Appendix C

MODELLING RESULTS, 'DO NOTHING', 'DO OPTIMUM', 'FINAL CONCEPT'

2016 & 2031

Camcycle and local residents' associations have put considerable effort into preparing the 'Do Optimum' alternative scheme design that the LLF has endorsed. When compared against the project objectives, it has various strengthens and weaknesses. Officers have assessed how well the design compares with a 'Do Nothing' scenario based on current 2016 and predicted 2031 traffic flows. Based on the results on this analysis officers have looked into how the design might be accommodated within existing highway boundaries as well as considering any engineering issues that would emerge if the design was taken forward for more detailed consideration.

In considering how best to develop the 'Do Optimum' design into one which could meet all of the key objectives of this scheme, alternative junction designs have been assessed with a view to balancing vehicle journey times along Milton Road whilst maintaining as many as possible of the 'Do Optimum' ideas for pedestrians, cyclists and landscaping. Inclusion and optimisation of bus lanes has also been considered within the analysis to enable a required element of bus priority whilst also maximising the opportunities for landscaping and tree planting. The conclusion of this analysis is a 'Final Concept' which is the officers recommended design concept to be taken forward into detailed design.

The following sections set out in detail the results of the modelling work that has been undertaken comparing, the 'Do Nothing scenario with 'Do Optimum and the 'Final Concept' design. The modelling results set out in the remainder of this Appendix relate to comparison of results against a validated 2016 baseline scenario and against an estimated 2031 'Do Nothing' future scenario.

Traffic Modelling

To support this process, peak period microsimulation traffic modelling has been undertaken using industry standard software (Paramics) to assess and compare the 'Do Nothing', 'Do Optimum' and 'Final Concept' options in terms of all vehicle journey times, bus journey times and reliability and peak hour queue lengths at key junctions along the length of the proposed scheme, based on 2016 and 2031 flows. The model has been run multiple times and an average of results has been taken. The results focus on the AM peak (8am-9am) and PM peak (5pm-6pm). The variations in bus journey times within these runs have been assessed to provide an indication of how bus journey reliability would be affected within each scenario.

Whilst individual cyclists are not included as a vehicle type explicitly in the Paramics model, provision for cycle movements is implicitly taken into account in the modelling where appropriate to reflect interactions with other vehicular traffic. The proposals provide for segregated provision for cyclists along the corridor and at locations where specific provision to assist cyclists is provided then this is explicitly included within the Paramics model. For example:

- Advanced stop-lines and/or advance green times for cyclists at signalised junctions,
- Toucan crossing provision,
- Crossings for cyclists/pedestrians on 'Dutch' roundabout entry and exit.

Traffic flows for 2031 have been provided by the Cambridge Sub-Region Model (CSRM) which has recently been updated to reflect more accurately the capacity of the road network, to take into account the emerging Local Plan developments and to reflect the anticipated influence on traffic levels of Greater Cambridge Partnership measures and other transport infrastructure improvements that are expected to be delivered over the coming years. This modelling scenario, known as the Foundation Year base, is also being used to assess other GCP schemes. The traffic modelling is based on current best practice advice for both strategic and local modelling techniques. All models have been developed using WebTAG Department for Transport guidance in terms of model development and validation. Industry standard modelling and forecasting techniques have been used.

Modelling Results and Conclusions

Journey Times (All Vehicles)

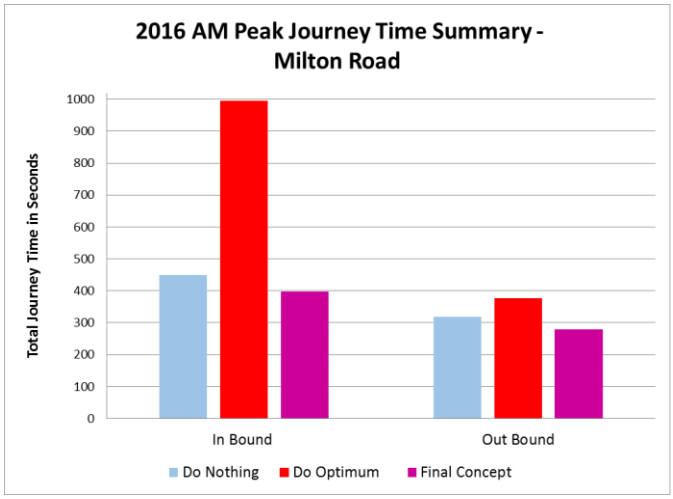
The graphs below provide a summary of 2016 & 2031 peak period journey times in minutes (combined bus and non-bus) within the AM and PM peak periods along the length of Milton Road, for each of the three scenarios tested.

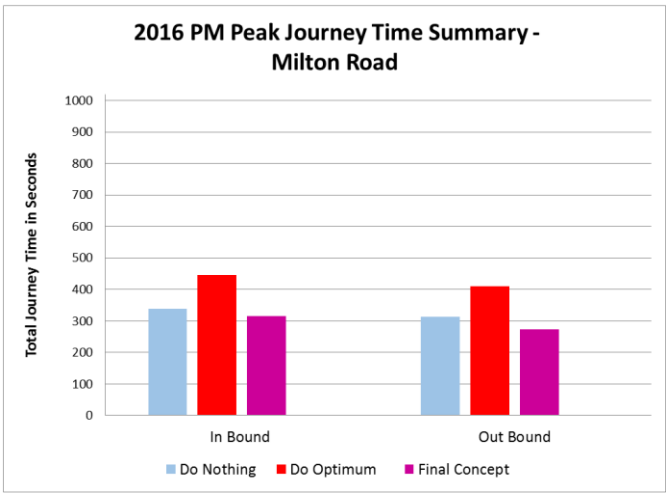
Compared with 'Do Nothing', in the 2016 AM peak the 'Do Optimum' proposal shows a more than doubling of the current journey times inbound into Cambridge from 7.5 mins to 16.6 mins. Outbound journeys are estimated to increase by 1 minute from 5.3 mins to 6.3 mins. In the 2016 PM peak inbound journey times increase by 1.8 minutes from 5.6 to 7.4 mins. Outbound trips increase by 1.6 minute from 5.2 mins to 6.8 mins.

The 'Final Concept' scenario in comparison to 'Do Nothing' shows a slight decreasing of the journey time, in both directions, in the AM and PM peak. In the 2016 AM Peak this results in around a 1 minute saving for inbound journeys and 0.6 minute saving for outbound. In the PM peak a journey time saving of 0.4 minutes is estimated for inbound journeys and 0.6 for outbound.

Overall the 2016 journey time comparison demonstrates that the 'Final Concept' essentially maintains current levels of total vehicle journey times along Milton Road in the AM and PM peaks while still delivering many of the elements of pedestrian & cycle provision identified in the 'Do Optimum' Scheme . The 'Do Optimum' scheme if delivered in its entirety is estimated to significantly increase the delays in the network compared to 'Do Nothing'.

2016 DO NOTHING' V 'DO OPTIMUM' v 'FINAL CONCEPT JOURNEY TIME COMPARISON





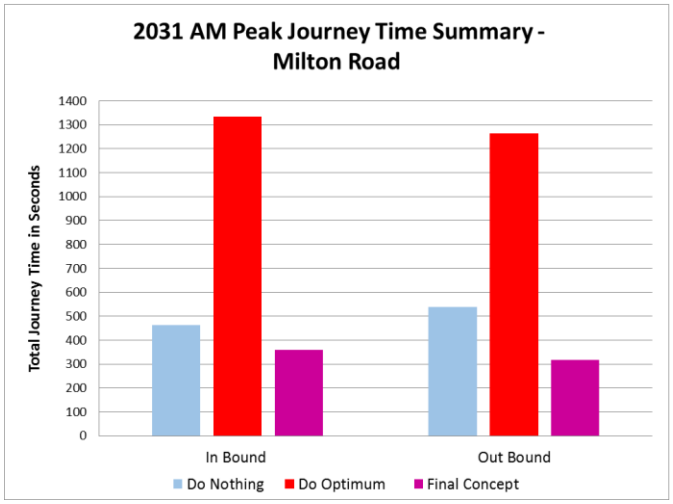
The graphs below provide a summary of estimated 2031 peak period journey times (combined bus and non-bus). In general the results indicate that extra traffic flow expected along Milton Road in 2031 will increase the delays in the network within all scenarios.

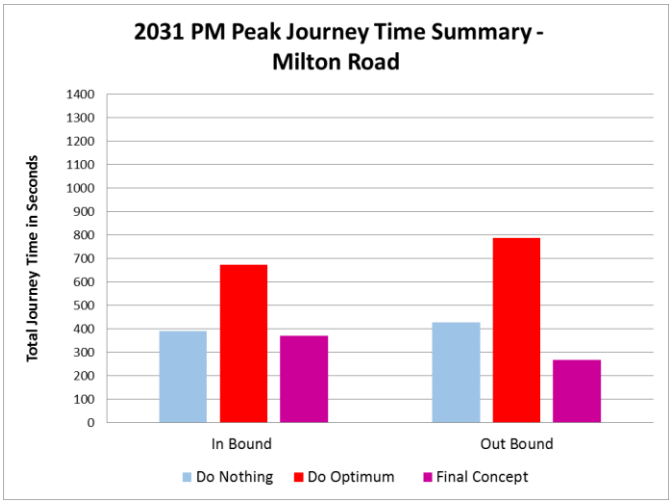
Compared with 'Do Nothing', in the 2031 AM peak the 'Do Optimum' proposal shows an estimated tripling of the current journey times into Cambridge from 7.7 mins to 22.2 mins. Outbound journey times are estimated to more than double from 9.0 mins to 21.1 mins. In the PM peak inbound journey times are predicted to increase by 4.7 minutes from 6.5 to 11.2 mins. Outbound trips increase by 6.0 minutes from 7.1 mins to 13.1 mins.

The 'Final Concept' scenario in comparison to 'Do Nothing' shows a slight 2031 AM peak decrease in the inbound journey time, of 1.7 minutes, and the outbound journey time is estimated to decrease by 3.3 minutes. In the 2031 PM peak, the inbound journey time is similar to the 'Do Nothing' scenario (saving 0.3 minutes) and the outbound journey time shows a saving of around 2.6 minutes.

The 2031 journey time comparison shows the 'Do Optimum' proposal does not cope well with expected 2031 traffic flows and the delay is significantly increased compared to 2016. 'Final Concept' provides a scenario which achieves the shortest journey time in both directions in 2031, within the AM & PM Peak.

2031 DO NOTHING' v 'DO OPTIMUM' v 'FINAL CONCEPT' JOURNEY TIME COMPARISON





Bus Journey Time and Bus Reliability

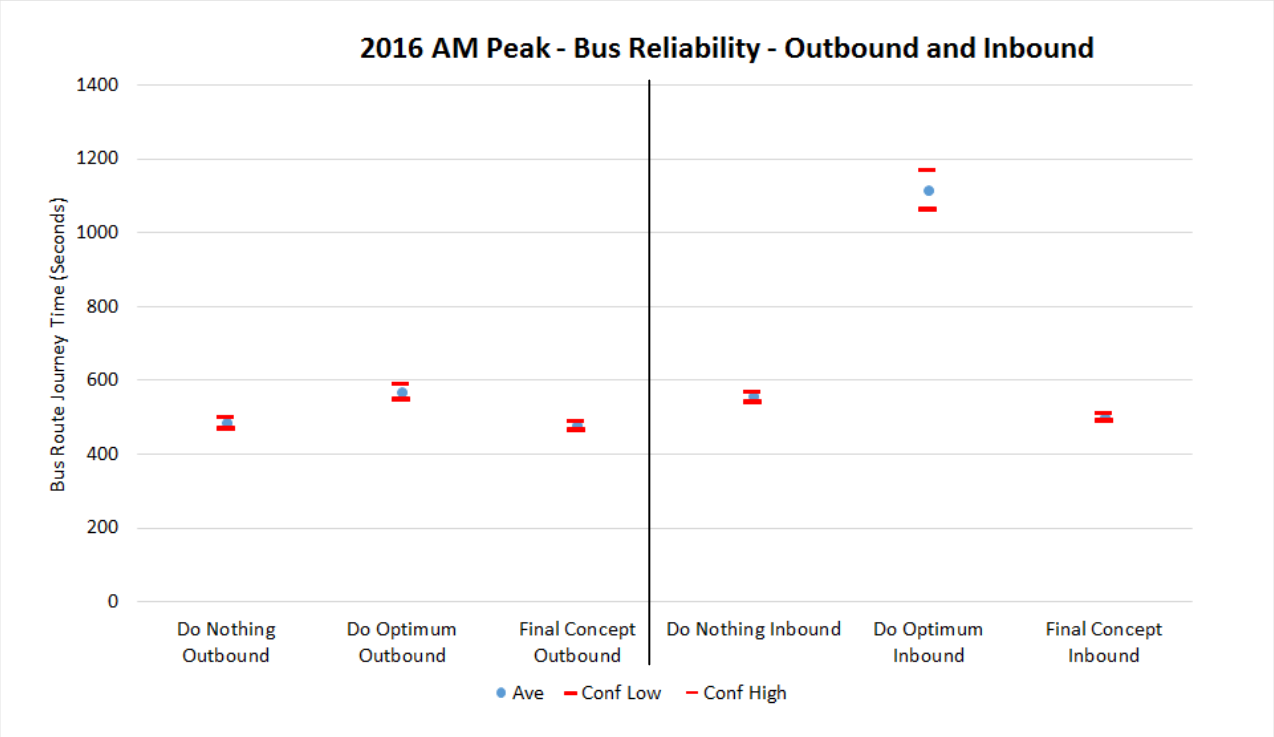
The impact on bus reliability within each of the three scenarios is shown below. The bus journeys are based on those services that travel the entire length of the scheme and do not make any allowance for dwell times at stops. The bus journey time also includes the journey along Mitcham's Corner and Victoria Ave (due to the way the bus routes are coded into the model), therefore the bus journey times shown in the graphs can be longer than the general traffic, which does not includes the journey time along Mitcham's corner and Victoria Ave, however it still enables a direct comparison between scenarios.

It should be noted that within the 'Final Concept' scenario the modelling work does not currently take account of measures within traffic signal sequences to prioritise bus movements which could further reduce bus journey times but may lengthen non-bus times. However, within the 'Do Optimum' scheme, all bus priority detailed within the proposal has been included in order to fully represent the 'Do Optimum' scheme put forward in its entirety.

The bus reliability indicators are provided relative to the current 2016 situation and the estimated future 2031 situation. Within both these time periods figures presented are the average journey times for the services over 10 model runs and seek to compare the range of journey times recorded over each peak hour to give a standard deviation and confidence interval which indicates journey time variability during the hour.

The graphs below show bus service average journey times and reliability in 2016 and 2031 for each scenario in the AM and PM peak. The closer the low/high confidence interval is to the average the less variability in the bus journey times recorded in the model and the more reliable the bus service. The journey time is indicated on the y axis.

2016 AM 'DO NOTHING' v 'DO OPTIMUM' v 'FINAL CONCEPT' BUS JOURNEY TIME AND RELIABILITY

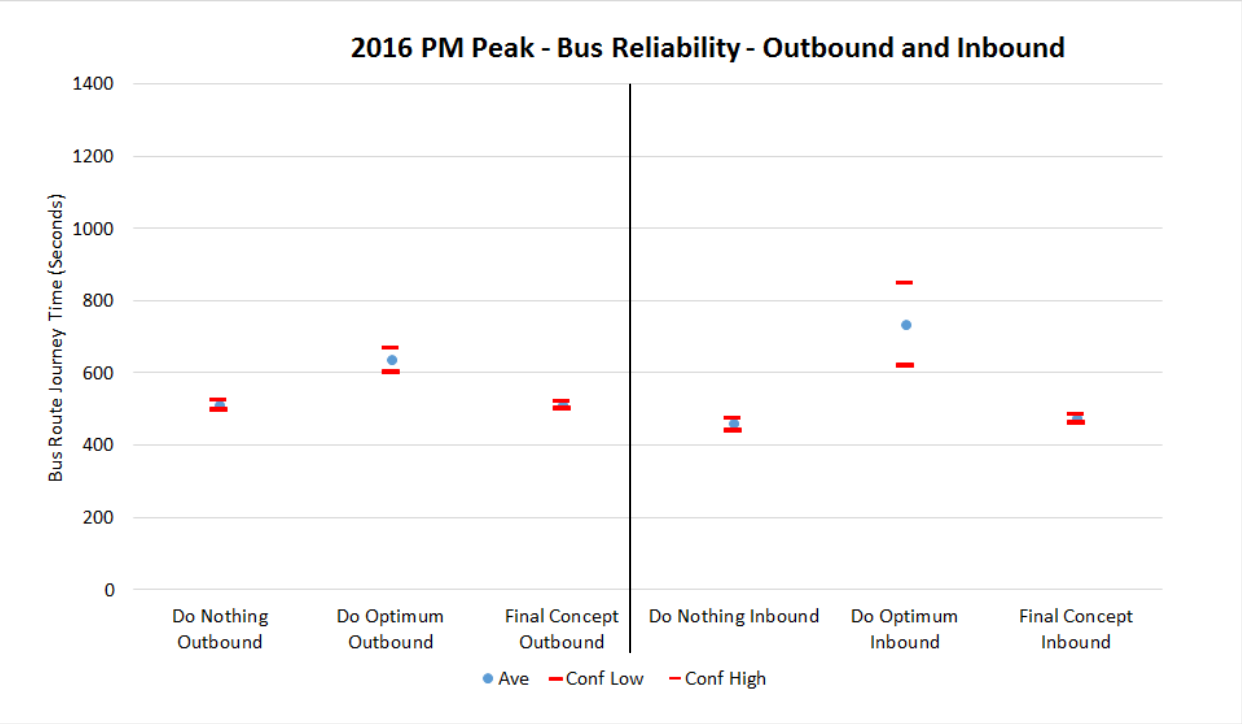


In the 2016 AM peak outbound bus reliability in 'Do Optimum' is slightly worse than the 'Do Nothing' with average journey times being 1.4 minutes longer. For inbound bus travel, reliability is much worse, with average journey times being 9.3 minutes longer and more variable in the 'Do Optimum' proposal compared to the 'Do Nothing' scenario, this is despite 'Do Optimum' including for bus priority within the signalisation of certain junctions. A significant contributor to the increase in inbound bus journey times is the large reduction in bus lane provision within the 'Do Optimum' proposal, compared to the 'Do Nothing'.

The 'Final Concept' provides a similar total length of bus lanes to the 'Do Nothing' scenario but allocates these sections of bus lane more evenly between inbound and outbound bus travel, in comparison to the 'Do Nothing' scenario which focuses bus lanes on inbound bus travel. The 2016 AM 'Final Concept' bus reliability results shows improved bus reliability for both directions of travel, maintaining average bus journey times inbound (even with a reduction of bus lanes on this side of the road in comparison to 'Do Nothing') and improving outbound average bus journey times in comparison to 'Do Nothing' (through increasing bus lanes on this side of the road). As previously stated bus priority measures at traffic signals have not yet been applied in the 'Final Concept' scenario which has the ability to further reduce bus journey times but may lengthen non-bus times.

Note: Bus priority measures at traffic signals can be counter-productive unless applied in a balanced way avoiding undue delay for other traffic which can, in itself, lead to delays to buses upstream of key junctions. Further detailed work on this will be undertaken as part of the detailed design work once key junction layouts have been determined and remodelled for the purposes of a business case.

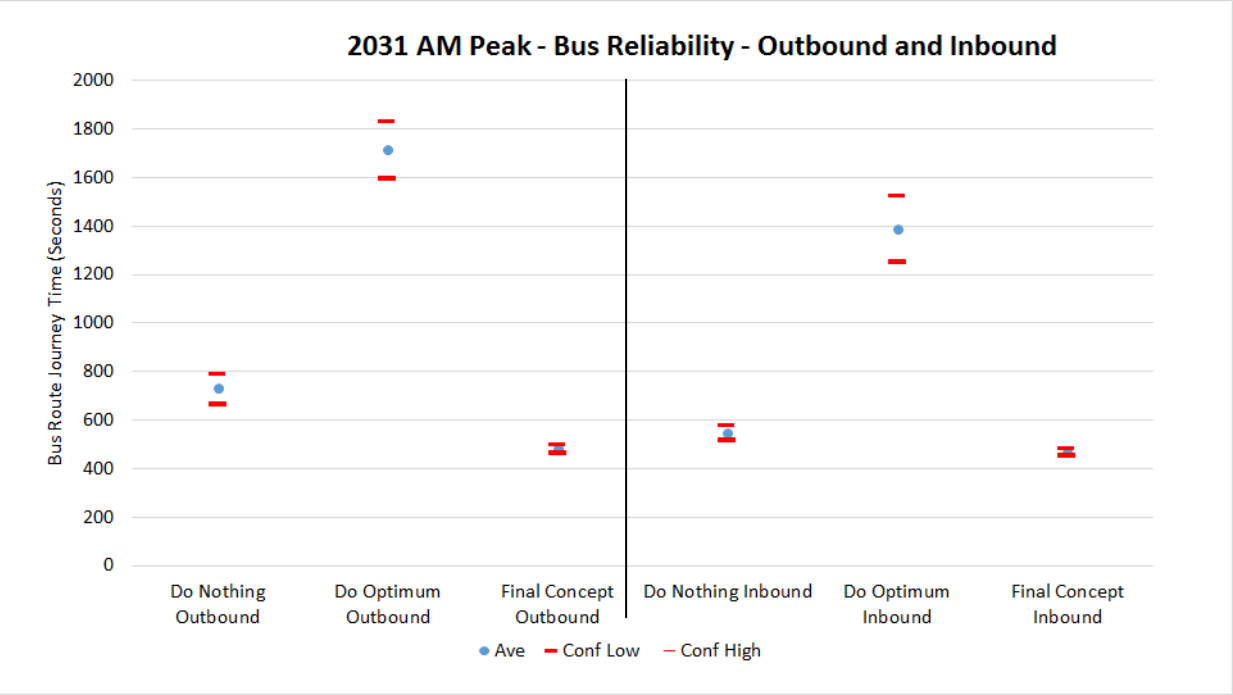
2016 PM 'DO NOTHING' v 'DO OPTIMUM' v 'FINAL CONCEPT' BUS JOURNEY TIME AND RELIABILITY



In the 2016 PM peak, outbound bus reliability in 'Do Optimum' is worse than the 'Do Nothing' and average journey times are 2.1 minutes longer. For inbound travel, bus reliability is much worse and average journey times extent to 4.6 minutes longer.

The 'Final Concept' again seeks to strike a balance across all modes and shows improved bus reliability for both directions of travel while maintaining average journey times to the 'Do Nothing'. This will be improved further in detailed design through the consideration of priority measures at traffic signals not yet been applied in the 'Final Concept' Scenario.

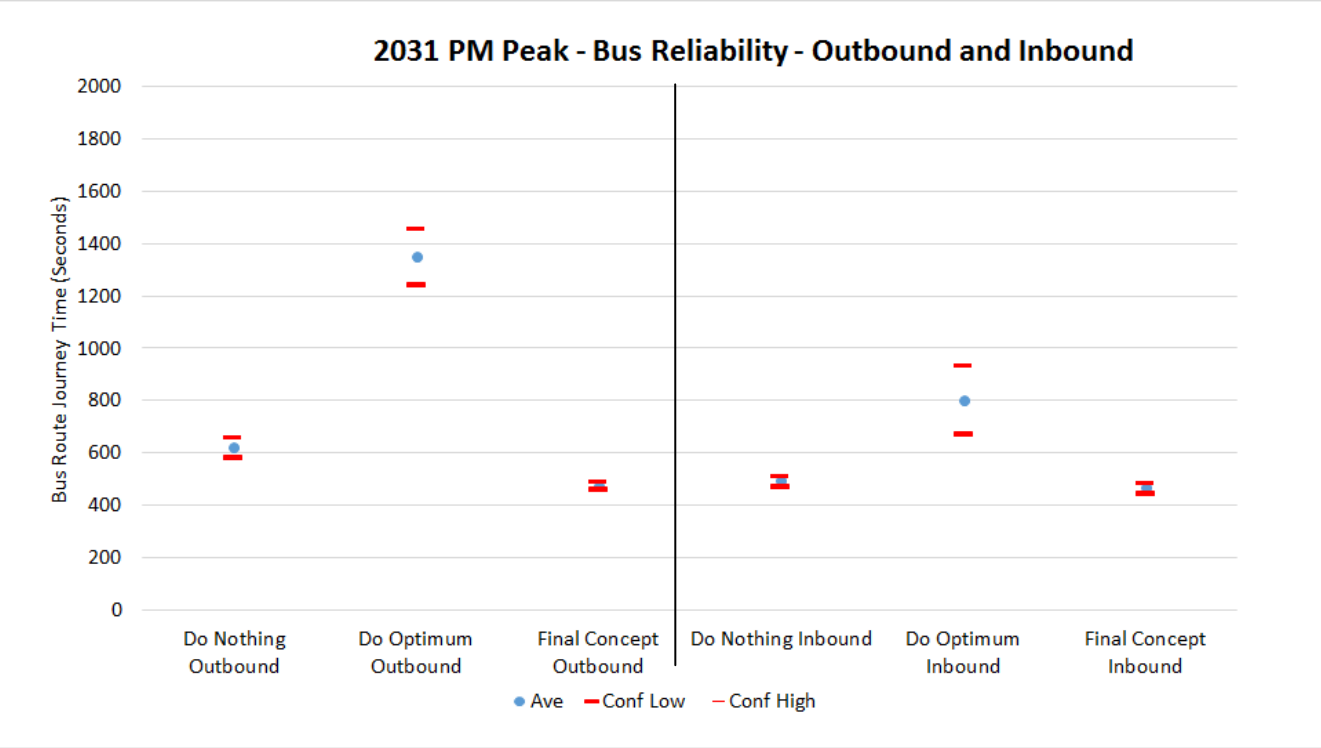
2031 AM 'DO NOTHING' v 'DO OPTIMUM' v 'FINAL CONCEPT' BUS JOURNEY TIME AND RELIABILITY



In the 2031 AM peak, outbound bus reliability in 'Do Optimum' is worse than the 'Do Nothing' and average journey times are 16.4 minutes longer. Inbound bus reliability is also worsened in combination with average journey times increasing by 14.0 minutes.

The 'Final Concept' in the 2031 AM Peak shows improved bus reliability in both directions of travel and improved average journey times over the 'Do Nothing' scenario, saving 4.1 minutes in average journey time for outbound bus travel and 1.3 minutes for inbound bus travel.

2031 PM 'DO NOTHING' v 'DO OPTIMUM' v 'FINAL CONCEPT' BUS JOURNEY TIME AND RELIABILITY



In the 2031 PM peak, outbound bus reliability in 'Do Optimum' is worse than the 'Do Nothing' and average journey times are 12.2 minutes longer. Inbound bus reliability is also more variable in combination with average journey times increasing by 5.2 minutes.

The 'Final Concept' in the 2031 PM Peak shows improved bus reliability in both directions of travel and improved average journey times over the 'Do Nothing' scenario, saving 2.5 minutes in average journey time for outbound bus travel and 0.6 minutes for inbound bus travel.

The modelling results demonstrate that the proposed 'Final Concept' can reduce the bus journey time and improve bus reliability in 2031. The 'Do Optimum' proposal significantly increases bus journey time and bus journey time variability is much increased, showing the scheme is unable to provide bus priority over general road traffic in 2031, within the context of increasing congestion on the network.

Whilst the 'Do Optimum' solution developed through the LLF contains many useful proposals, the modelling assessment undertaken demonstrates that this design concept would significantly disadvantage bus vehicle movements in no small part due to a signifiacnt reduction of bus lanes over the current 'Do Nothing' scenario. This therefore indicates a further deterioration in bus journey times and reliability in 2031 under this scenario.

Improved bus travel in 2031 is required , to be able to adequately cater for longer distance movements into Cambridge from, for example, the new towns of Northstowe,

Waterbeach and Camborne where cycling and walking are not reasonable options. Improving access to Cambridge from these areas is essential for increased economic growth which is the main driver for the Greater Cambridge Partnership. As the 'Do Optimum' scheme does not adequately address the scheme objectives relating to buses, modifications are required to achieve a better overall balance, as suggested within the 'Final Concept' scheme.

Consideration of 'Do Optimum' design modifications to develop a 'Final Concept'

As part of the process to identify modifications to the 'Do Optimum' design, in order to develop the 'Final concept' design, further LLF meetings were held in May and June to seek feedback on the emerging modelling results and to test initial ideas for modifying the design to better response to all the scheme objectives.

Individual Junction Modelling

To consider how best to modify the 'Do Optimum' design, into a 'Final Concept' design, alternative junction designs have been assessed with a view to balancing vehicle journey times along Milton Road (whilst maintaining as much as possible the 'Do Optimum' ideas for pedestrians and cycling), to optimise the length of bus lanes and to maximise the opportunites for landscaping and tree planting.

The modelling undertaken is based on conceptual designs rather than fully engineered detailed designs, however, the results provide a broad comparison on a similar basis of the impacts of the different design options at these key junctions and is considered appropriate for comparison purposes and to guide and inform decision making.

Within the Paramics modelling, four key junctions, during the peak periods, have been reviewed in detail to understand the issues of why the 'Do Optimum' design results in significant increases in vehicle journey times along Milton Road. The aim of this analysis has been to consider various design modifications aimed at achieving a better response to all project objectives, and hence inform the 'Final Concept' design proposal. The key junctions considered along Milton Road and which most significantly affect the overall journey times of vehicle traffic are:

- Gilbert Road,
- Elizabeth Way,
- Arbury Road, and
- King's Hedges Road

Officers have reflected on the individual junction modelling results and have reviewed other design issues that arise from the 'Do Optimum' design to consider what junction design changes would be appropriate for inclusion in the 'Final Concept'.

The results presented below look at each junction in turn and show the differences in maximum vehicle queuing at each arm of the junction, as well as overall total vehicle queuing, relative to the three scenarios of 'Do Nothing', 'Do Optimum' and the final junction designs included within the 'Final Concept' scheme. These results are shown

relative to the peak periods of 2016 and 2031 and measured in terms of number of vehicles.

It should be noted that although each junction is looked at separately in the analysis below, each scheme must be ultimately looked as a whole and hence the total journey time and bus reliability has been presented first in this Appendix. Impacts at one junction can be due to the cumulative impact of all changes at junctions along the road. So for example if more traffic is able to pass through Elizabeth Way this can impact downstream on Gilbert Road and so on. Therefore, although there may, in some cases, look like small differences between some of the junctions considered, when assessed as a whole these can culminate in bigger difference across the whole scheme.

Gilbert Road Junction

Do Nothing

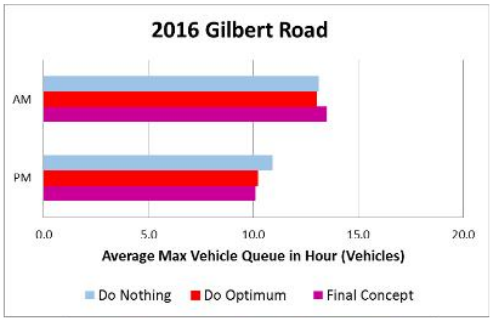
Do Optimum

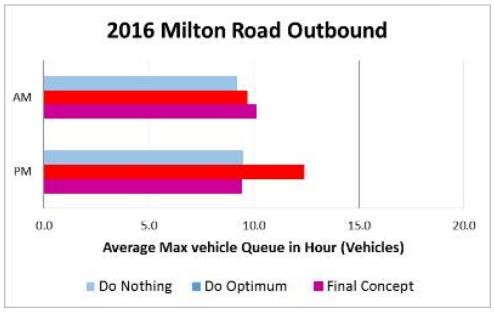
Final Concept

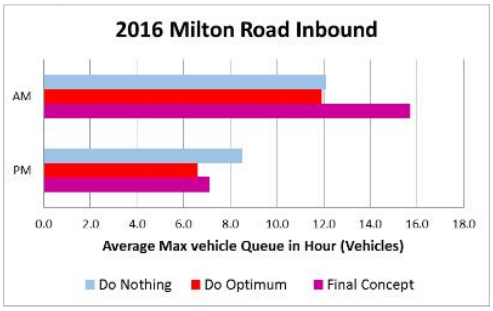
In reviewing the 'Do Optimum' junction layout, it was identified that the suggested radiuses of the junction were too tight to allow for all vehicle turning movements and hence the corner radii need to be relaxed. As a result this would impact on the space available for cycle and pedestrian movements.

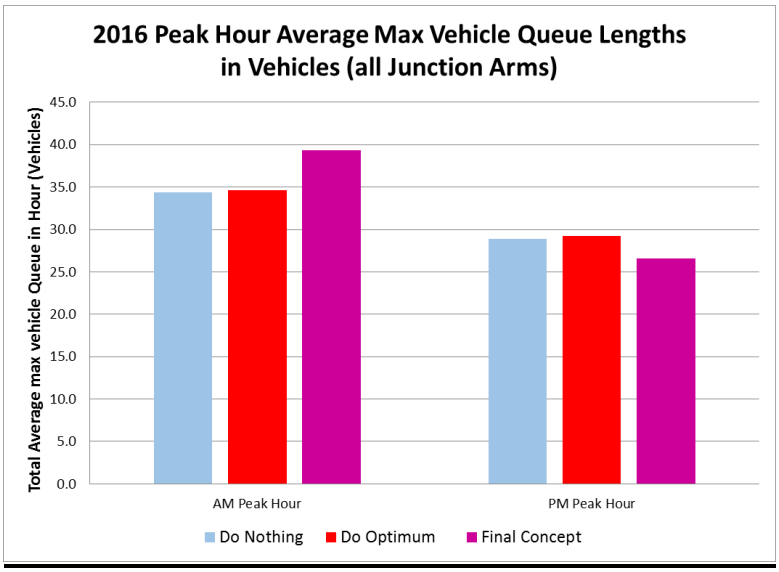
Whilst the proposed Final Concept design achieves a high degree of segregation for cyclists leading to and from the junction, there is insufficient space available for fully segregated cycle movements across the junction. It is suggested that the current signal staging should be trained with a main road and side road stage along with a full green pedestrian stage. In considering layout changes the need to avoid delays arising from motor vehicles turning right into the side road without compromising inbound cycle movements on the main road has been taken in to account.

2016 'DO NOTHING', 'DO OPTIMUM AND 'FINAL CONCEPT' QUEUE LENGTH SUMMARY RESULTS

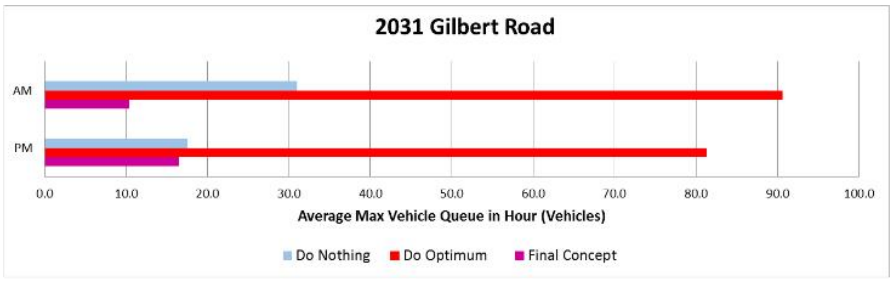


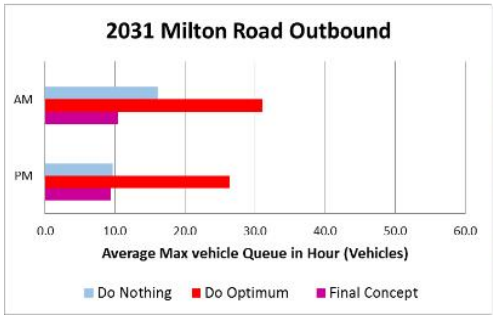


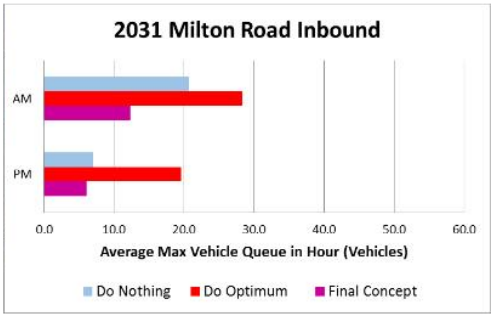


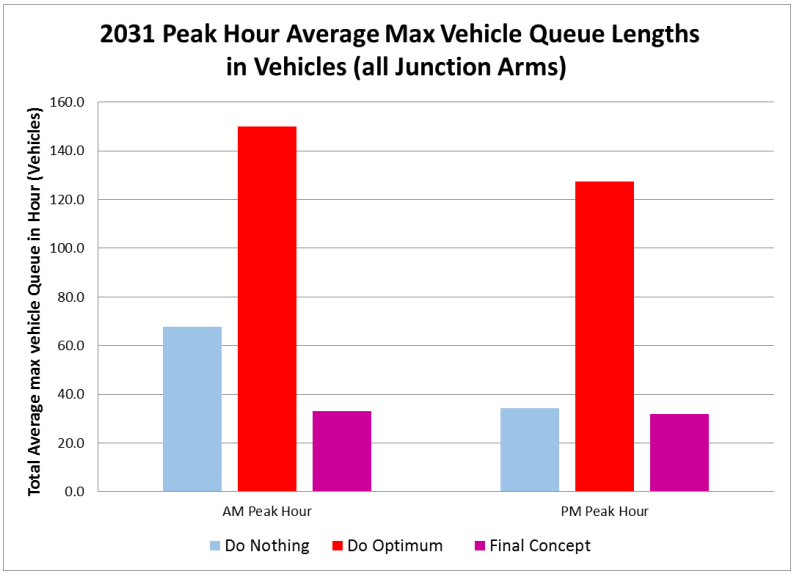


2031 'DO NOTHING', 'DO OPTIMUM AND 'FINAL CONCEPT' QUEUE LENGTH SUMMARY RESULTS









Graphs above compare the queue length on each arm and the total queue length at Gilbert Road junction in 'Do Nothing, 'Do Optimum' and 'Final Concept' scenarios in 2016 and 2031. In 2016, the total queue length is quite similar in all of the scenarios. The comparison demonstrates that neither the 'Do Optimum' nor the 'Final Concept' schemes have significant impact on this junction in 2016 in comparison to the 'Do Nothing' scenario. The 'Final Concepts' slight total queue increase (4.9 vehicles) is due to the improvements at Elizabeth Way roundabout, within this scenario, which allows more traffic from Elizabeth way to reach the inbound arm of Milton Roa,d at the Gilbert Road junction.

In terms of cumulative impacts of additional delay on all approaches to the junctions at Gilbert Road in 2031, in both the AM and PM peak hour there is significant additional delay associated with 'Do Optimum' and this is as a result of increases in queueing on all approaches but most notably on Gilbert Road.

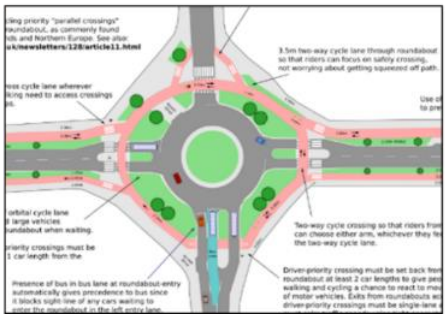
This occurs because of the additional delay and queuing that is experienced at Elizabeth Way and it's interaction with the signals at Arbury Road which causes blocking back to Mitcham's Corner and impacts on the ability of traffic to exit from Gilbert Road. The link queue length result indicates the queue at the Milton Road outbound link north of Gilbert Road blocks back to Gilbert Road and Milton Road.

The 2031 flow has less impact on the 'Final Concept' with the improved Elizabeth Way signalised roundabout and optimised Arbury Road junction. In the AM peak, the queue length on Gilbert Road is slightly less than 2016 as the flow on Gilbert Road is indicated to decrease in 2031 following incorporation of the CSRM projected reallocation of flows on the network in 2031.

Elizabeth Way Junction

Do Nothing

Do Optimum



Final Concept

The ‘Do Optimum’ design promotes the use of a ‘Dutch’ style roundabout at this junction. While officers agree that this would provide enhanced facilities for pedestrians and cyclists, the modelling of this approach suggests that such a design would severely compromise the vehicular capacity and therefore also have an adverse impact on achieving bus priority.

As the ‘Dutch’ style roundabouts are a key aspect of the ‘Do Optimum’ design and given the challenges in modelling this design concept, the Paramics modelling process has been peer reviewed by consultants, Royal Haskoning DHV, who have experience this is field of modelling. Royal Haskoning DHV has confirmed that the results from the Paramics process are broadly as expected.

The modelling shows that the ‘Final Concept’ proposal to replace the existing roundabout control with a signalised junction design would manage delays much more effectively and provide greater opportunity to prioritise bus movements as well as allowing coordination with the Arbury Road junction through linked signal timings to optimise the progression of buses and to manage and balance main road and side road delays. This could be achieved either through signalising the existing roundabout or through a signalised ‘T’ junction or crossroads. Both options have strengthens and weaknesses:

A ‘T’ junction signalised design would:

- improve conditions for cycling and walking by the provision of controlled crossing points and by allowing outbound cyclists on Milton Road to bypass the junction control altogether
- reduce the high level of injury accidents at the junction involving cyclists through better segregation of cycling movements
- provide more opportunities for improving the public realm and accessible landscaping areas
- increase overall traffic delays compared with a ‘Do Nothing’ scenario
- Sever junction access/egress for Highworth Avenue (a signalised crossroads could avoid this but the modified design would compromise other benefits)

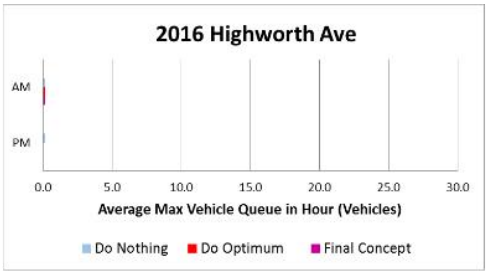
A signalised roundabout would:

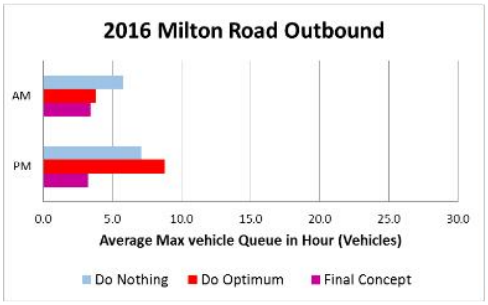
- reduce traffic delays compared with a ‘Do Nothing’ scenario
- reduce the high level of injury accidents at the junction involving cyclists
- Require more traffic signal street clutter
- achieve less segregation of cycling movements
- retain access/egress for Highworth Avenue

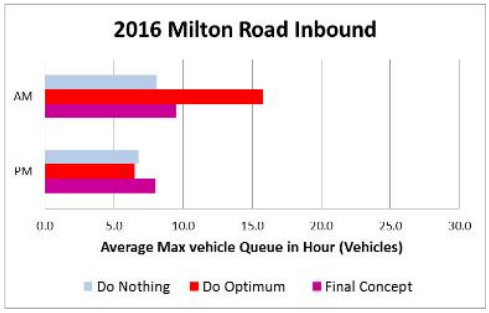
Whilst the number of daily trips affected by closing off the Highworth Avenue arm is small, local concerns have been raised over the impact on motorised access/egress for Highworth Avenue residents and the ‘Do Optimum’ design addresses these concerns by retaining access/egress directly to/from Milton Road, albeit at a cost to main road movements. Against a backdrop of concern over the accessibility of Highworth Avenue, a signalised roundabout options is suggested within the ‘Final Concept’.

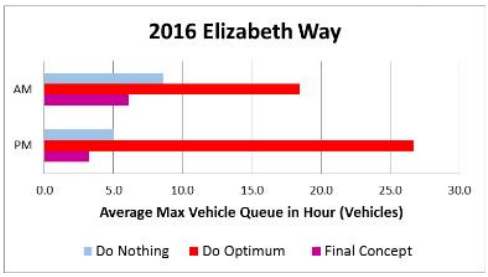
It is recognised that further work on how to manage cycling movements, and provide as much segregation as possible, as part of a signalised roundabout design, needs to be further strengthen and this will be considered at the detailed design stage.

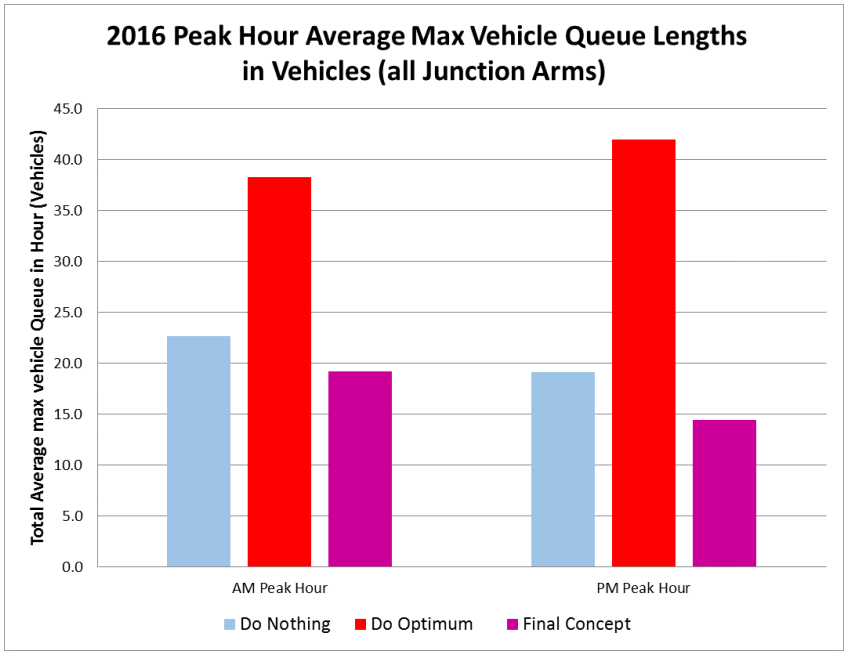
2016 ‘DO NOTHING’, ‘DO OPTIMUM AND ‘FINAL CONCEPT’ QUEUE LENGTH SUMMARY RESULTS



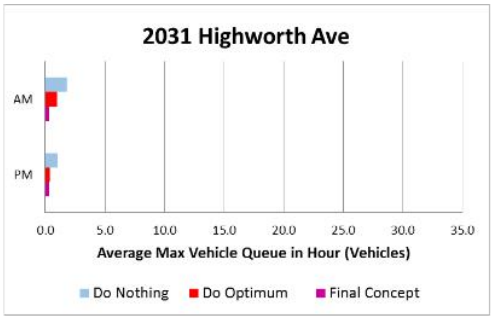


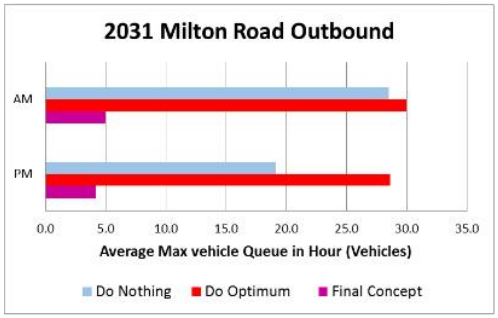


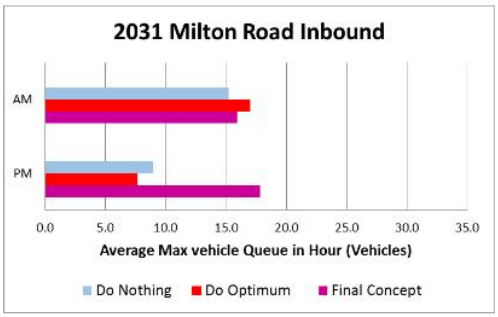


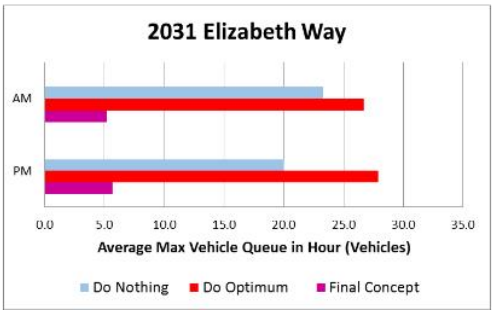


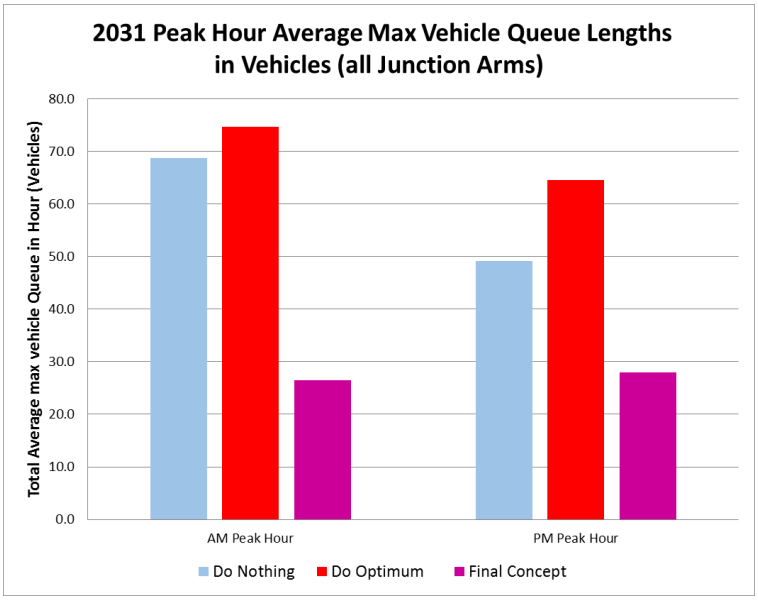
2031 'DO NOTHING', 'DO OPTIMUM AND 'FINAL CONCEPT' QUEUE LENGTH SUMMARY RESULTS











The graphs above compare the total queue length and the queue length on each arm at Elizabeth Way junction.

In 2016, the 'Do Optimum' scenario has longer queues on Elizabeth Way and Milton Road than 'Do Nothing'. The significant queue length increase on Elizabeth Way indicates the junction is over capacity in the 'Do Optimum' scheme. The 'Final Concept' scenario shows much improved total queue lengths in comparison with the 'Do Nothing' scenario, in large part due the signalisation reducing driver hesitation and delay, increasing capacity, and through better signal optimisation with the Arbury Road junction.

In 2031 the level of queueing increases across all scenarios and on all approaches, particularly in the AM peak where total queue delay almost doubles in 'Do Optimum' from 38 vehicles in 2016 up to 78 vehicles in 2031. In the PM peak the increase in queueing is less pronounced.

In both the AM and PM peaks the 2031 flow significantly increases the queue length on Elizabeth way in the 'Do Nothing' scenario, close to the levels indicated in the 'Do Optimum' scenario, which could block back to the Chesterton Road roundabout.

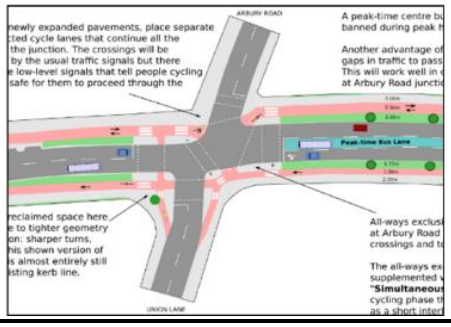
The overcapacity of the junction on Elizabeth Way in the 'Do Optimum' scenario causes rerouting on Milton Road and has a resultant effect on the performance of Gilbert Road in 2031. The 'Do Optimum' Scenario shows slightly shorter queue lengths on the Milton Road inbound arm in the PM peak, but this is due to excessive congestion at the Arbury Road junction and Kings Hedges junction blocking the traffic from arriving at his arm.

It is notable that the 2031 'Final Concept' provides an improvement in overall queuing compared with the 'Do Nothing' scenario in 2031 as the signalised roundabout improves the capacity at the junction.

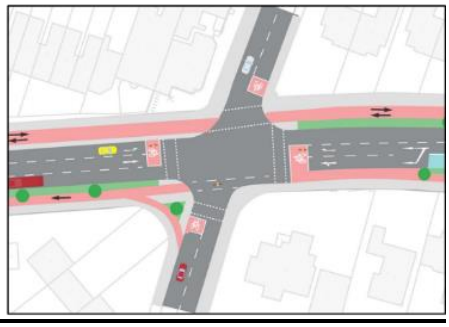
Arbury Road Junction

Do Nothing

Do Optimum



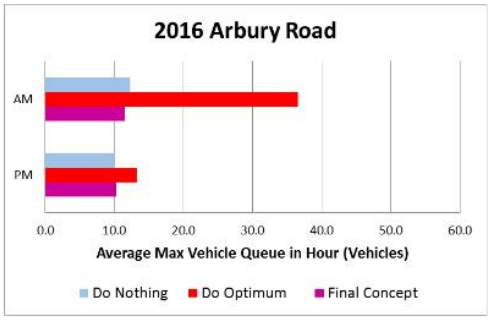
Final Concept

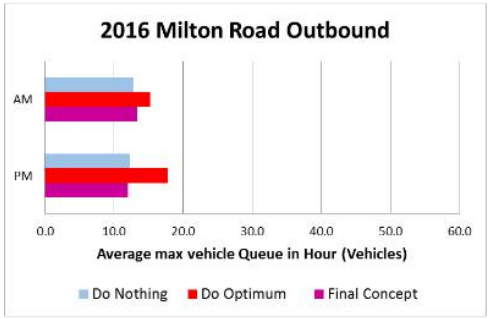


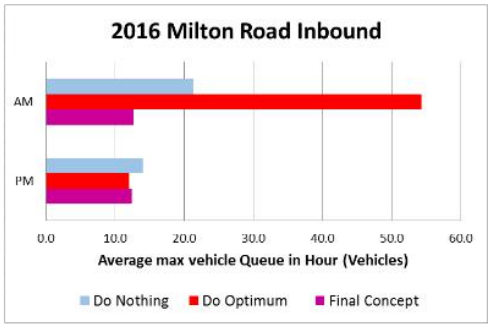
At the Arbury Road / Union Lane junction the ‘Do Optimum’ design advocates a slight staggering of the layout and a multiple signal stage sequence which would result in much longer delays and queuing. It would also be very difficult to fit this design within the existing highway boundaries whilst maintaining road space for larger vehicles to manoeuvre. The ‘Do Something’ design proposed closing off the Union Lane arm of the junction to motor vehicle movements. Whilst this approach would be more effective in managing queuing and delays, the concerns over traffic being displaced to other routes within East Chesterton and the impact on local accessibility as a result of closing off Union Lane are recognised and officers have considered alternative design options.

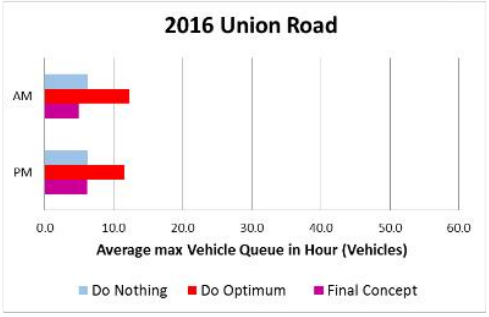
Compromise designs to keep open the Union Lane arm have been explored including the left turn from Union Lane being prohibited. Such an option was shown to reduce queuing on Union Lane itself whilst allowing the Union Lane signal stage to run at the same time as the main road crossing stage thereby optimising the signal sequence to allow a greater proportion of ‘green time’ to be given to the main road. However, feedback from the LLF suggests any restriction on traffic movements at the junction would be unacceptable to the local community despite the benefits that could accrue in terms of managing overall traffic delays. Therefore, within the ‘Final Concept’ the existing junction signal operation has been retained with further consideration to be given to the segregation of cycling movements as part of detailed design work.

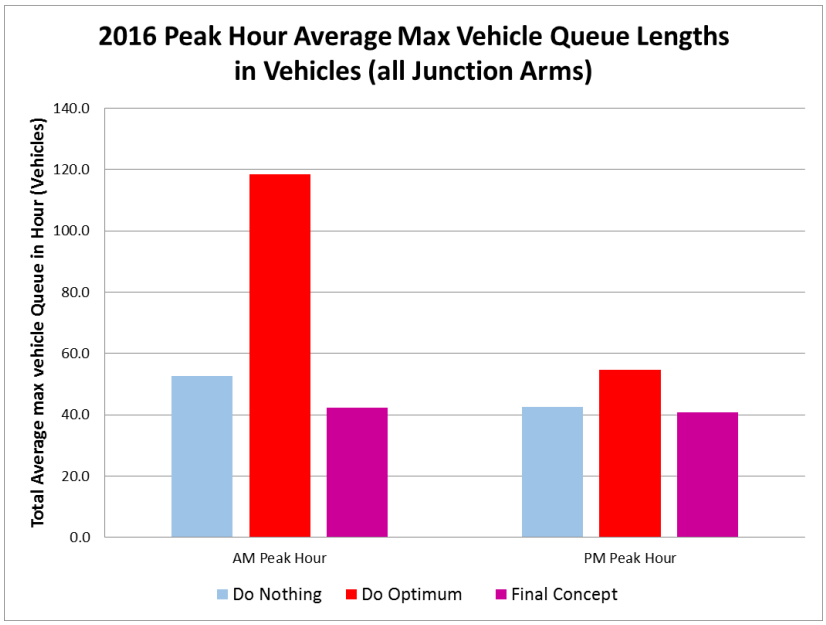
2016 'DO NOTHING', 'DO OPTIMUM AND 'FINAL CONCEPT' QUEUE LENGTH SUMMARY RESULTS



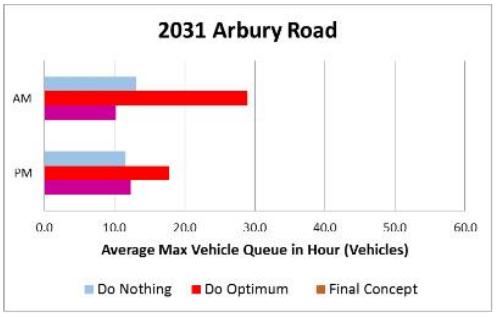


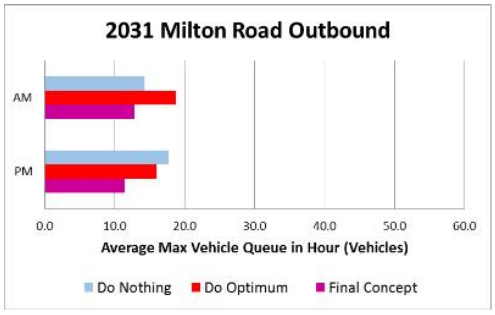


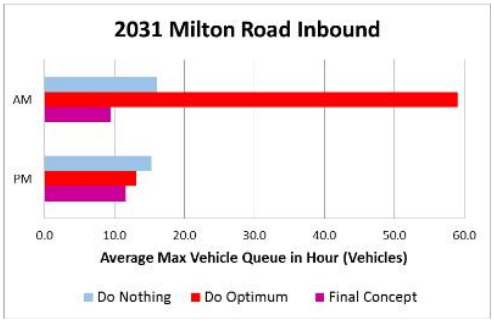


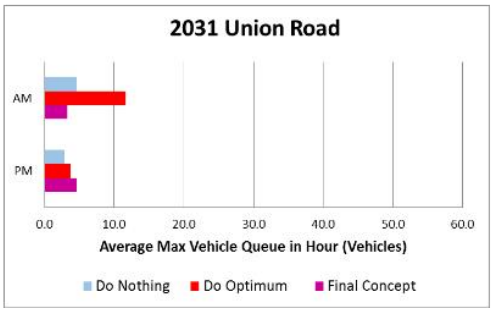


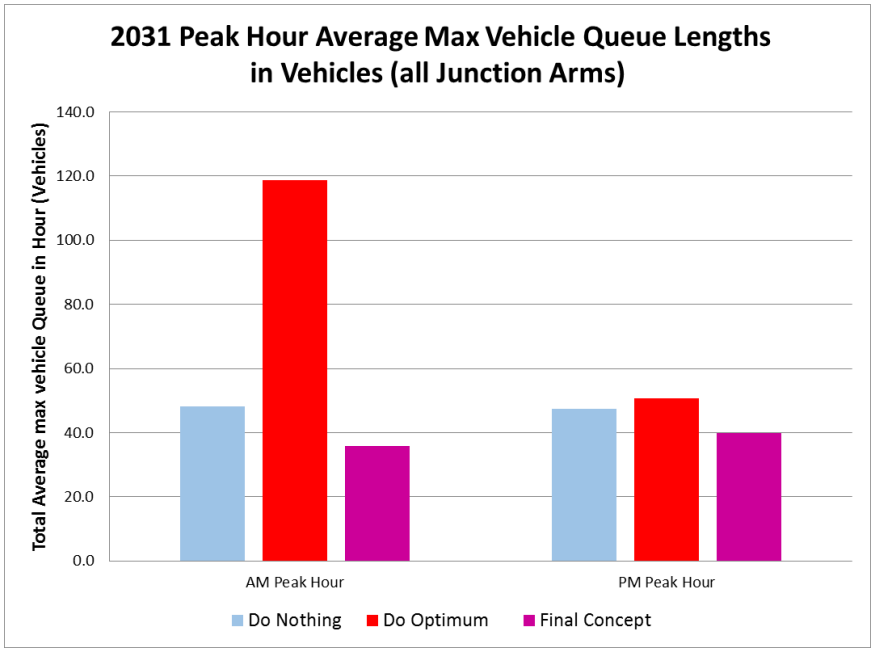
2031 'DO NOTHING', 'DO OPTIMUM AND 'FINAL CONCEPT' QUEUE LENGTH SUMMARY RESULTS











The graphs above compare the total queue length and the queue length on each arm at Arbury Junction. In both years 2016 and 2031, the ‘Do Optimum’ scenario generates longer queues than the ‘Do Nothing’ and ‘Final Concept’, on Arbury Road and Milton Road inbound, due to the over capacity of Elizabeth Way junction and the queues blocking back to Arbury Road junction. The ‘Final Concept’ slightly reduces queue length on Milton Road compared with ‘Do Nothing’ due to an extra flare provided on Milton Road inbound, which increases the capacity of the junction, as well as better optimisation with a signalised roundabout at Elizabeth Way.

In total, the 2031 results do not show significant queue length increases across the scenarios as the CSRM modelling indicates minimal flow increase on Arbury Road and Union Lane in 2031.

King's Hedges Road Junction

Do Nothing

Do Optimum

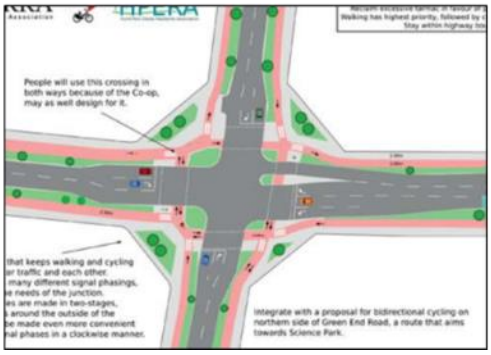
Final Concept

At the King's Hedges Road junction the 'Do Optimum' scheme identifies a preference for a 'Dutch' style roundabout scheme which is what has been modelled within the 'Do Optimum' scenario, within the results show below. However, within the 'Do Optimum' proposals a signalised junction option, with single stage pedestrian and cycling crossing points across each arm has also been identified as acceptable by the LLF.

It is considered that a signalised junction at this location is considered to be more viable than a 'Dutch' style roundabout in terms of balancing the flows at the junction and also balancing the benefits for sustainable transport modes and the impact on car based travel, subject to further detailed design work.

In developing the 'Final Concept' junction design at Kings Hedges Road, the key ideas for cycle and pedestrian segregation and single point crossings, as shown in the 'Do Optimum' signalised junction design, have been accommodated.

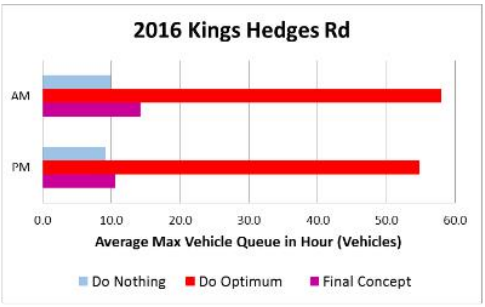
Do Optimum

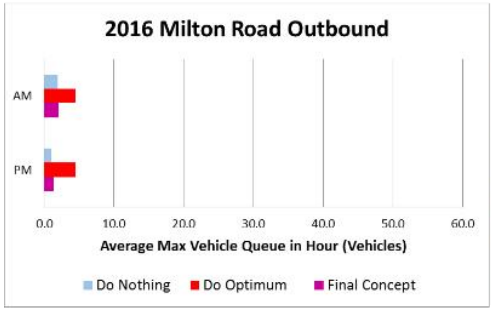


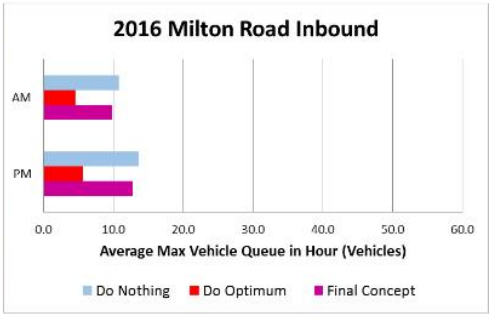
Final Concept

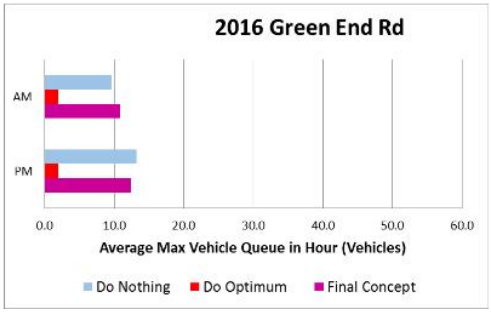
The layout of the 'Do Optimum' signalisation design fails to adequately accommodate all turning movements and needs a larger carriageway area which, in turn, reduces the space available for cycling and pedestrian movements, as indicated within the proposed 'Final Concept' junction design. However, officers believe that many of the ideas for segregating cycle movements from motorised traffic are worth further consideration as the detailed design is developed.

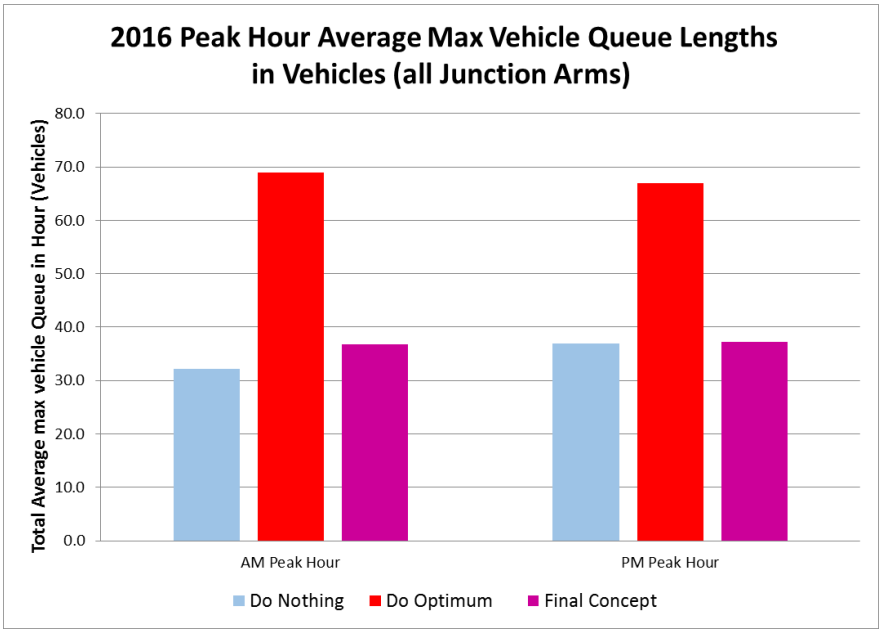
2016 'DO NOTHING', 'DO OPTIMUM AND 'FINAL CONCEPT' QUEUE LENGTH SUMMARY RESULTS



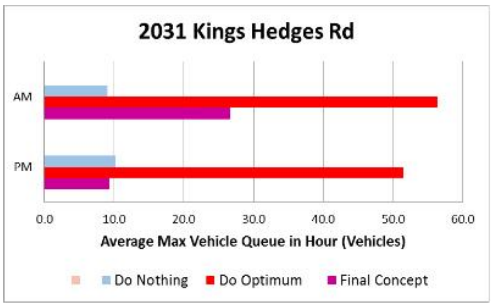


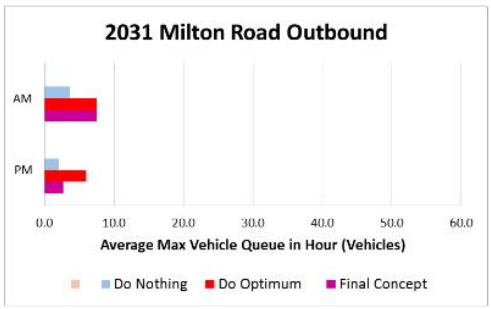


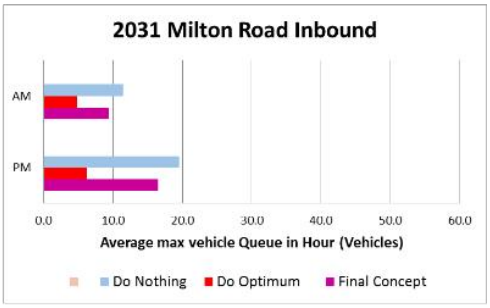


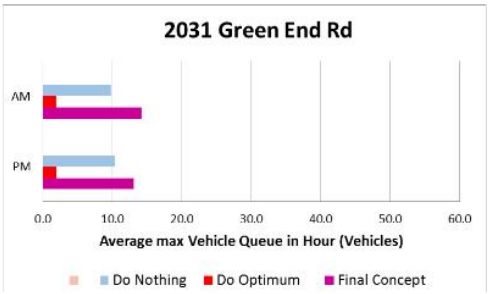


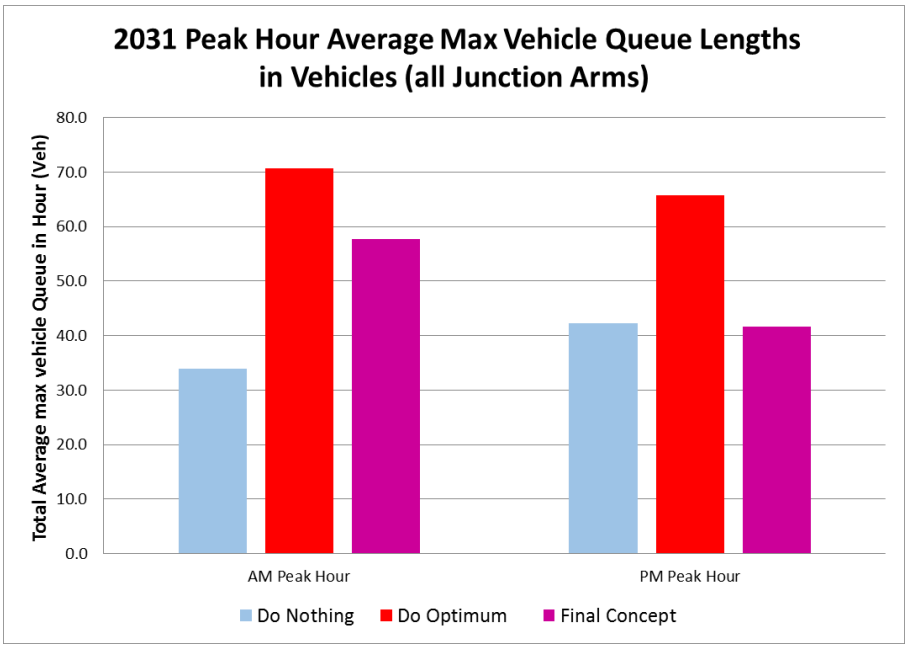
2031 'DO NOTHING', 'DO OPTIMUM AND 'FINAL CONCEPT' QUEUE LENGTH SUMMARY RESULTS











The graphs above compare the total queue length and the queue length on each arm at the King's Hedges Road Junction.

In year 2016 and year 2031, both the 'Do Optimum' (Dutch Style Roundabout) and 'Final Concept' experience an increase in overall queuing delay in the AM peak compared with the current layout, with 'Do Optimum' having the greatest impact which is mainly attributable to the additional queue length on King's Hedges Road.

The additional all green pedestrian/cyclist stage in the 'Final Concept' scenario significantly increases the queue delays in AM peak. The queue length on King's Hedges Road is significantly increased in the 'Do Optimum' scenario as the roundabout prioritises the flow on Milton Road outbound, which stops vehicles gaining priority onto the roundabout from King's Hedges Road.

The 2031 flows increase the total queue length in the 'Do Nothing' scenario and the 'Final Concept' scenario but does not indicate a significant additional impact on the 'Do Optimum' scenario as the junction is already over capacity in 2016 and the extra 2031 flow cannot be released into the junction.