

Technical Note

Project:	Milton Keynes Model Update	Job No:	60516496
Subject:	Revised Reference Case		
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Introduction

After the initial reporting on the 2031 Reference Case [reported in the Milton Keynes Multi-Modal Model (MKMMM) Traffic Forecasting Report] there have been some updates to new road schemes included in the 2031 forecast models. One significant addition is improvements at Kelly's Kitchen Roundabout on the A5 which have been approved by Highway's England.

In addition new information came to light regarding the A421 dualling scheme west of M1 Junction 13, specifically the A421 roundabout at M1 J13. It was originally understood that this would include a bypass lane to allow A421 westbound traffic to avoid the roundabout. However due to the location of a side road it would not be possible to have enough separation distance after the merge and hence this lane has been excluded from the scheme.

This first part of this note details the above changes and also some minor edits included to improve network accuracy given the opportunity had arisen to also include these. The latter part of this note gives a brief overview of the impacts of the changes made in terms of flow, delay and volume of capacity (V/C) ratios compared to the previous Reference Case model outcomes.

Network Amendments

A revised Reference Case Scenario was produced by applying the changes outlined in this section and then re-running the demand model with the original Reference Case input demand.

Kelly's Kitchen Roundabout

Since the Reference Case model was created, Highways England has approved the scheme design for Kelly's kitchen roundabout, which was submitted to them by developer of the Eaton Leys site. The design is for a Hamburger junction with the length of the A4146 between the junction and the Eaton Leys access dualled, with signals at this access. The proposed layouts are presented in Figure 1 and Figure 2.

Signal timings were provided in a LINSIG model. These models were produced on behalf of the developer but not based on flows from the updated MKMMM. For the AM peak it was possible to make use of the timings with minor adjustments to reduce delay. For the PM peak the LINSIG model was updated with flows from the existing PM MKMMM Reference Case model and the timings re-optimised. These timings were then coded into the revised Reference Case. For the inter-peak in the absence of LINSIG timings the PM timings were used and appear to work satisfactorily with the inter-peak flows in the MKMMM assignments.

It has been noted that according to the lane markings southbound traffic on the A5 is only permitted to use a single lane on the approach to the junction, this resulted in large delays when tested in the PM

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peak and it was also noted that in the LINSIG model the movement is permitted in two lanes. Therefore two A5 to A5 lanes (lanes 1 and 2) have also been coded in the revised MKMMM Reference Case.

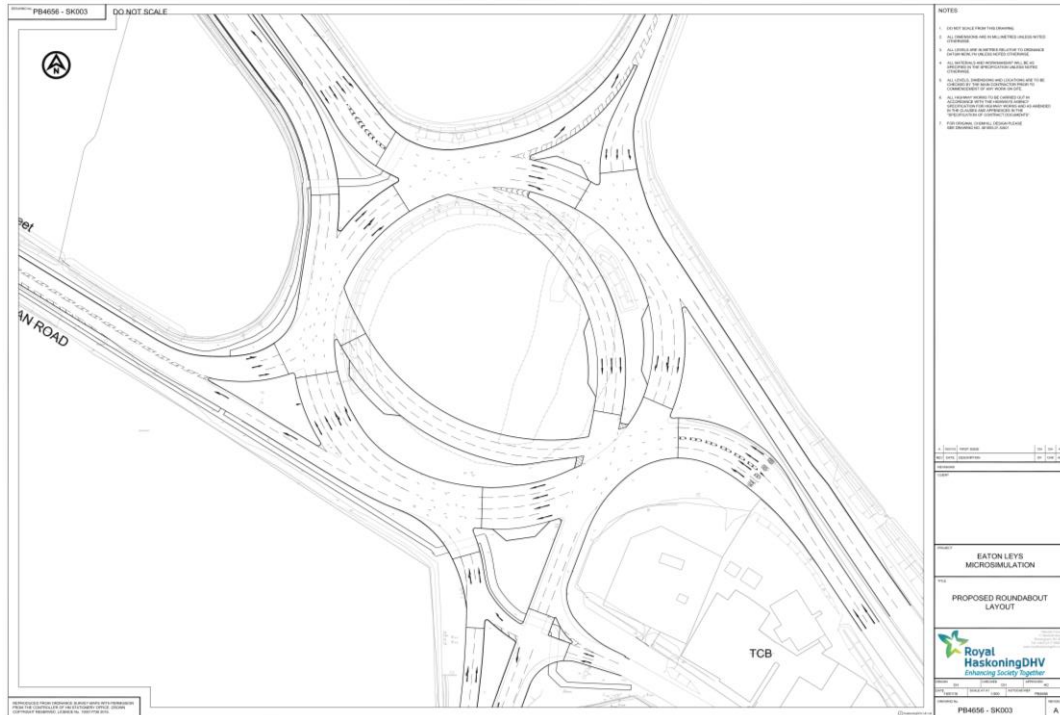


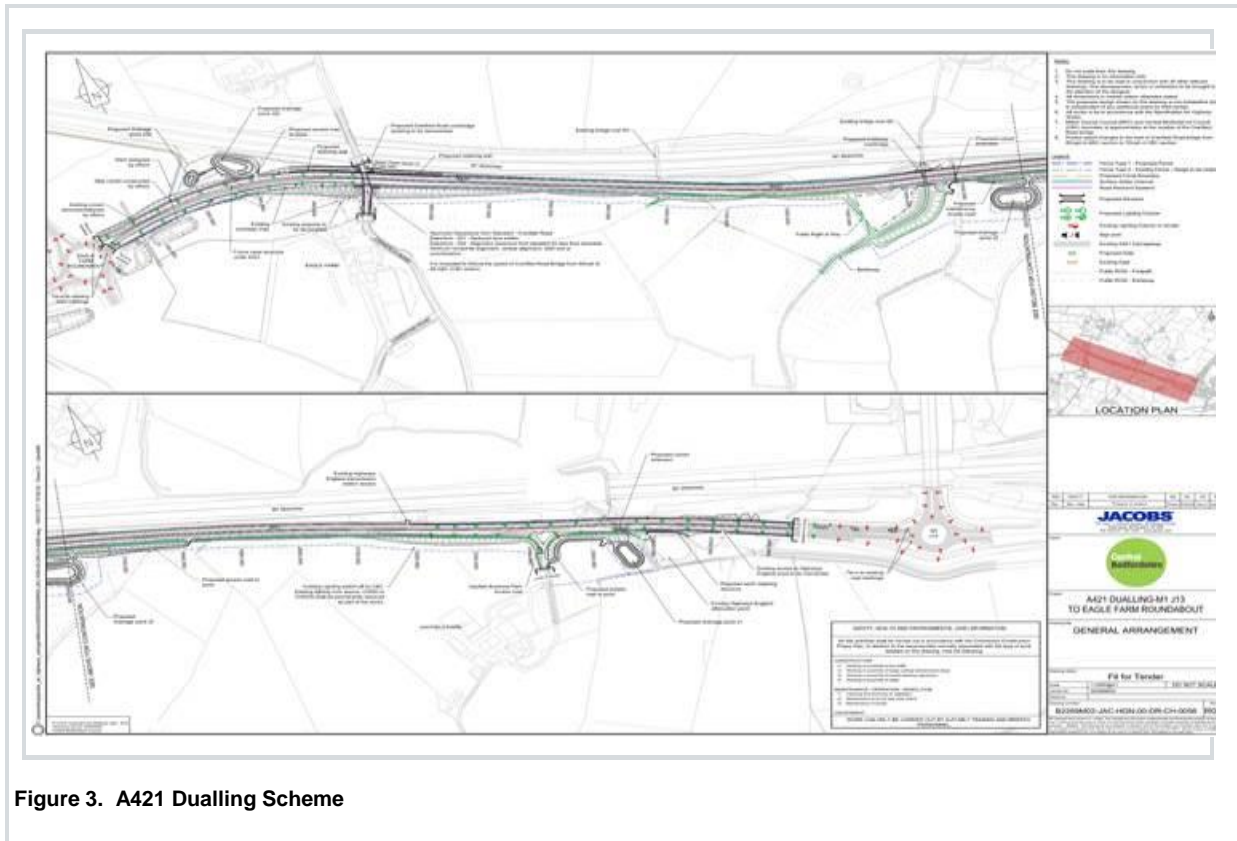
Figure 1. Kelly's Kitchen Proposed Layout (with single A5 north to south lane)



Figure 2. Proposed Eaton Leys Access

A421 dualling Scheme

When the Reference Case networks were originally coded we were informed by the scheme consultants that there would be a left turn bypass lane south of the A421 roundabout which would allow westbound traffic to bypass the roundabout. However it was subsequently brought to our attention that the scheme stops short of this roundabout with no interventions included at the junction. This is shown in Figure 3.



H6/V10 Roundabout

The H6 Childs Way approaches were modelled with 3 lanes at the give way line. This was corrected to two lanes at the give way line.

Salford Road / Bedford Road Junction

The junction is now modelled by a single signal node. Additional model detail was added on Bedford Road between the M1 J13 northern roundabout and Salford Road to model the hatched separation between the ahead and right turn lanes with long queues forming in the right turn lane leading to traffic blocking back.

Cranfield University loading point

Cranfield University in the original Reference Case had a single loading point whereas there are multiple exits onto the road network. In the PM peak in the 2031 forecast scenarios there was a large delay caused by the restrictive zone loading and forecast growth in trips. The give-way turns from the spigot have been amended to have a saturation flow of 9999 to help the traffic exit. This has significantly reduced delay although there is still a small amount of queue on the spigot and at nearby junctions.

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Open University Loading points

Zone 1094 representing the Open University, originally just loaded onto V10 Brickhill Street. In the Revised Reference Case it now also loads onto H9 Groveway.

The loading for zone 1024 directly south of zone 1094 was also amended as it was noted that this had two loading points in the model, it would be more realistically represented by a single loading point onto V10 Brickhill Street. This is because the access onto Groveway is a minor one and appears to be barrier controlled. The existing zone connectors are shown in Figure 4 and the revised zone connectors are shown in Figure 5.

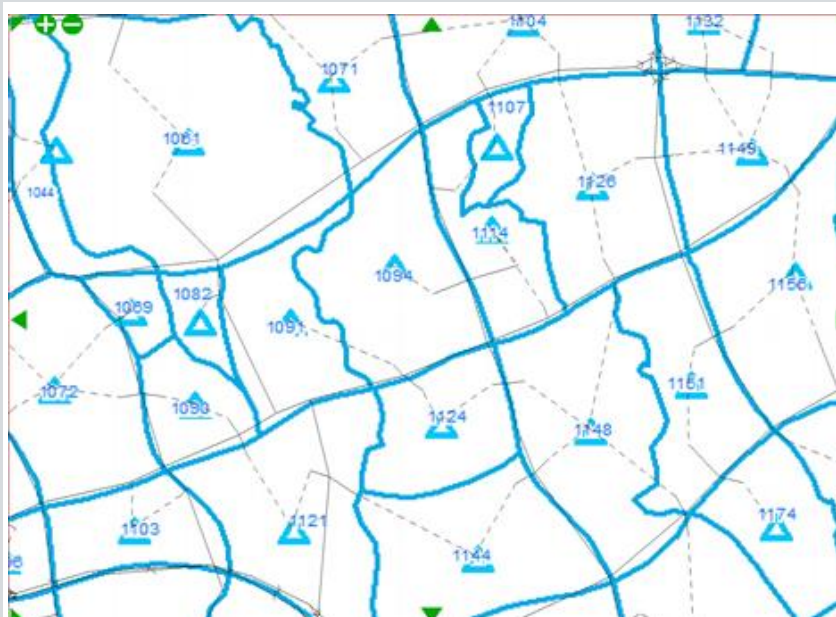


Figure 4. Existing Zone connections

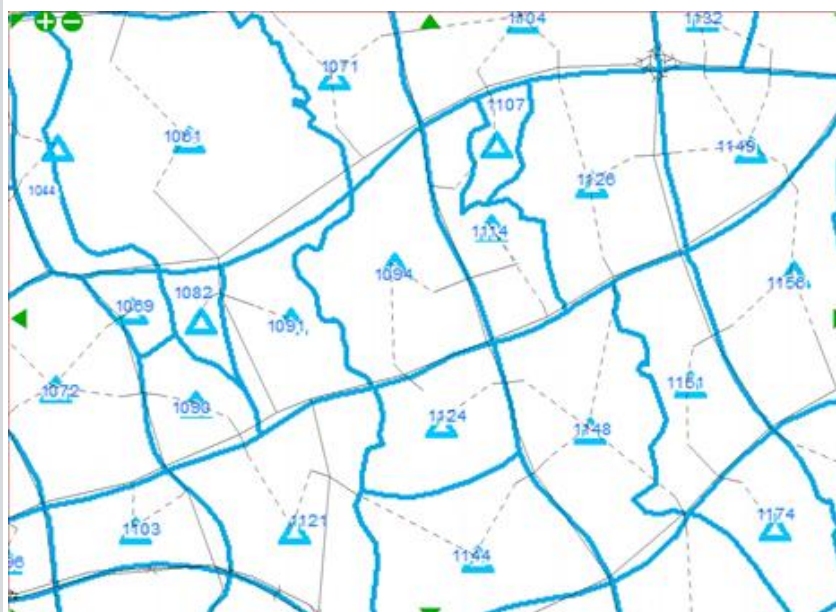


Figure 5. Revised Zone connections

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Impact on Modelled Traffic Flow

Flow comparison plots are presented in **Error! Reference source not found.** to Figure 8.

Kelly's Kitchen Roundabout

The largest impact of the new layout is in the AM Peak in which the northbound flow on A5 immediately north of the junction is over 900 PCUs (Passenger Car Units) higher than without the improvement. This is mostly due to traffic re-assigning from other routes and using the A5 and also reductions in queued traffic at Kelly's Kitchen. These other roads include Brickhill Street with less traffic north of Station Road.

A421 Dualling Scheme

There is a small reduction in westbound flow on A421 in all three time periods of around 50 to 100 PCUs.

There is now more traffic in the model using the south roundabout at M1 J13 and joining the A421 north eastbound using the on slip north of this roundabout.

H6/V10 roundabout

This has a notable impact in the AM Reference Case; there is a 300 PCU reduction on H6 between V11 and V10 with an increase on the parallel sections of H5 and H4. There is little impact in the IP and PM periods.

Salford Road / Bedford Road Junction

The impact is relatively small in terms of flow, the biggest impact being in the AM with a reduction of 59 PCU travelling northbound towards Brogborough. In the PM peak there is a small increase of 79 PCUs travelling towards Brogborough but this could be an effect of removing the A421 junction bypass lane.

Cranfield zone loading point

This has only impacted modelled traffic in the PM peak. More so in the full demand model run where there is a combined total of around 400 additional PCUs heading across the M1 towards MK on Newport Rd, Broughton Rd and the Wavendon Road.

Open University loading point

This only has a localised impact around the Brickhill St. / Groveway roundabout

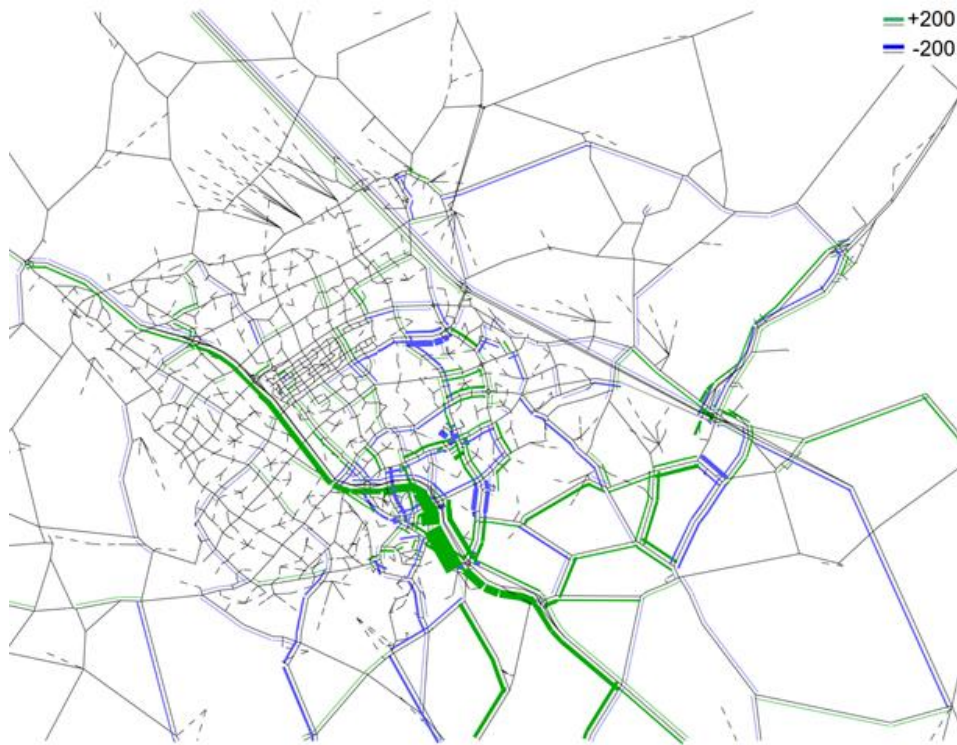


Figure 6. Actual Flow Comparison, Revised Reference Case less Original Reference Case - AM



Figure 7. Actual Flow Comparison, Revised Reference Case less Original Reference Case - IP

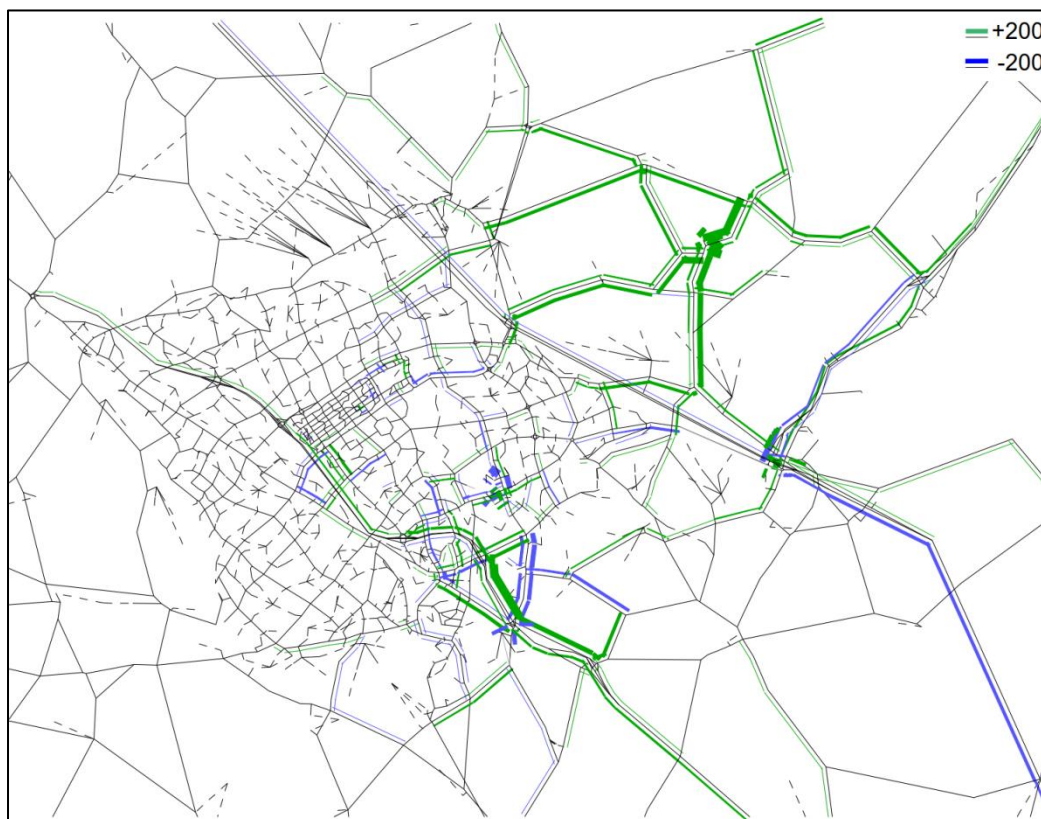


Figure 8. Actual Flow Comparison, Revised Reference Case less Original Reference Case - PM

Impact on Delays

Plots showing the change in total delay as a result of the amendments are presented in Figure 9 to Figure 11. As to be expected the improvements at Kelly's Kitchen Roundabout reduce the overall delay at that junction. At the A421 junction, with the left bypass lane removed, there is an increase in delay on the westbound approach to the roundabout.

As a result of the large increase in traffic through Kelly's Kitchen Roundabout in the AM peak there is an increase in delay on a number of roads to the south of Milton Keynes. Most notably delays have increased on the northbound A4146 approach to the junction with Galley Lane, and on the A5 northbound approach to the junction with Woburn Road and Sheep Lane. In the inter-peak there is minimal impact in terms of delay. Although there are slight increases in delay to the south of Milton Keynes in the PM peak these are to a lesser degree than in the AM Peak. The most notable impact in the PM peak is to the east of the M1, around Cranfield where the blocked trips have been released onto the network. This has increased delay at the junction Newport Road with the A509 just north of J14 by over half a minute.

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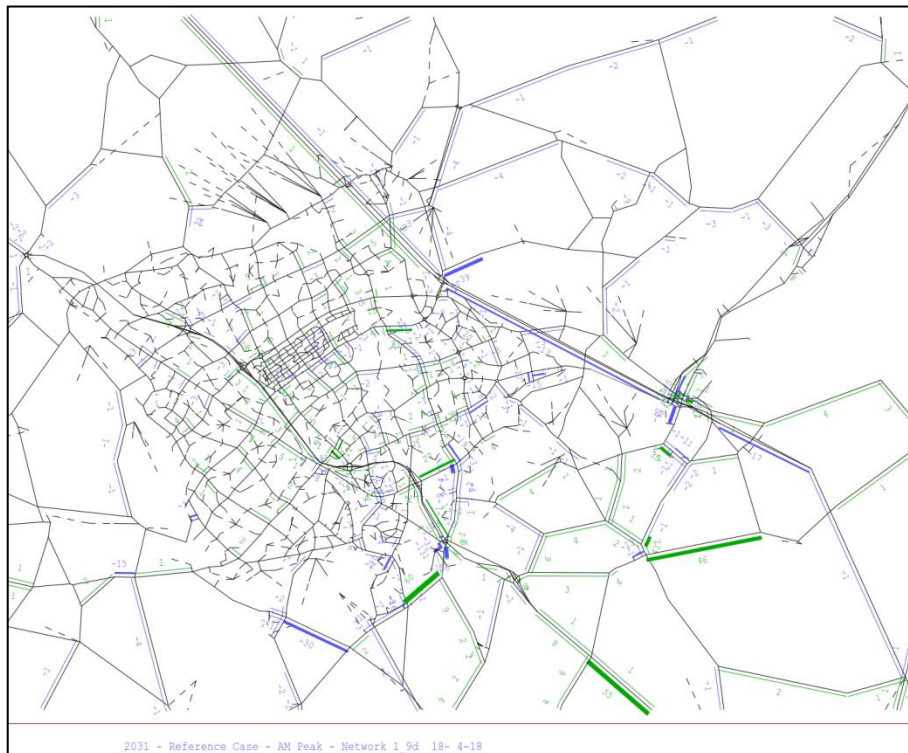


Figure 9. Delay Comparison, Revised Reference Case less Original Reference Case - AM

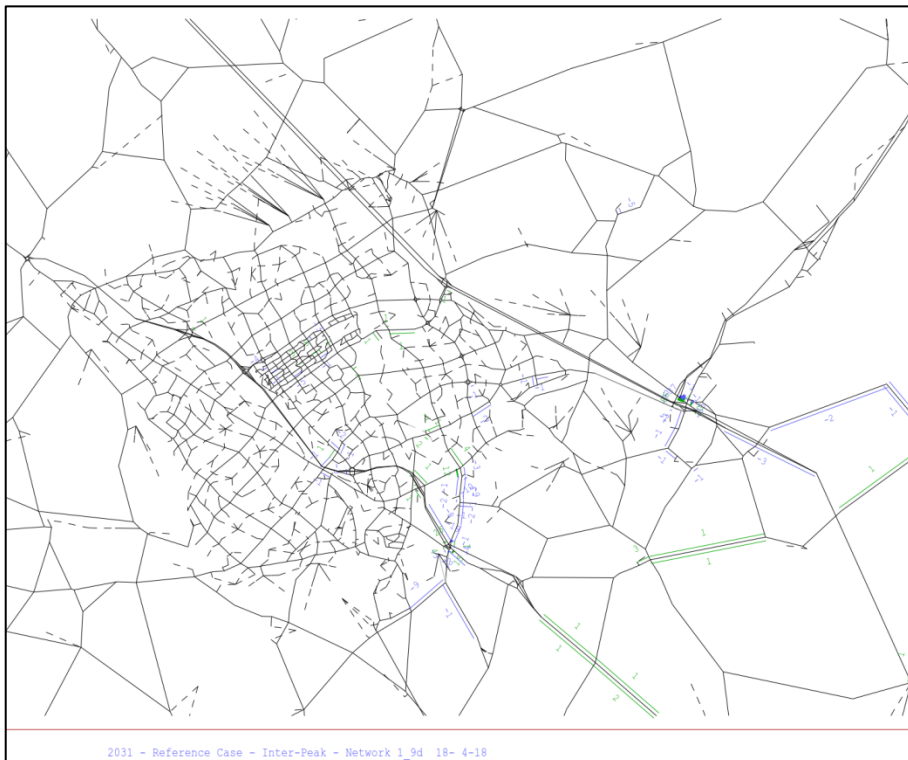


Figure 10. Delay Comparison, Revised Reference Case less Original Reference Case - IP

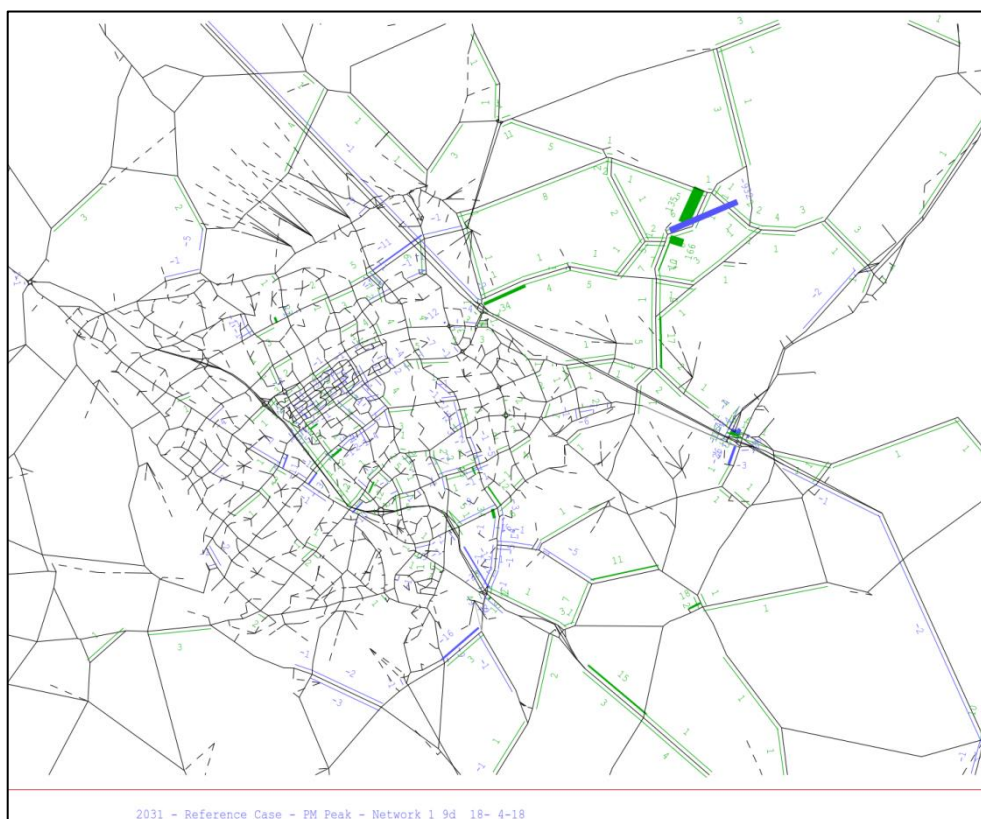


Figure 11. Delay Comparison, Revised Reference Case less Original Reference Case - PM

Volume over Capacity Ratios

There is a clear reduction of average node V/C between the revised Reference Case and the original Reference Case in the AM peak. However comparing V/C ratios between versions shows very little change and no notable changes. Although in the PM it appears the eastbound approach to the A421 roundabout is worse, this is not the case. In the original version there is a short link on the approach to the junction because of the bypass lane which has a V/C of 112% now the short link is removed the high V/C is simply more noticeable on the plot.

Plots showing the volume over capacity (V/C) ratios over 85% for the AM and PM peak for the original Reference Case and Revised Reference Case are presented in Figure 12 to Figure 15.

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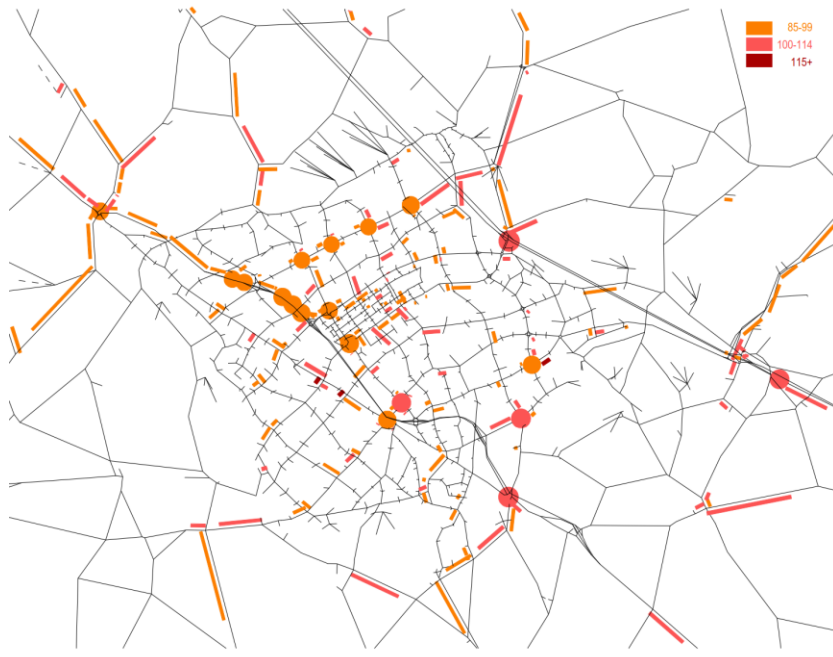


Figure 12. Volume over Capacity ratios 85% and above – Original Reference Case - AM

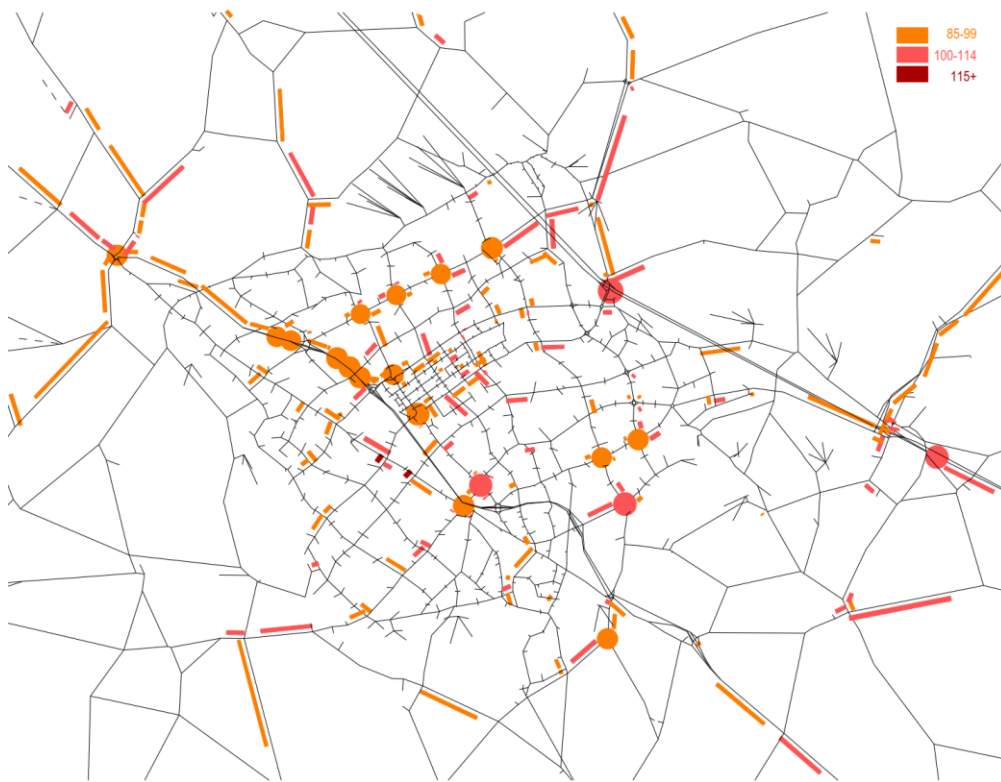


Figure 13. Volume over Capacity ratios 85% and above – Revised Reference Case - AM

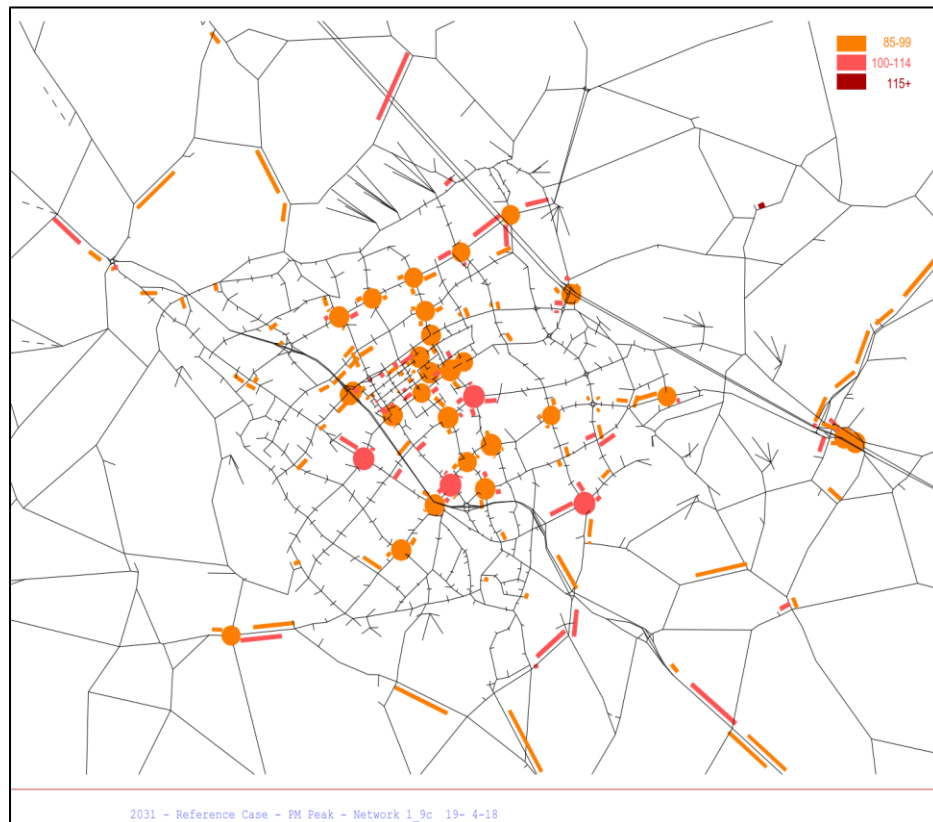


Figure 14. Volume over Capacity ratios 85% and above – Original Reference Case - PM

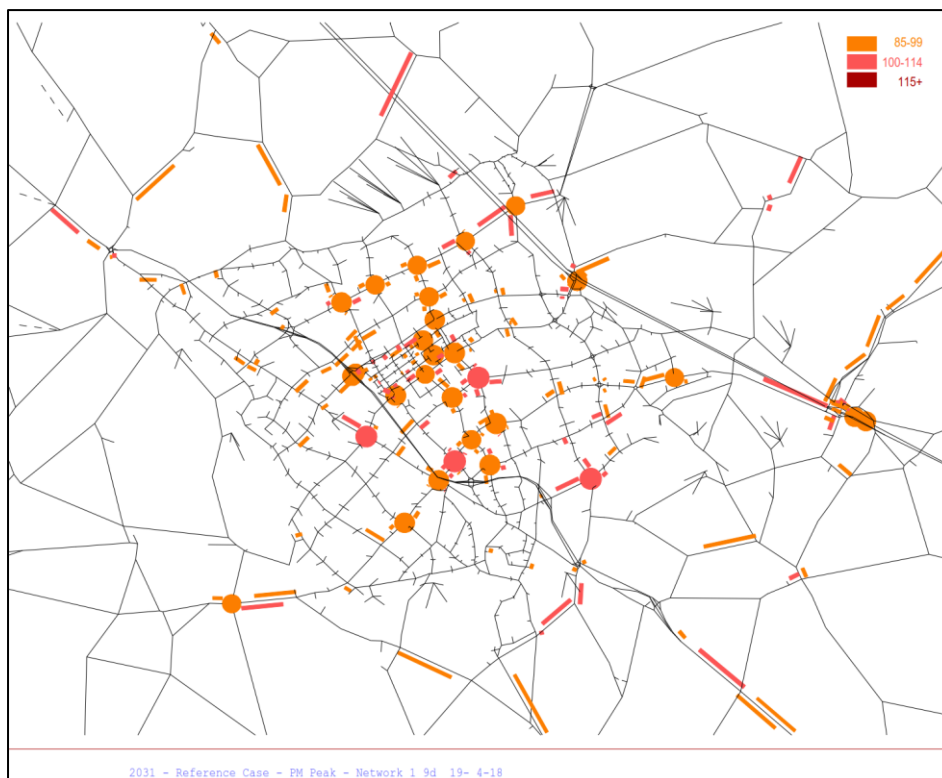


Figure 15. Volume over Capacity ratios 85% and above – Revised Reference Case - PM

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Conclusions

The biggest impact of the Kelly's Kitchen scheme is shown in the AM peak, with a large increase in flow northbound through the junction along the A5, which is making use of the additional capacity. It is possible that with further refinement of signal timings in the PM peak and inter-peak, more capacity could be more created here and therefore re-assignment to the junction. There are however some V/C ratios over 85% on links for the revised junction due to this large increase in flow. However these are still less severe than with the original layout.

In the AM peak there is some re-assignment to parallel routes particularly to the south of Childs way as a result of correcting the H6 approaches to H6/V10 roundabout. The largest impact in the PM is around Cranfield University but on the whole the impact has dissipated on the eastern outskirts of Milton Keynes. There is however a worsening of delay on the Newport Road junction with the A509 immediately north of M1 J14.

In terms of congestion issues across the network, with the exception of the Kelly's Kitchen Roundabout improvements the changes made in the revised Reference Case have had little impact on the locations of modelled congestion within Milton Keynes reported in the Traffic Forecasting Report.