

A428 Black Cat to Caxton Gibbet improvements

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9.50 Strategic Model Test at Girton

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1 Background

- 1.1.1 This technical note has been produced in response to the Written Representation from the Cambridgeshire joint authorities [REP1-048]. This note addresses the specific issue relating to the Girton interchange raised in paragraph 2.4.3 as follows:

Girton Interchange - the eastbound merge of A428/M11 is over capacity in future years and Highways England propose to monitor this situation. The westbound A14/M11 and A14/A428 diverges are incorrectly represented with reduced capacity for these movements modelled, effectively reducing the attractiveness of the scheme. Cambridgeshire County Council (CCC) requests that these inaccuracies are corrected in an updated model. CCC also requests that a solution is agreed between the Applicant and CCC should monitoring highlight an issue at this interchange that requires rectification.

- 1.1.2 A response to this issue was provided by the Applicant at Deadline 3 [REP3-008]. This technical note provides a more detailed analysis of forecast flows around Girton Interchange based on a sensitivity test with these coding issues rectified.
- 1.1.3 **Figure 1-1** shows the location of the M11 J14 Girton Interchange which connects the M11 from the north and south, the A14 from the east and the A428 from the west. As a result of the proposed A428 Scheme, the Stage 3 Strategic model forecasts increased flows at the junction. Cambridgeshire Joint Authorities have raised concerns that the increase in eastbound flows may result in congestion at the location where the A428 reduces to a single lane, which was changed from two lanes to one lane as part of the A14 Cambridge to Huntingdon improvement scheme in 2020.

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Figure 1-1 - Location of the Girton Interchange

2 Network Issues

2.1.1 Following a review of the A428 Stage 3 Strategic model the following network issues have been identified at Girton Interchange:

- a. A428 eastbound single lane – a speed flow curve (SFC) for a two lane dual carriageway was coded on this link (29625 to 29619) rather than a single lane SFC. However, the capacity at the downstream node (29619) was coded correctly and limited or controlled the A428 eastbound capacity.
- b. A428 eastbound link length – the link length of the A428 single lane prior to the A428/M11 merge was too long by 90 metres, and the length of the previous A428 link (2297-29625) was too short by 174m.
- c. M11 off-slip to A428 eastbound – SFCs were not coded on the M11 off-slip to the A428 eastbound merge.
- d. Westbound A14/M11 and A14/A428 diverges – only two rather than three lanes were coded on the shared section of A14/A428 west of the M11 diverge.

2.1.2 In order to assess the impact of these errors, the Applicant undertook a sensitivity test based on the 2040 Do Minimum (DM) (i.e. without Scheme) and Do Something (DS) (i.e. with Scheme) models with the following corrections:

- a. A428 eastbound single lane – the SFC on this link has been reduced to a lower capacity, from four,199 Passenger Car Units (PCUs) per hour to two,100 PCUs per hour.
- b. A428 eastbound link lengths – the distances of the relevant links have been corrected.
- c. M11 off-slip to A428 eastbound – The appropriate SFCs have been coded on the M11 off-slip.
- d. Westbound A14/M11 and A14/A428 diverges – increased the number of lanes from two to three on links 29613-29615 and 29615-29618, and increased the A428 diverge capacity to two lanes. The capacity and SFCs on these two links also have been adjusted accordingly.

3 Assessment

- 3.1.1 Figure 3-1 compares the 2040 AM DS scenario between the Girton Sensitivity Test ('Sensitivity Test') and the A428 Stage 3 Strategic model that was used for the DCO submission ('DCO model'). The green bandwidth represents an increase in forecast traffic flow in the Sensitivity Test while the blue bandwidth represents a decrease.
- 3.1.2 Figure 2 indicates that the traffic flow changes have increased marginally on the A14 westbound, towards both the M11 and A428, with some reductions on local roads including the A1303 Madingley Road and A1307 Huntingdon Road. In the eastbound direction there is a minor decrease of 8 PCUs on the A428 west of the M11.
- 3.1.3 The reason for the small change in the eastbound direction is due to the downstream node (29619) ultimately controlling capacity along this section of road. This node had been included and correctly coded in the DCO models. The reduced capacity of the SFC in the Sensitivity Test results in no change in journey times along this link, as shown in **Figure 3-2**.
- 3.1.4 In the westbound direction the impact of the corrections are more marked. As shown in **Figure 3-1** there is an increase of 40 PCUs on the A14 westbound before the A14/A428 diverge, of which 23 PCUs travel towards the A14 northbound and 17 PCUs travel towards the A428. The amended link capacity provides more capacity and therefore reduces delay (by five seconds per vehicle) despite attracting a modest increase in traffic.
- 3.1.5 There is also a reduction of up to 20 PCUs westbound on the A1307 and a reduction of up to 11 PCUs westbound on the A1303, due to traffic re-routing from local roads to the strategic road network.

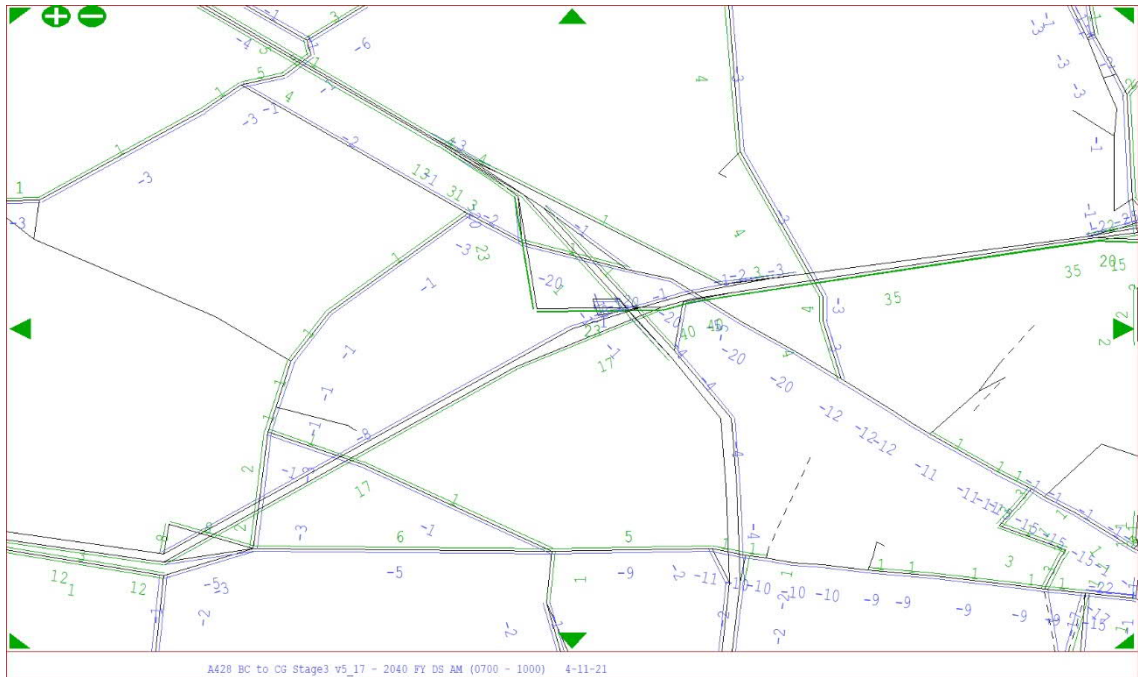


Figure 3-1 - Flow Comparison – Sensitivity Test Less DCO Model (2040 DS AM Peak)

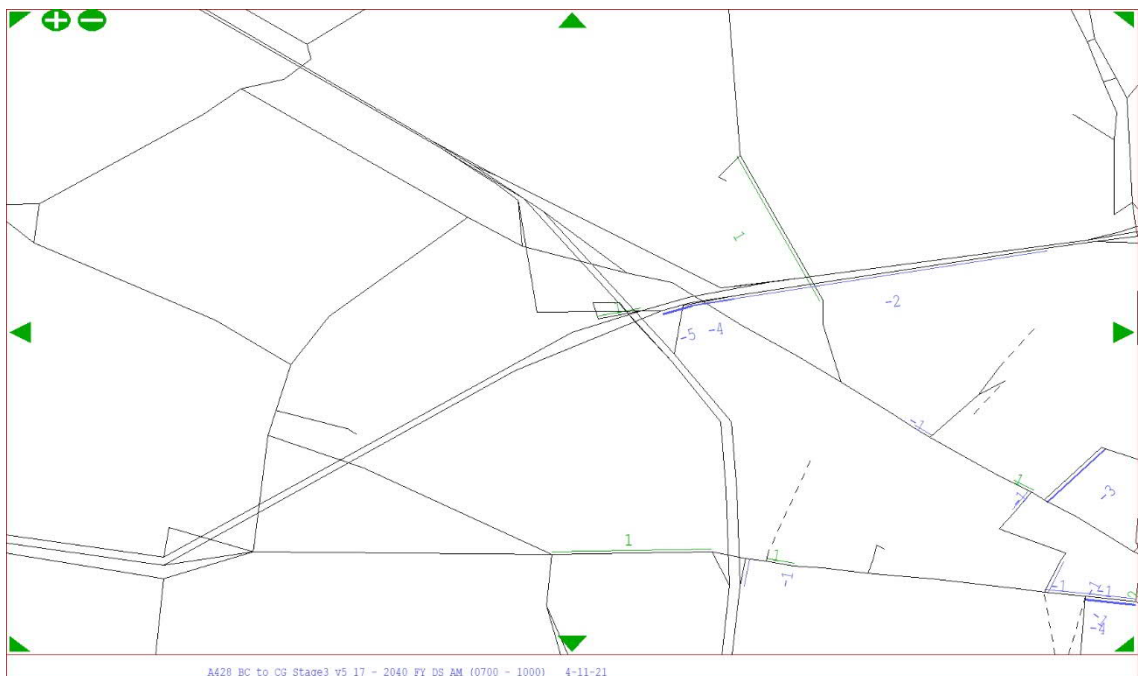


Figure 3-2 - Delay Comparison (Secs) – Sensitivity Test Less DCO Model (2040 DS AM Peak)

- 3.1.6 A 2040 PM Peak period assessment was also undertaken comparing flow and delay changes between the Sensitivity Test and the DCO model, as shown in **Figure 3-3** and **Figure 3-4** respectively. Similar to the AM peak, the change in the eastbound direction is relatively minor with a reduction of 15 PCUs on the A428.
- 3.1.7 PM Peak period traffic volumes are higher in the westbound direction than those in the AM Peak period. **Figure 3-3** and **Figure 3-4** show larger difference in flow and delay than the AM Peak. The Sensitivity Test forecasts show:
- An increase of 193 PCUs on the A14 WB at the A14/A428 diverge, due to a reduction of 36 seconds on delay.
 - An increase of 79 PCUs on the slip road from the A14 westbound to the A14 northbound.
 - An increase of 114 PCUs on the A428 westbound, immediately west of the A14.
 - A reduction of up to 54 PCUs on the A1307 westbound and a reduction of up to 11 PCUs on the A1303 westbound.

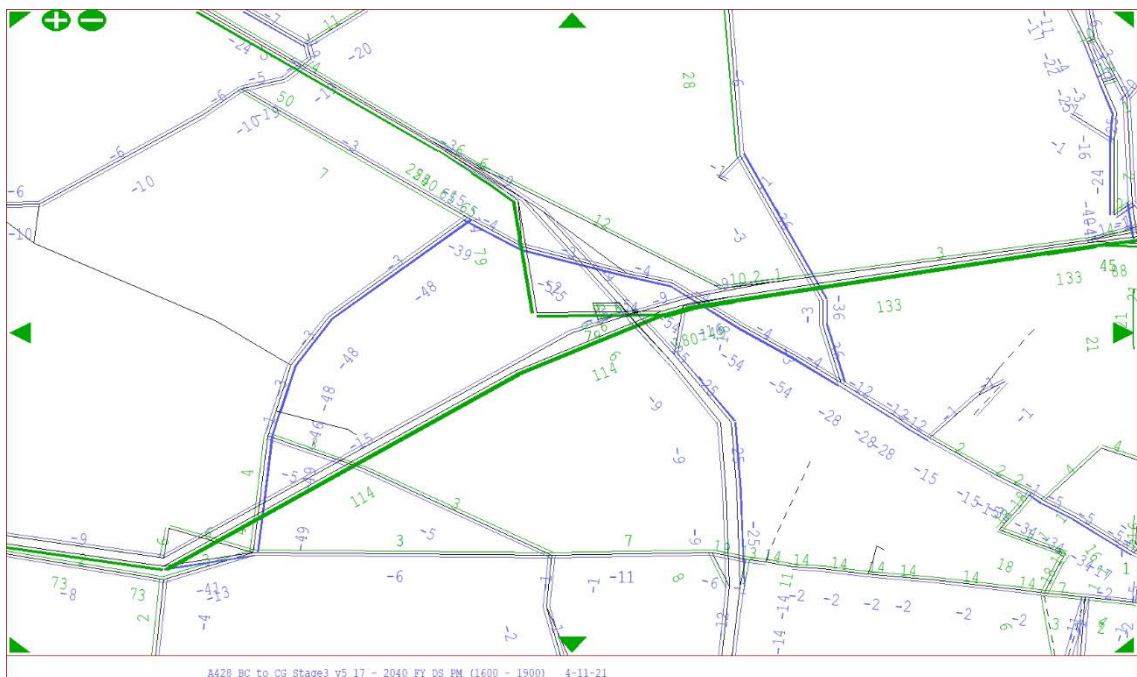


Figure 3-3 - Flow Comparison – Sensitivity Test Less DCO Model (2040 DS PM Peak)

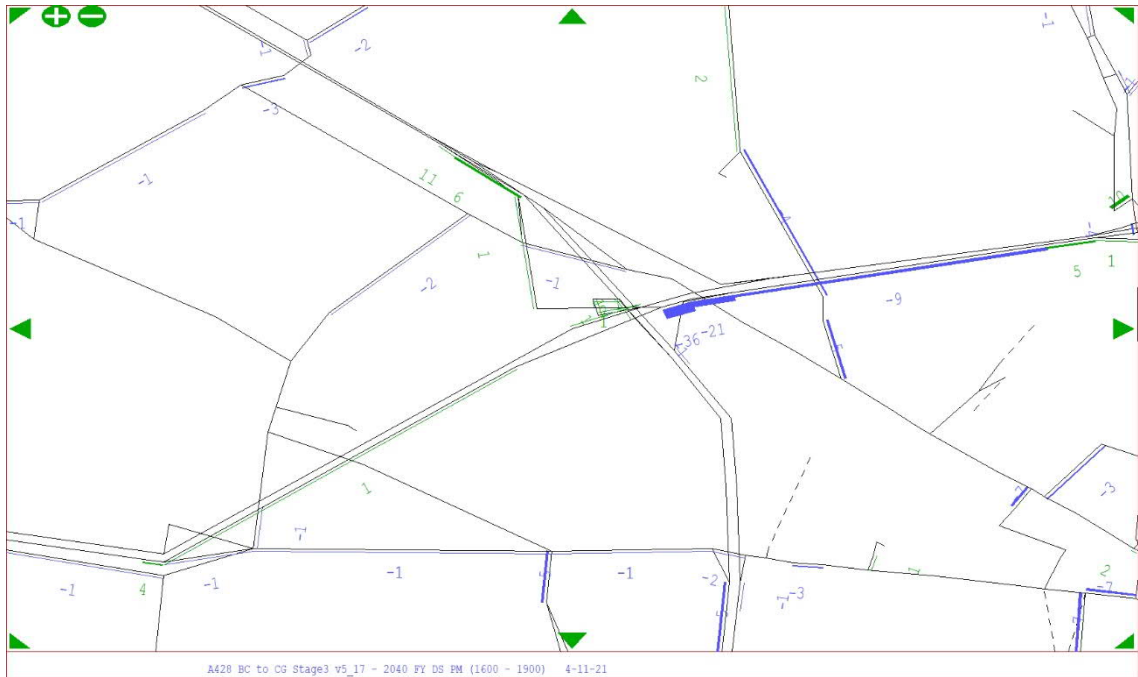


Figure 3-4 - Delay Comparison – Sensitivity Test Less DCO Model (2040 DS PM Peak)

4 Impact on Daily Traffic Forecasts

- 4.1.1 The Sensitivity Test forecast Annual Average Daily Traffic (AADT) have been calculated for selected roads at the Girton Interchange and surrounding area. These flows have been compared with the corresponding flows produced from the DCO models and are summarised in **Table 4-1**.
- 4.1.2 **Table 4-1** shows that the impact of the coding corrections is to generally increase traffic flows on the strategic roads and reduce flows on the local roads around the Girton Interchange.
- 4.1.3 Strategic Roads - there is an increase of 1,169 vehicles on the A14 westbound at the diverge of A14/A428 which is approximately a 2.4% increase on the link compared to the DCO model. Traffic increases by approximately 2.4% on the A14 link road and 2.6% on the A428 westbound after the diverge.
- 4.1.4 Local Roads – there is a decrease of 327 vehicles on the A1307 which is approximately a 2.5% reduction of traffic on this link. There is also a reduction of 2.1% on the Avenue, north of Madingley.

Table 4-1 - Traffic Flows – 2040 AADT in Vehicles

Area	Road	DCO Model		Girton Sensitivity Test		Test Less DCO		Test Less DCO %	
		2040 DM	2040 DS	2040 DM	2040 DS	2040 DM	2040 DS	2040 DM	2040 DS
Girton Interchange / Strategic Roads	A428 EB (the merge of A428/M11)	15,854	19,425	15,716	19,304	-138	-122	-0.9%	-0.6%
	A14 WB (the diverge of A14/A428)	45,477	48,105	46,036	49,274	560	1,169	1.2%	2.4%
	A14 Link Road (after the diverge of A14/A428)	27,611	26,086	27,941	26,722	329	636	1.2%	2.4%
	A428 WB (after the diverge of A14/A428)	17,865	21,974	18,096	22,552	230	578	1.3%	2.6%
Local Roads	Cambridge Road (via Girton)	11,026	11,203	10,990	11,097	-36	-105	-0.3%	-0.9%
	A1307 (East of A14 off-slip)	12,437	13,026	12,275	12,699	-162	-327	-1.3%	-2.5%
	A1303 (East of Coton junction)	17,371	19,773	17,427	19,719	55	-54	0.3%	-0.3%
	The Avenue (North of Madingley)	6,960	7,015	6,957	6,869	-2	-147	0.0%	-2.1%

4.1.5 **Table 4-2** provides a comparison of the 2040 DS AADT forecasts for the Sensitivity Test and the DCO model. This comparison is provided in both directions of the new A428 between Black Cat (BC) junction and Cambridge Road (CR) junction, and CR and Caxton Gibbet (CG) junction. It shows that the impact on the Scheme with the network amendments made in the Sensitivity Test are very modest. The largest change is an increase in AADT of under 100 vehicles westbound between CG and CR a difference of less than 0.3%.

Table 4-2 - Traffic Flows – 2040 DS AADT in Vehicles

Road	DCO Model	Girton Sensitivity Test	Test Less DCO	Test Less DCO %
A428 EB (BC to CR)	21,300	21,286	-15	-0.07%
A428 EB (CR to CG)	29,878	29,862	-16	-0.05%
A428 WB (CG to CR)	33,921	34,012	91	0.27%
A428 WB (CR to BC)	24,059	24,120	61	0.25%

5 Conclusions

- 5.1.1 The Sensitivity Test has demonstrated that with the corrections in the eastbound direction there is little impact on the volume of traffic flows in this direction in both AM and PM time periods. The reason for the small difference in flow and delay in the Sensitivity Test is an existing downstream node that is controlling capacity.
- 5.1.2 The Sensitivity Test has shown that impacts are greater in the westbound direction with the amendments made to the A14/M11 and A14/A428 diverges, and these affect the PM Peak hour more than the AM. However, the Sensitivity Test has shown that AADT flow changes around Girton Interchange are relatively small and less than 3% compared to the DCO model. In addition, the Sensitivity Test also shows that the impact in the DS, compared to the DCO model, is very small with the westbound AADT increasing by less than 0.3% and no material change on the Scheme in the eastbound direction.
- 5.1.3 The Sensitivity Test therefore demonstrates that with the network corrections included, the impact of AADT on the A428 in the DS scenarios is very small (i.e. less than 0.3%) compared to the AADT assessed and reported as part of the DCO.