A428 Black Cat to Caxton Gibbet improvements

TR010044

Volume 9

9.8 Traffic Routeing Impacts at Coton Technical Note

Planning Act 2008

Rule 8(1)(k)

Infrastructure Planning (Examination Procedure) Rules 2010

August 2021

Infrastructure Planning

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Development Consent Order 202[ ]

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Regulation Reference:	Rule 8(1)(k)
Planning Inspectorate Scheme Reference	TR010044
Application Document Reference	TR010044/EXAM/9.8
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Version	Date	Status of Version
Rev 1	31 August 2021	Final for Deadline 1

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1 Introduction

1.1.1 This technical note has been written following discussions with Cambridgeshire County Council (CCC) at the Local Technical Review Group (LTRG) meeting held on the 20 May 2021. CCC raised concerns that the amount of traffic travelling through Coton in the A428 strategic model is high and that this may raise concern amongst Council members.

1.1.2 Coton village lies just south of the A1303 and west of the M11, not far from M11 Junction 13, as shown in **Figure 1-1**. It is located on the road linking the A1303 with the A603, although the majority of the village is located to the west of this road and is located off High Street which is a no-through road. Cambridge Road connects the A1303 priority junction with Coton and is subject to a 30mph speed limit which continues into High Street (east) and Brook Lane, for a distance of around 850m. About halfway along Brook Lane the speed limit changes to 40mph for a distance of some 400m onto Grantchester Road which is de-restricted for a further 1.8km to where it meets the A603.

1.1.3 Just before the A603 roundabout, Grantchester Road meets the M11 J12 southbound off-slip, although motorway traffic has to give-way to traffic on Grantchester Road. The A603 provides a route into west Cambridge and traffic can also access the M11.

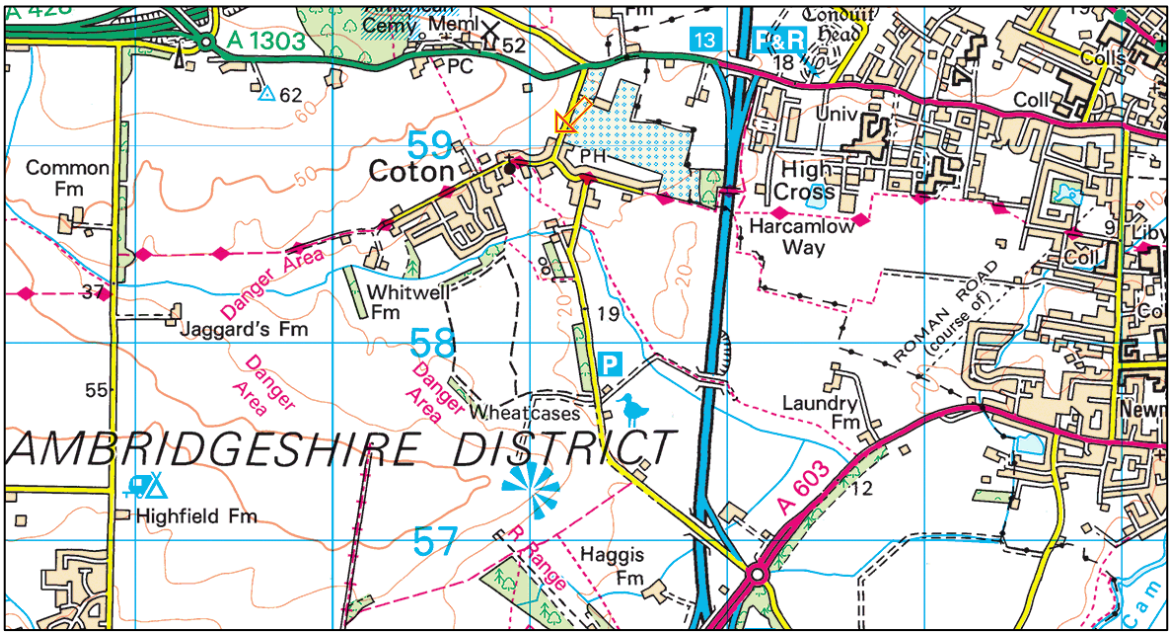

Figure 1-1: Location of Coton village

1.1.4 From the A1303 junction the route through Coton to the A603 is about 400m shorter than travelling via M11 J13 and exiting at J12, and when the A1303 is congested would provide a faster route.

2 A428 Strategic Model Calibration

2.1.1 The A1303 is a congested route in peak periods, particularly in the morning peak travelling towards Cambridge. Although some of this congestion is due to delays at M11 Junction 13, microsimulation modelling has demonstrated that the delays are due to capacity issues at A1303 junctions east of M11 Junction 13.

2.1.2 The traffic data available for the A428 strategic traffic model calibration was concentrated around the A428 Scheme and the majority of counts were located west of the M11. It was not intended that the strategic model should provide a detailed representation of the network in the Cambridge area. The model also represents average hours of an average weekday and hence does not replicate the fluctuations that can occur within these average periods, particularly the peak periods when traffic flows and journey times can vary considerably by location.

2.1.3 Another aspect of the traffic model is that it assumes perfect knowledge of the network. Therefore, if a route is calculated by the model to have a lower generalised cost it will assign traffic via that route. Drivers however may be unaware that a route is quicker, particularly if they are not familiar with the area and/or the alternative routes are not signposted. This applies at the A1303 junction, as although Coton and Grantchester are signposted, the A603 or M11 (J12) are not.

2.1.4 In terms of observed traffic using the route through Coton, **Figure 2-1** shows the hourly southbound traffic flow profile on Grantchester Road south of Coton village for a week in May 2016. This clearly shows that the route is used by a significant number of drivers during the weekday morning peak period. **Figure 2-2** shows the flow profile for the northbound direction and shows that there is a similar increase in traffic in the evening period and also a smaller uplift during the morning peak.

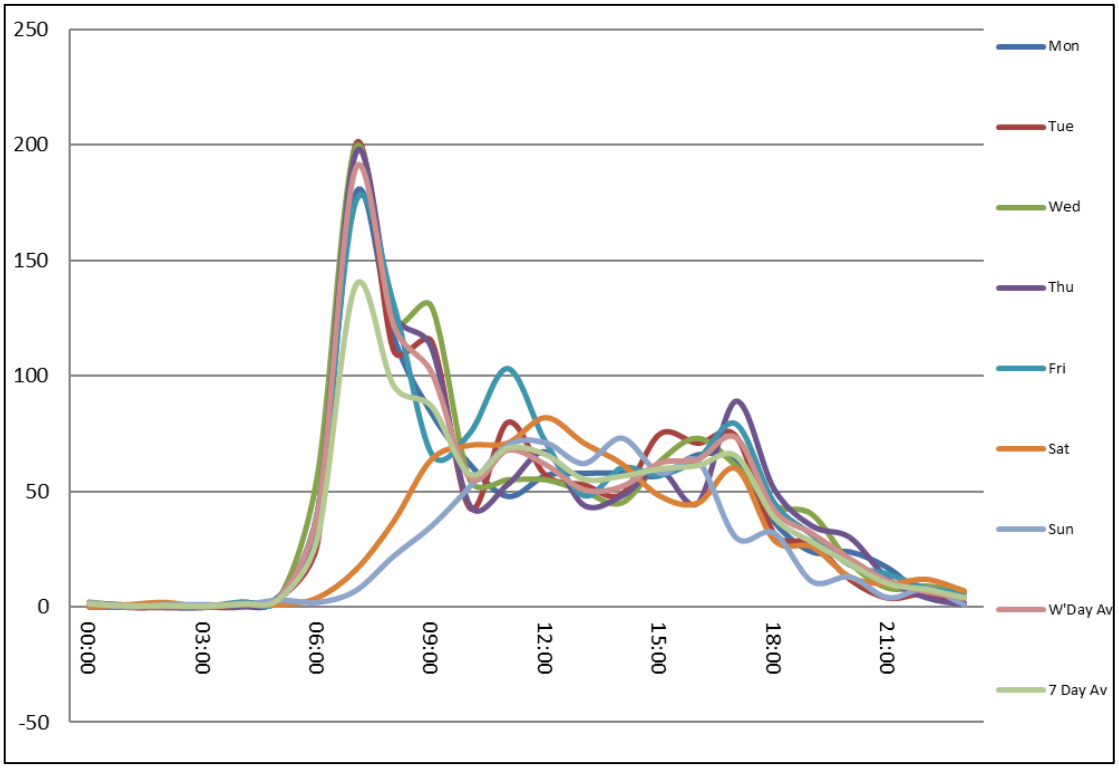

Figure 2-1: Grantchester Road Southbound Hourly Flow Profile

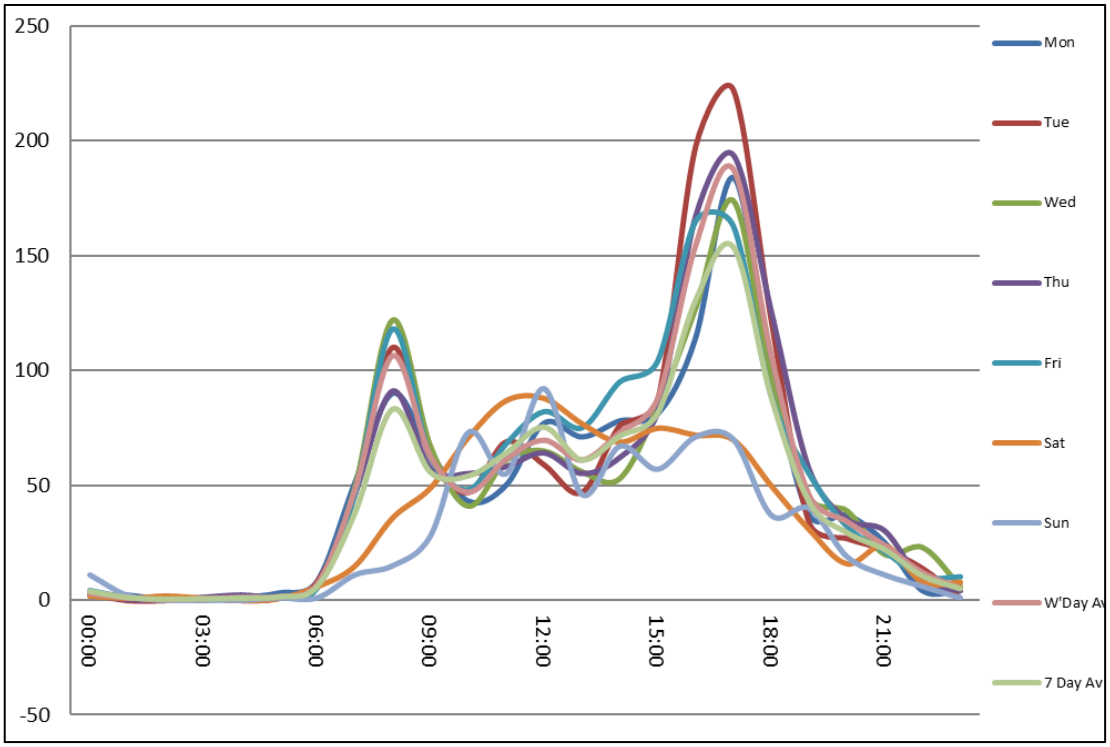

Figure 2-2: Grantchester Road Northbound Hourly Flow Profile

2.1.5 As well as the May 2016 automatic traffic count (ATC), a turning count survey was conducted in November 2019 at the A1303/Cambridge Road junction. This indicated similar volumes of traffic north of Coton to those south of Coton but also that the majority of Cambridge Road traffic in the peak periods was travelling to and from the A1303 west.

2.1.6 Compared to the 2016 ATC data, the 2015 base year strategic model[1] flow in the southbound direction in the AM peak average hour overestimates traffic on Grantchester Road by 219 passenger car units (PCUs). In the northbound direction the model performance was very close to observed flow, with a difference of just 3 PCU. The northbound modelled 2015 PM peak average hour flow is 102 PCUs higher than the observed flow, with the southbound volume 61 PCUs higher than the observed flow.

2.1.7 There are two explanations for the model over-predicting flows on Grantchester Road through Coton.

I. The model is assigning more traffic to the road through Coton to and from the A603 as the model predicts this route is faster than the alternative route via the M11. Through Coton village, as it's an urban area, fixed link speeds are used and set at 48kph (30mph). The 40mph section that was introduced at some time between Aug 2014 and June 2017 is not included in the base year or forecast year models. Therefore, between Coton and the A603 a speed flow curve (SFC) representing a 60mph speed limit is applicable although the free-flow speed is set at 82kph (51mph).

II. At the junction of Grantchester Road and the M11 J12 southbound off-slip, the turn saturation flow for traffic from the slip road is set too low. It is set at 770 PCUs which is applicable to a minor arm turn at a major road junction. The 'minor' arm however carries the higher traffic volumes and by some measure. Given the layout of the junction, which is similar to a merge rather than a standard 'T' junction, a higher saturation flow should be applicable. A review of 2019 WebTRIS[2] data for the off-slip demonstrated that hourly volumes were quite often in excess of the 770 model limit which would indicate that the model saturation flow should be higher, at around 1000-1200 PCUs. A higher saturation flow would result in more using M11 and less traffic using Granchester Road.

[1] The A428 Stage 3 Strategic Model models an average hour of peak period.

[2] Highways England Traffic Information System – online source of highway traffic information.

3 Traffic Origins and Destinations and Forecast Growth

3.1.1 The fact that the southbound problem at Coton is due to insufficient capacity on the M11 J12 off-slip reduces the likelihood that the model is routeing longer distance traffic through Coton. Of the 360 PCUs in the 2015 AM peak travelling southbound only 146 join the M11 at J12 and only 94 of these continue south of Junction 11 as displayed in **Figure 3-1**. Therefore almost 75% of traffic in the model passing Coton in the AM peak is traffic accessing the west and south-west areas of Cambridge and local villages.

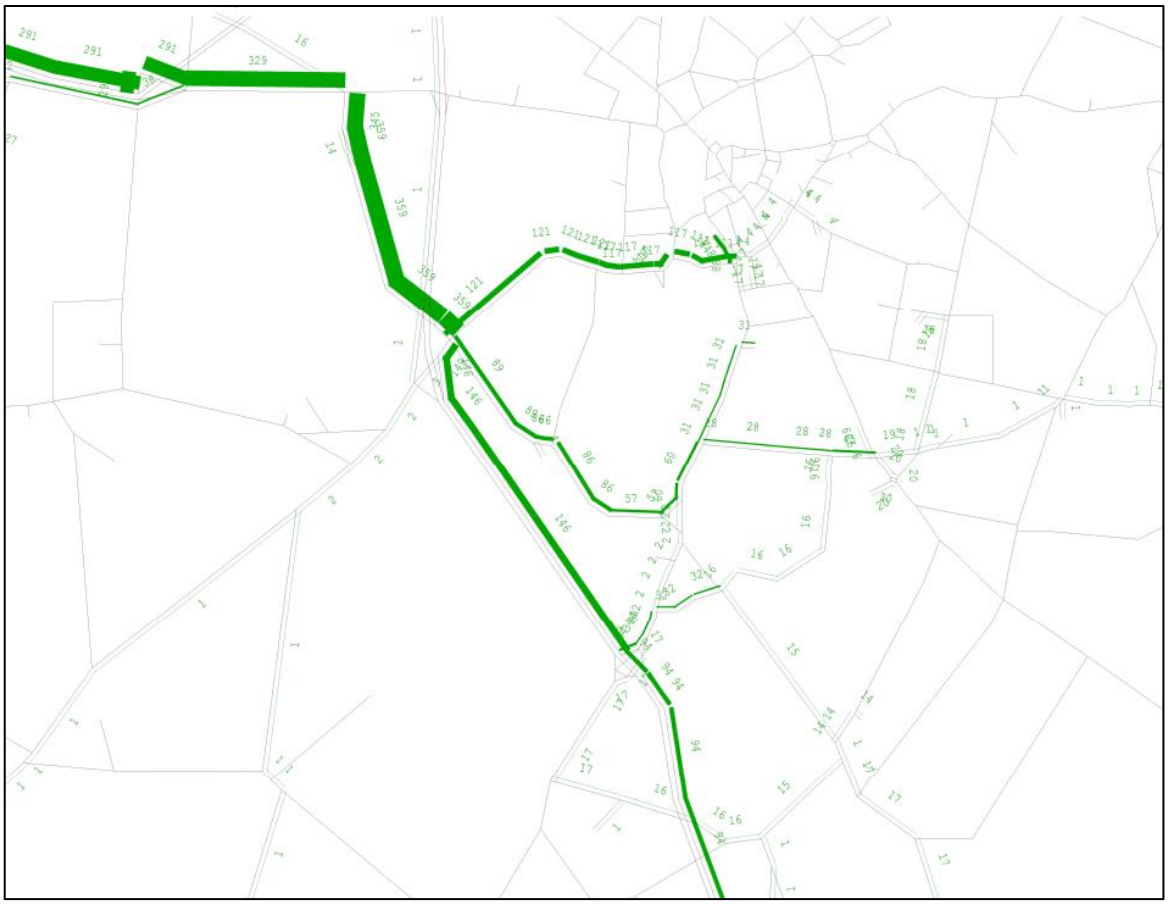

Figure 3-1 : Grantchester Road - 2015 AM Southbound Traffic Distribution

3.1.2 In the PM peak **Figure 3-2** shows that northbound traffic passing through Coton is virtually all from the Cambridge area with just 2 PCUs originating from the M11 south of junction 12. In this direction it would be logical that drivers travel from the Cambridge area via Coton as the distance via this route from the A603 northern roundabout is around 1.2km shorter and generally quicker than travelling via the M11.

3.1.3 The reason for the model over-predicting PM peak traffic through Coton is possibly due to some of this traffic not routeing via M11 junction 13, given that there is a shortfall of traffic on the J13 off-slip in the PM period. It may also be due to model zones in Cambridge being relatively large given the distance from the Scheme.

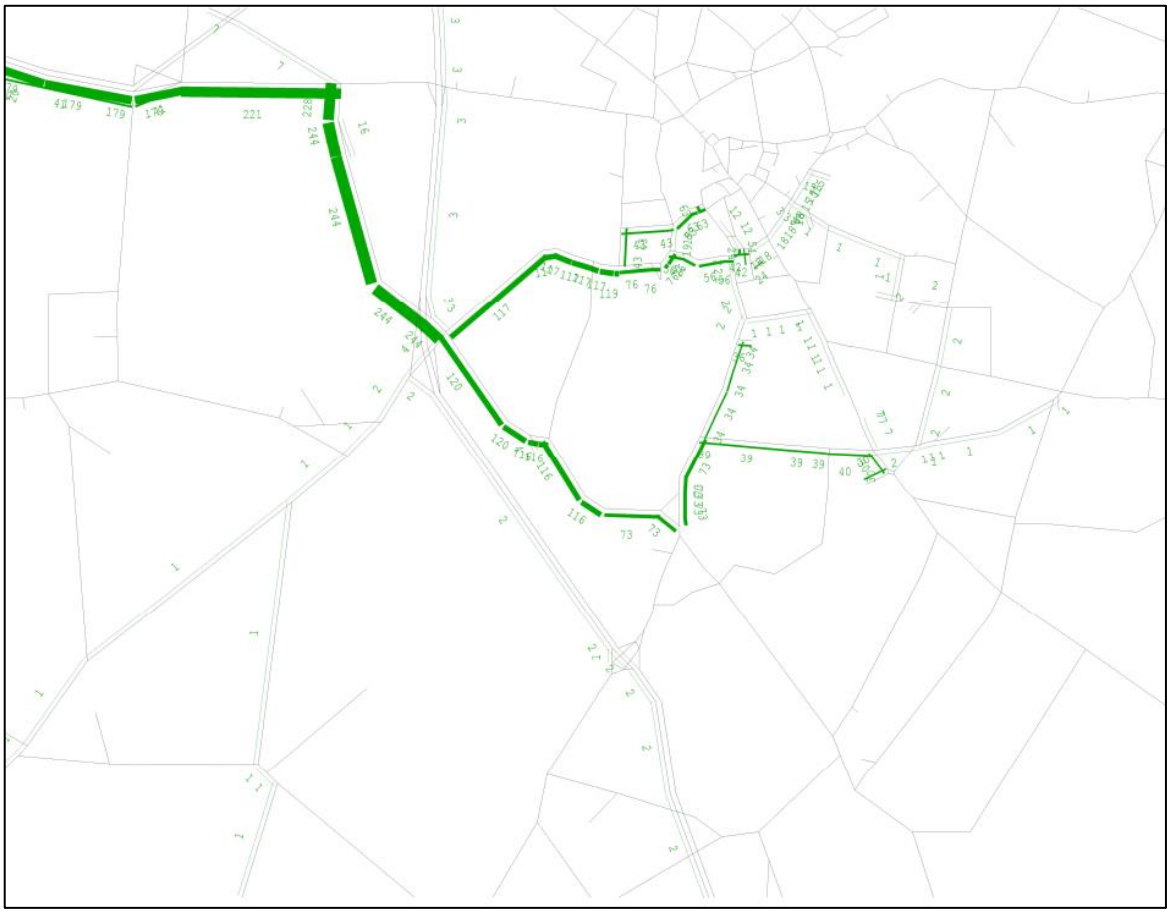

Figure 3-2 : Grantchester Road - 2015 PM Northbound Traffic Distribution

3.1.4 The issue of there being an over-estimation of modelled traffic in the base year continues into future years as the base year matrices and networks are used as a basis for forecasting. **Figure 3-3** shows the change in traffic flows between 2015 and the 2040 AM peak without the A428 Scheme, i.e. Do Minimum (DM) scenario. This shows that there is a forecast 205 PCU southbound through Coton and 137 northbound. Note that due to the completion of the A14 Cambridge to Huntingdon (C2H) scheme, and large developments coming forward during this period off the A1303 east of the M11, there are some changes in traffic patterns and routeings across this area of Cambridge.

Figure 3-3 : Forecast change in AM traffic volumes, 2015 to 2040 DM

3.1.5 **Figure 3-4** presents the distribution of southbound traffic through Coton in 2040 DM AM. This shows a total volume of 564 PCUs southbound compared to 359 in the 2015 AM peak in **Figure 3-1**. There is an increase from 94 to 158 travelling south of J11 and approximately 70 additional PCUs travelling west on the A603. Two reasons contributing to this increase is the issue of the capacity being understated on the J12 southbound off-slip, and additional congestion on the A1303 west of J13 which results in more southbound traffic routeing through Coton.

3.1.6 Due to additional congestion on the A1303 route, there is also an increase in traffic in the northbound direction through Coton although the absolute increase is less in the southbound direction.

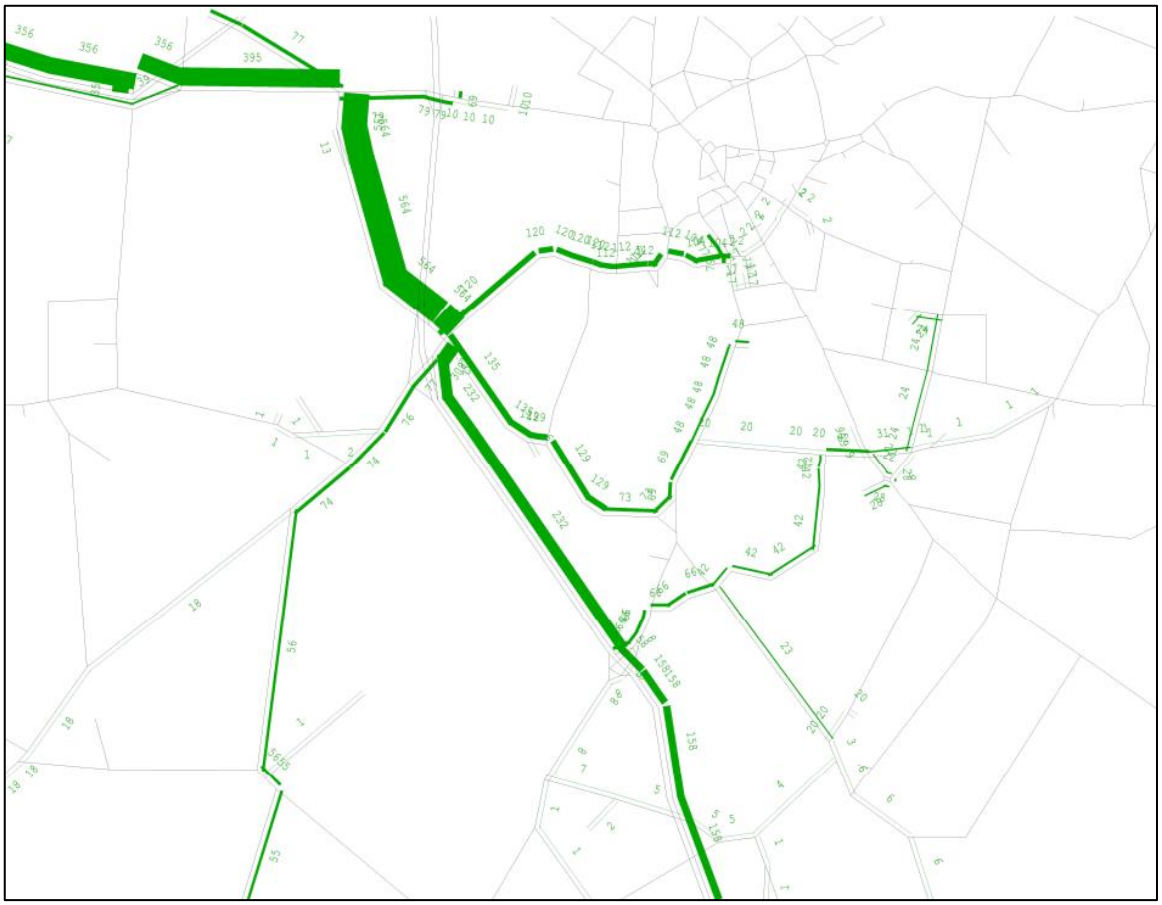

Figure 3-4 : Grantchester Road - 2040 DM - AM Southbound Traffic Distribution

3.1.7 In the 2040 DM PM peak, due to additional congestion on the A1303 route, there is also an increase in traffic in the northbound direction through Coton although the absolute increase is less in the southbound direction as displayed in **Figure 3-5**. Growth in the northbound direction would probably be greater if it were not for delay occurring to traffic on the Cambridge Road approach at the A1303 junction.

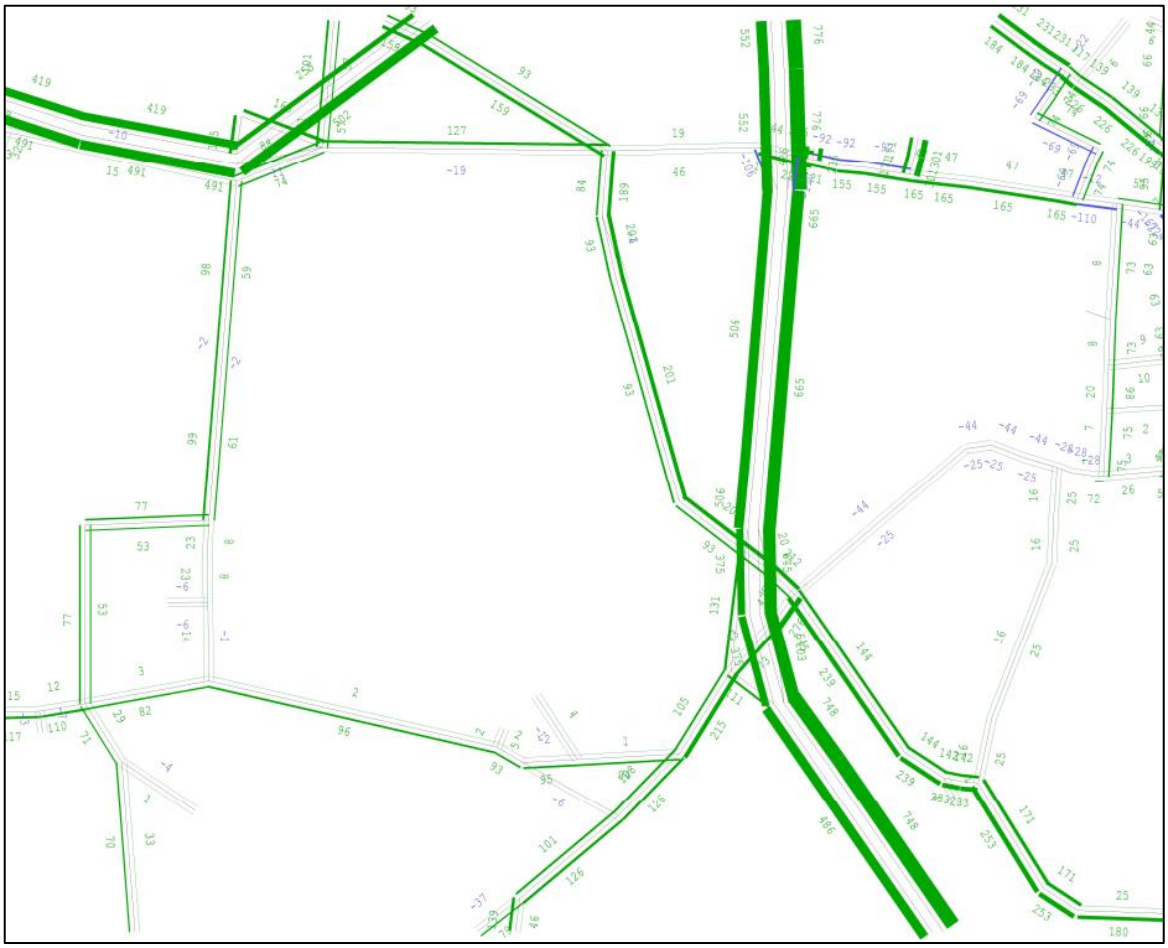

Figure 3-5 : Forecast change in PM traffic volumes, 2015 to 2040 DM

3.1.8 Although the increase in southbound traffic is greater in the PM peak, the northbound flow is still higher. **Figure 3-6** shows the distribution of the northbound traffic in the 2040 DM scenario and although traffic increases from 244 (**Figure 3-2**) to 352 PCUs, the volume of long distance traffic is still very low with just 7 PCUs originating south of M11 J11 with by far the majority coming from southwest and west Cambridge.

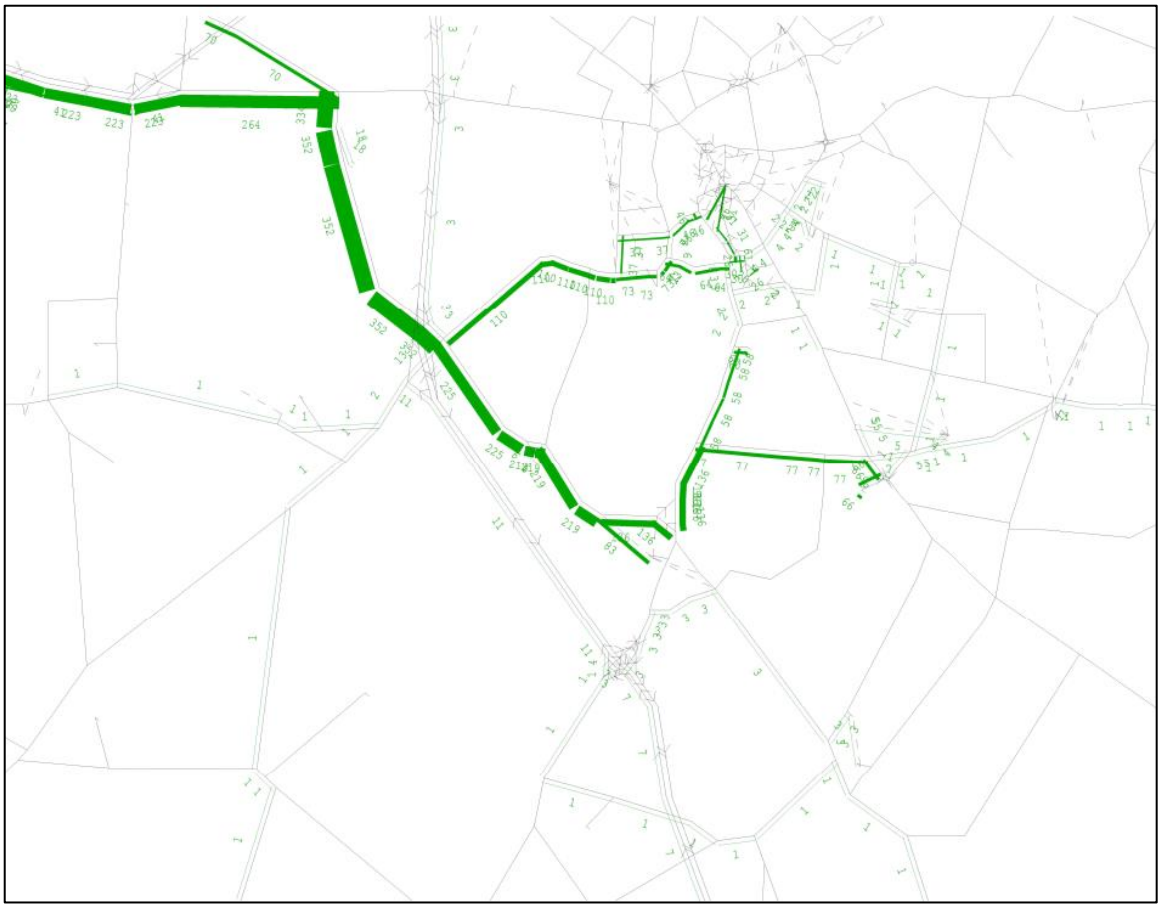

Figure 3-6 : Grantchester Road - 2040 DM - PM Northbound Traffic Distribution

3.1.9 The final part of this analysis is a review of the A428 Scheme impacts, i.e. Do Something (DS) Scenario on the route through Coton. **Figure 3-7** and **Figure 3-8** show the change between the 2040 DM and 2040 DS scenarios for the AM and PM peaks respectively. In the PM peak there is a forecast overall reduction in traffic through Coton as a result of the A428 Scheme. In the AM peak there is a modest increase in traffic due to the Scheme with an additional 51 PCUs southbound compared to the without Scheme scenario. As the Scheme makes the A428/A421 a quicker route there is some transfer of traffic from other roads, such as the A603 which does lead to some additional traffic on roads connecting into the A428, such as Grantchester Road.

3.1.10 **Figure 3-9** presents the distribution of the AM peak southbound traffic through Coton for the 2040 DS scenario, which has the largest impact by the Scheme in 2040. When compared to **Figure 3-4** this shows a small increase in longer distance traffic from 158 PCUs to 179 PCUs travelling beyond M11 J11.

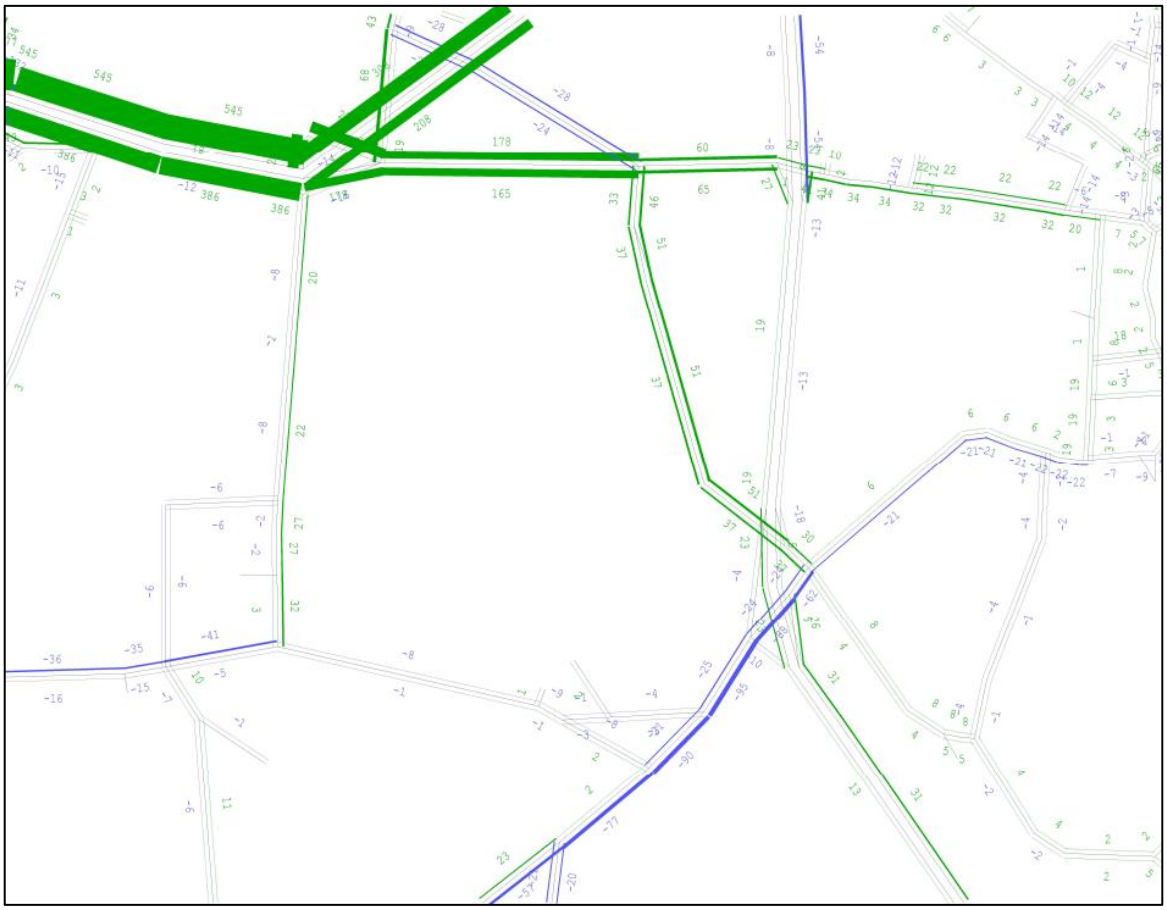

Figure 3-7 : Grantchester Road - 2040 AM - DS less DM Traffic Volume (PCU)

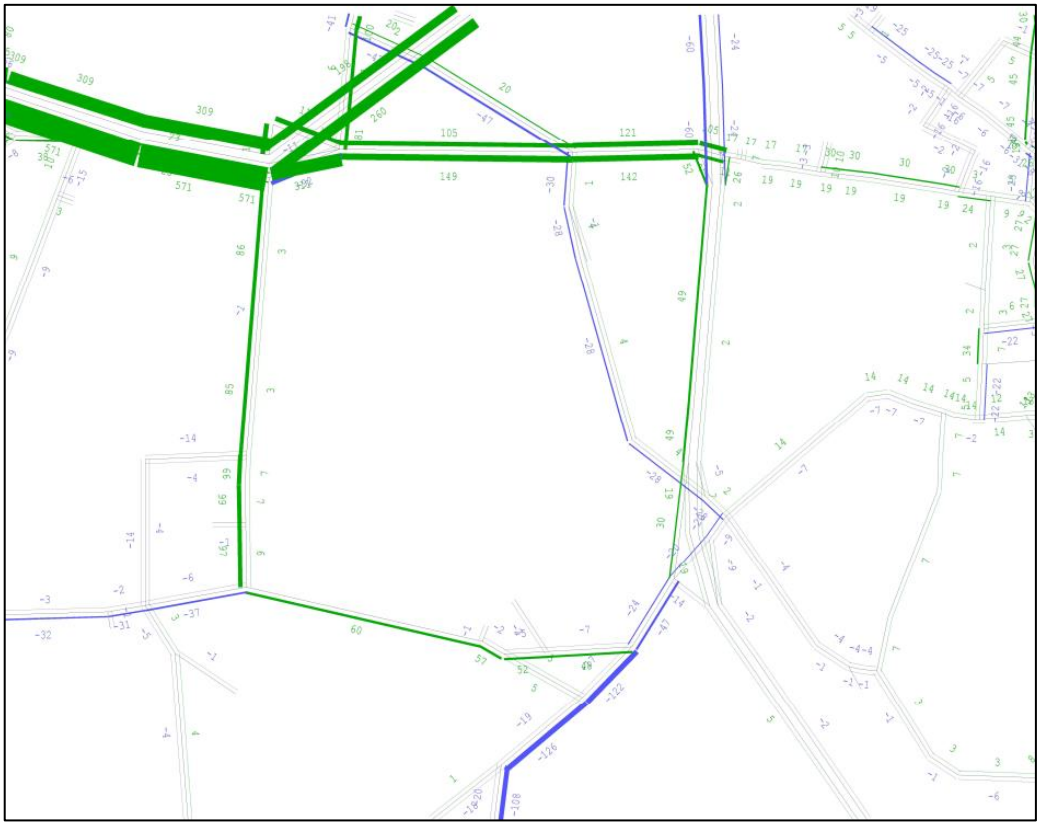

Figure 3-8 : Grantchester Road - 2040 PM - DS less DM Traffic Volume (PCU)

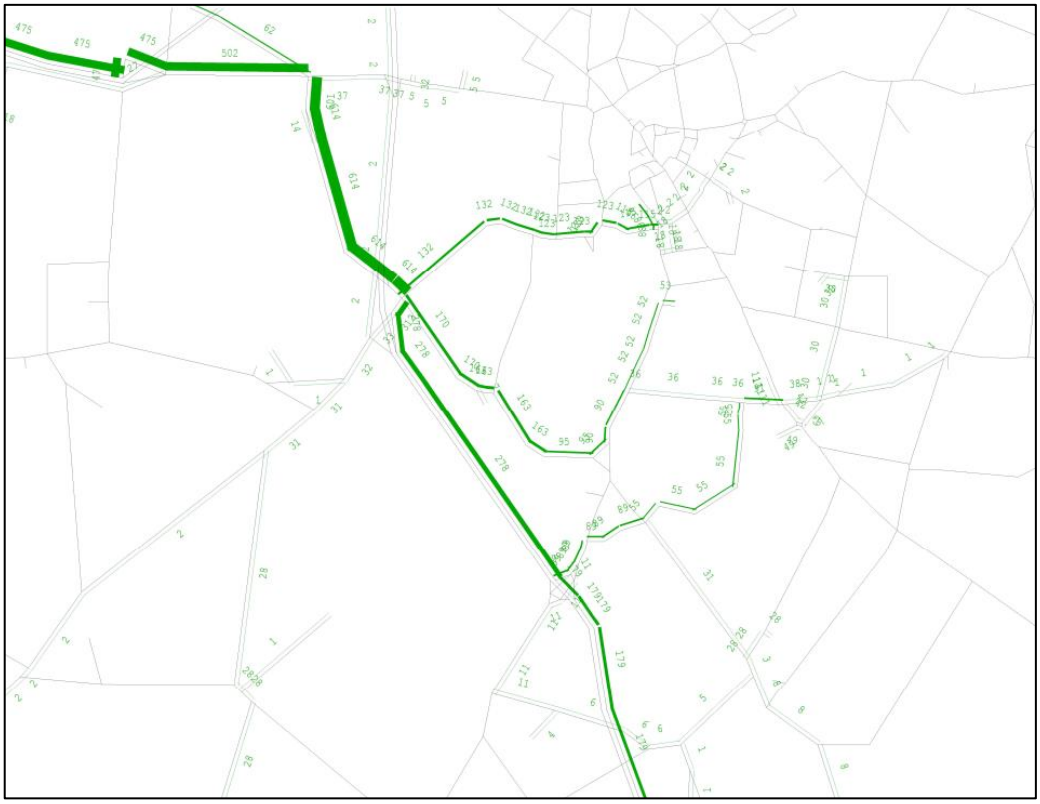

Figure 3-9 : Grantchester Road - 2040 DS - AM Southbound Traffic Distribution

4 Conclusions

4.1.1 The A428 Strategic Traffic Model was developed to assess the strategic impacts of the A428 Scheme. As it is a strategic model, there is a limit to how well it represents the local road network beyond the extents of the Scheme as there are necessary 'trade-offs' in terms of the network and traffic zone detail. Therefore, it would not be expected to model perfect representation of traffic behaviour on local roads some 10-15 kilometres from the Scheme.

4.1.2 Following CCC concerns about the volume of traffic routeing through Coton in the A428 strategic traffic model, a review of the model in the Coton area has been carried out. This has shown that the base year model overstates volumes to some degree with southbound volumes on Grantchester Road in the AM peak being around 219 PCUs (156% of the count data) too high and in the PM peak around 102 PCUs (72% of the count data) too high in the northbound direction and about 61 PCUs (103% of the count data) too high southbound.

4.1.3 A review of 2015 origins and destinations of this traffic has demonstrated that the majority of modelled traffic passing through Coton is travelling to or from locations in the Cambridge area, with relatively low volumes of longer distance traffic. For northbound traffic, the route through Coton from locations in west Cambridge would generally be quicker given that it is significantly shorter than using the M11 between J12 and J13.

4.1.4 A review of the strategic model coding of the M11 J12 southbound off-slip indicates that the capacity at the junction of this link with Grantchester Road is too low and is probably a reason why more traffic is routed through Coton in the model than was observed in the 2016 and 2019 traffic surveys.

4.1.5 A review of 2040 model forecasts does show the volumes through Coton to be greater than those in the 2015 models. However, this increase will also be partly due to the coding issue noted at the J12 southbound off-slip as the coded capacity is too low. Some of the increase will also be due to increasing congestion along the A1303 east of the Coton junction.

4.1.6 The strategic modelling indicates the A428 Scheme will have a small impact on the route through Coton as there is some transfer from alternative east-west routes to the A428. However, there is very little impact forecast in the evening peak period and increases in the morning peak period are relatively modest.

4.1.7 In summary, while the model is over-predicting the traffic routeing through Coton, this traffic is local traffic wit origins/destinations within Cambridge and is not affected by the Scheme.