Feasibility Report

A605 Cemetery Road Roundabout, Whittlesey Active Travel Measures

June 2023

Document History

JOB NUMBER: 5020600			**DOC REF: 5020600/300/320**			
P01	First Issue	HL	DRAFT			
Revision	Purpose Description	Originated	Checked	Reviewed	Authorised	Date

Local document reference: CH F404
Version number and date: v2 11/01/2022

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1.0 Introduction

This report was commissioned by Cambridgeshire County Council to investigate options for improving active travel measures at the roundabout at Cemetery Road with Blunts Lane on the A605, Whittlesey.

From an initial investigation of the site, the main issues concerning the roundabout include but are not limited to:

- Lack of provision for NMU desire lines
- Substandard pedestrian and cycling crossing points, reducing the crossing width for pedestrians / cyclists and / or vehicle running lane widths
- Narrow refuge islands
- Inadequate footway widths / shared use areas
- Wide vehicle lanes and non-standard geometry

The report identifies three main options to be compared and evaluated, all options will provide solutions to the issues stated above.

- Option 1: Do Minimum – minor island adjustments and dropped crossings.
- Option 2: Do Something – Geometry and island widening improvements.
- Option 3: A fully compliant LTN 1/20 signal controlled junction replacement.

Consideration is given to the constraints and opportunities for the project, as well as provisional cost estimate based on the Option 2 drawing.

The option drawings and this report combine to provide a basis for further consultation with the relevant stakeholders prior to securing funding for the progression of this scheme to detailed design.

2.0 The Site

Figure 1a: Site Overview

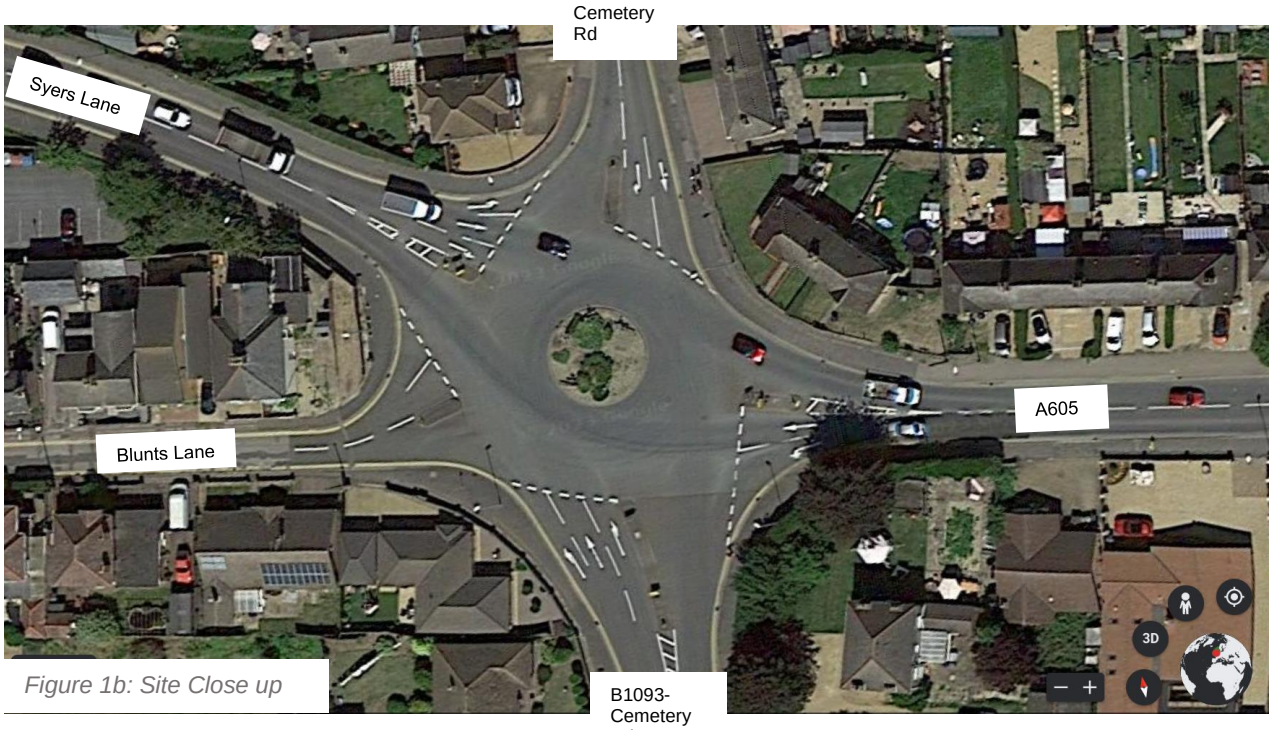

Figure 1b: Site Close up

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The site is five arm roundabout located in the centre of Whittlesey, it is one of three major roundabouts on the A605 route through Whittlesey. The roundabout is used often by local people and commuters travelling from March into Peterborough.

There are three schools and the town centre is located within an 800m radius of the site. Existing path widths and crossing provision are poor. Pedestrians and cyclists are forced to use other routes or cross using substandard facilities, much of this movement is during peak hours.

2.1 Existing Desire Lines

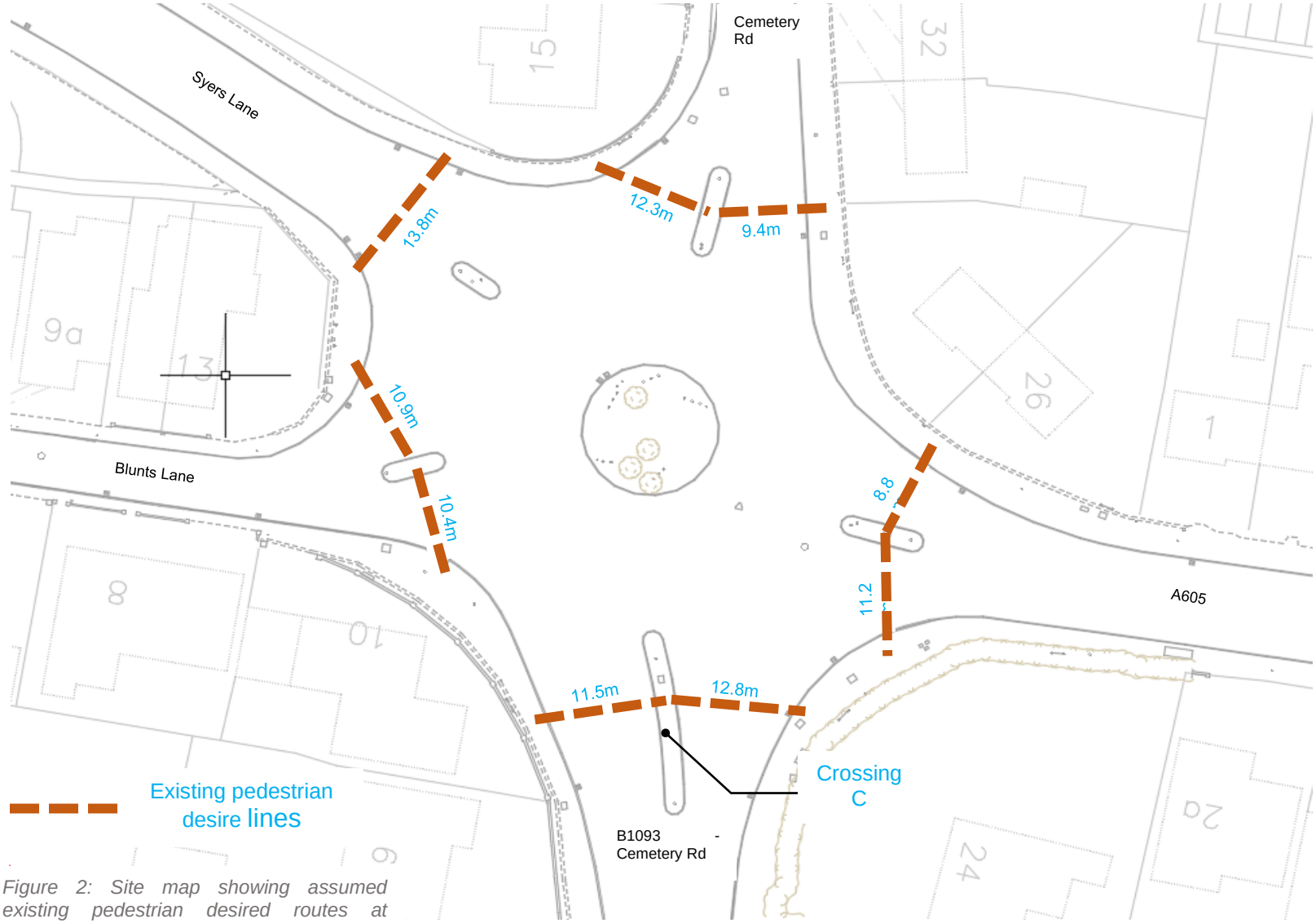


Figure 2: Site map showing assumed existing pedestrian desired routes at crossing points

Figure 2 shows the existing roundabout layout and the assumed desire lines for pedestrians attempting to cross over roads, currently there are splitter islands located at each arm of the roundabout. The roundabout sees a high amount of traffic, especially during peak times. In order to understand existing flows, a traffic demand survey was commissioned. The design options will use information gained from the survey to analyse the extents of improvements required to provide safe crossings for pedestrians and cyclists.

All the above crossing points have refuge islands located between the opposing lanes. Refuge islands are an important feature for safety, especially when vehicle flow and pedestrian use is high. Refuge islands should be an absolute minimum of 2m with 2.5m being preferred. LTN 1/20 states refuge islands used by cyclists should be a minimum of 3.0m in direction of travel length, the current refuge islands are a maximum of 1.8m.

3.0 Utilities

Stats C2 information has shown multiple services located within the area of the site.

Anglian Water – Plans show pipes are located beneath Blunts Lane, travelling to A605 and B1093, Cemetery Rd to North Cemetery Rd.

Virgin Media & BT – Cables are located within the site area, specifically along B1093 Cemetery Rd where alterations to the carriageway and footway are required. Further liaison with Virgin Media and BT will be required during construction to identify exact locations.

Cadent Gas – Low Pressure mains located along all arms.

UKPN – High Voltage cables located with site.

Site Investigation during the Detailed design will determine whether services can be accommodated or diverted these utilities which may impact suitability of some options or elements.

4.0 Traffic Survey

Cambridgeshire County Council commissioned Milestone Infrastructure to undertake a traffic demand survey at the roundabout to understand existing flows of traffic and how the current roundabout configuration compares to the proposed designs. The proposed designs were assessed to see if the different options affect the overall operation.

The survey was conducted on the 28 September 2022 to determine the current traffic flow and available capacity of the existing roundabout. 'Junction 10' software was then used to test the proposed Option 2 design providing results on each arms level of service.

Junction 10 software was used to test Option 2 only. As the changes in Option 1's lane widths and roundabout diameter were minimal, it can be assumed that the impact would also be minimal.

4.1 Summary of Results

Details of the whole traffic flow study can be found in Appendix A. This report will draw on the information gained from what is considered the worst-case scenario.
The worst-case scenario for the existing roundabout and proposed scheme is tested with the following constants:

- Estimated traffic demand in year 2031
- Peak times: AM & PM

'Table 3: Level of service definitions'
Appendix A, 'Cemetery Road roundabout, Whittlesey, Junction 10 modelling report.'

Level of service (LOS)	Description
A	Free flow
B	Reasonably free flow
C	Stable flow
D	Approaching unstable flow
E	Unstable flow & operation capacity
F	Forced or breakdown flow

Table 3 was produced via the software Junction 10; each test was scored against a LOS grade. 'A' being the most suitable. The results show the existing roundabout achieved a LOS rating of 'A' at all junctions at year 2031 at both peak AM and PM hours.

The result of the proposed roundabout scheme shows all tested junctions in year 2031 at peak AM and PM hours operate within capacity with a LOS rating of A.

The study goes on to state "the proposed layout (Option 2) has a positive impact on the roundabout for the AM and PM peak when compared with the existing layout, with reduced queueing and delay with Arm B (A605) experiencing the largest positive impact."

Although the A605 arm saw a noticeable improvement, the study found Blunts Lane and Syers Lane during peak PM hours performance decrease. However, this decrease was negligible which did not affect the LOS rating, therefore the junction continues to operate within capacity.

5.0 Options Study

Three options will be compared below. The first option, a low-cost solution. The main objective of this option is to improve pedestrian crossings facilities to a satisfactory standard while keeping the cost as low as possible.

The second option is to reduce vehicle lanes and increase refuge island widths to provide safe crossing points. Different size roundabouts ICDs were considered, however the traffic modelling proved that the roundabout currently works efficiently from a vehicular perspective. An increase in size may have impact on highway boundary and was not required to accommodate the islands.

The third option is a full reconstruction of the existing roundabout with the introduction innovative solutions. Two sub options have been considered. '3a', a signalised junction style design and '3b' a CYCLOPS design.

5.1 Option 1: Do Minimum

Figure 3, an extract of Drawing 5020585-MIN-HGA-ZZ-DR-CH-0101-S2-P02, shows the low-cost Option 1. Uncontrolled crossing measures in form of tactile paving have been introduced at each crossing point. The main benefit of tactile paving is to provide extra safety for visually impaired users. Tactile paving is also familiar, meaning cyclists and pedestrians assume they are at a designated crossing location.

The widths of the refuge islands on Cemetery Rd, A605 and B1093 have all been increased to at least a 2m – complying with the minimum standard stated in DMRB, CD143 for refuge islands when considering pedestrians only.

The number of lanes has also been maintained at all junctions, with Cemetery Rd, A605 and B1093 widths slightly decreasing due to the increase in widths of the refuge islands.

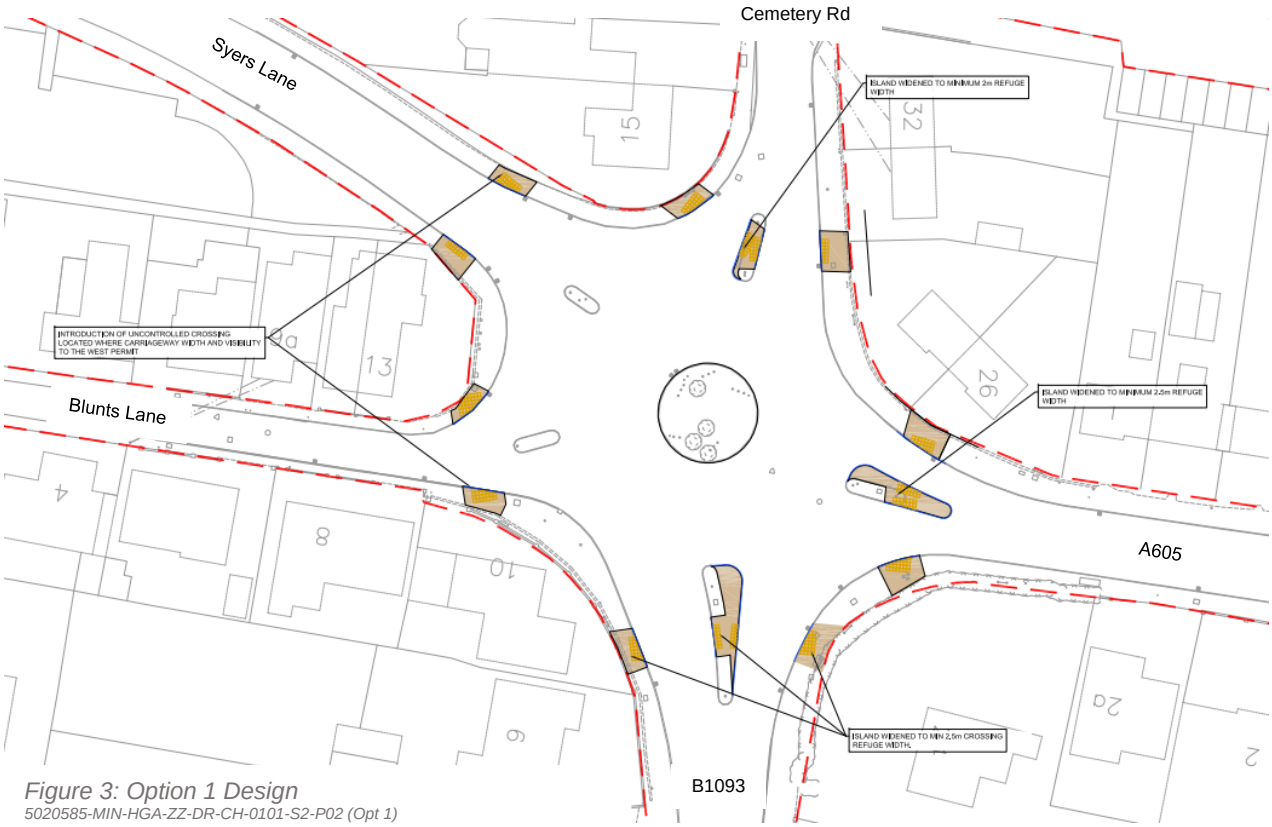


Figure 3: Option 1 Design
5020585-MIN-HGA-ZZ-DR-CH-0101-S2-P02 (Opt 1)

5.2 Option 2: Do Something

Drawing 5020585-MIN-HGA-ZZ-DR-CH-0102-S2-P02 shows a similar but more advanced design of Option 1. In Figure 4, Option 2 shown below we can compare the existing refuge island layout against the proposed layout. The new refuge islands are greater in width and length compared to the existing. The existing refuge islands measure approximately 1.8m in width. When considering LTN 1/20, guidance states refuge islands which will be used by pedestrians and cyclists should be a 'minimum of 3.0m in width (in the direction of travel for the cyclist)'. All proposed refuge islands meet this criteria. Refuge island at the A605 is narrowest at 3.5m minimum, however still exceeds standards.

Both Syers Lane and B1093 are three lane entry arms. Option 2 proposes to decrease the number of lanes. To maximise safety, entry widths should be kept to a minimum.
Entry width is the largest determinate of a roundabout's capacity, the circulatory road width must be at least as wide as the widest entry and must maintain a constant width throughout. The increase in size of refuge island and central island diameter, proposed in Option 2, resulted in the circulatory width decreasing thus providing enough width for a 2-lane entry only.

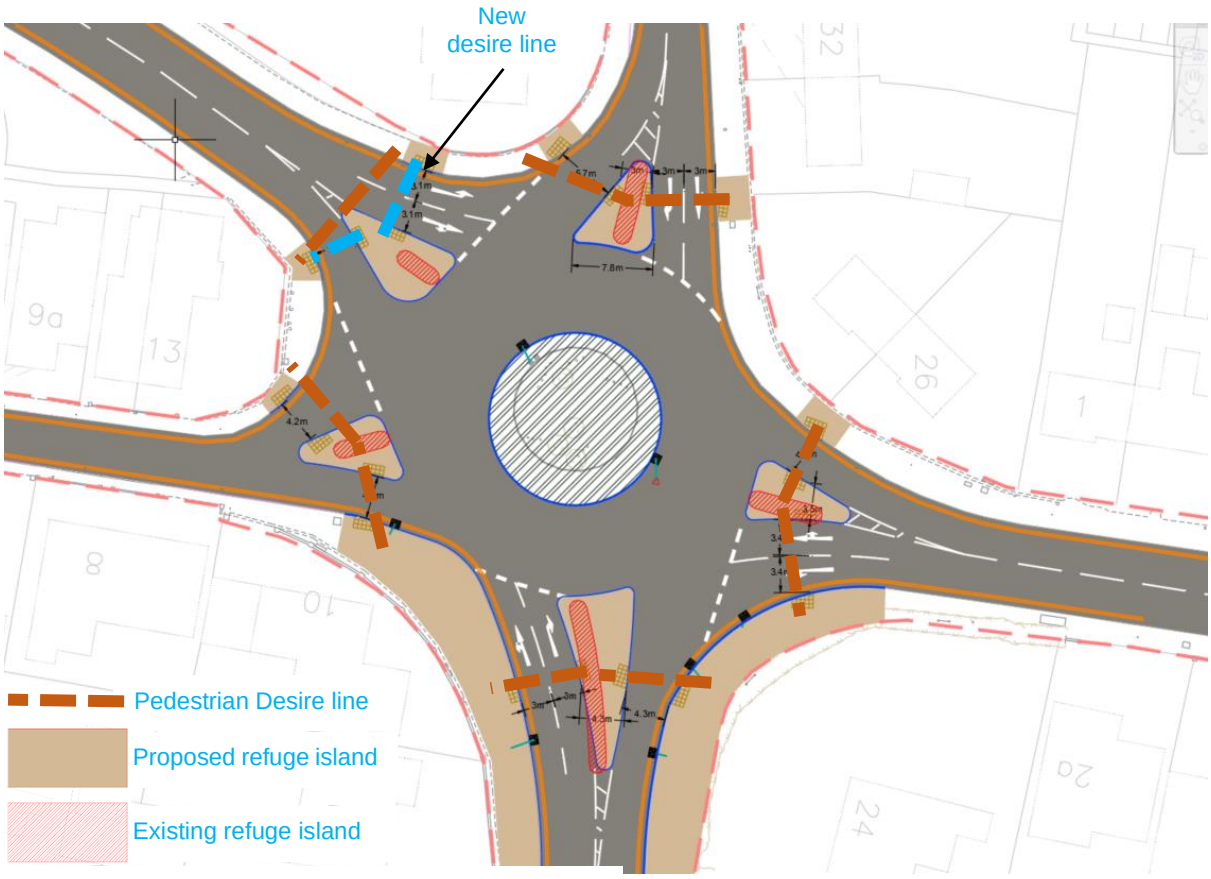


Figure 4: Option 2 Design
5020585-MIN-HGA-ZZ-DR-CH-0102-S2-P02 (Opt 2)

5.2.1 Refuge Island Improvements

Compared to the original refuge island lay out, Syers Lane has had a significant improvement whereby the new construction is in a more suitable location to be used by pedestrians and cyclists.

Tactile paving has also been introduced at each crossing point. This provides the same benefits as mentioned above in Option 1 however when paired with the new refuge island design, we can see how the existing desire lines change, in Figure 4 crossing 'E' the blue dashed line shows the new desire line. This is a major improvement as the new desire line passes through the proposed refuge island.

5.2.2 Roundabout Improvements

The current speed limit on each arm is 30MPH. Due to the roundabout's current configuration such as straight, wide carriageways, vehicles can easily maintain the 30MPH limit up to the entry and exits points. In addition, the roundabout has 5 arms, DMRB states that 'the number of accidents per year increases with the number of arms (due to increases in the potential conflict points).' The wide lanes, number of arms and lack of speed calming measures are all factors making the roundabout prone to collisions.

Option 2 adjusts the alignment of the approach kerb lines and central islands to provide improved approach geometry, this will lead to a decrease in vehicle approach speeds and better deflection characteristics. The Junction 10 analysis suggests an improvement to the vehicular flow of the roundabout in providing this option despite the reduction in entry lanes

Wider splitter islands will support this re-alignment and lane reduction whilst providing the primary benefit of a safe refuge space for crossing users.

The central island has increased in diameter from 11.8m to 16.5m. The size of the central island plays a key role in determining the amount of deflection imposed on the through vehicles path. This will force drivers to slow and increase steering input which improves awareness and creates gaps for vehicles entering the roundabout and also users waiting to cross.

5.3 Option 3a: Signal Controlled Junction

The third proposed option is a full re-design by removing the existing roundabout and replacing it with a signalised junction. Figure 5 is a realistic and feasible design which could effectively be implemented to provide safe travel for users.

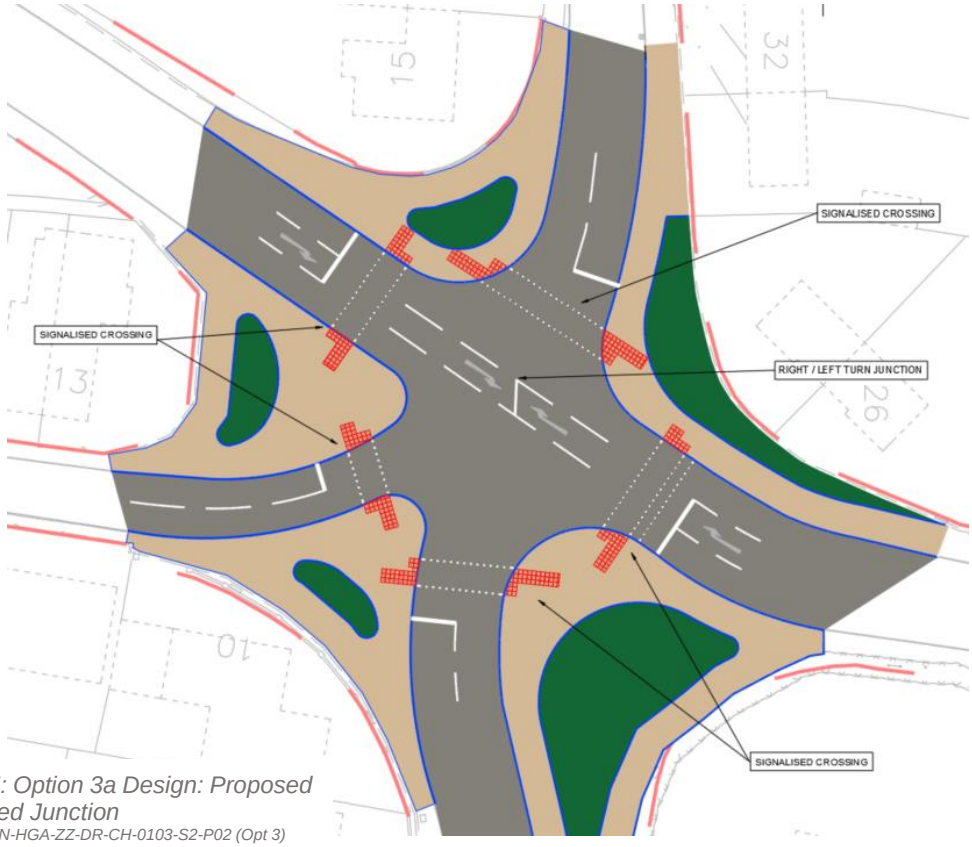


Figure 5: Option 3a Design: Proposed Signalised Junction
5020585-MIN-HGA-ZZ-DR-CH-0103-S2-P02 (Opt 3)

Option 3a provides wide footways with widths maintained at a minimum of 3.0m, green areas are also located between these paths, improving the biodiversity and setting of the junction

The combination of traffic signals and signalised crossings is to allow pedestrians to cross in specific phases, traffic lights can also be programmed to detect traffic flows and optimise who has priority. The costs of this scheme would be greater with a maintainable signal assets included. If sufficient budget could be allocated then this solution may be optimised to include for minimal vehicle delays whilst providing significant pedestrian safety improvements.

5.4 Option 3b: CYCLOPS Case Study

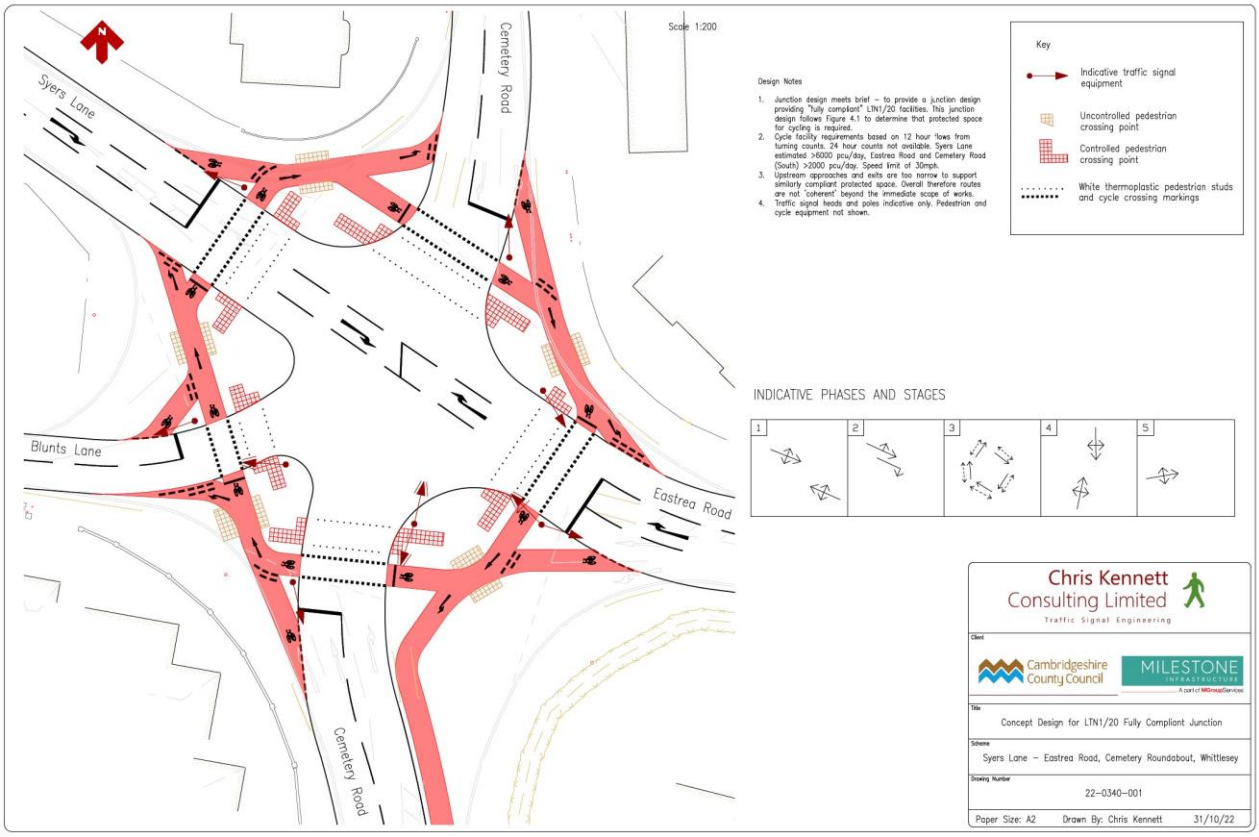
Various new active travel junctions have been adapted across the UK to provide safer methods of transport for users. The most suitable of these which could be adopted at the A605 roundabout if budget and demand permits is the Cycle Optimised Protected Signals (CYCLOPS) concept. This is an innovative design solution, the principle feature seen in Figure 6 is the external orbital cycle track separating cyclists from vehicular traffic in time or space, enabling multi-modal user conflicts to be managed safely. In the future, it is expected that the proportion of people walking and cycling will increase. CYCLOPS junctions naturally accommodate the future demand, allowing pedestrians and cycle 'phases' to run simultaneously.

In July 2020 Manchester introduced the first CYCLOPS junction (Figure 6). it allows cyclists to make a safe right turn while being protected from ongoing traffic.

Figure 6: Case study 1: CYCLOPS Junction, Hulme,

The main difference Manchester's new junction provides compared to traditional UK junction designs is that cyclists are offered an alternative safer route around the junction. They are no longer required to position themselves on the nearside of the lane, allowing vehicles to pass on their offside which is often the cause of 'left hook' cycling incidents, where cyclists going ahead are struck by a vehicle turning left from the same lane.

A concept of how this could look as a variation on the signal controlled junction is included below:



The CYCLOPS resolves this with its external orbital cycle route which separates cyclists from motor traffic. Bicycles approaching from all four arms can use the cycle track which encircles the junction to make left, ahead and right running movements safely protected from traffic.

Other benefits include:

- Cyclists & Pedestrians phases can run simultaneously.
- Pedestrian crossing times are shorter and closer to desire lines.
- Cyclists can filter left without signal control
- Journey times for all modes navigating the junctions, including motor traffic, are not negatively affected.

6.0 Cost Estimate

A cost estimate for design Option 2 has been provided as an indication of the potential cost. The cost stated below excludes and assumes the following.

- Assumption no utility works in this estimate
- Night-time working
- Risk of vandalism
- Excludes costs arising from environmental including contaminated materials and ecology issues
- Excludes costs of land rent for compound areas
- Excludes VAT

The estimated cost for Option 2 is **£664,600 - £969,700** this includes 46% optimism bias applied to the construction cost due to the scheme being developed only to concept stage at this time.

7.0 Recommendations

All three options discussed above are viable. Option 1 is a cost-effective method to improve the current roundabout, by simply installing tactile paved crossings and widening existing refuge islands, both travel for pedestrians and vehicle users will be improved. However crossing points will not be optimised for cyclists and will still require users to traverse three vehicle lanes on the approaches.

Option 2 provides a balance of benefits to costs in providing improved crossing facilities for all with minimal impact to vehicular capacity. The improvements build on Option 1 to allow for greater capacity in crossing movements and adequate cycle refuge capacity. The changes to the central island and kerb lines will slow vehicle speeds and improve deflection meaning the roundabout is easier to navigate whilst increasing prominence and visibility of crossing movements.

Option 3 provides a fully optimised solution which uses safety as its most significant factor. All improvements mentioned above will be present in this option, with the upgrade of a controlled crossing at each crossing location.

In the past 5 years the roundabout has experienced 3 minor collisions, from a business case perspective it would likely prove difficult to justify a full signalisation of the junction due to the cost and disruption associated with delivering Option 3.

The current roundabout is not ineffective from a vehicle capacity perspective, this is evident from the traffic flow survey. Safety measures should be introduced to increase protection for pedestrians. Option 1 and 2 provide suitable measures to aid safe crossing for pedestrians, with Option 2 being the recommended solution to take forward to preliminary design. It will be possible to further value engineer and optimise that solution through the next design phase.

8.0 Conclusion

This report has compared three options to improve the A605 roundabout, Whittlesey.

Each option is sufficiently developed to allow consultation with stakeholders and the public. The current construction budget estimate has a significant element of risk which has been incorporated into the estimate as there are many assumptions and unknown conditions with regards utilities and other constraints.

The report recommends preliminary design of Option 2 to enhance crossing facilities for active travel users.

9.0 Appendix

9.1 Drawings

5020585-MIN-HGA-ZZ-DR-CH-0101-S2-P02
5020585-MIN-HGA-ZZ-DR-CH-0102-S2-P02
5020585-MIN-HGA-ZZ-DR-CH-0103-S2-P02

9.2 Cemetery Road roundabout, Whittlesey, Junction 10 modelling report.