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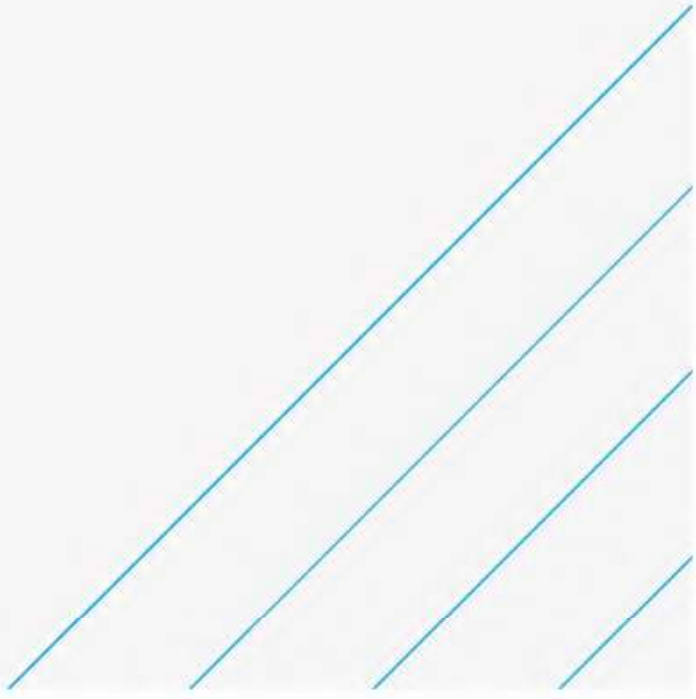
Basingstoke A30 SW Corridor Feasibility Study

Modelled Options Report

Hampshire Country Council

24 April 2019



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This document has 32 pages including the cover.

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	For Information	RPS	AS	SL	SL	24-04-19

Client signoff

Client	Hampshire Country Council
Project	Basingstoke A30 SW Corridor Feasibility Study
Job number	5163121
Client signature / date	

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1. Introduction

1.1. Study Location

The Brighton Hill roundabout is a key junction on the A30 corridor in south west Basingstoke. It is currently an unsignalised roundabout with the following six arms:

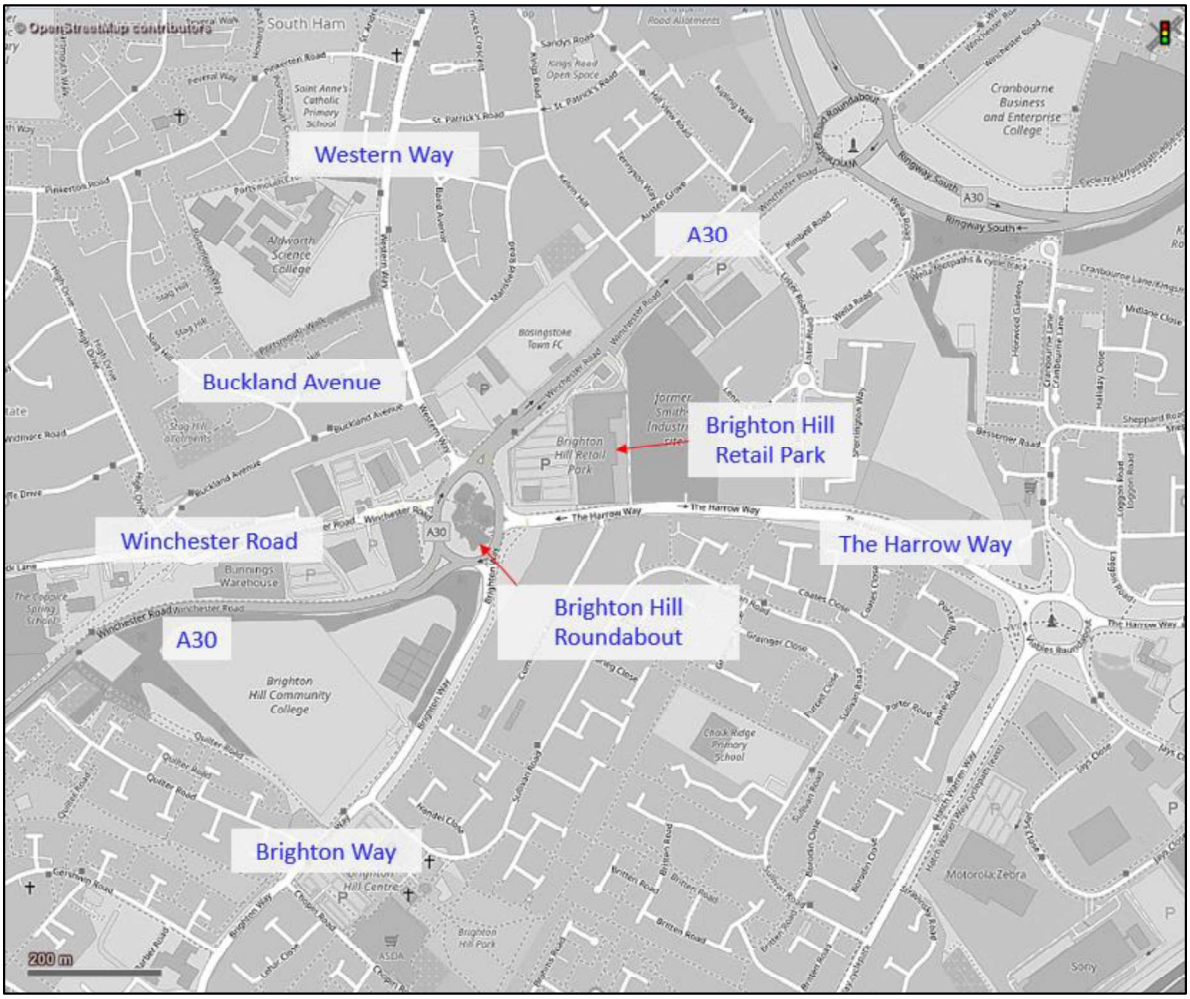
- A30 (north)
- The Harrow Way
- Brighton Way
- A30 (south)
- Winchester Road
- Western Way

Figure 1.1 shows the Brighton Hill roundabout and surrounding area with other nearby junctions.

The circulatory carriageway partly has two lanes, with a third (left-turn) lane present between Winchester Road and Western Way, A30 (north) and The Harrow Way and A30 (south) and Winchester Road.

There is one signalised junction for Brighton Hill Retail Park located on the A30 (north) approximately 250m north-east of the roundabout. A mini roundabout is provided at the Western Way/ Buckland Avenue junction on Western Way, approximately 100m north of the roundabout. There are also seven accesses on Winchester Road in close proximity to each other for approximately 150m west of the Brighton Hill roundabout.

Figure 1-1 - Brighton Hill Roundabout Junction Location



1.2. Project Background

The Brighton Hill roundabout serves residential and popular retail areas. Queueing and delay are experienced at the junction in the network peak hours. There are proposals for significant future housing growth in south west Basingstoke and funding has been identified to upgrade the A30 corridor to meet the increasing demand.

In October 2017, HCC produced a Task Order for Atkins which included the following work packages:

- WP2 – Development of a Microsimulation Model of Existing "Do Minimum" Road Layout for 2017 Base Year
- WP4- Full Capacity Analysis of the three identified options using the microsimulation model. TUBA outputs are to be produced that can be used to provide an initial Benefit to Cost Ratio (BCR) for scheme comparison and form the basis for the economic component of a Transport Business Case.

1.2.1. Option Testing

In September 2017, Hampshire County Council (HCC) produced an Initial Scheme Optioneering Study to undertake capacity analysis of the roundabout. The study identified the following three potential options for improvement.

- Option 1 – Signalised roundabout (Western Way entry closed)
- Option 2 – Signalised 'hamburger' roundabout (Western Way entry closed)
- Option 4 – Signalised 'hamburger' roundabout (Western Way entry open)

Development proposals for the Basingstoke Football Club site on the A30 subsequently emerged, with an opportunity to provide a new link road from the Western Way/Buckland Avenue junction through the existing football club site to a new signalised junction on the A30 north east of the Brighton Hill roundabout. This would provide an alternative access on the A30 with the Western Way entry to the roundabout closed.

In April 2018 HCC issued C311- Task Order Variation, which included the following additional options for testing:

- Option 1A – Option 1 plus link road via football club
- Option 2A – Option 2 plus link road via football club
- Option 1B – Option 1 plus the A30 south west of the roundabout converted to one-way westbound, and a new link from the A30 to Winchester Road which would operate one-way eastbound.
- Option 1C – Option 1B but with two-way traffic retained on both the A30 south west of the roundabout and on Winchester Road.

1.2.2. Business Case Modelling

Following development of the 2017 Brighton Hill Base Model and initial testing and reporting of option results to HCC, it was agreed that Option 1A would be the Preferred Option, with an Interim Preferred Option being Option 1, but with the Western Way entry to the roundabout retained.

In order to provide data for the BCR, both options have been tested at 2022 (assumed year of opening) and 2037 (assumed year of opening plus 15 years). Both options are categorised as 'Core' -that is no trips from the proposed football club development are included.

1.2.3. Related Reports

In line with the project brief, a Local Model Validation Report (LMVR) (Document Reference 5163121-GDC-001) has been produced to provide full details on the calibration and validation of the Brighton Hill Base Model.

1.3. Study Objectives

The HCC Task Order objectives in relation to WP2 and WP4 are summarised as follows:

- Development of a microsimulation model of the existing layout and traffic conditions at Brighton Hill
- Undertake feasibility work to identify a preferred option at the junction that would:
    - Provide greater capacity on the A30 to accommodate increased travel demand on the corridor.
    - Incorporate high quality pedestrian facilities at the junction that minimise severance and encourage pedestrian trips.
    - Incorporate high quality cycling facilities on the A30 corridor including connections to / from The Harrow Way, Brighton Way, Winchester Road and Western Way.
    - Incorporate measures to deliver Bus Rapid Transit (BRT) proposals along the A30 corridor.

In agreement with HCC, no BRT proposals have been modelled to date and cycling facilities have assumed to be in the form of on-street cycle lanes using the same signal phases as general traffic and Toucan Crossings.

1.4. Report Purpose

The purpose of this report is to provide the results of Vissim microsimulation analysis of the Preferred Option and Interim Preferred Option at 2022 and 2037 in comparison with a Do Minimum scenario in order to support the scheme business case.

1.5. Report Structure

This Report is made up of the following sections:

2. Modelling Approach and Assumptions
3. Traffic Forecasting
4. Model Calibration and Validation
5. Modelled Options
6. Option Performance
7. Summary and Conclusion

2. Modelling Approach and Assumptions

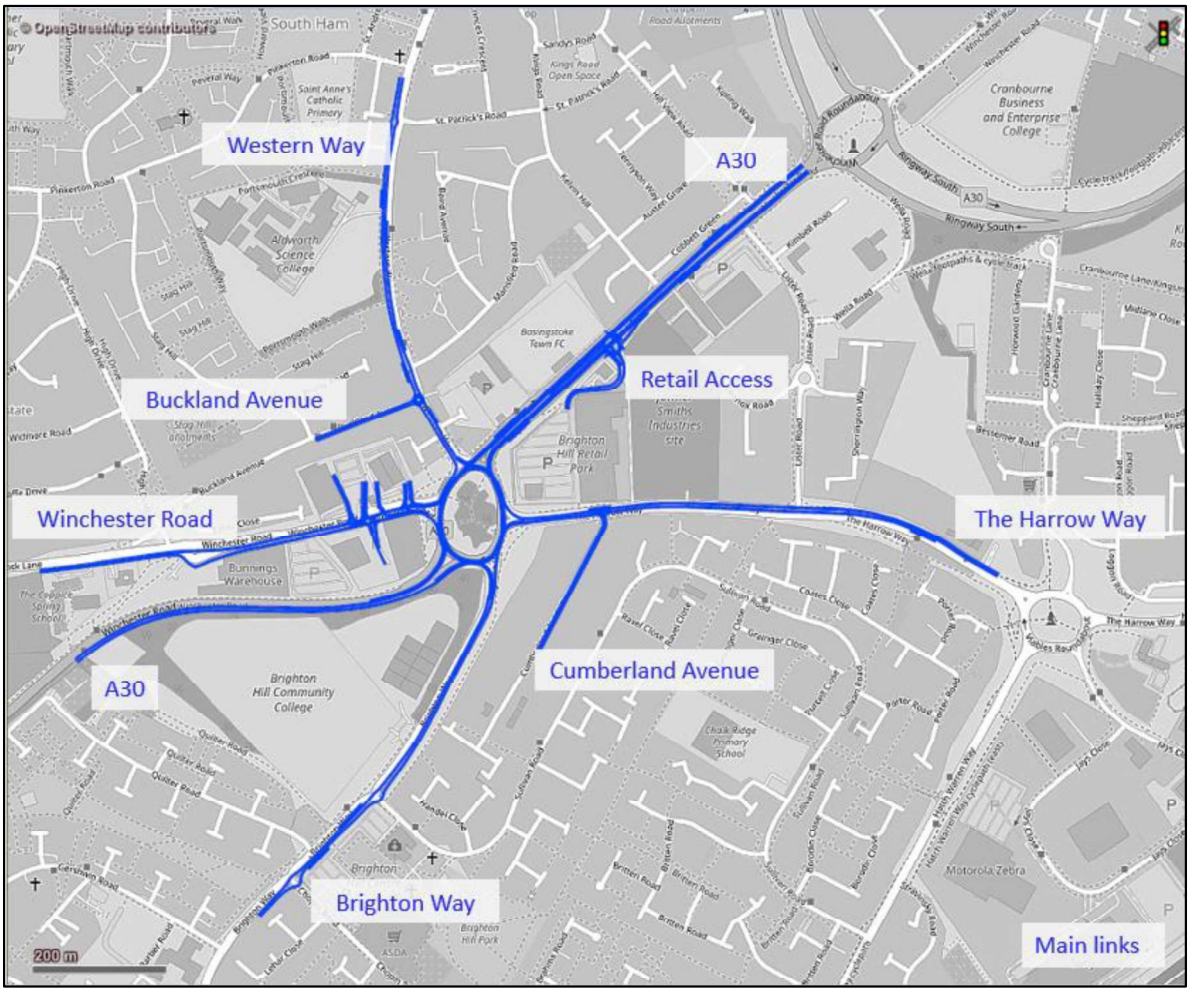
2.1. Methodology

In line with the study objectives (Section 1.3), a Vissim microsimulation model has been developed to test a range of improvement options. Vissim version 10.00-05 has been used.

As set out in the LMVR a 2017 Brighton Hill Base Model was been developed with traffic flows obtained from October 2017 surveys and has been calibrated and validated to an appropriate level based on the surveyed traffic flows and journey times.

Figure 2-1 shows the extent of the Brighton Hill Base Model.

Figure 2-1 - Brighton Hill Base Model Extent



The HCC Task Order determined that the North Hampshire Transport Model (NHTM) should be used to determine forecast demand flows. Following liaison with HCC as the project progressed, an alternative methodology was developed using TEMPro growth factors and committed development flows as set out in the C311 Task Order Variation.

As a general rule it has been assumed that pedestrian phases are called every other signal cycle.

2.2. Scenario Testing

Following calibration and validation of the Brighton Hill Base Model, a forecast year model has been developed in order to benchmark the performance of the proposed improvements:

- 2022 Do Minimum Scenario (2022 DM)
- 2037 Do Minimum Scenario (2037 DM)

Forecast flows have been developed using growth factors provided by HCC.

The scheme options identified in Project Background have then been coded to allow quantification of benefits under the following scenarios:

- 2022 Preferred Option Core - signalised roundabout (Western Way entry closed), new link road to the A30 through the football club site, but with no trips from that development
- 2022 Interim Preferred Core - signalised roundabout (Western Way entry retained), no link road to the A30 through the football club site and no trips from that development
- 2037 Preferred Option Core
- 2037 Interim Preferred Core

3. Existing Conditions and Forecast Flows

3.1. Traffic Surveys

Automatic Traffic Count (ATC) surveys were carried out on all arms of the Brighton Hill roundabout between 4th and 18th of October 2017. Manual Classified Counts (MCC) were also commissioned by HCC and undertaken at the roundabout and A30/Brighton Hill Retail Park Access signalised junction for the following periods:

- Thursday 12th October 2017, 07:00 to 19:00
- Friday 13th October 2017, 16:00 to 17:00
- Saturday 14th October 2017, 11:00 to 14:00

TAG M1.2 identifies the whole of October as a neutral month.

The observed traffic profile for the surveyed periods at the A30 Brighton Hill roundabout is shown in Figure 3-1, Figure 3-2 and Figure 3-3. The following peak hours were fixed by reviewing both the ATC data and rolling hour totals from the MCC data:

- AM Peak- 08:00-09:00
- IP -12:15-13:15
- PM Peak- 16:00-17:00
- Friday PM Peak – 16:15-17:15
- Saturday Lunch -12:00-13:00

The coloured bars in all three profiles illustrate the identified peak hours.

Figure 3-1 - Thursday ATC Survey - 12-hour profile

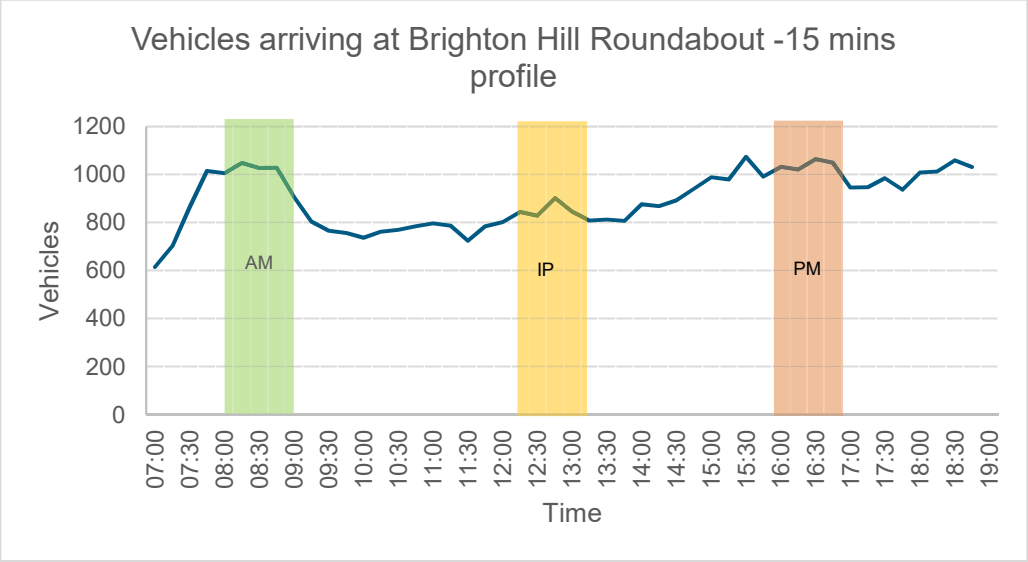


Figure 3-2 - Friday ATC Survey - Friday Evening profile

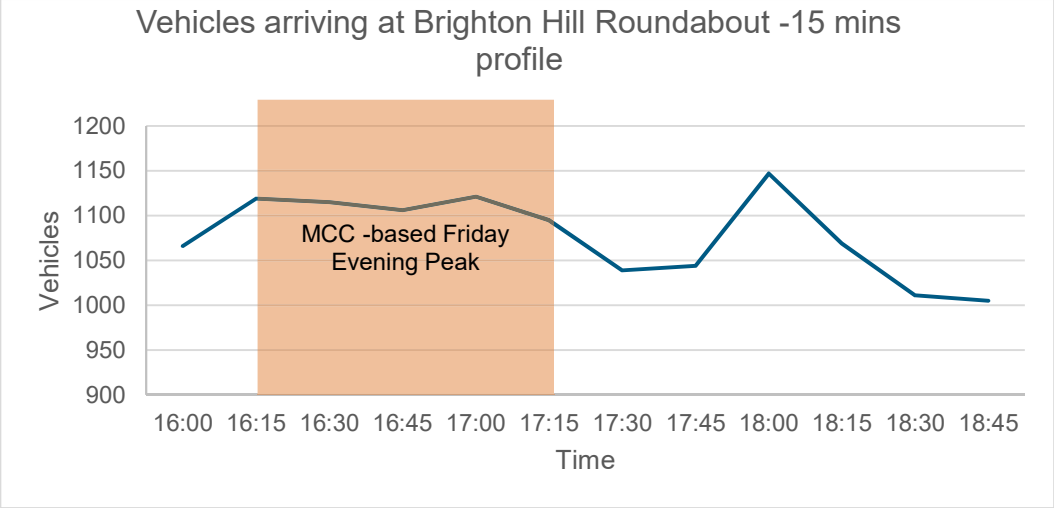


Figure 3-3 - Saturday ATC Survey - Saturday Midday Profile

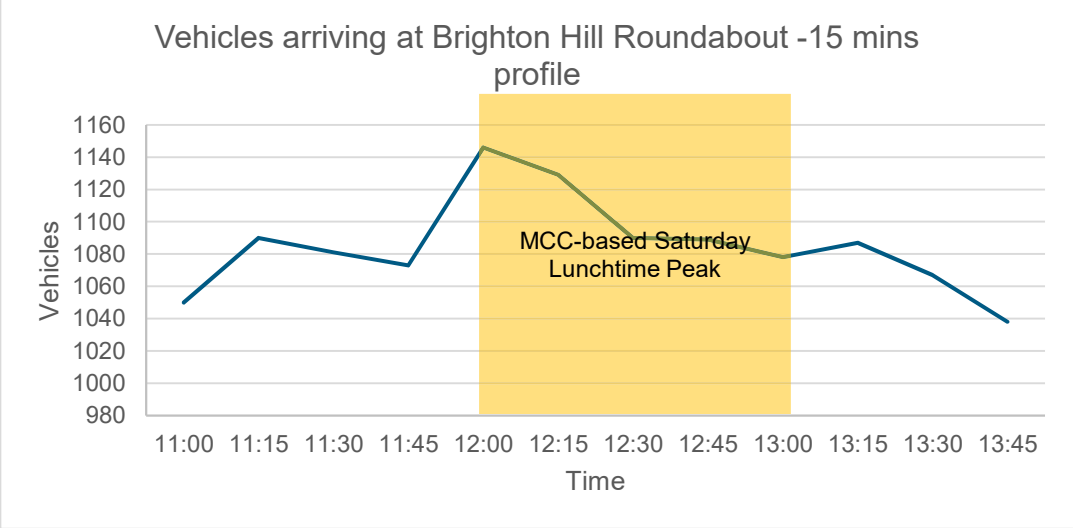


Table 3-1 shows the total demand observed in each identified peak based on the MCC survey data. It can be seen that the highest demand is in the Friday PM and Saturday lunchtime peaks, which are of a similar level.

Table 3-1 - Total observed demand by peak hour

Peak	Time		Total vehicle entries (Based on MCC)
	From	To	
Weekday AM	08:00	09:00	4111
Weekday IP	12:15	13:15	3421
Weekday PM	16:00	17:00	4168
Friday PM	16:15	17:15	4461
Saturday Lunch	12:00	13:00	4454

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3.2. Traffic Forecasting

Entry arm-wise growth factors for the opening and forecast year were provided by HCC which were applied to MCC data. In addition, development flows from the committed St Michael's Retail Park development were added to all scenarios.

Growth factors and development flows used are attached in **Appendix A**. Committed traffic associated with the St Michael's Retail Park development, allowing for some re-assignment associated with pass-by trips (hence some negative numbers) are also included in **Appendix A**.

Based on the above, traffic volume hourly input matrices for 2022 and 2037 are provided in **Appendix B**.

4. Option Development

4.1. Background

As set out in Section 1.2, seven options were initially tested with the following Preferred Option and Interim Preferred Option taken forward for further analysis.

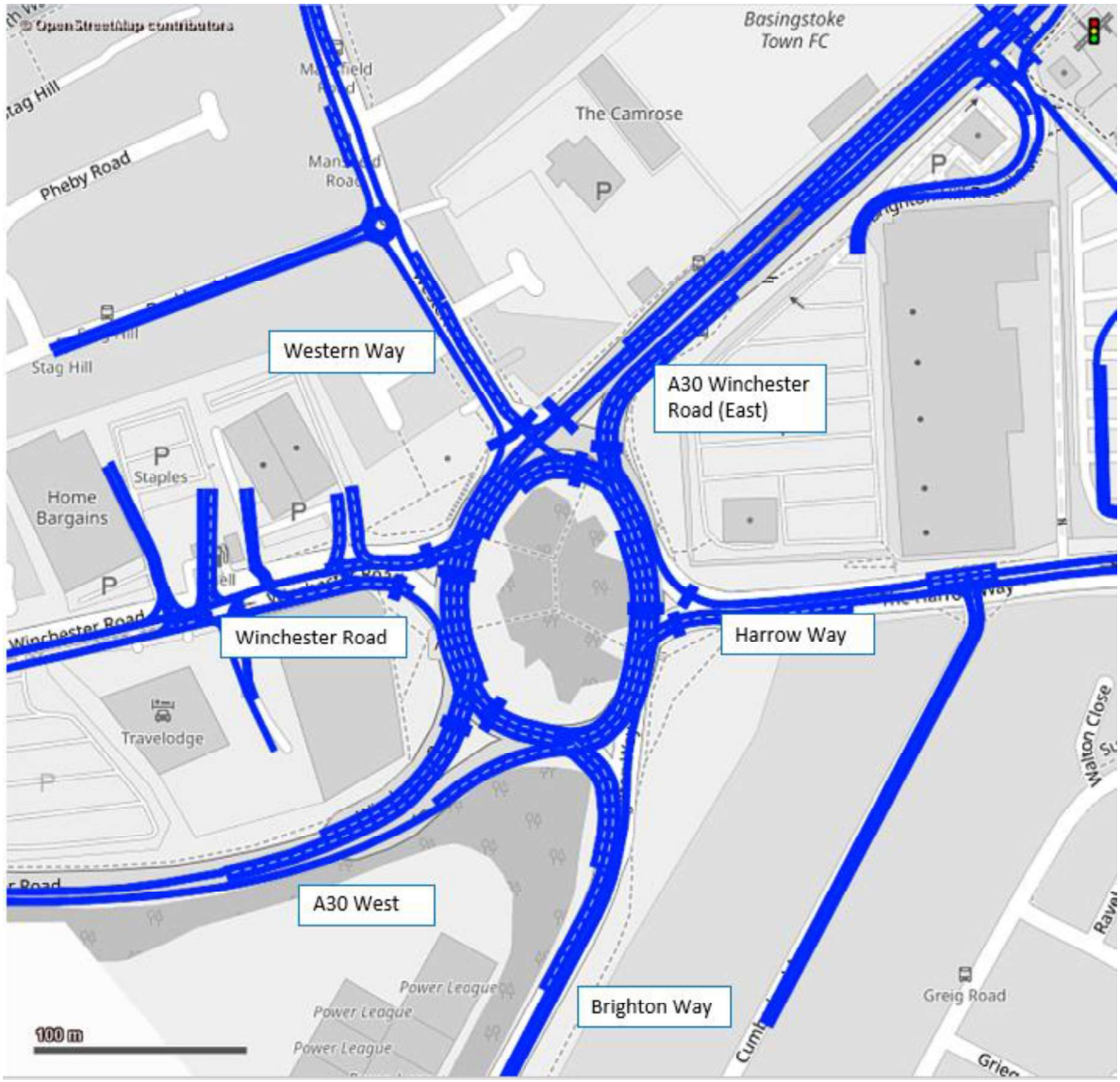
4.2. Modelled Options

The Preferred Option, as shown in Figure 4-1 below, is a fully signalised roundabout with a widened circulatory carriageway and entry and exit arms. This option includes closure of the Western Way entry on to the roundabout, a new link road through the football club site and a new three-arm signalised junction on the A30. The proposed Football Club junction includes pedestrian crossings on both roads but no right-turn into the link road from the A30. The southern end of Western Way becomes one-way north bound.

Figure 4-1 – Preferred Option Network

The Interim Preferred Option, as shown in Figure 4-2 below, is a fully signalised roundabout with a widened circulatory carriageway and entry and exit arms. This option retains the Western Way entry on to the roundabout, but there is no link road through the football club site or associated signalised junction on the A30. The Western Way entry requires a four-stage signal node.

Figure 4-2 – Interim Preferred Option Network



A summary of the geometric adjustments made to the Brighton Hill Base Model for option testing is presented in Table 4-1, with an overview of signal arrangements in Table 4-2.

Table 4-1 – Option Testing: Summary of model geometric adjustments

	Base Model	Preferred Option	Interim Preferred Option
Brighton Hill Circulatory (North)	Two lanes + left turn lane to Western Way	Three lanes + left turn lane to Western Way, signal controlled with pedestrian crossing	Three lanes + left turn lane to Western Way, signal controlled with pedestrian crossing
Brighton Hill Circulatory (East)	Two Lanes	Three lanes with 18m flared lane to The Harrow Way, signal controlled with pedestrian crossing	Three lanes with 18m flared lane to The Harrow Way, signal controlled with pedestrian crossing
Brighton Hill Circulatory (South East)	Two Lanes	Three lanes plus left turn flare to Brighton Way	Three lanes plus left turn flare to Brighton Way

	Base Model	Preferred Option	Interim Preferred Option
Brighton Hill Circulatory (South)	Two Lanes	Three lanes plus signal controlled with pedestrian crossing	Three lanes plus signal controlled with pedestrian crossing
Brighton Hill Circulatory (West)	Two Lanes	Three lanes with 32m flared lane to Winchester Road, signal controlled with pedestrian crossing	Three lanes with 32m flared lane to Winchester Road, signal controlled with pedestrian crossing
A30 (North East) entry	Two lanes, priority controlled	Two lanes plus 40.5m flare, signalised with a controlled pedestrian crossing	Two lanes plus 40.5m flare, signalised with a controlled pedestrian crossing
A30 (North East) exit	Two lanes on exit	Two lanes, with signal-controlled pedestrian crossing on exit	Two lanes, with signal-controlled pedestrian crossing on exit
The Harrow Way entry	One lane plus 16m flare, priority controlled	One lane plus 60m flare, signalised with a controlled pedestrian crossing	One lane plus 60m flare, signalised with a controlled pedestrian crossing
The Harrow Way exit	One lane exit	One lane, with signal-controlled pedestrian crossing on exit	One lane, with signal-controlled pedestrian crossing on exit
Brighton Way entry	One lane plus 50m flare, priority controlled	Two lanes plus 40m flare, signalised	Two lanes plus 40m flare, signalised
Brighton Way exit	One lane exit	One lane exit	One lane exit
A30 (South West) entry	One lane plus 125m flare, priority controlled	Two lanes plus 67m flare, signalised with a controlled pedestrian crossing	Two lanes plus 67m flare, signalised with a controlled pedestrian crossing
A30 (South West) exit	Two lanes on exit, which merge to one lane downstream	Two lanes on exit, which merge to one lane downstream	Two lanes on exit, which merge to one lane downstream
Winchester Road entry	One lane plus 18m flare, priority controlled	One lane plus 40m flare, signalised with a controlled pedestrian crossing	One lane plus 40m flare, signalised with a controlled pedestrian crossing
Winchester Road exit	One lane exit	One lane, with signal-controlled pedestrian crossing on exit	One lane, with signal-controlled pedestrian crossing on exit
Western Way entry	One lane plus 18m flare, priority controlled	Arm is closed for entry to roundabout	One lane plus 100m flare, signalised with a controlled pedestrian crossing
Western Way exit	One lane exit	One lane exit	One lane exit, with signal-controlled pedestrian crossing
A30/ Brighton Hill retail park junction	Signalised with controlled pedestrian crossings on two arms, two lane approaches, with segregated left-turn lane	No change	No change

	Base Model	Preferred Option	Interim Preferred Option
	on A30 (North East) and two-lane flare on the minor arm		
A30/ Football Club link road junction	No junction	Signalised with controlled pedestrian crossings on two arms, two lane approaches on A30 and two-lane flare on the minor arm	No junction
Western Way/ Buckland Avenue junction	Mini Roundabout	Mini-Roundabout with 'T-junction' on Western Way arm to provide access to Western Way cul-de-sac	No change

Table 4-2 – Option Testing: Summary of model signal adjustments

	Base Model	Preferred Option	Interim Preferred Option
A30 (North East) entry	No signals	Two stage signals with ped phase on Brighton Hill junction controller, 60 seconds cycle time	Four stage signals combining A30 NE, Western Way, circulatory and Pedestrian crossing on A30 Exit,60 seconds cycle time*
The Harrow Way entry	No Signals	Two stage signals with ped phase on Brighton Hill junction controller, 60 seconds cycle time*	Two stage signals with ped phase on Brighton Hill junction controller, 60 seconds cycle time
The Harrow Way exit	No Signals	Two stage signals with ped phase on Brighton Hill junction controller, 120 seconds double cycle time*	Two stage signals with ped phase on Brighton Hill junction controller, 120 seconds double cycle time*
Brighton Way entry	No Signals	Two stage signals on Brighton Hill junction controller, 60 seconds cycle time	Two stage signals on Brighton Hill junction controller, 60 seconds cycle time
A30 (South West) entry	No Signals	Two stage signals with ped phase on Brighton Hill junction controller, 60 seconds cycle time	Two stage signals with ped phase on Brighton Hill junction controller, 60 seconds cycle time
Winchester Road entry	No Signals	Two stage signals with ped phase on Brighton Hill junction controller, 60 seconds cycle time	Two stage signals with ped phase on Brighton Hill junction controller, 60 seconds cycle time

	Base Model	Preferred Option	Interim Preferred Option
Winchester Road exit	No Signals	Two stage signals with ped phase on Brighton Hill junction controller, 60 seconds double-cycle time*	Two stage signals with ped phase on Brighton Hill junction controller, 60 seconds double-cycle time*
Western Way entry	No Signals	Entry from Western Way to roundabout closed for traffic. No Signals.	Four stage signals combining A30 NE, Western Way, circulatory and Pedestrian crossing on A30 Exit,60 seconds cycle time*
A30/ Brighton Hill retail park junction	100 second cycle time with 4 stages and an all-red pedestrian stage called every cycle	No change	No change
A30/ Football Club link road junction	No junction	200 second double-cycle time with 3 stages and pedestrian stage called every cycle. Operates on its own controller	No junction
Western Way/ Buckland Avenue junction	Priority Mini Roundabout	No change	No change

* Pedestrian phase assumed to be called every second cycle

5. Option Performance

5.1. Network and Junction Performance Indicators

VISSIM produces a range of statistics to measure network performance as well as queueing and delay on individual arms at junctions. These statistics can be used to benchmark the performance of proposed improvements against a Do Minimum scenario.

5.1.1. Network Statistics

The following VISSIM statistics provide a good overview of network performance between modelled scenarios, allowing overall changes in network congestion to be identified:

- **Average network journey time –** for vehicles travelling though the modelled network in the peak hour in minutes.
- **Average network speeds –** average speeds in miles per hour for all vehicles during the peak hour.
- **Average delay time –** the difference between the theoretical travel time with no congestion, signals or other stops and the actual travel time per vehicle during the peak hour in minutes.

5.1.2. Node Statistics

When considering individual junctions, the following performance measures have been used:

- **Average queue -** the mean queue measured by VISSIM over the modelled time period in metres.
- **Maximum queue –** the maximum queue measured by VISSIM over the modelled time period in metres.

Full results for the Brighton Hill roundabout, the Football Club and Retail Park junctions are included in **Appendix C.**

5.2. Option Performance - Network wide

Table 5-1, overleaf, illustrates the overall performance of the modelled network across the five peak periods in the Base Model, 2022 Do Minimum, 2022 Preferred Option Core and 2022 Interim Preferred Core. The percentage change in the network performance indicators under each option is also shown, and colour-coded; green where an improvement results and red here there is a deterioration.

With reference to the Base 2017 and DM 2022 statistics, it can be seen from the table that there is a significant reduction in network performance across all indicators between 2017 and 2022 under 'do minimum' conditions, bar the interpeak period. Again, barring the IP, both options bring significant improvements in all peaks when compared with DM 2022. The network performs relatively well in the IP so the addition of signals under the proposed options results in increased journey times and delay. Of the two, the Preferred Option brings the most significant improvements.

Table 5-1 – 2022 Do Minimum, Preferred Option and Interim Preferred

	Performance Indicator	Base	DM	Preferred Option Core		Interim Preferred Core	
	(Average of all runs)	2017	2022	2022		2022	
AM	Network Journey Time (mins)	2.82	3.78	2.62	-31%	2.80	-26%
	Delay Time (mins)	1.05	1.94	0.87	-55%	1.06	-46%
	Network Speed (mph)	18.34	13.64	19.68	44%	18.23	34%
IP	Network Journey Time (mins)	2.11	2.07	2.39	15%	2.44	18%
	Delay Time (mins)	0.47	0.45	0.74	65%	0.81	80%
	Network Speed (mph)	23.02	23.29	20.26	-13%	19.64	-16%
PM	Network Journey Time (mins)	2.39	2.87	2.53	-12%	2.64	-8%
	Delay Time (mins)	0.70	1.17	0.86	-26%	0.98	-16%
	Network Speed (mph)	20.93	17.10	19.37	13%	18.41	8%
FRI	Network Journey Time (mins)	2.55	3.51	2.50	-29%	2.66	-24%
	Delay Time (mins)	0.89	1.79	0.87	-52%	1.02	-43%
	Network Speed (mph)	19.2	13.75	19.26	40%	17.98	31%
SAT	Network Journey Time (mins)	2.35	3.30	2.54	-23%	2.64	-20%
	Delay Time (mins)	0.73	1.65	0.94	-43%	1.04	-37%
	Network Speed (mph)	20.19	14.07	18.25	30%	17.45	24%

Table 5-2 illustrates the overall performance of the modelled network across the five peak periods in the Base Model, 2037 Do Minimum, 2037 Preferred Option Core and 2037 Interim Preferred Core.

Table 5-2 – 2037 Do Minimum, Preferred Option and Interim Preferred

	Performance Indicator	Base	DM	Preferred Option Core		Interim Preferred Core	
	(Average of all runs)	2017	2037	2037		2037	
AM	Network Journey Time (mins)	2.82	4.58	2.85	-38%	3.32	-27%
	Delay Time (mins)	1.05	2.65	1.08	-59%	1.53	-42%
	Network Speed (mph)	18.34	11.28	18.22	62%	15.50	37%
IP	Network Journey Time (mins)	2.11	2.38	2.51	5%	2.61	10%
	Delay Time (mins)	0.47	0.72	0.83	16%	0.94	31%
	Network Speed (mph)	23.02	20.61	19.60	-5%	18.68	-9%
PM	Network Journey Time (mins)	2.39	4.70	2.72	-42%	3.37	-28%
	Delay Time (mins)	0.70	2.80	1.03	-63%	1.64	-41%
	Network Speed (mph)	20.93	10.58	18.25	72%	14.64	38%
FRI	Network Journey Time (mins)	2.55	5.28	2.67	-49%	3.53	-33%
	Delay Time (mins)	0.89	3.34	1.01	-70%	1.81	-46%
	Network Speed (mph)	19.2	9.24	18.30	98%	13.79	49%
SAT	Network Journey Time (mins)	2.35	4.92	3.00	-39%	3.35	-32%
	Delay Time (mins)	0.73	3.09	1.34	-57%	1.68	-46%
	Network Speed (mph)	20.19	9.56	15.81	65%	14.03	47%

Again, it can be seen that there is a very significant deterioration in network performance between 2017 and 2037 (approximately 50% for many peaks/indicators). Both options result in a significant improvement, particularly the Preferred Option.

5.3. Option Performance - Nodes

5.3.1. Brighton Hill Roundabout

5.3.1.1. 2022

2022 AM Peak

Table 5-3 shows average and maximum queue lengths on each arm of the Brighton Hill roundabout in the 2022 AM peak. The percentage change in relation to the DM 2022 scenario is shown for each option and colour-coded (red increase in queue length, green decrease in queue length). To allow ease of comparison, total queuing on all arms for each option is also shown.

It can be seen that average and maximum queues will increase on all arms of the junction between 2017 and 2022, particularly on the A30 (south), Winchester Road and Western Way. The Preferred Option results in significant improvements on A30 (south) and Winchester Road, even in comparison with the 2017 situation, noting that the Western Way entry to the roundabout is closed in this scenario.

The Interim Option also results in significant improvements, noting that there are small increases on the short average queues on A30 (north) and The Harrow Way, the latter also seeing a longer maximum queue that in the 2022 Do Minimum scenario. Note the relatively short average and maximum queues on Western Way under this option.

Table 5-3 – Queue lengths - Brighton Hill Roundabout 2022 AM Peak

		Base	DM	Preferred Option Core		Interim Preferred Core	
Entry arm	Indicator	2017	2022	2022		2022	
A30 (north)	Average Queue (m)	12.62	14.49	14.45	0%	27.18	88%
	Max Queue (m)	111.86	127.65	83.35	-35%	101	-21%
The Harrow Way	Average Queue (m)	1.91	2.44	11.31	364%	18.7	666%
	Max Queue (m)	27.92	36.6	56.41	54%	139.36	281%
Brighton Way	Average Queue (m)	15.79	37.09	14.79	-60%	20.74	-44%
	Max Queue (m)	204.56	326.53	64.62	-80%	83.45	-74%
A30 (south)	Average Queue (m)	68.92	148.6	27.85	-81%	43.79	-71%
	Max Queue (m)	415.87	509.47	89.19	-82%	213.36	-58%
Winchester Road	Average Queue (m)	94.89	432.82	16.46	-96%	12.48	-97%
	Max Queue (m)	251.67	511.87	93.45	-82%	134.32	-74%
Western Way	Average Queue (m)	65.6	145.64	0	-100%	22.95	-84%
	Max Queue (m)	146.2	438.42	0	-100%	149.1	-66%
Cumulative Total	Average Queue (m)	259.73	781.08	84.86	-89%	145.84	-81%
	Max Queue (m)	1158.08	1950.54	387.02	-80%	820.59	-58%

2022 Friday PM Peak

Table 5-4, overleaf, shows that both the Preferred Option and Interim Preferred Option bring improvements in queuing on A30 (north), The Harrow Way and Brighton Way in the Friday PM peak. Queues on the A30 (south) are comparable, whilst relatively long maximum queues do form on Winchester Road and Western Way under the Interim Preferred Option scenario (the latter still being an improvement on the Do Minimum scenario).

Table 5-4 – Queue lengths - Brighton Hill Roundabout 2022 Friday PM Peak

Entry arm	Indicator	Base	DM	Preferred Option Core		Interim Preferred Core	
		2017	2022	2022		2022	
A30 (north)	Average Queue (m)	51.82	131.36	14.48	-89%	26.1	-80%
	Max Queue (m)	259.13	261.99	95.76	-63%	133.13	-49%
The Harrow Way	Average Queue (m)	47.38	98.73	14.19	-86%	22.73	-77%
	Max Queue (m)	168.84	172.39	58.9	-66%	131.99	-23%
Brighton Way	Average Queue (m)	70.43	89.57	15.11	-83%	25.32	-72%
	Max Queue (m)	318.61	335.87	65.49	-81%	106.03	-68%
A30 (south)	Average Queue (m)	4.92	6.93	19.5	181%	23.14	234%
	Max Queue (m)	63.55	72.64	69.36	-5%	75.11	3%
Winchester Road	Average Queue (m)	8.94	24.38	24.91	2%	34.79	43%
	Max Queue (m)	120.57	215.1	174.62	-19%	241.72	12%
Western Way	Average Queue (m)	19.09	111.47	0	-100%	43.48	-61%
	Max Queue (m)	109.01	303.47	0	-100%	178.68	-41%
Cumulative Total	Average Queue (m)	202.58	462.44	88.19	-81%	175.56	-62%
	Max Queue (m)	1039.71	1361.46	464.13	-66%	866.66	-36%

2022 Saturday Peak

Table 5-5 shows both options also reduce queueing in the Saturday lunchtime peak. Moderate average and maximum queues on the A30 (south) are largely unchanged and there is a relatively long maximum queue on Western Way in the Interim Preferred Option scenario, albeit significantly shorter than the Do Minimum scenario.

Table 5-5 – Queue lengths - Brighton Hill Roundabout 2022 Saturday Lunchtime Peak

Entry arm	Indicator	Base	DM	Preferred Option Core		Interim Preferred Core	
		2017	2022	2022		2022	
A30 (north)	Average Queue (m)	17.21	43.2	14.93	-65%	24.15	-44%
	Max Queue (m)	161.13	211.55	99.19	-53%	106.01	-50%
The Harrow Way	Average Queue (m)	5.18	24.11	17.2	-29%	19.25	-20%
	Max Queue (m)	47.34	137.87	83.9	-39%	111.72	-19%
Brighton Way	Average Queue (m)	38.51	397.33	14.5	-96%	24.33	-94%
	Max Queue (m)	248.47	511.91	58.93	-88%	122.36	-76%
A30 (south)	Average Queue (m)	12.29	30.81	25.9	-16%	31.33	2%
	Max Queue (m)	86.23	176.34	81.81	-54%	102.83	-42%
Winchester Road	Average Queue (m)	11.24	54.57	38.25	-30%	23.41	-57%
	Max Queue (m)	119.39	369.06	262.77	-29%	181.23	-51%
Western Way	Average Queue (m)	27.9	300.26	0	-100%	25.24	-92%
	Max Queue (m)	130.33	533.52	0	-100%	137.27	-74%
Cumulative Total	Average Queue (m)	112.33	850.28	110.78	-87%	147.71	-83%
	Max Queue (m)	792.89	1940.25	586.6	-70%	761.42	-61%

5.3.1.2. 2037

2037 AM Peak

Table 5-6 shows average and maximum queue lengths on each arm of the Brighton Hill roundabout in the 2037 AM peak.

It can be seen that average and maximum queues will increase on all arms of the junction between 2017 and 2037, particularly on the Brighton Way, A30 (south), Winchester Road and Western Way. The Preferred Option results in very significant improvements on Brighton Way, A30 (south) and Winchester Road, noting that the Western Way entry to the roundabout is closed in this scenario. There are moderate increases in average and maximum queues on The Harrow Way.

The Interim Option results in some significant improvements, noting that there are small increases on the short average queues on A30 (north) and The Harrow Way, the latter also seeing a longer maximum queue than in the 2037 Do Minimum scenario. Maximum queues on Western Way are relatively long under this scenario but still a significant improvement on the Do Minimum scenario.

Table 5-6 – Queue lengths - Brighton Hill Roundabout 2037 AM Peak

		Base	DM	Preferred Option Core		Interim Preferred Core	
Entry arm	Indicator	2017	2037	2037		2037	
A30 (north)	Average Queue (m)	12.62	24.36	16.92	-31%	41.89	72%
	Max Queue (m)	111.86	159.55	87.06	-45%	135.62	-15%
The Harrow Way	Average Queue (m)	1.91	3.9	26.35	576%	31.22	701%
	Max Queue (m)	27.92	48.47	113.51	134%	236.6	388%
Brighton Way	Average Queue (m)	15.79	308.31	18.85	-94%	53.45	-83%
	Max Queue (m)	204.56	511.64	80.36	-84%	326.25	-36%
A30 (south)	Average Queue (m)	68.92	158.79	39.72	-75%	85.45	-46%
	Max Queue (m)	415.87	506.38	109.07	-78%	505.59	0%
Winchester Road	Average Queue (m)	94.89	496.39	39.2	-92%	31.59	-94%
	Max Queue (m)	251.67	515.28	208.5	-60%	297.12	-42%
Western Way	Average Queue (m)	65.6	233.99	0	-100%	64.8	-72%
	Max Queue (m)	146.2	543.78	0	-100%	255.84	-53%
Cumulative Total	Average Queue (m)	259.73	1225.74	141.04	-88%	308.4	-75%
	Max Queue (m)	1158.08	2285.1	598.5	-74%	1757.02	-23%

2037 Friday PM Peak

Table 5-7 shows that both the Preferred Option and Interim Preferred Option bring improvements in queuing on A30 (north), The Harrow Way and Brighton Way in the Friday PM peak. Queues on the A30 (south) are comparable, but a long average queue on Brighton Way and long maximum queues on Brighton Way and Winchester Road remain in the Interim Preferred Option. Whilst a significant improvement, long average and maximum queues also remain on Western Way in this scenario.

Table 5-7 – Queue lengths - Brighton Hill Roundabout 2037 Friday PM Peak

		Base	DM Core	Preferred Option Core		Interim Preferred Core	
Entry arm	Indicator	2017	2037	2037		2037	
A30 (north)	Average Queue (m)	51.82	211.8	18.3	-91%	35.65	-83%
	Max Queue (m)	259.13	291.48	110.54	-62%	156.35	-46%
The Harrow Way	Average Queue (m)	47.38	109.06	17.88	-84%	31.29	-71%
	Max Queue (m)	168.84	162.48	69.39	-57%	155.95	-4%
Brighton Way	Average Queue (m)	70.43	416.71	27.93	-93%	226.38	-46%
	Max Queue (m)	318.61	513.16	155.77	-70%	463.78	-10%
A30 (south)	Average Queue (m)	4.92	14.79	24.09	63%	32.38	119%
	Max Queue (m)	63.55	105.84	85.1	-20%	123.08	16%
Winchester Road	Average Queue (m)	8.94	147.15	44.8	-70%	129.37	-12%
	Max Queue (m)	120.57	472.35	284.11	-40%	468.42	-1%
Western Way	Average Queue (m)	19.09	541.77	0	-100%	256.01	-53%
	Max Queue (m)	109.01	633.17	0	-100%	480.55	-24%
Cumulative Total	Average Queue (m)	202.58	1441.28	133	-91%	711.08	-51%
	Max Queue (m)	1039.71	2178.48	704.91	-68%	1848.13	-15%

2037 Saturday Peak

Table 5-8, overleaf, shows the Preferred Option reduces queueing in the Saturday lunchtime peak. Relatively long average and maximum queues on the A30 (south) and Winchester Road remain, although these are improvements on the Do Minimum scenario.

Table 5-8 – Queue lengths - Brighton Hill Roundabout 2037 Saturday Lunchtime Peak

Entry arm	Indicator	Base	DM Core	Preferred Option Core		Interim Preferred Core	
		2017	2037	2037		2037	
A30 (north)	Average Queue (m)	17.21	141.14	18.96	-87%	32.99	-77%
	Max Queue (m)	161.13	287.83	110.4	-62%	126.28	-56%
The Harrow Way	Average Queue (m)	5.18	104.26	56.7	-46%	24.01	-77%
	Max Queue (m)	47.34	163.86	133.79	-18%	132.8	-19%
Brighton Way	Average Queue (m)	38.51	483.16	17.64	-96%	95.99	-80%
	Max Queue (m)	248.47	511.86	64.49	-87%	340.93	-33%
A30 (south)	Average Queue (m)	12.29	86.45	72.74	-16%	166.71	93%
	Max Queue (m)	86.23	425.53	354.5	-17%	506.77	19%
Winchester Road	Average Queue (m)	11.24	232.22	137.77	-41%	85.6	-63%
	Max Queue (m)	119.39	495.55	480.27	-3%	397.95	-20%
Western Way	Average Queue (m)	27.9	506.45	0	-100%	142.68	-72%
	Max Queue (m)	130.33	633.29	0	-100%	328.77	-48%
Cumulative Total	Average Queue (m)	112.33	1553.68	303.81	-80%	547.98	-65%
	Max Queue (m)	792.89	2517.92	1143.45	-55%	1833.5	-27%

The Interim Preferred Option improves queueing on all arms except the A30 (south) where there is an increase in the already long maximum queues. Although representing improvements on the Do Minimum scenario, long maximum queues remain on Brighton Way, Winchester Road and Western Way in this option.

5.3.2. Football Club Junction

With reference to the results in Appendix C, average queues are short on all arms in all peaks at the proposed signalised junction for the football club link road at the A30. Occasionally longer queues (maximum queues) will develop on the link road and the A30, but these will dissipate quickly and do not block back through the upstream signals on the A30.

5.3.3. Retail Park Junction

Queuing and delay at this junction typically remains largely unchanged, although there are significant improvements in maximum queues on A30 (north) in the Friday PM peak at 2037 as shown in Table 5-9, overleaf.

Table 5-9 – Queue lengths – Retail Park Junction 2037 Friday PM Peak

Entry arm	Indicator	Base	DM	Preferred Option Core		Interim Preferred Core	
		2017	2037	2037		2037	
A30 (S)	Average Queue (m)	7.11	6.69	4.32	-35%	7.86	17%
	Max Queue (m)	60.62	59.12	87.4	48%	80.06	35%
A30 (S) Right Turn	Average Queue (m)	5.71	8.78	13.68	56%	10.12	15%
	Max Queue (m)	47.11	50.28	75.18	50%	73.64	46%
A30 (N)	Average Queue (m)	27.36	294.63	33.2	-89%	25.43	-91%
	Max Queue (m)	154.49	388.43	232.1	-40%	168.25	-57%
A30 (N) Left Turn	Average Queue (m)	2.29	146.26	3.74	-97%	3.77	-97%
	Max Queue (m)	69.64	318.73	104.38	-67%	105.05	-67%
Left Turn from Retail Park	Average Queue (m)	9.49	39.11	11.93	-69%	11.66	-70%
	Max Queue (m)	55.25	122.66	63.79	-48%	62.99	-49%
Right Turn from Retail Park	Average Queue (m)	9.49	39.11	11.93	-69%	11.66	-70%
	Max Queue (m)	55.25	122.66	63.79	-48%	62.99	-49%
Cumulative Total	Average Queue (m)	61.45	534.58	78.8	-85%	70.5	-87%
	Max Queue (m)	442.36	1061.88	626.64	-41%	552.98	-48%

Similar improvements in comparison with the 2037 Do Minimum scenario are seen in the Saturday lunchtime peak, as shown in Table 5-10, below.

Table 5-10 – Queue lengths – Retail Park Junction 2037 Saturday Lunchtime Peak

Entry arm	Indicator	Base	DM	Preferred Option Core		Interim Preferred Core	
		2017	2037	2037		2037	
A30 (S)	Average Queue (m)	13.85	10.08	17.74	76%	16.54	64%
	Max Queue (m)	83.39	77.57	100.24	29%	113.02	46%
A30 (S) Right Turn	Average Queue (m)	14.61	10.51	30.29	188%	21.12	101%
	Max Queue (m)	72.9	62.98	103.52	64%	98.85	57%
A30 (N)	Average Queue (m)	19.02	222.96	33.76	-85%	29.69	-87%
	Max Queue (m)	128.85	382.41	233	-39%	186.45	-51%
A30 (N) Left Turn	Average Queue (m)	6.39	206.94	16.54	-92%	15.99	-92%
	Max Queue (m)	102.46	389.75	168.67	-57%	158.86	-59%
Left Turn from Retail Park	Average Queue (m)	26.84	49.09	32.93	-33%	31.96	-35%
	Max Queue (m)	106.84	145.54	124.75	-14%	124.6	-14%
Right Turn from Retail	Average Queue (m)	26.84	49.09	32.93	-33%	31.96	-35%
	Max Queue (m)	106.84	145.54	124.75	-14%	124.6	-14%
Cumulative Total	Average Queue (m)	107.55	548.67	164.19	-70%	147.26	-73%
	Max Queue (m)	601.28	1203.79	854.93	-29%	806.38	-33%

6. Summary and Conclusion

6.1. Summary

The Brighton Hill roundabout is a key junction on the A30 corridor in south west Basingstoke. It is currently an unsignalised roundabout with six arms and queueing and delay are experienced in the peak hours.

Following initial option development by HCC and Atkins, a Preferred Option for improvement at the junction was agreed which included signalisation of all arms of the roundabout, closure of the Western Way entry and provision of a link road from Western Way to a proposed signalised junction on the A30. An Interim Preferred Option was also developed retaining the Western Way entry with no link road to the A30.

The purpose of this report is to provide the results of Vissim microsimulation analysis of the Preferred Option and Interim Preferred Option at 2022 and 2037 in comparison with a Do Minimum scenario in order to support the scheme business case.

In line with the project brief, a Local Model Validation Report (LMVR) (Document Reference 5163121-GDC-001) has also been produced to provide full details on the calibration and validation of the Brighton Hill Base Model.

The modelling work undertaken shows a significant reduction in network performance from 2017 (Base Year) to 2022 and 2037 under 'do minimum' conditions in the weekday AM, weekday PM, Friday PM and Saturday lunchtime peaks. Both options provide significant improvements in average journey time, speeds and delays across the modelled network in both forecast years.

The Preferred Option reduces queueing and delay on all arms of the Brighton Hill junction in the critical weekday AM, Friday PM and Saturday lunchtime peaks in 2037, although relatively long maximum queues will continue to form on Winchester Road in the weekday AM, Friday PM and Saturday PM peaks and A30 (south) on Saturday.

The Interim Preferred Option results in short average queues on all arms in the weekday AM peak at 2037 but longer maximum queues remain on Brighton Way, A30 (south) and Western Way. Although a significant improvement on the Do Minimum scenario, long average and maximum queues also remain on Brighton Way, Winchester Road and Western Way in the Friday PM peak and Saturday peak and also on the A30 (south) in the Saturday peak.

At 2022, the Interim Preferred Option results in short average queues on all arms in all scenarios, although longer maximum queues remain on the A30 (south) in the weekday AM peak period and Winchester Road in the Friday PM peak and Saturday peak period. The Preferred Option would result in low average queues on all arms in all peaks at 2022, with longer maximum queues continuing to form occasionally on Winchester Road in the Friday PM and Saturday lunchtime peaks.

Neither option would result in significant queuing or delay at the existing retail park or proposed football club junctions.

6.2. Conclusion

Without improvement, queuing and delay will increase significantly at the Brighton Hill roundabout in future years. Modelling of the Preferred Option to improve the junction brings significant improvement with longer queues only developing occasionally in the peak hour on Winchester Road at 2022 and Winchester Road and A30 (south) in 2037. The Interim Preferred Option scheme brings improvements at 2022 with occasional longer queues on A30 (south), Western Way and Winchester Road. By 2037, long average queues will occur on Brighton Way, Winchester Road and Western Way under the Interim Preferred Option.