A428 Black Cat to Caxton Gibbet improvements

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9.105 Applicant’s Responses to issues raised at Issue Specific Hearing 5 on 1 December 2021

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1 Introduction

1.1.1 This TN has been prepared in response to issues relating to the sensitivity testing of local junction capacity models, raised by Cambridgeshire County Council (CCC) at a meeting held on the 29 November 2021 and further discussed at Issue Specific Hearing 5 (ISH5) held on 1 December 2021.

1.1.2 The locations of concern were as follows:

a. A428/B1040 Eltisley junction.

b. A428/Cambourne junction.

c. A428/Toseland Road/Abbotsley Road junction.

d. B1046/Potton Road junction.

e. A428 Wyboston junction.

f. A428 Barford Road junction.

1.1.3 This Technical Note sets out the concerns identified at each location at the meeting and at ISH5 and goes on to provide a response.

2 A428/B1040 Eltisley Junction

Issue Discussed

2.1.2 CCC has concerns that the proposed junction (Eltisley Link junction) is overdesigned. CCC has requested sensitivity test modelling at this location with forecast flows built on the observed base year flows, for the 2040 future year models.

2.1.3 Following further discussions with CCC, it was decided that there may be insufficient observed turning count data in order to carry out a sensitivity test of the Eltisley Link Junction, and if the test were to be carried out, many of the SATURN model turning movements used in the previous modelling would need to be used. As such, it was decided that a comparison of observed data and the base model SATURN flows would be carried out.

Methodology.

2.1.4 The methodology adopted was as follows:

a. The latest available pre Covid observed traffic count data was obtained from 2017 counts; these were used as the observed flows for the junctions.

b. The actual AM and PM peak hours for each junction were identified.

c. AM and PM peak hour matrices were created for all vehicles for the base year.

d. Growth factors were calculated to factor up the 2015 SATURN model flows to 2017 (the same year as the observed base flows); these were obtained by comparing the 2015 SATURN model base with the 2025 DM SATURN model output turning flows for the junctions concerned and calculating a proportional factor for the 10 year growth, then deriving a two year growth factor in order to factor up the 2015 SATRUN flows to 2017.

e. These factored up SATURN flows were then compared to the 2017 observed flows.

Comparison

2.1.5 This section compares the 2017 observed flows to the factored-up SATURN model base flows.

2.1.6 For A428/B1040 Eltisley East, the results are set out in **Table 2-1** and **Table 2-2**. In the AM peak (07:00-08:00), it can be seen that overall there are a higher number of vehicles travelling through the junction in the SATURN model flows, with an additional 165 vehicles compared to the 2017 observed flows. In the PM peak (16:45-17:45), overall there are fewer vehicles travelling through the junction in the SATURN models flows, with 277 fewer vehicles compared to the 2017 observed flows.

2.1.7 For A428/B1040 Eltisley West, the results are set out in **Table 2-3** and **Table 2-4**. In the AM peak (07:00-08:00), it can be seen that overall there are a higher number of vehicles travelling through the junction in the SATURN model flows, with an additional 309 vehicles compared to the 2017 observed flows. In the PM peak (16:45-17:45), overall there are fewer vehicles travelling through the junction in the SATURN models flows, with 244 fewer vehicles compared to the 2017 observed flows.

Table 2-1: A428/B1040 Eltisley East AM peak

AM Peak	Factored up SATURN flows				2017 observed flows				Difference			
	B1040 St Ives Rd (N)	A428 (E)	A428 (W)	Total	B1040 St Ives Rd (N)	A428 (E)	A428 (W)	Total	B1040 St Ives Rd (N)	A428 (E)	A428 (W)	Total
B1040 St Ives Rd (N)	0	48	157	205	0	264	129	393	0	-216	28	-188
A428 (E)	102	0	949	1050	68	0	918	986	34	0	31	64
A428 (W)	128	1019	0	1148	93	766	0	859	35	253	0	289
Total	230	1068	1105	**2403**	161	1030	1047	**2238**	69	38	58	**165**

Table 2-2: A428/B1040 Eltisley East PM peak

PM	Factored up SATURN flows				2017 observed flows				Difference			
	B1040 St Ives Rd (N)	A428 (E)	A428 (W)	Total	B1040 St Ives Rd (N)	A428 (E)	A428 (W)	Total	B1040 St Ives Rd (N)	A428 (E)	A428 (W)	Total
B1040 St Ives Rd (N)	0	65	159	224	0	85	69	153	0	-19	90	71
A428 (E)	16	0	1158	1174	88	0	1245	1332	-72	0	-86	-158
A428 (W)	128	732	0	860	282	770	0	1051	-153	-38	0	-191
Total	144	797	1317	**2259**	369	854	1313	**2536**	-225	-57	4	**-277**

Table 2-3: A428/B1040 Eltisley West AM peak

AM Peak	Factored up SATURN flows				2017 observed flows				Difference			
	A428 (E)	B1040 (S)	A428 (W)	**Total**	A428 (E)	B1040 (S)	A428 (W)	**Total**	A428 (E)	B1040 (S)	A428 (W)	**Total**
A428 (E)	0	212	893	1105	0	130	919	1049	0	83	-26	57
B1040 (S)	87	0	11	98	81	0	36	117	6	0	-25	-18
A428 (W)	1060	12	0	1072	787	15	0	802	273	-3	0	270
Total	**1147**	224	904	**2275**	868	145	955	**1967**	280	80	-51	**309**

Table 2-4: A428/B1040 Eltisley West PM peak

AM Peak	Factored up SATURN flows				2017 observed flows				Difference			
	A428 (E)	B1040 (S)	A428 (W)	**Total**	A428 (E)	B1040 (S)	A428 (W)	**Total**	A428 (E)	B1040 (S)	A428 (W)	**Total**
A428 (E)	0	150	1166	1316	0	117	1205	1321	0	34	-39	-5
B1040 (S)	119	0	23	142	80	0	39	119	39	0	-16	23
A428 (W)	742	9	0	750	975	38	0	1013	-233	-29	0	-262
Total	860	159	1189	**2208**	1055	154	1244	**2452**	-194	5	-55	**-244**

Commentary

2.1.8 Whilst the overall pattern is that the SATURN model over-predicts flows through this pair of junctions in the AM peak and under-predicts them in the PM peak, there are a number of more significant differences. The most significant of these is the flow of 264 vehicles observed to make the left turn out of B1040 (N) on to A428 (E) at the north junction in the AM peak. This was not expected, since there are no significant destinations, other than Eltisley village itself, along the A428 between this junction and Caxton Gibbet, some 2.5km to the east, to which there is a more direct route available via the A1198.

2.1.9 In interpreting these differences, there are two important factors to note, namely:

a. The local network is known to be congested and there is anecdotal evidence that drivers use the local road through Eltisley to avoid congestion at the existing A428/B1040 junctions. Assessment work for the construction stage of the Scheme, as reported in the Transport Assessment **[APP-241]**, revealed significant over capacity at the A428/B1040 junctions in the 2025 'Do Minimum'. There is also understood to be congestion at the Caxton Gibbet junction at peak periods.

b. The observed flows are not a complete set of data for the network of junctions serving Eltisley: no data was collected at the A428/Cambridge Road junction to the east of the village, nor was data collected at the B1040 junctions with St Neots Road or Potton End, to the west and south west of the village respectively. There is therefore no data to quantify the potential impact of rat running on the network at present.

2.1.10 The observed flow of 264 vehicles making the B1040 (N) to A428 (E) in the AM peak could therefore be made up of four components:

1. Genuine left-turners on to the A428.
2. Drivers making the left turn and then making the right turn into Eltisley village.
3. Drivers making a B1040 (N) to B1040 (S) or A428 (W) movement, using the local road through Eltisley as a 'rat run'.
4. Drivers avoiding congestion on the A1198 at the Caxton Gibbet junction, using the B1040 as a 'rat run'.

2.1.11 Logically, the first two items on the list above would be expected to be very few in number: they cannot be uniquely quantified because of the lack of data at the A428/Cambridge Road junction to the east of the village; the third and fourth items are examples of 'rat running' behaviour, which also cannot be quantified and which it would be unreasonable for a strategic model to accurately predict at the level of detail required.

2.1.12 The Scheme will result in a fundamental change to the layout of this junction. Drivers making movement (3) currently turn left out of the B1040(N) on to the A428 (E) whereas, with the Scheme in place, they will go straight ahead at the northern roundabout on to the former A428 (W): drivers making movement (4) would not be expected to use the Eltisley junction at all once the Scheme opens because they would revert to the direct route between Papworth and Caxton Gibbet via the A1198.

2.1.13 It is clear that the current layout at Eltisley suffers from congestion at peak times and that this results in rat-running, which cannot currently be quantified. This congestion will be removed by the Scheme. There will, therefore, no longer be any incentive for drivers to use the local roads within and around Eltisley as rat-runs to avoid congestion at key Scheme junctions.

2.1.14 The assertion is therefore that the observed flows do not provide a useful starting point from which to forecast future flows through the junction for the following reasons:

a. The observed flows do not reflect the layout that will exist once the Scheme opens to traffic: much of the traffic making movements such as the current B1040(N) to A428(E) left turn may turn in the opposite direction once the Scheme opens.

b. The observed flows are influenced by congestion both at the Eltisley and the Caxton Gibbet junctions: drivers are understood to respond to this congestion by seeking alternative routes ('rat-runs'), the volume of traffic currently making such movements cannot be quantified from the data available: this congestion will be removed by the Scheme and this will be expected to remove the rat-running.

Conclusion

2.1.15 On this basis, the Applicant considers that the use of the 2025 and 2040 'Scheme' SATURN model flows is the most reliable way of assessing the performance of the Eltisley junction once the Scheme opens to traffic.

2.1.16 The Applicant now understands that CCC have accepted this position in respect of the Eltisley junction.

3 A428/Cambourne Junction

Issue Discussed

3.1.2 CCC sought reassurance that the modelling at this location is based on robust flows. CCC requested a logic-check on the flows in a transport assessment prepared by the developer of the land at West Cambourne. The assessment was only requested for the 2040 future year and not for the 2025 future year’

3.1.3 Based on the above, a sensitivity test has been carried out to evaluate how the junction performs in the 2040 DS with traffic flows based on data collected by the developer of the land at West Cambourne. The test consists of traffic flow re-forecasting and a re-run of the 2040 DS LINSIG model.

Methodology

3.1.4 The methodology was as follows:

a. The latest available pre Covid observed traffic count data was obtained from 2017 counts carried out by the developer of the land at West Cambourne; these were used as the observed flows for the junctions.

b. The actual AM and PM peak hours for each junction were identified.

c. AM and PM peak hour matrices were created for all vehicles for the base year.

d. Growth factors were calculated to obtain 2040 DM traffic flows from the observed peak hour matrices – these were obtained by comparing the 2015 SATURN model base with 2040 DM SATURN model output turning flows for the junctions concerned and calculating a proportional factor to derive the new 2040 Do Minimum matrix from the observed data.

e. 2040 DS matrices for the junctions were derived by comparing the 2040 DM vs 2040 DS SATURN model output flows and applying absolute changes in peak hourly flows to the 2040 DM matrix derived from the observed data to obtain the 2040 DS matrix.

f. The LINSIG model for the junction was then re-run using the newly derived 2040 DS traffic flow matrix.

Comparison

3.1.5 This section compares model outputs set out in the Transport Assessment Annex **[APP-243]** to the model results of the sensitivity test for 2040 DS.

3.1.6 In the AM and PM peak on the northern roundabout, there is an increase in Degree of Saturation (DoS) on every arm presented in **Table 3-1** however all arms continue to operate under 80% (i.e. comfortably within capacity). The A428 Off-Slip Road roundabout entry experiences an increase in queueing in both peak periods, with an increase in 1 PCU in the AM and an increase of 2 PCU’s in the PM, both increases causing the queue back from the roundabout to slightly exceed the queueing space available between the pedestrian crossing on this arm and the roundabout entry itself. However, the total queue on this arm will still remain well within the capacity of the slip road to accommodate it. All other arms in the northern roundabout continue to have queues that would be within the capacity of the current layout to accommodate them.

3.1.7 In the AM and PM peak on the southern roundabout, almost every arm experiences an increase in DoS and queuing, however all continue to operate under 80% DoS with queues that remain within the capacity of the current layout to accommodate.

Conclusion

3.1.8 The conclusion of this Sensitivity Test is that the 2017 observed flows result in a higher forecast of 2040 'Scheme' flows at the Cambourne junction. However, the current layout is confirmed as having sufficient capacity to accommodate them.

Table 3-1:TAA model outputs vs Sensitivity test model outputs

	AM						PM					
Arm/Arm Turning Movements	TAA (SATURN flows)			Sensitivity test (calculated flows)			TAA (SATURN flows)			Sensitivity test (calculated flows)		
	DoS (%)	Delays (sec/pcu)	MMQ* (PCU)	DoS (%)	Delays (sec/pcu)	MMQ* (PCU)	DoS (%)	Delays (sec/pcu)	MMQ* (PCU)	DoS (%)	Delays (sec/pcu)	MMQ* (PCU)
Cambourne N - St Neots Road	12.5 %	1	0	13.8%	1	0	8.1%	1	0	19.9%	1	0
Cambourne N - Overbridge Left	3.3%	1	0	10.5%	1	0	7.6%	1	0	20.2%	1	0
Cambourne N - Overbridge Right	20.0 %	1	0	31.2%	1	0	15.9%	1	0	22.9%	1	0
Cambourne N - A428 Off-Slip Road (RAB entry)	11.9 %	1	3	19.8%	3	4	18.2%	2	4	44.1%	5	6
Cambourne N - A428 Off-Slip Road (at pedestrian crossing)	4.5%	5	1	20.3%	4	3	13.6%	6	2	31.1%	5	4
Access Road (west) (former A428)	10.1 %	1	0	19.7%	2	0	8.7%	2	0	10.1%	2	0
Cambourne S - Overbridge Ahead	20.4 %	15	2	24.2%	19	4	14.4%	18	1	32.0%	10	4
Cambourne S - Overbridge Ahead Right	31.9 %	15	4	24.7%	16	4	28.9%	19	3	32.9%	10	5
Cambourne S - A428 Off-Slip Road Left	24.2 %	16	2	18.5%	24	2	14.6%	11	1	26.1%	33	3
Cambourne S - A428 Off-Slip Road Left Ahead	24.9 %	16	2	22.6%	24	3	15.4%	11	2	30.5%	33	3

Arm/Arm Turning Movements	AM						PM					
	TAA (SATURN flows)			Sensitivity test (calculated flows)			TAA (SATURN flows)			Sensitivity test (calculated flows)		
	DoS (%)	Delays (sec/pcu)	MMQ* (PCU)	DoS (%)	Delays (sec/pcu)	MMQ* (PCU)	DoS (%)	Delays (sec/pcu)	MMQ* (PCU)	DoS (%)	Delays (sec/pcu)	MMQ* (PCU)
Cambourne S - Cambourne Road (S) Ahead Left	24.7 %	10	3	39.9%	12	7	30.4%	9	3	58.3%	19	11
Cambourne S - Cambourne Road (S) Ahead	38.2 %	11	5	52.8%	14	10	27.7%	8	3	44.6%	16	8
Cambourne S - A428 On-Slip Road Ahead (at pedestrian crossing)	28.7 %	4	1	27.4%	5	3	23.4%	4	1	26.5%	13	4

4 A428/Toseland Road/Abbotsley Road junction

Issue Discussed

4.1.2 CCC has requested sensitivity test modelling at this location with forecast flows built on the observed base year flows, for the 2040 future year models. CCC accept that they can run the PICADY model at this location themselves if the revised flows are provided by the Applicant. However, CCC has requested, if possible, that the Applicant also undertakes the modelling.

4.1.3 Prior to determining whether a sensitivity test is required, a comparison of observed data and the base model SATURN flows was carried out. The following paragraphs set out the findings of that comparison. In the event, the Applicant determined that a sensitivity test at this junction was not appropriate, for the reasons given at paras 4.1.7 to 4.1.12.

Methodology

4.1.4 The methodology was as follows:

a. The latest available pre Covid observed traffic count data was obtained from 2017 counts; these were used as the observed flows for the junctions.

b. The actual AM and PM peak hours for each junction were identified.

c. AM and PM peak hour matrices were created for all vehicles for the base year.

d. Growth factors were calculated to factor up the 2015 SATURN model flows to 2017 (the same year as the observed base flows); these were obtained by comparing the 2015 SATURN model base with the 2025 DM SATURN model output turning flows for the junctions concerned and calculating a proportional factor for the 10 year growth, then deriving a two year growth factor in order to factor up the 2015 SATURN flows to 2017.

e. These factored up SATURN flows were then compared to the 2017 observed flows.

Comparison

4.1.5 For the A428/Toseland Road/Abbotsley Road Junction, observed traffic counts were only available for the A428 (Cambridge Road)/Toseland Road section of the junction, and so only this section of the junction has been included in this assessment.

4.1.6 For A428 (Cambridge Road)/Toseland Road, the results are set out in **Table 4-1** and **Table 4-2**. In the AM peak (06:30-07:30), overall, there are a higher number of vehicles travelling through the junction in the SATURN model flows, with an additional 217 (+11.7%) vehicles compared to the 2017 observed flows. In the PM peak (16:45-17:45), it can be seen that there are overall fewer vehicles travelling through the junction in the SATURN model flows, with 229 fewer (-10%) vehicles compared to the 2017 observed flows.

Table 4-1: A428/Toseland Road/Abbotsley Road AM Peak

AM Peak	Factored up SATURN flows				2017 observed flows				Difference			
	Toseland Road	A428 Cambridge Road E	A428 Cambridge Road W	**Total**	Toseland Road	A428 Cambridge Road E	A428 Cambridge Road W	**Total**	Toseland Road	A428 Cambridge Road E	A428 Cambridge Road W	**Total**
Toseland Road	0	17	45	62	0	68	5	72	0	-50	40	-10
A428 Cambridge Road E	12	0	900	912	23	0	740	763	-11	0	161	150
A428 Cambridge Road W	41	1065	0	1106	22	1007	0	1029	19	59	0	78
Total	53	1082	945	2080	45	1074	744	1863	8	8	201	217

Table 4-2: A428/Toseland Road/Abbotsley Road PM Peak

PM Peak	Factored up SATURN flows				2017 observed flows				Difference			
	Toseland Road	A428 Cambridge Road E	A428 Cambridge Road W	**Total**	Toseland Road	A428 Cambridge Road E	A428 Cambridge Road W	**Total**	Toseland Road	A428 Cambridge Road E	A428 Cambridge Road W	**Total**
Toseland Road	0	5	34	39	0	39	5	44	0	-34	30	-4
A428 Cambridge Road E	21	0	1197	1218	63	0	1184	1247	-42	0	13	-29
A428 Cambridge Road W	74	732	0	806	31	971	0	1002	43	-239	0	-196
Total	95	737	1232	2064	94	1010	1189	2293	1	-273	43	-229

Commentary

4.1.7 Whilst the overall pattern is that the SATURN model over-predicts flows through this junction in the AM peak and under-predicts them in the PM peak, the following should be noted:

4.1.8 The difference between the total flows through the junction, derived by the two alternative methods, is relatively small, being of the order of 10% in each of the AM and PM peaks. The difference in the minor road approach flows is minimal, albeit there are some more differences in individual turning movements. The PICADY model results set out in the Transport Assessment **[APP-241]** for this junction indicate a maximum RFC (ratio of flow to capacity) of 0.28 in the 2040 Do Something AM peak. Arguably, therefore, an adjustment of around 10% in the forecast flows would lead to a similar result.

4.1.9 At present, the junction is dominated by heavy volumes of A428 through traffic. It is therefore highly likely that the traffic flows joining, leaving and crossing the A428 at this location are influenced by drivers' perceptions of the congestion they are likely to encounter at this junction. The Scheme will remove almost all of this through traffic and allow the junction to revert to its function of providing access from local villages on to the wider road network.

4.1.10 The assertion is therefore that the observed flows do not provide better starting point from which to forecast future flows through the junction than the flows derived directly from the SATURN model.

Conclusion

4.1.11 On the basis of the above commentary, the Applicant considers that the use of the 2025 and 2040 'Scheme' SATURN model flows is an acceptable way of assessing the performance of the A428/Toseland Road/Abbotsley Road junction once the Scheme opens to traffic.

4.1.12 On that basis, the proposed sensitivity test has not been carried out.

5 B1046/Potton Road Junction

Issue Discussed

5.1.2 CCC has requested sensitivity test modelling at this location. CCC has concerns that the use of different flows (which CCC consider to be more robust) could lead to the redesign of the junction.

5.1.3 The first step taken to address the above was to undertake a comparison of the observed data and the base model flows for the junction. The comparison found that the overall pattern is that the SATURN model under-predicts flows through this junction in both the AM peak and PM peak.

5.1.4 This note provides a summary of the methodology adopted and results obtained from further sensitivity analysis and modelling carried out.

Methodology

5.1.5 The methodology was as follows:

a. The latest available pre-Covid observed traffic count data from 2017 was obtained.

b. The actual AM and PM peak hours for each junction were identified.

c. AM and PM peak hour matrices were created for all vehicles and for heavy vehicles for the base year.

d. Growth factors were calculated to obtain 2040 DM traffic flows from the observed peak hour matrices – these were obtained by comparing the 2015 SATURN model base with the 2040 DM SATURN model output turning flows for the junctions concerned and calculating a proportional factor to derive the new 2040 Do Minimum matrices from the observed data.

e. 2040 DS matrices for the junctions were derived by comparing the 2040 DM vs 2040 DS SATURN model output flows and applying absolute changes in peak hourly flows to the 2040 DM matrices derived from the observed data to obtain the 2040 DS matrices.

f. The previously built PICADY model for the junction was re-run using the newly derived 2040 DS traffic flow matrices.

Comparison

5.1.6 The results of the sensitivity test modelling compared to that carried out within the Transport Assessment **[APP-241]** can be seen in **Table 5-1** and **Table 5-2**. In the AM peak, the sensitivity tests show there is a predicted reduction in Ratio of Flow to Capacity (RFC), delay and queues on all turning movements in comparison to results set out in the TA.

5.1.7 In spite of the generally higher flows arising from the sensitivity test, the overall effect is to assign less traffic to the arms which must give way (namely the right turn into and the left and right turns out of Potton Road) whereas the increases are concentrated on the straight ahead movements along the B1046.

5.1.8 In the PM peak, the sensitivity tests show there is a predicted reduction in RFC and delay for the Potton Rd to B1046 (W) turning movement and the B1046 (W) to B1046 (E) & Potton Rd movement compared to the results set out in the Tramsport Assessment (TA) **[APP-241]**; the queues for these turning movements remain at zero for both. For the movement from Potton Rd to B1046 (E), there is a slight RFC increase of 0.06 and an increase in delay of 1.09 when comparing the sensitivity test results to the TA **[APP-241]**. Queues have also increased from 0 in the TA **[APP-241]** to 0.1 in the sensitivity test results. However, this increase is very minimal and the junction remains well within capacity under the sensitivity test.

5.1.9 Despite the small increases in the PM peak, there is an overall improvement in the operation of the junction in both peak periods in the sensitivity test, in comparison to the results set out in the TA **[APP-241]**.

Table 5-1: 2040 DS AM

	Results submitted in the Transport Assessment			Results of Sensitivity Test		
	RFC	Delay (sec)	Queue (veh)	RFC	Delay (sec)	Queue (veh)
Potton Rd to B1046 (W) – left turn from minor arm	0.13	6	0	0.02	5.60	0
Potton Rd to B1046 (E) – right turn from minor arm	0.04	9	0	0.00	0	0
B1046 (W) to B1046 (E) & Potton Rd – right turn from major arm	0.44	10	1	0.03	4.69	0

Table 5-2: 2040 DS PM

	Results submitted in the Transport Assessment			Results of Sensitivity Test		
	RFC	Delay (sec)	Queue (veh)	RFC	Delay (sec)	Queue (veh)
Potton Rd to B1046 (W) – left turn from minor arm	0.23	7	0	0.04	5.97	0
Potton Rd to B1046 (E) – right turn from minor arm	0.04	8	0	0.10	9.09	0.1
B1046 (W) to B1046 (E) & Potton Rd – right turn from major arm	0.21	7	0	0.03	5.06	0

Conclusion

5.1.10 The conclusion of this Sensitivity Test is that the junction is predicted to continue to operate within capacity with the use of the sensitivity test traffic flows.

5.1.11 Although it is predicted to operate with a significant amount of spare capacity, the layout proposed is determined by the need to achieve the minimum design standards applicable to this type of junction in the Design Manual for Roads and Bridges, rather than the need to achieve a certain level of traffic capacity. There is therefore no question of this junction having been 'over designed'.

6 A428/Wyboston and Barford Road Junctions

Issue Discussed

6.1.2 The sensitivity testing recently carried out in respect of the operation of the Wyboston and Barford Road junctions on the existing A428, once the Scheme opens, has identified that queueing on the Great North Road (North) and Barford Road (North) arms of these junctions could become marginally worse in 2040 with the Scheme in place than in the Do Minimum.

6.1.3 The reason for this appears to be an increase in the use of these arms of the junctions by locally-generated traffic seeking to take advantage of the decongestion of the existing A428 brought about by the Scheme and to transfer to the Wyboston and Barford Road junctions from other routes elsewhere within St Neots. These traffic flow increases, and the reasons for them, were acknowledged in document **[APP-069]** (TN55 'Consultation Report Appendix W: Response to traffic queries raised by the Joint Response from the Cambridgeshire and Peterborough Local Authorities').

6.1.4 The results of the sensitivity testing are presented in document **[REP5-018]** (9.68 'National Highways – Other – Junction Model Sensitivity Test Results').

6.1.5 In response to this, CCC requested the Applicant to consider the potential to re-allocate road space within the Wyboston and Barford Road junctions to make better use of the underlying capacity of these junctions and to achieve a more balanced outcome for users of the roads concerned.

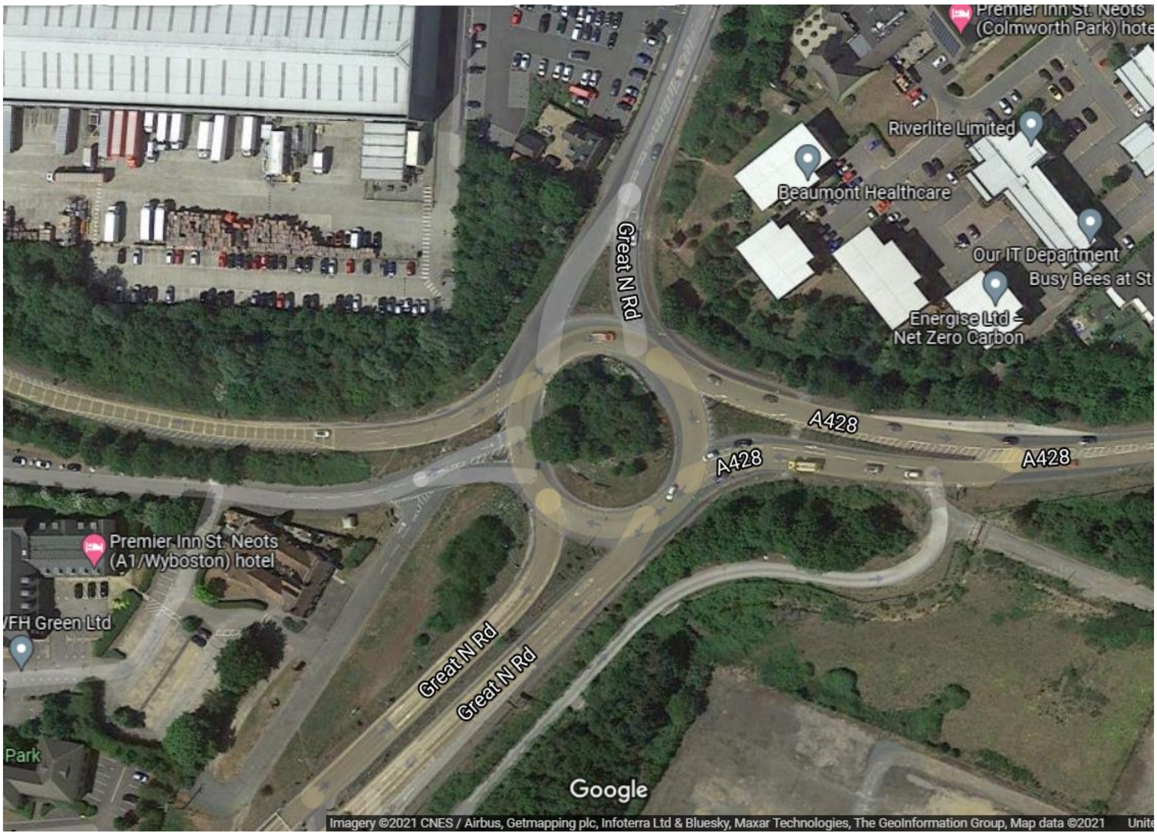
6.1.6 This request was adopted by the Planning Inspectorate as Action Point 1 arising from Issue Specific Hearing 5 (ISH5).

6.1.7 As a matter of principle, the Applicant may consider the implementation of low-cost measures at these junctions aimed at maximising the benefits brought about by the Scheme. For example, adjustments to road markings or lane destination signage. However, this will not extend to carrying out physical construction work on the Local Road Network, such as carriageway construction or kerb realignment, or the installation of traffic signals, etc.

Wyboston Junction

6.1.8 This is a five-arm roundabout, serving the existing A428, A1 southbound off-slip, Great North Road (North) and the access to Phoenix Park (a business park). Great North Road (North) is currently provided as a single lane approach, with a flare to provide two lanes at the roundabout entry. The second lane is approximately 35m long, allowing up to 6 vehicles to queue in each lane, any queueing in excess of this would extend into the single lane section on the approach. The road markings allocate the nearside lane for the use of straight-ahead and left-turning traffic, and the offside lane for straight-ahead and right-turning traffic. The ARCADY model was run in lane simulation mode, with traffic allocated to the lanes consistent with the road markings.

Wyboston Junction



6.1.9 The results of the sensitivity test indicate that, in 2025, the Great North Road (North) arm would benefit from the Scheme, with reduced delays in the AM and PM peaks and a reduction in queueing in the PM peak, although an increase in queueing of one vehicle is predicted in the AM peak.

6.1.10 By 2040, the situation is reversed, with an increase in queueing in both peaks: in the AM peak from nine to 29 vehicles and in the PM peak from 48 to 53 vehicles.

Results of Sensitivity Testing: Wyboston Junction

Results from the Sensitivity Testing

	AM PEAK RFC	AM PEAK Delay (sec)	AM PEAK Queue (veh)	PM PEAK RFC	PM PEAK Delay (sec)	PM PEAK Queue (veh)
2016 Base (Observed flows)						
Great North Road (N)	0.92	42	10	0.96	46	15
A428 (E)	0.72	14	5	0.72	13	5
Great North Road (S)	0.91	30	10	0.94	33	12
Premier Inn Access	0.09	12	0	0.38	20	1
A1 S'bound off-slip	0.88	65	13	0.36	13	1

Results quoted in the Transport Assessment Annex

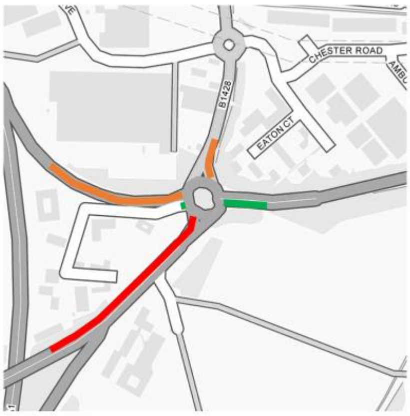
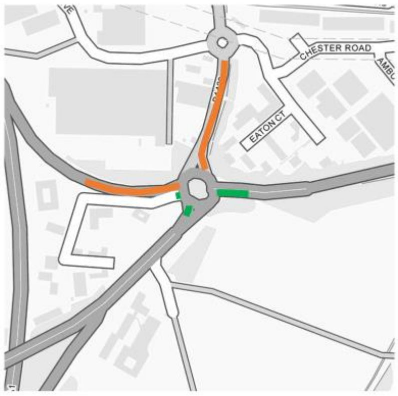
	AM PEAK RFC	AM PEAK Delay (sec)	AM PEAK Queue (veh)	PM PEAK RFC	PM PEAK Delay (sec)	PM PEAK Queue (veh)
2025 Do Minimum						
Great North Road (N)	0.73	15	3	0.81	18	4
A428 (E)	0.60	9	4	0.70	11	5
Great North Road (S)	0.97	53	17	0.90	25	9
Premier Inn Access	0.08	10	0	0.34	13	1
A1 S'bound off-slip	0.43	10	1	0.33	9	1
2025 Do Something						
Great North Road (N)	0.76	12	3	0.77	12	3
A428 (E)	0.59	9	2	0.74	12	4
Great North Road (S)	0.40	6	1	0.58	8	2
Premier Inn Access	0.05	6	0	0.31	12	1
A1 S'bound off-slip	0.40	7	1	0.35	9	1
2040 Do Minimum						
Great North Road (N)	0.73	14	3	0.86	23	6
A428 (E)	0.67	10	4	0.70	12	5
Great North Road (S)	1.00	73	24	0.93	37	12
Premier Inn Access	0.08	10	0	0.34	14	1
A1 S'bound off-slip	0.48	10	1	0.38	10	1
2040 Do Something						
Great North Road (N)	0.81	20	6	0.85	18	6
A428 (E)	0.65	10	3	0.81	17	5
Great North Road (S)	0.54	7	2	0.68	10	3
Premier Inn Access	0.06	6	0	0.35	14	1
A1 S'bound off-slip	0.45	8	1	0.43	11	1

Results from the Sensitivity Testing

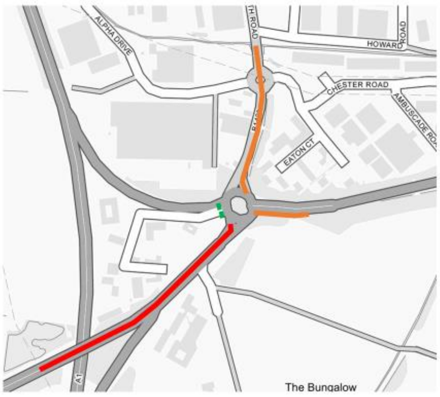
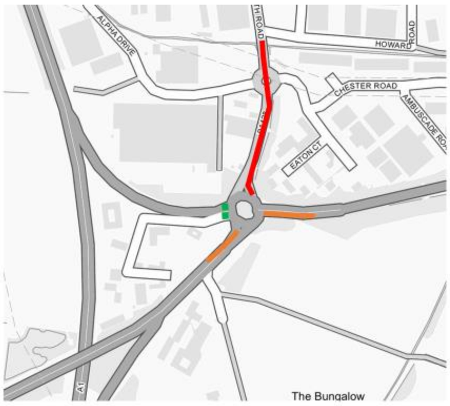
	AM PEAK RFC	AM PEAK Delay (sec)	AM PEAK Queue (veh)	PM PEAK RFC	PM PEAK Delay (sec)	PM PEAK Queue (veh)
2025 Do Minimum						
Great North Road (N)	0.92	44	9	0.99	94	32
A428 (E)	0.74	15	7	0.90	26	13
Great North Road (S)	1.03	81	31	1.07	121	47
Premier Inn Access	0.11	14	0	0.41	19	1
A1 S'bound off-slip	0.97	143	33	0.40	14	1
2025 Do Something						
Great North Road (N)	0.92	37	10	0.96	50	16
A428 (E)	0.78	15	5	0.83	17	7
Great North Road (S)	0.61	7	2	0.85	13	5
Premier Inn Access	0.07	8	0	0.40	19	1
A1 S'bound off-slip	0.88	48	11	0.43	14	1
2040 Do Minimum						
Great North Road (N)	0.90	45	9	0.99	141	48
A428 (E)	0.82	21	11	0.90	28	15
Great North Road (S)	1.09	133	50	1.13	198	73
Premier Inn Access	0.12	14	0	0.39	18	1
A1 S'bound off-slip	0.98	165	39	0.41	14	1
2040 Do Something						
Great North Road (N)	0.97	97	29	1.01	138	53
A428 (E)	0.84	21	7	0.89	31	13
Great North Road (S)	0.70	9	3	0.94	29	11
Premier Inn Access	0.08	10	0	0.49	34	1
A1 S'bound off-slip	0.96	104	26	0.56	18	2

6.1.11 This has been identified as a concern by CCC, who perceive an increased risk of traffic queuing from this junction tailing back to, and affecting the operation of, the local road network junctions on Great North Road to the north of the Wyboston junction, namely the Marlborough Road/Alpha Drive and Howard Road junctions. The sensitivity testing acknowledges that, in 2040, in the PM peak, the queue back from the Wyboston junction could extend through the Marlborough Road/Alpha Drive junction in the "Do Minimum" scenario and, with the Scheme in place, as far as the Howard Road junction. It is important to note however that even without the Scheme these queues are likely to happen in the "Do Minimum" scenario and with the Scheme these queues become marginally longer, especially in the PM peak when the queues are predicted to be at their maximum.

Wyboston: 2040 Sensitivity Test: AM Peak

2040 DM	2040 Scheme (DS)
	

Wyboston: 2040 Sensitivity Test: PM Peak

2040 DM	2040 Scheme (DS)
	

6.1.12 More detailed scrutiny of the ARCADY results reveals that the nearside lane is the busier of the two, carrying about 65% of the traffic and generating the more significant queue. The model indicates that the queue in the offside lane would be contained within the two-lane section.

Potential to Re-allocate road space

6.1.13 The problem identified in the model indicates that more capacity is required to accommodate the left turn from Great North Road (North) towards the current A428 east. In principle, this could be achieved in one of five ways:

a. Retain the existing layout: re-mark the current lanes to allocate straight ahead traffic to the offside lane only.

b. Increase the capacity of the roundabout approach.

c. Provide a free-flow left turn lane from GNR(N) into the A428 eastbound exit.

d. Reduce the capacity of one of the other arms to provide more gaps in the circulatory flow at the GNR(N) arm.

e. Signalisation.

6.1.14 The potential for each of these is considered below.

Re-mark the current lanes to allocate straight ahead traffic to the offside lane only

6.1.15 Although the ARCADY model is coded to allow straight ahead traffic to use either lane, the model will already assume that the majority of straight ahead traffic uses the quieter, offside lane. The ARCADY model could be re-run to confirm this by adjusting the lane allocation. However, undertaking a sensitivity test would be of little value because the likely outcome is similar to the main test already reported.

Increase the capacity of the roundabout approach:

a. Providing a longer second lane on the approach to the roundabout.

b. Providing a third lane on the entry to the roundabout.

6.1.16 This would require the construction of additional highway capacity within the highway verge. This would be subject to design and land constraints. It is not something that the Applicant would undertake as part of the Scheme. However, it might be something for the Local Highway Authority to consider once the Scheme opens and traffic patterns have settled. However, its potential would be limited unless, by doing so, drivers could be encouraged to turn left from both lanes. This would require the geometry of the A428 (east) exit to also be reconsidered and this could result in a quite substantial scheme. The Applicant does not consider it necessary to undertake such an elaborate scheme as part of the A428 Scheme, only to deliver negligible additional benefits which are not to address the impacts of the Scheme or meet the Scheme objectives. Therefore, the Applicant does not propose to undertake further sensitivity testing for this.

Free-flow left turn lane from GNR(N) into the A428 eastbound

6.1.17 This would require new carriageway construction as above. However, there are two design elements which could be 'show stoppers' to this option: the presence of an at-grade uncontrolled pedestrian crossing across the A428 and a bus stop layby, both of which would be located within the exit taper from the free-flow lane. Whilst the bus stop layby appears not to be currently in use, there is a risk that bus or coach companies may decide to use it in the future. On balance, this option does not appear feasible.

Reduce the capacity of one of the other arms

6.1.18 In order to have less traffic circulating past the Great North Road (N) arm, it would be necessary to reduce the capacity of either the Great North Road (South) arm or the A1 southbound off-slip arm. This would not be advisable, since both of these arms are predicted to exceed their capacity in 2040 with the Scheme in place, albeit they perform better than in the 2040 Do Min.

Signalisation

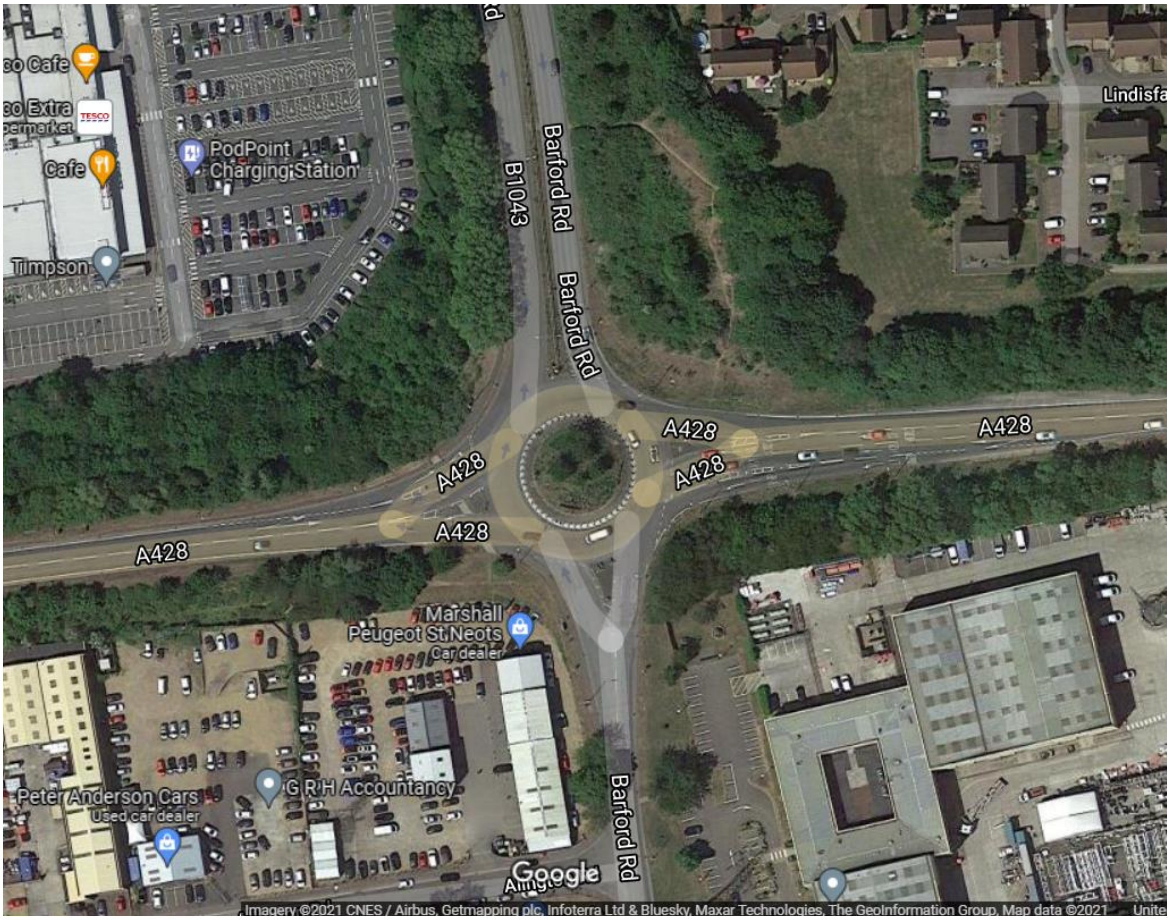
6.1.19 Conversion of the roundabout to a traffic signal controlled layout would provide the opportunity to control traffic entering the roundabout and give priority to the Great North Road (North) arm. The roundabout is some 60m in diameter and it is possible that signalisation could be considered, subject to the achievement of adequate 'stacking' space on the circulatory opposing each of the entry arms. The risk with converting a standard-sized roundabout to traffic signal control is the risk that the junction could 'lock-up' if queues of traffic exceed the space available to accommodate them. This option would have to be the subject of careful design and modelling in order to demonstrate its feasibility.

6.1.20 For the reasons given at paragraph 6.1.16 above, full-scale signalisation of a roundabout which sees a net reduction in traffic due to the Scheme is not something that the Applicant would undertake as part of the Scheme. However, it might be something for the Local Highway Authority to consider once the Scheme opens and traffic patterns have settled.

Barford Road Junction

6.1.21 This is a four-arm roundabout, serving the existing A428, Barford Road (North) and Barford Road (South). Barford Road (North) is currently provided as a two-lane dual carriageway between the A428 and the 'Tesco' roundabout, some 165m to the north. The road markings allocate the nearside lane for the use of straight-ahead and left-turning traffic, and the offside lane for right-turning traffic only. The ARCADY model was run in lane simulation mode, with traffic allocated to the lanes consistent with the road markings, except that, in the model, straight ahead traffic was permitted to use either lane on the Barford Road (North) approach because it appears feasible for drivers to undertake this manoeuvre.

Barford Road Junction



6.1.22 The results of the sensitivity test indicate that, in 2025 the Barford Road (North) arm would benefit as a result of the Scheme, with reduced queues and delays in the AM and PM peaks, as would the other three arms.

6.1.23 By 2040, the Barford Road (North) arm is still predicted to benefit from the Scheme in the AM peak. However, in the PM peak, the model indicates an increase in queueing from seven to 14 vehicles.

Results of Sensitivity Testing: Barford Road Junction

Results as submitted in the Transport Assessment Annex

Results quoted in the Transport Assessment Annex

	AM PEAK			PM PEAK		
	RFC	Delay (sec)	Queue (veh)	RFC	Delay (sec)	Queue (veh)
	2025 Do Minimum					
Barford Road (N)	0.63	13	3	0.60	10	2
A428 (E)	1.00	552	140	1.01	629	171
Barford Road (S)	0.37	9	1	0.57	13	2
A428 (W)	0.93	41	15	0.74	13	5
	2025 Do Something					
Barford Road (N)	0.57	9	3	0.56	8	2
A428 (E)	0.47	8	1	0.57	10	2
Barford Road (S)	0.07	6	0	0.30	8	1
A428 (W)	0.51	6	2	0.68	9	3

	AM PEAK			PM PEAK		
	RFC	Delay (sec)	Queue (veh)	RFC	Delay (sec)	Queue (veh)
	2040 Do Minimum					
Barford Road (N)	0.62	13	3	0.64	12	3
A428 (E)	1.02	869	244	1.00	860	263
Barford Road (S)	0.51	11	1	0.70	18	3
A428 (W)	0.96	61	25	0.87	23	11
	2040 Do Something					
Barford Road (N)	0.58	9	2	0.64	9	2
A428 (E)	0.70	13	2	0.80	16	5
Barford Road (S)	0.09	7	0	0.42	11	1
A428 (W)	0.64	8	3	0.72	10	4

Results of the Sensitivity Test

Results from the Sensitivity Testing

	AM PEAK			PM PEAK		
	RFC	Delay (sec)	Queue (veh)	RFC	Delay (sec)	Queue (veh)
	2017 Base (Observed flows)					
Barford Road (N)	0.93	31	10	0.78	15	4
A428 (E)	1.00	331	62	0.97	91	22
Barford Road (S)	0.26	9	1	0.52	16	3
A428 (W)	0.85	21	9	0.76	15	7

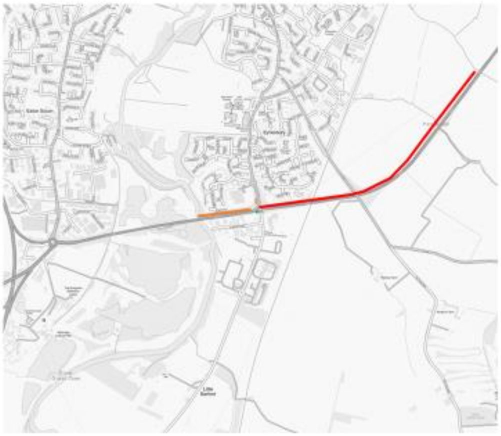
	AM PEAK			PM PEAK		
	RFC	Delay (sec)	Queue (veh)	RFC	Delay (sec)	Queue (veh)
	2025 Do Minimum					
Barford Road (N)	0.94	41	12	0.87	30	7
A428 (E)	1.02	807	190	1.01	434	114
Barford Road (S)	0.37	10	1	0.91	95	24
A428 (W)	0.93	44	19	0.99	123	66
	2025 Do Something					
Barford Road (N)	0.83	17	5	0.79	17	4
A428 (E)	0.42	11	2	0.48	8	1
Barford Road (S)	0.15	8	0	0.62	16	3
A428 (W)	0.52	6	2	0.75	14	5

	AM PEAK			PM PEAK		
	RFC	Delay (sec)	Queue (veh)	RFC	Delay (sec)	Queue (veh)
	2040 Do Minimum					
Barford Road (N)	0.96	39	11	0.89	34	7
A428 (E)	1.01	1229	344	1.01	848	271
Barford Road (S)	0.57	12	2	0.98	948	252
A428 (W)	1.00	132	65	1.01	769	317
	2040 Do Something					
Barford Road (N)	0.87	22	6	0.96	61	14
A428 (E)	0.69	18	4	0.79	17	5
Barford Road (S)	0.21	8	1	0.97	281	78
A428 (W)	0.73	10	4	0.96	117	62

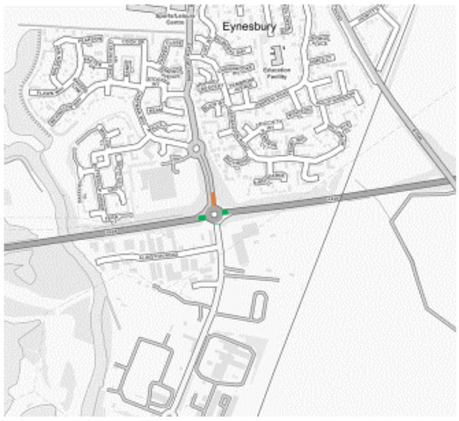
6.1.24 This has been identified as a concern by CCC. The sensitivity testing indicates that in 2040, for the PM peak, the queue in the “Do Something” scenario back from the Barford Road junction could extend approximately half way to the ‘Tesco’ roundabout. Given that the predicted queuen is contained nwithin the dual carriageway section between the ‘Tesco’ roundabout and the A428 roundabout, the Applicant, therefore, maintains that this will not result in a wider problem on the Local Road Network.

Barford Road: 2040 Sensitivity Test: AM Peak

2040 DM

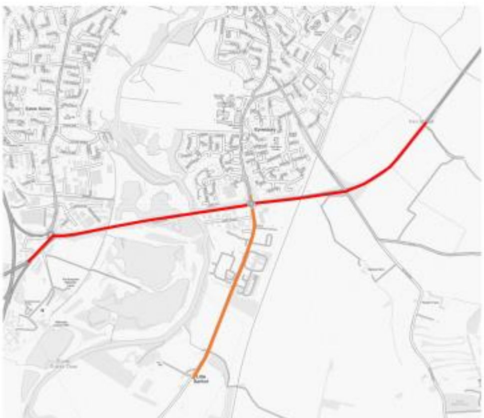


2040 Scheme (DS)

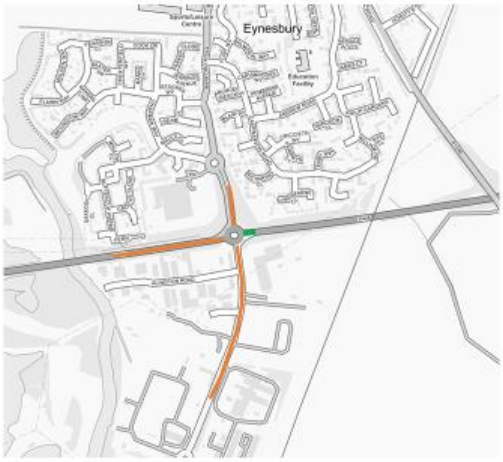


Barford Road: 2040 Sensitivity Test: PM Peak

2040 DM



2040 Scheme (DS)



6.1.25 More detailed scrutiny of the ARCADY results reveals that the offside lane is the busier of the two, carrying about 75% (AM peak) to 85% (PM peak) of the traffic and generating the more significant queue. The model indicates that the queue in the nearside lane would be minimal.

Potential to Re-allocate road space

6.1.26 The problem identified in the model indicates that more capacity is required to accommodate the right turn from Barford Road towards the current A428 west. In principle, this could be achieved in one of five ways:

a. Retain the existing layout: re-model in ARCADY to reflect the allocation of straight ahead traffic to the nearside lane only.

b. Increase the capacity of the roundabout approach.

c. Reduce the capacity of one of the other arms to provide more gaps in the circulatory flow at the Barford Road (N) arm.

d. Signalisation

6.1.27 The potential for each of these is considered below.

Re-code in ARCADY to allocate straight ahead traffic to the nearside lane only

6.1.28 Although the ARCADY model is coded to allow straight ahead traffic to use either lane, the model will assume that the majority of straight ahead traffic uses the quieter, nearside lane. The ARCADY model could be re-run to confirm this by adjusting the lane allocation. However, undertaking a sensitivity test would be of little value because the likely outcome is similar to the main test already reported.

Increase the capacity of the roundabout approach:

a. Providing a third lane on the immediate entry to the roundabout

6.1.29 There is already a full two-lane approach, so providing additional capacity would require the addition of a third lane on the immediate approach to the roundabout. This would require the construction of additional highway capacity within the highway verge. This would be subject to design and land constraints, and is not something that the Applicant would undertake as part of the Scheme. However, it might be something for the Local Highway Authority to consider once the Scheme opens and traffic patterns have settled. However, its potential would be limited because it would only provide the quieter straight-ahead and left turn traffic streams with their own lanes and not address the lack of capacity for the right turns. The geometry of the roundabout and of the A428 (west) roundabout exit does not lend itself to allowing right turns from Barford Road (north) to A428 (west) to circulate around and leave the roundabout in two lanes. To address this would result in a quite substantial scheme. The Applicant does not consider it necessary to undertake such a substantial scheme as part of the A428 Scheme, only to deliver negligible additional benefits which are not needed to address the impacts of the Scheme or meet the Scheme objectives. Therefore, the Applicant does not propose to undertake further sensitivity testing for this.

Reduce the capacity of one of the other arms

6.1.30 In order to have less traffic circulating past the Barford Road (North) arm, it would be necessary to reduce the capacity of either the A428 (West) arm or the Barford Road (South) arm. This would not be advisable, since both of these arms are predicted to exceed their capacity in 2040 with the Scheme in place, albeit they perform better than in the 2040 "Do Minimum". In addition, the potential to reduce the capacity of the Barford Road (South) roundabout entry would be very limited: the current layout provides a minimal flare from one lane to two on the roundabout entry and to reduce this further would not be consistent with the principles of roundabout design.

Signalisation

6.1.31 Conversion of the roundabout to a traffic signal controlled layout could provide the opportunity to control traffic entering the roundabout and give priority to the Barford Road (North) arm. However, the roundabout is some 50m in diameter and it appears that there would not be sufficient length alongside each of the splitter islands to meet the advice in DMRB (CD116 para 4.2.2) to accommodate internal queues on the circulatory.

Conclusions

6.1.32 After considering the various options of reallocation of the road space on the Wyboston and Barford Road junctions, the Applicant has concluded that by solely adjusting the lane markings, the benefits in traffic operations will be negligible or marginal. More substantive widening or improvements could bring in some potential benefits but they are beyond the scope of the Scheme. Hence, the Applicant does not propose to undertake any further sensitivity tests of any alternative schemes for these junctions, which remain unaltered from their current forms as presented in the DCO application for the Scheme.