

# Agenda Item 9iii

Appendix 3: Further Transport Evidence Base Work - Task 5 Proformas

<b>Junction</b>	<b>A414/A1081 London Colney Roundabout</b>
<b>Reference</b>	<b>Site 2</b>
<b>Location</b>	<p>The A414/A1081 junction is a five arm roundabout located to the south of St Albans, just to the north of London Colney.</p> <p>The roundabout consists of five signalised arms connecting A414 Orbital Road East and West, A1081 North and South and London Colney High Street. The junction forms a significant part of the local strategic network and provides links westbound on the A414 towards the M25 at Junction 21a near Watford and the M1 at Junction 8 near Hemel Hempstead. Eastbound links on the A414 provide access the A1 (M) at junction 3 near Hatfield. To the south, the A1081 provides a link to the M25 at Junction 22 and also leads to large industrial developments.</p>

<b>Description of Problem</b>
<p>The roundabout already manages large traffic volumes and often experiences significant delays during the peak hours. The A414 eastbound and westbound tends to carry the majority of the traffic flows, but large volumes also use the A1081 into St Albans and towards the M25 at Junction 22.</p> <p>The Hertfordshire County Council's (HCC) existing 2014 Base Year and 2031 Forecast Year COMET models (version 3, March 2017) have been used to identify areas of pressure on the highway network. COMET Base Year model highlighted that Site 2 has a junction delay of 1-2.5 minutes in AM Peak and 2.5-5 minutes in PM Peak and has been identified as a congestion hotspot in previous studies.</p> <p>The COMET 2031 Forecast Year model indicated increases in delays by approximately 1–1.5 minutes around the junction for every vehicle at the traffic signals in both the AM and PM peak. This delay is based on a do-minimum network and can be ascertained from these delays that the current layout would not provide sufficient capacity.</p> <p>It is also noted that the A414 east-west route attracts a significant volume of strategic route traffic in Hertfordshire. Therefore, improvements have been sought to reduce delays associated with the future increase in flow by improving the capacity of the junction.</p> <p><b>Constraints:</b></p> <p>The existing highway boundary limits the scope to which the existing junction can be widened and/or modified. The existing footbridge on the eastern side of the junction spans the A414 and would be expensive to demolish and reconstruct. The existing five arms at the junction would need to be retained and provide the same level of access for all existing turning movements.</p> <p>Currently, work is being undertaken on the A414 Strategy. Liaison with HCC would be required to ensure future designs do not conflict between this strategy and the proposal put forward within this pro forma.</p>

**Design Improvement Feasibility Details**

Three options have been considered for this junction: Upgrading the existing traffic signals, providing a flyover / under and modifying the roundabout to a 'hamburger' layout. Based on projected design flows it is unlikely that modifications to the existing signals would provide sufficient long term capacity and the cost of the flyover / under layout would be prohibitively expensive and complex to construct. The flyover / under is considered to be efficient in the long term to increase the capacity of the junction but due to very high construction costs this option has been ruled out and the option deemed to be most appropriate for further analysis is the 'hamburger' layout roundabout design.

The hamburger layout design is anticipated to increase junction capacity by enabling a higher east / west flow on the A414. However, there is a potential detrimental effect that could be caused by the turning traffic for the A1081 that would prevent the layout being used efficiently by east / west traffic. In addition, the layout is complex and will be unusual for both local and longer distance vehicular users. Gantry signs have been incorporated into the design to indicate which lane traffic will need to approach the junction, with right turning traffic required to use the nearside lanes.

The design has been designed in accordance with DMRB 86/03 – Layout of Large Signal Controlled Junctions. However, it is noted that the design standard recommends that this type of layout is not used for junction in excess of four arms and with over four lane entries. A departure from standard would be required to permit this layout to progress for preliminary design.

**A414 Eastbound and Westbound Traffic Lanes**

The existing layout would be modified to provide two ahead lanes for the A414 only in the offside lanes and the other traffic entering the junction would be guided to the nearside lanes, for both left and right turning traffic. The existing traffic lanes would be widened to accommodate the revised A414 ahead movement through the central island. The existing central island would be modified to introduce two lanes in each direction with a central reserve between the opposing traffic lanes.

The existing splitter islands on both approaches would be enlarged to provide the approach deflection for traffic entering the junction and clarity for the turning movements. The exits would be modified to accommodate the ahead A414 movement through the central roundabout island and the merging traffic from the A1081 and London Colney High Street.

**A1081 from Junction 22 of M25**

The layout from the A1081 would remain largely unaffected by the proposed modifications.

**A1081 from St Albans**

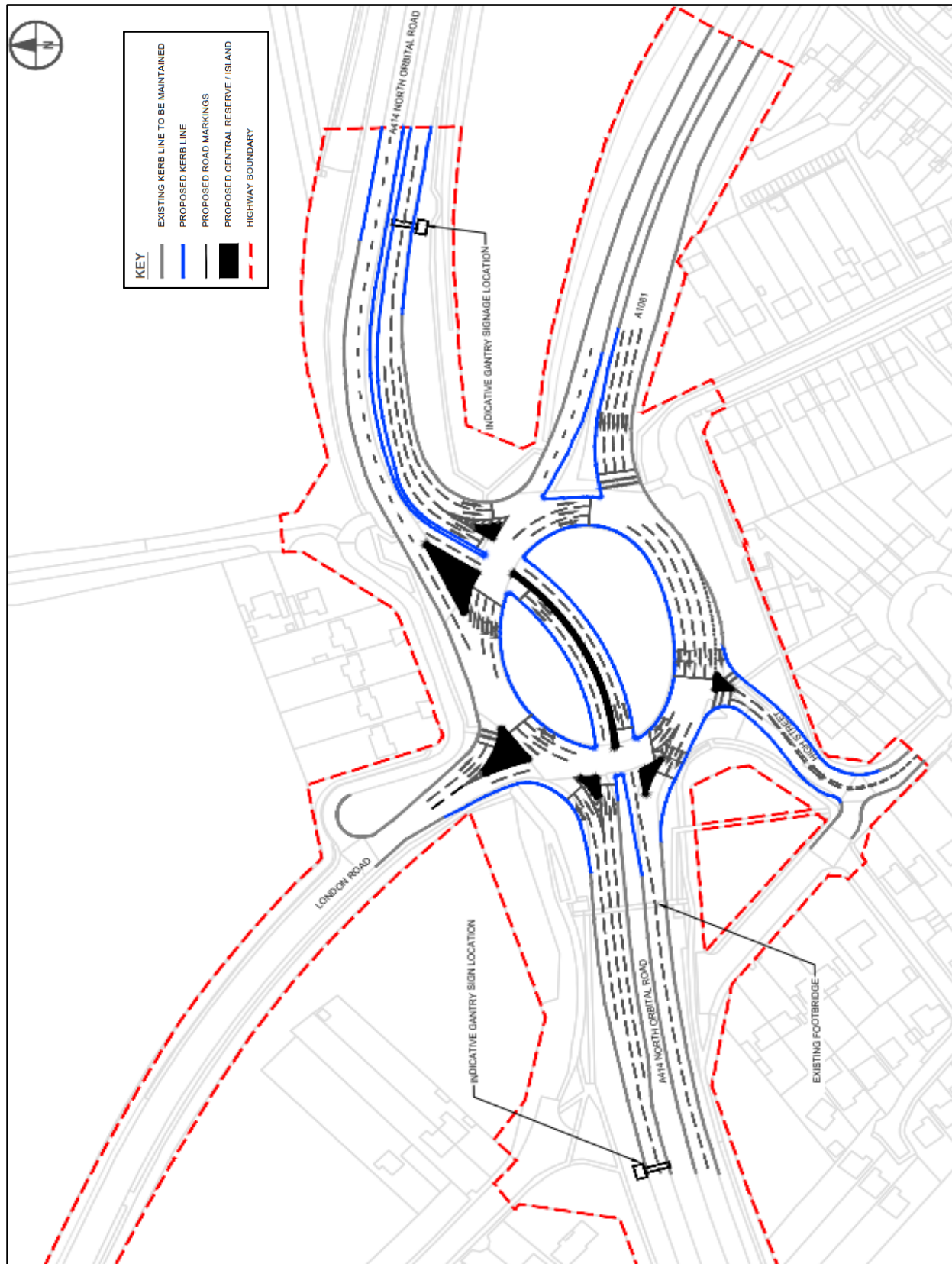
The layout from the A1081 would remain largely unaffected by the proposed modifications but with the provision of a modified splitter island.

**London Colney High Street**

The layout would require new carriageway construction to re-align the approach to the junction and a lengthened two lane approach from the High Street.

## Design Improvement Plans

## Outline Design:



Extract of the feasibility drawing no. 60534762-SADC-DWG-SITE 2 REV 1 (Refer to Appendix A for complete drawing)

**Outline Cost Analysis****Basis of Order of Magnitude Estimate:**

Site 2: A414-A1081 Roundabout/60534762-SADC-DWG-SITE 2- REV 1

**Assumptions:**

1. Everything within the existing and new kerb lines will be broken out to 600mm depth
2. Allowed for laying new and diverting existing storm drainage only. We have assumed there are no foul drainage requirements on the site
3. No allowance for works to existing pedestrian footbridge
4. The proposed Central Reservations are built up as per a typical bitumenous footpath construction
5. Assumed pedestrian crossings to London Road and High Street only
6. Assumed dimensions of proposed guardrail, lights, traffic lights, VRS barrier & posts, signage in the absense of any detailed drawings

**Exclusions:**

1. Any works or costs associated with landscaping
2. The demolition of any existing structures
3. Any works beyond the boundary line or before the end of the existing kerbs as shown on the drawing
4. Inflation beyond 2Q 2017
5. Professional fees
6. Planning and development control costs
7. Value added Tax

Works Element	Estimated Cost	Notes
Construction Cost	£ 6,160,000	
Allowances for Preliminaries	£ 1,232,000	20% of construction items
Allowances for Traffic Management ( TM )	£ 1,540,000	25% of construction items
Allowances for Scheme Design	£ 893,200	10% of construction items (including Prelims and TM)
Allowances for Utilities / Electricals	£ 1,232,000	20% of construction items
Sub-Total for allowances and construction items	£ 11,057,200	
Optimism Bias	£ 4,865,168	44% of sub-total
<b>Cost for Delivery</b>	<b>£ 15,922,368</b>	

<b>Junction</b>	<b>B651 St Albans Road / Sandridge Road / Marshalswick Lane / Beech Road signals (King William Junction)</b>
<b>Reference</b>	<b>Site 6</b>
<b>Location</b>	<p>The junction of Sandridge Road, Beech Road, Marshalswick Lane and St Albans Road, is a staggered four arm traffic signal controlled junction, to the north of St. Albans. All approaches to the junction have a speed limit of 30mph.</p> <p>The B651 St Albans Road is the main road from Wheathampstead and Sandridge towards central St Albans, whilst the B651 Sandridge Road is a major road to central St Albans from Marshalswick and Bernard's Heath. Beech Road and Marshalswick Lane form part of a ring road around suburban St Albans, and provide a corridor that enables traffic from Harpenden, Redbourn and Hemel Hempstead to access Marshalswick and Jersey Farm in the north east of St Albans.</p>

<b>Description of Problem</b>
<p>The junction currently experiences large volumes of traffic and often experiences delays.</p> <p>The Hertfordshire County Council's (HCC) existing 2014 Base Year and 2031 Forecast Year COMET models (version 3, March 2017) have been used to identify areas of pressure on the highway network. COMET Base Year model highlighted that Site 6 has an average junction delay of 1 minute in the both peaks and has been identified as a congestion hotspot in previous studies.</p> <p>The COMET 2031 forecast year model indicated an average delay of up to 1.5 minutes in both peaks. It can be ascertained from these delays that the current layout would not provide sufficient capacity.</p> <p>Therefore, improvements have been sought to reduce delays associated with the future increase in flow by improving the capacity of the junction.</p> <p><b>Constraints:</b></p> <p>The existing bridge that allows the railway to run below the junction limits the scope to which the junction can be widened and/or modified. In addition to the railway, the highway boundary limits the extent to which modifications can be made. There are numerous buildings surrounding the junction including residential and commercial properties, King William IV public house, a petrol station and a warehouse.</p>

<b>Design Improvement Feasibility Details</b>
<p>Three mitigation options have been considered at this junction: banning a right-turn movement from Beech Road to Sandridge Road, providing a double roundabout and upgrading the existing traffic signals.</p> <p>The concept of banning a right turn movement has been considered as a method of improving junction capacity as it would remove a signal stage from the overall signal cycle. The right turn from Beech Road to a Sandridge Road was selected as this has the lowest volume of right turning vehicles (refer to table 1 below) and would have the least volume of displaced traffic. In reviewing the existing signal staging information it has been determined that banning this movement also would not remove the stage from the signal cycle, as the right turn movement from Marshalswick Lane to St Albans Road also operates under the same stage. To remove this stage from the signal cycle would also require the banning of this additional right turn movement. This is likely to attract concerns from the local community over displaced traffic from the banned manoeuvres and likely to be deemed not acceptable by local residents. It is therefore considered unlikely that the option would gain approval for construction.</p> <p>A double roundabout has been considered as another option but this is likely to remove the existing pedestrian facilities and would be complicated to model using the current known traffic flow data and the COMET model and as such has not been progressed.</p>

In reviewing the HCC Traffic signal feasibility report dated February 2011, it recommended to provide an opposed right turn movement from Marshalswick Lane and Beech Road along with a new staggered crossing at Beech Road (these proposals provided the best outcome during modelling). It appears that the recommended upgrade has already been implemented and this represents the optimum layout of the current traffic signal. In reviewing the current layout, it shows the junction is already operating under only 4 stages with one being pedestrian only stage. The junction is also operated by MOVA signals therefore no further improvements are proposed at this junction. The drawing has been produced showing the existing layout of the junction with no further proposals for improvement.

Traffic counts were undertaken in November 2010 and provide more information on the movement of vehicles. Refer to table 1 for the data extracted from the feasibility report by Hertfordshire County Council.

**Table 1:**

Location ( From)	Location ( To)	Data (Number of vehicles)	
		AM Peak 08:00-09:00	PM Peak 17:00-18:00
St Albans Road	Marshalswick Lane	114	124
St Albans Road	Sandridge Road	309	262
St Albans Road (Right turn)	Beech Road	210	150
Marshalswick Lane	Sandridge Road	106	74
Marshalswick Lane	Beech Road	473	45
Marshalswick Lane (Right turn)*	St Albans Road	48	103
Sandridge Road	Beech Road	87	66
Sandridge Road	St Albans Road	162	306
Sandridge Road (Right turn)	Marshalswick Lane	125	111
Beech Road	St Albans Road	106	194
Beech Road	Marshalswick Lane	417	407
Beech Road (Right turn)*	Sandridge Road	44	37

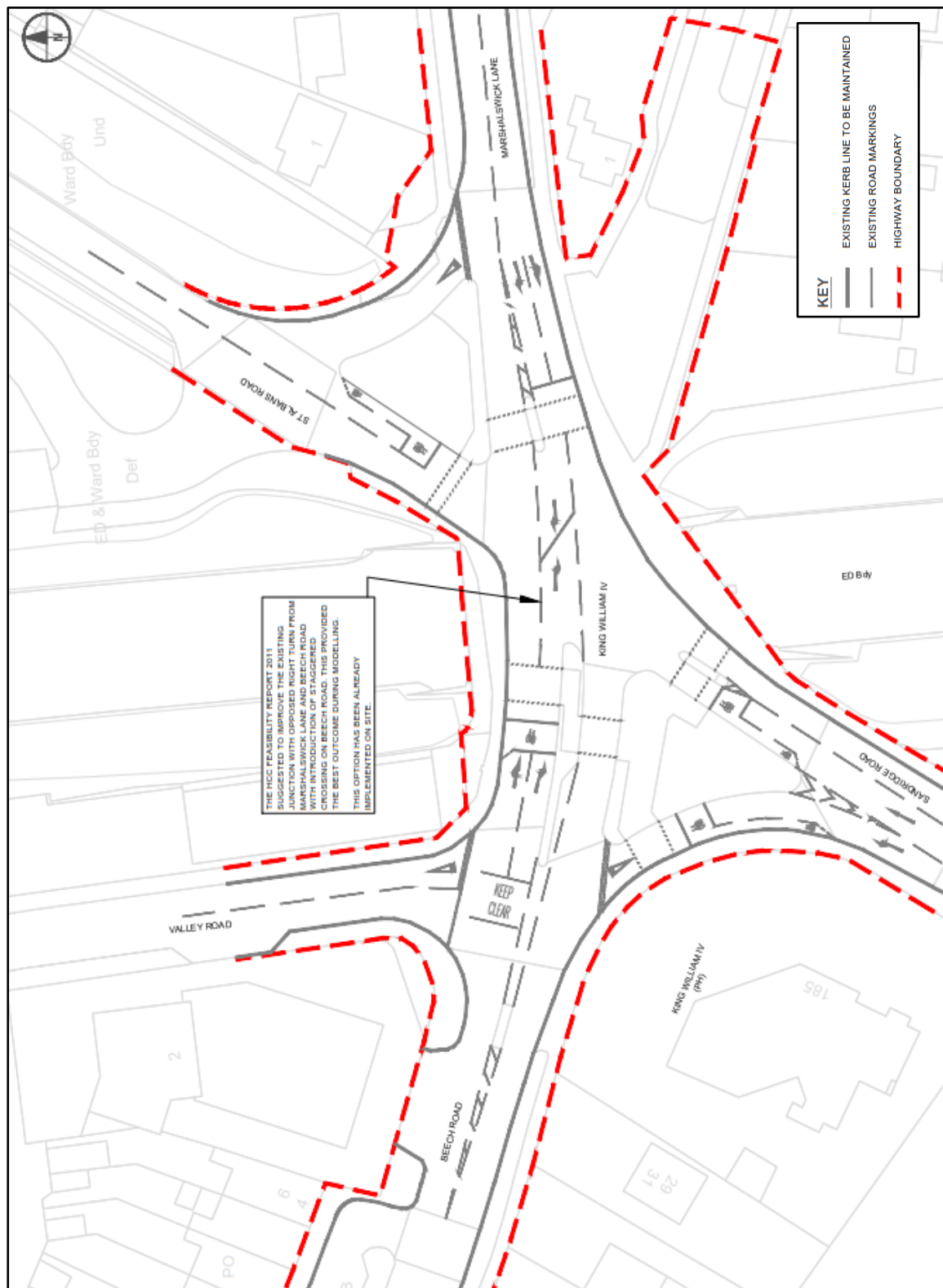
*\*Highlighted right turn movements considered for right turn ban.*

Following review of all three mitigation options, no works has been proposed at this junction due to the reasons stated for each option considered above.



## Design Improvement Plans

## Outline Design:



Extract of the feasibility drawing no. 60534762-SADC-DWG-SITE 6 REV 1 (Refer to Appendix A for complete drawing)



Outline Cost Analysis

No mitigation proposed.

<b>Junction</b>	<b>A1081 Harpenden Road / Beech Road / Batchwood Drive (Ancient Briton Junction)</b>
<b>Reference</b>	<b>Site 7</b>
<b>Location</b>	<p>The Ancient Briton junction is a four arm signalised junction, in a suburban area, north of central St Albans.</p> <p>A1081 Harpenden Road provides the main link between central St Albans and Harpenden and joins links to connect with A405 Orbital Road towards the M1 or M25.</p> <p>Batchwood Drive/Beech Road forms part of a ring road around suburban St Albans, and provides a corridor that enables traffic from Harpenden, Redbourn Road and Hemel Hempstead to access the North East of St Albans.</p>

<b>Description of Problem</b>
<p>The junction currently experiences large traffic flows with extensive queues forming on all approach arms. The queue on the A1081 southbound can already extend to a mile. It is evident that conditions at the junction will worsen in future years, even without any additional development- related traffic increase.</p> <p>The Hertfordshire County Council's (HCC) existing 2014 Base Year and 2031 Forecast Year COMET models (version 3, March 2017) have been used to identify areas of pressure on the highway network. COMET Base Year model highlighted that Site 7 has an average junction delay of 3.0 minutes in the AM peak, whilst the junction experiences an average delay of 2.0 minutes in the PM peak. The model also demonstrated this junction being one of the worst performing junctions and identified as a congestion hotspot.</p> <p>The congestion in the 2031 Forecast Year model highlighted that Site 7 has an average junction delay of 3.5 minutes on all approaches during the AM peak. During the PM peak, an average delay of 3.0 minutes exists.</p> <p>Therefore, improvements have been sought to reduce delays associated with the future increase in flow by improving the capacity of the junction.</p> <p><b>Constraints:</b></p> <p>The existing highway boundary limits the scope to which the existing junction can be widened and/or modified. Also, difficult to expand due to the close proximity of nearby buildings.</p> <p>Google Maps show BT cabinets and other utilities covers at the proposed site. The mitigation option proposed requires relocation of the cabinets and other covers which might prove very expensive. Therefore further C2, C3, and C4 enquiries will be required to confirm the extents of any statutory utility diversion works and GPR is also recommended to identify the exact location and depth of the underground services.</p>

**Design Improvement Feasibility Details**

Two options have been considered for this junction: a right turn ban from Harpenden Road Southbound onto Batchwood Drive and to widen Batchwood Drive to enable a separate right turn lane.

The initial concept of banning a right turn movement from Harpenden Road to Batchwood Drive has been rejected. It is thought that it would not be acceptable by local residents and would be unlikely to achieve approval due to concerns over where the displaced traffic would migrate to. It is therefore considered unlikely that the option would gain approval for construction. Altering traffic routes was considered for the displaced traffic but it would likely require some form of traffic calming measures on the local road network to mitigate against the increased traffic flow.

It was therefore decided not to proceed with this option, and considered the separate right turn lane on Batchwood Drive turning into Harpenden Road to be most appropriate to carry out further analysis. This option was considered to improve the operational efficiency of the junction, therefore increasing capacity and reducing delays experienced by motorists.

**Batchwood Drive**

The alignment of the Batchwood Drive approach is proposed to be altered through localised widening to enable a separate right turn lane to be provided. The inclusion of the right turn lane will allow both the Beech Road and Batchwood Drive approaches to run in the same stage and thereby reducing the number of stages at the junction from 5 to 4, maximising the green time given to each approach at the junction.

The initial design proposed required some land take from the registered common land to facilitate the widening on Batchwood Drive, providing wider lane widths and a smoother radius for larger vehicles turning left from Harpenden Road Northbound onto Batchwood Drive, but after the further investigations, St Albans District Council has confirmed the land belongs to Althorp Estate and is therefore privately owned. The proposal has been redesigned to keep within the highway boundary but this has meant that minimum lane widths and turning radii have been used.

**Beech Road**

The layout from Beech Road would remain largely unaffected by the proposed modifications.

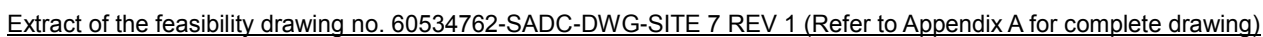
**Harpenden Road Northbound**

The layout from Harpenden Road northbound would remain largely unaffected by the proposed modifications. However the alignment of the nearside kerb from the stop line is proposed to be altered to accommodate the widening on Batchwood Drive.

**Harpenden Road Southbound**

The two lanes approaching the junction are proposed to be widened to 3.5m each to improve the layout of the junction and capacity of the traffic flow for vehicles travelling southbound. It is ensured that sufficient width has been provided for the footway, with re-aligned kerb, due to the use by St Albans Girls School. A width of 1.4m is shown in the outline design.

## Outline Design:



**Outline Cost Analysis****Basis of Order of Magnitude Estimate:**

Site 7: A1081 Harpenden Rd/Beech Rd/ Batchwood Drive (Ancient Briton)/60534762-SADC-DWG-SITE 7-REV 1

**Assumptions:**

1. Everything within the existing and new kerb lines will be broken out to 600mm depth
2. There are to be no works to Harpenden Rd south and Beech Rd
3. Allowed for laying new and diverting existing storm drainage only. We have assumed there are no foul drainage requirements on the site
4. The proposed Central Reservations are built up as per a typical bituminous footpath construction
5. Assumed requirement for crossings to all Batchwood Drive and Harpenden Rd north
6. Dimensions of proposed guardrail, lights, traffic lights and signage are assumed in the absence of detailed drawings

**Exclusions:**

1. Any works or costs associated with landscaping
2. The demolition of any existing structures
3. Any works beyond the boundary line or works to estates leading off of Batchwood Drive and Harpenden Rd
4. Inflation beyond 2Q 2017
5. Professional fees
6. Planning and development control costs
7. Value added Tax

Works Element	Estimated Cost	Notes
Construction Cost	£ 397,000	
Allowances for Preliminaries	£ 79,400	20% of construction items
Allowances for Traffic Management ( TM )	£ 99,250	25% of construction items
Allowances for Scheme Design	£ 57,565	10% of construction items (including Prelims and TM)
Allowances for Utilities / Electricals	£ 79,400	20% of construction items
Sub-Total for allowances and construction items	£ 712,615	
Optimism Bias	£ 313,551	44% of sub-total
<b>Cost for Delivery</b>	<b>£ 1,026,166</b>	

<b>Junction</b>	<b>A5183 Redbourn Road / A4147 Bluehouse Hill / Batchwood Drive roundabout</b>
<b>Reference</b>	<b>Site 8</b>
<b>Location</b>	<p>The site is a four arm roundabout, with a dual lane entry on each arm, located to the west of St Albans.</p> <p>It consists of the following roads: A5183 Redbourn Road, A1583 Verulam Road, Batchwood Drive and A4147 Bluehouse Hill (Hemel Hempstead Road). The north-east arm of the roundabout is Batchwood Drive, towards Townsend and the A1081 Harpenden Road. A4147 Bluehouse Hill (Hemel Hempstead Road) is on the south-west arm and provides a primary link to Hemel Hempstead.</p> <p>The eastern arm is the A5183 Verulam Road which leads to central St Albans, whilst the A5183 Redbourn Road is on the western arm of the roundabout, leading to Redbourn.</p>

<b>Description of Problem</b>
<p>The roundabout has high number of vehicles travelling to and from of Hemel Hempstead and St Albans. There are significant movements from A4147 Bluehouse Hill travelling south east into A5183 Verulam Road and A5183 Verulam Road travelling north east into Batchwood drive. It is evident that conditions at the roundabout will worsen in future years, even without any additional development- related traffic increase.</p> <p>The Hertfordshire County Council's (HCC) existing 2014 Base Year and 2031 Forecast Year COMET models (version 3, March 2017) have been used to identify areas of pressure on the highway network. COMET Base Year model highlighted that Site 8 has an average junction delay of 0.5 minute in the both AM &amp; PM peak periods and has been identified as a congestion hotspot in previous studies.</p> <p>The COMET 2031 forecast year model indicated similar delay of 0.5 minute on the approach arms in the AM peak for inbound traffic and the PM peak for outbound traffic. There is a reduction in flows on A4147 due to delays at surrounding junctions.</p> <p>Therefore, improvements have been sought to reduce delays associated with the future increase in flow by improving the capacity of the junction.</p> <p><b>Constraints:</b></p> <p>The existing highway boundary limits the scope to which the existing junction can be widened and/or modified.</p> <p>Google maps show the presence of many existing utilities within the extents of the proposed site. Implementing the mitigation option proposed may require the relocation and diversion of existing services which could potentially add significant costs to the scheme.</p>

**Design Improvement Feasibility Details**

A number of options have been considered at this junction: providing segregated left turn lane from A5183 Verulam Road to A4147 Bluehouse Hill, increasing flare lengths and entry widths of the existing two lane entries and widening to three lane entries.

The segregated left turn option was considered but, as no turning count data is available, it is difficult to determine the best approaches to implement this proposal on. Whilst the left turn from A5183 onto A4147 towards Hemel Hempstead was indicated to have a likely benefit from this option, the turning count data is necessary to meet DMRB requirements and a departure from standard may be required for delivery of this option. A general widening of the approach arms and increase in flare length was also considered as a mitigation measure to be implemented at this site. It may provide a general upgrade to the capacity across the whole roundabout and seek to reduce the delays but this would be minimal against the level of intervention and construction required to deliver. Widening the existing two lane entries to three lanes is considered as the most appropriate mitigation, where significant improvements to capacity can be gained.

**A5183 Verulam Road**

The existing non-physical deflection island is proposed to be maintained, but relocated to accommodate for the additional proposed lane. This is in the form of road markings and separates the new dedicated left turn lane from the other straight ahead and straight ahead and right turn lanes. This aims to increase the capacity for the left turners on this approach. The central reservation has also been altered, in line with the general roundabout widening.

**A417 & Batchwood Drive**

The entries on both approaches are proposed to be widened from two lanes to three in order to accommodate an increase in capacity at the roundabout. A left turn arrow marking is proposed in the nearside lane whilst the central and offside lanes will be marked with an ahead arrow and an ahead and right turn arrow respectively.

**A5183 Redbourn Road**

The entry of this approach has been widened from two lanes to three to increase the capacity at the roundabout and reduce the delay experienced by motorists. A physical subsidiary deflection island is proposed at this approach to mitigate against the reduction in deflection resulting from the increase in the number of lanes. The nearside lane will be marked with a left turn arrow and separated from the other entry lanes by means of the island. The central and offside lanes will be marked with an ahead arrow and an ahead and right turn arrow respectively.

The central island is proposed to be widened in order for deflection and circulatory carriageway width requirements set out in DMRB TD16/07 to be met.

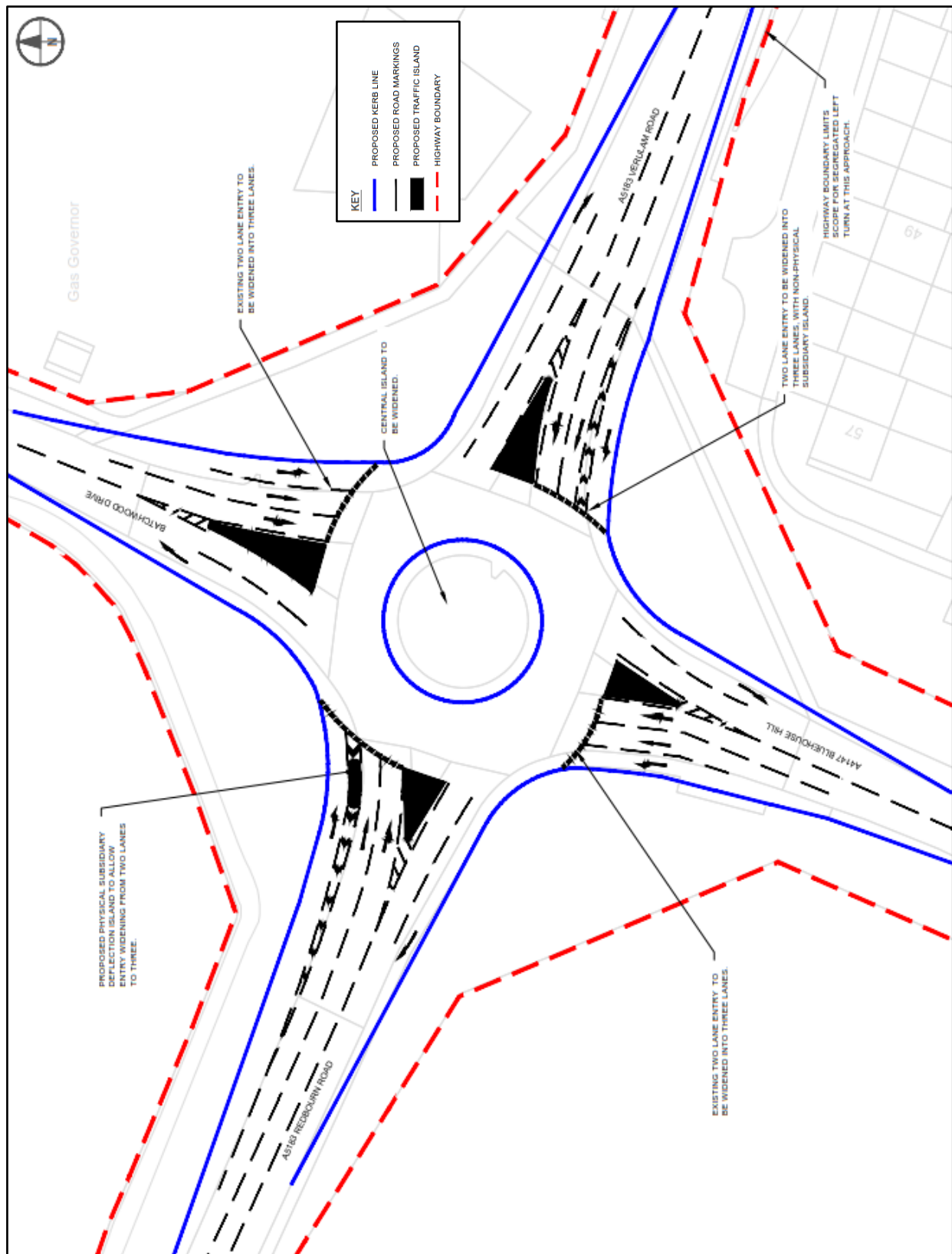
The exits of all approaches are proposed to merge from two lanes to one as the number of entry lanes has been increased.

There is also a long term aspiration from HCC to provide an off carriageway cycle link from St Albans to Redbourn via Redbourn Road. This should be considered at the later design stages should this aspiration continue to exist.



## Design Improvement Plans

## Outline Design:



Extract of the feasibility drawing no. 60534762-SADC-DWG-SITE 8 REV 1 (Refer to Appendix A for complete drawing)

**Outline Cost Analysis****Basis of Order of Magnitude Estimate:**

Site 8: A5183 Redbourn Road/A4147 Bluehouse Hill/Batchwood Drive Roundabout/60534762-SADC-DWG-SITE 8-REV 1

**Assumptions:**

1. Everything within the existing and new kerb lines will be broken out to 600mm depth
2. Allowed for laying new and diverting existing storm drainage only. We have assumed there are no foul drainage requirements on the site
3. The proposed Central Reservations are built up as per a typical bituminous footpath construction
4. Dimensions of proposed lights, traffic lights, signage are assumed in the absence of detailed drawings
5. Centre of roundabout to be a hard central reservation build up

**Exclusions:**

1. Any works or costs associated with landscaping
2. The demolition of any existing structures
3. Any works beyond the boundary line
4. Inflation beyond 2Q 2017
5. Professional fees
6. Planning and development control costs.
7. Value added Tax

Works Element	Estimated Cost	Notes
Construction Cost	£ 1,211,000	
Allowances for Preliminaries	£ 242,200	20% of construction items
Allowances for Traffic Management ( TM )	£ 302,750	25% of construction items
Allowances for Scheme Design	£ 175,595	10% of construction items (including Prelims and TM)
Allowances for Utilities / Electricals	£ 242,200	20% of construction items
Sub-Total for allowances and construction items	£ 2,173,745	
Optimism Bias	£ 956,448	44% of sub-total
<b>Cost for Delivery</b>	<b>£ 3,130,193</b>	

<b>Junction</b>	<b>B653 Cory Wright Way / Marford Road, Wheathampstead</b>
<b>Reference</b>	<b>Site 10</b>
<b>Location</b>	<p>This junction is a three arm roundabout located in a rural area, east of Wheathampstead and north of St Albans.</p> <p>The roundabout connects Marford Road and B653 Cory Wright Way and provides links to the A1 (M) and Welwyn Garden City to the east and Harpenden to the west. Marford Road leads into the town centre of Wheathampstead, approximately one mile to the east. This also provides a link into central St Albans. Cory Wright Way provides a bypass for Wheathampstead and leads to Harpenden. The B653 Marford Road continues eastbound from the junction towards Welwyn Garden City.</p>

<b>Description of Problem</b>
<p>The roundabout already manages large traffic volumes and often experiences significant delays during the peak hours on the B653 approaches.</p> <p>The Hertfordshire County Council's (HCC) existing 2014 Base Year and 2031 Forecast Year COMET models (Version 3, March 2017) have been used to identify areas of pressure on the highway network. The COMET Base Year Model highlighted that Site 10 has an average junction delay of 1.0 minute in the AM Peak and a delay of up to 0.5 minutes in the PM Peak hours.</p> <p>Strategic modelling of the junction in future years using the 2031 COMET model has indicated increased delays would appear on all approaches, as the current layout would not provide sufficient capacity for future traffic flows. An average delay of 2.0 minutes has been identified on all approaches in the AM peak and an increase in delay by an average of 1.5 minutes in the PM peak.</p> <p>Therefore, improvements have been sought to reduce delays associated with the future increase in flow by improving the capacity of the junction.</p> <p><b>Constraints:</b></p> <p>The existing highway boundary limits the scope to which the existing junction can be widened and/or modified.</p>

**Design Improvement Feasibility Details**

Two options have been considered for this junction: widening the B653 approach, by utilising farm land and introducing part time traffic signals with a reduction of the existing speed limit from 60mph to 40mph.

Widening the B653 approach by utilising adjacent farm land was not considered appropriate due to the relating land costs and the minimal corresponding reductions in delays.

Part time traffic signals have been proposed due to the ability to filter the peak hour traffic flows more efficiently and therefore reducing the delays experienced by motorists.

The proposed roundabout has been designed to DMRB standard Volume 6, section 2, Part 3 TD 16/07 Geometric Design of Roundabouts.

**B653 Marford Road**

The existing approach would be widened to provide a traffic lane for each movement. The nearside lane would accommodate vehicles travelling into central Wheathampstead, whilst the outside lane would accommodate vehicles turning right onto B653 Cory Wright Way. This allows for greater traffic flows and independent turning movements on this approach.

A 40mph speed limit is to be introduced on the approach to the roundabout at this arm to ensure adequate forward visibility of the proposed part time signal head is provided due to the lower approach speeds.

The central reservation has been modified to accommodate the widening.

**B653 Cory Wright Way**

New carriageway construction would be required as it is proposed that the alignment of the approach is altered. It is proposed that the approach is diverted further eastwards to allow for the oncoming vehicles to reach an appropriate speed before entering the roundabout.

It is proposed that this approach is also widened to two lanes at the entry to allow for one traffic lane per turning movement. The nearside lane would accommodate vehicles traveling towards Welwyn Garden City and Hatfield, whilst the off side lane would accommodate vehicles turning right into Wheathampstead.

A 40mph speed limit is to be introduced on the approach to the roundabout at this arm to improve visibility of the proposed part time signal head is provided due to the lower approach speeds.

The central reservation has been modified to accommodate the widening.

**Marford Road**

This approach would be widened from a single-lane entry to two lanes and accommodate one turning movement per lane. The nearside lane would be marked with a left turn arrow and the far side lane would be marked with an 'ahead' arrow.

The central reservation has been modified to accommodate the widening.

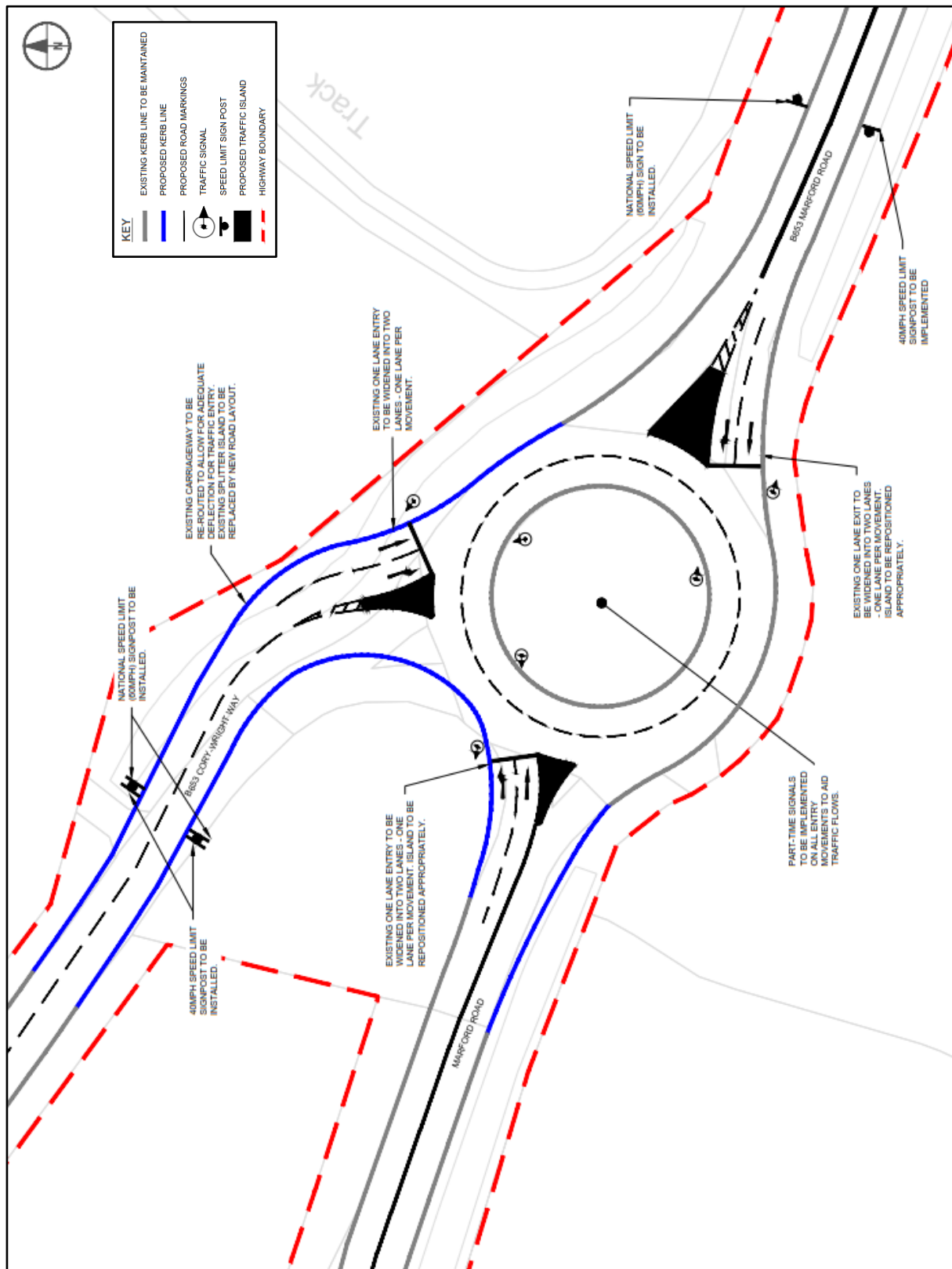
Part time signals are to be installed on all three approaches with the intent of aiding the flows during peak hours to reduce the severity of delays. These will be installed both on the roundabout for view from the stop lines as well as on the approach, with 215m of visibility (as per DMRB) before the signal to allow for vehicles to slow down in enough time.

The existing vegetation in the central roundabout island should be maintained to ensure it does not become overgrown, resulting in an obstruction to the sighting distances on the roundabout.

A circulatory road marking has been proposed to show the lanes in which vehicles from all movements should keep to. This should aid flows as they will allow for more vehicles to enter the roundabout at once; increasing the capacity.

## Design Improvement Plans

## Outline design:



Extract of the feasibility drawing no. 60534762-SADC-DWG-SITE 10 REV 1 (Refer to Appendix A for complete drawing)

**Outline Cost Analysis****Basis of Order of Magnitude Estimate:**

Site 10: B653 Roundabout - Cory Wright Way & Marford Road, Wheathampstead/60534762-SADC-DWG-SITE 10-REV 1

**Assumptions:**

1. Everything within the existing and new kerb lines will be broken out to 600mm depth
2. Allowed for laying new and diverting existing storm drainage only. We have assumed there are no foul drainage requirements on the site
3. The proposed Central Reservations are built up as per a typical bituminous footpath construction
4. Dimensions of proposed lights, traffic lights, signage & VRS assumed in the absence of detailed drawings
5. Centre of roundabout to be hard central reservation build up

**Exclusions:**

1. Any works or costs associated with landscaping
2. The demolition of any existing structures
3. Inflation beyond 2Q 2017
4. Professional fees
5. Planning and development control costs
6. Value added Tax

Works Element	Estimated Cost	Notes
Construction Cost	£ 931,000	
Allowances for Preliminaries	£ 186,200	20% of construction items
Allowances for Traffic Management ( TM )	£ 232,750	25% of construction items
Allowances for Scheme Design	£ 134,995	10% of construction items (including Prelims and TM)
Allowances for Utilities / Electricals	£ 186,200	20% of construction items
Sub-Total for allowances and construction items	£ 1,671,145	
Optimism Bias	£ 735,304	44% of sub-total
<b>Cost for Delivery</b>	<b>£ 2,406,449</b>	

<b>Junction</b>	<b>A4147 Hemel Hempstead Rd/King Harry Lane</b>
<b>Reference</b>	<b>Site A</b>
<b>Location</b>	<p>This junction is a three arm roundabout (commonly known as Bluehouse Hill roundabout) located to the south-west of St Albans, next to Verulamium Park.</p> <p>The roundabout connects the A4147 Hemel Hempstead Road, King Harry Lane and A4147 Bluehouse Hill.</p> <p>The A4147 is the main trunk road connecting central St Albans to Hemel Hempstead. The north-eastbound link connects to the A5183 which provides a route into the centre, whilst the south-westbound link connects to Hemel Hempstead and provides a route to the M1 at Junction 8.</p> <p>King Harry Lane provides a connection to the St Stephens area, south of St Albans.</p>

<b>Description of Problem</b>
<p>The roundabout currently experiences high volumes of traffic flows, with significant movement from the A4147 travelling north east into St Albans and south west into Hemel Hempstead. It is evident that conditions at the roundabout will worsen in future years, even without any additional development-related traffic increase.</p> <p>The Hertfordshire County Council's (HCC) existing 2014 Base Year and 2031 Forecast Year COMET models (version 3, March 2017) have been used to identify areas of pressure on the highway network. COMET Base Year model highlighted that Site A has an average junction delay of 1.5 minute in the both AM &amp; PM peak periods and has been identified as a congestion hotspot in previous studies.</p> <p>The COMET 2031 forecast year model indicated an average delay of 2 minutes for every vehicle in AM Peak and PM Peak. The modelling also indicated the significant increase in delay on the King Harry Lane despite a relatively modest flow increase. This is due to the arm already being at capacity in the Base Year and therefore unable to accommodate more traffic.</p> <p>Therefore, improvements have been sought to reduce delays associated with the future increase in flow by improving the capacity of the junction.</p> <p><b>Constraints:</b></p> <p>The existing highway boundary limits the scope to which the existing junction can be widened and/or modified. The existing footways also constrain the site and the potential mitigation measures, as this ultimately needs to be retained to maintain pedestrian provision.</p>



**Design Improvement Feasibility Details**

Due to the constraints at this junction, the option considered is an additional lane on each approach to accommodate individual turning movements. In particular, the right turn movement into King Harry Lane is sought to be improved.

This option is considered as the most appropriate for the site, where it is anticipated that junction capacity can be increased and delays reduced across the roundabout junction as a whole.

The proposed roundabout has been designed to DMRB standard Volume 6, section 2, Part 3 TD 16/07 Geometric Design of Roundabouts.

**A4147 Hemel Hempstead Road**

The existing approach would be widened to provide a traffic lane for each movement. The nearside lane would accommodate vehicles travelling north, whilst the off side lane would accommodate vehicles turning right onto King Harry Lane.

The site also has constraints of highway boundary which limits the extents of widening. Therefore, two lanes have been proposed with designated movement on each lane.

The two lanes would allow for straight-ahead movements to move independently from the right turning traffic, which in turn reduce the delays from the A4147. This independent movement for right turning traffic would aid the reduction of delays to vehicles travelling from the northbound direction.

The central reservation has been modified to accommodate the widening.

A 3.0m cycle track proposed by Hertfordshire County Council has been included within the design. However, no provision has been made within this mitigation option for cyclists to cross Hemel Hempstead Road to continue their journey.

Should the design progress, options for the continuation of the proposed cycle track should be investigated.

Consideration has also been made to enable the cycle track to be linked to the existing facility on King Harry Lane which leads to Verulamium Park. A 2.5m shared use width is the minimum width provided but this can be increased with only a minor reduction in capacity on the King Harry Lane approach.

**Bluehouse Hill**

This approach would be widened from a single-lane entry to two lanes and accommodate one turning movement per lane. The nearside lane would be marked with a left turn arrow and the far side lane would be marked with an ahead arrow.

The central reservation has been modified to accommodate the widening.

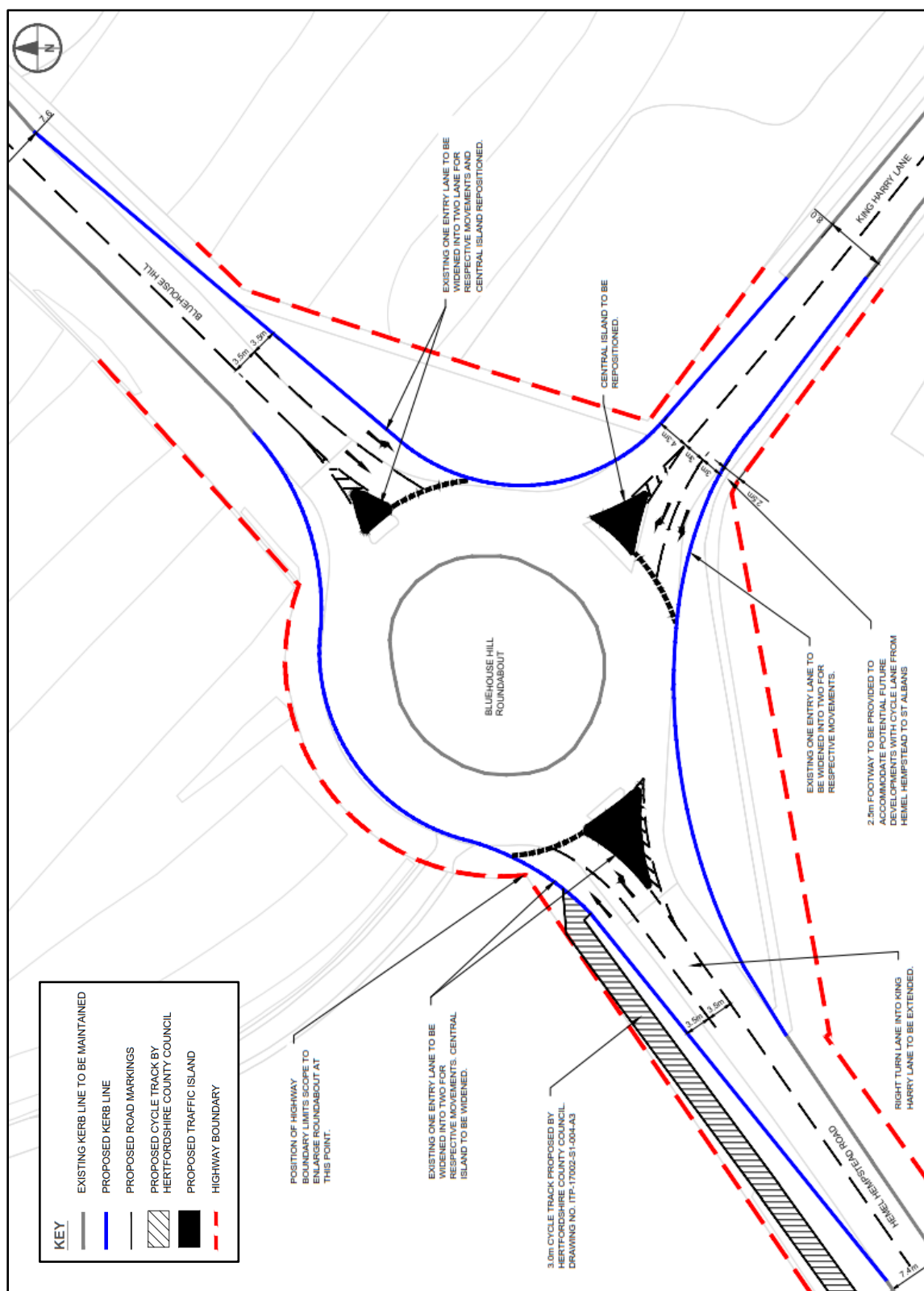
**King Harry Lane**

As with the other approaches, the single-lane entry would be widened to two lanes so each turning movement is independent of each other. The nearside lane would be marked with a left turn arrow and the far side lane would be marked with an ahead arrow. The lane widths have been restricted at this approach to 3.1m in order to maintain the existing footway.

The central reservation has been modified to accommodate the widening.

## Design Improvement Plans

## Outline Design:



Extract of the feasibility drawing no. 60534762-SADC-DWG-SITE A REV 1 (Refer to Appendix A for complete drawing)

**Outline Cost Analysis****Basis of Order of Magnitude Estimate:**

Site A: A4147 Hemel Hempstead Rd/ King Harry Lane/60534762-SADC-DWG-SITE A-REV 1

**Assumptions:**

1. Everything within the existing and new kerb lines will be broken out to 600mm depth
2. Works are to extend to the edge of the drawing for each of the 3 roads, Hemel Hempstead Rd, Bluehouse Hill and King Harry Lane
3. Allowed for laying new and diverting existing storm drainage only. We have assumed there are no foul drainage requirements on the site
4. The proposed Central Reservations are built up as per a typical bituminous footpath construction
5. Dimensions of proposed VRS, lights and signage assumed in the absence of detailed drawings
6. All works/ costs associated with the cycle track will be carried out by Hertfordshire County Council

**Exclusions:**

1. Any works or costs associated with landscaping
2. The demolition of any existing structures
3. Any landscaping/paving works beyond the line of road kerbing
4. Any works/costs associated with the cycle track
5. Inflation beyond 2Q 2017
6. Professional fees
7. Planning and development control costs.
8. Value added Tax

Works Element	Estimated Cost	Notes
Construction Cost	£ 944,000	
Allowances for Preliminaries	£ 188,800	20% of construction items
Allowances for Traffic Management ( TM )	£ 236,000	25% of construction items
Allowances for Scheme Design	£ 136,880	10% of construction items (including Prelims and TM)
Allowances for Utilities / Electricals	£ 188,800	20% of construction items
Sub-Total for allowances and construction items	£ 1,694,480	
Optimism Bias	£ 745,571	44% of sub-total
<b>Cost for Delivery</b>	<b>£ 2,440,051</b>	

<b>Junction</b>	<b>A1081 Luton Rd/ Park Hill</b>
<b>Reference</b>	<b>Site B</b>
<b>Location</b>	<p>The junction is a three arm traffic signalised junction, in a residential area within Harpenden, linking Park Hill with the A1081 Luton Road.</p> <p>The A1081 provides a link between Luton and St Albans, and is sited through Harpenden. Luton is to the north of the A1081 Luton Road/Park Hill junction, whilst St Albans is to the South.</p> <p>Park Hill leads to Roundwood Primary and Roundwood Park Schools, south-west of the junction and runs adjacent to the Nickey Line.</p>

<b>Description of Problem</b>
<p>The junction currently experiences high volumes of traffic, with the significant movements travelling north and southbound along A1081 Luton Road. However, delay for traffic is most prominent on the Park Hill Approach.</p> <p>The Hertfordshire County Council's (HCC) existing 2014 Base Year and 2031 Forecast Year COMET models (Version 3, March 2017) have been used to identify areas of pressure on the highway network. COMET Base Year model highlighted that Site B has an average junction delay of 0.5 minute.</p> <p>Results from the COMET Forecast Year 2031 model indicated an average delay at this junction of 1.0 minute, particularly affecting traffic approaching from Luton Road.</p> <p>Therefore, improvements have been sought to reduce delays associated with the future increase in flow by improving the capacity of the junction.</p> <p><b>Constraints</b></p> <ul style="list-style-type: none"> <li>• The railway bridge to the east of the A1081 Luton Road/Park Hill junction, limits the scope to which the existing junction can be widened and/or modified.</li> <li>• The highway boundary limits the mitigation options to be proposed.</li> </ul>

<b>Design Improvement Feasibility Details</b>
<p>Based on the existing geometry, the highway boundary and the existing constraint of the railway bridge, the option considered most appropriate at this junction is for Microprocessor Optimised Vehicle Actuation (MOVA) to control traffic signal timings.</p> <p>This solution would allow the junction to generate its own signal timings cycle-by-cycle, varying continuously with traffic conditions. The available green time given to any of the approaches can be altered by assessing the number of vehicles approaching the signals, whilst also determining the impact that the queuing vehicles would have on the overall operation of the junction. Therefore, MOVA operated signals can reduce the delays at the junction, increasing capacity and reducing congestion. It is typically considered that the introduction of MOVA can reduce delays by an average of 13%, as reported in Traffic Advisory Leaflet 3/97.</p> <p><b>Park Hill</b></p> <p>New MOVA detector loops are proposed to be cut at typical distances from the stop line of 40 metres and 100 metres and associated ducting to be provided. It is proposed for the existing infrastructure to remain, including the pedestrian crossing across this approach.</p>

## **A1081 Luton Road: Eastbound and Westbound Traffic Lanes**

As on the Park Hill approach, new MOVA detector loops are proposed to be cut at typical distances from the stop lines of each approach at 40 metres and 100 metres, with the existing infrastructure to remain. The pedestrian crossing across the eastbound approach is proposed to be retained.

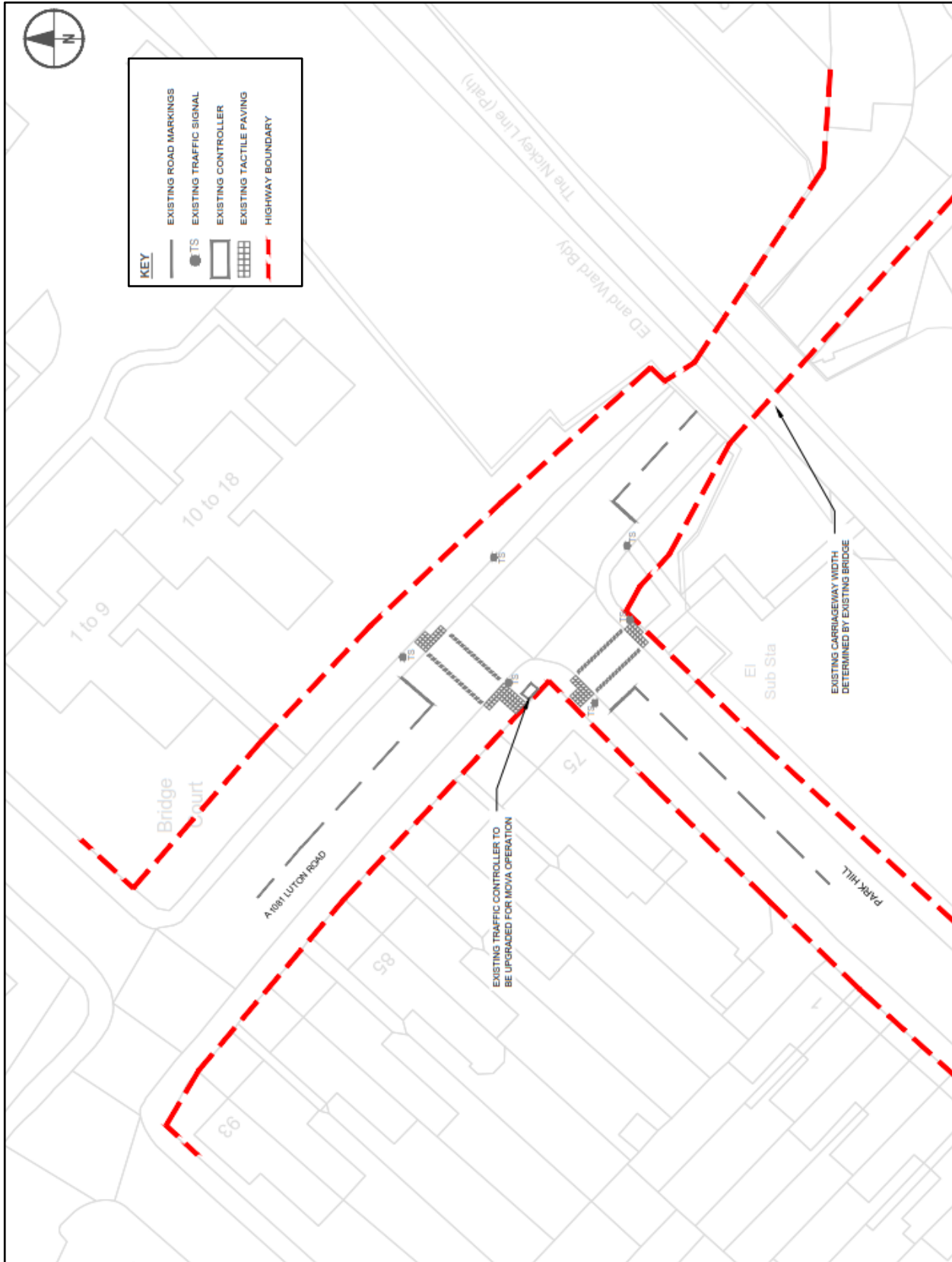
### **Further considerations**

The existing controller at the junction may not have been maintained to the required standard, and this could affect the current signal timings. Additional capacity at the junction may be sought from checking the junction for maintenance defects and rectifying any issues.

Should the design progress, the location of the detector loops may differ based on the cruise time of vehicles appropriate at the time the scheme is implemented.

## Design Improvement Plans

### Outline Design:



Extract of the feasibility drawing no. 60534762-SADC-DWG-SITE B REV 1 (Refer to Appendix A for complete drawing)

**Outline Cost Analysis****Basis of Order of Magnitude Estimate:**

Site B: A1081 Luton Road/Park Hill Junction/60534762-SADC-DWG-SITEB-REV 1

**Assumptions:**

1. MOVA detector loops are to be diamond shape with lengths of equal size 0.6m
2. Cables will be run through pavement back to the junction
3. Assumed 3 man gang for saw cutting and cable laying

**Exclusions:**

1. For construction items only we have excluded prelims, traffic management, utilities
2. The demolition of any existing structures
3. Any works or costs associated with modifying the existing traffic signal junction
4. Inflation beyond 2Q 2017
5. Professional fees
6. Planning and development control costs
7. Value added Tax

Works Element	Estimated Cost	Notes
Construction Cost	£ 27,000	
Allowances for Preliminaries	£ 5,400	20% of construction items
Allowances for Traffic Management ( TM )	£ 6,750	25% of construction items
Allowances for Scheme Design	£ 3,915	10% of construction items (including Prelims and TM)
Allowances for Utilities / Electricals	£ 5,400	20% of construction items
Sub-Total for allowances and construction items	£ 48,465	
Optimism Bias	£ 21,325	44% of sub-total
<b>Cost for Delivery</b>	<b>£ 69,790</b>	



<b>Junction</b>	<b>A1057 Hatfield Rd/Station Rd</b>
<b>Reference</b>	<b>Site E</b>
<b>Location</b>	<p>The junction is a four arm roundabout, with a single lane entry on each arm, located in Smallford. It consists of the following roads: A1057 Hatfield Road, Station Road and Oaklands Lane.</p> <p>The south-west arm of the roundabout is the A1057 Hatfield Road and leads into central St Albans, whilst the north-east arm, also the A1057, leads into Hatfield. The A1057 is a primary road linking St Albans to Hatfield. Station Road is on the south-east arm of the roundabout, leading towards the A414 North Orbital Road and Colney Heath. The north-west arm is Oaklands Lane, providing a link to towards Jersey Farm. This arm also provides a less direct route into central St Albans via Sandpit Lane.</p>

<b>Description of Problem</b>
<p>The roundabout has a high number of vehicles travelling to and from St Albans and Hatfield along the A1057. Both the eastbound and westbound approach straight ahead movements have the largest flows.</p> <p>The Hertfordshire County Council's (HCC) existing 2014 Base Year and 2031 Forecast Year COMET models (Version 3, March 2017) have been used to identify areas of pressure on the highway network. This roundabout was indicated to have an average junction delay of 1 minute, with 2-3 minutes delay on the A1057 Hatfield Rd Westbound approach from the COMET 2014 Base Year model.</p> <p>The COMET 2031 Forecast Year model highlighted an average junction delay of 2 minutes for all vehicles in both peaks. An increase in delay of 30 seconds is observed in each peak period in 2031, compared to the 2014 model.</p> <p>It is noted that the proposed Oaklands College Development, located approximately 1.5km north-west of this junction, is likely to introduce additional demand on local junctions. This may result in further increases to the delay at the roundabout and would also result in insufficient capacity. Refer to <b>Figure 1</b> for the map. <b>Figure 2</b> shows proposed accesses to the development and the nature of these.</p> <p>Therefore, mitigation measures to reduce delay and increase capacity for existing and future traffic levels are sought at this roundabout.</p> <p>In addition to the current and forecasted delays at this junction, the roundabout currently does not meet standards set out in the Design Manual for Roads and Bridges (DMRB).</p> <p><b>Constraints:</b></p> <p>The highway boundary constrains the roundabout junction and limits the scope to which the existing junction can be widened and/or modified.</p>

**Design Improvement Feasibility Details**

Two options have been considered at this junction: providing a signalised junction rather than a roundabout, and upgrading the existing roundabout from single lane to two lane entry. Based on the existing highways boundary constraints and the perceived minimal reductions in delay and increase in capacity, the signalised junction option was considered as inappropriate.

Widening each approach of the roundabout, from the existing single lane entry to dual lane entry was considered suitable for further analysis. It is anticipated that this mitigation measure will increase roundabout capacity by enabling a greater flow entering the junction across all approaches. However, this increase in capacity is constrained by the length over which the approaches have been extended, based on the constraints of the highway boundary.

The roundabout has been enlarged to accommodate for the entry lane widening and provides two circulatory lanes. An overrun area is proposed around the central island to maintain circulatory widths in line with DMRB TD16/07.

The design is concept and as such, shows representative road markings and no signage. The required signage and detailed markings would be provided at later design stages.

**Station Road**

The current single lane entry is proposed to be widened to two lanes. The highway boundary is most apparent at this approach, where entry widths and the extents of the lane widening have been constrained. However, minimum requirements for each of these features have been satisfied and have been designed in line with DMRB, TD16/07.

The central reservation has been altered in line with the widening of the circulatory carriageway and the new approaches would have markings to indicate a left turn and a straight on and right turn.

**A1057 Hatfield Road**

Both the north-east and south-west approaches of the roundabout are proposed to be widened to two lanes, and as the other approaches, would have markings to indicate a left turn on the nearside lane and a straight on and right turn on the offside lane.

The zebra crossing on the north-east approach is proposed to be retained. However, this may need to be realigned due to the proposed modification of the central reservation.

The existing bus stops at each of the exit arms have been considered in the design, where these are to be retained in their existing locations.

**Oaklands Lane**

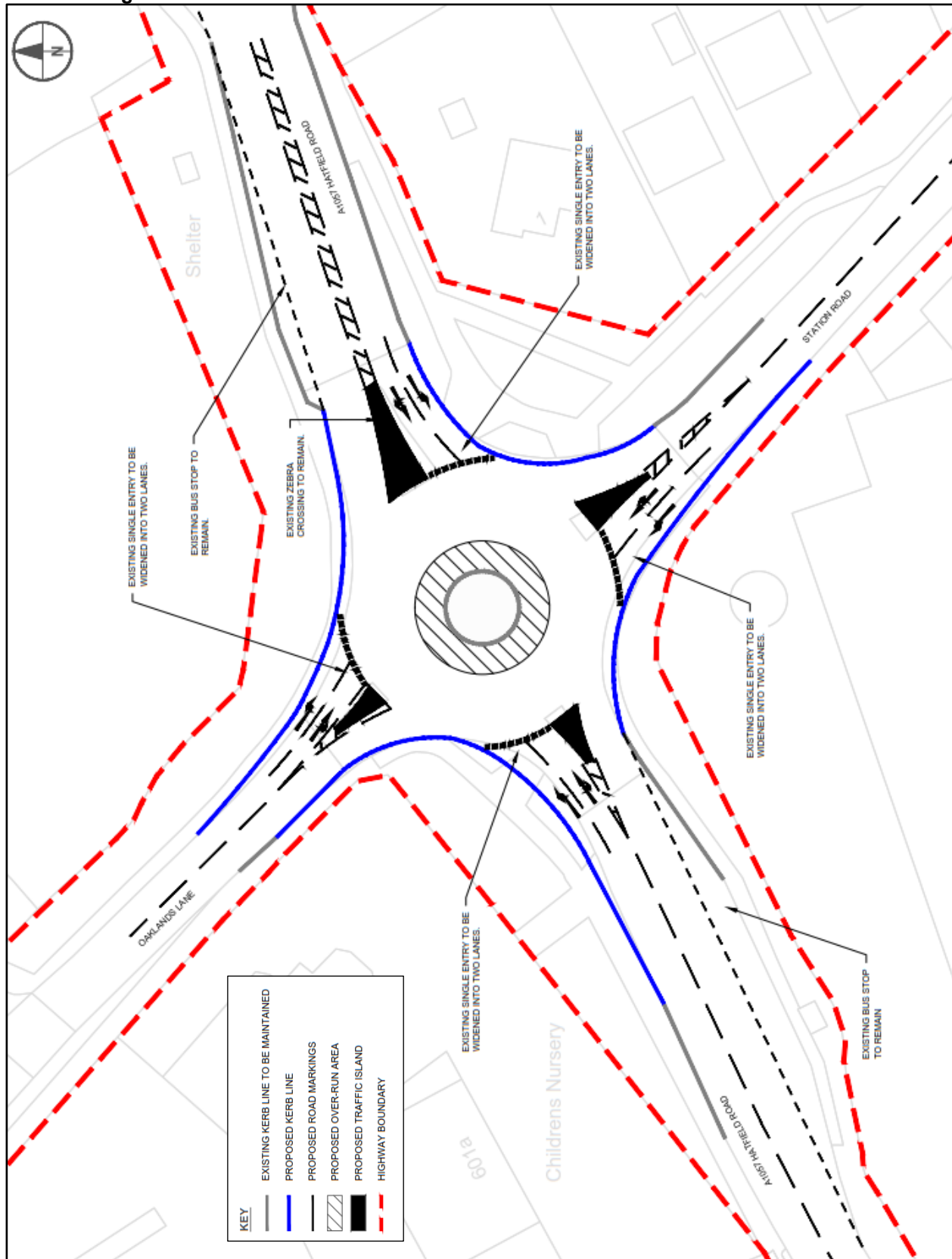
Similarly to the other approaches at this junction, Oaklands Lane is proposed to be widened to two lanes at the entry with a left turn arrow marked in the nearside lane and a straight ahead and right turn arrow marked in the offside lane. Again, this results in a modification to the central reservation.

The design is concept and as such, shows representative road markings and no signage. The required signage and detailed markings would be provided at further design stages.

HCC have recently upgraded the cycle link from Hatfield Road to the Alban Way along Station Road. There is also a long term aspiration from HCC to continue this into Oaklands Lane making use of the existing pedestrian crossing on Hatfield Road.

## Design Improvement Plans

## Outline Design:



Extract of the feasibility drawing no. 60534762-SADC-DWG-SITE E REV 1 (Refer to Appendix A for complete drawing)

### Outline Cost Analysis

#### Basis of Order of Magnitude Estimate:

Site E: A1057 Hatfield Road/Station Road Smallford Roundabout/60534762-SADC-DWG-SITE E-REV 1

#### Assumptions:

1. Everything within the existing and new kerb lines will be broken out to 600mm depth including bus laybys
2. Allowed for laying new and diverting existing storm drainage only. We have assumed there are no foul drainage requirements on the site
3. The proposed Central Reservations are built up as per a typical bituminous footpath construction
4. Dimensions of proposed lights, traffic lights, signage & VRS assumed in the absence of detailed drawings
5. Centre of roundabout to be hard central reservation build up

#### Exclusions:

1. Any works or costs associated with landscaping
2. The demolition of any existing structures
3. Any works beyond existing kerb line, including the likes of paving, landscaping, bus shelters and the like other than that otherwise stated
4. Inflation beyond 2Q 2017
5. Professional fees
6. Planning and development control costs
7. Value added Tax

Works Element	Estimated Cost	Notes
Construction Cost	£ 673,000	
Allowances for Preliminaries	£ 134,600	20% of construction items
Allowances for Traffic Management ( TM )	£ 168,250	25% of construction items
Allowances for Scheme Design	£ 97,585	10% of construction items (including Prelims and TM)
Allowances for Utilities / Electricals	£ 134,600	20% of construction items
Sub-Total for allowances and construction items	£ 1,208,035	
Optimism Bias	£ 531,535	44% of sub-total
<b>Cost for Delivery</b>	<b>£ 1,739,570</b>	