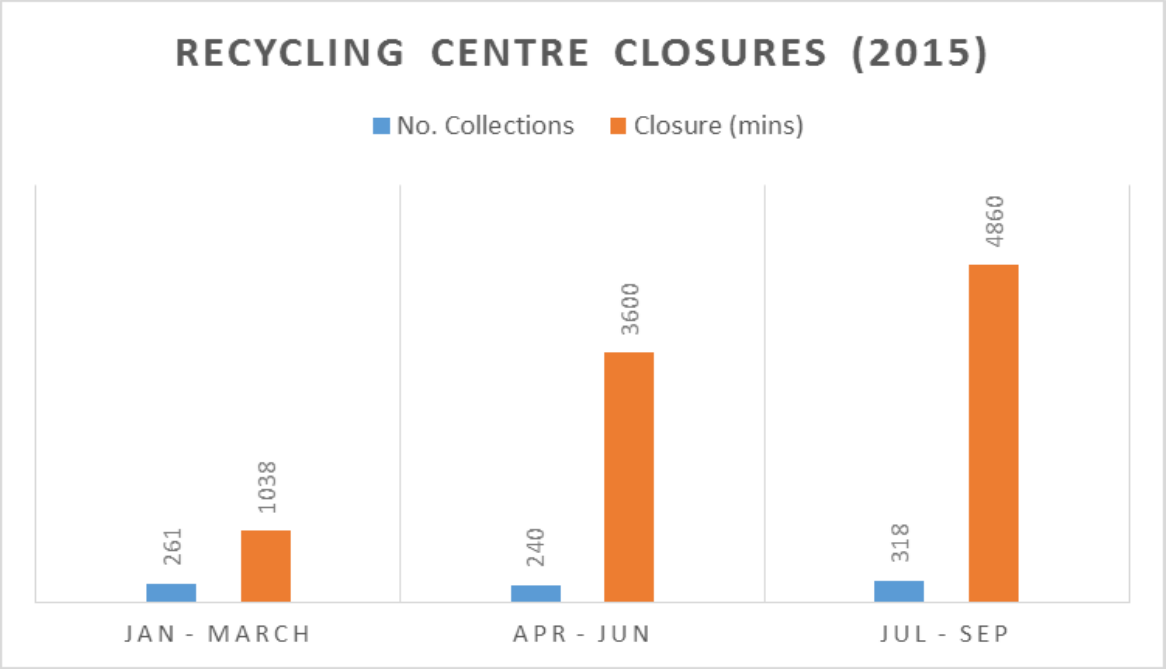

Figure 2.2: Wisbech Recycling Centre Closure Frequencies

Railway

The disused railway level crossing currently severs New Bridge Lane on either side of the railway track. Vehicle trips over the crossing are physically prevented by barriers as shown in Figure 2.3 beneath.

Figure 2.3: Disused Level Crossing

The disused railway and level crossing are currently owned by Network Rail, and any scheme proposing to cross this location would require their permission and acquisition of the land.

Traffic Flows

Turning counts were undertaken in March 2015 at the junctions of Cromwell Road / New Bridge Lane, Boleness Road / Weasenham Lane, Cromwell Road / Weasenham Lane, and Elm High Road / Weasenham Lane. The location of these junctions is shown within Figure 2.4.

Turning movements were recorded over a twelve hour period between 07:00 and 19:00, incorporating peak hours of 08:00 - 09:00 (AM) and 17:00 - 18:00 (PM).

Figure 2.4: Location of Traffic Counts

The information gathered from these traffic counts provides a picture of the current traffic situation in and around the proposed Wisbech South Development Site and provides a baseline for later measurements. This is discussed for each of the junctions in turn beneath.

Please note that the A47 / Cromwell Road Roundabout and the A47 / Elm High Road Roundabout are also relevant to the consideration of the Southern Access Road. These junctions are specifically affected with the Southern Access Road options that create a new junction directly onto the A47.

Further detail on the existing conditions at the junctions can be found in the 'New A47 Junction: South' Report, which is an accompanying report within the Wisbech Access Study.

Elm High Road / Weasenham Lane / Ramnoth Road Traffic Flows

Figure 2.5 shows the layout of the Elm High Road / Weasenham Lane / Ramnoth Road junction. Traffic counts for the 12 hour, AM and PM peak hours is shown below, providing an indication of the traffic demand on a daily basis.

Figure 2.5: Elm High Road/Weasenham Lane/Ramnoth Road Junction layout

The traffic flows for the 12 hour period are shown beneath in Figure 2.6.

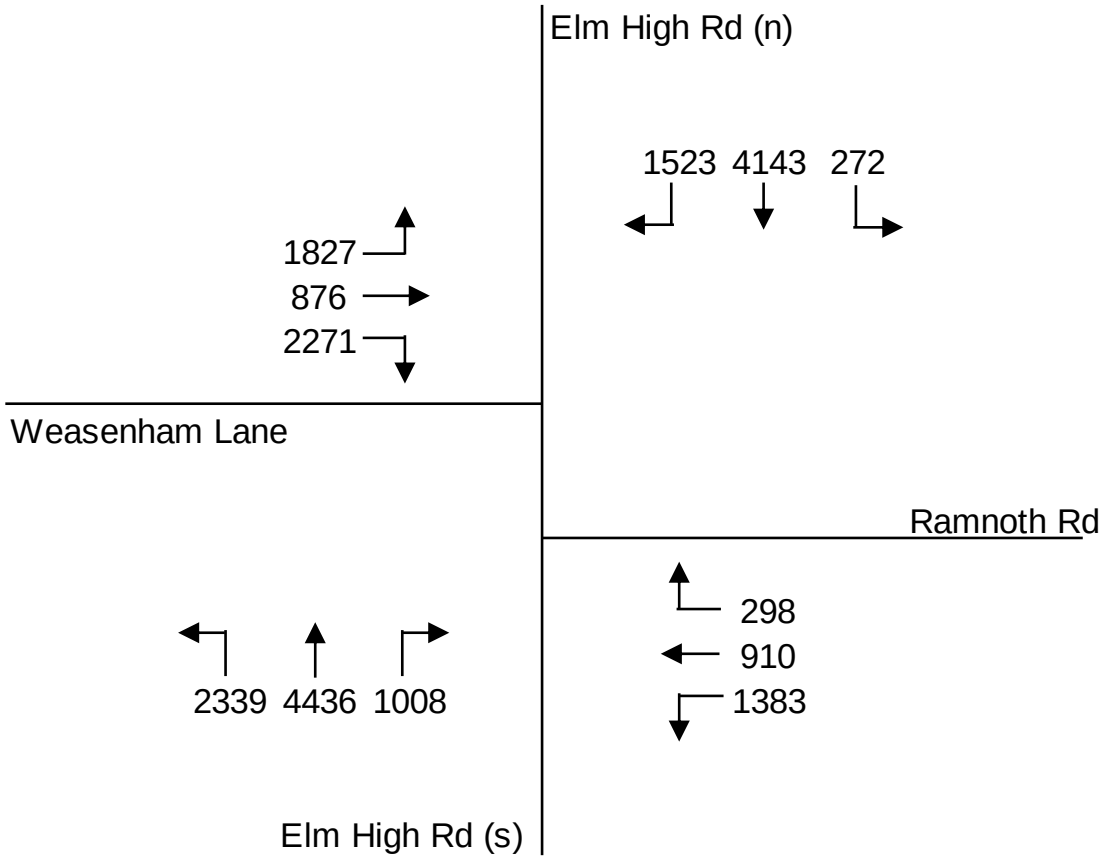

Figure 2.6: Elm High Road / Weasenham Lane / Ramnoth Road Junction 12 Hour Traffic Data

The traffic flows show that the main movement at this junction is on Elm High Road travelling both northbound and southbound. Traffic coming from Weasenham Lane turning onto Elm High Road is relatively equally split between vehicles travelling northbound and southbound.

The traffic flows for the AM peak hour are shown beneath in Figure 2.7.

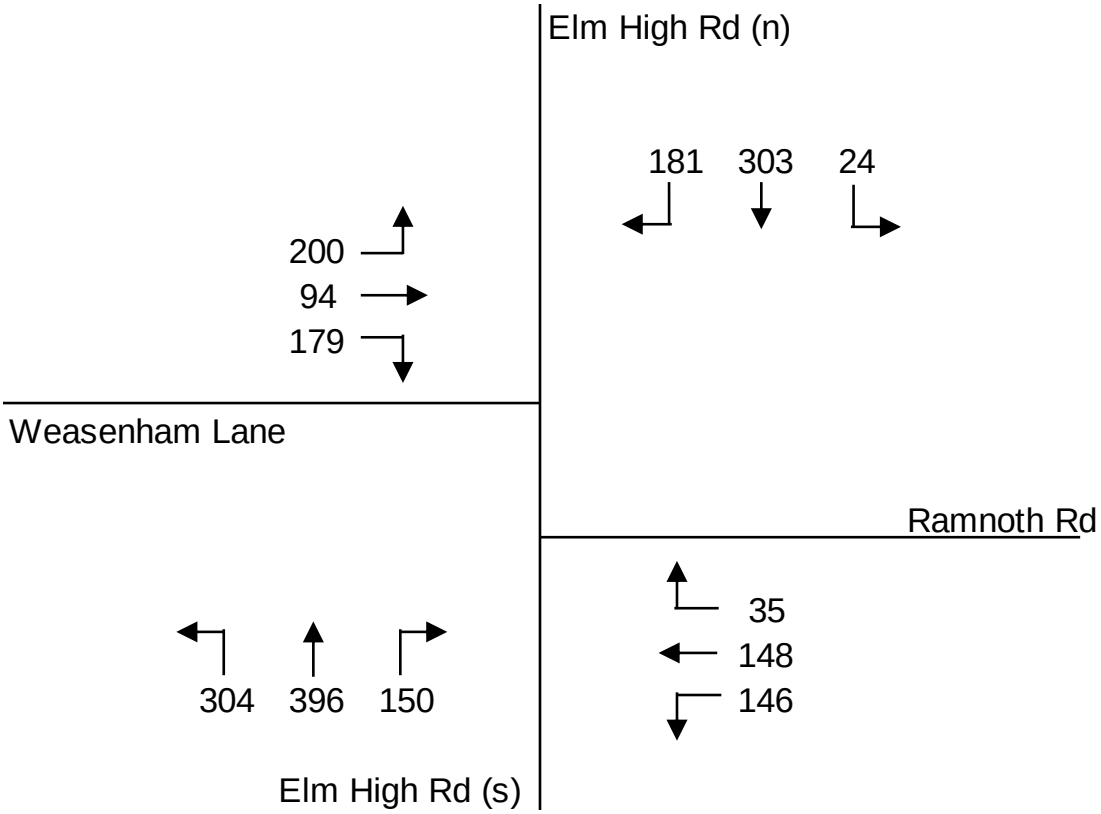

Figure 2.7: Elm High Road / Weasenham Lane / Ramnoth Road Junction AM Peak Hour Traffic Data

In the AM peak hour the main movement is along Elm High Road travelling in both directions. Significantly more traffic is turning onto Weasenham Lane from Elm High Road South, again there is an almost equal split of traffic leaving Weasenham Lane and turning onto Elm High Road northbound and southbound. Overall more traffic is entering Weasenham Lane than leaving it, which would be expected given the amount of employment located adjacent to Weasenham Lane.

The traffic flows for the PM peak hour are shown beneath in Figure 2.8.

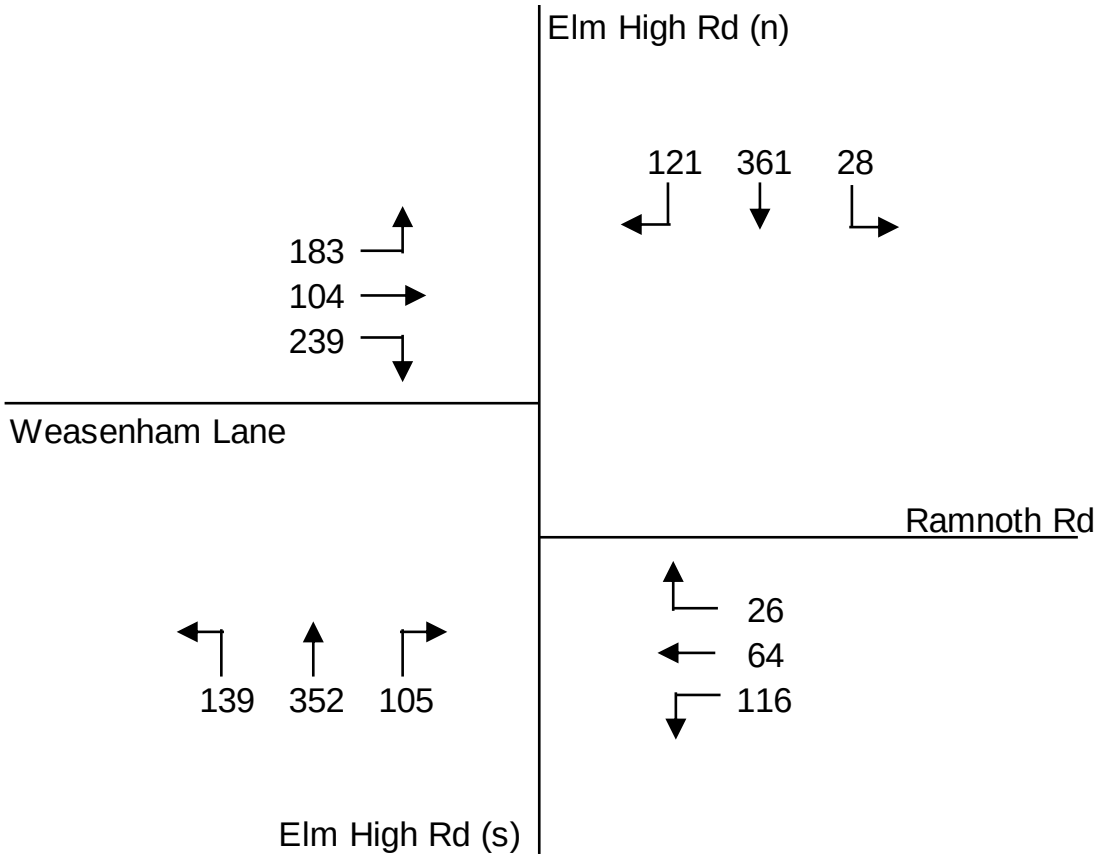

Figure 2.8: Elm High Road / Weasenham Lane / Ramnoth Road Junction PM Peak Hour Traffic Data

As with the AM peak hour and 12 hour flows, the main movements at the junction during the PM peak hour are the ahead movements along Elm High Road. In reverse to the AM peak hour, there is more traffic leaving Weasenham Lane than entering during the PM peak hour.

Weasenham Lane / Boleness Road Junction

The following figures show the layout of the Weasenham Lane / Boleness Road Junction and the traffic flows for the junction for the 12 hour period, the AM peak hour and the PM peak hour.

Figure 2.9: Weasenham Lane / Boleness Road Junction Layout

The traffic flows for the 12 hour period are shown beneath in Figure 2.10.

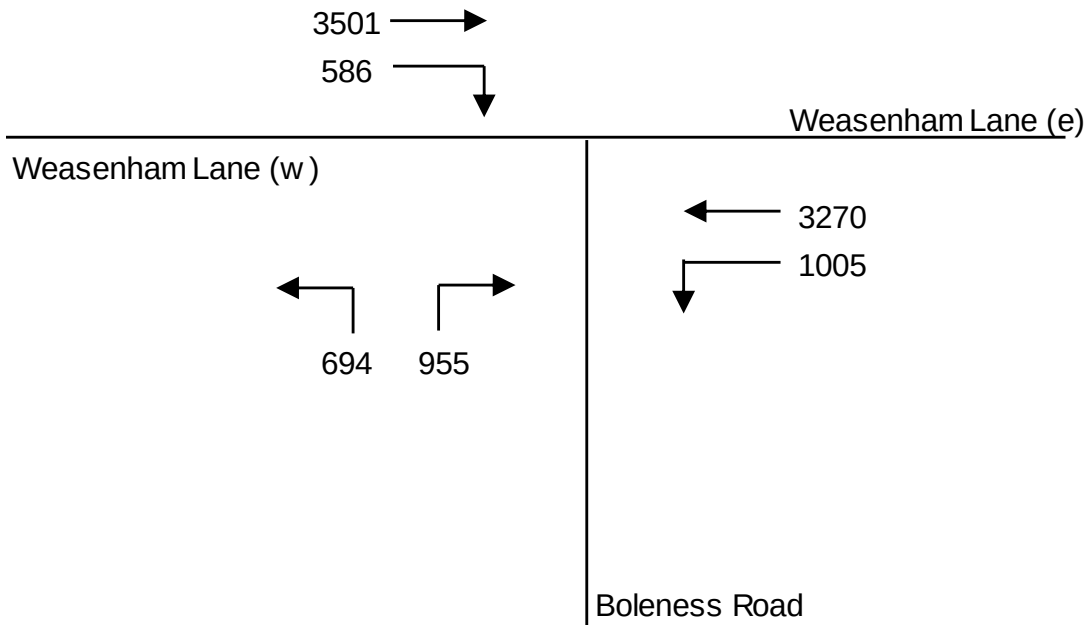

Figure 2.10: Weasenham Lane / Boleness Road Junction 12 Hour Traffic Data

The dominant movement is on Weasenham Lane heading in either direction. Almost 40% more traffic turns onto Boleness Road from Weasenham Lane east than from Weasenham Lane west. Similarly, notably more traffic leaving Boleness Road turns east than west.

The traffic flows for the AM peak hour are shown beneath in Figure 2.11.

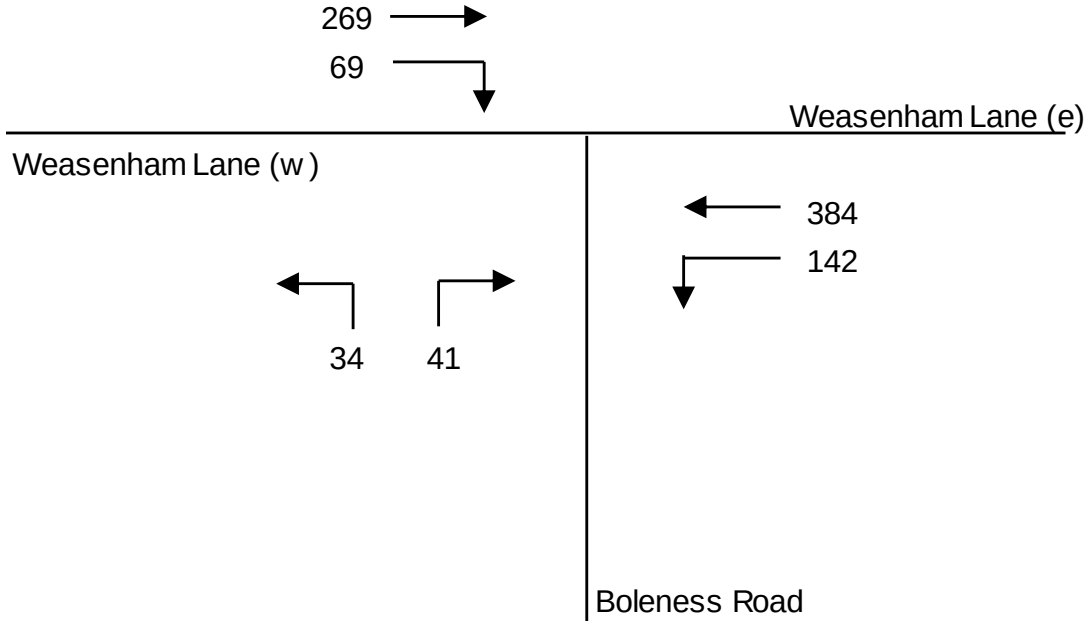

Figure 2.11: Weasenham Lane / Boleness Road Junction AM Peak Hour Traffic Data

In the AM peak hour the dominant traffic movement remains along Weasenham Lane in both directions. There is over 50% more traffic entering Boleness Road from Weasenham Lane east than west. Overall significantly more traffic is entering Boleness Road than leaving it, which would be expected with the employment land uses.

The traffic flows for the PM peak hour are shown beneath in Figure 2.12.

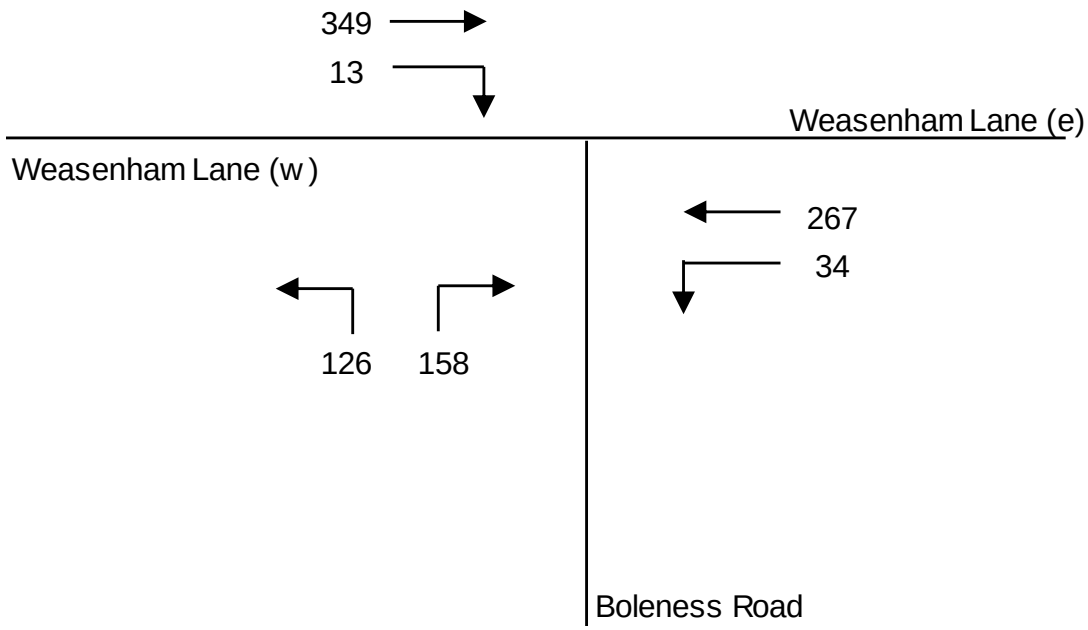

Figure 2.12: Weasenham Lane / Boleness Road Junction PM Peak Hour Traffic Data

Again the dominant traffic movement is along Weasenham Lane in both directions. However unlike the AM peak hour, in the PM peak hour there is significantly more traffic leaving Boleness Road than entering. Traffic leaving Boleness Road is split fairly equally between left and right turning vehicles.

Cromwell Road / Weasenham Lane Junction

The following figures show the layout of the Cromwell Road/Weasenham Lane junction and the 12 hour, AM peak hour and PM peak hour traffic flows through the junction.

The layout of the junction is shown in Figure 2.13 beneath.

Figure 2.13: Cromwell Road / Weasenham Lane Junction Layout

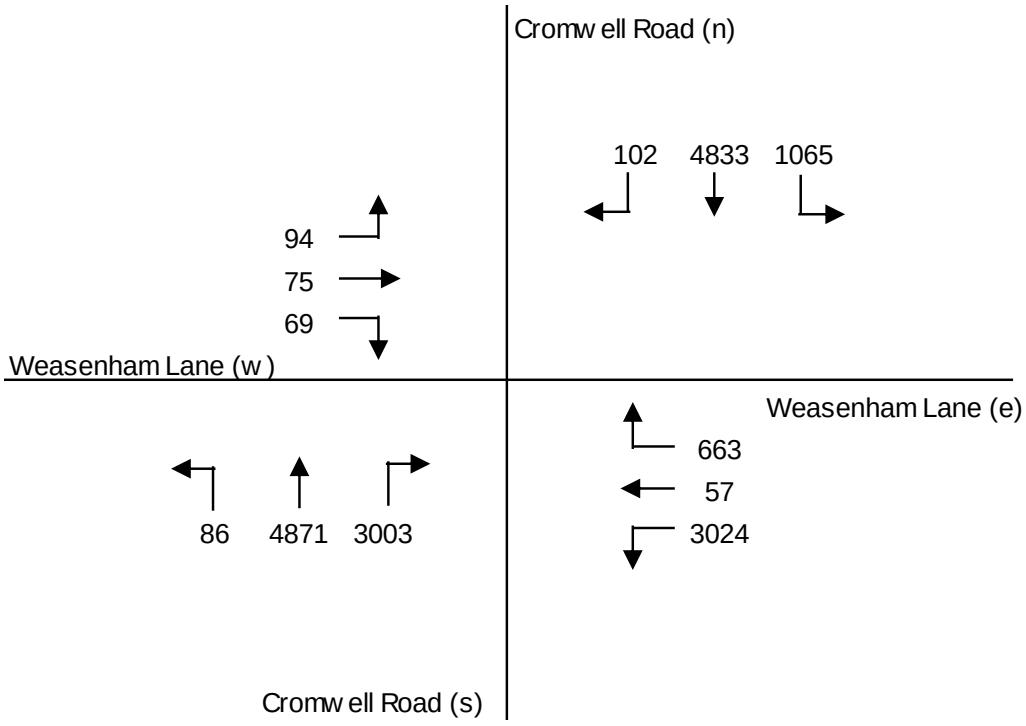

Figure 2.14: Cromwell Road / Weasenham Lane Junction 12 Hour Traffic Data

Although the dominant movement is along Cromwell Road in both directions, there is a considerable amount of traffic entering and leaving Weasenham Lane (4,143 and 3,744 vehicles respectively) over the 12 hour survey period. Over 50% more traffic turns onto Weasenham Lane east from Cromwell Road south than north.

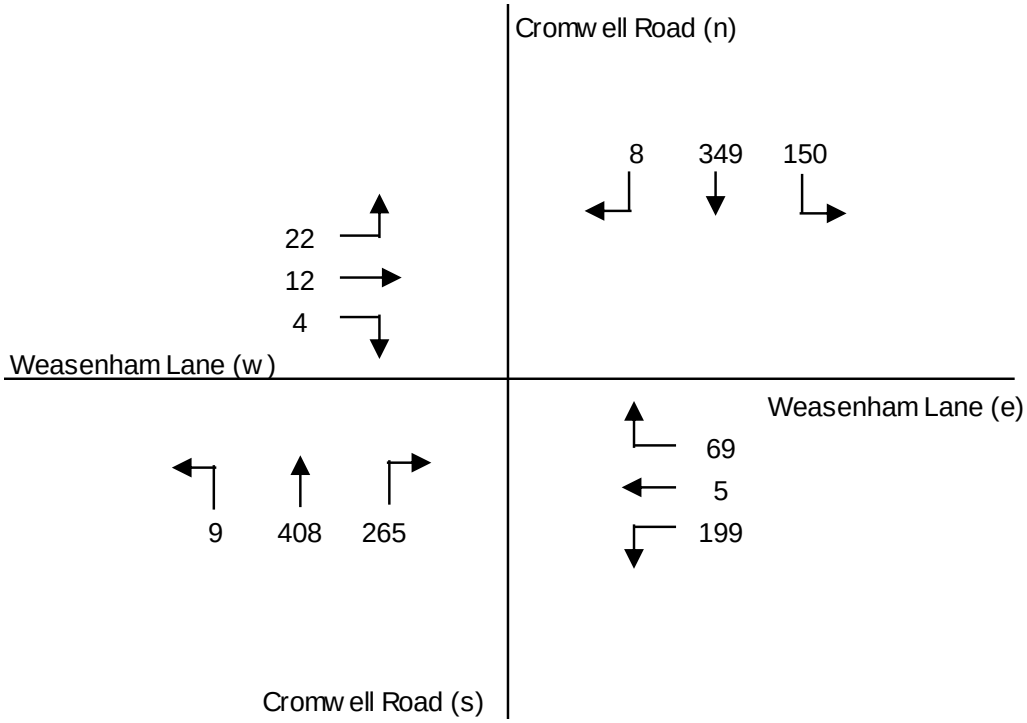

Figure 2.15: Cromwell Road / Weasenham Lane Junction AM Peak Hour Traffic Data

During the AM peak hour more traffic enters Weasenham Lane east than leaves it. However the dominant movement is still the ahead movements on Cromwell Road in both northbound and southbound directions.

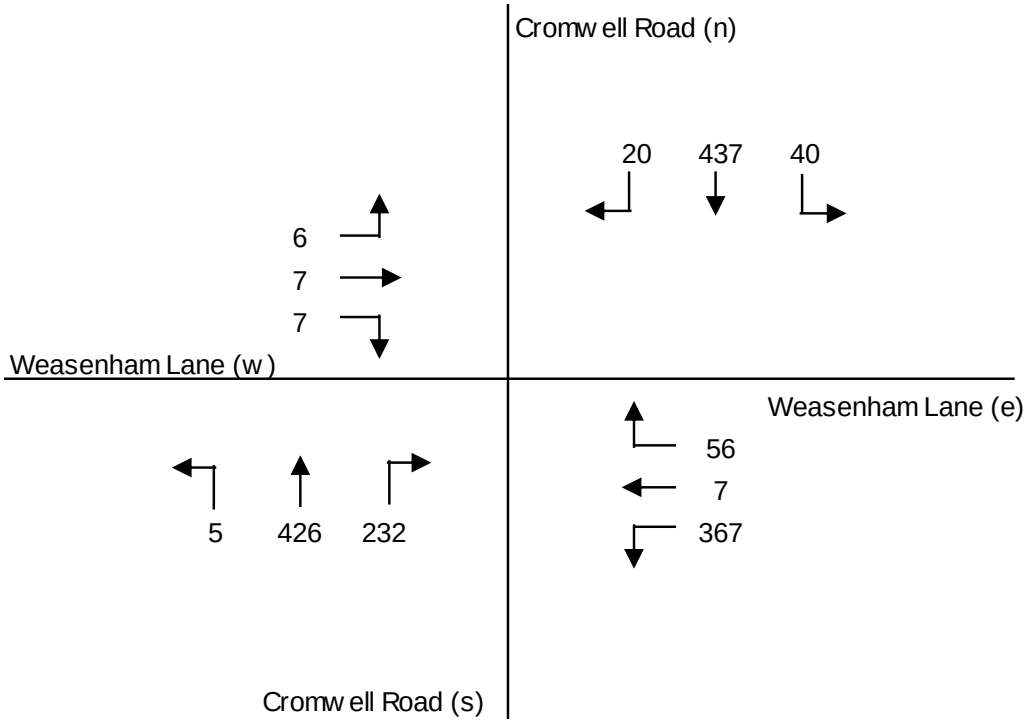

Figure 2.16: Cromwell Road / Weasenham Lane Junction PM Peak Hour Traffic Data

During the PM peak hour, the traffic flow from Weasenham Lane is reversed compared to the AM peak hour as more traffic leaves Weasenham Lane east than enters it. The dominant flow remains as the ahead movements on Cromwell Road in both northbound and southbound directions.

Cromwell Road / New Bridge Lane Junction

The following figures show the layout of the Cromwell Road / New Bridge lane junction.

Figure 2.17: Cromwell Road / New Bridge Lane Junction Layout

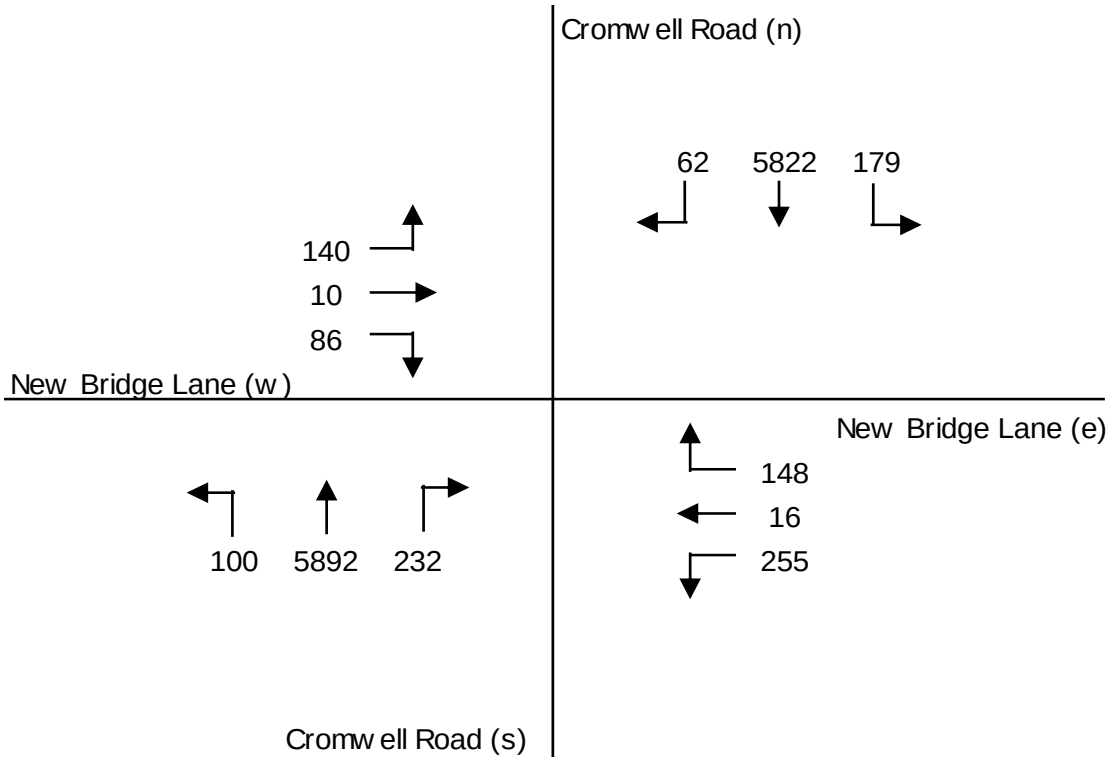

Figure 2.18: Cromwell Road / New Bridge Lane Junction 12 Hour Traffic Data

The dominant movement at the junction of Cromwell Road / New Bridge Lane is the ahead movement along Cromwell Road in both directions. Almost exactly the same amount of traffic enters New Bridge Lane east (421) as leaves (419) over the 12 hour period surveyed.

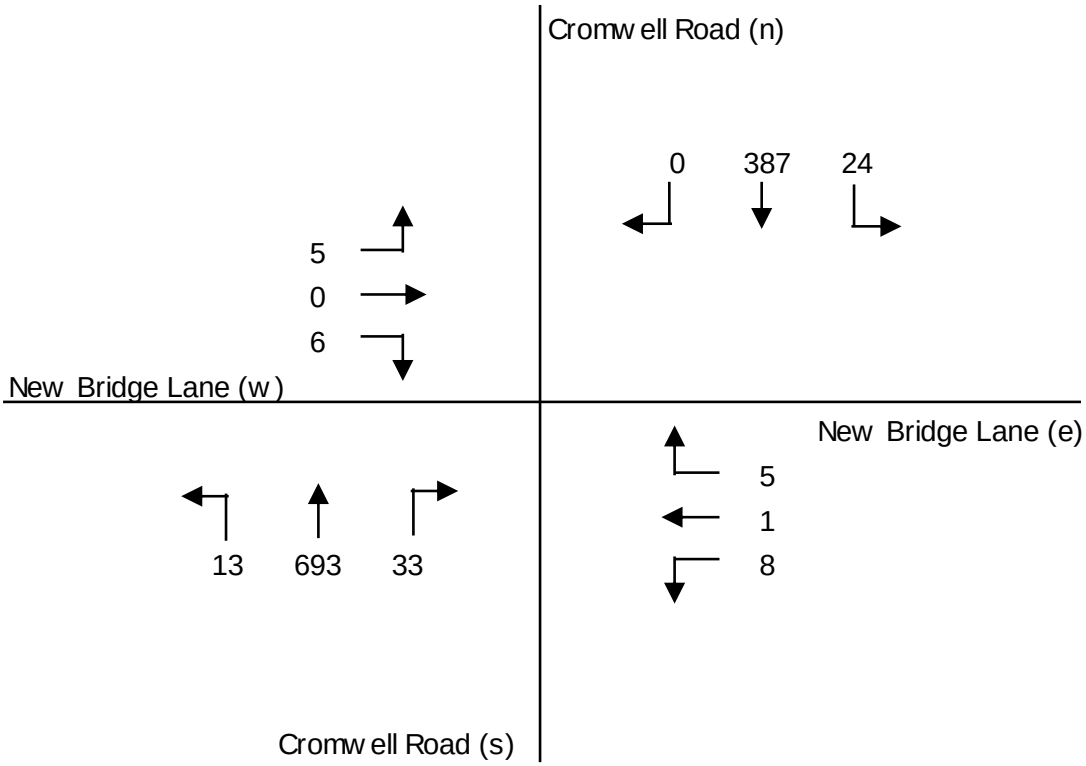

Figure 2.19: Cromwell Road / New Bridge Lane Junction AM Peak Hour Traffic Data

The dominant traffic flows during the AM peak hour are ahead in both directions along Cromwell Road. Considerably more traffic enters New Bridge Lane than exits, which is expected as New Bridge Lane provides access to a number of employment locations.

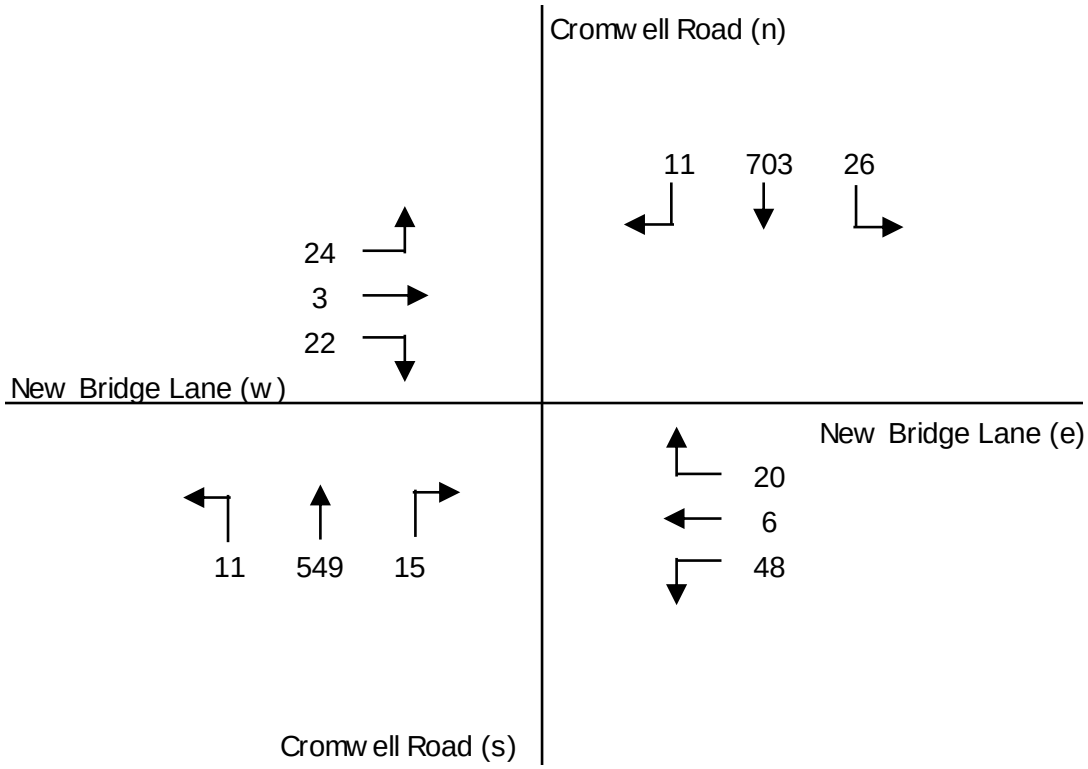

Figure 2.20: Cromwell Road/New Bridge Lane Junction PM Peak Hour Traffic Data

As with the AM peak hour, the dominant movement remains along Cromwell Road in both directions. The traffic flow recorded leaving New Bridge Lane was greater than that entering it.

Traffic Flow Summary

The traffic data shows that traffic within the area is very tidal (as would be expected given the land use types). Vehicles generally use the main corridors of Cromwell Road and Elm High Road in the AM peak hour to access the employment areas off Weasenham Lane, and then leave via the same corridors during the PM peak hour.

Existing Congestion and Delay

This section considers the current delays experienced by road users at the following locations within the vicinity of the Southern Access Road:

- Weasenham Lane;
- B198 Cromwell Road / Weasenham Lane Junction; and,
- Weasenham Lane / A1101 Elm High Road / Ramnoth Road Junction.

Satellite Navigation (TomTom) data has been used to assess journey times and delay at each of these locations. The TomTom dataset is based on information collected between 2nd November 2015 and 22nd January 2016, excluding weekends, bank holidays and the Christmas period.

Time periods selected to assess journey time and delay include:

- Free Flow – between hours of 00:00 and 05:00;
- AM Peak – between hours of 08:00 and 09:00, and;
- PM Peak – between hours of 17:00 and 18:00.

Within the TomTom dataset the carriageway is divided into multiple sections called segments.

To calculate delay, the average travel time for the Free Flow period has been used as the base measurement as it represents conditions of unobstructed travel. The additional travel time (beyond that recorded in the Free Flow period) for each of the peak hours is then taken as the delay, as shown in the equation below:

AM (or PM) Average Travel Time (s) – Free Flow Average Travel Time (s) = Delay (s)

Weasenham Lane Delay

The following figures and tables report the delay currently experienced along Weasenham Lane in the AM and PM peak hours. The entire length of Weasenham Lane, between Cromwell Road and Elm High Road junctions, has been assessed, with segments used totalling 0.8 miles.

Table 2.1 beneath shows the delay experienced on the Weasenham Lane eastbound approach during each of the peak hour periods.

Table 2.1: Journey Times and Delay for Weasenham Lane Eastbound Approach

Segment ID	Length (metres)	Free Flow (00:00 - 06:00)	AM (08:00 - 09:00)	PM (17:00 - 18:00)
213	72.5	11.1	17.5	11.0
215	12.6	1.2	2.1	1.4
210	244.5	21.4	27.1	20.1
1297	212.1	16.3	36.3	16.8
1302	35.7	3.3	6.9	3.6
1336	103.7	8.8	18.4	10.2
1294	42.5	4.4	7.5	4.1
1207	87.7	6.5	11.1	12.0
1211	94.0	6.9	12.0	15.1
1201	16.1	1.3	2.5	2.3
1175	6.3	0.5	1.1	0.9
1181	155.1	15.7	21.3	28.8
137	9.2	0.7	1.3	2.1
139	76.7	5.8	12.3	17.6
160	34.1	2.4	6.8	9.5
158	120.8	9.5	32.1	37.8
103	18.9	1.7	6.7	7.1
125	9.2	6.9	3.9	4.4
118	15.8	1.7	6.3	7.2
119	15.3	2.1	8.5	9.6
7	20.3	6.1	21.6	18.2
	Total	**134.5**	**263.2**	**239.9**
	Delay		**128.7**	**105.4**

Table 2.1 shows the Free Flow time when travelling eastbound along Weasenham Lane is 134 seconds (2 minutes 14 seconds), over 0.8 miles.

This approach experiences delay across both peak hours, however delay is greatest during the AM peak hour, whereby 128 seconds (2 minutes 8 seconds) is added to journey times.

PM peak hour delay is shown to be lower at 105 seconds (1 minute 45 seconds), but still indicates significant congestion along this route.

Table 2.2 beneath shows the delay experienced on the Weasenham Lane westbound approach during each of the peak hour periods.

Table 2.2: Journey Times and Delay for Weasenham Lane Westbound Approach

Segment ID	Length (metres)	Free Flow (00:00 - 06:00)	AM (08:00 - 09:00)	PM (17:00 - 18:00)
116	11.7	1.6	2.3	2.9
115	23.0	2.9	3.7	3.6
117	15.8	1.8	2.3	2.0
123	9.2	0.8	1.5	1.2
104	18.9	1.9	3.0	2.3
157	120.8	9.7	14.8	11.4
159	34.1	2.5	5.8	3.2
140	76.7	5.6	6.4	6.7
138	9.2	0.6	0.7	0.7
1180	155.5	12.7	12.2	15.2
1178	6.3	0.8	1.5	1.9
1209	94.0	9.5	8.2	11.9
1206	87.7	7.0	6.4	22.3
1292	42.5	3.3	4.7	8.7
1334	103.7	9.6	10.4	20.4
1304	35.7	3.1	5.1	4.8
1299	212.1	15.6	16.8	25.7
211	244.5	18.3	23.4	55.6
214	12.6	1.1	2.0	5.5
212	72.5	12.1	24.1	40.8
	Total	**120.4**	**154.9**	**246.8**
	Delay		**34.5**	**126.4**

Table 2.2 shows the Free Flow time when travelling westbound along Weasenham Lane is 120 seconds (2 minutes), over 0.8 miles.

This approach experiences delay across both peak hours, however delay is greatest during the PM peak hour, whereby 126 seconds (2 minutes 6 seconds) is added to journey times.

AM peak hour delay is shown to be less severe with 34 seconds added to journey times.

Results shown in Table 2.1 and 2.2 show the tidality of traffic along this east-west corridor, with a greater proportion of traffic travelling eastbound (originating from Cromwell Road) during the AM peak hour, and travelling westbound (originating from Elm High Road) during the PM peak hour.

Cromwell Road / Weasenham Lane Delay

The following figures and tables report the delay currently experienced at Cromwell Road / Weasenham Lane Junction in the AM and PM peak hours.

Figure 2.21: TomTom segments used at Cromwell Road / Weasenham Lane

Table 2.3 beneath shows the delay experienced on the Cromwell Road northbound approach during each of the peak hour periods.

Table 2.3: Journey Times and Delay for Cromwell Road Northbound Approach

Segment ID	Length (metres)	Free Flow	AM	PM
		(00:00 - 06:00)	(08:00 - 09:00)	(17:00 - 18:00)
209	75.67	12	22	22
218	95.97	7	9	14
91	181.10	15	20	22
	Total	**34**	**51**	**58**
	Delay		**17**	**24**

The table shows that there is 17 seconds of delay experienced in the AM peak hour, on top of the 34 second free flow travel time. During the PM peak this delay increases to 24 seconds.

Table 2.4 beneath shows the delay experienced on the Cromwell Road southbound approach during each of the peak hour periods.

Table 2.4: Journey Times and Delay for Cromwell Road Southbound Approach

Segment ID	Length (metres)	Free Flow	AM	PM
		(00:00 - 06:00)	(08:00 - 09:00)	(17:00 - 18:00)
255	101.16	8	28	55
256	11.42	1	1	5
260	46.87	3	9	15
244	10.49	1	2	3
252	181.21	11	17	49
	Total	**24**	**57**	**127**
	Delay		**33**	**103**

The table shows that significant delay is experienced in both peaks compared to the Free Flow journey times. An additional 33 seconds is experienced in the AM peak hour, this increases significantly to 103 seconds during the PM peak hour.

Observations of the survey footage from the traffic counts shows that vehicles on Cromwell Road southbound are sometimes prevented from proceeding through the junction due to delays further to the south, which occasionally causes blocking back through the Cromwell Road/Weasenham Lane Junction, as shown in Figure 2.22 beneath.

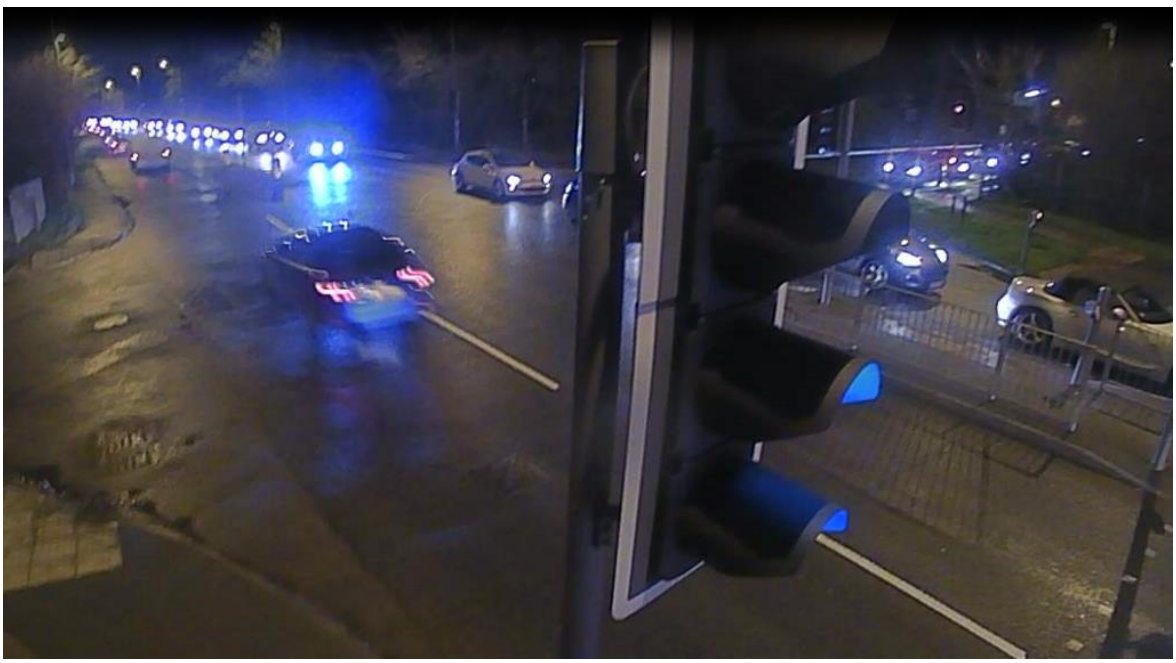

Figure 2.22: Vehicles blocking back on Cromwell Road Southbound

Table 2.5 beneath shows the delay experienced on the Weasenham Lane Westbound approach during each of the peak hour periods.

Table 2.5: Journey Times and Delay for Weasenham Lane Westbound Approach

Segment ID	Length (metres)	Free Flow (00:00 - 06:00)	AM (08:00 - 09:00)	PM (17:00 - 18:00)
198	10.92	2	5	3
212	72.57	12	24	41
214	12.63	1	2	6
211	244.51	18	23	56
	Total	**33**	**54**	**106**
	Delay		**21**	**73**

The table shows that there is 21 seconds of delay experienced in the AM peak hour, on top of the 33 second free flow travel time. During the PM peak this delay increases by over three times the amount to 73 seconds.

As shown in Figure 2.22 above, some of this delay during the PM peak hour will be attributable to delay further to the south along Cromwell Road impacting back on this junction.

Weasenham Lane / Elm High Road / Ramnoth Road Delay

The following figures and tables indicate the delay currently experienced at Weasenham Lane / Elm High Road / Ramnoth Road Junction in the AM and PM peak hours.

Figure 2.23: TomTom segments used at Elm High Road / Weasenham Lane / Ramnoth Road

Table 2.6 beneath shows the delay experienced on the Weasenham Lane Eastbound approach during each of the peak hour periods.

Table 2.6: Journey Times and Delay for Weasenham Lane Eastbound Approach

Segment ID	Length (metres)	Free Flow (00:00 - 06:00)	AM (08:00 - 09:00)	PM (17:00 - 18:00)
4	10.58	3	8	8
7	20.33	6	22	18
119	15.36	2	9	10
118	15.87	2	6	7
125	9.22	1	4	4
103	18.92	2	7	7
158	120.87	10	32	38
160	34.1	2	7	10
	Total	**28**	**95**	**102**
	Delay		**67**	**74**

Relatively similar amounts of delay are experienced in both the AM and PM peak hours, the delay is over 1 minute in addition to the Free Flow travel time of 28 seconds. The delay during the AM peak hour will likely be partly due to cars dropping students off at the Thomas Clarkson Academy. During the PM peak it will most likely consist of vehicles leaving the employment areas off Weasenham Lane.

Table 2.7 beneath shows the delay experienced on the Churchill Road Southbound approach during each of the peak hour periods.

Table 2.7: Journey Times and Delay for Churchill Road Southbound Approach

Segment ID	Length (metres)	Free Flow (00:00 - 06:00)	AM (08:00 - 09:00)	PM (17:00 - 18:00)
13	15.92	3	8	13
15	23.61	3	11	15
40	19.71	1	5	7
241	284.64	16	24	34
	Total	**23**	**48**	**69**
	Delay		**25**	**46**

The data shows that there is 25 seconds of delay on the Churchill Road southbound approach during the AM peak hour, which nearly doubles to 46 seconds during the PM peak hour.

Table 2.8 beneath shows the delay experienced on the Ramnoth Road Westbound approach during each of the peak hour periods.

Table 2.8: Journey Times and Delay for Ramnoth Road Westbound Approach

Segment ID	Length (metres)	Free Flow (00:00 - 06:00)	AM (08:00 - 09:00)	PM (17:00 - 18:00)
101	10.53	3	8	6
95	19.81	5	18	17
127	166.91	16	49	30
	Total	**24**	**75**	**53**
	Delay		**51**	**29**

More delay is experienced during the AM peak hour than during the PM peak hour along the Ramnoth Road approach to the junction. However, the delay in both peaks is still a significant increase on the Free Flow journey time of 24 seconds.

Table 2.9 beneath shows the delay experienced on the Elm High Road Northbound approach during each of the peak hour periods.

Table 2.9: Journey Times and Delay for Elm High Road Northbound Approach

Segment ID	Length (metres)	Free Flow (00:00 - 06:00)	AM (08:00 - 09:00)	PM (17:00 - 18:00)
84	49.31	6	25	27
154	16.85	1	6	4
156	5.88	1	2	1
162	67.31	5	15	8
142	24.53	2	5	2
144	21.32	1	4	2
	Total	**16**	**57**	**44**
	Delay		**41**	**28**

As with the Ramnoth Road approach, greater delay is experienced during the AM peak hour travelling northbound than is experienced in the PM peak hour. This is a function of the tidal traffic identified within the traffic counts, and which results from the high level of employment areas off Weasenham Lane.

Accident Data

Accident data was obtained for the four count locations discussed above, as well as for along New bridge Lane and Boleness Road. Data was obtained from Cambridgeshire County Council for the period of 2010 to 2015. During this time there were 39 recorded accidents at various locations within the study area. The details of the accidents are provided beneath in Tables 2.10 – 2.15.

Table 2.10: Elm High Road / Ramnoth Road / Weasenham Lane Junction Accident Data

Accident Number	Year	Severity	Summary
0538310	2010	Slight	Vehicle 1 going ahead (S-N), vehicle 2 turning right (E-N).
2774810	2010	Slight	Vehicle 1 going ahead (N-S), vehicle 2 drives into the back of vehicle 1.
0375511	2011	Slight	Vehicle 1 going ahead, hit from behind by vehicle 2.
0899811	2011	Slight	Vehicle 1 turning right (N-W), vehicle 2 moving off (S-N).
0039513	2013	Slight	Car changing lane to left, hits pedestrian.
0318413	2013	Slight	Vehicle 1 turning right (N-SW), vehicle 2 going ahead (S-N).
0155714	2014	Slight	Vehicle 1 going ahead (S-N), vehicle 2 turning right (N-W)
0082815	2015	Slight	Vehicle 1 turning right (NW-SW), hit by vehicle 2 going ahead (SE-NW).
0105615	2015	Slight	Vehicle 1 slow or stopping (S-N), hit by vehicle 2 going ahead (S-N)

Table 2.11: Weasenham Lane / Boleness Road Junction Accident Data

Accident Number	Year	Severity	Summary
0596510	2010	Slight	Vehicle 1 slow or stopping (NW-E), vehicle 2 waiting to go ahead but held up (NW-E), vehicle 3 waiting to go ahead but held up (NW-E).
0706810	2010	Slight	Vehicle 1 turning right (NW-SW), vehicle 2 (bicycle) going ahead (SE-NW).

Table 2.12: Cromwell Road / Weasenham Lane Junction Accident Data

Accident Number	Year	Severity	Summary
0330010	2010	Slight	Vehicle 1 going ahead (NE-SW), vehicle 2 moving off (NW-SE).
0406210	2010	Slight	Vehicle 1 turning left (SE-SW), vehicle 2 going ahead (NE-SW).
0522010	2010	Slight	Vehicle 1 going ahead, hit pedestrian.
0652310	2010	Slight	Vehicle 1 going ahead, vehicle 2 waiting to go but held up.
0694910	2010	Slight	Vehicle 1 going ahead (E-W), vehicle 2 going ahead (S-N), vehicle 3 waiting to turn left (W-E).
0745010	2010	Slight	Vehicle 1 going ahead (E-W), vehicle 2 going ahead (S-N).
1266510	2010	Slight	Vehicle 1 turning left (SE-SW), vehicle 2 going ahead (NE-SW).
1399310	2010	Serious	Vehicle 1 turning left (SE-SW), vehicle 2 going ahead (SW-NE).
1800010	2010	Slight	Vehicle 1 moving off (NW-SE), vehicle 2 going ahead (NE-SW).
1850810	2010	Slight	Vehicle 1 moving off (SE-NW), vehicle 2 going ahead (NE-SW).
2767910	2010	Slight	Vehicle 1 moving off (E-W), vehicle 2 going ahead (N-S).
2929110	2010	Slight	Vehicle turning right (SE-NE), vehicle 2 going ahead (NE-SW).
2987610	2010	Slight	Vehicle 1 going ahead (NW-SE), vehicle 2 going ahead (NE-SW).
0114311	2011	Slight	Vehicle 1 going ahead (W-E) vehicle 2 going ahead (S-N).
0432611	2011	Slight	Vehicle 1 going ahead (E-W), vehicle 2 going ahead (S-N).
0455511	2011	Slight	Vehicle 1 turning right (SW-SE), vehicle 2 going ahead (NE-SW).
0919411	2011	Slight	Vehicle 1 turning left (SE-SW), vehicle 2 going ahead (NE-SW).
0867711	2011	Slight	Vehicle 1 going ahead (E-W), vehicle 2 going ahead (S-N), vehicle 3 waiting to turn left (W-N).
0925311	2011	Slight	Vehicle 1 moving off, vehicle 2 waiting to go but held up.
0001412	2012	Slight	Vehicle 1 turning right (NE-NW), vehicle 2 going ahead (SW-NE).
0045712	2012	Slight	Vehicle 1 turning right (S-E), vehicle 2 going ahead (N-S) and vehicle 3 waiting to turn left (E-S).
0393612	2012	Slight	Vehicle 1 going ahead, vehicle 2 waiting to go but held up, vehicle 3 waiting to go but held up.
0595312	2012	Slight	Vehicle 1 turning right (NE-NW), vehicle 2 going ahead (SW-NE).

Table 2.13: Cromwell Road / New Bridge Lane Junction Accident Data

Accident Number	Year	Severity	Summary
3014713	2013	Slight	Vehicle 1 going ahead (NE-SW), vehicle 2 reversing (SE-NW), vehicle 3 parked.
3050113	2013	Slight	Vehicle 1 U-turning (SW-SW), vehicle 2 going ahead (SW-NE).
0034414	2014	Slight	Vehicle 1 going ahead (SW-NE), vehicle 2 waiting to go ahead but held up (SW-NE)

Table 2.14: Boleness Road Accident Data

Accident Number	Year	Severity	Summary
2304010	2010	Slight	Vehicle 1 slow or stopping (SW-NE), vehicle 2 reversing (NE-SW).

Table 2.15: New Bridge Lane Accident Data

Accident Number	Year	Severity	Summary
0198712	2012	Serious	Vehicle 1 overtaking moving vehicle on offside (SE-NW), vehicle 2 turning right (SE-NE).

Tables 2.10 and 2.12 show that most of the recorded accidents were concentrated at the junctions on either end of Weasenham Lane. These were also the junctions where the higher traffic flows were recorded.

At the junction of Cromwell Road/Weasenham Lane there have been 23 accidents over the five year period, a high proportion of which appear to be rear end shunts.

Flood Risk

Figure 2.24 shows flood risk information acquired by the Environment Agency. The information provided shows that part of the scheme area lies within Flood Risk Zone 2 (Medium – light blue) and Flood Risk Zone 3 (High – dark blue).

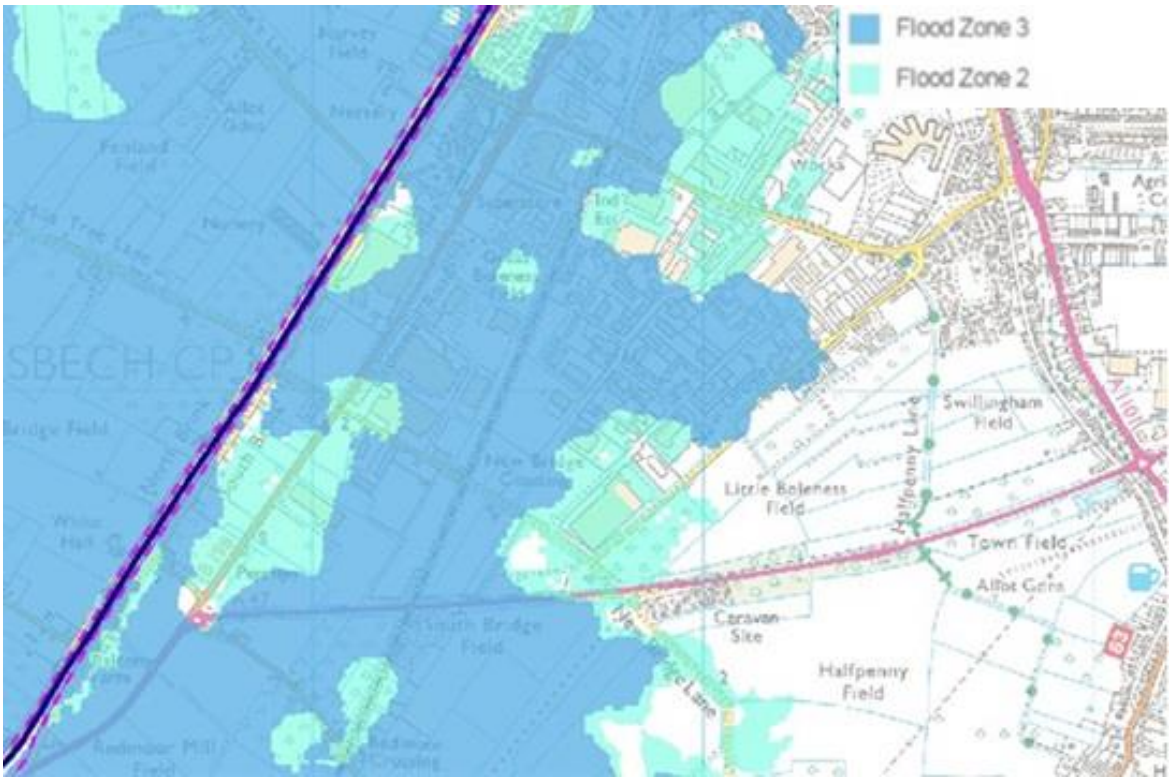

Figure 2.24: Flood Risk for South Wisbech Development

The Flood Risk predominantly applies to the western end of the site, which consists of industrial and commercial land uses. Any scheme in this location would need to take account of this information during detailed design.

Environmental Issues

An environmental assessment of the study area has been completed using DEFRA's mapping tool MAGIC. The assessment was undertaken around the area of the Wisbech South Development and identifies:

- Ecological issues – Habitats; and
- Ecological issues – Species.

The assessment identified the following environmental considerations:

- The presence of traditional orchards to the north of the A47 and east of Boleness Road, shown in Figure 2.25; and,
- The presence of Farmland Birds, including; Turtle Dove, Yellow Wagtail, Corn Bunting, Lapwing and Tree Sparrows.

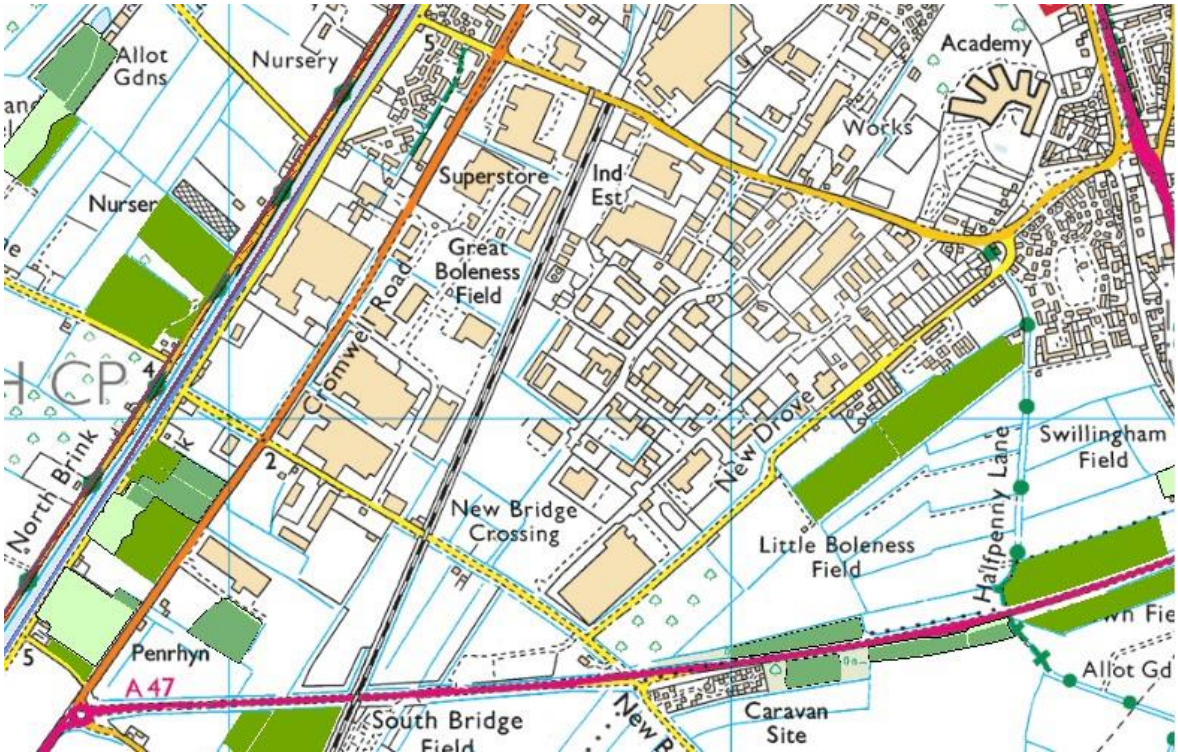

Figure 2.25: Presence of traditional orchards in the vicinity of the scheme

As with Flood Risk, these are factors that should be considered within the detailed design of any scheme. The presence of Farmland Birds may also have an impact on the construction schedule, which should minimise any disruption to the birds during their nesting season.

Site Visit Observations

A site visit was undertaken on Tuesday 25th February 2016 to assess the existing conditions, current infrastructure provision and access arrangements. Members of the project team walked the proposed route of the Southern Access Road from the junction of New Bridge Lane / Cromwell Road to the junction of Boleness Road / Weasenham Lane. The site visit identified the following key issues:

- On-street parking;
- Drainage;
- Disused Level Crossing; and,
- Deficiency in Existing Infrastructure.

These issues are discussed in turn beneath.

On Street Parking

Figure 2.26 shows on street parking along New Bridge Lane.

Figure 2.26: New Bridge Lane looking towards Cromwell Road

The site visit identified that there was a significant amount of on street parking along the western half of New Bridge Lane. Although New Bridge Lane is quite wide towards the western end (near Cromwell Road), parking restrictions (Traffic Regulation Order) would be required along this stretch as part of the Southern Access Road scheme to ensure that parked vehicles do not obstruct the flow of two way traffic.

Drainage

Figure 2.27 shows the existing drainage channel along the southern side of New Bridge Lane.

Figure 2.27: Drainage Ditch on New Bridge Lane

There is a significant drainage ditch running along the southern verge of New Bridge Lane. Any road widening, or development accesses along this section of the road would require the filling/relocation or culverting of this drain. As demonstrated by the flood risk information provided above, it is essential that good drainage provision is retained alongside any scheme to reduce the risk of flooding.

Disused Level Crossing

The presence of the disused Level Crossing is a significant feature along New Bridge Lane. Vehicular access over the disused crossing is currently prevented by two large concrete barriers.

Figure 2.28: New Bridge Lane where it crosses the Railway Tracks

New Bridge Lane narrows significantly as it heads towards the disused railway line. By the time it reaches the old tracks it is reduced to a single lane width. The proposed alignment for the Southern Access Road crosses the railway line and permission from Network Rail would be required.

Deficiency in Existing Infrastructure

New Bridge Lane to the east of the disused railway line consists of a poor quality single carriageway track which provides access to several properties. The road would require upgrading to accommodate the development proposals, and this would require significant works to the drainage ditches running along either side.

Figure 2.29: New Bridge Lane towards Boleness Road

A new cold storage facility has recently been constructed at the southern end of Boleness road, close to the point where a new junction between Boleness Road and New Bridge Lane would most likely be created. Some infrastructure upgrades have been implemented as part of this development, however further improvements would be required.

Boleness Road is already heavily used and provides direct access to a large number of industrial units. As discussed above, there is also a household waste recycling site on Boleness Road which closed for a short while during the site visit, resulting in a number of cars queuing whilst waiting for the centre to re-open. The existing pressures along Boleness Road will impact on the roads ability to cater for development traffic from the Wisbech South Development site.

3 Development Proposals

Introduction

This chapter provides an overview of the South West Wisbech extension, outlining the development proposal, phasing and predicted development traffic flows. The Southern Access Road is being considered to provide access to the development area to facilitate these proposals.

Development Proposal

The South West Wisbech Broad Location for growth is defined in Policy LP8 of the Fenland Local Plan (2014), and includes around 217 acres of land to the north of the A47, with the River Nene forming the western boundary of the site and Elm Low Road the eastern boundary.

The Local Plan (2014) describes the South West Wisbech development site as follows:

"This area is located broadly to the north of the A47, south-east of New Drove, north and south of New Bridge Lane, and along Cromwell Road between New Bridge Lane and the A47/B198 roundabout. Will require improved east-west road links to relieve pressure on Weasenham Lane. This will form the basis of the Southern Access road also being investigated as part of the Wisbech Access study. The area will be predominantly for business purposes, though there is some potential for residential development. Existing areas of high quality woodland, including some mature orchards, should be retained and enhanced to serve as multifunctional public open space areas with amenity, biodiversity and community food value. Noise mitigation and screening measures should be provided along the A47, and between the residential and business areas as appropriate."

A Broad Concept Plan (BCP) of the site was produced in April 2015. The BCP shows the site split into 4 phases, these are Phase 1, Phase 1a, Phase 2 and Phase 3. The BCP is shown on the following page.

Note, that the BCP assumes the provision of a new junction onto the A47 in the form of a four arm roundabout. That assumption is the focus of another study, which aims to determine what impact a junction at this location would take, and what form it would have.

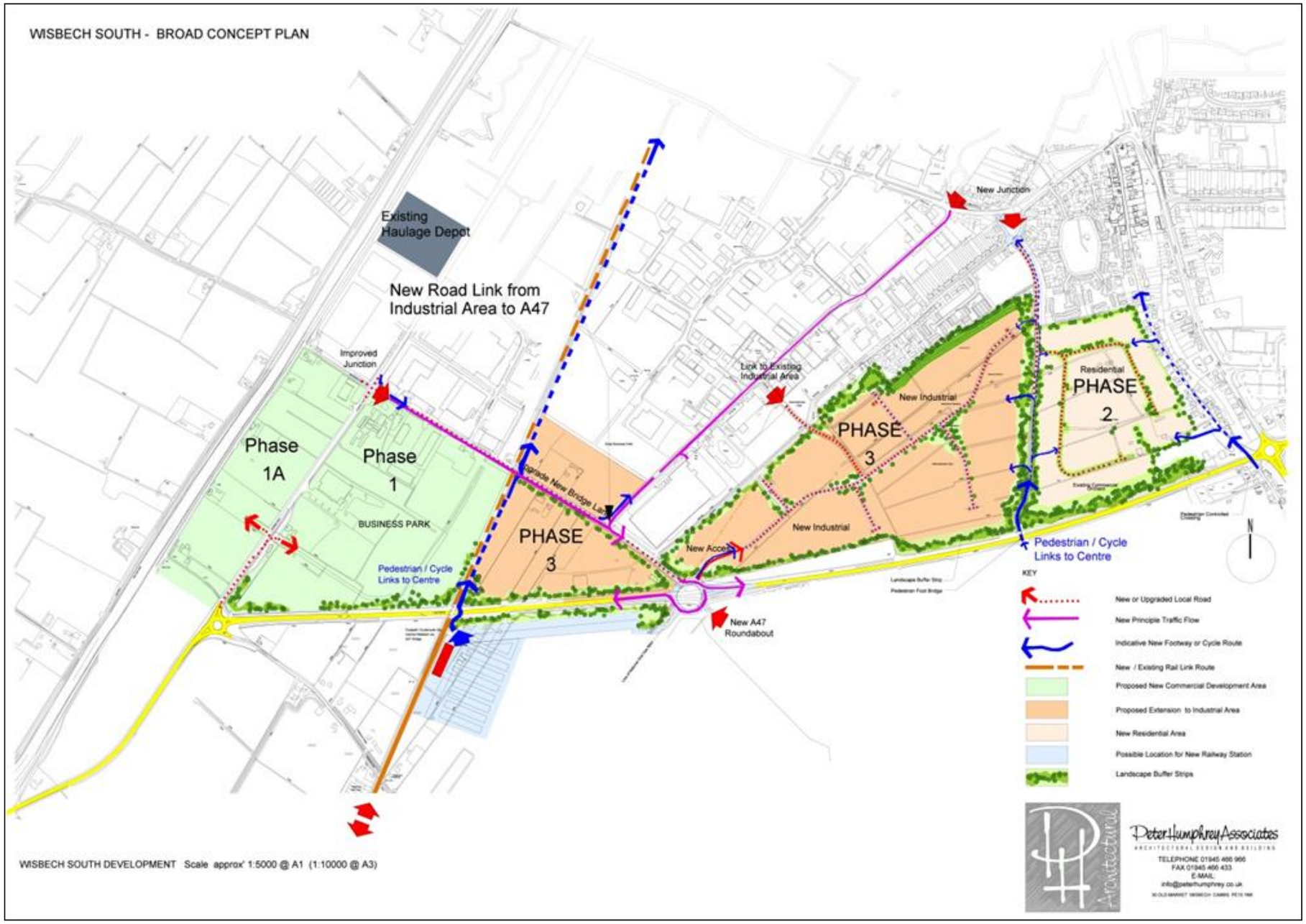

Figure 3.1: South Wisbech Development Site Broad Concept Plan

The composition of the four phases shown in the BCP are detailed beneath.

Assumptions for Phase 1

Phase 1 consists of a series of land parcels:

- **Site A:** This site is about 2ha and will consist of a mix of development split between office use (2,100 sq m) and warehouse use (2,896 sq m).
- **Site B:** The site is about 2.4ha with expected job creation of 134.
- **Site C:** This site is 4.7ha and will create around 380 jobs on a breakdown of 10% B1 office use, 60% B2 industry use and 30% B8 distribution use.
- **Site D** About 1.2ha site, with an assumed 10% B1 office, 60% B2 Industry use and 30% B8 Distribution use. This site also includes a Pub / Restaurant.
- **Access Assumptions:** The BCP shows access to Phase 1 via a new junction with Cromwell Road. Previous traffic modelling work undertaken by Atkins to inform the Local Plan (Wisbech Traffic Model, Strategic Development Sites: March 2015) has assumed that this junction is a four arm signalised junction providing access to / from Cromwell Road from the Phase 1 and Phase 1A sites. This assumption has been retained for the Wisbech Access Study and is included within this particular assessment by virtue of the traffic flows extracted from the WATS model and used in the Option Assessment.

  As well as an access point onto Cromwell Road, this assessment has also included an additional access onto Weasenham Lane at the existing junction with Salter's Way.

Assumptions for Phase 1A

Phase 1A will have one access point into and out of the site, as with Phase 1 this is assumed to be via a signalised junction with Cromwell Road. The site is about 10ha of proposed commercial development.

Assumptions for Phase 2

Phase 2 has an indicative timeline of 2016 – 2031 and consists of 14.30ha of residential land use. The current assumptions are for 25 houses per hectare and will be built at a rate of around 25 dwellings per year over the forecast period, with the total number of house estimated to be 357. The site will be accessed from New Drove / Half Penny Lane.

Assumptions for Phase 3

Phase 3 consists of approximately 35ha. of industrial land which is forecast to be developed between 2021 – 2031. This expected to generate 1,611 jobs between 2021 and 2025 (based on the same land use split as Phase 1), and a further 1,144 jobs between 2025 and 2031.

Access into Phase 3 has been assumed to be via three local access junctions along New Bridge Lane and Boleness Road.

Development Phasing

Table 3.1 beneath shows the proposed phasing of each of the sites (cumulative totals), consisting of office, industrial, warehouse and residential units. The table also shows which WATS zones each of the development phases are assigned to, which is relevant to the trips used in the option assessment. Note that the green cells represent completion of a development phase.

Table 3.1: Wisbech South Growth Profile and Saturn Zone Allocation

Phase	Total Allocation	SATURN Zone	Phasing		
			2021	2026	2031
1	Office (GFA)	30222	3,752	-	-
	Industrial (GFA)		9,912	-	-
	Warehouse (GFA)		14,572	-	-
	Housing (dwellings)		-	-	-
1A	Office (GFA)	30218	-	2,800	-
	Industrial (GFA)		-	8,400	-
	Warehouse (GFA)		-	16,800	-
	Housing (dwellings)		-	-	-
2	Office (GFA)	30221	-	-	-
	Industrial (GFA)		-	-	-
	Warehouse (GFA)		-	-	-
	Housing (dwellings)		113	235	357
3	Office (GFA)	30251		953	1,906
	Industrial (GFA)			5,714	11,428
	Warehouse (GFA)			2,858	5,717
	Housing (dwellings)		-	-	-
	Office (GFA)	30215		2,223	4,446
	Industrial (GFA)			13,332	26,665
	Warehouse (GFA)			6,670	13,339
	Housing (dwellings)		-	-	-

Development Traffic

Forecast traffic flows for future years of 2021, 2026 and 2031, have been extracted from the 2015 Wisbech Access Transport Study (WATS) model for use in the junction assessment.

The phases of the broad concept plan are also shown beneath in Figure 3.2.

Figure 3.2: Wisbech South West Development Site: Broad Concept Plan Phases

These three phases are represented within the WATS model using a series of SATURN zones dedicated to development traffic. The zones are shown in the figure beneath.

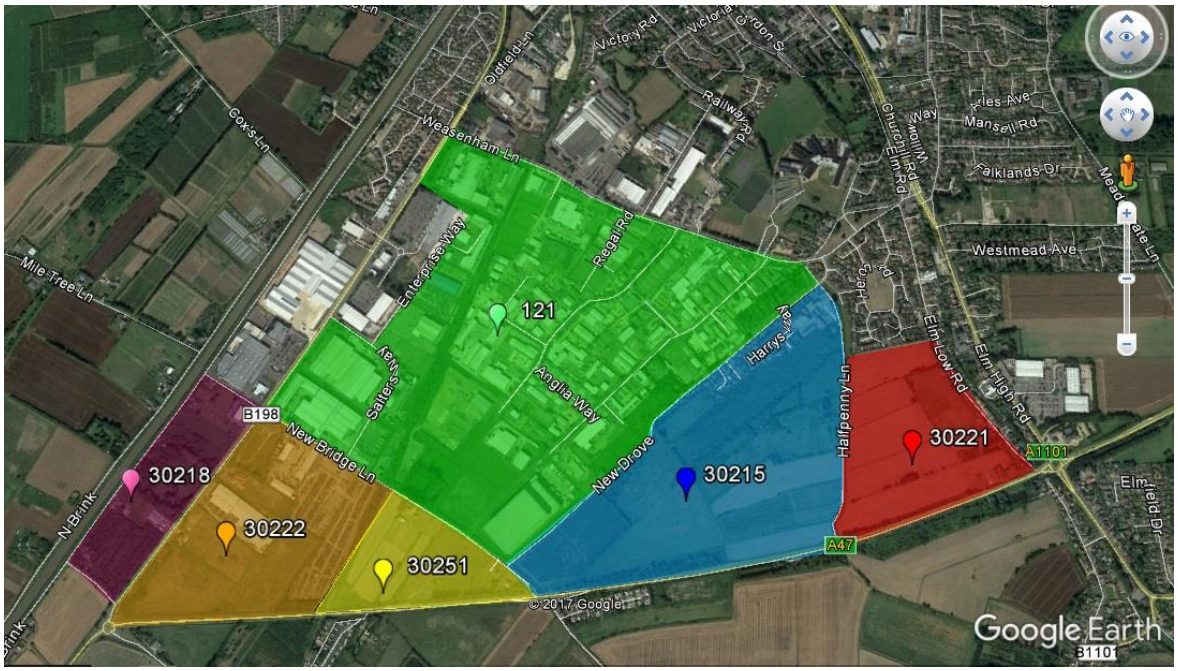

Figure 3.3: Representation of the Wisbech South West Phases in Saturn Zones

The zones 30215, 30218, 30221 and 30222 represent the Wisbech South development site. Zone 121 (green) represents existing traffic generated by the areas adjacent to the development site.

Predicted traffic flows for the new A47 Junction are shown beneath for both the AM and PM peak hours, and each of the forecast years. These flows have been extracted by using the Select Link Analysis (SLA) tool within SATURN and show the numbers of trips expected to be generated (Table 3.2) and attracted (Table 3.3) by the zones comprising the Wisbech South Development.

Table 3.2: Future Year Traffic Generation for the Wisbech South Development

Phase	SATURN Zone	AM Peak			PM Peak		
		2021	2026	2031	2021	2026	2031
1	30222	78	82	85	149	153	154
1A	30218	7	7	7	9	10	10
2	30221	74	78	81	41	42	44
3	30215	41	63	105	39	88	180
	30251	-	9	28	-	21	64
Total		200	239	306	238	314	452

Table 3.3: Future Year Traffic Attraction for the Wisbech South Development

Phase	SATURN Zone	AM Peak			PM Peak		
		2021	2026	2031	2021	2026	2031
1	30222	224	231	239	105	109	113
1A	30218	46	48	51	35	37	39
2	30221	57	60	64	49	51	53
3	30215	110	171	280	62	78	109
	30251	-	25	74	-	7	21
Total		437	535	535	251	282	335

Table 3.2 and 3.3 show a steady increase in the total number of vehicles generated by the South Wisbech Development Site, across the forecast years assessed.

The results indicate a tidaliity of traffic flow, with a greater number of vehicles attracted to the development site in the AM peak hour, whilst a greater number of traffic being generated by the site in the PM peak hour. This reflects the employment and industrial land uses outlined for the development site within the BCP.

Zones 30215 (Phase 3) and 30222 (Phase 1) are shown to both be the origin and destination of vehicles.

Please note, the blank cells for 2021 AM and PM peak hours, reflects the construction phasing for Phase 3 as outlined within Table 3.1.

4 Junction Form Assessment

Introduction

This chapter outlines the assessment of the proposed junctions along the Southern Access Road. In order to assess options for the Southern Access Road scheme, it was first necessary to determine the location and form of the junctions that the various development sites would use to access the road.

The location of these junctions have been informed by the BCP which divides the Wisbech South Development into distinct land parcels which are delivered in phases. The existing infrastructure provision has also been taken into consideration when determining the location of the proposed junctions along the Southern Access Road.

Four junction locations have been identified for serving the development land off of the Southern Access Road. These are:

- **Access Junction 1** – New Bridge Lane / Salters Way / Development Access. This junction provides access to the Phase 1 development land to the south of New Bridge Lane and west of the disused railway line;
- **Access Junction 2** – New Bridge Lane / Development Access. This is an entirely new junction located to the east of the disused railway line to provide access to the western half of the Phase 3 development land, both north and south of New Bridge Lane;
- **Access Junction 3** – New Bridge Lane / Boleness Road / Development Access. This is another new junction, which serves several purposes including:
    - Connection between New Bridge Lane and Boleness Road;
    - Access into the eastern half of the Phase 3 development land (east of Boleness Road); and,
    - Potential access to a new A47 junction to the south.
- **Access Junction 4** – Boleness Road / Development Access. This basis of this junction already exists. This junction will provide a second point of access into the eastern half of the Phase 3 development land (east of Boleness Road).

Figure 4.1 beneath outlines the location of these junctions.

Figure 4.1: Development Access Junction Locations on the Southern Access Road

The BCP also includes two other parcels of development land, Phase 1A and Phase 2, neither of which are access off the Southern Access Road. Phase 1A is accessed directly from a new signalised junction along Cromwell Road between the A47 and New Bridge Lane. Access to the Phase 2 land is via Halfpenny Lane.

Junction Modelling

The following modelling packages have been used to assess the junctions identified above:

- PICADY modelling software in TRL'S Junction 9 for priority junctions, and;
- ARCADY modelling software in TRL'S Junction 9 for roundabouts.

WATS Model and Scenarios Assessed

This Junction Assessment has been completed using the WATS Model (2008). The purpose of using the old model within this assessment, was to use the results to inform the junction coding within the updated model.

The following scenarios have been assessed to establish the required junction form:

- AM Peak Hour (08:00 – 09:00) and PM Peak Hour (17:00 – 18:00); and,
- 2031 Future Year Scenario.

The future year 2031 was chosen as the scenario for junction testing due to traffic flows associated with South Wisbech being highest at this time, following the completion of all proposed development.

To extract the traffic flows used in the local junction assessments, each of the junctions were coded into the WATS SATURN model and an assignment run using the 2031 AM and PM peak matrices, including development traffic.

Modelling Assumptions

Each of the four junctions were initially assessed as a priority junction. If the junction failed operationally as a basic priority junction (high levels of delay or an RFC greater than 0.85) then it was assessed with additional capacity or tested as a roundabout. The junction form was then determined once it was found to operate with an acceptable RFC and LOS (defined beneath).

Model Outputs

The following measures have been used to understand the impact of the proposed junctions:

Queue Lengths (PCU) indicates the likely impact of queuing on the approach to the junction and on the surrounding network.

Delay (seconds) indicates the likely impact of vehicle delay on journey times as a consequence of the junction.

Ratio Flow to Capacity (RFC) indicates the likely performance of a junction, with a value of 0.85 being a practical capacity threshold. Any value greater than 1.00 implies the demand flow is equal or has exceeded capacity.

LOS (Level of Service) indicates the expected level of service that vehicles will experience using the junction, where 'A' represents free flow conditions, and 'F' represents break down as a result of exceeding capacity.

Modelling Results

The junction form assessment process is detailed beneath, including the different types of junction tested at each location, the geometry and traffic flows used and the results from the modelling.

Junction 1

Junction 1 was initially assessed as a priority junction, with New Bridge Lane (east and west) serving as the major arms, and Salters Way and a new Development Access as the minor arms which are required to give priority. The layout of the junction is shown beneath in Figure 4.2.

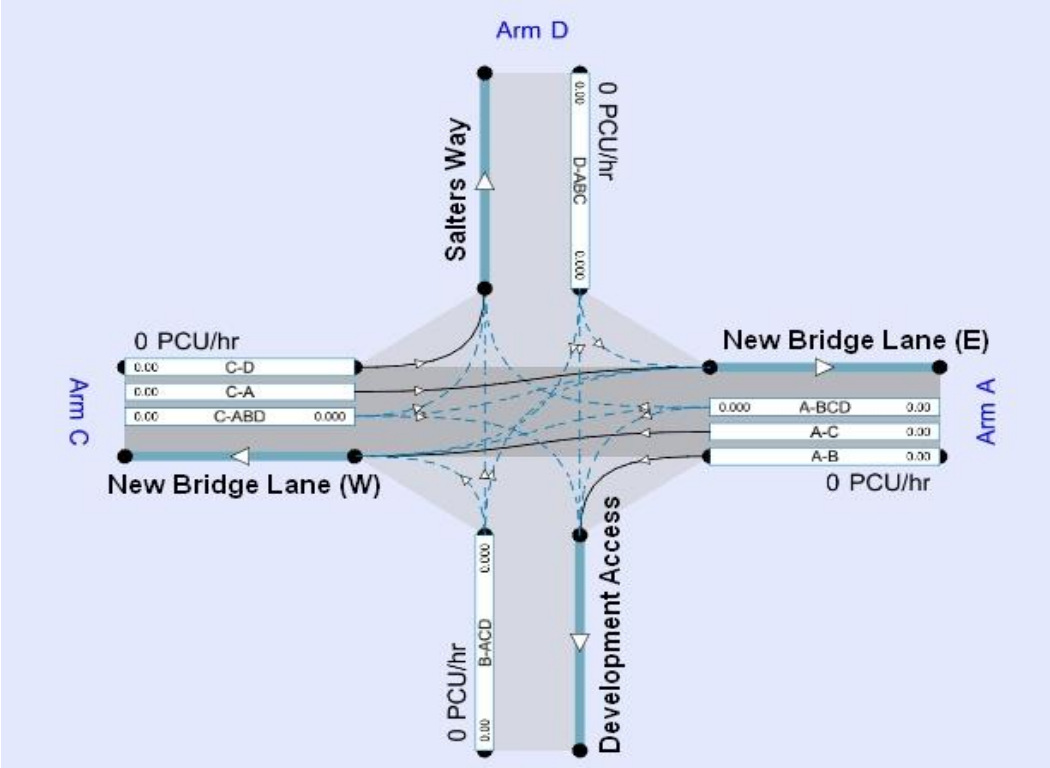

Figure 4.2: Junction 1 – Priority Junction Layout

The geometry assumed for this junction is shown beneath. Standard highway geometry has been applied to the proposed junction.

Table 4.1: Junction 1 Priority Junction Geometry

Major Arms	Width of Carriageway (m)	Visibility for right turners (m)	
Arm A – New Bridge Lane (E)	7.0	200	
Arm C – New Bridge Lane (W)	7.0	100	
Minor Arms	**Width of Carriageway (m)**	**Left Visibility (m)**	**Right Visibility (m)**
Arm B – Development Access	3.75	100	75
Arm D – Salters Way	3.75	75	100

The traffic flows used for the model are shown in Table 4.2 below. These flows have been extracted from the WATS model and include development traffic.

Table 4.2: Junction 1 Traffic Flows (2031)

	To			
	AM			
From	New Bridge Ln E	Development Acc	New Bridge Ln W	Salters Way
New Bridge Ln E	0	0	312	0
Development Acc.	0	0	74	2
New Bridge Ln W	177	93	0	204
Salters Way	0	6	71	0
	PM			
From	New Bridge Ln E	Development Acc	New Bridge Ln W	Salters Way
New Bridge Ln E	0	0	172	3
Development Acc	0	0	103	4
New Bridge Ln W	468	15	0	40
Salters Way	0	1	200	0

The results from the modelling assessment are shown in Table 4.3 beneath.

Table 4.3: Junction 1 Priority Junction Results (2031)

	AM				PM			
	Queue (pcu)	Delay (s)	RFC	LOS	Queue (pcu)	Delay (s)	RFC	LOS
Development Access	0.2	7.38	0.13	A	0.2	7.33	0.18	A
New Bridge Lane (E)	0.0	0.00	0.00	A	0.0	5.94	0.01	A
Salters Way	0.3	11.98	0.20	B	1.4	23.87	0.57	C
New Bridge Lane (W)	0.6	6.22	0.24	A	0.1	4.79	0.04	A

The results show that the priority junction is expected to operate within capacity during both peak hours in 2031, with the highest RFC of 0.57 recorded for the Salters Way approach. Delay for this movement is greatest during the PM peak, with an average of 23.87 seconds added to journey times.

The results for A-BCD (New Bridge Lane east towards Cromwell Road) shows no queuing and delays in the AM peak hour. This is because there is very little traffic coming from this direction during the AM peak. Vehicles that are travelling in this direction form part of the mainstream traffic travelling from other parts of the Wisbech South Development to Cromwell Road and do not have to stop or give way to other traffic.

The results from the assessment demonstrate **that Junction 1 operates within capacity as a priority junction**, and this has been included within the Southern Access Road scheme.

Junction 2

Junction 2 was initially modelled as a priority junction, with New Bridge Lane (east and west) serving as the as the major arm and the development access as the minor arm required to give way.

The layout of the junction is shown beneath in Figure 4.3.

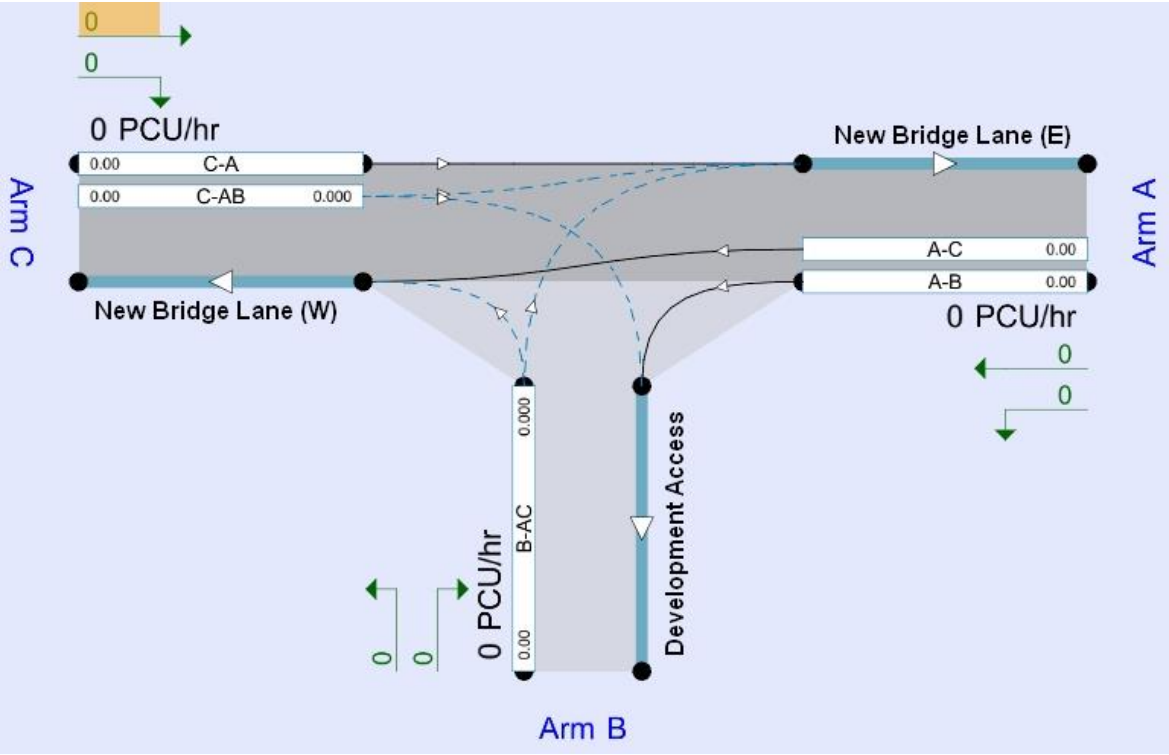

Figure 4.3: Junction 2 – Priority Junction Layout

The geometry assumed for this junction is shown beneath. Standard highway geometry has been applied to the proposed junction.

Table 4.4: Junction 2 Priority Junction Geometry

Major Arms	Width of Carriageway (m)	Visibility for right turners (m)	
Arm A - New Bridge Lane (E) Arm C - New Bridge Lane (W)	7.0	250	
Minor Arms	**Width of Carriageway (m)**	**Left Visibility (m)**	**Right Visibility (m)**
Arm B - Development Access	3.50	100	200

The traffic flows used for the model are shown in Table 4.5 below.

Table 4.5: Junction 2 Traffic Flows (2031)

	To		
	AM		
From	New Bridge Ln E	Development Acc.	New Bridge Ln W
New Bridge Ln E	0	476	312
Development Acc.	59	0	0
New Bridge Ln W	177	0	0
	PM		
From	New Bridge Ln E	Development Acc.	New Bridge Ln W
New Bridge Ln E	0	34	174
Development Acc.	456	0	0
New Bridge Ln W	468	0	0

The results from the modelling assessment are shown in Table 4.6 beneath.

Table 4.6: Junction 2 Priority Junction Results (2031)

Approach	AM				PM			
	Queue (pcu)	Delay (s)	RFC	LOS	Queue (pcu)	Delay (s)	RFC	LOS
B-AC	0.2	10.23	0.14	B	19.1	138.31	1.02	F
C-AB	0.0	0.00	0.00	A	0.0	0.00	0.00	A

The model output indicates that the minor arm serving the development access (Arm B) junction will be over capacity in the 2031 PM peak with an RFC of 1.02 which manifests as a delay of approximately 140 seconds.

Given the significant delay on the development access arm, Junction 2 was then assessed as a roundabout. The layout for the junction is shown in Figure 4.4 beneath.

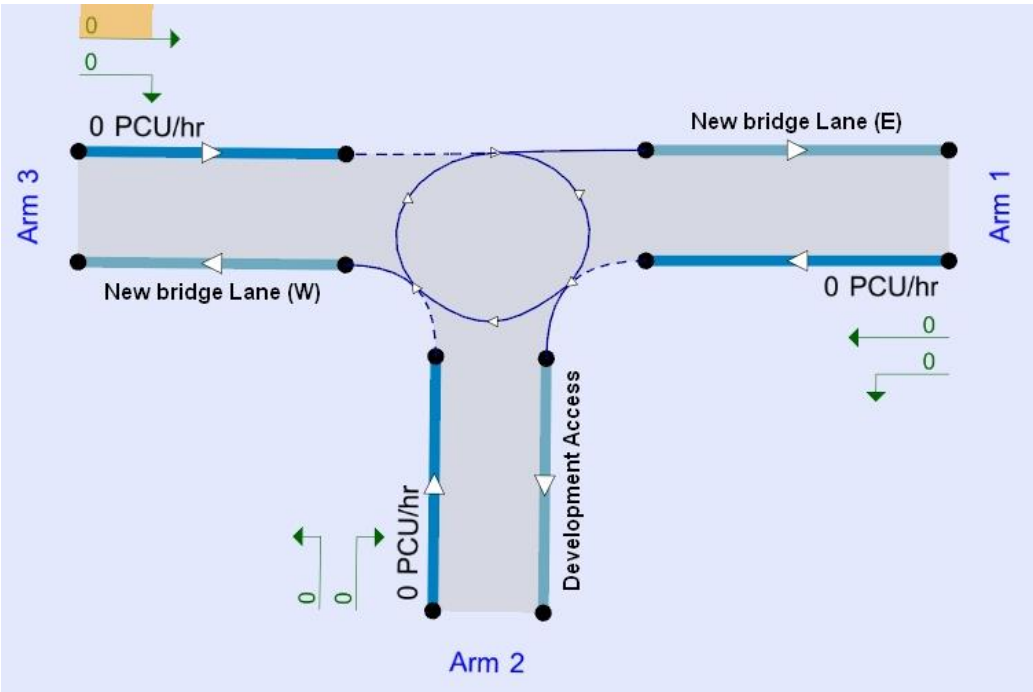

Figure 4.4: Junction 2 – Roundabout Layout

The roundabout geometry assumed for the assessment is shown in the table beneath.

Table 4.7: Junction 2 Mini-Roundabout Junction Geometry

Arm	Approach Road Half width (m)	Minimum approach road half width (m)	Entry Width (m)	Effective Flare Width (m)	Distance to next arm (m)	Entry Corner kerb Line Distance (m)
New Bridge Lane (e)	3.00	3.00	3.00	0.00	5.00	2.00
Development Access	3.00	3.00	3.00	0.00	5.00	2.00
New Bridge Lane (w)	3.00	3.00	3.00	0.00	5.00	2.00

The traffic flows used to assess a roundabout at this location remained the same as those used to assess the priority junction, as reported in Table 4.5.

The results from the assessment of the roundabout are shown beneath in Table 4.8.

Table 4.8: Junction 2 Roundabout Results (2031)

Approach	AM				PM			
	Queue (pcu)	Delay (s)	RFC	LOS	Queue (pcu)	Delay (s)	RFC	LOS
New Bridge Lane (e)	7.2	31.60	0.88	D	0.3	5.24	0.23	A
Development Access	0.1	5.52	0.08	A	1.5	10.70	0.58	B
New Bridge Lane (w)	0.3	5.27	0.21	A	3.1	22.59	0.75	C

The results show that the roundabout is expected to operate within capacity on all approaches and in both peaks, although there will be approximately 30 seconds of delay experienced on New Bridge Lane (e) during the AM peak hour by 2031.

The results from the assessment demonstrate that **Junction 2 operates within capacity as a roundabout**, and this has been included within the Southern Access Road scheme.

Junction 3

This junction was initially modelled as a priority junction, with New Bridge Lane and Boleness Road serving as the major arms, and the development access as the minor arm required to give way.

Note that by default this junction does not include a fourth arm providing a connection to a new A47 junction to the south, but that this is included at a later stage as part of the wider assessment of the Southern Access Road.

The layout of the priority junction assessed is shown beneath in Figure 4.5.

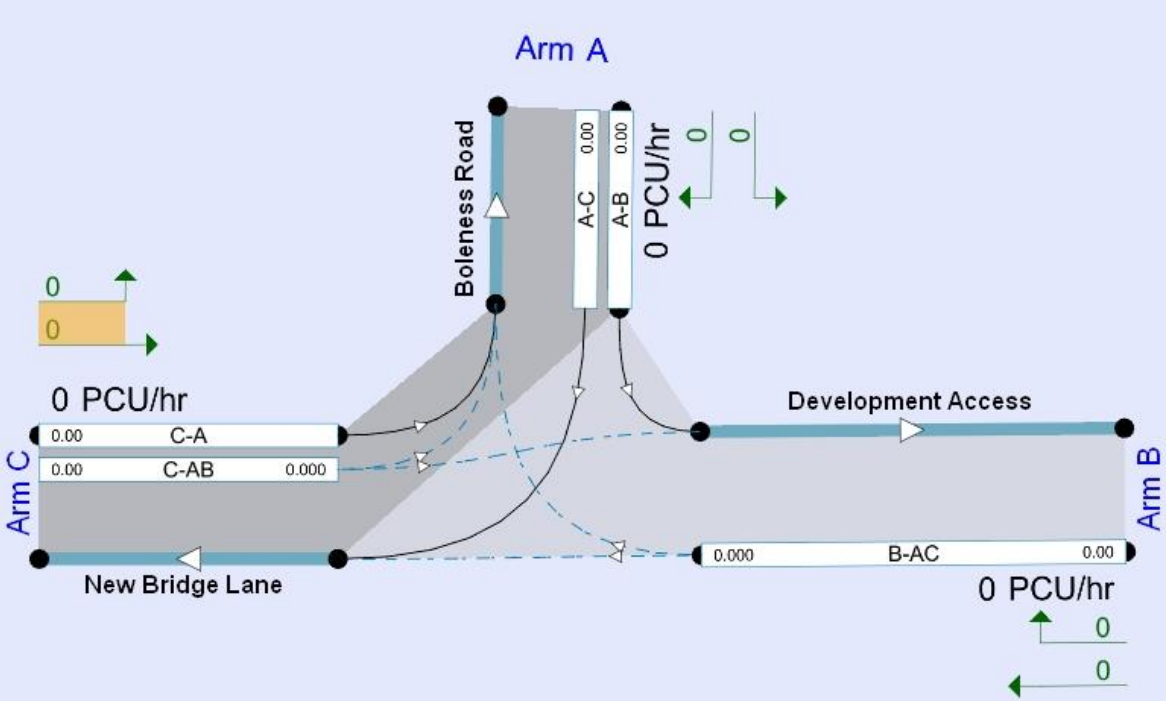

Figure 4.5: Junction 3 – Priority Junction Layout

The geometry assumed for the assessment of the priority junction is provided in Table 4.9 beneath.

Table 4.9: Junction 3 Priority Junction Geometry

Major Arms	Width of Carriageway (m)	Visibility for right turners (m)	
Arm A – Boleness Road Arm C – New Bridge Lane	7.0	50	
Minor Arms	**Width of Carriageway (m)**	**Left Visibility (m)**	**Right Visibility (m)**
Arm B – Development Access	3.50	100	75

The traffic flows used for the model are shown in Table 4.10 beneath.

Table 4.10: Junction 3 Traffic Flows (2031)

	To		
	AM		
From	Boleness Road	Development Acc.	New Bridge Ln
Boleness Road	0	0	749
Development Acc.	0	0	39
New Bridge Ln	156	80	0
	PM		
From	Boleness Road	Development Acc.	New Bridge Ln
Boleness Road	0	0	121
Development Acc.	239	0	88
New Bridge Ln	918	6	0

The results from the assessment of the priority junction are shown beneath in Table 4.11.

Table 4.11: Junction 3 Priority Junction Results (2031)

Approach	AM				PM			
	Queue (pcu)	Delay (s)	RFC	LOS	Queue (pcu)	Delay (s)	RFC	LOS
Development Access	0.1	8.87	0.09	A	5.0	53.20	0.84	F
New Bridge Lane Boleness Road	0.5	9.40	0.23	A	0.0	3.98	0.02	A

The results indicates that as a priority junction, the junction will be over capacity on the minor arm serving the development during the PM peak hour by 2031, with a delay of 53.2 seconds and a LOS F.

Given the significant delay on the development access arm, Junction 3 was then assessed as a roundabout.

At this stage of the assessment the additional arm was added to the junction to provide access to the new A47 junction. The wider assessment of the A47 connection to the Southern Access Road is considered in subsequent chapters.

The layout for the roundabout is shown beneath in Figure 4.6.

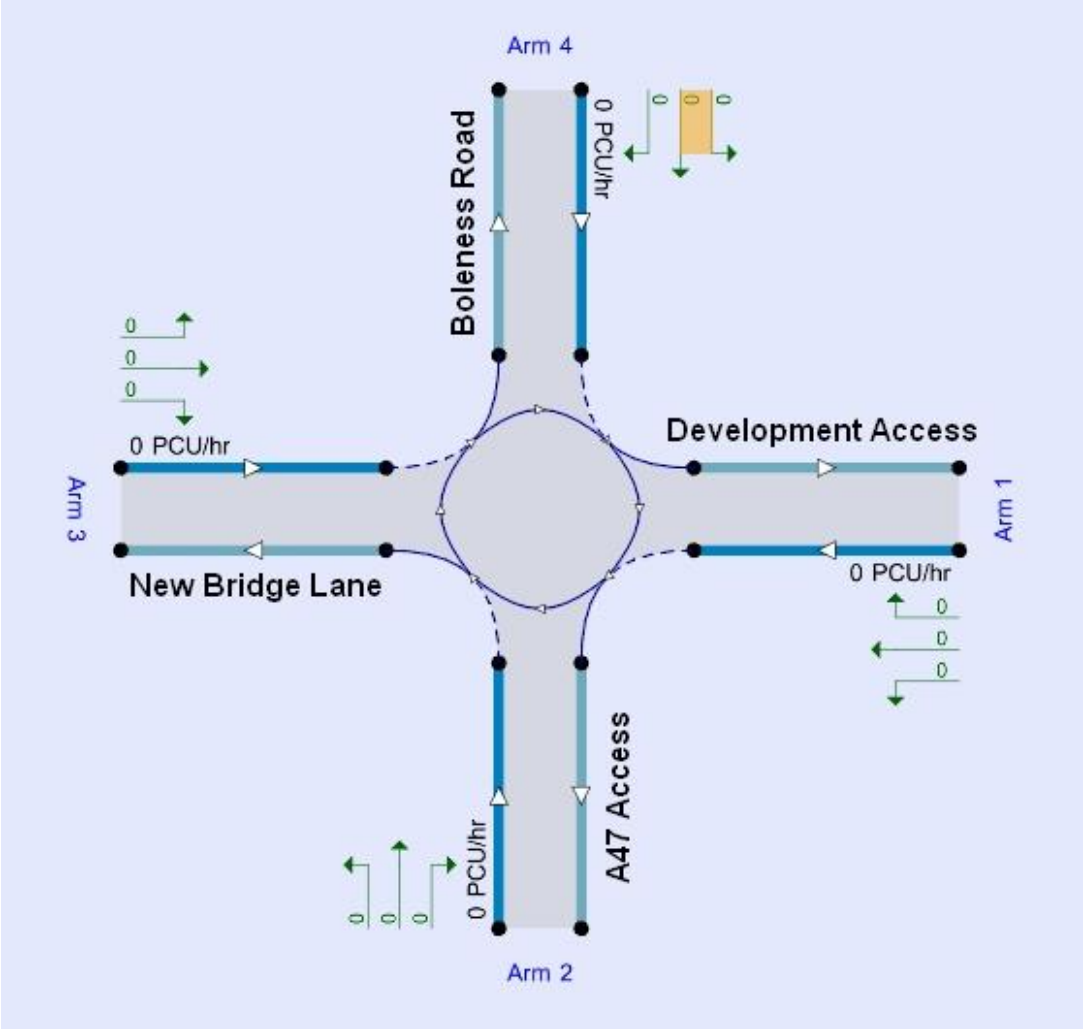

Figure 4.6: Junction 3 – Roundabout Layout

The roundabout geometry assumed for the assessment is shown in the table beneath.

Table 4.12: Junction 3 Roundabout Geometry

Arm	Approach Road Half width (m)	Entry Width (m)	Effective Flare Width (m)	Entry Radius	Inscribed Circle Diameter	Conflict (entry) Angle
Development Access	3.65	7.30	30.0	30.0	50.0	50.0
A47 Access	7.30	7.30	0.0	30.0	50.0	50.0
New Bridge Lane	7.30	7.30	0.0	30.0	50.0	50.0
Boleness Road	3.65	7.30	30.0	30.0	50.0	50.0

The geometry shown within the table above represents two lane approaches on both the A47 Access and New Bridge Lane.

Note that the roundabout has been assessed with an ICD of 50 metres, which is quite large for such a location. Smaller ICD's were initially assessed, but did not provide enough capacity. Increasing the ICD of a roundabout increase capacity as the there is more distance between the approach arms which creates larger gaps on the circulatory, making it easier for vehicles waiting to enter the roundabout.

The traffic flows used for the model are shown in Table 4.13 beneath.

Table 4.13: Junction 3 Traffic Flows (2031)

	To			
	AM			
From	Development Acc.	A47 Access	New Bridge Ln	Boleness Rd
Development Acc.	0	78	4	0
A47 Access	98	0	207	226
New Bridge Ln	6	115	0	62
Boleness Rd	0	638	371	0
	PM			
From	Development Acc.	A47 Access	New Bridge Ln	Boleness Rd
Development Acc.	0	238	14	275
A47 Access	20	0	97	689
New Bridge Ln	0	350	0	698
Boleness Rd	0	588	31	0

The results from the assessment of the roundabout are shown beneath in Table 4.14.

Table 4.14: Junction 3 Roundabout Results (2031)

Approach	AM				PM			
	Queue (pcu)	Delay (s)	RFC	LOS	Queue (pcu)	Delay (s)	RFC	LOS
Development Access	0.1	3.78	0.09	A	1.0	6.34	0.51	A
A47 Access	0.5	2.92	0.32	A	0.9	3.70	0.48	A
New Bridge Lane	0.1	2.61	0.13	A	5.0	16.34	0.84	C
Boleness Road	2.0	6.63	0.67	A	0.8	4.14	0.44	A

The model results show that the roundabout assessed is expected to operate within capacity in both AM and PM peak hours by 2031. The maximum RFC (0.84) and Delay (16 seconds) is experienced during the PM peak hour on the New Bridge Lane approach to the roundabout, however this approach still operates within capacity.

The results from the assessment demonstrate that **Junction 3 operates within capacity as a roundabout,** and this has been included within the Southern Access Road scheme.

Junction 4

Junction 4 has been assessed as a priority junction with Boleness Road serving as the major arm and the Development Access as the minor arm required to give way.

This junction already exists, but the side arm has not been extended into the development site and only provides access to several adjacent businesses as shown beneath in Figures 4.7 and 4.8.

Figure 4.7: Junction 4 – Existing Infrastructure

Figure 4.8: Google Street View of Junction 4 Development Access

Figure 4.8 above shows the Google Street view of the development access from Boleness Road.

The layout for the priority junction as assessed is shown beneath in Figure 4.9.

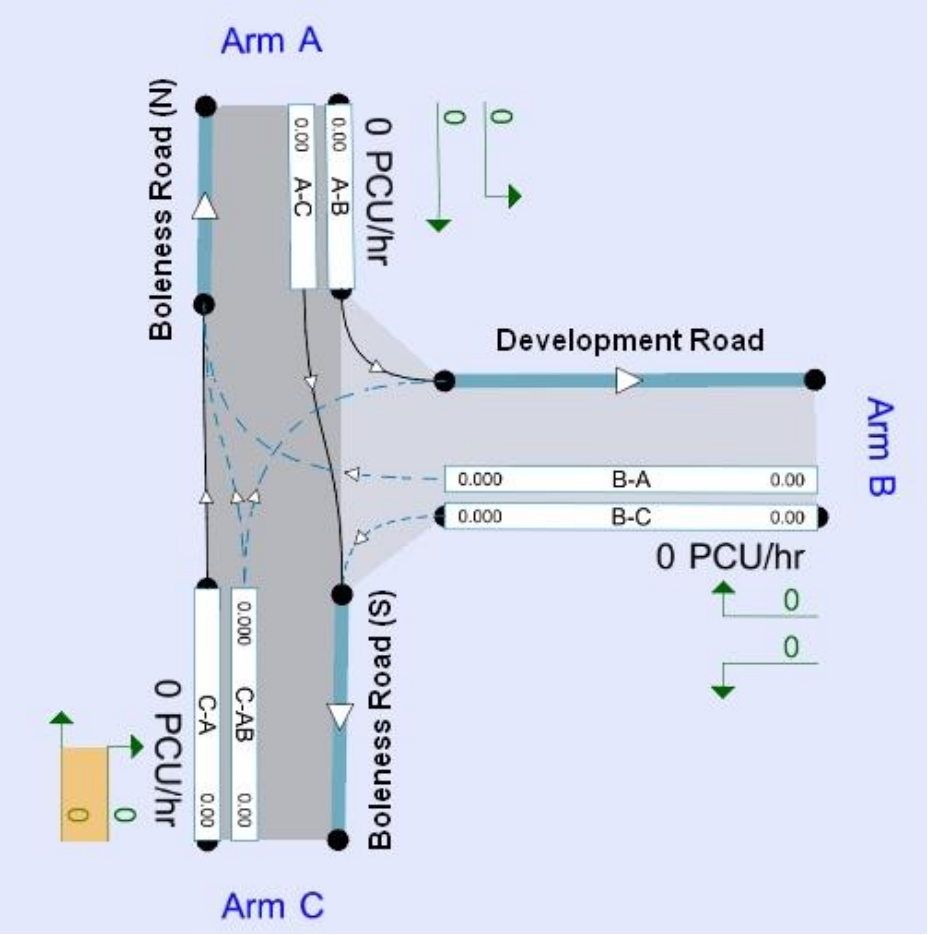

Figure 4.9: Junction 4 – Priority Junction Layout

The geometry assumed for the assessment of the priority junction is provided in Table 4.15 beneath.

Table 4.15: Junction 4 Priority Junction Geometry

Major Arms	Width of Carriageway (m)	Visibility for right turners (m)	
Boleness Road	7.0	150	
Minor Arms	Width of Carriageway (m)	Left Visibility (m)	Right Visibility (m)
Development Access	5.00	75	150

The traffic flows used for the model are shown beneath in Table 4.16.

Table 4.16: Junction 4 Traffic Flows (2031)

	To		
	AM		
From	Boleness Road (N)	Development Acc.	Boleness Road (S)
Boleness Road (N)	0	495	749
Development Acc.	96	0	0
Boleness Road (S)	156	0	0
	PM		
From	Boleness Road (N)	Development Acc.	Boleness Road (S)
Boleness Road (N)	0	44	121
Development Acc.	207	0	0
Boleness Road (S)	1157	0	0

The traffic flows used for the model are shown beneath in Table 4.17.

Table 4.17: Junction 4 Priority Junction Results (2031)

Approach	AM				PM			
	Queue (pcu)	Delay (s)	RFC	LOS	Queue (pcu)	Delay (s)	RFC	LOS
Development Access Left Turn	0.0	0.00	0.00	A	0.0	0.00	0.00	A
Development Access Right Turn	0.5	16.71	0.31	C	1.4	22.69	0.57	C
Boleness Road	0.0	0.00	0.00	A	0.0	0.00	0.00	A

The results show that the priority junction is expected to operate within capacity during both peak hours in 2031, with the highest RFC of 0.57 recorded for the movement from the Development Access to Boleness Road (n). Delay for this movement is greatest during the PM peak, with an average of 22.69 seconds added to journey times.

The results from the assessment demonstrate that **Junction 4 operates within capacity as a priority junction**, and this has been included within the Southern Access Road scheme.

Preferred Junction Types

The junction assessment has shown that the following junction forms are all expected to operate within capacity, resulting in the Southern Access Road providing a balance between good connectivity to the South Wisbech development area and the wider road network. The preferred junctions are:

- Junction 1 – Priority Junction;
- Junction 2 – Roundabout;
- Junction 3 – Roundabout; and,
- Junction 4 – Priority Junction.

5 Southern Access Road Configuration Assessment

Introduction

Once the location and form of the junctions required along the Southern Access Road had been identified, different options were devised for the configuration of the Southern Access Road. All of the options use New Bridge Lane and Boleness Road as the nucleus, but have different levels of connectivity between these roads and the wider network (including the A47).

The options assessed were developed following a site visit in February 2016 which assessed the current level of infrastructure provision, a consideration of the access required to facilitate the BCP and an initial modelling assessment.

In keeping with the study brief, options for this scheme element have been generated alongside the assumption that a railway (proposed outside the scope of this study) would be built south of the A47. To ensure that the Wisbech Access Study is flexible enough to respond to the latest proposals for the alignment of the railway line and location of a potential station, Southern Access Road options have been considered for both 'with railway' and 'without railway', which refers to a railway line that severs New Bridge Lane, and one which does not.

Six options were assessed in total, each of which have been measured against a Do Minimum Scenario. The options were:

Do Minimum – This was used as a base scenario against which the performance of each of the options was assessed (and the benefits derived). The Do Minimum scenario has no physical connection between New Bridge Lane and Boleness Road. The Do Minimum scenario includes development traffic and the four junctions identified in the previous chapter to provide access into the development land parcels.

Option 1 – Creates a connection between New Bridge Lane and Boleness Road, including the four development junctions;

Option 2 – Creates a connection between New Bridge Lane and Boleness Road, as well as a connection onto the A47 via a new A47 Junction, also including the four development junctions;

Option 3 – Creates a connection between Boleness Road and the A47 via a new A47 Junction, but without a connection onto New Bridge Lane. Also including the four development junctions;

Option 4 – Creates a connection between New Bridge Lane and the A47 via a new A47 Junction, but without a connection onto Boleness Road. Also including the four development junctions. Note that the development land to the east of Boleness Road can still access New Bridge Lane and the A47 via Junction 3.

Option 5a – Creates a connection between Boleness Road and New Bridge Lane, however New Bridge Lane is severed between development junctions 1 and 2 due to the railway line; and,

Option 5b – Creates a connection between Boleness Road and the A47 via a new A47 Junction, New Bridge Lane is severed between development junctions 1 and 2 due to the railway line.

Please refer to the 'New A47 Junction: South' Report for further details on the form of junction proposed for the A47, which is included in Options 2, 3, 4 and 5b.

The following series of figures beneath depict each of the options outlined above. Figure 5.1 beneath shows the 'Do Minimum' Scenario which includes the development, but has no connection between New Bridge Lane, Boleness Road or the A47.

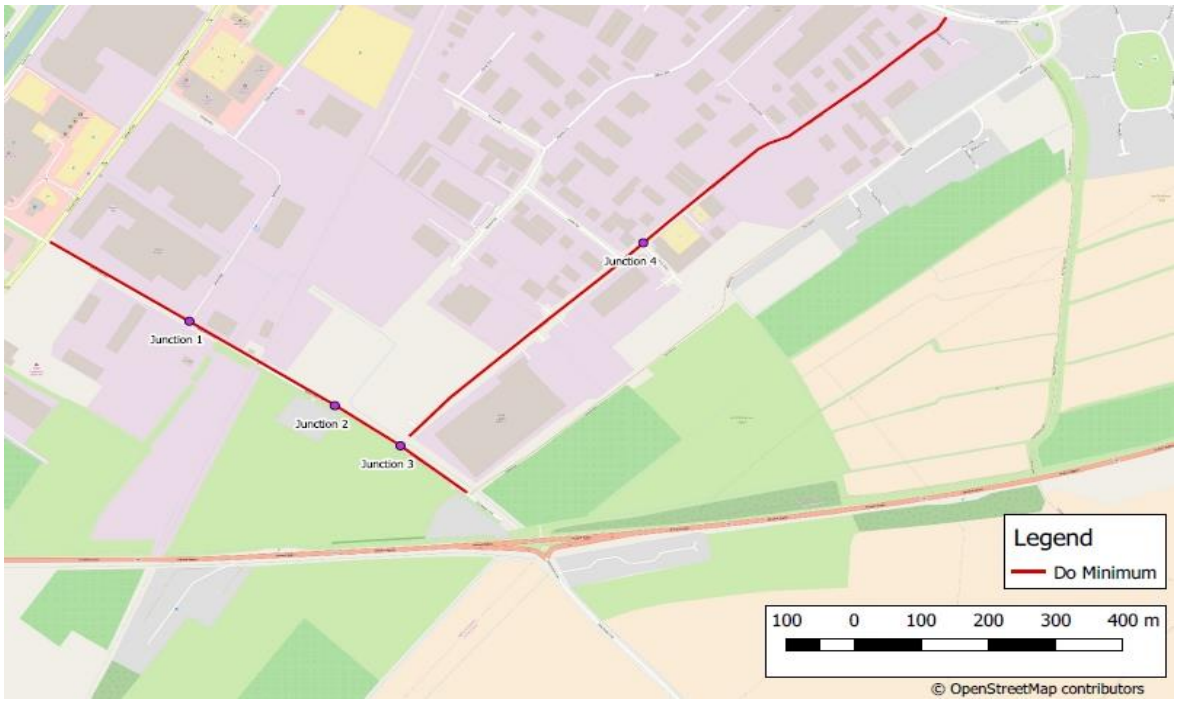

Figure 5.1: Southern Access Road – Do Minimum Scenario

Figure 5.2 beneath depicts Option 1 which creates a connection between New Bridge Lane and Boleness Road.

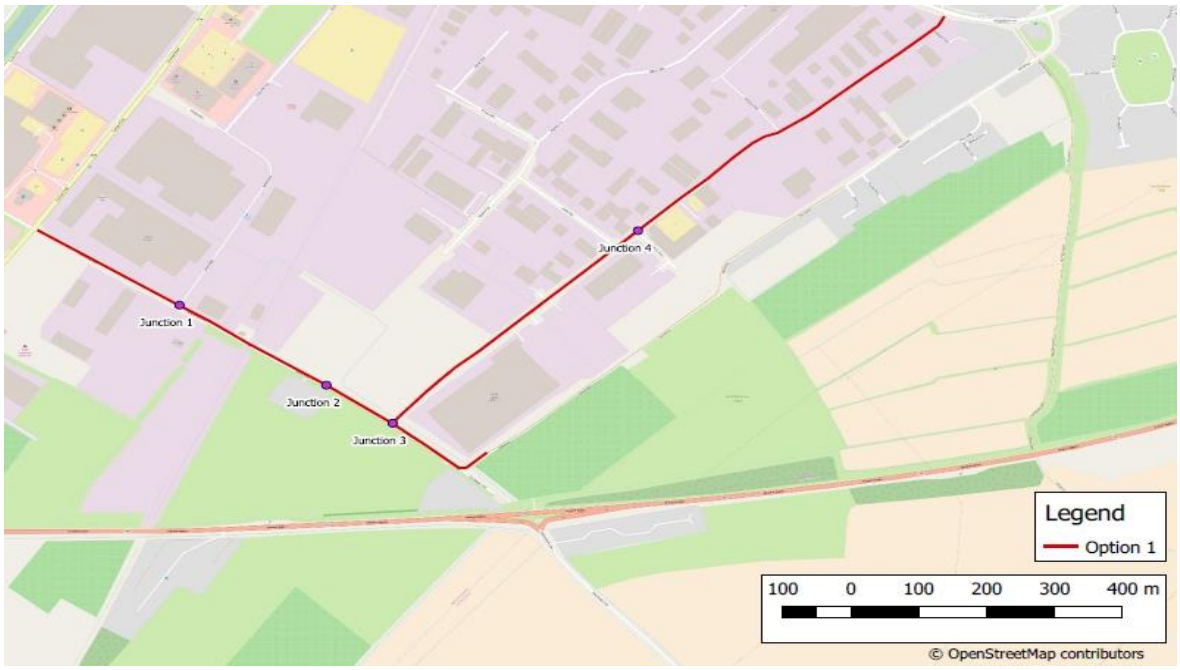

Figure 5.2: Southern Access Road – Option 1

Figure 5.3 beneath depicts Option 2 creates a connection between New Bridge Lane and Boleness Road, as well as a connection onto the A47 via a new A47 Junction.

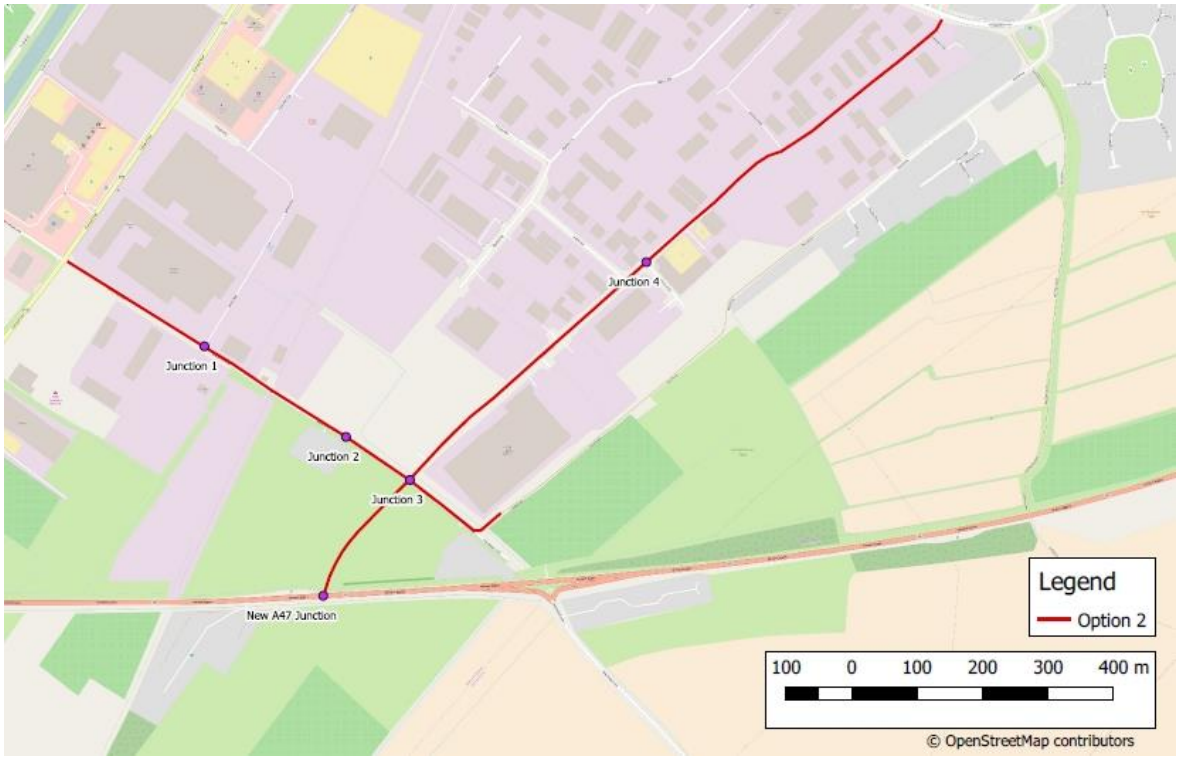

Figure 5.3: Southern Access Road – Option 2

Figure 5.4 beneath depicts Option 3 which creates a connection between Boleness Road and the A47 via a new A47 Junction, but without a connection onto New Bridge Lane.

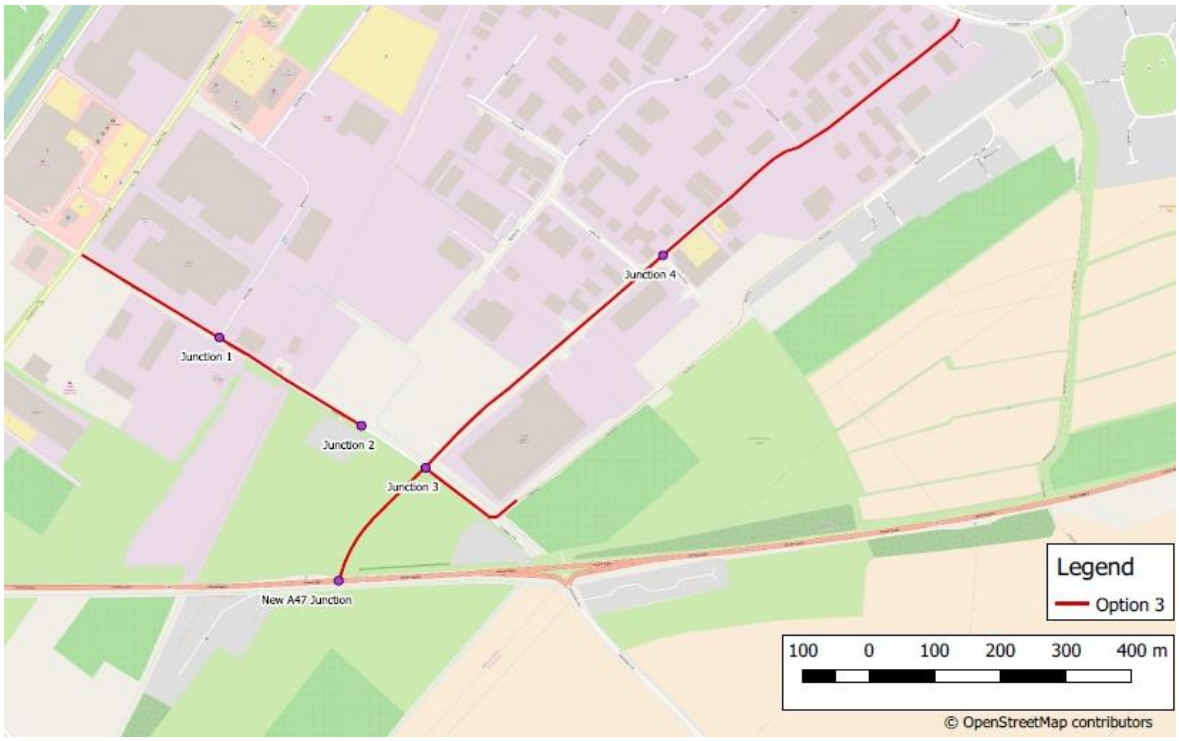

Figure 5.4: Southern Access Road – Option 3

Figure 5.5 beneath depicts Option 4 which creates a connection between New Bridge Lane and the A47 via a new A47 Junction, but without a connection onto Boleness Road.

Figure 5.5: Southern Access Road – Option 4

Figure 5.6 beneath depicts Option 5a which creates a connection between Boleness Road and New Bridge Lane, however New Bridge Lane is severed between development junctions 1 and 2 due to the railway line.

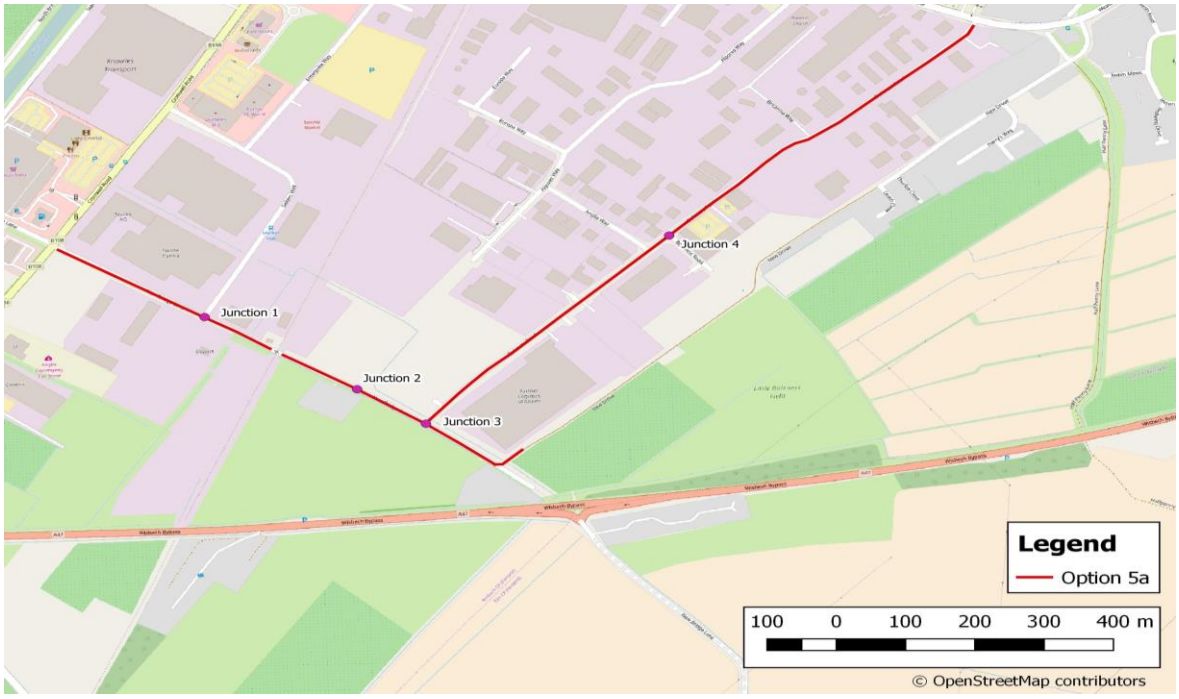

Figure 5.6: Southern Access Road – Option 5a

Figure 5.7 beneath depicts Option 5b which creates a connection between Boleness Road and the A47 via a new A47 Junction, New Bridge Lane is severed between development junctions 1 and 2 due to the railway line.

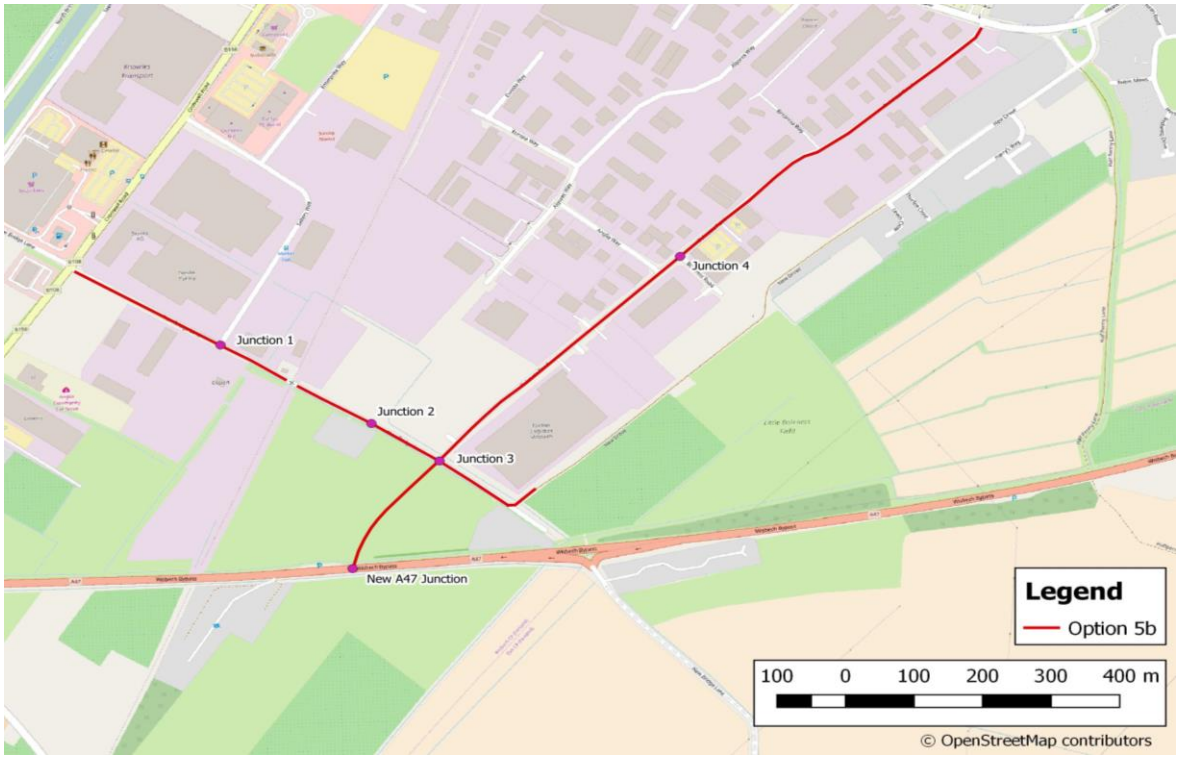

Figure 5.7: Southern Access Road - Option 5b

Assessment Assumptions

The following assumptions are consistent across all options tested and have been informed by the Junction Assessment described in the previous chapter:

- Junction 1 is a priority crossroads;
- Junction 2 is a roundabout;
- Junction 3 is roundabout (three or four arm dependant on the option); and,
- Junction 4 is a priority junction.

In addition to the development access junctions listed above, the assessment also assumes that:

- Connection to Cromwell Road is via Option CR 2, which is a signalised junction identified in the 'Cromwell Road Option Assessment' Report; and,
- Connection to the A47 (Options 2, 3, 4 and 5b) is via a roundabout as identified in the 'New A47 Junction: South' Report.

The layout of each of these junctions within the WATS model is shown in the figures beneath.

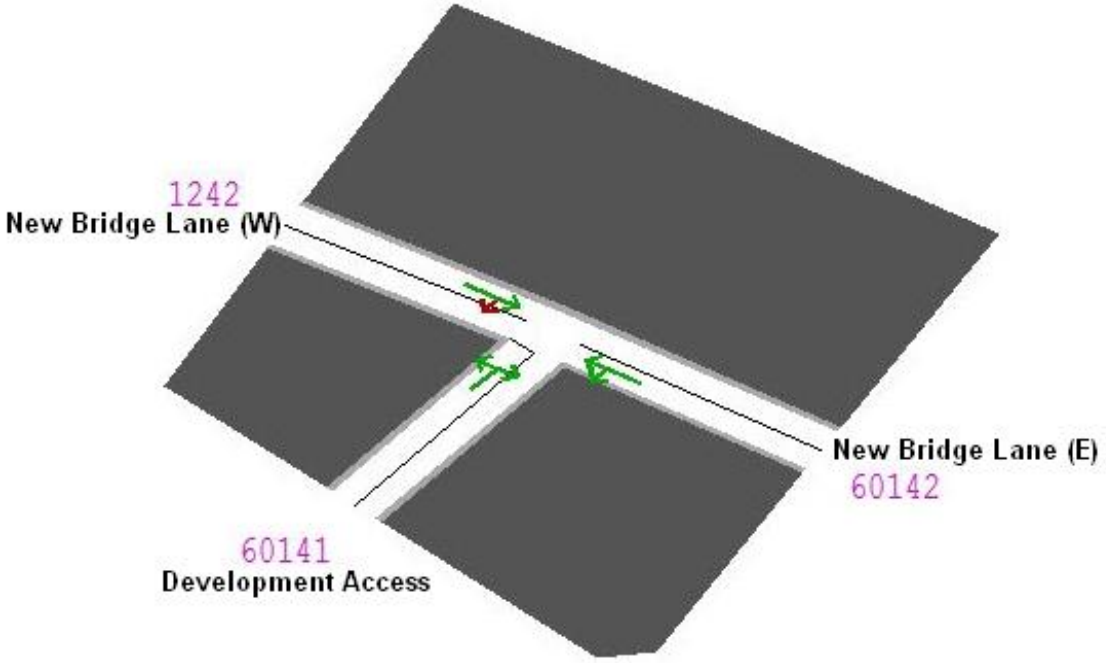

Figure 5.8: Junction 1 – Layout in the WATS model

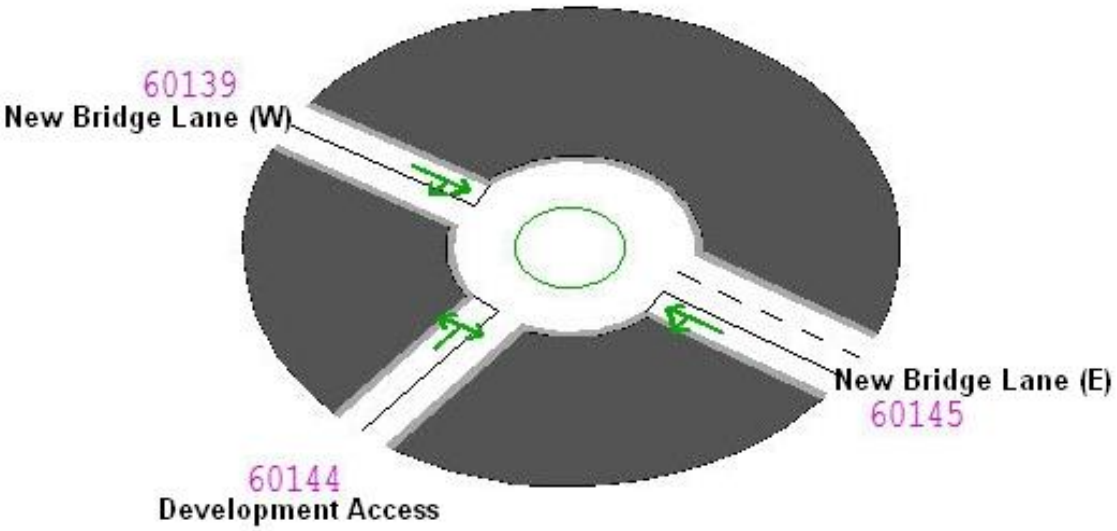

Figure 5.9: Junction 2 – Layout in the WATS model

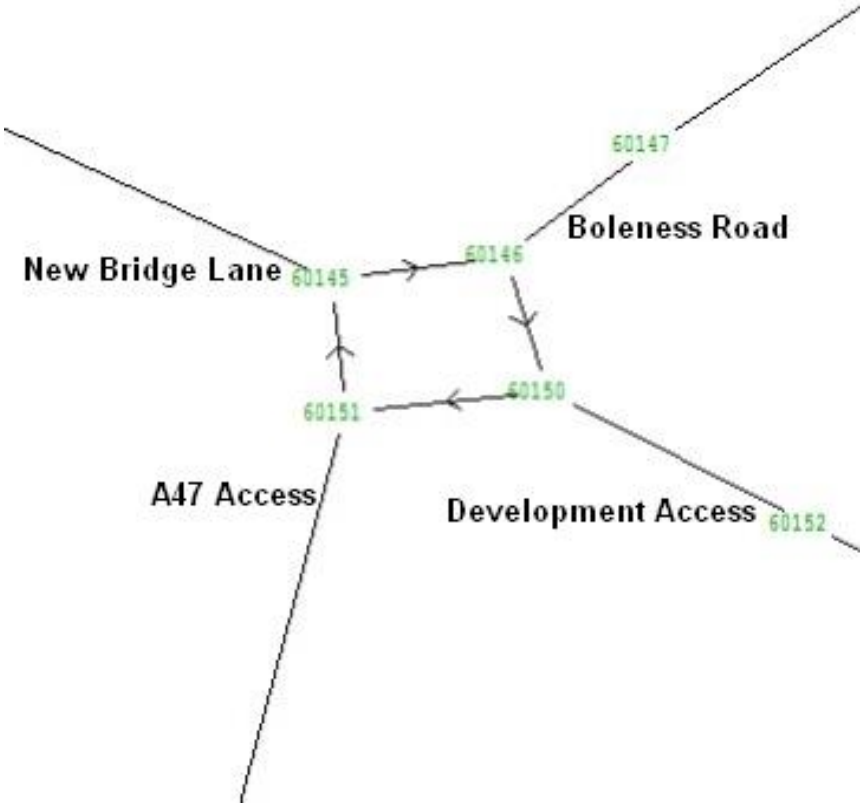

Figure 5.10: Junction 3 – Layout in the WATS model

Due to the size of the roundabout, Junction 3 has been modelled as an expanded roundabout in the Saturn Model.

Node 60151 – Two lane entrance from the A47 Access, two lane exit from 60150

Node 60145 – Two lane entrance from New Bridge Lane, one lane exit from 60151

Node 60146 – Two lane entrance from Boleness Road, one lane exit from 60145

Node 60150 – Two lane entrance from the Development Access, one lane exit from 60146

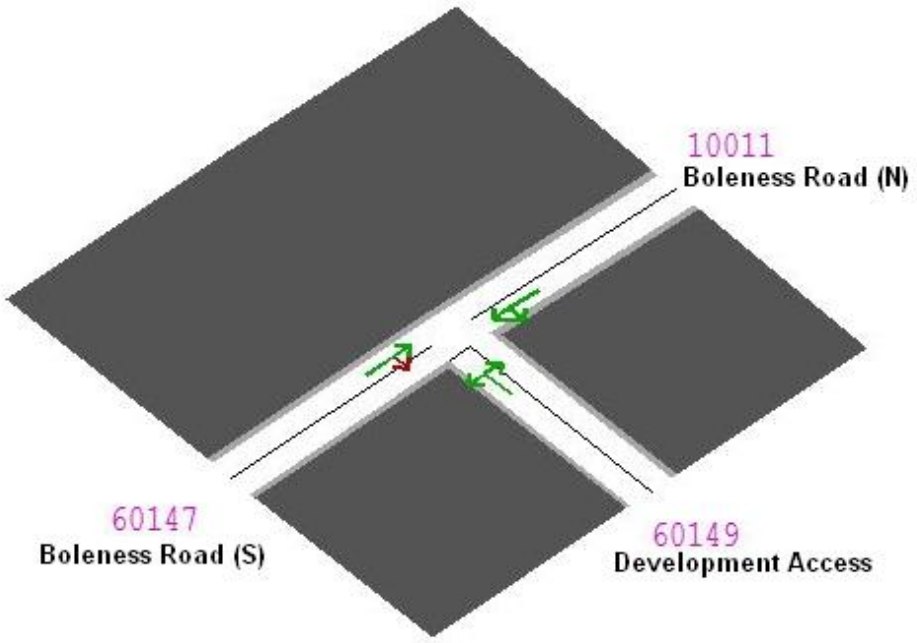

Figure 5.11: Junction 4 – Layout in the WATS model

Model Results

The following measures have been used to understand the performance of each of the options in the 2021, 2026 and 2031 forecast year scenarios:

- **Delays (secs)**: Simulation links: Flow-weighted delay to include: (a) transient delays, (b) V>C queuing delays and (c) any delays associated with link capacity restraint (speed-flow) curves;
- **VC Ratio (RFC)**: The V/C of a road or junction is a measure of the traffic demand at the junction in relation to its ability to accommodate such traffic flow i.e. it is a measure of congestion. A junction with a capacity of 1,000 vehicles per hour and a traffic demand of 850 vehicles per hour has a V/C of 0.85 (or 85%). This is reported as RFC (Ratio of Flow to Capacity);
- **Transient Queues**: The time (delay) spent by vehicles waiting in queues when at or approaching a junction. In the case of signals, this delay would clear in a single cycle.
- **Over-Capacity Queues:** The extra time spent in queues at over-capacity junctions waiting for the cycle in which the vehicle exits (subdivided into queues on the links and, if there are any, queues on centroid connectors due to blocking back.);
- **Total Travel Time**: The sum of both link and junction times;
- **Travel Distance**: Vehicle or PCU - KMs on simulation links; and,
- **Overall Average Speed**: Defined by (total distance) / (total time).

Do Minimum Results

The following results are for the Do Minimum scenario which show the expected delay and RFC values for the Southern Access Road and surrounding network, for the AM and PM peak hours.

The following figures highlight the delay for the Do Minimum scenario, whilst Table 5.1 summarises the RFC for the local network, highlighting where the network will experience the most strain.

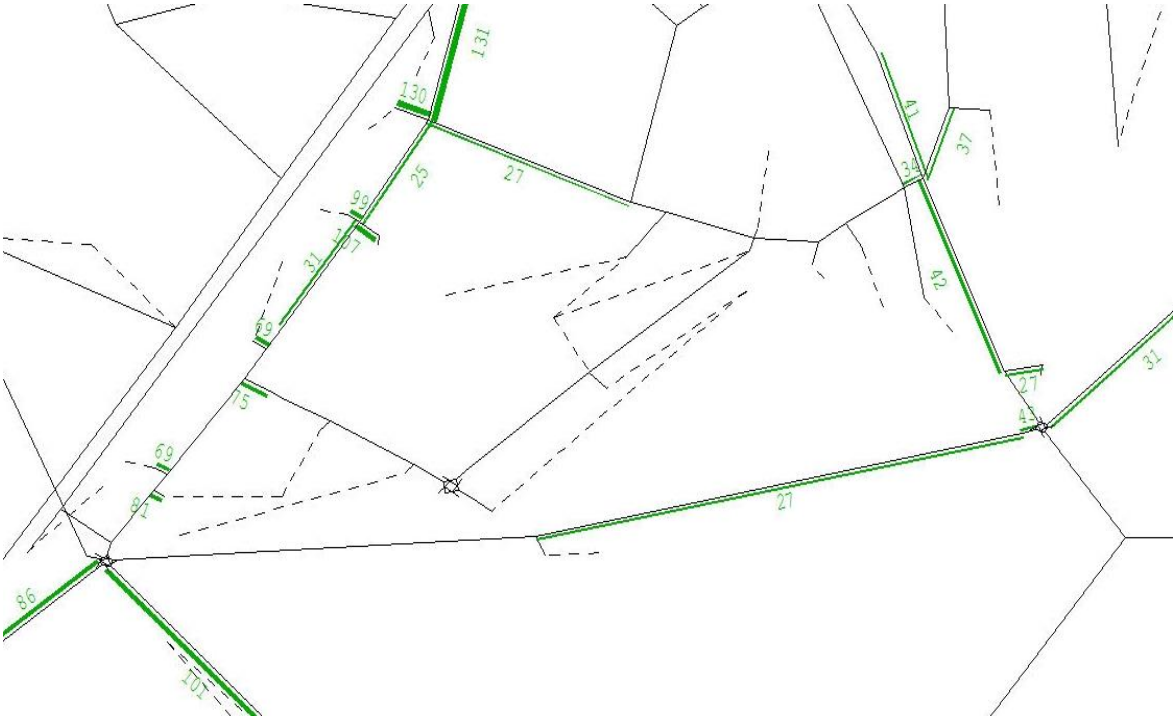

Figure 5.12: Do Minimum Delay (sec) – 2031 AM Peak Hour

There is significant delay in the Do Minimum scenario by the 2031 AM peak hour along Cromwell Road southbound towards the Weasenham Lane junction (131 seconds) and eastbound towards this junction (130 seconds).

There is also delay experienced on Elm High Road around the junction with Weasenham Lane in all directions leading to the junction. 75 seconds of delay is experienced on the Southern Access road exiting onto Cromwell Road at the junction. Cromwell Road roundabout experiences considerable delay on the A47 West approach (86 seconds) and Redmoor Lane approach (101 seconds).

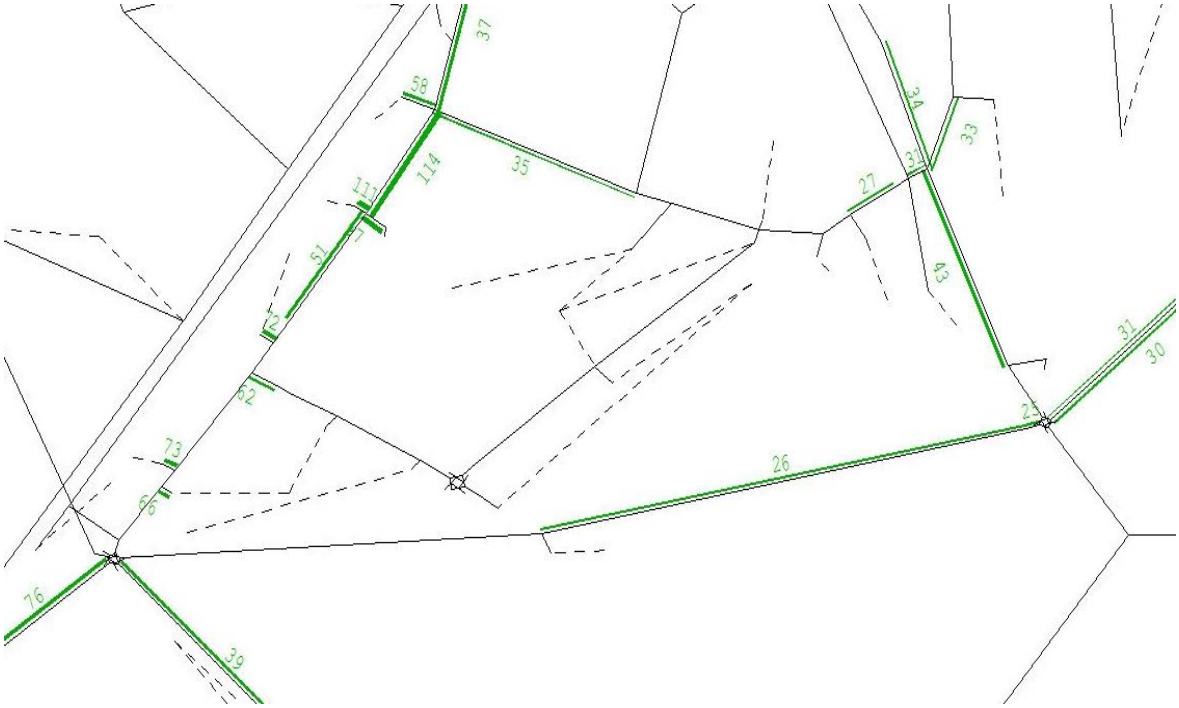

Figure 5.13: The Do Minimum Delay (sec) – 2031 PM Peak Hour

Similar to the AM peak hour there is delay experienced on Cromwell Road around the junction with Weasenham Lane, however unlike the AM peak the delay is experienced most significantly on Cromwell Road southbound leading away from the Weasenham Lane junction (114 seconds). As with the AM peak, there is delay experienced on Elm High Road around the junction with Weasenham Lane and Cromwell Road roundabout, however this is not as severe as that experienced in the AM peak.

The delay in the AM and PM peak indicate that on the Do Minimum scenario works would be needed at Cromwell Road / Weasenham Lane junction, Elm High Road / Weasenham Lane Junction, Cromwell Road roundabout, Elm High Road roundabout and the junction of New Bridge Lane and Cromwell Road.

The following table shows the RFC for the Do Minimum scenario.

Table 5.1: RFC Results for Do Minimum Scenario

Link		Direction	2021		2026		2031	
			AM	PM	AM	PM	AM	PM
Cromwell Road	Cromwell Road roundabout to Development Access	Northbound	53	41	57	45	57	48
		Southbound	23	29	24	33	24	37
	Development Access to New Bridge Lane	Northbound	48	37	50	41	52	47
		Southbound	30	35	33	37	32	40
	New Bridge Lane to Sandown Road	Northbound	73	74	79	82	79	91
		Southbound	49	39	46	51	56	63
	Sandown Road to Weasenham Lane	Northbound	59	55	61	59	62	64
		Southbound	77	102	73	106	78	102

Weasenham Lane	Cromwell Road to Sandall Road	Eastbound	30	19	32	20	34	27
		Westbound	41	61	46	62	54	76
	Sandall Road to Algores Way	Eastbound	38	19	41	20	41	25
		Westbound	40	31	44	35	48	38
	Algores Way to Boleness Road	Eastbound	29	21	33	21	40	28
		Westbound	18	11	20	13	22	15
Southern Access Road	Cromwell Road to Access Junction 1	Eastbound	20	10	22	10	23	12
		Westbound	19	24	23	31	28	36
	Access Junction 1 to Access Junction 2	Eastbound	0	0	2	1	6	2
		Westbound	0	0	0	1	1	3
	Access Junction 2 to Junction 3	Eastbound	0	0	0	0	0	0
		Westbound	0	0	0	0	0	0
	Junction 3 to Development Access	Eastbound	0	0	0	0	0	0
		Westbound	0	0	0	0	0	0
	Junction 3 to Junction 4	Northbound	0	0	0	0	0	0
		Southbound	0	0	0	0	0	0
	Junction 4 to Weasenham Lane	Northbound	21	22	25	30	32	43
		Southbound	33	15	43	18	61	21
Weasenham Lane	Boleness Road Junction to New Drove Junction	Eastbound	22	36	24	39	27	46
		Westbound	39	24	43	25	51	24
	New Drove Junction to Elm Road Junction	Eastbound	53	75	58	80	66	92
		Westbound	60	34	68	37	81	36
	Elm Road Junction to Elm High Road Junction	Eastbound	28	34	32	38	37	40
		Westbound	44	26	56	29	66	29
Elm High Road	Weasenham Lane Junction to Morrisons	Northbound	62	71	74	74	79	85
		Southbound	58	82	74	87	86	88
	Morrisons to Elm High Road Roundabout	Northbound	67	44	73	49	80	50
		Southbound	38	56	49	62	58	68
A47	Elm High Road roundabout to Cromwell Road roundabout	Eastbound	62	68	65	74	64	79
		Westbound	56	64	72	70	83	69

The RFC results indicate that all of the roads which form the Southern Access Road will operate within capacity in both peaks in 2031. However the section of Cromwell Road southbound from the Weasenham Lane junction will operate over capacity in each of the PM peaks.

Weasenham Lane towards the Elm High Road junction will be close to capacity in the 2031 PM peak, as will Elm High Road between Weasenham Lane and Morrison's in both directions which will operate close to capacity.

Of the roads that make up the Southern Access Road itself (New Bridge Lane, Boleness Road), all operate within capacity during both 2031 peak hours. The Do Minimum scenario, shows that most development traffic will be entering and exiting the developments through Junction 1 and Junction 4.

The RFC for the links which are above 85% in the Do Minimum scenario are shown beneath in Figures 5.14 and 5.15 for each of the 2031 peak hours.

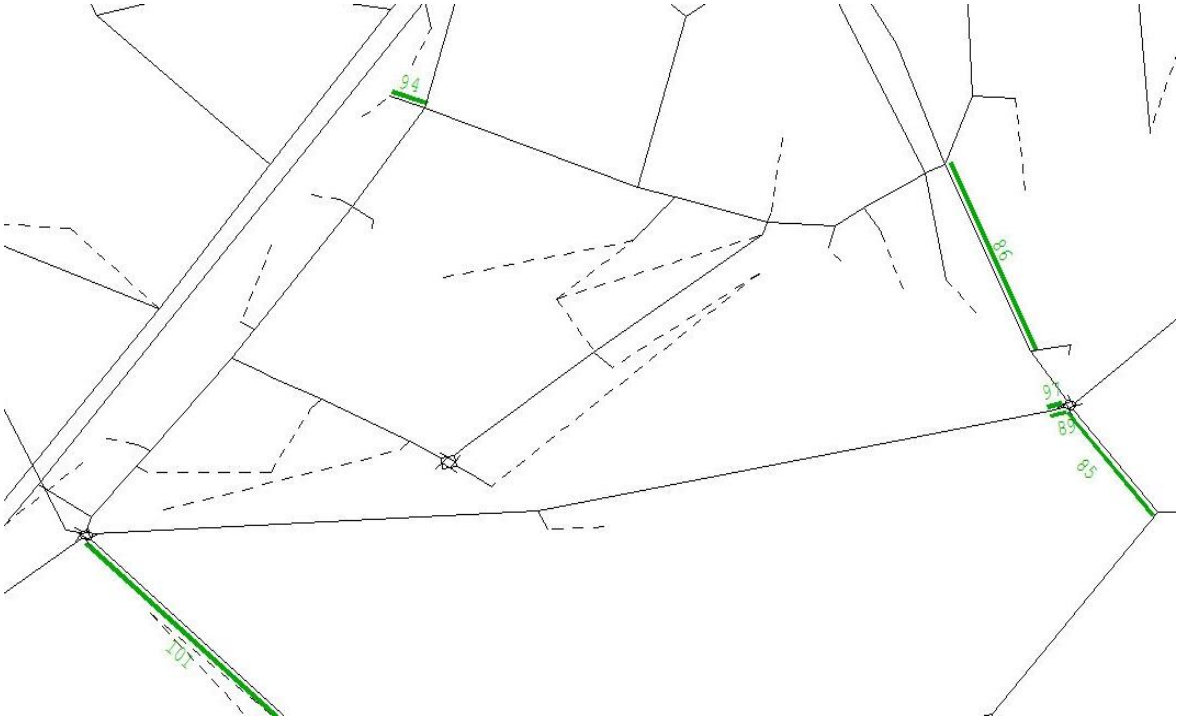

Figure 5.14: Do Minimum RFC – 2031 AM Peak Hour

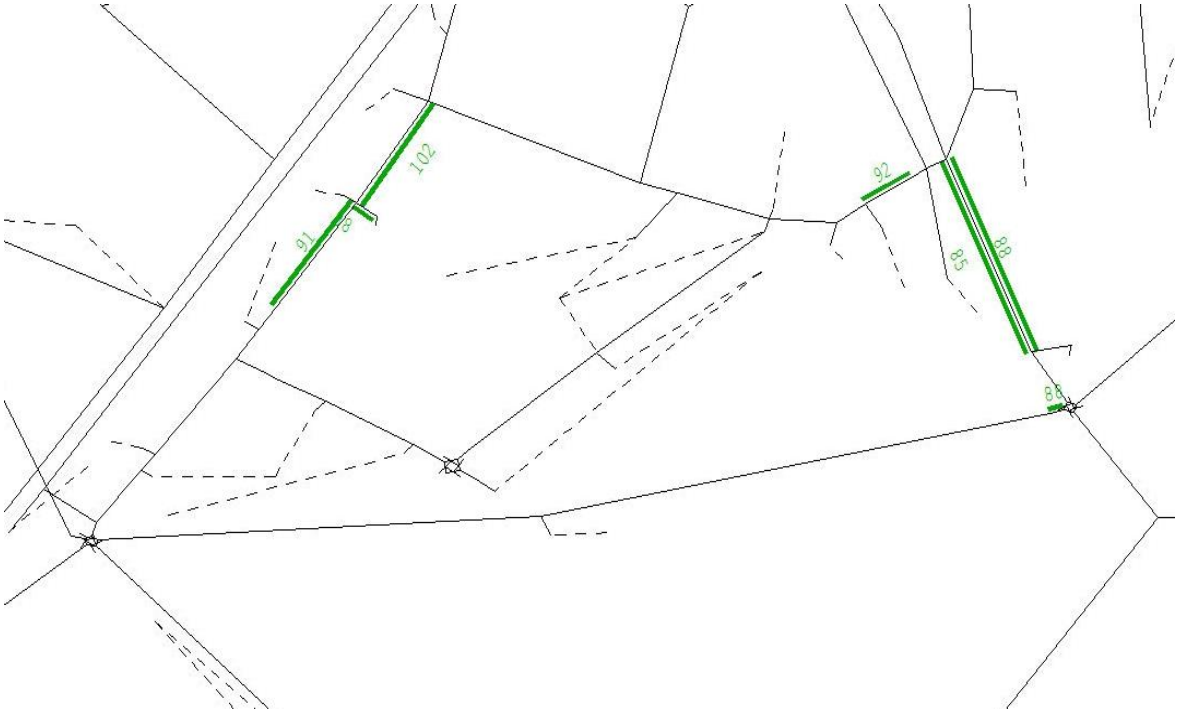

Figure 5.15: Do Minimum RFC – 2031 PM Peak Hour

Table 5.2 below, shows the network wide statistic from the model for the Do Minimum scenario (a comparison of all options is shown at the end of this chapter). The measures reported are described beneath:

- **Transient Queues:** The time (delay) spent by vehicles waiting in queues when at or approaching a junction. In the case of signals, this delay would clear in a single cycle.
- **Over-Capacity Queues:** the extra time spent in queues at over-capacity junctions waiting for the cycle in which the vehicle exits (subdivided into queues on the links and, if there are any, queues on centroid connectors due to blocking back);
- **Total Travel Time:** The sum of both link and junction times;
- **Travel Distance:** Vehicle or PCU-KM's on simulation links; and,
- **Overall Average Speed:** Defined by (total distance) / (total time).

Table 5.2: Do Minimum Results – Network Wide Statistics

	2021 AM	2021 PM
Transient Queues (pcu hrs)	424.6	456.1
Over Capacity Queues (pcu hrs)	30.3	58.2
Total Travel Time (pcu hrs)	13147.1	12012
Total Travel Distance (pcu kms)	710070.5	637633.9
Average speed (kph)	54	53.1
	2026 AM	**2026 PM**
Transient Queues (pcu hrs)	524.6	535.6
Over Capacity Queues (pcu hrs)	88.6	90.1
Total Travel Time (pcu hrs)	14152.1	12864.9
Total Travel Distance (pcu kms)	756314.7	678123.6
Average speed (kph)	53.4	52.7
	2031 AM	**2031 PM**
Transient Queues (pcu hrs)	655.6	583.9
Over Capacity Queues (pcu hrs)	376.7	209.3
Total Travel Time (pcu hrs)	15561	13885.6
Total Travel Distance (pcu kms)	809427.4	724372
Average speed (kph)	52	52.2

The results for the Do Minimum scenario show that there will be a significant increase in both Transient Queues and Over Capacity Queues if the development proposals take place without any additional infrastructure added. Even in the Do Minimum scenario, some work would need to be undertaken on the eastern end of New Bridge Lane to allow it to be used as an access road to the developments in this area.

Option 1 Results

Option 1 creates a connection between New Bridge Lane and Boleness Road, without a connection onto the A47.

The following figures for Option 1 show the expected delay on the network for the AM and PM peak hours. This option has also been compared against the Do Minimum scenario to show the difference in delay.

Also shown within the results are the VC ratios for the Southern Access Road and surrounding network for Option 1, which are shown for both the AM and PM peak hours.

Figures 5.16 and 5.17 show the difference in delay between the Do Minimum scenario and Option 1, where blue represents a reduction in delay resulting from Option 1, and green represents an increase in delay resulting from Option 1.

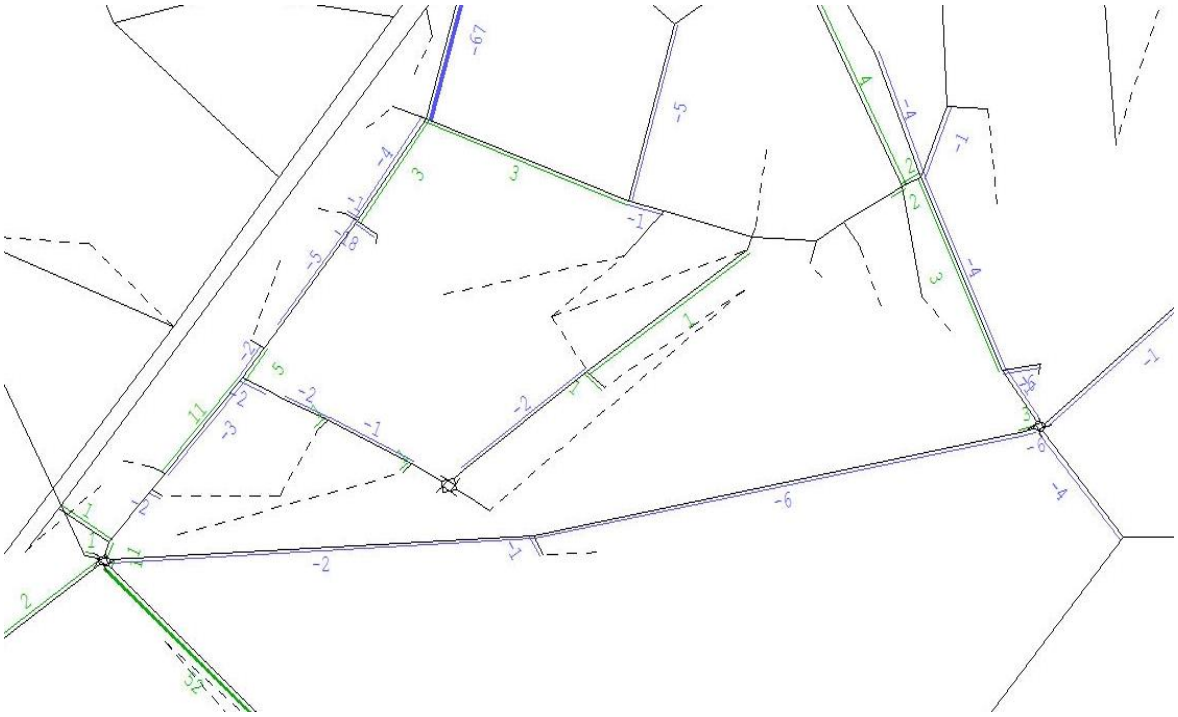

Figure 5.16: Option 1 vs Do Minimum – Comparison of Delay (sec) 2031 (AM)

Compared with the Do Minimum scenario, Option 1 is expected to decrease delay along Cromwell Lane southbound towards the Weasenham Lane junction by 67 seconds. However it will increase delay by 52 seconds on Redmoor Lane towards Cromwell Road roundabout. Around the rest of the immediate network, delay will be very much the same as that experienced in the 'Do minimum' scenario.

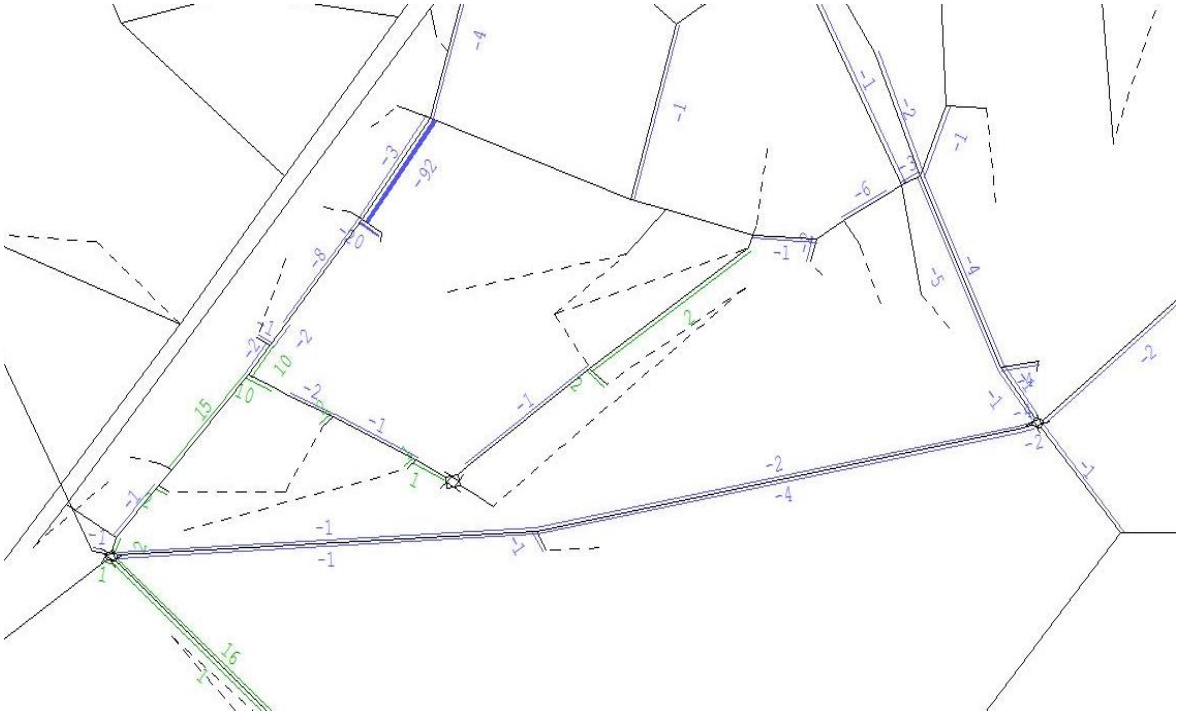

Figure 5.17: Option 1 vs Do Minimum – comparison of Delay (sec) 2031 (PM)

There is some reduction (92 seconds) in delay experienced on Cromwell Road southbound from the Weasenham Lane junction.

Overall in terms of delay across the Southern Access Road area, Option 1 performs much the same as the Do Minimum scenario across the highlighted network.

The following table shows the RFC for Option 1 along the Southern Access Road and surrounding network.

Table 5.3: RFC Results for Option 1

Link		Direction	2021		2026		2031	
			AM	PM	AM	PM	AM	PM
Cromwell Road	Cromwell Road roundabout to Development Access	Northbound	54	40	58	44	58	46
		Southbound	26	35	27	38	30	44
	Development Access to New Bridge Lane	Northbound	47	37	49	41	49	48
		Southbound	32	44	35	47	40	49
	New Bridge Lane to Sandown Road	Northbound	64	64	64	71	63	81
		Southbound	53	47	55	47	60	67
	Sandown Road to Weasenham Lane	Northbound	48	51	50	55	48	55
		Southbound	73	101	78	101	81	78
Weasenham Lane	Cromwell Road to Sandall Road	Eastbound	21	15	23	16	21	18
		Westbound	38	60	40	61	42	55
	Sandall Road to Algores Way	Eastbound	29	16	31	19	32	17
		Westbound	35	29	39	30	41	27
	Algores Way to Boleness Road	Eastbound	24	22	28	26	33	22
		Westbound	17	13	19	13	20	11
Southern Access Road	Cromwell Road to Access Junction 1	Eastbound	25	7	25	6	24	18
		Westbound	26	55	31	64	34	54
	Access Junction 1 to Access Junction 2	Eastbound	14	10	15	11	19	16
		Westbound	3	9	4	11	6	16
	Access Junction 2 to Junction 3	Eastbound	7	5	8	6	10	10
		Westbound	4	15	8	19	14	27
	Junction 3 to Development Access	Eastbound	2	2	3	3	5	4
		Westbound	0	1	1	2	1	4
	Junction 3 to Junction 4	Northbound	16	11	17	12	20	20
		Southbound	2	8	4	9	7	11
	Junction 4 to Weasenham Lane	Northbound	29	26	33	33	43	49
		Southbound	32	28	45	32	66	43
Weasenham Lane	Boleness Road Junction to New Drove Junction	Eastbound	22	34	24	39	27	45
		Westbound	36	25	42	26	49	26
	New Drove Junction to Elm Road Junction	Eastbound	53	71	59	80	66	89
		Westbound	58	37	69	39	84	40
	Elm Road Junction to Elm High Road Junction	Eastbound	28	31	32	34	36	39
		Westbound	45	28	57	30	68	32
Elm High Road	Weasenham Lane Junction to Morrisons	Northbound	61	72	73	75	84	80
		Southbound	54	74	69	81	77	81
	Morrisons to Elm High Road Roundabout	Northbound	64	40	71	45	81	47
		Southbound	35	49	46	55	52	59
A47	Elm High Road roundabout to Cromwell Road roundabout	Eastbound	61	65	64	72	64	75
		Westbound	52	55	67	62	75	60

The results for Option 1 indicate that the majority of the roads in the surrounding network operate much the same as those in the Do Minimum scenario. The southbound section of Cromwell Road leading away from the Weasenham Lane junction operates over capacity in the 2026 and 2031 PM peaks.

Weasenham Lane eastbound towards Elm High Road is close to capacity in the 2031 PM peak and the southbound section of Elm High Road leading to Elm High Road Roundabout still operates closer to capacity.

Figures 5.18 and 5.19 below show the 2031 AM and PM peak hour RFC greater than 85% for the Southern Access Road and surrounding network.

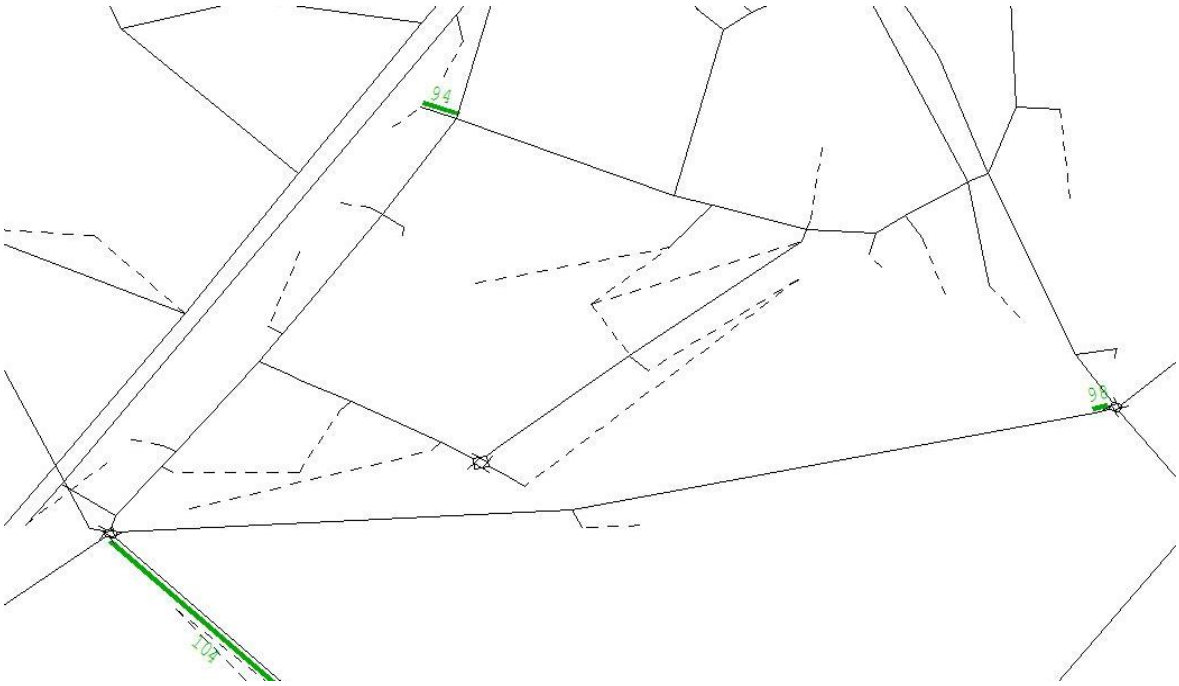

Figure 5.18: Option 1 – RFC 2031 (AM)

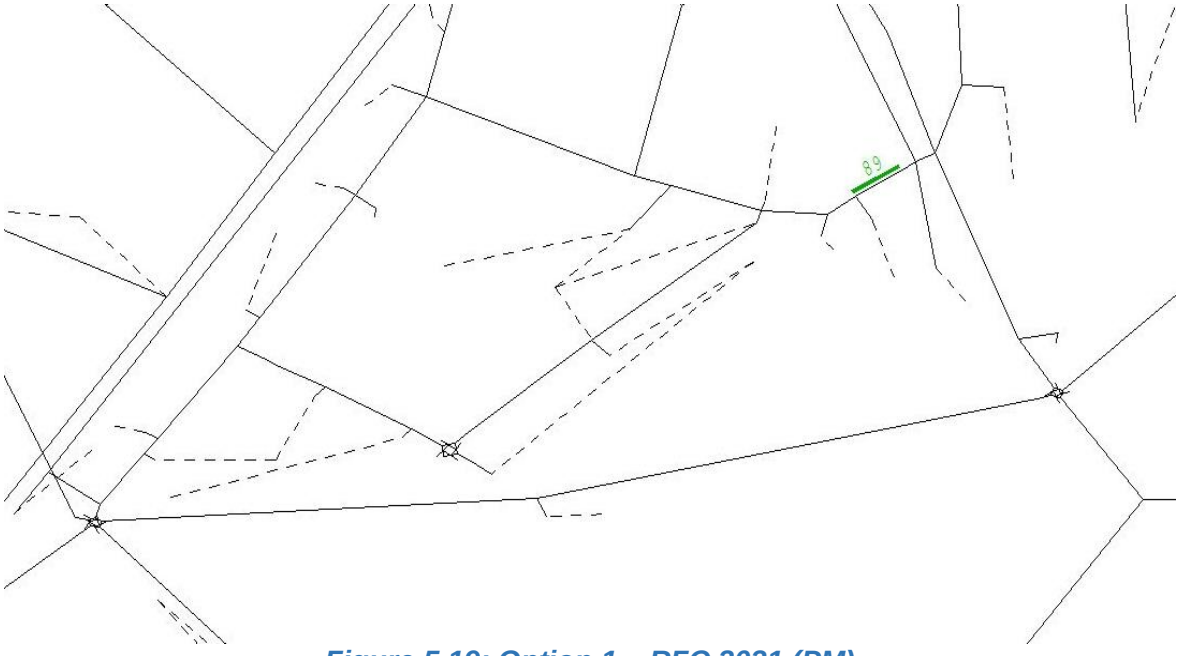

Figure 5.19: Option 1 – RFC 2031 (PM)

The results for Option 1 indicate that opening the link between New Bridge Lane and Boleness Road, increases the traffic using this route to travel east to west across the network. Although both New Bridge Lane and Boleness Road operate within capacity, some works would need to take place at Cromwell and Elm High Road roundabouts as well as on Weasenham Lane between New Drove and Elm Road.

Table 5.4 below, shows the network wide statistic from the model for Option 1 (a comparison of all options is shown at the end of this chapter).

Table 5.4: Option 1 Results – Network Wide Statistics

	2021 AM	2021 PM
Transient Queues (pcu hrs)	426	426
Over Capacity Queues (pcu hrs)	29.8	49.3
Total Travel Time (pcu hrs)	13142.1	11967.7
Total Travel Distance (pcu kms)	709795.8	637272.8
Average speed (kph)	54	53.2
	2026 AM	**2026 PM**
Transient Queues (pcu hrs)	514.3	499.7
Over Capacity Queues (pcu hrs)	89	57.1
Total Travel Time (pcu hrs)	14137.4	12788.4
Total Travel Distance (pcu kms)	756081.8	677642.8
Average speed (kph)	53.5	53
	2031 AM	**2031 PM**
Transient Queues (pcu hrs)	646.8	548.2
Over Capacity Queues (pcu hrs)	339.8	196.3
Total Travel Time (pcu hrs)	15508.7	13826.7
Total Travel Distance (pcu kms)	808935.8	723756.1
Average speed (kph)	52.2	52.3

The results indicate that the Transient and Over Capacity Queues increase in each time period.

Option 2 Results

Option 2 creates a connection between New Bridge Lane and Boleness Road, as well as a connection onto the A47.

The following results for Option 2 show the expected delay on the network for the AM and PM peak hours. This option has also been compared against the Do Minimum scenario to show the difference in Delay. Also shown in the results is the RFC for the Southern Access Road and surrounding network. The ratios are shown for both AM and PM peak in each of the scenario years. The final table collates network wide information for comparison.

Figures 5.20 and 5.21 show the difference in delay between the Do Minimum scenario and Option 2, where blue represents a reduction in delay resulting from Option 2, and green represents an increase in delay resulting from Option 2.

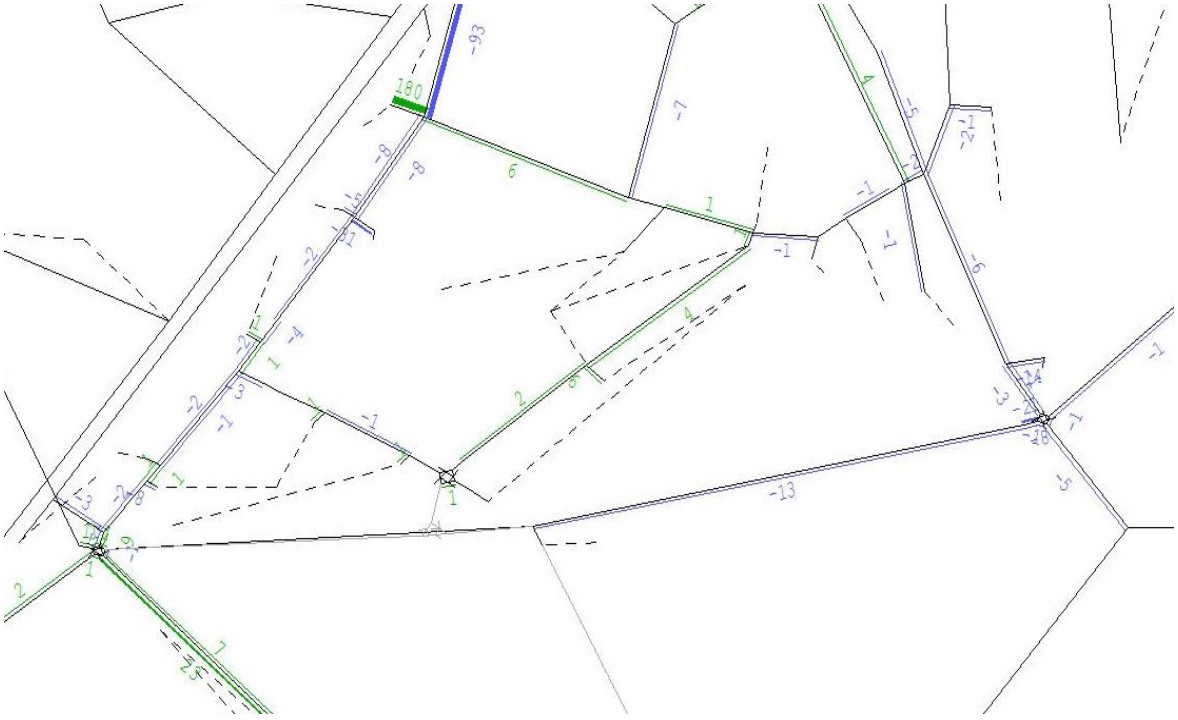

Figure 5.20: Option 2 vs Do Minimum – comparison of Delay (sec) 2031 (AM)

Like Option 1, Option 2 shows some decrease in delay compared to the Do Minimum scenario for Cromwell Road southbound towards the Weasenham Lane junction (93 seconds). Overall there are minimal decreases in delay across the majority of the highlighted network when compared with the Do Minimum scenario delay.

Figure 5.21 below shows the difference in delay between the Do Minimum scenario and Option 2 for the 2031 PM peak hour.

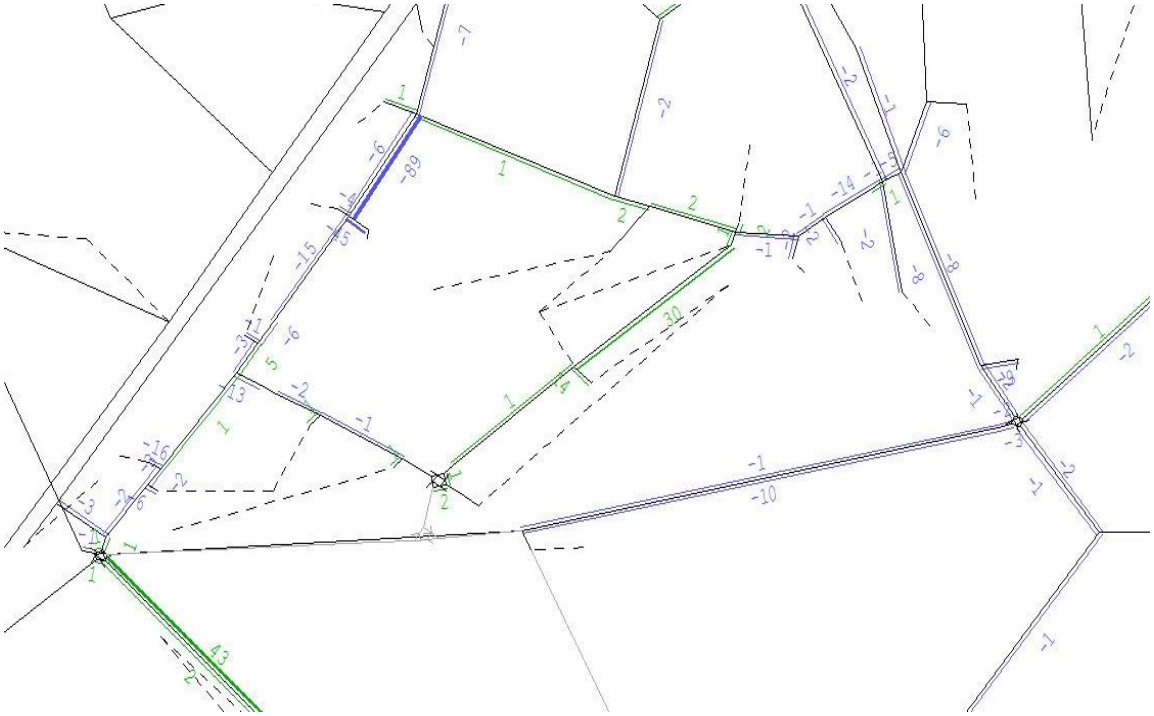

Figure 5.21: Option 2 vs Do Minimum – Comparison of Delay (sec) 2031 (PM)

Much the same as with Option 1, Option 2 shows some significant decreases in delay (89 seconds) on Cromwell Road southbound from the Weasenham Lane junction.

Unlike the Do Minimum and Option 1 scenarios, there is now some delay experienced on the proposed Southern Access Road, this is between development access junction 4 and Weasenham Lane, with an additional 30 seconds of delay being experienced above the Do Minimum scenario of 3 seconds.

The following table shows the RFC for Option 2 for the Southern Access Road and surrounding network.

Table 5.5: RFC Results for Option 2

Link		Direction	2021		2026		2031	
			AM	PM	AM	PM	AM	PM
Cromwell Road	Cromwell Road roundabout to Development Access	Northbound	28	21	31	22	30	24
		Southbound	20	10	23	12	24	17
	Development Access to New Bridge Lane	Northbound	26	19	27	21	27	25
		Southbound	24	11	30	12	30	20
	New Bridge Lane to Sandown Road	Northbound	48	45	52	48	51	60
		Southbound	44	32	52	34	53	49
	Sandown Road to Weasenham Lane	Northbound	38	44	40	46	40	43
		Southbound	52	55	60	58	62	60
Weasenham Lane	Cromwell Road to Sandall Road	Eastbound	7	5	8	6	8	9
		Westbound	25	16	32	21	34	29
	Sandall Road to Algores Way	Eastbound	21	15	22	16	23	17
		Westbound	41	30	45	32	46	32
	Algores Way to Boleness	Eastbound	20	28	21	31	25	29

	Road	Westbound	21	12	23	13	24	14
Southern Access Road	Cromwell Road to Access Junction 1	Eastbound	20	15	21	15	20	17
		Westbound	10	17	11	20	14	16
	Access Junction 1 to Access Junction 2	Eastbound	5	17	7	18	8	20
		Westbound	2	1	3	2	3	3
	Access Junction 2 to Junction 3	Eastbound	3	9	3	10	4	12
		Westbound	4	2	5	3	8	4
	Junction 3 to Development Access	Eastbound	3	3	5	4	9	5
		Westbound	1	1	1	3	2	6
	Junction 3 to Junction 4	Northbound	63	44	65	47	65	53
		Southbound	11	28	13	29	15	28
	Junction 4 to Weasenham Lane	Northbound	68	58	72	65	75	77
		Southbound	45	90	55	95	69	93
Weasenham Lane	Boleness Road Junction to New Drove Junction	Eastbound	23	32	24	37	26	42
		Westbound	35	28	42	31	47	28
	New Drove Junction to Elm Road Junction	Eastbound	53	63	57	71	63	79
		Westbound	58	40	69	46	81	42
	Elm Road Junction to Elm High Road Junction	Eastbound	28	27	31	30	35	36
		Westbound	44	30	56	33	65	33
Elm High Road	Weasenham Lane Junction to Morrisons	Northbound	59	69	67	75	75	74
		Southbound	45	58	52	64	63	64
	Morrisons to Elm High Road Roundabout	Northbound	55	38	61	43	67	43
		Southbound	28	38	34	45	41	50
A47	Elm High Road roundabout to New A47 Roundabout	Eastbound	59	64	63	72	65	77
		Westbound	48	45	56	49	70	52
	New A47 Roundabout to Cromwell Road Roundabout	Eastbound	58	48	60	53	60	57
		Westbound	58	86	67	92	79	95

All roads making up the Southern Access Road operate within capacity, however the southbound link between Weasenham Lane and Development Access junction 4 on Boleness Road operates very close to capacity in the PM peak for 2021, 2026 and 2031. Also the A47 westbound between the new A47 roundabout and Cromwell Road is operating near capacity in the 2026 and 2031 PM peak.

Figures 5.22 and 5.23 below show the 2031 AM and PM peak hour RFC over 85% for the Southern Access Road and surrounding network.

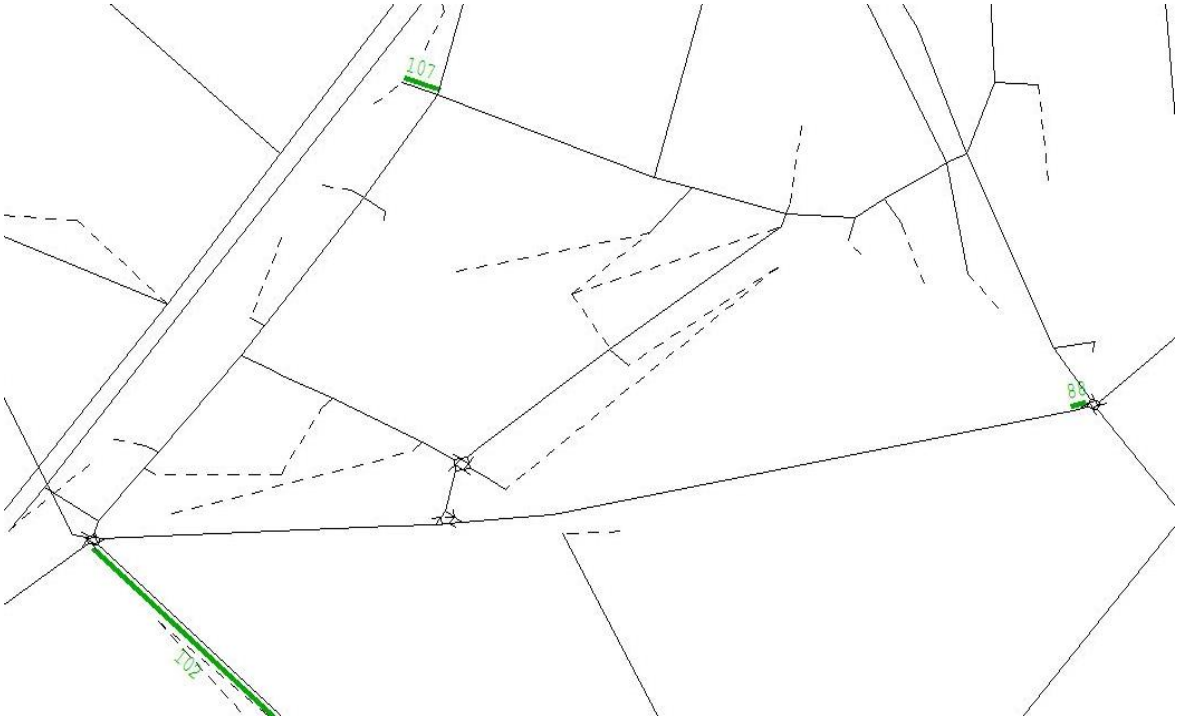

Figure 5.22: Option 2 – RFC 2031 (AM)

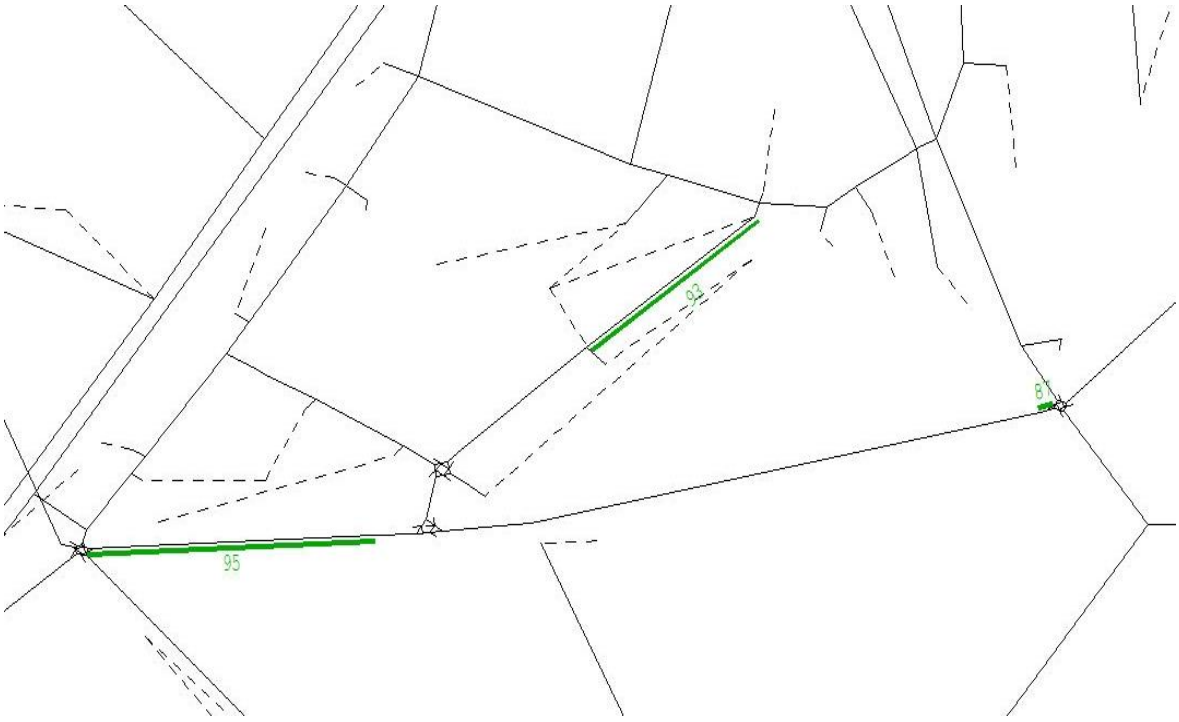

Figure 5.23: Option 2 – RFC 2031 (PM)

The Option 2 scenario results indicate that additional infrastructure works would need to be undertaken at Cromwell and Elm High Road roundabouts, as well as on Boleness Road.

Table 5.6 below, shows the network wide statistic from the model for Option 2 (a comparison of all options is shown at the end of this chapter).

Table 5.6: Option 2 – Network Wide Statistics

	2021 AM	2021 PM
Transient Queues (pcu hrs)	414.5	407.3
Over Capacity Queues (pcu hrs)	28.3	49.2
Total Travel Time (pcu hrs)	13121.9	11942.8
Total Travel Distance (pcu kms)	709675.1	636995.4
Average speed (kph)	54.1	53.3
	2026 AM	**2026 PM**
Transient Queues (pcu hrs)	502.6	477.3
Over Capacity Queues (pcu hrs)	112.5	58.6
Total Travel Time (pcu hrs)	14139.5	12760.6
Total Travel Distance (pcu kms)	755847.6	677287.4
Average speed (kph)	53.5	53.1
	2031 AM	2031 PM
Transient Queues (pcu hrs)	629.4	519.6
Over Capacity Queues (pcu hrs)	411.3	357
Total Travel Time (pcu hrs)	15552.7	13951.9
Total Travel Distance (pcu kms)	808757.1	723421.8
Average speed (kph)	52	51.9

The results for Option 2, indicate as with the other options that the Transient and Over Capacity Queues increase at each forecasted year. However these increases are less than those experienced for the Do Minimum scenario and Option 1. A comparison of the network wide statistics for all options is provided at the end of this chapter.

Option 3 Results

Option 3 creates a connection between Boleness Road and the A47 via a new A47 Junction, but without a connection onto New Bridge Lane.

The following figures for Option 3 show the expected delay on the network for the AM and PM peak hours. This option has also been compared against the Do Minimum scenario to show the difference in Delay. Also shown in the results is the RFC for the Southern Access Road and the surrounding network. The ratios are shown for both AM and PM peak hours in each of the scenario years.

Figures 5.24 and 5.25 show the difference in delay between the Do Minimum scenario and Option 3, where blue represents a reduction in delay resulting from Option 3, and green represents an increase in delay resulting from Option 3.

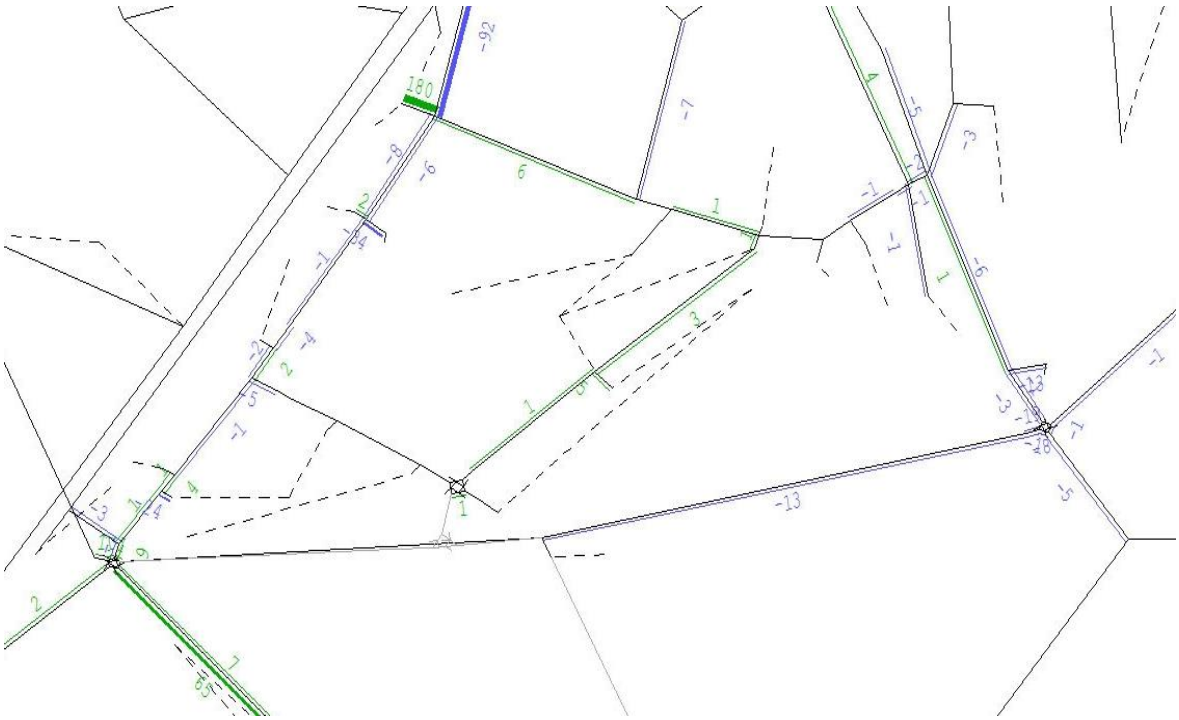

Figure 5.24: Option 3 vs Do Minimum – Comparison of Delay (sec) 2031 (AM)

The Option 3 scenario shows a decrease in delay (92 seconds) on Cromwell Road southbound towards the Weasenham Lane junction in the AM peak hour compared with the Do Minimum scenario, this is very similar to the decrease in delay experienced in Options 1 and 2.

Figure 5.25 below shows the difference in delay between the Do Minimum scenario and Option 3 for the 2031 PM peak hour.

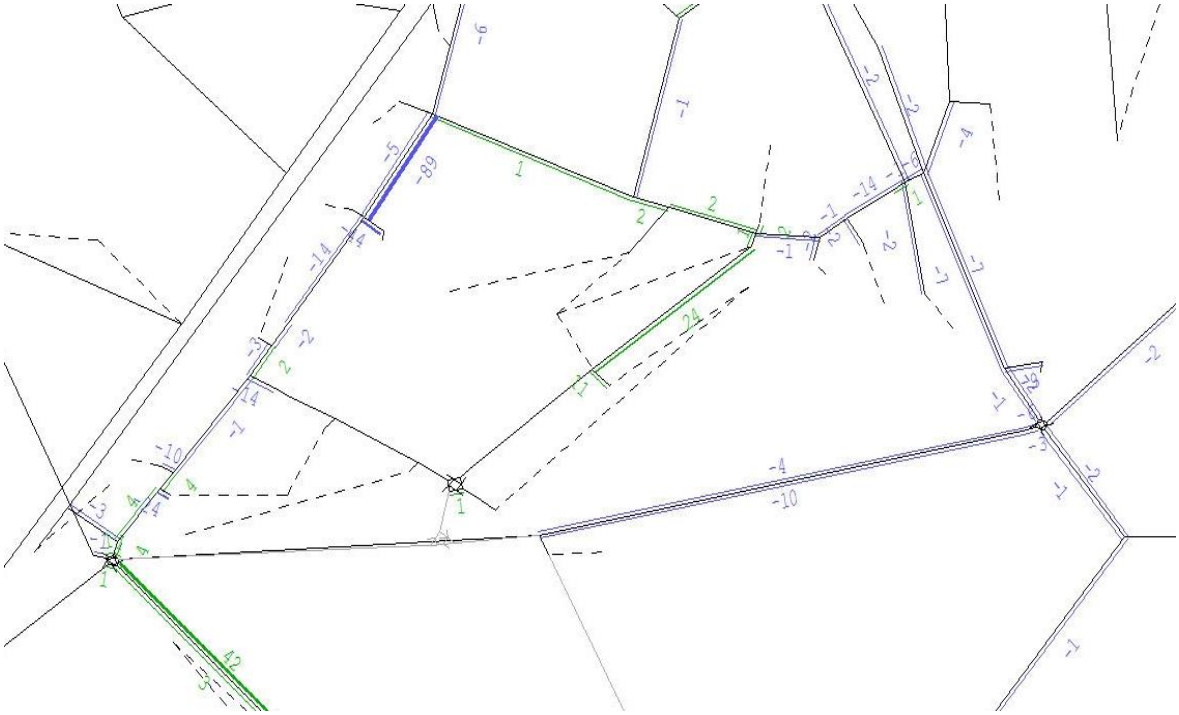

Figure 5.25: Option 3 vs Do Minimum – Comparison of Delay (sec) 2031 (PM)

Much the same as with Option 1 and 2, Option 3 shows some significant decreases in delay on Cromwell Road southbound from the Weasenham Lane junction.

Similar to the Option 2 scenario, there is now some delay experienced on the proposed Southern Access Road, this is between development access junction 4 and Weasenham Lane, with an additional 24 seconds of delay being experienced above the Do Minimum scenario of 3 seconds.

The following table shows the RFC for Option 3 for the Southern Access Road and the surrounding network.

Table 5.7: RFC for Option 3

Link		Direction	2021		2026		2031	
			AM	PM	AM	PM	AM	PM
Cromwell Road	Cromwell Road roundabout to Development Access	Northbound	30	21	33	23	33	29
		Southbound	21	18	25	20	25	24
	Development Access to New Bridge Lane	Northbound	26	19	27	21	27	25
		Southbound	25	18	30	20	30	23
	New Bridge Lane to Sandown Road	Northbound	49	46	52	49	53	63
		Southbound	43	30	52	32	55	43
	Sandown Road to Weasenham Lane	Northbound	39	44	40	46	39	47
		Southbound	53	56	63	60	65	70
Weasenham Lane	Cromwell Road to Sandall Road	Eastbound	8	6	9	7	10	12
		Westbound	28	19	35	27	38	33
	Sandall Road to Algores Way	Eastbound	21	15	22	16	22	17
		Westbound	41	29	45	31	46	32

	Algores Way to Boleness Road	Eastbound	20	29	22	31	25	31
		Westbound	21	12	23	13	24	14
Southern Access Road	Cromwell Road to Access Junction 1	Eastbound	20	10	22	11	23	12
		Westbound	13	21	17	28	23	22
	Access Junction 1 to Access Junction 2	Eastbound	0	0	2	1	6	2
		Westbound	0	0	0	1	1	3
	Access Junction 2 to Junction 3	Eastbound	0	0	0	0	0	0
		Westbound	0	0	0	0	0	0
	Junction 3 to Development Access	Eastbound	3	3	5	3	8	5
		Westbound	1	1	1	3	2	6
	Junction 3 to Junction 4	Northbound	62	42	63	44	62	48
		Southbound	10	27	12	28	12	27
	Junction 4 to Weasenham Lane	Northbound	67	56	71	62	72	72
		Southbound	43	89	52	92	64	91
Weasenham Lane	Boleness Road Junction to New Drove Junction	Eastbound	22	31	24	37	26	42
		Westbound	35	28	42	32	47	28
	New Drove Junction to Elm Road Junction	Eastbound	52	62	57	70	63	78
		Westbound	58	40	69	46	80	43
	Elm Road Junction to Elm High Road Junction	Eastbound	28	27	31	30	35	36
		Westbound	44	30	55	33	64	34
Elm High Road	Weasenham Lane Junction to Morrisons	Northbound	59	70	68	75	78	76
		Southbound	46	58	54	65	65	67
	Morrisons to Elm High Road Roundabout	Northbound	55	38	61	43	70	43
		Southbound	29	38	35	45	43	49
A47	Elm High Road roundabout to New A47 Roundabout	Eastbound	59	63	62	71	63	73
		Westbound	48	45	57	49	72	51
	New A47 Roundabout to Cromwell Road Roundabout	Eastbound	60	56	62	61	62	64
		Westbound	60	86	70	93	83	96

The results for Option 3 are similar to those for Option 2, there is some nearing of capacity on Boleness Road southbound between Weasenham Lane and Development Access Junction 4 in the 2026 and 2031 PM Peak. Also some nearing of capacity on the A47 westbound between the new A47 roundabout and Cromwell Road roundabout.

Figures 5.26 and 5.27 below show the 2031 AM and PM peak hour RFC above 85% for the Southern Access Road and surrounding network.

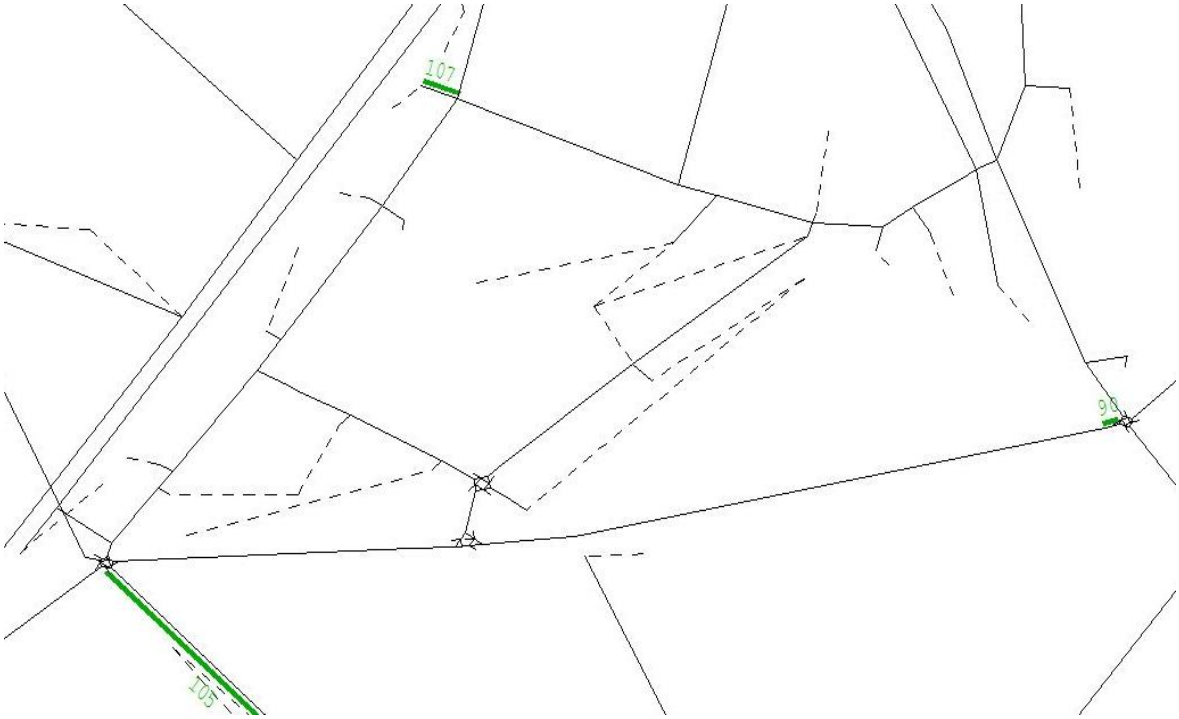

Figure 5.26: Option 3 – RFC 2031 (AM)

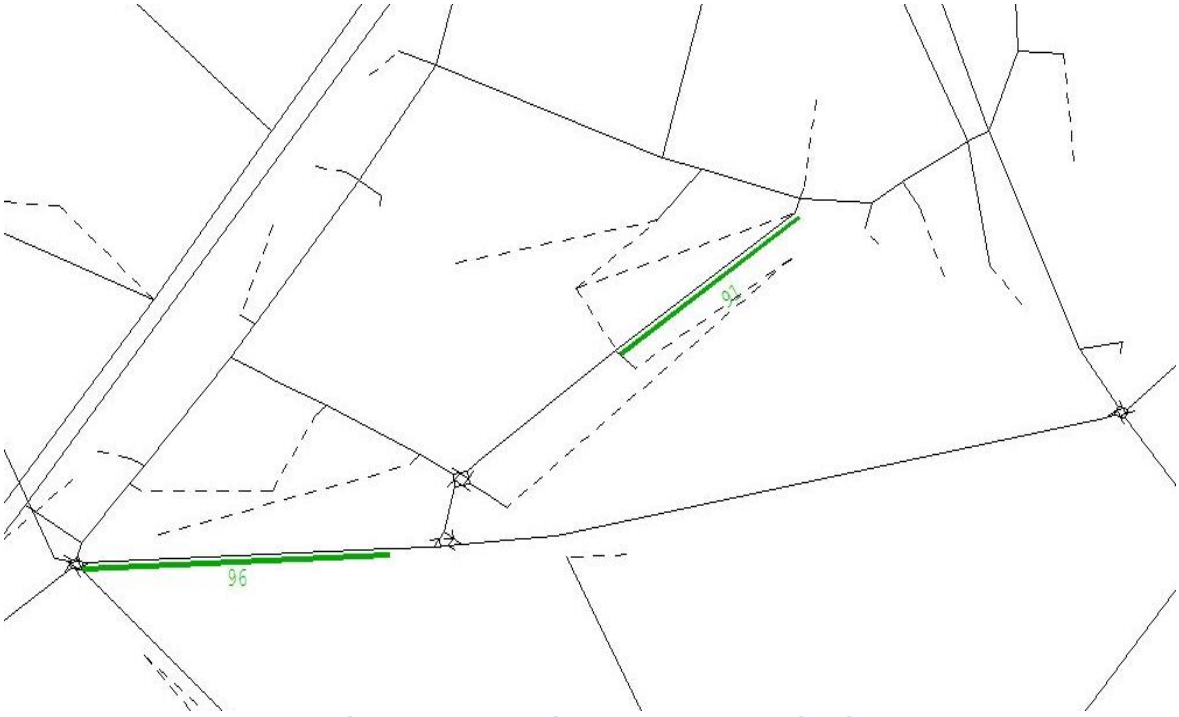

Figure 5.27: Option 3 – RFC 2031 (PM)

As with the previous two scenarios, the Option 3 scenario results indicate that additional infrastructure works would need to be undertaken at Cromwell and Elm High Road roundabouts, as well as on Boleness Road.

Table 5.8 below, shows the network wide statistic from the model for Option 3 (a comparison of all options is shown at the end of this chapter).

Table 5.8: Option 3 – Network Wide Statistics

	2021 AM	2021 PM
Transient Queues (pcu hrs)	414.3	411
Over Capacity Queues (pcu hrs)	29.3	47.3
Total Travel Time (pcu hrs)	13123.4	11944.9
Total Travel Distance (pcu kms)	709720.5	637075
Average speed (kph)	54.1	53.3
	2026 AM	**2026 PM**
Transient Queues (pcu hrs)	509.3	480.2
Over Capacity Queues (pcu hrs)	97.1	58.3
Total Travel Time (pcu hrs)	14131.5	12763.6
Total Travel Distance (pcu kms)	755889	677376.1
Average speed (kph)	53.5	53.1
	2031 AM	**2031 PM**
Transient Queues (pcu hrs)	635.2	523.1
Over Capacity Queues (pcu hrs)	404.4	209.5
Total Travel Time (pcu hrs)	15553	13808.4
Total Travel Distance (pcu kms)	808815.8	723485
Average speed (kph)	52	52.4

As with all of the options considered, Transient and Over Capacity Queues increase with each future year. A comparison of the network wide statistics for each option is provided at the end of this chapter.

Option 4 Results

Option 4 creates a connection between New Bridge Lane and the A47 via a new A47 Junction, but without a connection onto Boleness Road. Note that the development land to the east of Boleness Road can still access New Bridge Lane and the A47 via Junction 3.

Figures 5.28 and 5.29 show the difference in delay between the Do Minimum scenario and Option 4, where blue represents a reduction in delay resulting from Option 4, and green represents an increase in delay resulting from Option 4.

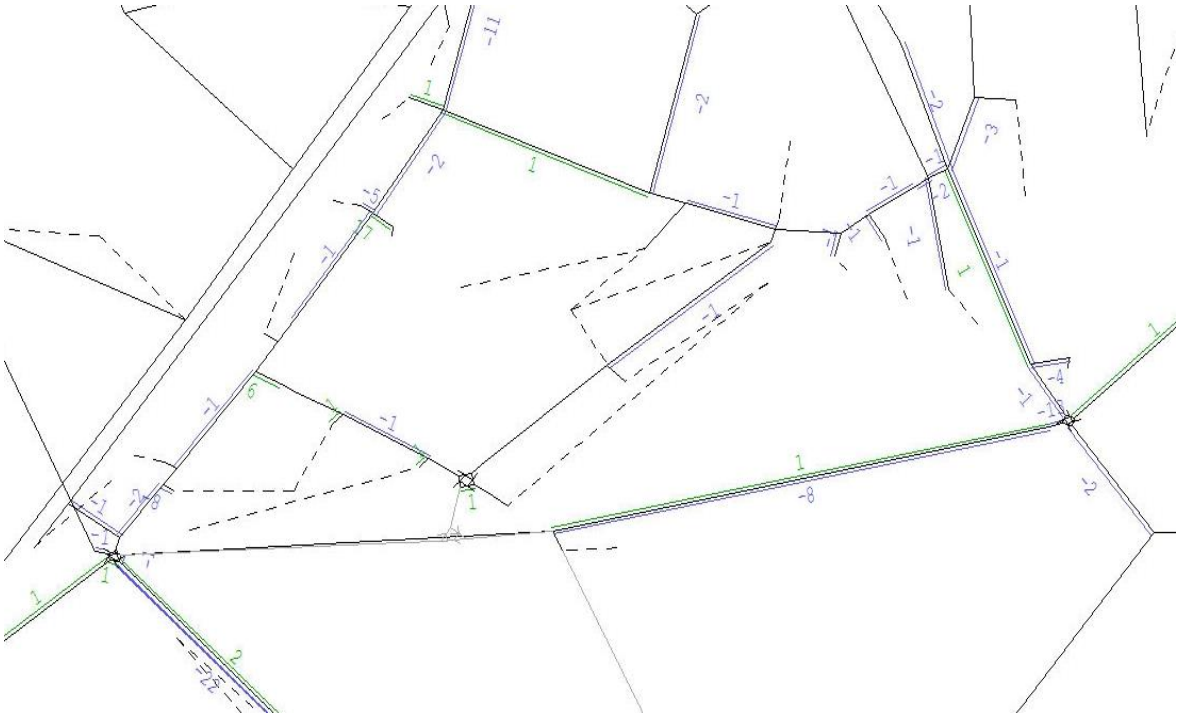

Figure 5.28: Option 4 vs Do Minimum – comparison of Delay (sec) 2031 (AM)

When compared with the Do Minimum scenario there is very little difference between the delays experienced in the AM Peak hour for Option 4.

Figure 5.29 below shows the difference in delay between the Do Minimum scenario and Option 4 for the 2031 PM peak hour.

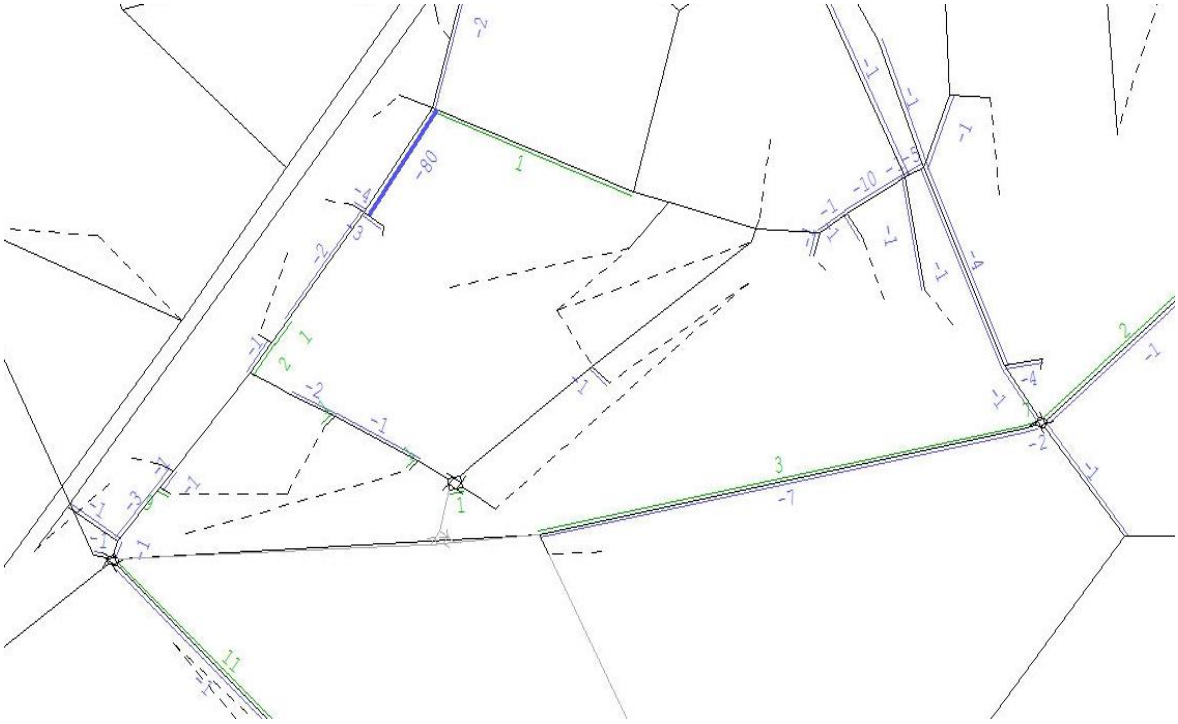

Figure 5.29: Option 4 vs Do Minimum – comparison of Delay (sec) 2031 (PM)

During the PM peak hour Option 4 shows much the same reductions in delay against the Do Minimum scenario as the other options, with the main benefit being on Cromwell Road southbound travelling away from the Weasenham Lane junction.

The following table shows the RFC for Option 4 for the Southern Access Road and the surrounding network.

Table 5.9: RFC for Option 4

Link		Direction	2021		2026		2031	
			AM	PM	AM	PM	AM	PM
Cromwell Road	Cromwell Road roundabout to Development Access	Northbound	53	40	54	42	53	41
		Southbound	23	22	23	23	24	30
	Development Access to New Bridge Lane	Northbound	47	37	49	40	48	44
		Southbound	33	28	34	28	33	34
	New Bridge Lane to Sandown Road	Northbound	71	72	74	79	76	89
		Southbound	53	52	56	53	59	69
	Sandown Road to Weasenham Lane	Northbound	58	54	60	58	61	62
		Southbound	76	101	74	103	76	100
Weasenham Lane	Cromwell Road to Sandall Road	Eastbound	28	17	30	18	31	25
		Westbound	41	60	45	62	53	79
	Sandall Road to Algores Way	Eastbound	36	17	38	19	38	23
		Westbound	39	29	42	31	46	37
	Algores Way to Boleness Road	Eastbound	26	18	29	20	32	25
		Westbound	18	10	19	11	21	14
Ac	Cromwell Road to Access	Eastbound	21	16	23	15	23	17

	Junction 1	Westbound	17	23	19	26	24	26
	Access Junction 1 to Access Junction 2	Eastbound	4	15	6	17	8	18
		Westbound	2	1	2	2	2	2
	Access Junction 2 to Junction 3	Eastbound	2	8	3	9	3	10
		Westbound	2	1	3	2	6	2
	Junction 3 to Development Access	Eastbound	3	3	5	3	8	5
		Westbound	1	1	1	3	2	6
	Junction 3 to Junction 4	Northbound	0	0	0	0	0	0
		Southbound	0	0	0	0	0	0
	Junction 4 to Weasenham Lane	Northbound	19	21	22	24	27	28
		Southbound	29	11	35	12	46	13
Weasenham Lane	Boleness Road Junction to New Drove Junction	Eastbound	22	36	23	39	26	43
		Westbound	38	24	41	25	48	24
	New Drove Junction to Elm Road Junction	Eastbound	51	75	57	80	62	84
		Westbound	60	34	64	36	76	36
	Elm Road Junction to Elm High Road Junction	Eastbound	27	34	31	37	34	37
		Westbound	43	26	53	28	62	29
Elm High Road	Weasenham Lane Junction to Morrisons	Northbound	60	69	71	73	78	84
		Southbound	54	80	72	86	84	81
	Morrisons to Elm High Road Roundabout	Northbound	64	42	70	48	76	47
		Southbound	35	54	48	62	57	66
A47	Elm High Road roundabout to New A47 Roundabout	Eastbound	62	67	65	75	67	82
		Westbound	53	61	70	68	83	63
	New A47 Roundabout to Cromwell Road Roundabout	Eastbound	37	34	39	38	40	42
		Westbound	50	61	67	69	77	67

The RFCs for all of the roads which make up the Southern Access Road show that they all operate within capacity. However there is an over capacity issue on Cromwell Road in each of the PM peak scenarios heading southbound from Weasenham Lane. Weasenham Lane is nearing capacity in the 2031 PM peak, as is Elm High Road northbound between Morrison's and the Weasenham Lane junction.

The RFCs over 85% for the Southern Access Road and the surrounding network are shown in Figures 5.30 and 5.31 beneath for each of the peak hours.

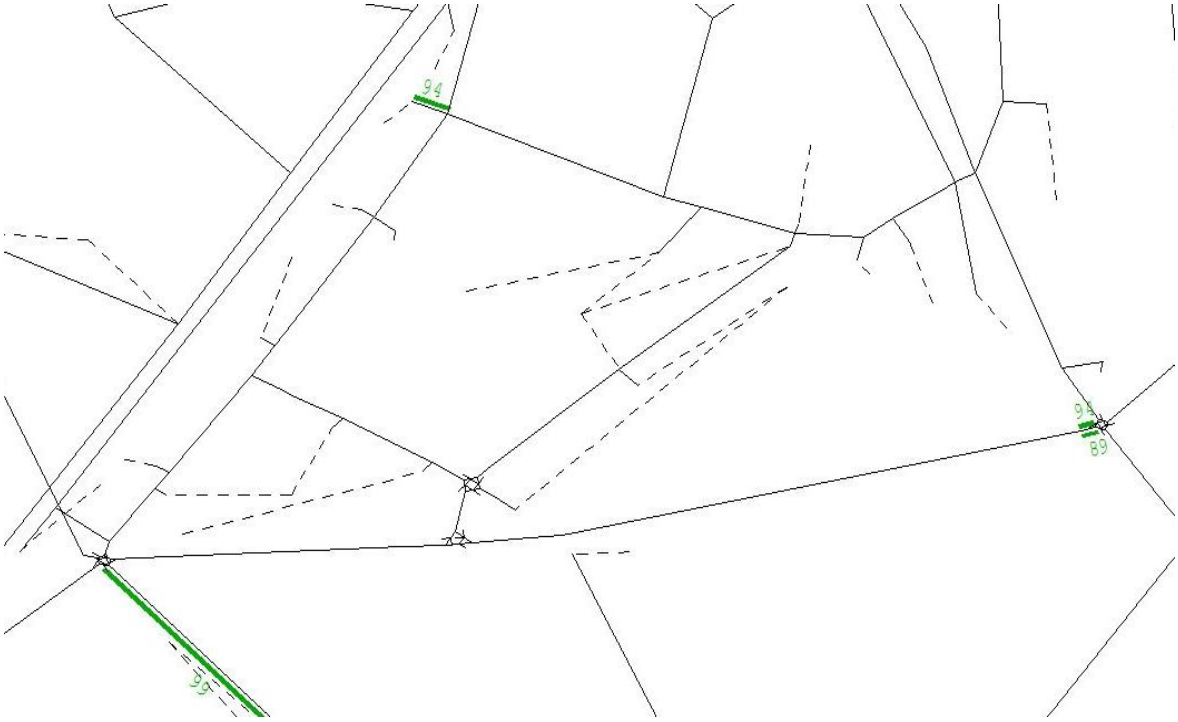

Figure 5.30: Option 4 – RFC 2031 (AM)

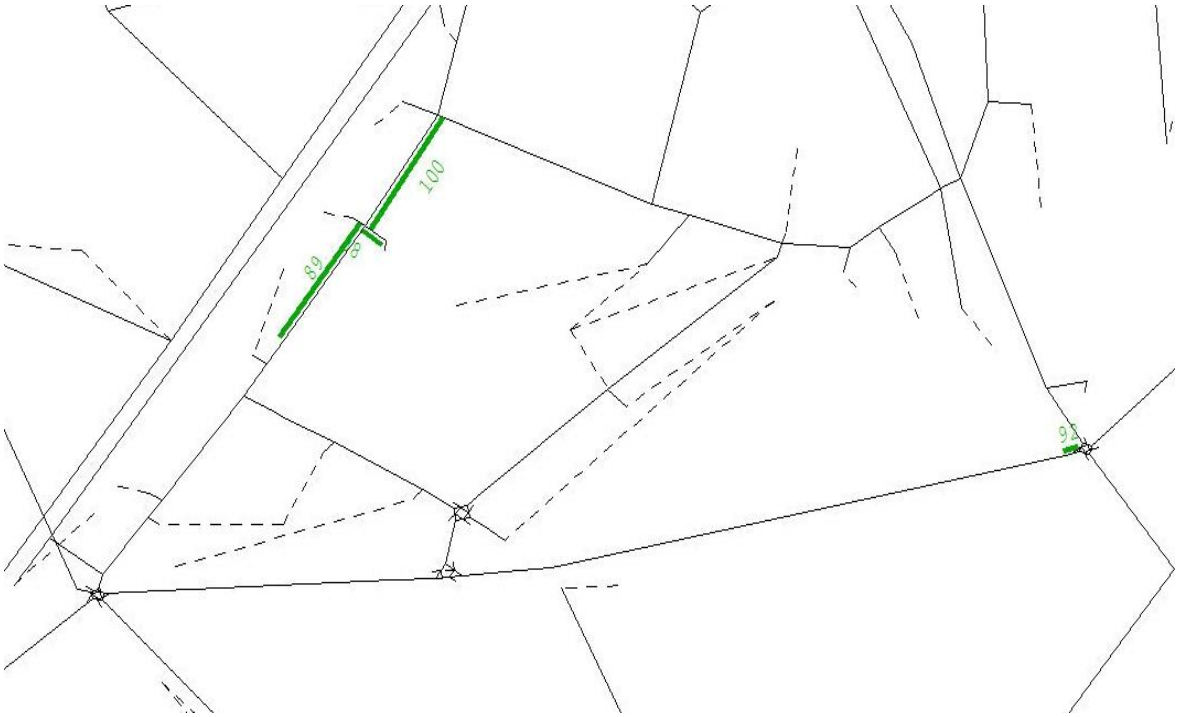

Figure 5.31: Option 4 – RFC 2031 (PM)

The Option 4 scenario indicates that additional capacity works would need to be undertaken on Cromwell Road between New Bridge Lane and Weasenham Lane and at the Cromwell Road and Elm High Road roundabouts.

Table 5.10 below, shows the network wide statistic from the model for Option 4 (a comparison of all options is shown at the end of this chapter).

Table 5.10: Option 4 – Network Wide Results

	2021 AM	2021 PM
Transient Queues (pcu hrs)	429.3	447.8
Over Capacity Queues (pcu hrs)	30.3	54.5
Total Travel Time (pcu hrs)	13149.2	11997.4
Total Travel Distance (pcu kms)	710035.7	637553.6
Average speed (kph)	54	53.1
	2026 AM	**2026 PM**
Transient Queues (pcu hrs)	518.8	529.7
Over Capacity Queues (pcu hrs)	92.7	73.4
Total Travel Time (pcu hrs)	14148	12837.4
Total Travel Distance (pcu kms)	756317.7	677938.1
Average speed (kph)	53.5	52.8
	2031 AM	**2031 PM**
Transient Queues (pcu hrs)	648.8	556.2
Over Capacity Queues (pcu hrs)	347.9	268
Total Travel Time (pcu hrs)	15522.3	13908.2
Total Travel Distance (pcu kms)	809259.5	724014.1
Average speed (kph)	52.1	52.1

As with all other scenarios, the Transient and Over Capacity Queues increase in each scenario tested.

Option 5a Results

Option 5a creates a connection between Boleness Road and New Bridge Lane, however New Bridge Lane is severed between development junctions 1 and 2 due to the railway line.

Figures 5.32 and 5.33 show the difference in delay between the Do Minimum scenario and Option 5a, where blue represents a reduction in delay resulting from Option 5a, and green represents an increase in delay resulting from Option 5a.

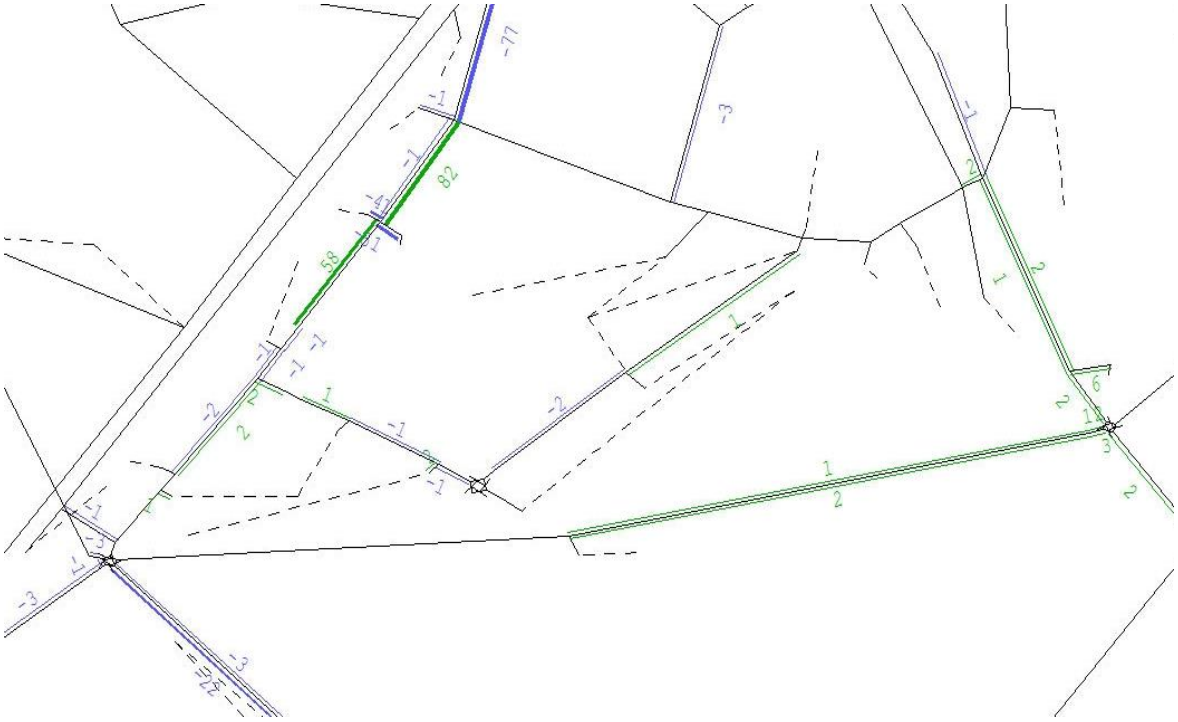

Figure 5.32: Option 5a vs Do Minimum – Comparison of Delay (sec) 2031 (AM)

When compared with the Do Minimum scenario there is a decrease in delay (77 seconds) on Cromwell Road southbound towards Weasenham Lane junction. However unlike the previous options there is now an increase (82 seconds) on Cromwell Road southbound away from Weasenham Lane junction.

There is an increase in delay (58 seconds) on Cromwell Road northbound heading from New Bridge Lane to Sandown Road. On the rest of the network area there is very little difference between the delays experienced in the AM Peak hour for Option 5a.

Figure 5.33 below shows the difference in delay between the Do Minimum scenario and Option 5a for the 2031 PM peak hour.

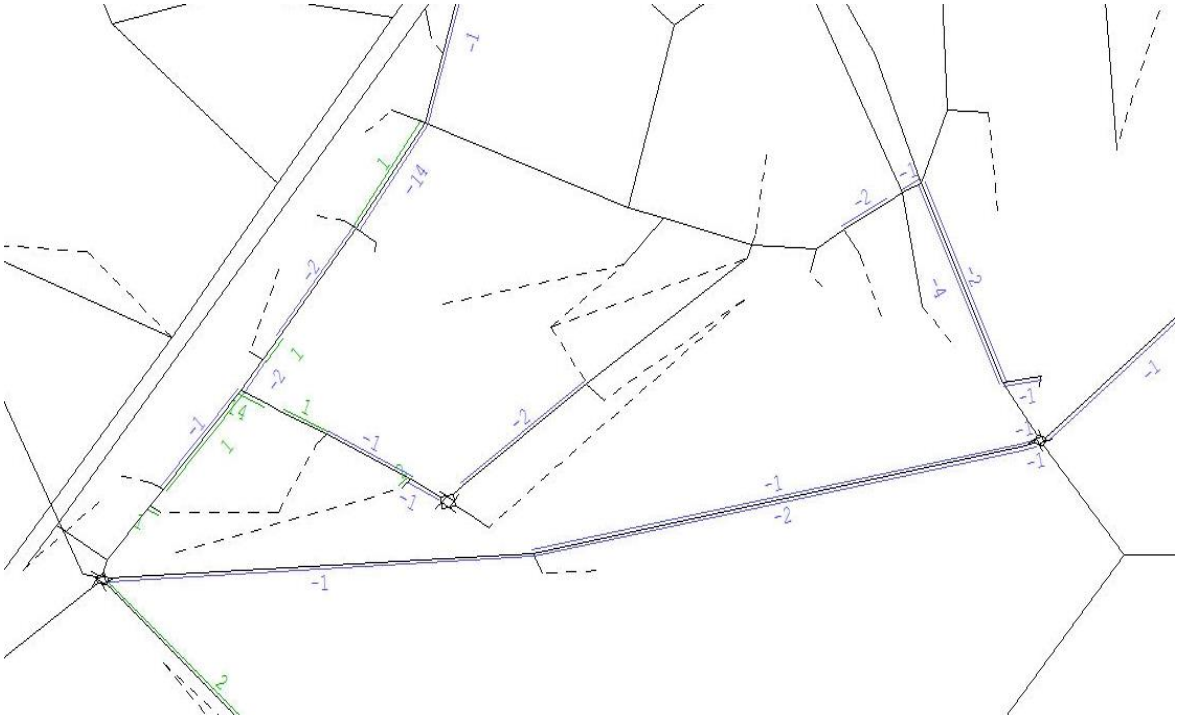

Figure 5.33: Option 5a vs Do Minimum – comparison of Delay (sec) 2031 (PM)

During the PM peak hour Option 5a shows much the same delay as that found in the Do Minimum scenario.

Additional works would need to take place on Cromwell Road, further to those that have already been highlighted for the previous options modelled.

The following table shows the RFC for Option 5a for the Southern Access Road and the surrounding network.

Table 5.11: RFC for Option 5a

Link		Direction	2021		2026		2031	
			AM	PM	AM	PM	AM	PM
Cromwell Road	Cromwell Road roundabout to Development Access	Northbound	53	41	57	45	54	48
		Southbound	23	29	24	32	22	39
	Development Access to New Bridge Lane	Northbound	48	37	50	41	47	45
		Southbound	31	35	34	37	30	42
	New Bridge Lane to Sandown Road	Northbound	73	74	79	81	99	90
		Southbound	50	50	53	51	47	62
	Sandown Road to Weasenham Lane	Northbound	59	55	60	59	57	64
		Southbound	77	102	72	106	101	101
Weasenham Lane	Cromwell Road to Sandall Road	Eastbound	30	19	32	20	33	27
		Westbound	41	61	46	60	42	83
	Sandall Road to Algores Way	Eastbound	38	18	41	20	44	26
		Westbound	40	31	44	36	47	42
	Algores Way to Boleness Road	Eastbound	29	21	35	22	44	29
		Westbound	18	10	20	13	21	18

Southern Access Road	Cromwell Road to Access Junction 1	Eastbound	20	10	21	9	19	11
		Westbound	19	24	20	24	20	28
	Access Junction 1 to Access Junction 2	Eastbound	0	0	0	0	0	0
		Westbound	0	0	0	0	0	0
	Access Junction 2 to Junction 3	Eastbound	0	0	0	1	1	3
		Westbound	0	0	2	1	7	2
	Junction 3 to Development Access	Eastbound	0	0	0	0	0	0
		Westbound	0	0	0	0	0	0
	Junction 3 to Junction 4	Northbound	0	0	1	3	3	8
		Southbound	0	0	1	0	4	1
	Junction 4 to Weasenham Lane	Northbound	21	22	26	32	36	50
		Southbound	33	15	47	19	68	24
Weasenham Lane	Boleness Road Junction to New Drove Junction	Eastbound	22	36	24	39	28	45
		Westbound	39	24	43	25	50	24
	New Drove Junction to Elm Road Junction	Eastbound	53	75	59	80	68	91
		Westbound	60	34	69	37	80	37
	Elm Road Junction to Elm High Road Junction	Eastbound	28	34	33	38	38	40
		Westbound	44	26	57	29	66	30
Elm High Road	Weasenham Lane Junction to Morrisons	Northbound	62	71	72	74	82	81
		Southbound	57	82	73	87	89	86
	Morrisons to Elm High Road Roundabout	Northbound	67	44	73	49	83	49
		Southbound	37	56	49	61	60	65
A47	Elm High Road roundabout to Cromwell Road roundabout	Eastbound	62	68	65	74	66	78
		Westbound	56	64	71	70	85	66

With the exception of Cromwell Road southbound from Weasenham Lane which operates over-capacity in all of the PM peak scenarios, all roads within the Southern Access Road and surrounding network operate within capacity.

The RFCs over 85% for the Southern Access Road and the surrounding network are shown in Figures 5.34 and 5.35 beneath for each of the peak hours.

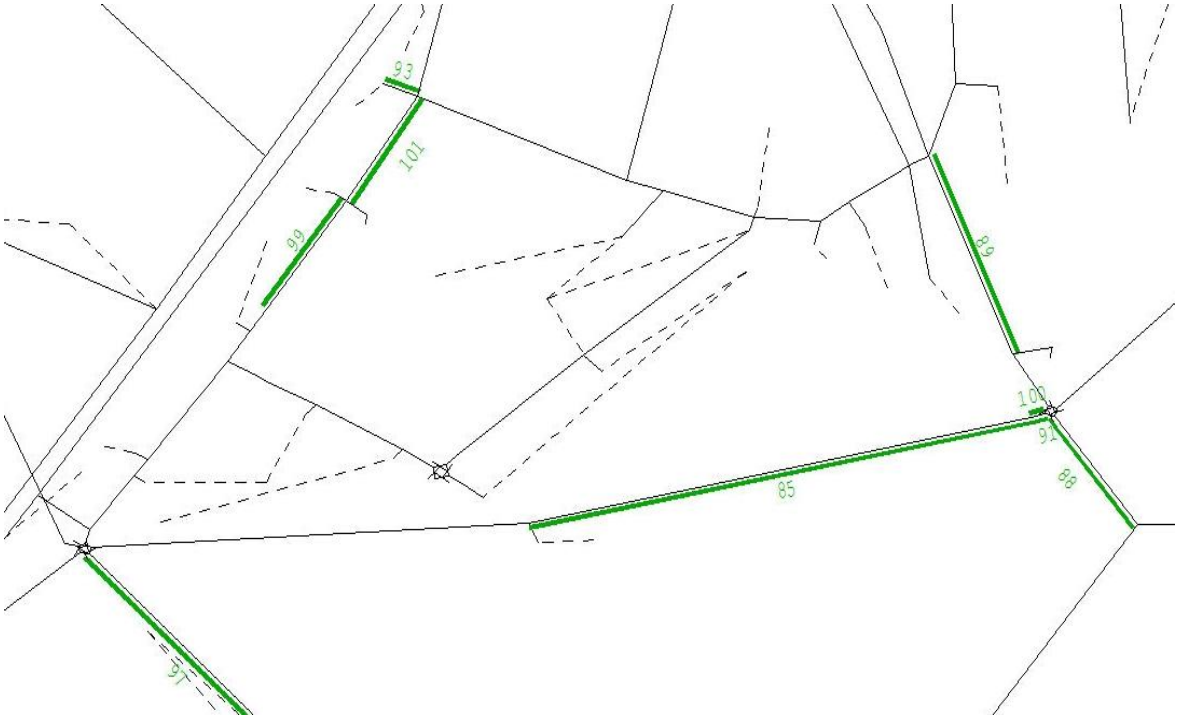

Figure 5.34: Option 5a – RFC 2031 (AM)

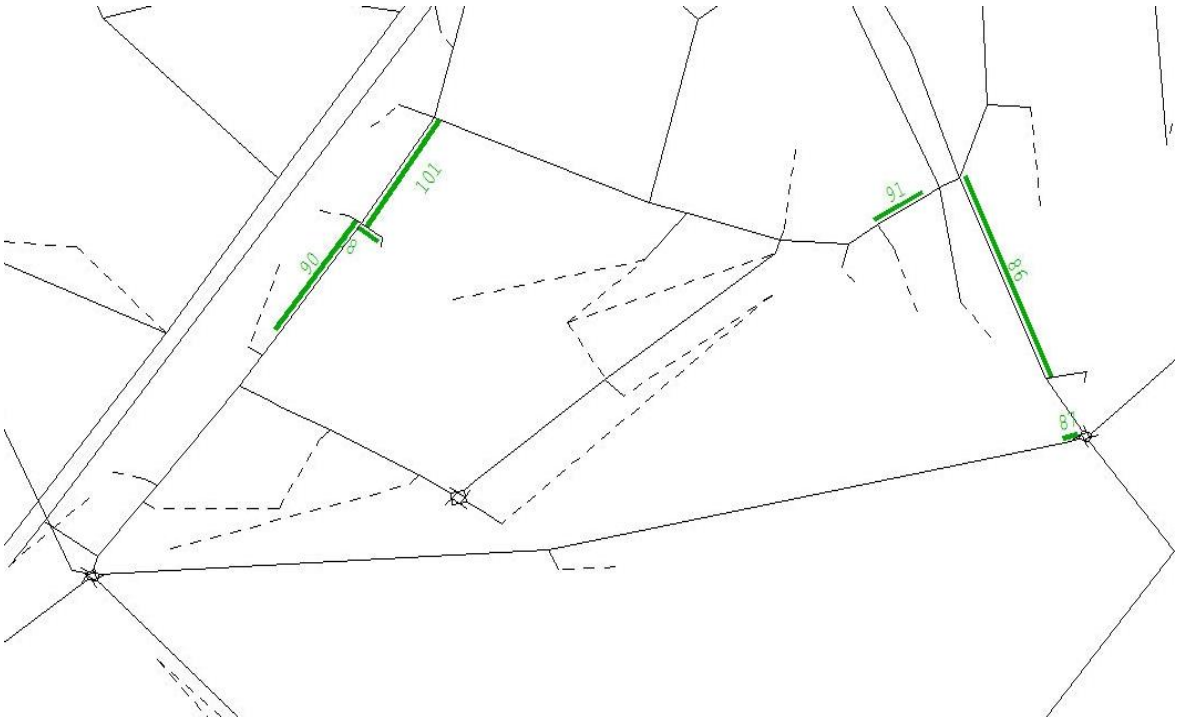

Figure 5.35: Option 5a – RFC 2031 (PM)

As with all the other scenarios tested, additional works would need to be undertaken on Cromwell Road and the roundabouts at Cromwell and Elm High Road. Unlike the other scenarios, additional works would also need to be undertaken on Elm High Road in both directions between Morrison's and Weasenham Lane to increase capacity.

Table 5.12 below, shows the network wide statistic from the model for Option 5a (a comparison of all options is shown at the end of this chapter).

Table 5.12: Option 5a – Network Wide Results

	2021 AM	2021 PM
Transient Queues (pcu hrs)	427	453.8
Over Capacity Queues (pcu hrs)	30.5	58.4
Total Travel Time (pcu hrs)	13149.7	12010.2
Total Travel Distance (pcu kms)	710063.3	637644.3
Average speed (kph)	54	53.1
	2026 AM	**2026 PM**
Transient Queues (pcu hrs)	523.6	534.3
Over Capacity Queues (pcu hrs)	89.2	90.6
Total Travel Time (pcu hrs)	14151.5	12864.2
Total Travel Distance (pcu kms)	756304.1	678126.7
Average speed (kph)	53.4	52.7
	2031 AM	**2031 PM**
Transient Queues (pcu hrs)	680	577.6
Over Capacity Queues (pcu hrs)	356.3	217
Total Travel Time (pcu hrs)	15570.6	13886.7
Total Travel Distance (pcu kms)	809586	724327.7
Average speed (kph)	52	52.2

As with all other scenarios, the Transient and Over Capacity Queues increase in each scenario tested.

Option 5b Results

Creates a connection between Boleness Road and the A47 via a new A47 Junction, New Bridge Lane is severed between development junctions 1 and 2 due to the railway line.

Figures 5.36 and 5.37 show the difference in delay between the Do Minimum scenario and Option 5b, where blue represents a reduction in delay resulting from Option 5b, and green represents an increase in delay resulting from Option 5b.

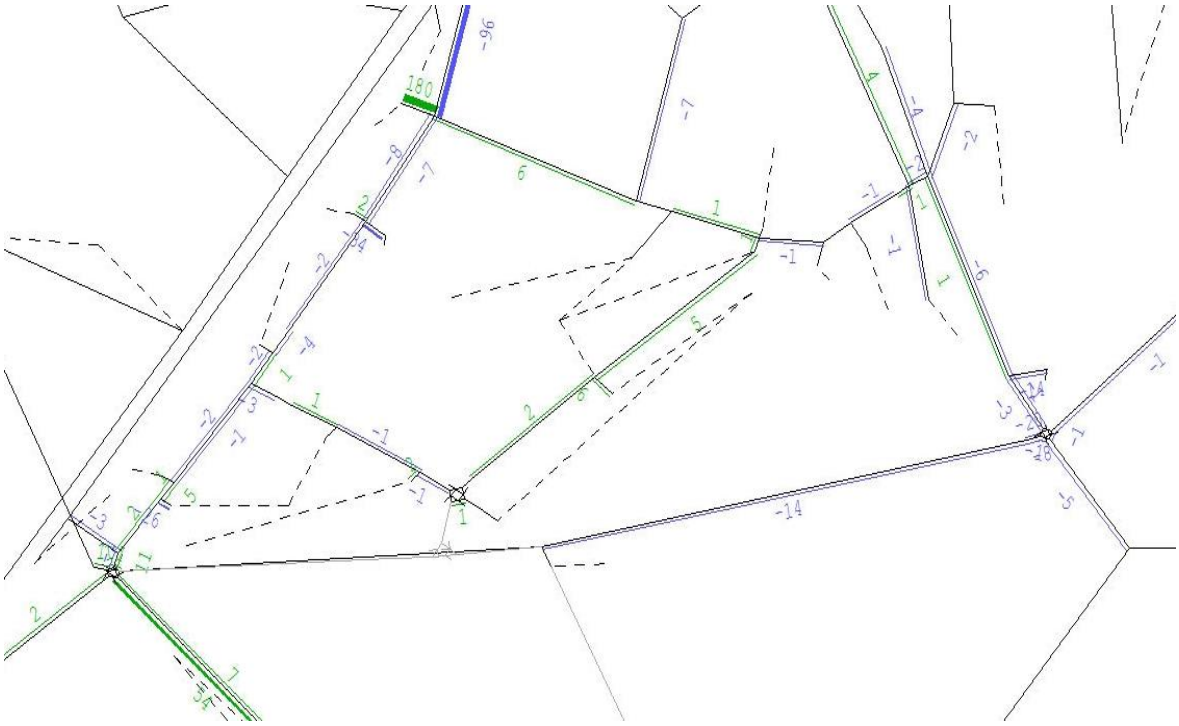

Figure 5.36: Option 5b vs Do Minimum – comparison of Delay (sec) 2031 (AM)

Option 5b shows some decrease in delay (96 seconds) compared to the Do Minimum scenario for Cromwell Road southbound towards the Weasenham Lane junction. Overall there are minimal decreases in delay across the majority of the highlighted network when compared with the Do Minimum scenario delay.

Figure 5.37 below shows the difference in delay between the Do Minimum scenario and Option 5b for the 2031 PM peak hour.

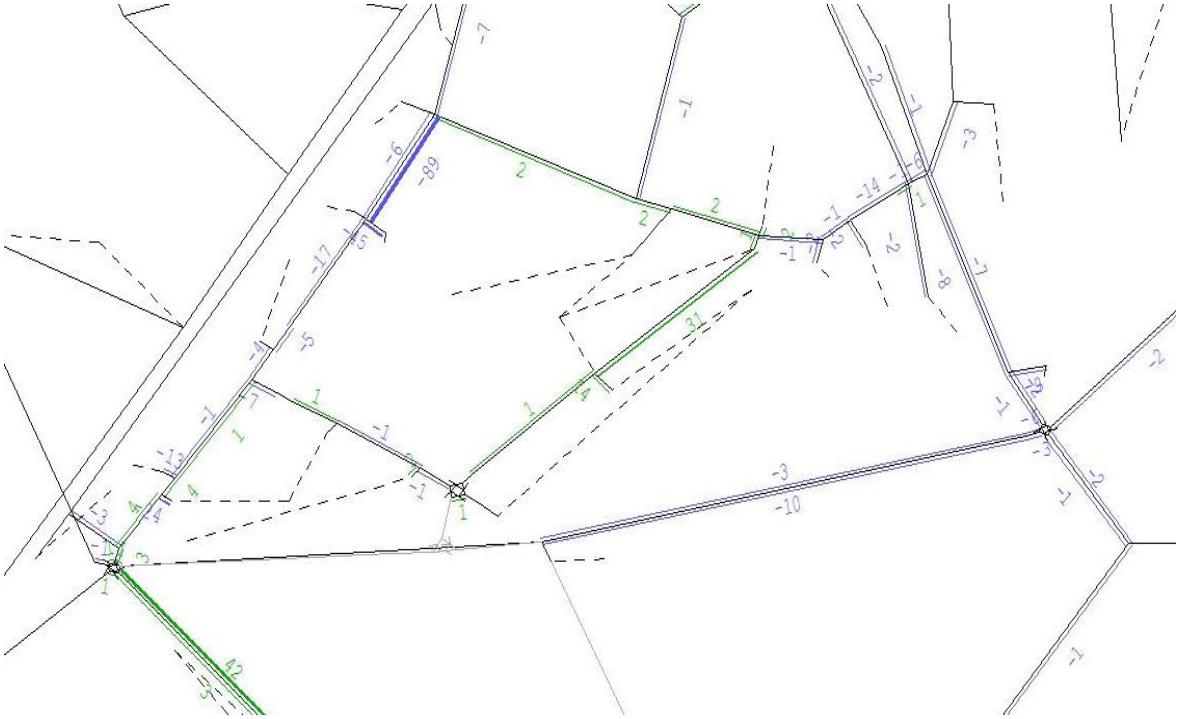

Figure 5.37: Option 5b vs Do Minimum – comparison of Delay (sec) 2031 PM

During the PM peak hour Option 5b shows much the same reductions in delay against the Do Minimum scenario as the other options 1-4.

The following table shows the RFC for Option 5b for the Southern Access Road and the surrounding network.

Table 5.13: RFC for Option 5b

Link		Direction	2021		2026		2031	
			AM	PM	AM	PM	AM	PM
Cromwell Road	Cromwell Road roundabout to Development Access	Northbound	30	22	33	23	33	29
		Southbound	21	18	26	20	27	23
	Development Access to New Bridge Lane	Northbound	26	19	27	21	26	24
		Southbound	25	18	31	20	32	22
	New Bridge Lane to Sandown Road	Northbound	49	46	51	48	51	57
		Southbound	43	30	51	32	52	38
	Sandown Road to Weasenham Lane	Northbound	39	44	40	46	39	45
		Southbound	53	56	62	60	63	72
Weasenham Lane	Cromwell Road to Sandall Road	Eastbound	8	6	9	7	9	11
		Westbound	28	19	35	26	37	34
	Sandall Road to Algores Way	Eastbound	21	15	22	16	23	18
		Westbound	41	29	46	32	46	34
	Algores Way to Boleness Road	Eastbound	20	29	23	31	27	31
		Westbound	21	12	24	13	24	15
Southern Access	Cromwell Road to Access Junction 1	Eastbound	20	10	20	11	19	11
		Westbound	13	21	13	21	13	15
	Access Junction 1 to Access	Eastbound	0	0	0	0	0	0

	Junction 2	Westbound	0	0	0	0	0	0
	Access Junction 2 to Junction 3	Eastbound	0	0	0	1	1	3
		Westbound	0	0	2	1	6	2
	Junction 3 to Development Access	Eastbound	3	3	5	3	8	5
		Westbound	1	1	1	3	2	6
	Junction 3 to Junction 4	Northbound	62	42	64	45	64	53
		Southbound	10	27	12	28	15	28
	Junction 4 to Weasenham Lane	Northbound	67	56	71	64	74	77
		Southbound	44	89	55	93	71	93
Weasenham Lane	Boleness Road Junction to New Drove Junction	Eastbound	23	31	24	37	26	42
		Westbound	35	28	42	31	48	28
	New Drove Junction to Elm Road Junction	Eastbound	53	62	57	71	63	78
		Westbound	58	40	70	46	82	42
	Elm Road Junction to Elm High Road Junction	Eastbound	28	27	31	30	35	36
		Westbound	44	30	56	33	65	33
Elm High Road	Weasenham Lane Junction to Morrisons	Northbound	60	70	69	75	77	74
		Southbound	46	58	53	65	63	67
	Morrisons to Elm High Road Roundabout	Northbound	55	38	62	43	69	44
		Southbound	29	38	35	45	41	49
A47	Elm High Road roundabout to New A47 Roundabout	Eastbound	59	63	62	71	64	74
		Westbound	48	45	57	49	70	51
	New A47 Roundabout to Cromwell Road Roundabout	Eastbound	60	56	62	61	62	64
		Westbound	60	86	70	93	81	96

The RFCs for option 5b indicate all roads operating within capacity.

The RFCs over 85% for the Southern Access Road and the surrounding network are shown in Figures 5.38 and 5.39 beneath for each of the peak hours.

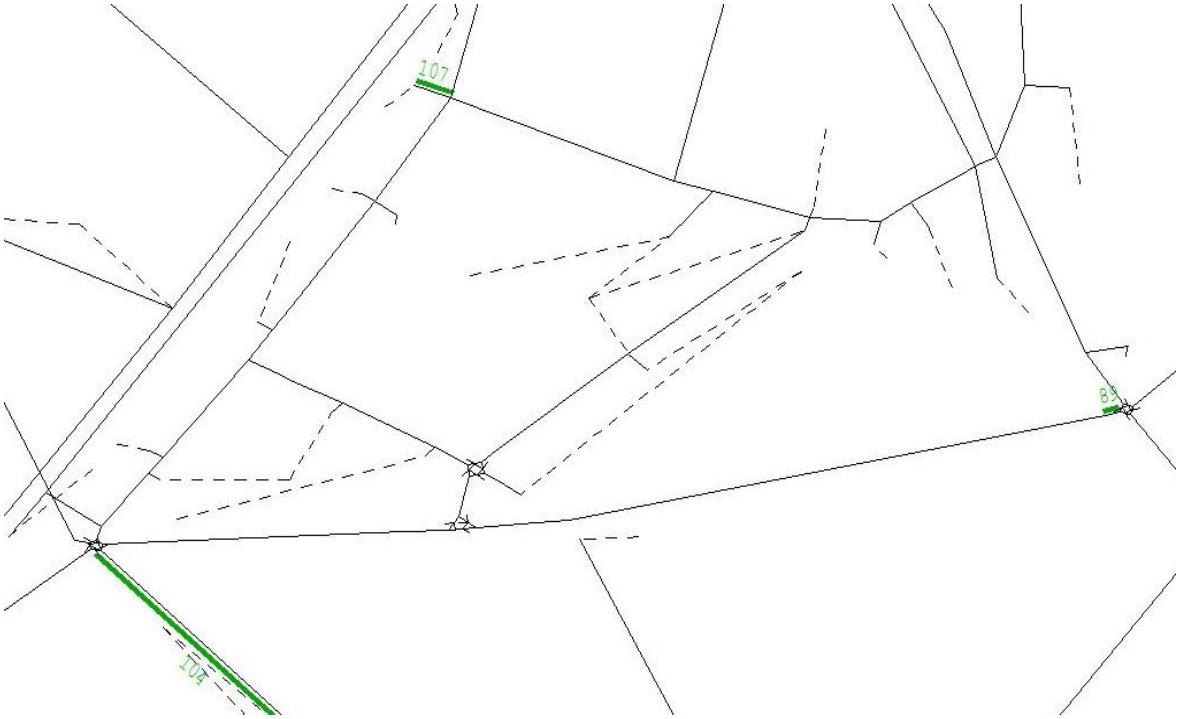

Figure 5.38: Option 5b – RFC 2031 (AM)

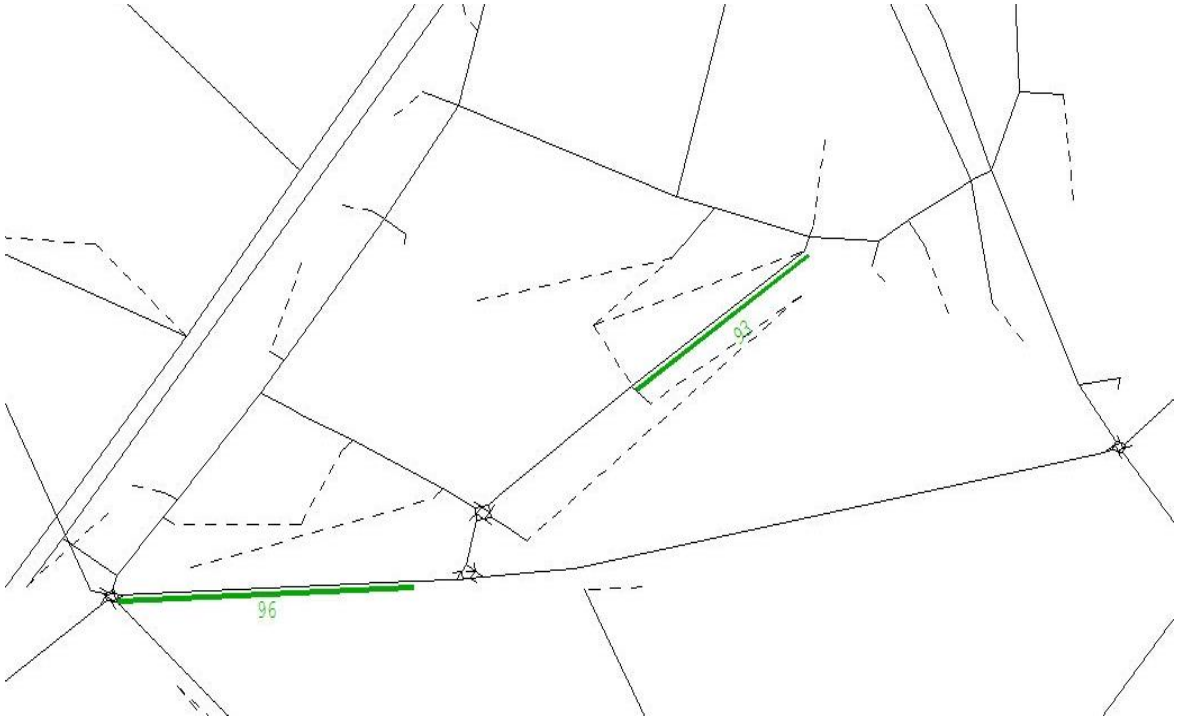

Figure 5.39: Option 5b – RFC 2031 (PM)

Table 5.14 below, shows the network wide statistic from the model for Option 5b (a comparison of all options is shown at the end of this chapter).

Table 5.14: Option 5b – Network Wide Results

	2021 AM	2021 PM
Transient Queues (pcu hrs)	416.2	412
Over Capacity Queues (pcu hrs)	30	47.2
Total Travel Time (pcu hrs)	13125.9	11946.1
Total Travel Distance (pcu kms)	709723.2	637083.1
Average speed (kph)	54.1	53.3
	2026 AM	**2026 PM**
Transient Queues (pcu hrs)	507	480.9
Over Capacity Queues (pcu hrs)	92.5	56.6
Total Travel Time (pcu hrs)	14125	12762.3
Total Travel Distance (pcu kms)	755894.9	677362.4
Average speed (kph)	53.5	53.1
	2031 AM	**2031 PM**
Transient Queues (pcu hrs)	632.7	522
Over Capacity Queues (pcu hrs)	402.7	204
Total Travel Time (pcu hrs)	15548	13802
Total Travel Distance (pcu kms)	808774.8	723492.3
Average speed (kph)	52	52.4

As with all other scenarios, the Transient and Over Capacity Queues increase in each scenario tested.

Option Assessment Summary

The table on the following page provides a comparison of the network wide statistics for each of the options assessed.

For each measure and scenario, the optimum performing option is shown in blue.

Table 5.15 shows that Option 2 is generally the best performing option on a network wide level, especially on the measure of Over Capacity Queues which represents delay generated links and junction which are over capacity.

Table 5.15: Network Wide Results – Option Comparison

	2021													
	AM							PM						
	DM	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5a**	**Option 5b**	**DM**	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5a**	**Option 5b**
Transient Queues (pcu hrs)	424.6	426	414.5	414.3	429.3	427	416.2	456.1	426	407.3	411	447.8	453.8	412
Over Capacity Queues (pcu hrs)	30.3	29.8	28.3	29.3	30.3	30.5	30	58.2	49.3	49.2	47.3	54.5	58.4	47.2
Total Travel Time (pcu hrs)	13147.1	13142.1	13121.9	13123.4	13149.2	13149.7	13125.9	12012	11967.7	11942.8	11944.9	11997.4	12010.2	11946.1
Total Travel Distance (pcu kms)	710070.5	709795.8	709675.1	709720.5	710035.7	710063.3	709723.2	637633.9	637272.8	636995.4	637075	637553.6	637644.3	637083.1
Average speed (kph)	54	54	54.1	54.1	54	54	54.1	53.1	53.2	53.3	53.3	53.1	53.1	53.3
	2026													
	AM							PM						
	DM	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5a**	**Option 5b**	**DM**	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5a**	**Option 5b**
Transient Queues (pcu hrs)	524.6	514.3	502.6	509.3	518.8	523.6	507	535.6	499.7	477.3	480.2	529.7	534.3	480.9
Over Capacity Queues (pcu hrs)	88.6	89	112.5	97.1	92.7	89.2	92.5	90.1	57.1	58.6	58.3	73.4	90.6	56.6
Total Travel Time (pcu hrs)	14152.1	14137.4	14139.5	14131.5	14148	14151.5	14125	12864.9	12788.4	12760.6	12763.6	12837.4	12864.2	12762.3
Total Travel Distance (pcu kms)	756314.7	756081.8	755847.6	755889	756317.7	756304.1	755894.9	678123.6	677642.8	677287.4	677376.1	677938.1	678126.7	677362.4
Average speed (kph)	53.4	53.5	53.5	53.5	53.5	53.4	53.5	52.7	53	53.1	53.1	52.8	52.7	53.1
	2031													
	AM							PM						
	DM	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5a**	**Option 5b**	**DM**	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5a**	**Option 5b**
Transient Queues (pcu hrs)	655.6	646.8	629.4	635.2	648.8	680	632.7	583.9	548.2	519.6	523.1	556.2	577.6	522
Over Capacity Queues (pcu hrs)	376.7	339.8	411.3	404.4	347.9	356.3	402.7	209.3	196.3	357	209.5	268	217	204
Total Travel Time (pcu hrs)	15561	15508.7	15552.7	15553	15522.3	15570.6	15548	13885.6	13826.7	13951.9	13808.4	13908.2	13886.7	13802
Total Travel Distance (pcu kms)	809427.4	808935.8	808757.1	808815.8	809259.5	809586	808774.8	724372	723756.1	723421.8	723485	724014.1	724327.7	723492.3
Average speed (kph)	52	52.2	52	52	52.1	52	52	52.2	52.3	51.9	52.4	52.1	52.2	52.4

Preferred Option

From the results obtained from the modelling assessment, it is apparent that all options operate satisfactorily and could be implemented as the Southern Access Road. However these options are dependent on various other schemes taking place on the network surrounding the Southern Access road, most notably at Elm High Road roundabout, Elm High Road / Weasenham Lane junction and Cromwell Road/Weasenham Lane junction.

Due to the fact that the Southern Access Road options are dependent on other schemes, both options 1 and 2 are to be progressed to the package modelling phase. At this phase options 5a and 5b will also be included to provide evidence and assessment of the impact a new railway line between Wisbech and March would have on the local road network around the Wisbech South Development.

6 Concept Highway Design

Introduction

This chapter outlines the Concept Highway Design and cost- estimate for the preferred options identified within this report. The chapter includes:

- Design Assumptions and Input decisions;
- Concept Design Drawings;
- STATS Review, and;
- Road Safety Review.

Preferred Option

The schemes within the Wisbech Access Study have been designed to concept design level. Designs are based on national and local highway standards, and make clear reference where departures from standards are proposed. Any further level of design would require highway surveys, including topographical surveys.

Scheme designs have been informed by an initial STATs search, to identify if any public utilities would be affected by the scheme which may compromise scheme delivery.

As identified within the previous chapter, **Options 1, 2, 5a and 5b** have been progressed to the concept design stage of the Wisbech Access Study. The descriptions below provide a summary of the junctions included within each option:

- CR2 – Signalised junction with Cromwell Road (as reported in the Cromwell Road Report);
- Access Junction 1 – Four arm priority junction;
- Access Junction 2 – Four arm roundabout, providing access from New Bridge Lane into Phase 3 of the Development;
- Access Junction 3 – Four arm roundabout between New Bridge Lane, Boleness Road, Phase 3 of the Development and the A47;
- Junction 4 – Priority junction between Boleness Road and the Phase 3 of the Development, and;
- New A47 Junction (South) – Three arm roundabout, connecting the Southern Access Road to the A47.

Design Assumptions and Input Decisions

All designs are concept designs based on Ordinance Survey mapping. Level information is unknown and therefore embankments / cuttings and footprints should be treated as indicative.

The scheme has been designed using Manual for Streets 1 & 2 alongside the Cambridgeshire Estate Road specification. Where the scheme is positioned on the A47 trunk road, the concept design has been developed in accordance with the Design Manual for Roads and Bridges (DMRB).

Scheme assumptions concerning geometric parameters of lane length and flare length alongside capacity decisions have been informed by the assessment work described earlier within this report.

The design assumes land take on either side of New Bridge Lane, alongside the removal of the left turn out on New Bridge Lane, south of the A47 trunk road as detailed in the 'New A47 Junction: South' Report.

Figures 6.1 on the following page shows the Concept Design for all four options.

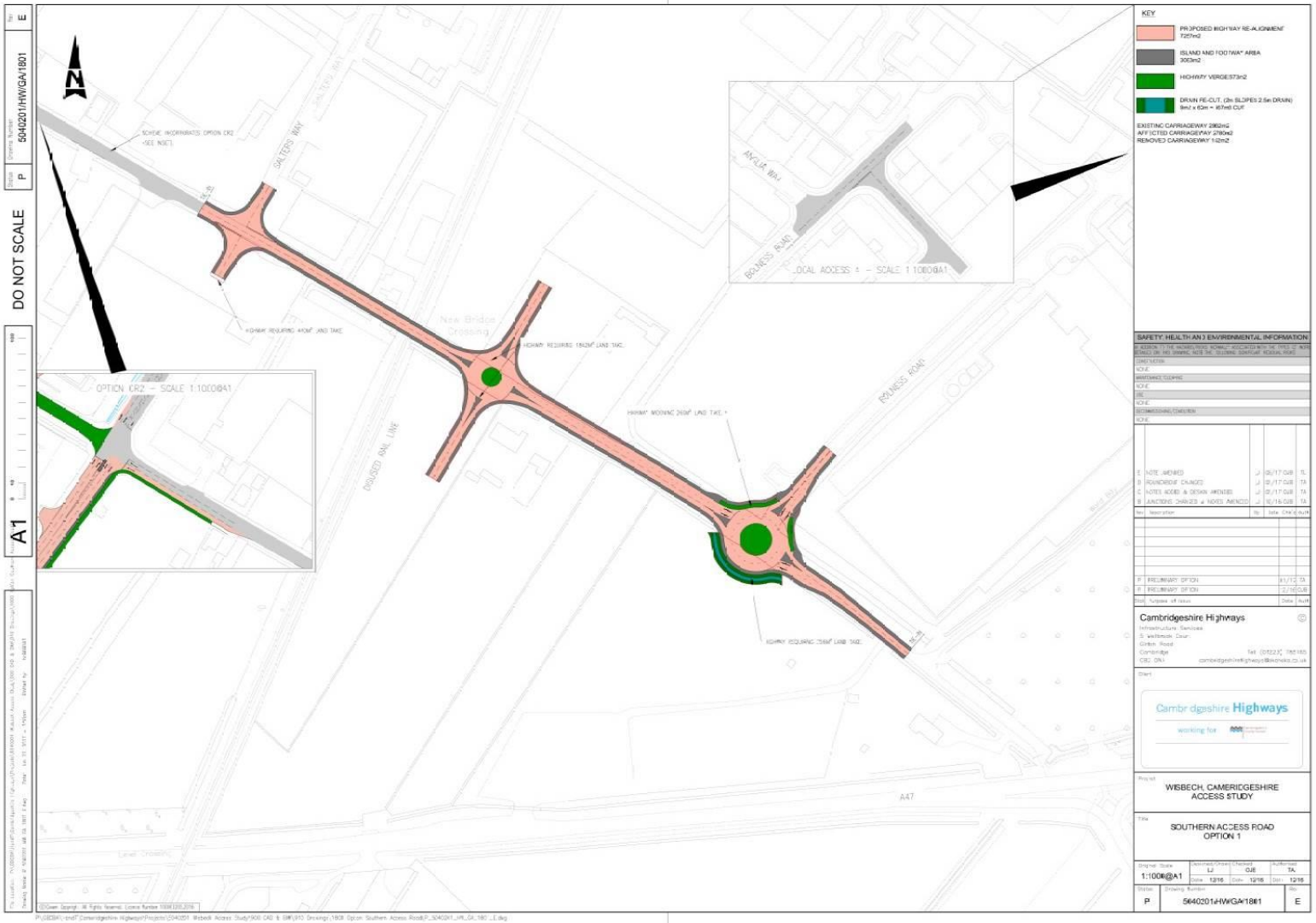

Figure 6.1: SAR 1 Concept Highway Design

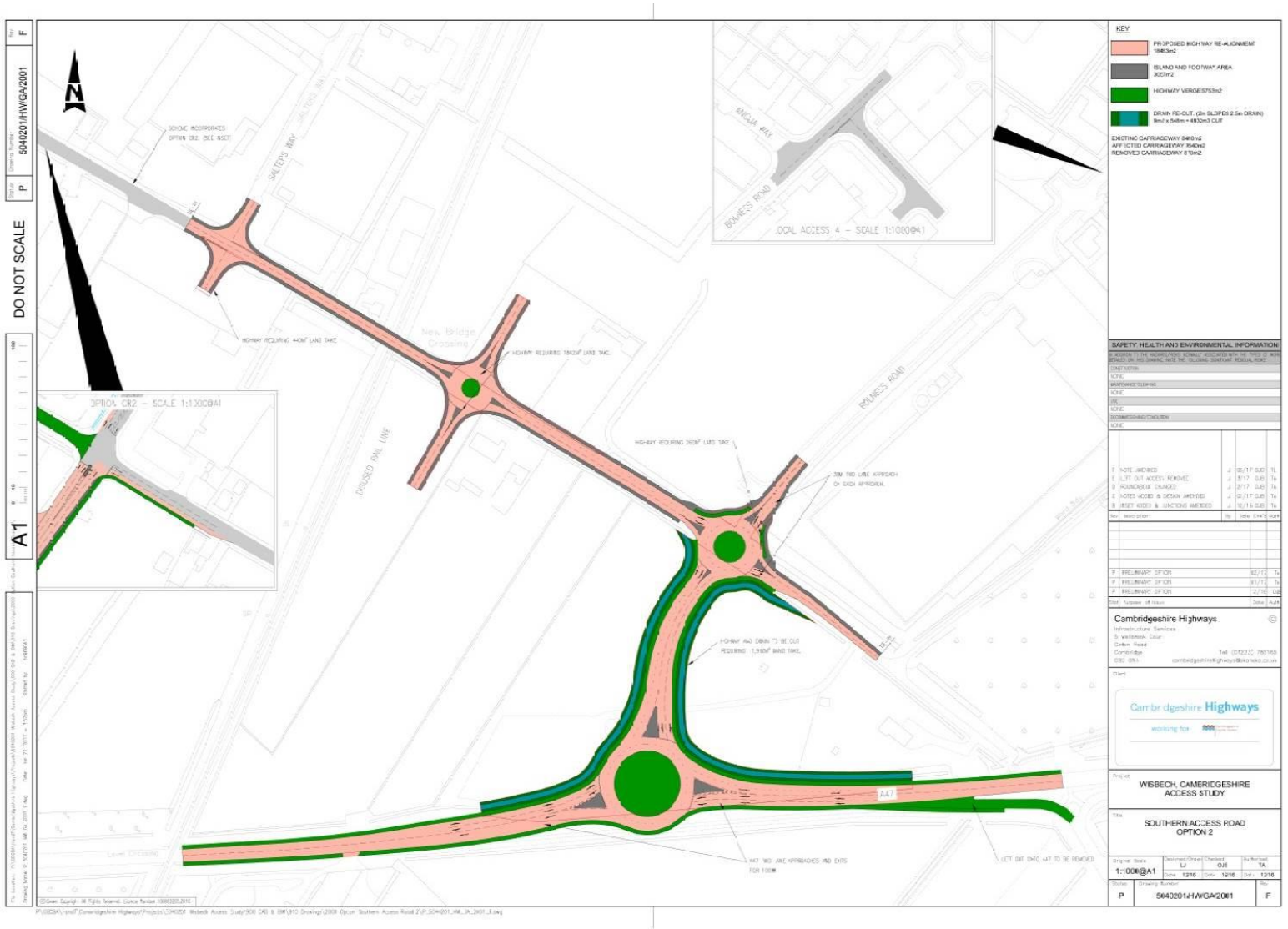

Figure 6.2: SAR 2 Concept Highway Design

Figure 6.3: SAR 5A Concept Highway Design

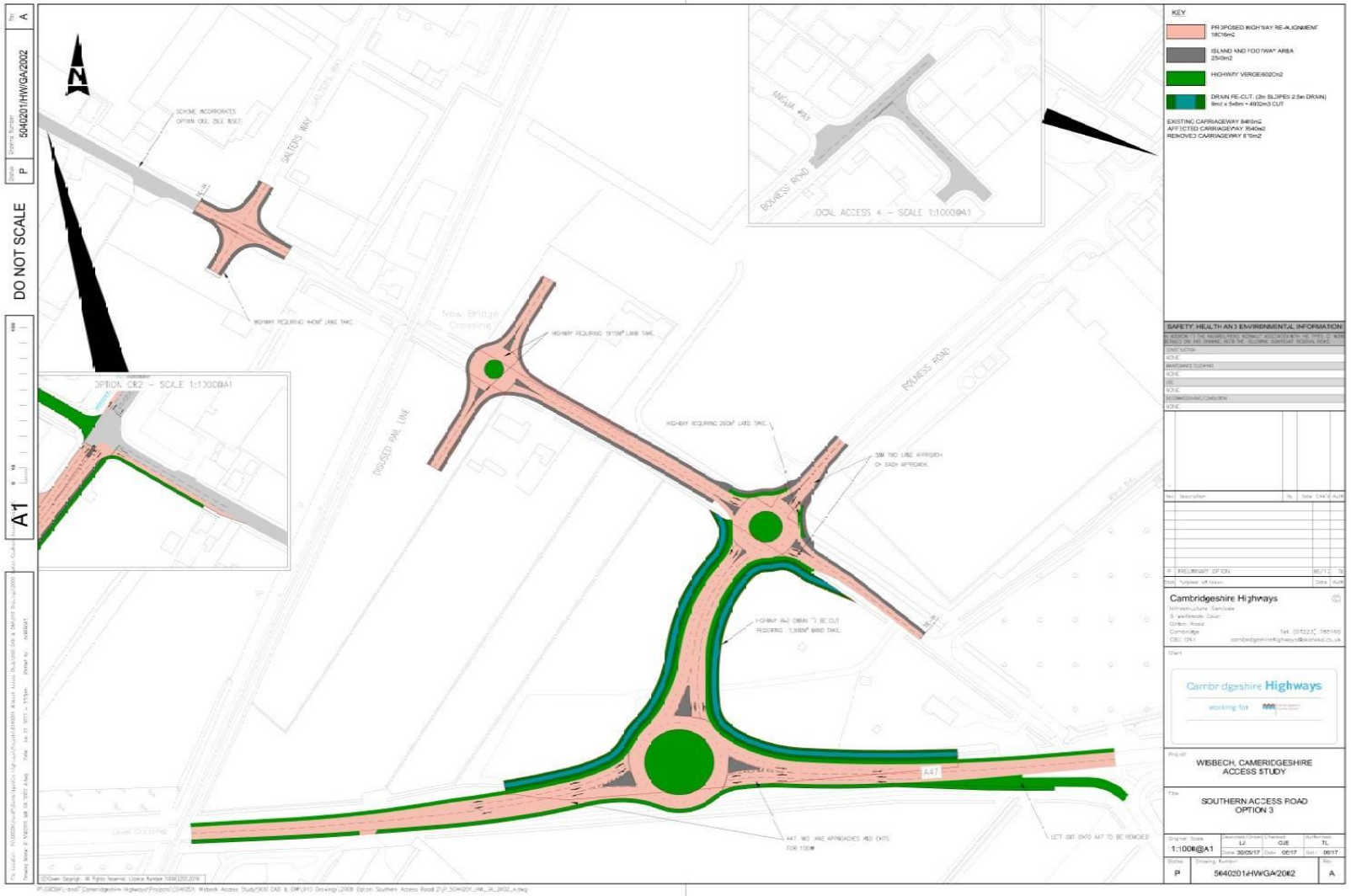

Figure 6.4: SAR 5B Concept Highway Design

STATS Review

As part of the concept design process, searches have been undertaken to determine whether any STATS exist within the vicinity of the proposed schemes. STATS refers to utilities or services which run beneath the surface of the road, for example:

- Electricity Cables;
- Gas Mains;
- Water Mains and sewers; and,
- Telecommunications Wires.

This information will be necessary for further design stages, including more detailed scheme cost estimates. The presence of STATS may also dictate amendments to a scheme design at a later point.

Table 6.1 and Figure 6.5 beneath shows the STATS present within the vicinity of the Southern Access Road.

The cells highlighted in blue within the table beneath indicate the STATS present for within this scheme location. STATs shown in Figure 6.5 are representative of all Southern Access Road schemes, despite the Figure showing SAR 1.

Table 6.1: STATs .Present at the A47 / Cromwell Road Roundabout

Anglian Water surface sewer (SWS)	Anglian Water portable water (AW)	Anglian Water foul sewer (Foul)	National Grid LP Gas Main (Gas LP)	National Grid MP Gas Main (Gas MP)
UKPN overhead electric (Elec OH)	UKPN underground electric (Elec UG)	Gas Main (Fulcrum MPG)	BT open reach underground Comms (BT)	Virgin Media underground Comms (VM)

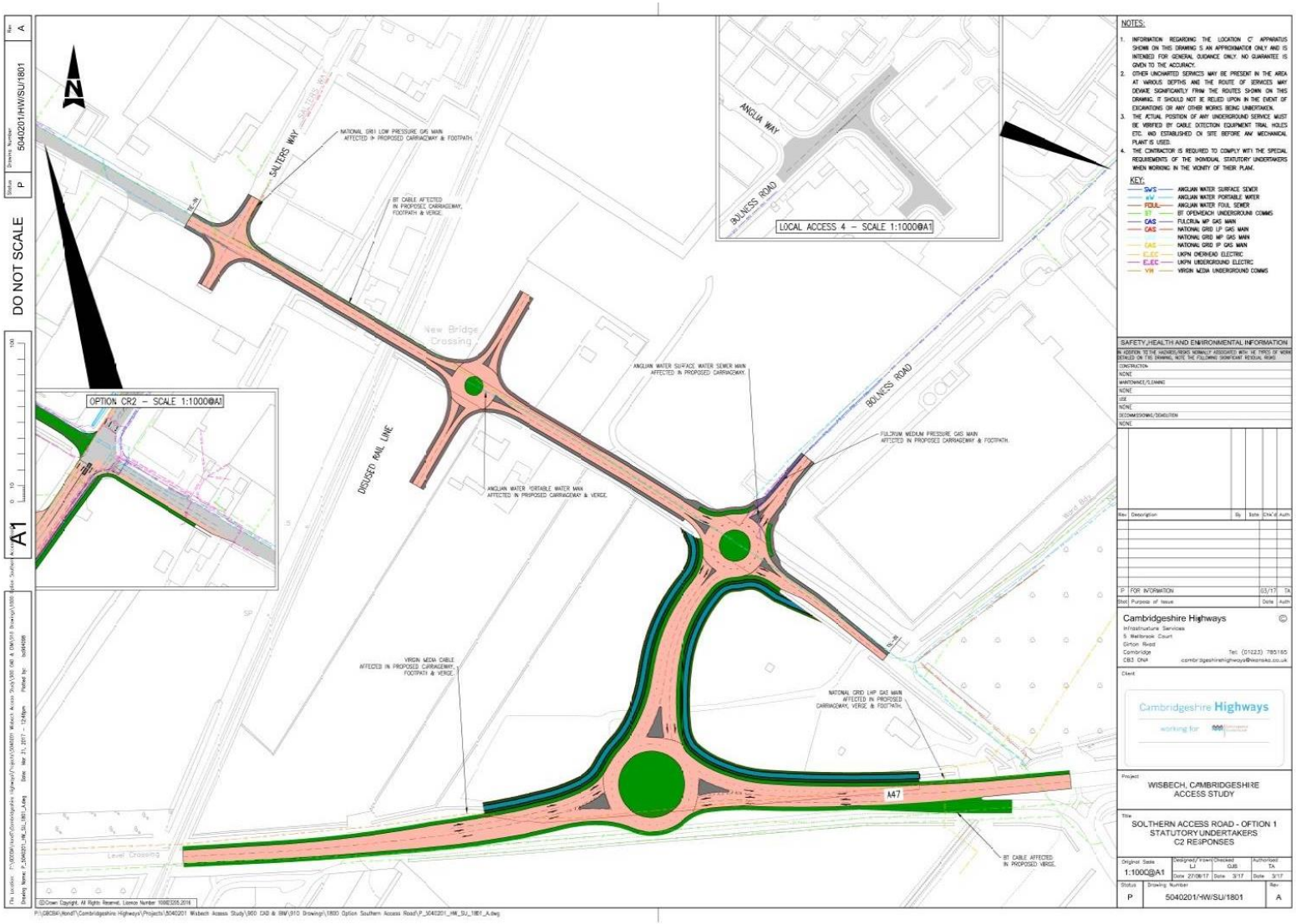

Figure 6.4: SAR Options STATS Plan

Road Safety Review

The Concept Designs have been subject to an initial Road Safety Review by Cambridgeshire County Council. The purpose of the Road Safety Review is to identify potential safety issues associated with the schemes prior to any further design phase, and in particular any that could compromise scheme deliverability.

Note that this does not constitute a formal Road Safety Audit, and is instead initial feedback based on the Concept Designs. It should also be noted that does it does not necessarily reflect the opinions Highways England, and any provision of a new junction onto the A47 would need to satisfy their Road Safety Requirements.

Comments from the Road Safety Review for a Southern Access Road are documented in Table 6.1 below. Comments within Table 6.1 covers all options therefore with and without an A47 junction.

Table 6.2: Road Safety Review for the Southern Access Road

Road Safety Feedback	Comment
This plans indicates that the junction opposite the northern end is to be closed off – this is not shown on any other plans.	Not applicable to the Southern Access Road Scheme.
Roundabouts are inherently unsafe for cyclists – if it can reasonably be expected that cyclists will use this route the footways should be designated as shared use and designed accordingly.	Roundabouts are required on capacity grounds, and the provision of shared space footpaths is difficult to the the presence of drainage ditches adjacent to New Bridge Lane. The road will be subject to a 30mph. There is also adequate scope for a comprehensive pedestrian and cyclist network beyond this scheme as part of the Wisbech South development proposals on either side of New Bridge Lane.
Three lanes are shown between the two roundabouts – there is potential for overtaking related accidents if north-westbound vehicles, motor cyclists may be particularly at risk.	This is required on capacity grounds. The road will be subject to a 30mph speed limit and the lanes will be marked for separate turning movements at the roundabout, so overtaking should not be an issue.
At the eastern roundabout each approach has two lanes, each exit is one lane. This has a high potential for accidents as both lanes of traffic are being directed to one exit.	Two lane approaches are required on capacity grounds. Consideration should be given to widening the exits and applying hatching as part of the detailed design phase.
There are properties in the vicinity of the roundabout – ensure safe access/egress for residents, visitors etc.	There is still insufficient detail from the development proposals to determine whether these properties will remain, however access arrangements can be considered further at the detailed design phase.
As above plus the merge length on the A47 is short increasing the likelihood of side swipe type accidents.	The merge length is in excess of 100 metres, and in line with the relevant design standards. The provision at this roundabout also represents a significant improvement on the existing roundabouts to either side.

Railway Line Concerns

Note: Despite proposals for a new railway line (to be positioned south of the town centre) being beyond the scope of the Wisbech Access Study, the impact and relationship on schemes included within the study have been considered.

Railway line proposals will directly impact both the form and operation of the Southern Access Road, as indicated below:

Southern Access Road– If the railway line is implemented to the south of the town centre, the Southern Access Road joining New Bridge Lane and Boleness Road will be severed on New Bridge Lane (towards West of the site). A level crossing would be proposed for this location however the stopping time associated with the crossing would impact the operation of the east –west route and therefore impede on the industrial and employment units planned for the South Wisbech Development site.

In knowledge of potential proposals of a railway line, the Wisbech Access Study has considered the impact of the railway severance, and has included 'with railway' and 'without railway' scenarios within the Southern Access Road scheme assessments.

Scheme Cost Estimate

It should be noted that although considered robust, these cost estimates are based on concept level designs, and may alter in the future subject to further information becoming available during later design stages.

The cost estimates include the following items:

- Drainage;
- Carriageway;
- Junctions;
- Footpaths;
- Street Lighting;
- Signing and Lining;
- Preliminaries, including design (10% const. cost) and supervision (20% const. cost);
- Traffic Management;
- Land purchase and compulsory purchase estimates;
- Demolition;
- Land Acquisition; and,
- Optimism Bias @ 45%.

The cost estimates exclude the following items:

- Services Diversions;
- Contaminated Land Treatment; and,
- Local Planning Fees.

Land Acquisition and Demolition Costs

The following costs have been applied where land acquisition or demolition is required by a scheme. These costs are considered relevant to the location of the schemes and are derived from experience of other similar schemes within the region.

- Land Acquisition – Agricultural £37, 500 per hectare;
- Land Acquisition – Urban / Built £125,000 per hectare;
- Compulsory Purchase Order – Dwelling £277,500 per dwelling, and;
- Demolition – £70m^2 or £7,500 per dwelling.

Optimism Bias

The scheme costs also include 45% optimism bias. This is an uplift that is applied to the final scheme cost in line with DfT guidance on preparing scheme cost estimates. The DfT describes optimism bias in their Web Tag Note 'A1.2 Scheme Costs' (November 2014) as:

'*Optimism bias is the demonstrated systematic tendency for appraisers to be overly optimistic about key parameters. Theorists on cost overrun suggest that optimism bias could be caused by the organisation of the decision-making process and strategic behaviour of stakeholders involved in the planning and decision-making processes.*

Different levels of optimism bias should be applied to scheme costs depending on the nature of the scheme (road, rail, ITS etc.) and how developed proposals or designs are. The schemes costed as part of the study are road schemes and are all at the first stage of scheme development. As a result of this an optimism bias of 45% is applied to the scheme costs.

The cost estimate for the scheme, including optimism bias are summarised in the table beneath. More detailed breakdowns of the costs are provided in Appendix A. Note that the cost assume the scheme is delivered in isolation, and do not reflect the potential cost savings that may be associated with delivering adjacent or overlapping schemes at the same time.

Table 6.3: Option 1 Scheme Cost Estimate

Road Safety Feedback	Comment
Land Acquisition	£158,237.50
Demolition	£0.00
Construction	£711,714.50
Design (10% of const. cost)	£61,040.95
Supervision, site facilities and site fences (20% of const. cost)	£122,081.90
Traffic management	£67,500.00
Sub Total	**£1,120,574.85**
Optimism bias (@45%)	£458,671.43
Total	**£1,579,246.28**

Table 6.4: Option 2 Scheme Cost Estimate

Road Safety Feedback	Comment
Land Acquisition	£158,237.50
Demolition	£0.00
Construction	£4,108,893.75
Design (10% of const. cost)	£410,889.38
Supervision, site facilities and site fences (20% of const. cost)	£821,778.75
Traffic management	£326,000.00
Sub Total	**£5,825,799.38**
Optimism bias (@45%)	£2,621,609.72
Total	**£8,447,409.09**

Table 6.5: Option 5a Scheme Cost Estimate

Road Safety Feedback	Comment
Land Acquisition	£158,237.50
Demolition	£0.00
Construction	£2,878,971.53
Design (10% of const. cost)	£287,897.15
Supervision, site facilities and site fences (20% of const. cost)	£575,794.31
Traffic management	£94,500.00
Sub Total	**£3,995,400.49**
Optimism bias (@45%)	£1,797,930.22
Total	**£5,793,330.71**

Table 6.6: Option 5b Scheme Cost Estimate

Road Safety Feedback	Comment
Land Acquisition	£158,237.50
Demolition	£0.00
Construction	£4,174,547.00
Design (10% of const. cost)	£417,454.70
Supervision, site facilities and site fences (20% of const. cost)	£834,909.40
Traffic management	£262,500.00
Sub Total	**£5,847,648.60**
Optimism bias (@45%)	£2,631,441.87
Total	**£8,479,090.47**

7 Summary

Skanska have been commissioned by Cambridgeshire County Council to undertake an assessment of options to provide a Southern Access Road to the South of the town centre. This assessment forms the first phase of the Wisbech Access Study.

The purpose of this scheme assessment is to determine the configuration and junction forms along a new east to west link that will be positioned through the South Wisbech Development Site. This scheme will facilitate growth stated within the Local Plan (2014) as well as aim to alleviate congestion from alternative routes.

This report has considered the existing conditions within the vicinity of the South Wisbech Development Site, including traffic flows at key junctions such as Cromwell Road / Weasenham Lane, Elm High Road / Weasenham Lane, Weasenham Lane / Boleness Road and Cromwell Road / New Bridge Lane. Existing congestion and delay at the A47 Cromwell Road and Elm High Road Roundabouts have also be assessed.

Additionally, accident data, flood risks, environmental considerations are also discussed within this report.

Development proposals for the South Wisbech development site are reported within Chapter 3 of this report, which draws attention to the development proposals and phasing of the site in accordance with the Broad Concept Plan (BCP). Forecast traffic flows either generated by or attracted to the development site are also explored.

Chapters four and five of this report provide commentary for the junction and configuration assessments for the Southern Access Road.

Within chapter four, the location and form of junctions that would facilitate the Southern Access Road have been determined. The location of these junctions were informed by the BCP which divides the Wisbech South Development into distinct land parcels. The four junction locations were identified as:

- **Access Junction 1** – New Bridge Lane / Salters Way / Development Access. This junction provides access to the Phase 1 development land to the south of New Bridge Lane and west of the disused railway line;
- **Access Junction 2** – New Bridge Lane / Development Access. This is an entirely new junction located to the east of the disused railway line to provide access to the western half of the Phase 3 development land, both north and south of New Bridge Lane;
- **Access Junction 3** – New Bridge Lane / Boleness Road / Development Access; and
- **Access Junction 4** – Boleness Road / Development Access. This basis of this junction already exists. This junction will provide a second point of access into the eastern half of the Phase 3 development land (east of Boleness Road).

To establish preferred junction forms (for locations above) all junctions were initially assessed as a priority junction, however upgraded to a roundabout if the initial priority junction assessments were shown to fail operationally, as indicated by an RFC greater than 100%.

The junction form assessment used the WATS (2008 base) as well as modelling software ARCADY and PICADY. The purpose of using the old WATS model for this assessment was based on the results informing the junction coding within the updated model.

Through using a series of model outputs including queue lengths, delay, ratio flow to capacity and LOS (Level of Service), the following junctions forms were progressed within the study:

- Junction 1 is a priority crossroads;
- Junction 2 is a roundabout;
- Junction 3 is roundabout (three or four arm dependant on the option); and,
- Junction 4 is a priority junction.

Once the location and form of the junctions required along the Southern Access Road had been identified, different options were devised for the configuration of the Southern Access Road, following a site visit which assessed the current level of infrastructure and required access for the BCP.

All of the options devised utilise New Bridge Lane and Boleness Road as the nucleus, but show different levels of connectivity between these roads and the wider network (including the A47).

Six options were assessed in total, each of which have been measured against a Do Minimum Scenario. The options were:

Do Minimum – This was used as a base scenario against which the performance of each of the options was assessed (and the benefits derived). The Do Minimum scenario has no physical connection between New Bridge Lane and Boleness Road. The Do Minimum scenario includes development traffic and the four junctions identified in the previous chapter to provide access into the development land parcels.

Option 1 – Creates a connection between New Bridge Lane and Boleness Road, including the four development junctions;

Option 2 – Creates a connection between New Bridge Lane and Boleness Road, as well as a connection onto the A47 via a new A47 Junction, also including the four development junctions;

Option 3 – Creates a connection between Boleness Road and the A47 via a new A47 Junction, but without a connection onto New Bridge Lane. Also including the four development junctions;

Option 4 – Creates a connection between New Bridge Lane and the A47 via a new A47 Junction, but without a connection onto Boleness Road. Also including the four development junctions. Note that the development land to the east of Boleness Road can still access New Bridge Lane and the A47 via Junction 3.

Option 5a – Creates a connection between Boleness Road and New Bridge Lane, however New Bridge Lane is severed between development junctions 1 and 2 due to the railway line; and,

Option 5b – Creates a connection between Boleness Road and the A47 via a new A47 Junction, New Bridge Lane is severed between development junctions 1 and 2 due to the railway line.

All options within Chapter 5 were assessed using the updated WATs model, and assessed against model outputs of delay, VC ratio, Transient queues, over capacity queues, total travel time, travel distance and average speed.

From the results obtained from the modelling assessment, it is apparent that all options operate satisfactorily and could be implemented as the Southern Access Road. However these options are dependent on various other schemes taking place on the network surrounding the Southern Access road, most notably at Elm High Road roundabout, Elm High Road / Weasenham Lane junction and Cromwell Road / Weasenham Lane junction.

Due to the fact that the Southern Access Road options are dependent on other schemes, both options 1 and 2 are to be progressed to the package modelling phase. At this phase options 5a and 5b will also be included to provide evidence and assessment of the impact a new railway line between Wisbech and March would have on the local road network around the Wisbech South Development.

The final chapter of this report shows the Concept Highway Design of the above options, including information of design assumptions, STAT review, road safety review and cost estimate.

Appendix A – Scheme Cost Summary

Wisbech Access Study
SAR2
Southern Acess Road

Highways Only

Construction Assumptions;

Carriageway	s/c	40	15.00	Footpath	25	12.00
	b/c	60	15.00		65	15.00
	rd b	200	40.00			
	sub base	450	37.5		260	25.00
	Capping la	520	40.00			
	terram& tsting		3.00			
		1270			350	
	exc & CA		35.00			30.00
			185.50			82.00

General Site Clearence	25590 m3	4.00	102,360.00
Exc & realign drainage ditch	4590 m3	55.00	252,450.00
Form new verge	5220 m2	35.00	182,700.00
BO exstg carriageway & reinstate	870 m2	55.00	47,850.00
Excavate & construct new carriageway areas	10942.5 m2	185.50	2,029,833.75
			-
Excavate & construct footway areas	3350 m2	82.00	274,700.00
			-
Plane & resurface carriageway	7540 m2	25.00	188,500.00
BO & replace kerbs	2000 m	120.00	240,000.00
			-
Carriageway kerbs	2000 m	33.00	66,000.00
			-
Alter existing junctions	3 item	35,000.00	105,000.00
			-
Carriageway drainage & alterations	1 allow	210,000.00	210,000.00
			-
Street lighting & alterations	1 allow	180,000.00	180,000.00
			-
Duct provision	1 alow	50,000.00	50,000.00
			-
Signs & lines	1 allow	52,000.00	52,000.00
			-
Surveys	1 item	60,000.00	60,000.00
			-
Landscaping	1 item	67,500.00	67,500.00
			4,108,893.75

Prelims

Land Acquisition	12659 m2	12.50	158,237.50
Demolition	m2		-
Design	10%		410,889.38
Staff, supervision, accommodation & Fees	20%		821,778.75
Traffic Management	24 weeks	5,250.00	126,000.00
Traffic Management on trunk road	20 weeks	10,000.00	200,000.00
			5,825,799.38
Add Contingency & Optimism Bias	45%		2,621,609.72
			8,447,409.09

Risks/Assumptions

Soil conditions (contamination etc) not covered
Vandalism
Assume drainage connects onto existing arterial SW.
Assumes street lights reconnected to existing supplies.
Assumes site cleared by others.
No allowance for new building

Assumes clear site.
Works carried out in one continuous visit

area of surfacing is re calculated to match scaled measure

SKANSKA

Wisbech Access Study 10/04/2017

SAR2
Southern Acess Road

Highways Only

Construction Assumptions;

Carriageway	s/c	40	15.00	Footpath	25	12.00	
	b/c	60	15.00		65	15.00	
	rd b	200	40.00				
	sub base	450	37.5		260	25.00	
	Capping la	520	40.00				
	terram& tsting		3.00				
		1270			350		
	exc & CA		35.00			30.00	
			185.50			82.00	

General Site Clearence	25590 m3	4.00	102,360.00	
Exc & realign drainage ditch	4590 m3	55.00	252,450.00	
Form new verge	5220 m2	35.00	182,700.00	
BO exstg carriageway & reinstate	870 m2	55.00	47,850.00	
Excavate & construct new carriageway areas	10942.5 m2	185.50	2,029,833.75	-
Excavate & construct footway areas	3350 m2	82.00	274,700.00	-
Plane & resurface carriageway	7540 m2	25.00	188,500.00	-
BO & replace kerbs	2000 m	120.00	240,000.00	-
Carriageway kerbs	2000 m	33.00	66,000.00	-
Alter existing junctions	3 item	35,000.00	105,000.00	-
Carriageway drainage & alterations	1 allow	210,000.00	210,000.00	-
Street lighting & alterations	1 allow	180,000.00	180,000.00	-
Duct provision	1 alow	50,000.00	50,000.00	-
Signs & lines	1 allow	52,000.00	52,000.00	-
Surveys	1 item	60,000.00	60,000.00	-
Landscaping	1 item	67,500.00	67,500.00	
			4,108,893.75	

Prelims

Land Acquisition	12659 m2	12.50	158,237.50	
Demolition	m2		-	
Design	10%		410,889.38	
Staff, supervision, accommodation & Fees	20%		821,778.75	
Traffic Management	24 weeks	5,250.00	126,000.00	
Traffic Management on trunk road	20 weeks	10,000.00	200,000.00	
			5,825,799.38	
Add Contingency & Optimism Bias	45%		2,621,609.72	
			8,447,409.09	

Risks/Assumptions

Soil conditions (contamination etc) not covered
Vandalism
Assume drainage connects onto existing arterial SW.
Assumes street lights reconnected to existing supplies.
Assumes site cleared by others.
No allowance for new building

Assumes clear site.
Works carried out in one continuous visit

area of surfacing is re calculated to match scaled measure

SKANSKA

Wisbech Access Study 27/07/2017

SAR5a

Southern Acess Road 5040201/HW/GA/2002

Southern Access Road without A 47 RAB

Construction Assumptions;

Carriageway	s/c	40	15.00	Footpath	25	12.00	
	b/c	60	15.00		65	15.00	
	rd b	200	40.00				
	sub base	450	37.5		260	25.00	
	Capping la	520	40.00				
	terram& tsting		3.00				
		1270			350		
	exc & CA		35.00			30.00	
			185.50			82.00	

General Site Clearence	19,944.60 m2	4.00	79,778.40	
Exc & realign drainage ditch	1152 m3	55.00	63,360.00	
Form new verge	3530 m2	35.00	123,550.00	
BO exstg carriageway & reinstate	261 m2	55.00	14,355.00	
Excavate & construct new carriageway areas	8645.4 m2	185.50	1,603,721.70	-
Excavate & construct footway areas	2305 m2	82.00	189,010.00	-
Plane & resurface carriageway	1,778.60 m2	25.00	44,465.00	-
BO & replace kerbs	644 m	120.00	77,280.00	-
Carriageway kerbs	1010 m	33.00	33,330.00	-
Alter existing junctions & Ped Crossings	7 item	35,000.00	245,000.00	-
Carriageway drainage & alterations	1 allow	100,314.29	100,314.29	-
Street lighting & alterations	1 allow	152,857.14	152,857.14	-
Duct provision	1 alow	41,250.00	41,250.00	-
Signs & lines	1 allow	48,200.00	48,200.00	-
Surveys	1 item	45,000.00	45,000.00	-
Landscaping	1 item	17,500.00	17,500.00	
			2,878,971.53	

Prelims

Land Acquisition	12659 m2	12.50	158,237.50
Demolition	m2		-
Design	10%		287,897.15
Staff, supervision, accommodation & Fees	20%		575,794.31
Traffic Management	18 weeks	5,250.00	94,500.00
			3,995,400.49
Add Contingency & Optimism Bias	45%		1,797,930.22
			5,793,330.71

Risks/Assumptions

Soil conditions (contamination etc) not covered
Assume drainage connects onto existing arterial SW.
Assumes street lights reconnected to existing supplies.

Assumes clear site.
Works carried out in one continuous visit

area of surfacing is re calculated to match scaled measure

SKANSKA

Wisbech Access Study 27/07/2017

SAR5b
Southern Acess Road 5040201/HW/GA/2002

Southern Access Road with A 47 RAB

Construction Assumptions;

Carriageway	s/c	40	15.00	Footpath	25	12.00	
	b/c	60	15.00		65	15.00	
	rd b	200	40.00				
	sub base	450	37.5		260	25.00	
	Capping la	520	40.00				
	terram& tsting		3.00				
		1270			350		
	exc & CA		35.00			30.00	
			185.50			82.00	

General Site Clearence	26576 m2	4.00	106,304.00	
Exc & realign drainage ditch	4932 m3	55.00	271,260.00	
Form new verge	6020 m2	35.00	210,700.00	
BO exstg carriageway & reinstate	870 m2	55.00	47,850.00	
Excavate & construct new carriageway areas	9606 m2	185.50	1,781,913.00	-
Excavate & construct footway areas	2540 m2	82.00	208,280.00	-
Plane & resurface carriageway	8410 m2	25.00	210,250.00	-
BO & replace kerbs	1570 m	120.00	188,400.00	-
Carriageway kerbs	1230 m	33.00	40,590.00	-
Alter existing junctions & Ped Crossings	12 item	35,000.00	420,000.00	-
Carriageway drainage & alterations	1 allow	164,200.00	164,200.00	-
Street lighting & alterations	1 allow	235,000.00	235,000.00	-
Duct provision	1 alow	70,000.00	70,000.00	-
Signs & lines	1 allow	97,300.00	97,300.00	-
Surveys	1 item	75,000.00	75,000.00	-
Landscaping	1 item	47,500.00	47,500.00	
			4,174,547.00	

Prelims

Land Acquisition	12659 m2	12.50	158,237.50	
Demolition	m2		-	
Design	10%		417,454.70	
Staff, supervision, accommodation & Fees	20%		834,909.40	
Traffic Management	30 weeks	8,750.00	262,500.00	
			5,847,648.60	
Add Contingency & Optimism Bias	45%		2,631,441.87	
			8,479,090.47	

Risks/Assumptions

Soil conditions (contamination etc) not covered
Assume drainage connects onto existing arterial SW.
Assumes street lights reconnected to existing supplies.

Assumes clear site.
Works carried out in one continuous visit

Assumes clear site.
Works carried out in one continuous visit

area of surfacing is re calculated to match scaled measure