Isle of Wight Council

Isle of Wight Junction Assessment and Design

Junction Feasibility Study – Quarr Hill / Newnham Road

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1 Introduction

General

1.1 WYG have been appointed by the Isle of Wight (IOW) Council to undertake a feasibility study for a series of highway junctions located throughout the island, with a particular focus on the towns of Newport, Ryde, Shanklin and Sandown. The study has been carried out to identify traffic management issues impacting on all road users and develop proposals that will form part of a package of schemes to be progressed as part of the Council's Local Implementation Plan (LIP) process.

1.2 IOW Council has identified 15 highway junctions which currently experience traffic issues such as congestion and queuing. The study considers where the main issues lie in relation to traffic movement, road safety, bus operation, pedestrian and cycle provision, public realm, parking provision and servicing. Each of the 15 highway junctions are to be supplemented by a feasibility study report, with traffic modelling software used to test the various proposals in order to identify a range of measures aimed at improving the behaviour and movement of traffic at each junction.

1.3 The 15 key junctions identified are summarised in **Table 1.1** below:

Table 1.1 List of Junctions

ID Num	Junction Name	Area	Junction Type
1	St Mary's Roundabout	Newport	4 arm Roundabout
2	Coppins Bridge Gyratory	Newport	Gyratory
3	Hunnyhill/Hunnycross Way	Newport	Signalised Crossroads
4	Hunnycross Way/Riverway	Newport	3x Roundabouts
5	Medina Way/Coppins Bridge Roundabout	Newport	Gyratory
6	Queens Road/West Street	Ryde	5 arm Signalised Jct
7	Argyll St/West St	Ryde	Signalised Crossroads
8	Binstead Road/Pellhurst Road	Ryde	3 arm Signalised Jct
9	Quarr Hill/Newnham Road	Ryde	4 arm Roundabout
10	Marlborough Road/Great Preston Road	Ryde	Signalised Crossroads
11	High Street/Victoria Avenue, Shanklin	Shanklin	3 arm Signalised Jct
12	Newport Road/Industrial Way	Shanklin	4 arm Roundabout
13	Newport Road/Sandown Road	Shanklin	3 arm Signalised Jct
14	Lake Hill/The Fairway	Shanklin	Triangular 3x Priority Jcts
15	Morton Common/Perowne Way	Sandown	3 arm Signalised Jct

Site Location & Background

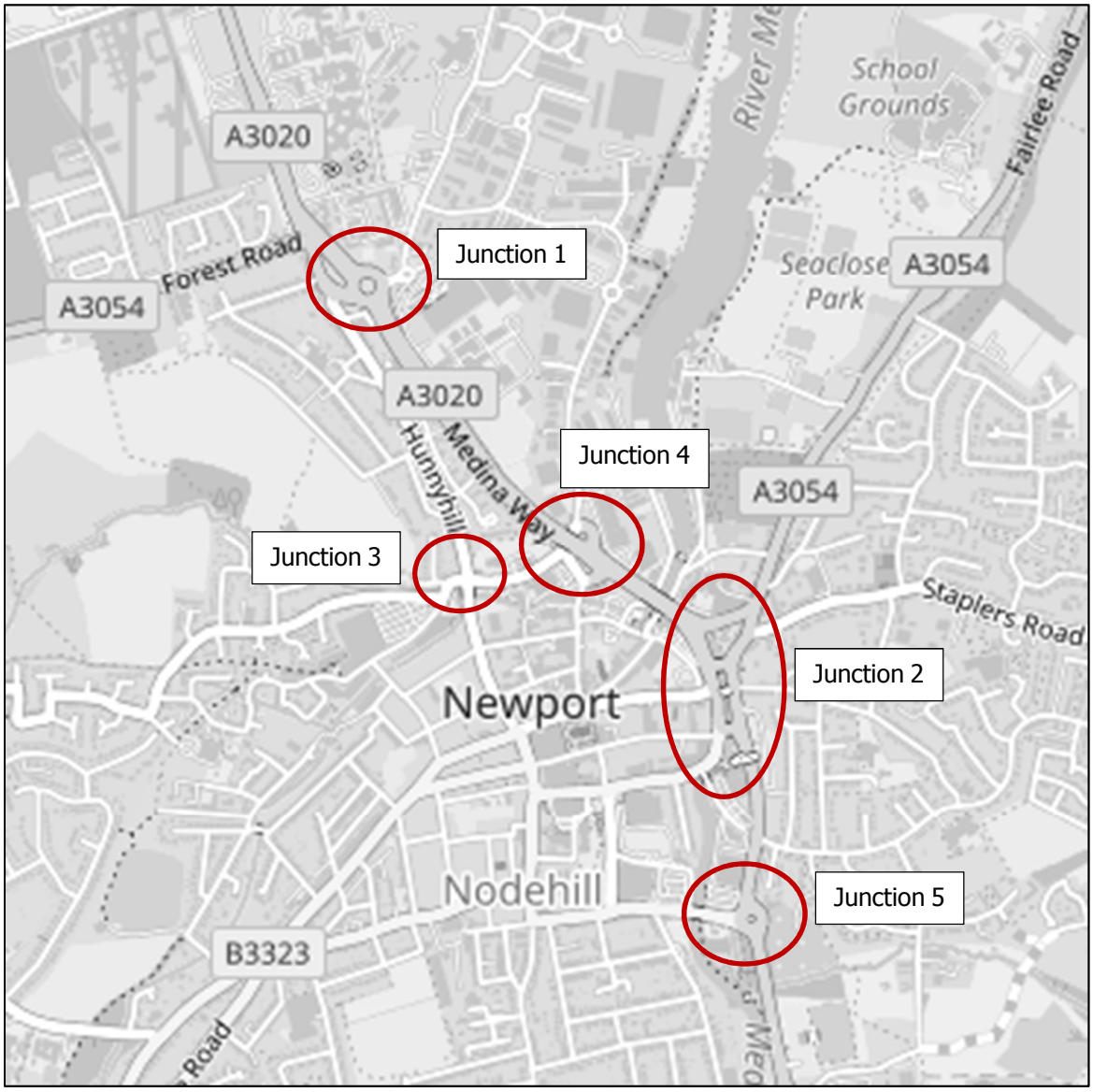
1.4 The Isle of Wight is an island located in the English Channel, approximately 6km off the Hampshire coast. The towns of Newport, Ryde, Shanklin and Sandown comprise the project study area for this feasibility study.

1.5 The town of Newport is the largest town on the IOW and is located in the centre of the island, the town of Ryde is located approximately 10km to the east of Newport, on the north-eastern coast of the island whilst Shanklin and Sandown are located approximately 9km to the south of Ryde and 10km to the south east of Newport.

1.6 The IOW as a whole is characterised by high car ownership levels, with 77.5% of households on the island owning a car or van, as indicated by the 2011 Census. Thus, the private vehicle remains the most convenient and fastest way to travel around the island.

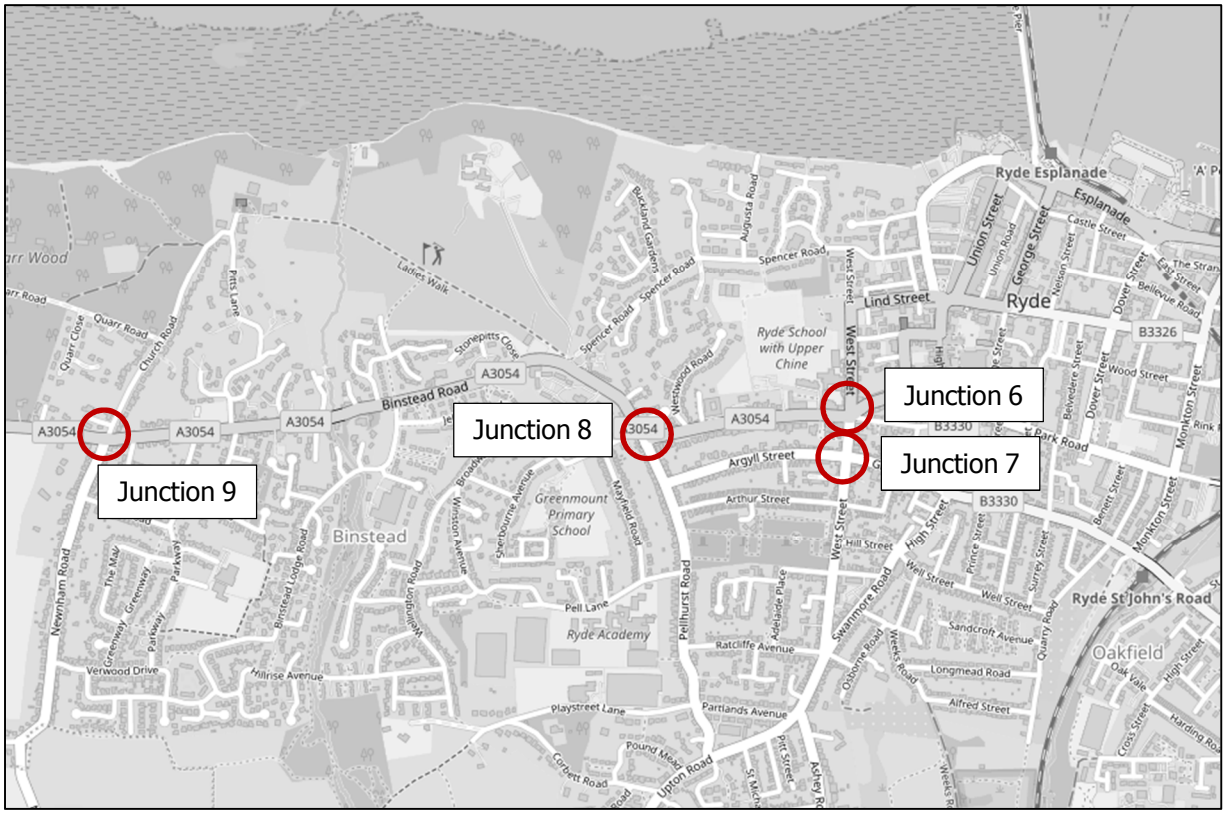
1.7 **Figures 1.1 – 1.3** presents the locations of all 15 junctions within Newport, Ryde and Shanklin & Sandown, which comprise the feasibility study area.

Figure 1.1 Feasibility Study Area – Newport Junctions



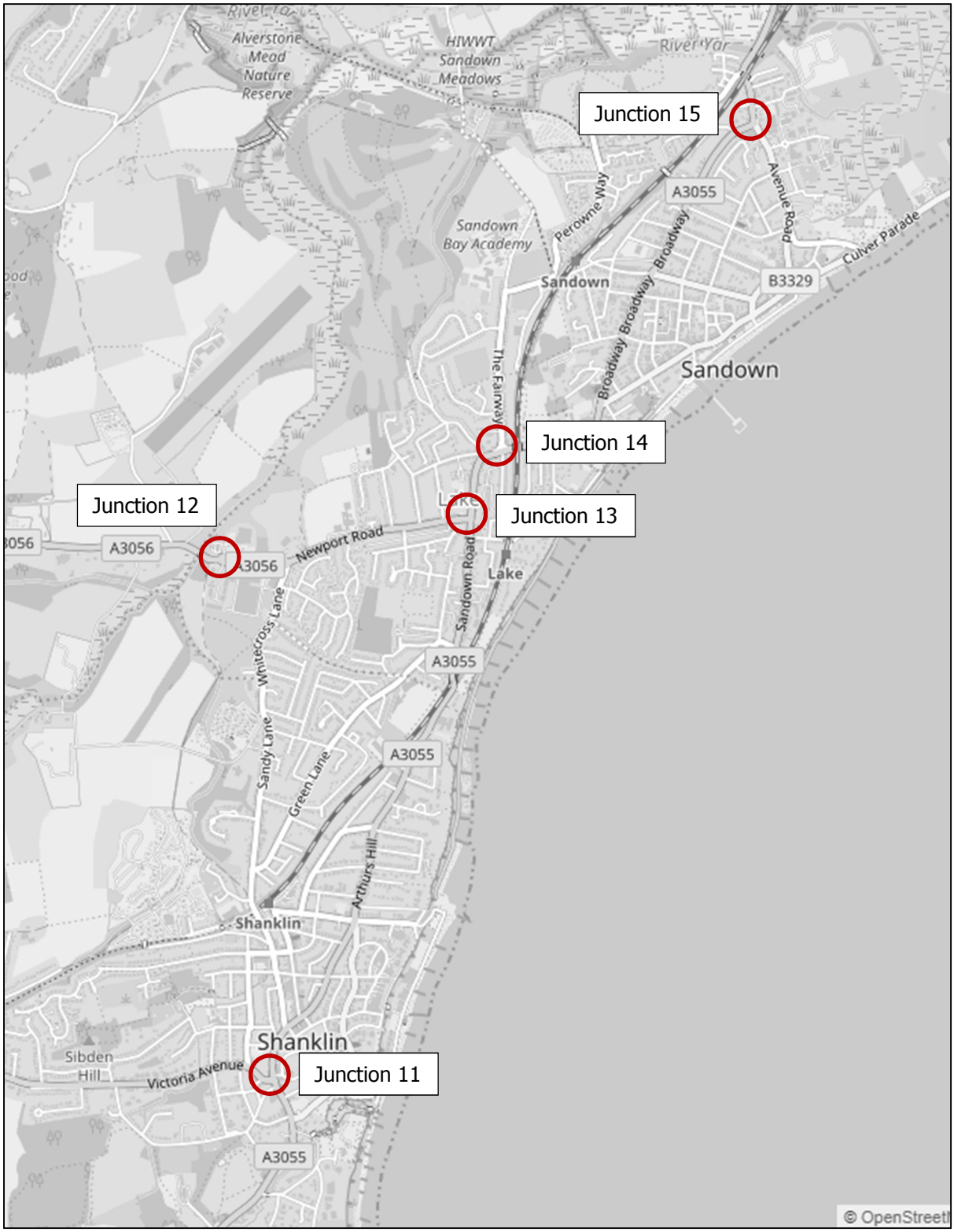
Source: OpenStreetMap with WYG Annotations, September 2017

Figure 1.2 Feasibility Study Area – Ryde Junctions



Source: OpenStreetMap, September 2017

Figure 1.3 Feasibility Study Area – Sandown & Shanklin Junctions



Source: OpenStreetMap, September 2017

1.8 Each of the 15 junctions are to be addressed within an individual feasibility study report. This report focuses on Junction 9, the highway junction of Quarr Hill / Church Road / Binstead Hill / Newnham Road which comprises a four-arm roundabout in Ryde.

1.9 **Figure 1.4** presents a site location plan of the four-arm roundabout junction.

Figure 1.4 Junction Location Plan

Source: Google Satellite Image, August 2017

Scope/Purpose of Study

1.1 The purpose of the study is to identify, through the use of traffic modelling software, where the main issues lie in terms of capacity, congestion and queuing at the junction; the traffic modelling will inform the type of highway improvements and design required at each junction.

Report Structure

1.2 The remainder of this document is structured as follows:

- **Chapter 2: Existing Conditions** - summarising the existing conditions at the junction, providing background to the junction, local highway network and detailing the current traffic issues experienced at the junction;
- **Chapter 3: Modelling Methodology** - setting-out details of tasks undertaken to build traffic models of the study area using specialist software, including results of option testing for the junction of interest;
- **Chapter 4: Proposed Scheme** - detailing the proposed scheme for highway improvements at the junction and their expected outcome; and
- **Chapter 5: Summary and Conclusions** - summarising the feasibility study process and outlining the key findings of the assessment.

1.3 All Appendices are included at the end of this report for information.

2 Existing Conditions

General

2.1 This chapter establishes the existing, or 'baseline', highway conditions which currently prevail in the area surrounding the junction. It describes the existing local highway network and any traffic issues present at the junction.

2.2 Baseline studies have been informed by detailed site visits and desk-based research carried out between August and September 2017.

2.3 This report focuses on the four-arm roundabout junction at A3054 Quarr Hill / Church Road / A3054 Binstead Hill / Newnham Road in Ryde.

Data Collection

2.4 Traffic flow surveys were undertaken by MHC Traffic Ltd on Thursday 20th July 2017 to establish the baseline traffic conditions for the local highway network on the IOW. A range of surveys were undertaken including:

- Manual Classified Counts (MCC) for turning flow information at 15 key junctions on the IOW;
- Automatic Traffic Counts (ATCs) were placed at strategic locations on the network allowing the speeds to be obtained at each of these junctions;
- Queue length surveys at stop lines of all 15 junctions; and
- Traffic video surveys at each of the 15 junctions.

2.5 The surveys allowed for the identification of turning movements at all key junctions as well as routing within the IOW. Signal timing data was additionally supplied by the IOW Council for use for the correct modelling of signal timing data.

2.6 The data collected as part of the surveys was used directly for calibrating and validating the base scenario for both the Junctions 9 and LinSig models. Video footage of the surveyed junctions was additionally reviewed to ensure that the base models reflect the on-street road conditions as closely as possible.

Study Area/Junction Background

2.7 The Quarr Hill / Church Road / Binstead Hill / Newnham Road roundabout junction is located on the western edge of Ryde, approximately 2km to the west of the town centre. The A3054 Quarr Hill forms the western arm, A3054 Binstead Hill forms the eastern arm, whilst Church Road and Newnham Road form the northern and southern arms.

2.8 The junction provides access to Newport to the west, Ryde to the east, and the residential area of Binstead to the north and the south. A location plan of the junction is provided in **Figure 2.1**.

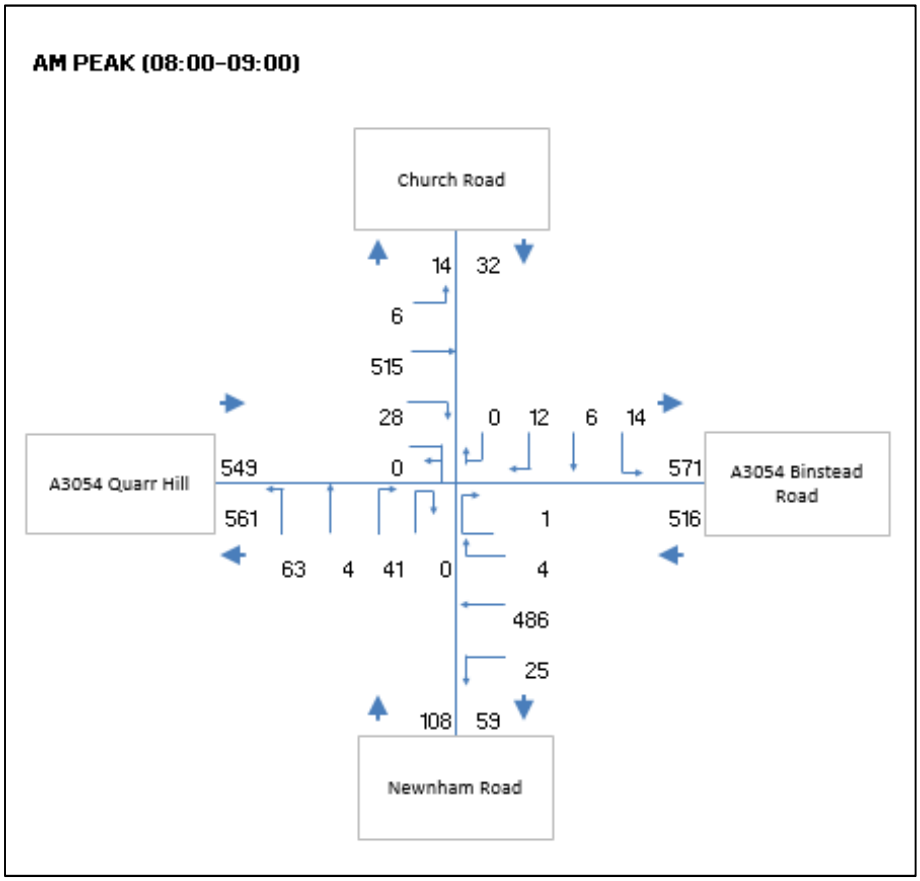
Figure 2.1 Junction Location Plan

Source: Google Image, August 2017

Base Traffic Flows

2.9 This section details the current traffic flows and queuing at the junction, as indicated by the survey data. These are shown in **Figures 2.2** and **2.3**.

Figure 2.2 AM Traffic Flows (PCUs)

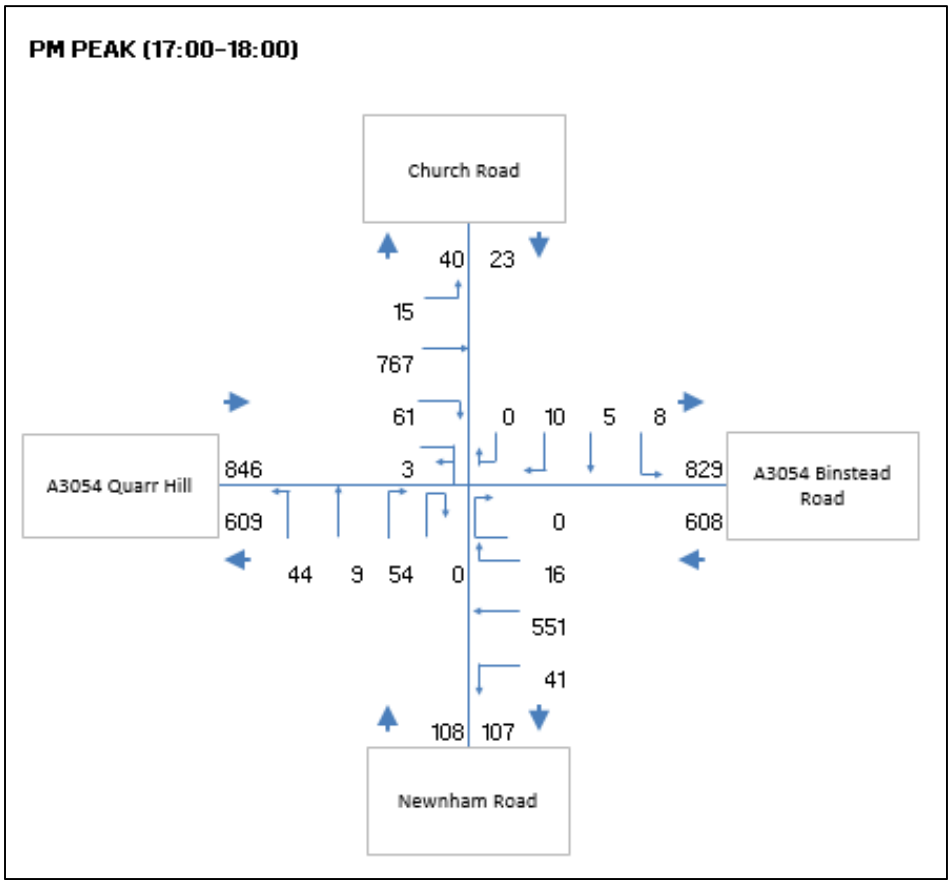


2.10 As shown in Figure 2.2, the highest traffic flows are those travelling eastbound in the AM Peak (08:00-09:00) with 515 PCUs undertaking this movement. The eastbound flows are predominantly generated by those commuting to Ryde for work. Westbound traffic is of a comparable level, with 486 PCUs recorded.

2.11 In terms of queues, the longest queues occur on the A3054 Quarr Hill, with a maximum observed queue of four vehicles recorded. Some queuing also occurs on the A3054 Binstead Hill and Newnham Road, with maximum observed queues of two vehicles.

2.12 **Figure 2.3** below shows the traffic flows for the PM Peak (17:00-18:00).

Figure 2.3 PM Traffic Flows (PCUs)



2.13 As shown in Figure 2.3, the highest traffic flows are those travelling eastbound in the PM Peak (17:00-18:00), with 767 PCUs undertaking this movement. This was also the case in the AM Peak. Westbound flows are lower, with 551 PCUs recorded.

2.14 Queuing principally occurs on A3054 Quarr Hill, with a maximum observed queue of 12 vehicles on this arm. Queueing also occurs on A3054 Binstead Hill and Newnham Road, with maximum observed queues of six and seven vehicles respectively.

Local Highway Network

2.15 The roundabout junction comprises the A3054 Quarr Hill, Church Road, A3054 Binstead Hill and Newnham Road. This section provides a description of each of these roads.

A3054 Quarr Hill / Binstead Hill

2.16 The A3054 Quarr Hil / Binstead Hill is a two-way single carriageway road and forms a strategic road on the island, providing a link between Ryde and Newport. In the vicinity of the junction, the road is subject to a 30mph speed limit. Pedestrian refuge islands are provided on the western arm. Footways are provided on both sides of the carriageway.

Church Road

2.17 Church Road is a two-way single carriageway residential street. The road is subject to a 30mph speed limit with a footway provided on its eastern side.

Newnham Road

2.18 Newnham Road is a two-way single carriageway residential street. The road is subject to a 30mph speed with footway provided on its eastern side. The road provides access to the residential area of Binstead.

Utilities Assessment

2.19 A utilities assessment has been carried out at the junction as an indication of which utilities are present within the vicinity of the junction. The following utilities which may be affected by improvements at the junction are listed below:

- Environment Agency
- Isle of Wight Council
- LinesearchbeforeUdig
- Openreach – (British Telecommunications)
- Scottish and Southern Electricity
- SGN – Southern Gas Networks
- Southern Water
- Wight Fibre

3 Modelling Methodology

Introduction

3.1 Traffic modelling has been undertaken as part of the feasibility study, identifying how the local highway network operates and how it might operate following the proposed improvements to the junction. Junctions 9 is the latest version of TRL's industry-standard software for modelling roundabouts, and has therefore been used for modelling this junction. LinSig v3 was used to test a potential signalised junction as part of the proposed design option for the junction.

3.2 The modelling has been undertaken for two weekday periods determined to be the network peaks in terms of traffic volumes, with the AM peak between 08:00 and 09:00 and the PM peak between 17:00 and 18:00. These peaks were identified through analysis of traffic count data. Initially, Base Year modelling was using survey data collected in July 2017. Future Year modelling was subsequently carried out in order to test the proposed changes to the network and assess the scale of impact on road traffic.

Explanation of Results

3.3 Junction capacity results are usually expressed in terms of 'Ratio of Flow to Capacity' (RFC) for priority and roundabout junctions. An existing junction is considered to have reached its theoretical capacity when it has an RFC of 1.00 or greater, however most highways authorities will usually expect an applicant to be able to achieve an RFC of less than 0.85, as a value above either of this figure is considered too close to the theoretical capacity for the junction to perform satisfactorily. Where junction improvements or a new junction are proposed, applicants should aim to achieve results of significantly less than 0.85 RFC.

3.4 Queue lengths at junction approaches are usually expressed in terms of 'Passenger Car Equivalent' (PCE) or 'Passenger Car Unit' (PCU). A standard car typically has a PCE/PCU value of 1.0; larger vehicles, such as goods vehicles, typically have PCE/PCU values greater than 1.0 and smaller vehicles, such as motorcycles, typically have PCE/PCU values less than 1.0.

3.5 The Degree of Saturation (DoS) is a ratio of demand to capacity on each approach to a signalised junction, with a value of 100% meaning that demand and capacity are equal and no further traffic is able to progress through the junction. Values over 85% are typically regarded as suffering from traffic congestion, with queues of vehicles beginning to form. The term Practical Reserve Capacity (PRC) is often used to refer to the available spare capacity at a junction. A negative PRC indicates that the junction is over capacity.

3.6 It is noted that a DoS of 90% or over recorded on an approach to the junction is deemed as approaching capacity and therefore a DoS of under 90% is considered acceptable.

Base Year Modelling

3.7 Data was collected as part of the surveys was compared to the base year outputs to match calibrate modelled flows and queue patterns to those observed, within acceptable variations. The results for the A3054 Quarr Hill / Church Road / A3054 Binstead Road / Newnham Road roundabout junction are summarised in **Table 3.1**, with full output results included in **Appendix B**.

Junction 9 Results – 2017 Base Year

Table 3.1 2017 Base Year Junction Assessment

Approach	2017 Base Year Assessment			
	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
	RFC	Queue (PCU)	RFC	Queue (PCU)
1 - Binstead Hill	0.63	1.7	0.75	2.9
2 - Newnham Road	0.20	0.2	0.21	0.3
3 - Quarr Hill	0.55	1.3	0.86	5.8
4 - Church Road	0.10	0.1	0.16	0.2

3.8 The base year results as shown in Table 3.1, indicate that the junction operates within recommended capacity except during the PM Peak, whereby a RFC of 0.86 is recorded on the Quarr Hill arm. Queues of 5.8 PCUs are recorded on this arm. It is noted that the modelled queues recorded on all arms are shown to be in correlation with observed queues.

3.9 For comparison purposes, the existing roundabout junction has been tested in the future year scenario (2034) to determine how the junction would operate without any physical alterations. The results of this are shown in **Table 3.2**.

Junction 9 Results – Future Year

Table 3.2 2034 Future Year Junction Assessment

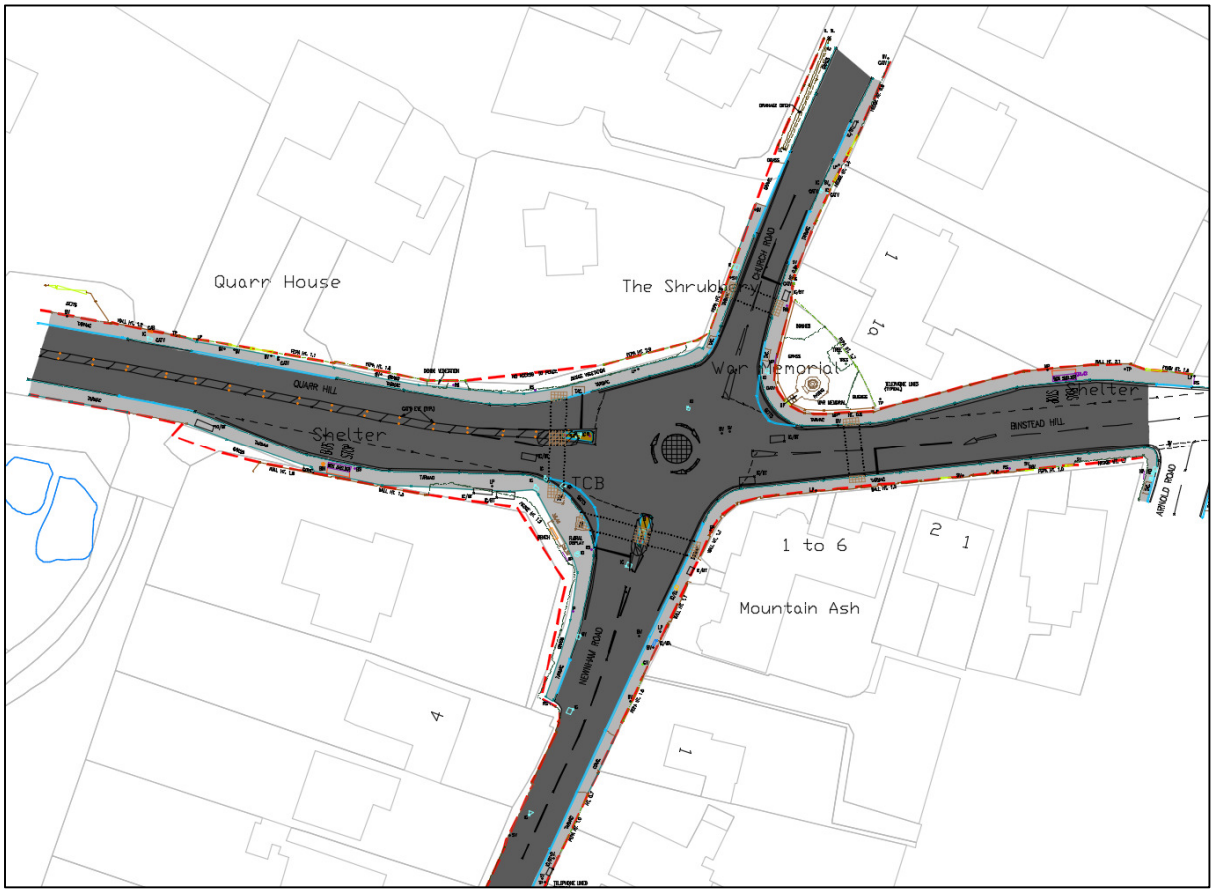
Approach	2034 Base Year Assessment			
	AM Peak (08:00-09:00)		PM Peak (17:00-18:00)	
	RFC	Queue (PCU)	RFC	Queue (PCU)
1 - Binstead Hill	0.78	3.5	0.94	10.9
2 - Newnham Road	0.27	0.4	0.29	0.4
3 - Quarr Hill	0.68	2.2	1.07	47.9
4 - Church Road	0.16	0.2	0.37	0.5

3.10 As shown in Table 3.2, in the Future Year 2034, the roundabout junction is shown to exceed capacity in the PM Peak, on the Binstead Hill and Quarr Hill arms. On Binstead Hill, an RFC of 0.94 is recorded with modelled queues of 10.9 PCUs, whilst on Quarr Hill an RFC of 1.07 is recorded as well as queues of 47.9 PCUs, during the PM Peak. Therefore, this shows that without any physical alterations the junction would operate over maximum capacity during the PM Peak.

Proposed Scheme

3.11 The proposed scheme for the roundabout junction involves creating a signalised junction with pedestrian crossings across each of the four arms. This is to provide a safer environment for pedestrians and cyclists to cross at the junction, whereby pedestrian refuge islands are currently provided. This scheme is shown in **Figure 3.1** below.

Figure 3.1 Signalised Junction Design



Source: WYG Drawing A90129-99-10

3.12 Taking into account the Base Year modelling results, the main capacity issues experienced at the junction are found on the Quarr Hill and Binstead Hill arm. By signalising the junction, this should offer greater capacity by providing designated green time and traffic priority to each arm. This design has been tested as part of the Future Year assessment.

Forecast/Future Year Modelling

3.13 Forecast or Future Year modelling was undertaken using the proposed highway design for the junction, as shown in Figure 3.1, to ascertain the effectiveness and feasibility of the design. The results for the proposed junction design are summarised in **Table 3.3**, with full output results included in **Appendix B**.

LinSig Modelling Results – Future Year/Proposals

Table 3.3 Future Year Assessment: LinSig Modelling Results

Arm Cycle time AM Peak – 90 seconds PM Peak – 105 seconds	AM Peak			PM Peak		
	Deg Sat (%)	Mean Max Queue (pcu)	Av. Delay Per PCU (s/pcu)	Deg Sat (%)	Mean Max Queue (pcu)	Av. Delay Per PCU (s/pcu)
1/1 – Church Road	18.0%	1.0	45.9	16.0%	0.8	56.0
2/1 – Binstead Hill	64.9%	12.3	21.4	67.5%	15.4	20.3
3/1 – Newnham Road	65.6%	4.1	63.7	83.7%	5.9	107.3
4/1 – Quarr Hill	67.9%	13.5	22.5	90.3%	30.6	34.5
PRC	32.5%			-0.3%		
Total Delay (pcu/hr)	10.78			18.36		

3.14 As shown in Table 3.3, the proposed signalised junction design is expected to operate with much greater capacity in comparison to the existing mini-roundabout junction. It is noted that during the AM Peak, the signalised junction operates within capacity with a 90 second cycle time, with an overall PRC of 32.5% recorded. For the PM Peak, it was found that a 90 second cycle time was not efficient enough for the junction to operate within capacity, and thus a longer cycle time of 105 seconds was tested. With the 105 second cycle time, the junction operates with a PRC of -0.3% in the PM and thus the junction remains over capacity.

3.15 Subsequently, a 120 second cycle time was also tested during the PM Peak, as shown in **Table 3.4**, which was found to offer the largest gain in capacity, with a PRC of 5.5% recorded. As a result, the signalised junction would operate within capacity in the PM, with a 120 second cycle time.

Table 3.4 Future Year Assessment: LinSig Modelling Results

Arm Cycle time PM Peak – 120 seconds	PM Peak		
	Deg Sat (%)	Mean Max Queue (pcu)	Av. Delay Per PCU (s/pcu)
1/1 – Church Road	15.4%	0.9	61.3
2/1 – Binstead Hill	63.8%	16.1	18.9
3/1 – Newnham Road	78.2%	5.9	98.6
4/1 – Quarr Hill	85.3%	30.2	28.4
PRC	5.5%		
Total Delay (pcu/hr)	16.08		

Cost/Time Savings Analysis

3.16 A cost savings analysis has been undertaken for the junction based on the delay/time savings gained by lengthening the junction's cycle time for the PM Peak. In order to calculate the cost savings, fuel cost values were extracted for the average car (per km) (petrol / diesel) from the Department for Transport (DfT) document 'Values of Time and Vehicle Operating Costs' Transport Analysis Guidance (TAG), January 2014. The average fuel cost for an average car was extracted as £0.79 per kilometre.

3.17 To calculate the total cost savings for the PM Peak, the average speed at the junction was recorded as 35mph (56kph) (based on ATC data collected by MHC Traffic Ltd), which was then applied to the total time savings for the whole PM period (16:00-19:00). The total time savings were based on the delay savings on the Quarr Hill and Binstead Hill arms, when compared to the predicted delays if the junction were to remain as a roundabout in the 2034 Future Year.

3.18 As a result, the total distance saved was determined from this. The average fuel cost per kilometre was then applied to the total distance, giving a total cost saving per PM Peak period, for an average weekday. For the annual cost savings, the total PM cost savings were applied to a total of 253 days (excluding weekends and Bank Holidays), seeing as this assessment only takes into account an average weekday. The results of this assessment are summarised in **Table 3.5** below.

Table 3.5 Estimated Cost/Time Savings Analysis of Junction 9

Time Period	Average Existing Delay per PCU (secs)	Estimated Average Delay per PCU (secs)	Average Journey Time Savings (secs)	Assumed Length of Time Period (Hours)	Average No. of PCUs per hour	Time Savings for All Vehicles During Period (secs)	Value of Time Savings Per Period (£)	Value of Time Savings Per Annum
PM Peak (16:00-19:00)	96	24	72	3	571	124,175	£1,366.36	£345,688.46
TOTAL						**124,175**	**£1,366.36**	**£345,688.46**

3.19 As shown in Table 3.5, the estimated cost savings per peak period were £1,366.36 in the PM Peak, and thus the overall annual fuel cost savings was estimated to be £345,688.46.

Outcome / Conclusions

3.20 The outcome of the modelling results indicate that signalising the junction is the most effective way at increasing capacity at the junction. This gives each arm a designated green time and thus enables a higher amount of traffic to travel through the junction, as a result, allowing the junction to operate more efficiently. The proposed junction would also provide a more desirable environment for pedestrians and cyclists to cross, with designated pedestrian crossings across each of the arms.

4 Proposed Scheme

General

4.1 This chapter considers the proposed improvements scheme for the A3054 Quarr Hill / Church Road / A3054 Binstead Road / Newnham Road four-arm roundabout junction. Drawings of the proposals are included in **Appendix A**.

Proposed Junction Improvements

Junction Issues

4.2 Current issues specific to the A3054 Quarr Hill / Church Road / A3054 Binstead Road / Newnham Road four-arm roundabout junction include:

- Highest traffic flows eastbound / westbound on Quarr Hill and Binstead Hill;
- The roundabout junction behaves more like a priority junction, as opposed to a roundabout;
- Queuing occurs on the both the eastern and western arms; and
- Exceeds capacity during the PM Peak.

Opportunities

4.3 The opportunities to improve the four-arm roundabout junction are primarily focused on:

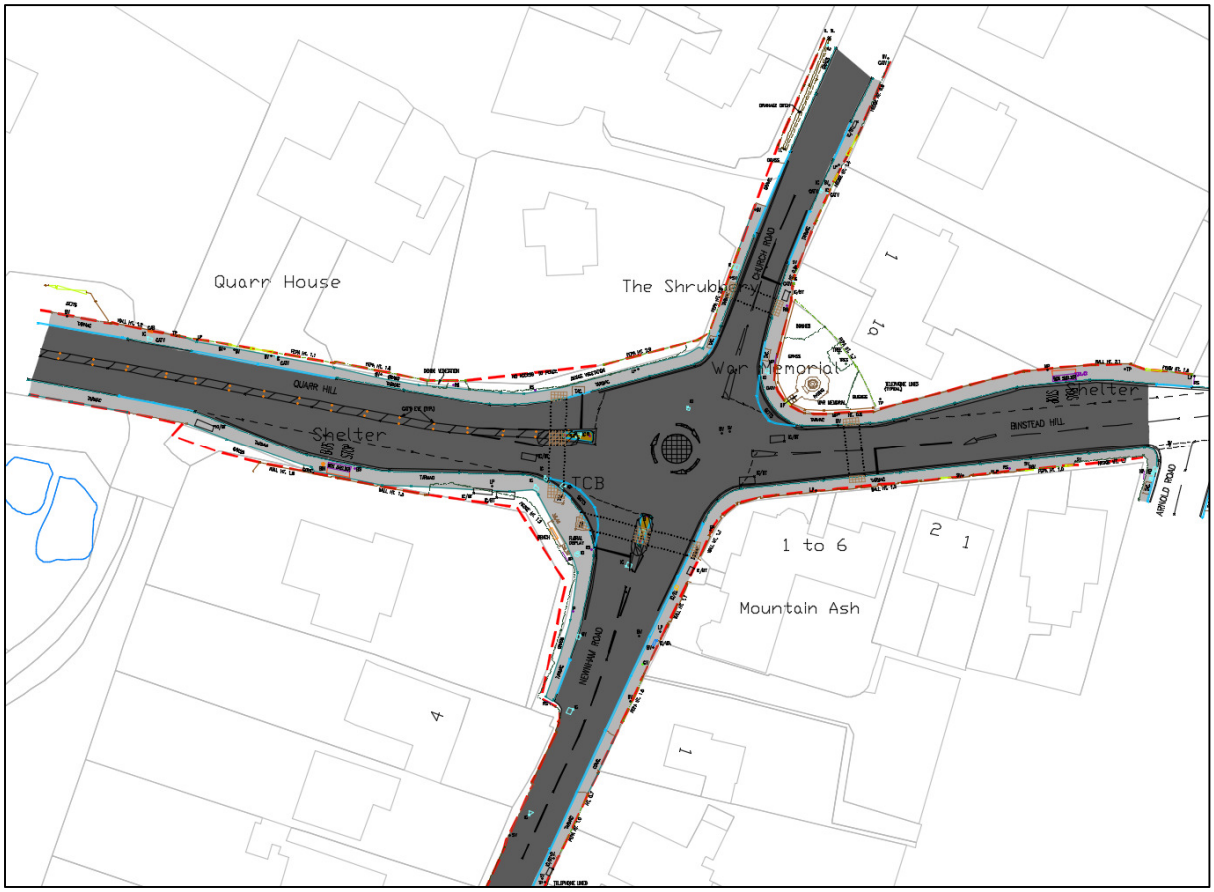
- Giving greater priority to dominant traffic movements such as the eastbound and westbound traffic (straight-ahead); and
- Reducing existing traffic congestion, queuing and delays.

Proposals

4.4 The proposed scheme for the roundabout junction involves creating a signalised junction with pedestrian crossings across each of the four arms. This is to provide a safer environment for pedestrians and cyclists to cross at the junction, whereby pedestrian refuge islands are currently provided. By signalising the junction, this should offer greater capacity by providing designated green time and traffic priority to each arm. This design has been tested as part of the Future Year assessment.

4.5 The proposed layout is presented below in **Figure 4.1**. The 1:250 drawing is included at **Appendix A**.

Figure 4.1 Signalised Junction Design



Source: WYG Drawing A90129-99-10

Cost/Benefit Analysis

4.6 This section of the feasibility study sets out an indication of the costs of the proposals at each section of the study area. The costs are based on appraisal of construction prices from SPONS and WYG's understanding of similar schemes developed for other local authorities. The cost estimate is identified in **Table 4.1**.

Quarr Hill

4.7 The scope of improvements includes the following:

a) Removal of existing pedestrian refuge and reinstate carriageway.

b) Removal and replacement of lit sign posts and bollards on pedestrian refuge.

c) Existing inspection chamber to be levelled.

d) Construction of new pedestrian refuge.

e) Dropped kerbs and tactile paving where required.

f) Signals to be installed.

g) Where needed, existing road markings will be removed and new markings will be implemented.

h) High friction surfacing to be implemented.

Church Road

4.8 The scope of improvements includes the following:

a) Dropped kerbs and tactile paving where required.

b) Signals to be installed.

c) Where needed, existing road markings will be removed and new markings will be implemented.

d) High friction surfacing to be implemented.

Binstead Hill

4.9 The scope of improvements includes the following:

a) Dropped kerbs and tactile paving where required.

b) Signals to be installed.

c) Where needed, existing road markings will be removed and new markings will be implemented.

d) High friction surfacing to be implemented.

Newnham Road

4.10 The scope of improvements includes the following:

e) Removal of existing pedestrian refuge and reinstate carriageway.

f) Removal and replacement of lit sign posts and bollards on pedestrian refuge.

g) Existing inspection chamber to be levelled.

h) Construction of new pedestrian refuge.

i) Dropped kerbs and tactile paving where required.

j) Signals to be installed.

k) Where needed, existing road markings will be removed and new markings will be implemented.

l) High friction surfacing to be implemented.

Summary

4.11 **Table 4.1** sets out a summary of the indicative estimated costs for the proposals within the study area.

Table 4.1 Cost Estimate of Proposals – Summary

Proposal	Cost Estimate
Construction Estimate	£54,000
Risk Variables (Statutory Undertakers, Safety Audit requirements)	£13,500
Design Administration and Land Costs	£5,400
Total	**£72,900**

Source: WYG, December 2017

Conclusion

4.12 The northern, eastern and southern arms are operating within the recommended capacity for this junction at present, however the western arm (Quarr Hill) is not operating within recommended capacity within the PM Peak hour.

4.13 The future prediction for this junction is that it will exceed recommended capacity in the PM Peak, on Binstead Hill and Quarr Hill.

Recommendations

4.14 We recommend that the junction be signalised on each arm to assist in the smooth running of this junction.

5 Summary and Conclusions

Summary

5.1 WYG have been appointed by the Isle of Wight (IOW) Council to undertake a feasibility study for a series of highway junctions located throughout the island, with a particular focus on the towns of Newport, Ryde, Shanklin and Sandown. The study has been carried out to identify traffic management issues impacting on all road users and develop proposals that will form part of a package of schemes to be progressed as part of the Council's Local Implementation Plan (LIP) process.

5.2 IOW Council has identified 15 highway junctions which currently experience traffic issues such as congestion and queuing. The study considers where the main issues lie in relation to traffic movement, road safety, bus operation, pedestrian and cycle provision, public realm, parking provision and servicing. Each of the 15 highway junctions is subject to a feasibility study report, with traffic modelling software used to test various proposals in order to identify a range of measures aimed at improving the behaviour and movement of traffic at each junction.

5.3 The Quarr Hill / Church Road / Binstead Hill / Newnham Road roundabout junction is located on the western edge of Ryde, approximately 2km to the west of the town centre. The A3054 Quarr Hill forms the western arm, A3054 Binstead Hill forms the eastern arm, whilst Church Road and Newnham Road form the northern and southern arms.

5.4 The junction provides access to Newport to the west, Ryde to the east, and the residential area of Binstead to the north and the south. At present, the junction is known to experience congestion and queuing, particularly on the western arm.

5.5 The roundabout modelling software within Junctions 9 and LinSig v3 was used to model the junction, in the Base and Future Year scenarios. The modelling has been undertaken for two weekday periods considered to be the network peaks in terms of traffic volumes, with the AM peak between 08:00 and 09:00 and the PM peak between 17:00 and 18:00. The Base Year results indicate that the junction operates within recommended capacity except during the PM Peak, whereby a RFC of 0.86 is recorded on the Quarr Hill arm. Modelled queues of 5.8 PCUs are recorded on this arm.

5.6 For comparison purposes, the existing roundabout junction was tested in the Future Year scenario (2034) to determine how the junction would operate without any physical alterations. It was found that the junction would exceed capacity in the PM Peak, on the Binstead Hill and Quarr Hill arms.

5.7 As a result, improvements to the roundabout junction have been focused around improving the flow of traffic through the junction, in particular for those vehicles travelling eastbound and westbound along Quarr Hill and Binstead Hill. Therefore, it was considered that signalising the junction would be the most effective option at improving junction capacity, as it would provide a designated green time for each arm.

5.8 With the proposed signalised junction tested, the results indicate that the junction is expected to operate with much greater capacity, in comparison to the roundabout junction. It was found that during the AM Peak, the signalised junction operates within capacity with a 90 second cycle time, with an overall PRC of 32.5% recorded. For the PM Peak, it was found that a 90 second cycle time was not efficient enough for the junction to operate within capacity, and thus a longer cycle time of 105 seconds was tested. With the 105 second cycle time, the junction operates with a PRC of -0.3% in the PM and thus the junction remains over capacity. With the cycle time further increased to 120 seconds, the PRC increases to 5.5%.

Conclusions

5.9 As part of this feasibility study, it can be concluded that the proposed signalised junction provides a vast improvement in comparison to the existing roundabout junction. The improvements brought forward address the existing capacity issues, reducing queuing and congestion in comparison to the existing roundabout junction. As part of the proposed signalised junction, designated pedestrian crossings will be provided across each arm, thus creating a more desirable environment for pedestrians and cyclists to cross, whereby only pedestrian refuge islands are currently provided.

Appendix A
1:250 DRAWINGS

Proposed tactile paving and dropped kerbs

Proposed traffic signals

Proposed tactile paving and dropped kerbs

Centre markings to be removed

Proposed tactile paving and dropped kerbs

Proposed traffic signals

Proposed tactile paving and dropped kerbs

Proposed traffic signals

Proposed tactile paving and dropped kerbs

Quarr House

The Shrubbery

CHURCH ROAD

QUARR HILL

BINSTEAD HILL

NEWNHAM ROAD

ARNOLD ROAD

War Memorial

Shelter

Shelter

TCB

1 to 6

Mountain Ash

4

1

8

Notes:

General

1. Do not scale from drawing.
2. All dimensions are in metres, unless stated otherwise.
3. This drawing is to be read & printed in colour.
4. This drawing is for illustrative purposes only.

Disclaimer

1. The information contained in this drawing is based on a combination of OS and data provided by others and WYG shall not be liable for any inaccuracies or deficiencies.

KEY:

- Extent of highway boundary
- Existing carriageway
- Existing footway / public realm
- Existing road marking
- Proposed road marking
- New carriageway construction
- New footway construction
- Mini roundabout and arrow markings to be burnt off

INDICATIVE

REV	DETAILS	DRAWN BY	CHECKED BY	DATE

CLIENT: Client

PROJECT: Junction 9 Ryde

DRAWING TITLE: Drawing Title

SCALES:	SHEET SIZE:
1: 250	A1

DRAWN:	CHECKED:	DATE:
SJR	NW	November 2017

WYG Transport
part of WYG group
11th Floor 1 Angel Court London EC2R 7HJ
t: 0207 250 7500 f: 0207 250 7501 e: transport@wyg.com

DRAWING NUMBER: A090129-99-10

REVISION:

Appendix B
MODELLING OUTPUT RESULTS

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Junction 9 - Quarr Hill Newnham Rd.j9
Path: X:\Projects\2012\A090000\A090129-99 - IoW Junction Assessment and Design\30 Technical\31 Modelling\2017 Base Models\Junction 9
Report generation date: 18/01/2018 17:31:16

Summary of junction performance

	AM					PM				
	Q (PCU)	Delay (s)	RFC	LOS	Res Cap	Q (PCU)	Delay (s)	RFC	LOS	Res Cap
	2017									
1 - Binstead Hill	1.7	11.25	0.63	B	39 % [1 - Binstead Hill]	2.9	16.57	0.75	C	6 % [3 - Quarr Hill]
2 - Newnham Rd	0.2	7.49	0.20	A		0.3	8.06	0.21	A	
3 - Quarr Hill	1.3	7.66	0.55	A		5.8	23.56	0.86	C	
4 - Church Rd	0.1	11.38	0.10	B		0.2	26.18	0.16	D	
	2034									
1 - Binstead Hill	3.5	18.68	0.78	C	14 % [1 - Binstead Hill]	10.9	51.52	0.94	F	-14 % [3 - Quarr Hill]
2 - Newnham Rd	0.4	9.23	0.27	A		0.4	10.43	0.29	B	
3 - Quarr Hill	2.2	10.73	0.68	B		47.9	140.76	1.07	F	
4 - Church Rd	0.2	15.95	0.16	C		0.5	68.31	0.37	F	

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of Av. delay per arriving vehicle. Res Cap indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	19/12/2016
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	WYG\philip.eveleigh
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Av. delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Mini-roundabout model	Calculate Q Percentiles	Calculate residual capacity	Residual capacity criteria type	RFC Threshold	Av. Delay threshold (s)	Q threshold (PCU)
JUNCTIONS 9		✓	Delay	0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2017	AM	ONE HOUR	07:45	09:15	15
D2	2017	PM	ONE HOUR	16:45	18:15	15
D3	2034	AM	ONE HOUR	07:45	09:15	15
D4	2034	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2017, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 1 and 3 have 88% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout	1, 2, 3, 4	9.28	A

Junction Network Options

Driving side	Lighting	Road surface	In London	Res Cap (%)	First arm reaching threshold
Left	Normal/unknown	Normal/unknown		39	1 - Binstead Hill

Arms

Arms

Arm	Name	Description
1	Binstead Hill	
2	Newnham Rd	
3	Quarr Hill	
4	Church Rd	

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1 - Binstead Hill	3.00	3.00	3.50	6.4	15.00	9.61	0.0	
2 - Newnham Rd	4.30	4.30	6.64	0.2	11.00	10.00	0.0	✓
3 - Quarr Hill	3.30	3.30	4.70	3.0	17.00	14.00	0.0	✓
4 - Church Rd	2.14	2.13	4.11	1.6	6.54	4.12	0.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Binstead Hill	0.607	928
2 - Newnham Rd	0.533	901
3 - Quarr Hill	0.527	1123
4 - Church Rd	0.572	720

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2017	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
1 - Binstead Hill		✓	516	100.000
2 - Newnham Rd		✓	108	100.000
3 - Quarr Hill		✓	549	100.000
4 - Church Rd		✓	32	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Binstead Hill	2 - Newnham Rd	3 - Quarr Hill	4 - Church Rd
From	1 - Binstead Hill	1	25	486	4
	2 - Newnham Rd	41	0	63	4
	3 - Quarr Hill	515	28	0	6
	4 - Church Rd	14	6	12	0

Vehicle Mix

HV %s

		To			
		1 - Binstead Hill	2 - Newnham Rd	3 - Quarr Hill	4 - Church Rd
From	1 - Binstead Hill	0	4	3	0
	2 - Newnham Rd	0	0	2	0
	3 - Quarr Hill	4	7	0	0
	4 - Church Rd	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
1 - Binstead Hill	0.63	11.25	1.7	B
2 - Newnham Rd	0.20	7.49	0.2	A
3 - Quarr Hill	0.55	7.66	1.3	A
4 - Church Rd	0.10	11.38	0.1	B

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	388	35	907	0.428	385	0.8	7.065	A
2 - Newnham Rd	81	376	700	0.116	81	0.1	5.874	A
3 - Quarr Hill	413	37	1103	0.375	411	0.6	5.393	A
4 - Church Rd	24	438	470	0.052	24	0.1	8.075	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	464	41	903	0.514	463	1.1	8.394	A
2 - Newnham Rd	97	451	660	0.147	97	0.2	6.465	A
3 - Quarr Hill	494	45	1099	0.449	493	0.8	6.169	A
4 - Church Rd	29	525	420	0.069	29	0.1	9.206	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	568	51	898	0.633	566	1.7	11.080	B
2 - Newnham Rd	119	551	607	0.196	119	0.2	7.458	A
3 - Quarr Hill	604	55	1094	0.553	603	1.3	7.604	A
4 - Church Rd	35	642	353	0.101	35	0.1	11.340	B

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	568	51	897	0.633	568	1.7	11.248	B
2 - Newnham Rd	119	554	605	0.196	119	0.2	7.487	A
3 - Quarr Hill	604	55	1094	0.553	604	1.3	7.656	A
4 - Church Rd	35	644	352	0.101	35	0.1	11.385	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	464	42	903	0.514	466	1.1	8.546	A
2 - Newnham Rd	97	455	658	0.148	97	0.2	6.500	A
3 - Quarr Hill	494	45	1099	0.449	495	0.9	6.224	A
4 - Church Rd	29	528	418	0.069	29	0.1	9.254	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	388	35	907	0.428	390	0.8	7.186	A
2 - Newnham Rd	81	380	698	0.117	81	0.1	5.911	A
3 - Quarr Hill	413	38	1103	0.375	414	0.6	5.448	A
4 - Church Rd	24	441	468	0.052	24	0.1	8.122	A

2017, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 1 and 3 have 91% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout	1, 2, 3, 4	19.89	C

Junction Network Options

Driving side	Lighting	Road surface	In London	Res Cap (%)	First arm reaching threshold
Left	Normal/unknown	Normal/unknown		6	3 - Quarr Hill

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2017	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
1 - Binstead Hill		✓	599	100.000
2 - Newnham Rd		✓	108	100.000
3 - Quarr Hill		✓	846	100.000
4 - Church Rd		✓	23	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Binstead Hill	2 - Newnham Rd	3 - Quarr Hill	4 - Church Rd
From	1 - Binstead Hill	0	41	551	7
	2 - Newnham Rd	54	0	44	9
	3 - Quarr Hill	767	61	3	15
	4 - Church Rd	8	5	10	0

Vehicle Mix

HV %s

		To			
		1 - Binstead Hill	2 - Newnham Rd	3 - Quarr Hill	4 - Church Rd
From	1 - Binstead Hill	0	2	0	0
	2 - Newnham Rd	0	0	0	0
	3 - Quarr Hill	1	9	50	0
	4 - Church Rd	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
1 - Binstead Hill	0.75	16.57	2.9	C
2 - Newnham Rd	0.21	8.06	0.3	A
3 - Quarr Hill	0.86	23.56	5.8	C
4 - Church Rd	0.16	26.18	0.2	D

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	451	59	892	0.505	447	1.0	8.020	A
2 - Newnham Rd	81	426	673	0.121	81	0.1	6.070	A
3 - Quarr Hill	637	53	1095	0.582	632	1.4	7.806	A
4 - Church Rd	17	661	342	0.051	17	0.1	11.084	B

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	538	71	885	0.608	536	1.5	10.268	B
2 - Newnham Rd	97	512	628	0.154	97	0.2	6.778	A
3 - Quarr Hill	761	63	1090	0.698	757	2.3	10.895	B
4 - Church Rd	21	793	267	0.078	21	0.1	14.638	B

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	659	86	876	0.753	654	2.9	15.846	C
2 - Newnham Rd	119	624	568	0.209	118	0.3	8.002	A
3 - Quarr Hill	932	77	1082	0.861	919	5.4	20.978	C
4 - Church Rd	26	963	169	0.151	25	0.2	24.923	C

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	659	88	875	0.753	659	2.9	16.572	C
2 - Newnham Rd	119	629	565	0.210	119	0.3	8.059	A
3 - Quarr Hill	932	78	1082	0.861	930	5.8	23.564	C
4 - Church Rd	26	974	163	0.157	26	0.2	26.182	D

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	538	73	884	0.609	544	1.6	10.746	B
2 - Newnham Rd	97	519	624	0.155	97	0.2	6.841	A
3 - Quarr Hill	761	64	1089	0.698	774	2.4	12.067	B
4 - Church Rd	21	810	257	0.081	21	0.1	15.297	C

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	451	60	892	0.505	453	1.0	8.258	A
2 - Newnham Rd	81	432	670	0.121	81	0.1	6.116	A
3 - Quarr Hill	637	53	1095	0.582	641	1.4	8.138	A
4 - Church Rd	17	671	336	0.052	18	0.1	11.303	B

2034, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 1 and 3 have 88% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout	1, 2, 3, 4	14.14	B

Junction Network Options

Driving side	Lighting	Road surface	In London	Res Cap (%)	First arm reaching threshold
Left	Normal/unknown	Normal/unknown		14	1 - Binstead Hill

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2034	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
1 - Binstead Hill		✓	630	100.000
2 - Newnham Rd		✓	132	100.000
3 - Quarr Hill		✓	671	100.000
4 - Church Rd		✓	40	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Binstead Hill	2 - Newnham Rd	3 - Quarr Hill	4 - Church Rd
From	1 - Binstead Hill	1	30	594	5
	2 - Newnham Rd	50	0	77	5
	3 - Quarr Hill	630	34	0	7
	4 - Church Rd	17	8	15	0

Vehicle Mix

HV %s

		To			
		1 - Binstead Hill	2 - Newnham Rd	3 - Quarr Hill	4 - Church Rd
From	1 - Binstead Hill	0	4	3	0
	2 - Newnham Rd	0	0	2	0
	3 - Quarr Hill	4	7	0	0
	4 - Church Rd	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
1 - Binstead Hill	0.78	18.68	3.5	C
2 - Newnham Rd	0.27	9.23	0.4	A
3 - Quarr Hill	0.68	10.73	2.2	B
4 - Church Rd	0.16	15.95	0.2	C

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	474	43	902	0.526	470	1.1	8.488	A
2 - Newnham Rd	99	459	656	0.152	99	0.2	6.527	A
3 - Quarr Hill	505	46	1099	0.460	502	0.9	6.240	A
4 - Church Rd	30	535	414	0.073	30	0.1	9.355	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	566	51	897	0.631	564	1.7	11.046	B
2 - Newnham Rd	119	551	607	0.196	118	0.2	7.451	A
3 - Quarr Hill	603	55	1094	0.551	602	1.3	7.586	A
4 - Church Rd	36	641	353	0.102	36	0.1	11.335	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	694	62	890	0.779	687	3.3	17.674	C
2 - Newnham Rd	145	671	543	0.268	145	0.4	9.140	A
3 - Quarr Hill	739	67	1088	0.679	735	2.1	10.531	B
4 - Church Rd	44	784	272	0.162	44	0.2	15.760	C

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	694	63	890	0.779	693	3.5	18.684	C
2 - Newnham Rd	145	677	540	0.269	145	0.4	9.234	A
3 - Quarr Hill	739	67	1087	0.679	739	2.2	10.730	B
4 - Church Rd	44	787	270	0.163	44	0.2	15.945	C

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	566	52	897	0.631	573	1.8	11.668	B
2 - Newnham Rd	119	559	602	0.197	119	0.3	7.547	A
3 - Quarr Hill	603	55	1094	0.551	607	1.3	7.746	A
4 - Church Rd	36	646	350	0.103	36	0.1	11.476	B

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	474	43	902	0.526	477	1.2	8.776	A
2 - Newnham Rd	99	466	652	0.152	100	0.2	6.592	A
3 - Quarr Hill	505	46	1099	0.460	507	0.9	6.351	A
4 - Church Rd	30	540	411	0.073	30	0.1	9.456	A

2034, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 1 and 3 have 91% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Mini-roundabout	1, 2, 3, 4	96.64	F

Junction Network Options

Driving side	Lighting	Road surface	In London	Res Cap (%)	First arm reaching threshold
Left	Normal/unknown	Normal/unknown		-14	3 - Quarr Hill

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2034	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
1 - Binstead Hill		✓	741	100.000
2 - Newnham Rd		✓	131	100.000
3 - Quarr Hill		✓	1032	100.000
4 - Church Rd		✓	28	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Binstead Hill	2 - Newnham Rd	3 - Quarr Hill	4 - Church Rd
From	1 - Binstead Hill	0	50	671	20
	2 - Newnham Rd	66	0	54	11
	3 - Quarr Hill	935	75	4	18
	4 - Church Rd	10	6	12	0

Vehicle Mix

HV %s

		To			
		1 - Binstead Hill	2 - Newnham Rd	3 - Quarr Hill	4 - Church Rd
From	1 - Binstead Hill	0	2	0	0
	2 - Newnham Rd	0	0	0	0
	3 - Quarr Hill	1	9	50	0
	4 - Church Rd	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
1 - Binstead Hill	0.94	51.52	10.9	F
2 - Newnham Rd	0.29	10.43	0.4	B
3 - Quarr Hill	1.07	140.76	47.9	F
4 - Church Rd	0.37	68.31	0.5	F

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	558	72	885	0.631	551	1.7	10.617	B
2 - Newnham Rd	99	526	620	0.159	98	0.2	6.884	A
3 - Quarr Hill	777	72	1085	0.716	767	2.5	11.204	B
4 - Church Rd	21	803	261	0.081	21	0.1	14.984	B

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	666	86	876	0.760	661	3.0	16.350	C
2 - Newnham Rd	118	631	564	0.209	117	0.3	8.052	A
3 - Quarr Hill	928	87	1077	0.861	916	5.4	21.229	C
4 - Church Rd	25	959	171	0.147	25	0.2	24.516	C

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	816	99	868	0.940	791	9.1	38.197	E
2 - Newnham Rd	144	755	498	0.290	144	0.4	10.143	B
3 - Quarr Hill	1136	106	1067	1.065	1043	28.8	72.259	F
4 - Church Rd	31	1097	92	0.333	30	0.5	56.390	F

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	816	101	867	0.941	808	10.9	51.518	F
2 - Newnham Rd	144	771	489	0.295	144	0.4	10.428	B
3 - Quarr Hill	1136	107	1067	1.065	1060	47.9	140.756	F
4 - Church Rd	31	1114	83	0.373	30	0.5	68.315	F

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	666	97	869	0.766	696	3.6	23.545	C
2 - Newnham Rd	118	664	547	0.215	118	0.3	8.417	A
3 - Quarr Hill	928	88	1076	0.862	1054	16.3	114.689	F
4 - Church Rd	25	1095	93	0.269	26	0.4	53.663	F

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Binstead Hill	558	78	881	0.633	565	1.8	11.650	B
2 - Newnham Rd	99	540	613	0.161	99	0.2	7.013	A
3 - Quarr Hill	777	73	1084	0.717	831	2.7	17.386	C
4 - Church Rd	21	867	224	0.094	22	0.1	17.919	C

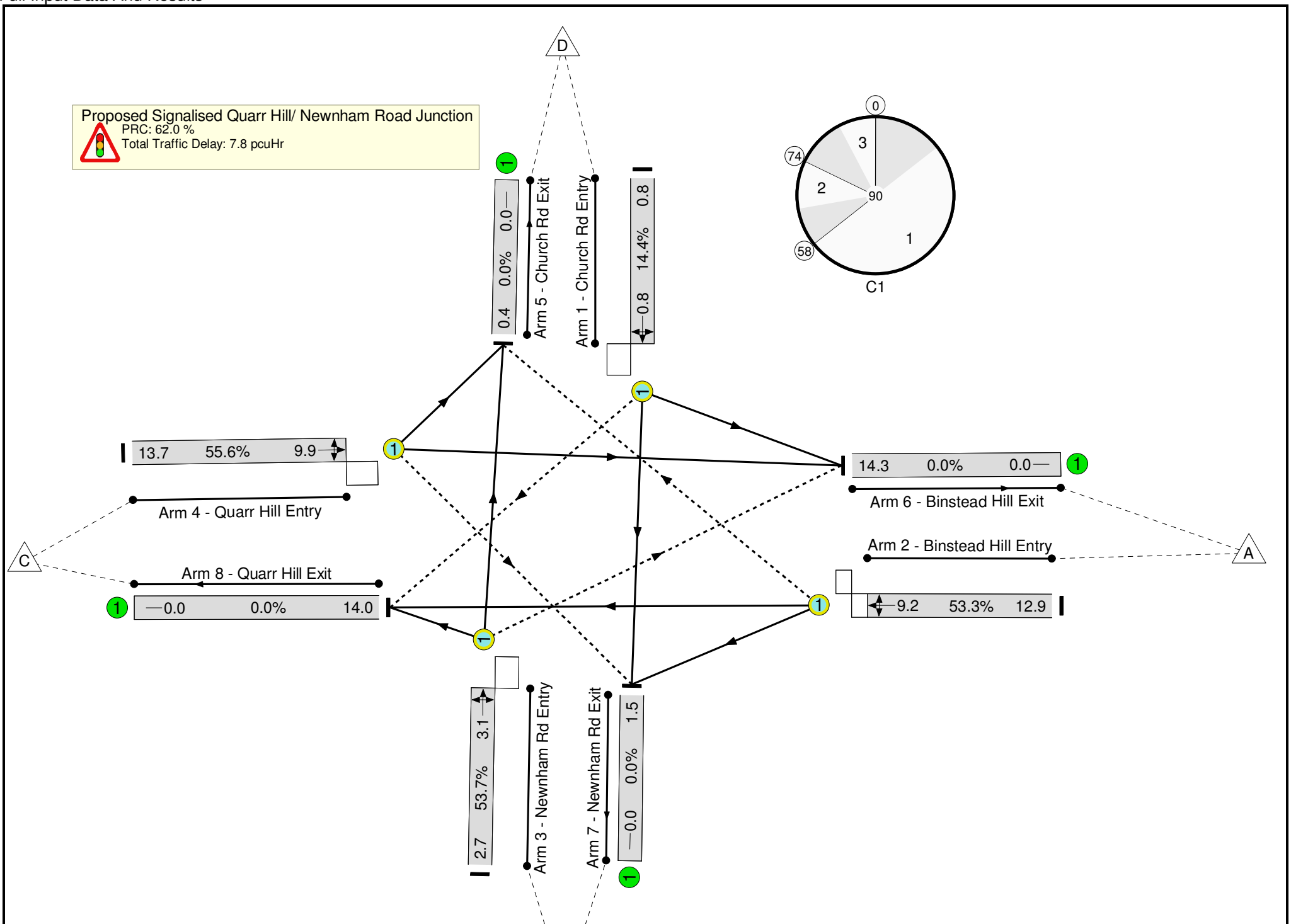
Full Input Data And Results

User and Project Details

Project:	**A090129-60**
Title:	**HCA Tender IoW**
Location:	Hunnyhill/Hunnycross Way/St James St/Vicarage Walk
Additional detail:	
File name:	Junction 9 - Quarr Hill Newnham Road.lsg3x
Author:	
Company:	
Address:	

Full Input Data And Results
Scenario 1: '2017 AM NCPL1' (FG1: '2017 AM', Plan 1: 'Network Control Plan 1')
Network Layout Diagram

Full Input Data And Results



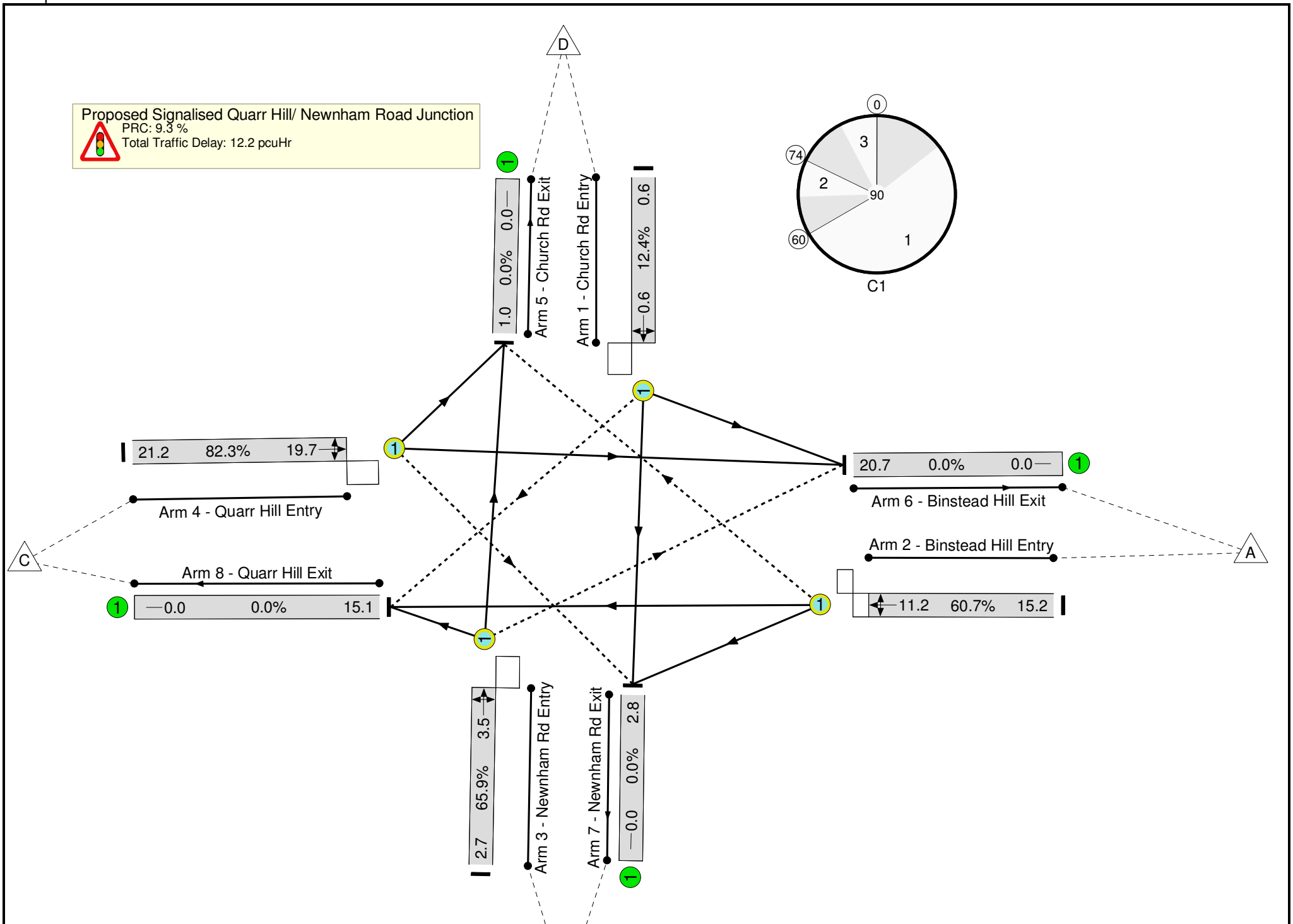
Network Results

Item	Lane Description	Lane Type	Controller Stream	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Bonus Green (s)	Demand Flow (pcu)	Max Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: HCA Tender IoW	-	-	**N/A**	-		-	-	-	-	-	-	**55.6%**	-	-
Proposed Signalised Quarr Hill/ Newnham Road Junction	-	-	**N/A**	-		-	-	-	-	-	-	**55.6%**	-	-
1/1	Church Rd Entry Left Ahead Right	O	N/A	D		11	-	-	32	1661	221	14.4%	45.2	0.8
2/1	Binstead Hill Entry Right Left Ahead	O	N/A	A		45	-	-	516	1894	968	53.3%	18.8	9.2
3/1	Newnham Rd Entry Ahead Right Left	O	N/A	B		9	-	-	108	1811	201	53.7%	56.9	3.1
4/1	Quarr Hill Entry Left Ahead Right	O	N/A	C		45	-	-	549	1933	988	55.6%	19.3	9.9
5/1	Church Rd Exit	U	N/A	-		-	-	-	14	Inf	Inf	0.0%	0.0	0.0
6/1	Binstead Hill Exit	U	N/A	-		-	-	-	570	Inf	Inf	0.0%	0.0	0.0
7/1	Newnham Rd Exit	U	N/A	-		-	-	-	60	Inf	Inf	0.0%	0.0	0.0
8/1	Quarr Hill Exit	U	N/A	-		-	-	-	561	Inf	Inf	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): 62.0 Total Delay for Signalled Lanes (pcuHr): 7.75 Cycle Time (s): 90
PRC Over All Lanes (%): 62.0 Total Delay Over All Lanes(pcuHr): 7.75

Full Input Data And Results
Scenario 2: '2017 PM NCPL1' (FG2: '2017 PM', Plan 1: 'Network Control Plan 1')
Network Layout Diagram

Full Input Data And Results



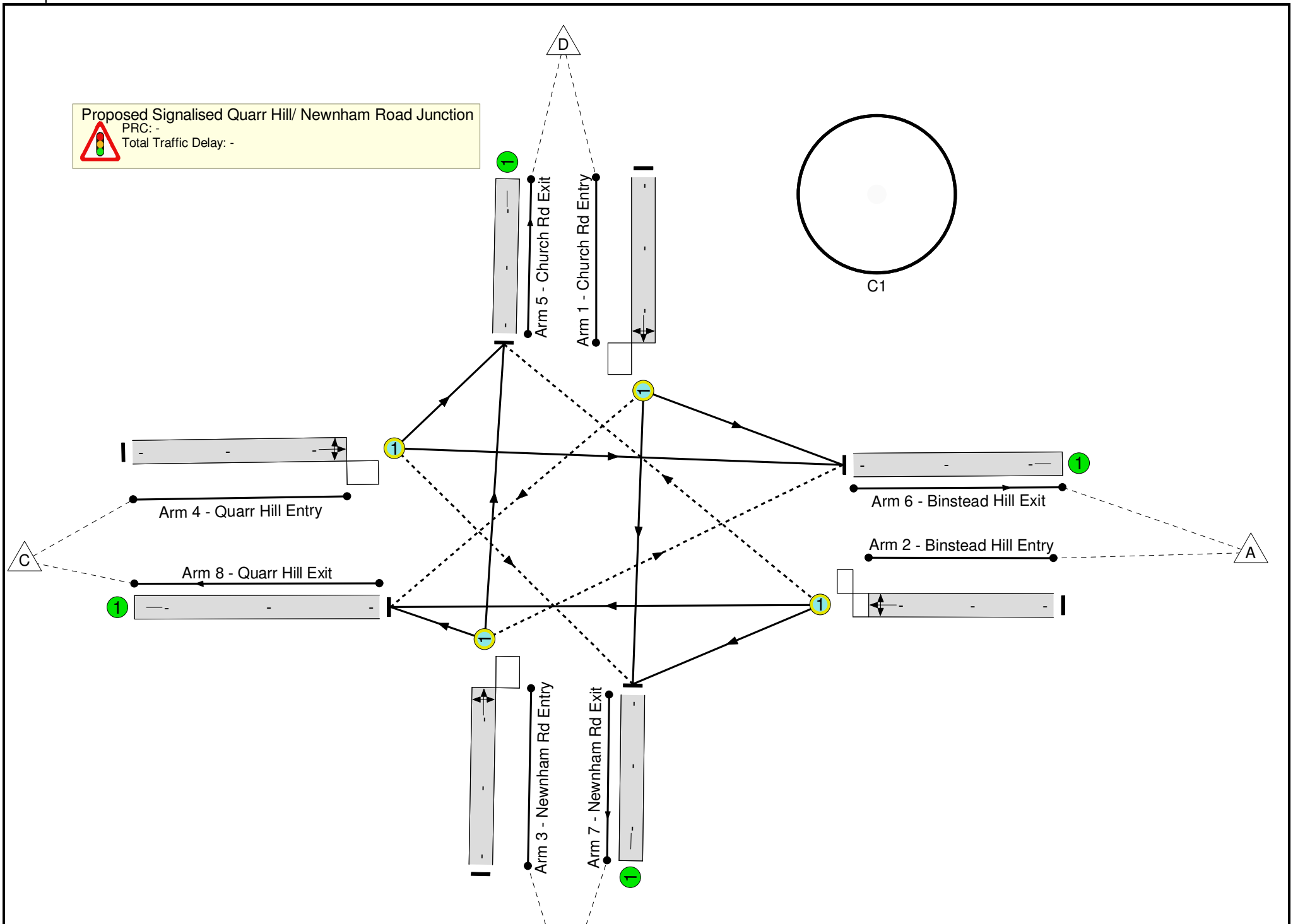
Network Results

Item	Lane Description	Lane Type	Controller Stream	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Bonus Green (s)	Demand Flow (pcu)	Max Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: HCA Tender IoW	-	-	**N/A**	-		-	-	-	-	-	-	**82.3%**	-	-
Proposed Signalised Quarr Hill/ Newnham Road Junction	-	-	**N/A**	-		-	-	-	-	-	-	**82.3%**	-	-
1/1	Church Rd Entry Left Ahead Right	O	N/A	D		9	-	-	23	1675	186	12.4%	48.0	0.6
2/1	Binstead Hill Entry Right Left Ahead	O	N/A	A		47	-	-	608	1881	1002	60.7%	19.5	11.2
3/1	Newnham Rd Entry Ahead Right Left	O	N/A	B		7	-	-	107	1827	162	65.9%	71.1	3.5
4/1	Quarr Hill Entry Left Ahead Right	O	N/A	C		47	-	-	846	1927	1028	82.3%	27.5	19.7
5/1	Church Rd Exit	U	N/A	-		-	-	-	40	Inf	Inf	0.0%	0.0	0.0
6/1	Binstead Hill Exit	U	N/A	-		-	-	-	829	Inf	Inf	0.0%	0.0	0.0
7/1	Newnham Rd Exit	U	N/A	-		-	-	-	110	Inf	Inf	0.0%	0.0	0.0
8/1	Quarr Hill Exit	U	N/A	-		-	-	-	605	Inf	Inf	0.0%	0.0	0.0

C1 PRC for Signalled Lanes (%): 9.3 Total Delay for Signalled Lanes (pcuHr): 12.18 Cycle Time (s): 90
PRC Over All Lanes (%): 9.3 Total Delay Over All Lanes(pcuHr): 12.18

Full Input Data And Results
Scenario 7: '2017 AM NCPL2' (FG1: '2017 AM', Plan 2: 'Network Control Plan 2')
Network Layout Diagram

Full Input Data And Results



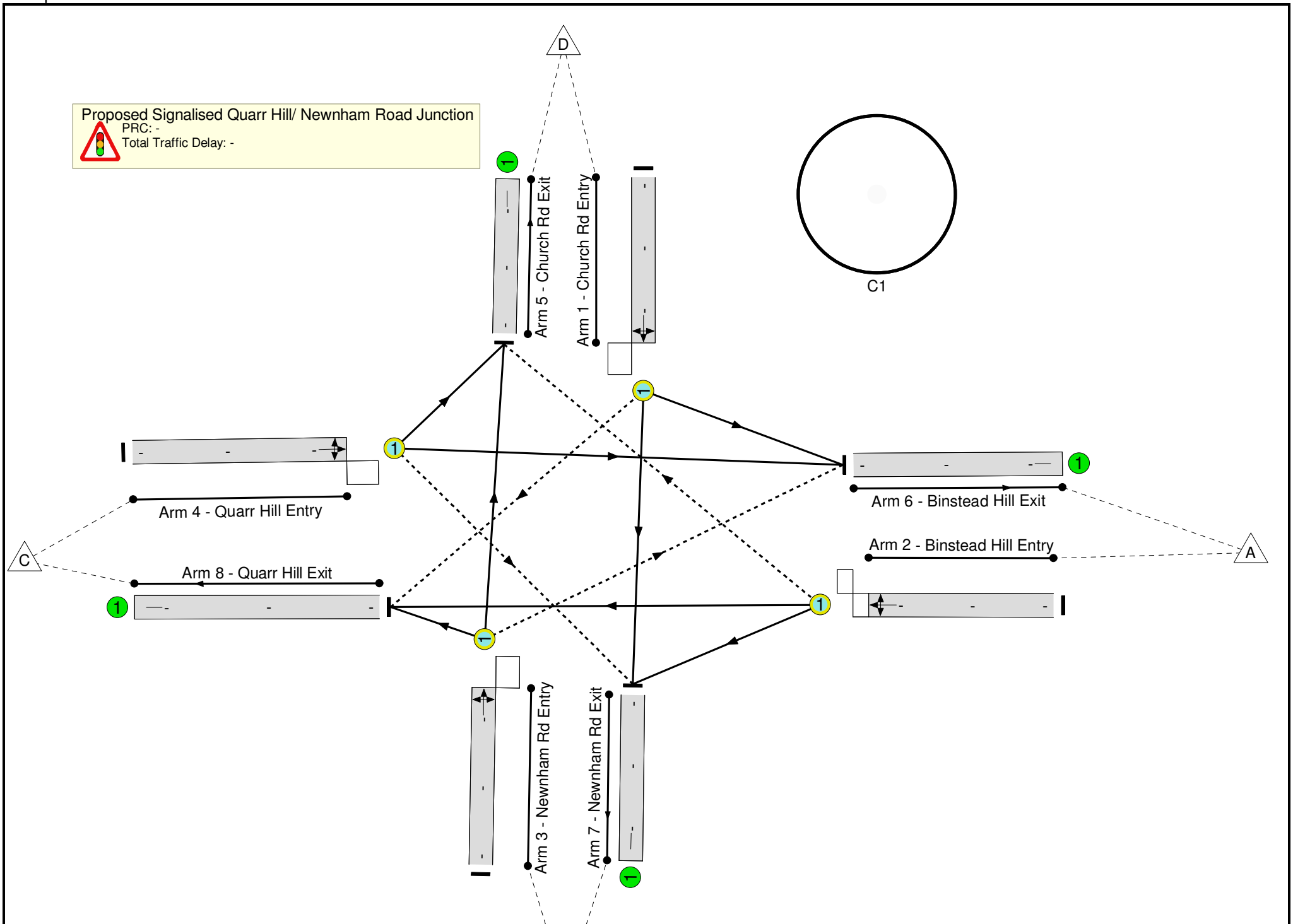
Network Results

Item	Lane Description	Lane Type	Controller Stream	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Bonus Green (s)	Demand Flow (pcu)	Max Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: HCA Tender IoW	**-**	**-**	**N/A**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**0.0%**	**-**	**-**
Proposed Signalised Quarr Hill/ Newnham Road Junction	**-**	**-**	**N/A**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**0.0%**	**-**	**-**
1/1	Church Rd Entry Left Ahead Right	O	N/A	D		-	-	-	32	1661	-	-	-	-
2/1	Binstead Hill Entry Right Left Ahead	O	N/A	A		-	-	-	516	1894	-	-	-	-
3/1	Newnham Rd Entry Ahead Right Left	O	N/A	B		-	-	-	108	1811	-	-	-	-
4/1	Quarr Hill Entry Left Ahead Right	O	N/A	C		-	-	-	549	1933	-	-	-	-
5/1	Church Rd Exit	U	N/A	-		-	-	-	14	Inf	Inf	-	-	-
6/1	Binstead Hill Exit	U	N/A	-		-	-	-	570	Inf	Inf	-	-	-
7/1	Newnham Rd Exit	U	N/A	-		-	-	-	60	Inf	Inf	-	-	-
8/1	Quarr Hill Exit	U	N/A	-		-	-	-	561	Inf	Inf	-	-	-

C1 PRC for Signalled Lanes (%): 0.0 Total Delay for Signalled Lanes (pcuHr): 0.00 Cycle Time (s): 79
PRC Over All Lanes (%): 0.0 Total Delay Over All Lanes(pcuHr): 0.00

Full Input Data And Results
Scenario 8: '2017 AM NCPL2' (FG2: '2017 PM', Plan 2: 'Network Control Plan 2')
Network Layout Diagram

Full Input Data And Results



Full Input Data And Results

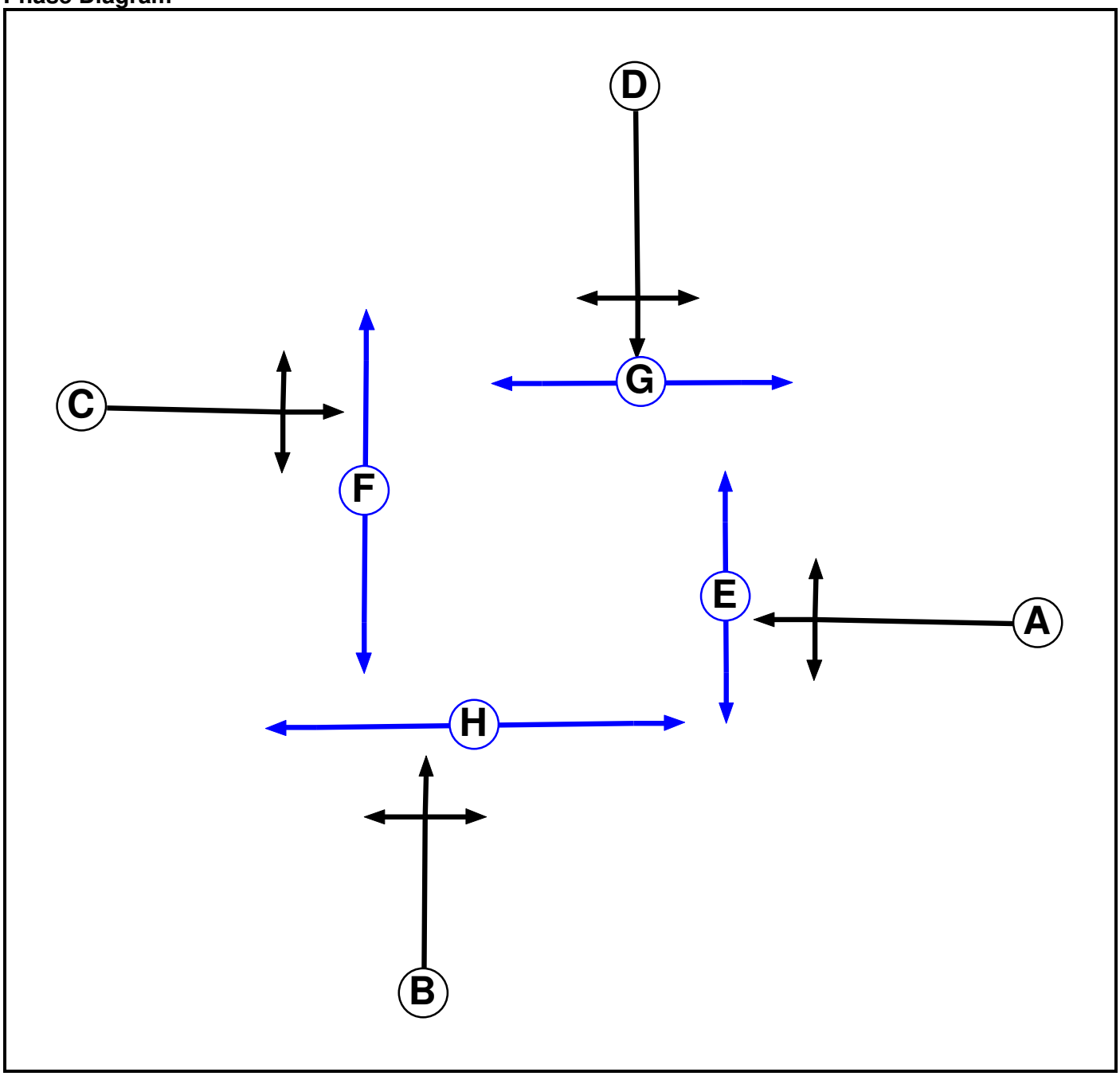
Network Results

Item	Lane Description	Lane Type	Controller Stream	Full Phase	Arrow Phase	Total Green (s)	Arrow Green (s)	Bonus Green (s)	Demand Flow (pcu)	Max Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: HCA Tender IoW	**-**	**-**	**N/A**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**0.0%**	**-**	**-**
Proposed Signalised Quarr Hill/ Newnham Road Junction	**-**	**-**	**N/A**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**0.0%**	**-**	**-**
1/1	Church Rd Entry Left Ahead Right	O	N/A	D		-	-	-	23	1675	-	-	-	-
2/1	Binstead Hill Entry Right Left Ahead	O	N/A	A		-	-	-	608	1881	-	-	-	-
3/1	Newnham Rd Entry Ahead Right Left	O	N/A	B		-	-	-	107	1827	-	-	-	-
4/1	Quarr Hill Entry Left Ahead Right	O	N/A	C		-	-	-	846	1927	-	-	-	-
5/1	Church Rd Exit	U	N/A	-		-	-	-	40	Inf	Inf	-	-	-
6/1	Binstead Hill Exit	U	N/A	-		-	-	-	829	Inf	Inf	-	-	-
7/1	Newnham Rd Exit	U	N/A	-		-	-	-	110	Inf	Inf	-	-	-
8/1	Quarr Hill Exit	U	N/A	-		-	-	-	605	Inf	Inf	-	-	-

C1 PRC for Signalled Lanes (%): 0.0 Total Delay for Signalled Lanes (pcuHr): 0.00 Cycle Time (s): 79
PRC Over All Lanes (%): 0.0 Total Delay Over All Lanes(pcuHr): 0.00

Full Input Data And Results

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Pedestrian		7	7
F	Pedestrian		7	7
G	Pedestrian		7	7
H	Pedestrian		7	7

Full Input Data And Results

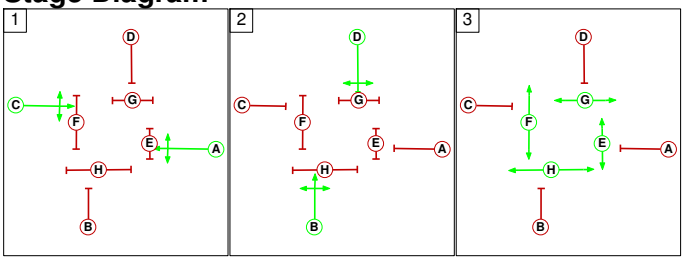
Phase Intergreens Matrix

Terminating Phase	Starting Phase								
		A	B	C	D	E	F	G	H
	A		7	-	5	5	9	7	8
	B	7		5	-	9	6	9	5
	C	-	5		5	8	5	7	7
	D	5	-	5		7	9	5	8
	E	7	7	7	7		-	-	-
	F	11	11	11	11	-		-	-
	G	6	6	6	6	-	-		-
	H	13	13	13	13	-	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	A C
2	B D
3	E F G H

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

From Stage	To Stage		
	1	2	3
1		7	9
2	7		9
3	13	13	

Give-Way Lane Input Data

Junction: Proposed Signalised Quarr Hill/ Newnham Road Junction

Lane	Movement	Max Flow when Giving Way (PCU/Hr)	Min Flow when Giving Way (PCU/Hr)	Opposing Lane	Opp. Lane Coeff.	Opp. Mvmnts.	Right Turn Storage (PCU)	Non-Blocking Storage (PCU)	RTF	Right Turn Move up (s)	Max Turns in Intergreen (PCU)
1/1 (Church Rd Entry)	8/1 (Right)	1439	0	3/1	1.09	To 5/1 (Ahead) To 8/1 (Left)	2.00	2.00	0.50	2	2.00
2/1 (Binstead Hill Entry)	5/1 (Right)	1439	0	4/1	1.09	To 5/1 (Left) To 6/1 (Ahead)	2.00	1.00	0.50	2	2.00
3/1 (Newnham Rd Entry)	6/1 (Right)	1439	0	1/1	1.09	To 6/1 (Left) To 7/1 (Ahead)	2.00	2.00	0.50	2	2.00
4/1 (Quarr Hill Entry)	7/1 (Right)	1439	0	2/1	1.09	To 7/1 (Left) To 8/1 (Ahead)	2.00	2.00	0.50	2	2.00

Full Input Data And Results

Lane Input Data

Junction: Proposed Signalised Quarr Hill/ Newnham Road Junction

Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Church Rd Entry)	O	D	2	3	60.0	Geom	-	2.60	0.00	Y	Arm 6 Left	8.00
											Arm 7 Ahead	Inf
											Arm 8 Right	12.00
2/1 (Binstead Hill Entry)	O	A	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 5 Right	7.00
											Arm 7 Left	8.00
											Arm 8 Ahead	Inf
3/1 (Newnham Rd Entry)	O	B	2	3	60.0	Geom	-	4.40	0.00	Y	Arm 5 Ahead	Inf
											Arm 6 Right	12.00
											Arm 8 Left	10.00
4/1 (Quarr Hill Entry)	O	C	2	3	60.0	Geom	-	3.30	0.00	Y	Arm 5 Left	45.00
											Arm 6 Ahead	Inf
											Arm 7 Right	13.00
5/1 (Church Rd Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (Binstead Hill Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1 (Newnham Rd Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1 (Quarr Hill Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2017 AM'	08:00	09:00	01:00	
2: '2017 PM'	17:00	18:00	01:00	
3: '20XX - AM - Base'	08:00	09:00	01:00	
4: '20XX - PM - Base'	17:00	18:00	01:00	
5: '2034- AM - DS'	08:00	09:00	01:00	
6: '2034- PM - DS'	17:00	18:00	01:00	

Full Input Data And Results

Full Input Data And Results

Scenario 5: '2034 - AM - DS' (FG5: '2034- AM - DS', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: HCA Tender IoW	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**67.9%**
Proposed Signalised Quarr Hill/ Newnham Road Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**67.9%**
1/1	Church Rd Entry Left Ahead Right	O	N/A	N/A	D		1	11	-	40	1664	222	18.0%
2/1	Binstead Hill Entry Right Left Ahead	O	N/A	N/A	A		1	45	-	629	1895	969	64.9%
3/1	Newnham Rd Entry Ahead Right Left	O	N/A	N/A	B		1	9	-	132	1811	201	65.6%
4/1	Quarr Hill Entry Left Ahead Right	O	N/A	N/A	C		1	45	-	671	1933	988	67.9%
5/1	Church Rd Exit	U	N/A	N/A	-		-	-	-	17	Inf	Inf	0.0%
6/1	Binstead Hill Exit	U	N/A	N/A	-		-	-	-	697	Inf	Inf	0.0%
7/1	Newnham Rd Exit	U	N/A	N/A	-		-	-	-	72	Inf	Inf	0.0%
8/1	Quarr Hill Exit	U	N/A	N/A	-		-	-	-	686	Inf	Inf	0.0%

Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: HCA Tender IoW	**-**	**-**	**104**	**0**	**0**	**7.7**	**3.0**	**0.1**	**10.8**	**-**	**-**	**-**	**-**
Proposed Signalised Quarr Hill/ Newnham Road Junction	**-**	**-**	**104**	**0**	**0**	**7.7**	**3.0**	**0.1**	**10.8**	**-**	**-**	**-**	**-**
1/1	40	40	15	0	0	0.4	0.1	0.0	0.5	45.9	0.9	0.1	1.0
2/1	629	629	5	0	0	2.8	0.9	0.0	3.7	21.4	11.4	0.9	12.3
3/1	132	132	50	0	0	1.4	0.9	0.0	2.3	63.7	3.2	0.9	4.1
4/1	671	671	34	0	0	3.1	1.1	0.1	4.2	22.5	12.5	1.1	13.5
5/1	17	17	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	697	697	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	72	72	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	686	686	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 32.5 Total Delay for Signalled Lanes (pcuHr): 10.78 Cycle Time (s): 90
PRC Over All Lanes (%): 32.5 Total Delay Over All Lanes(pcuHr): 10.78

Full Input Data And Results

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	30	594	5	629
	B	50	0	77	5	132
	C	630	34	0	7	671
	D	17	8	15	0	40
	Tot.	697	72	686	17	1472

Traffic Lane Flows

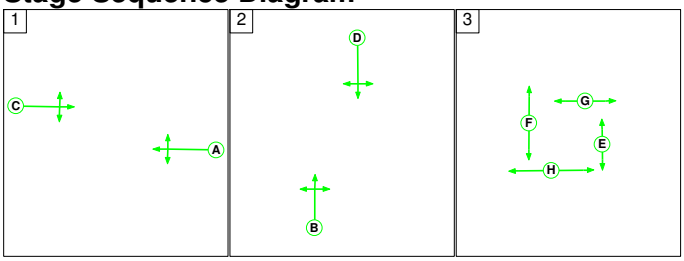
Lane	Scenario 5: 2034 - AM - DS
Junction: Proposed Signalised Quarr Hill/ Newnham Road Junction	
1/1	40
2/1	629
3/1	132
4/1	671
5/1	17
6/1	697
7/1	72
8/1	686

Full Input Data And Results

Lane Saturation Flows

Junction: Proposed Signalised Quarr Hill/ Newnham Road Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Church Rd Entry)	2.60	0.00	Y	Arm 6 Left	8.00	42.5 %	1664	1664
				Arm 7 Ahead	Inf	20.0 %		
				Arm 8 Right	12.00	37.5 %		
2/1 (Binstead Hill Entry)	3.00	0.00	Y	Arm 5 Right	7.00	0.8 %	1895	1895
				Arm 7 Left	8.00	4.8 %		
				Arm 8 Ahead	Inf	94.4 %		
3/1 (Newnham Rd Entry)	4.40	0.00	Y	Arm 5 Ahead	Inf	3.8 %	1811	1811
				Arm 6 Right	12.00	37.9 %		
				Arm 8 Left	10.00	58.3 %		
4/1 (Quarr Hill Entry)	3.30	0.00	Y	Arm 5 Left	45.00	1.0 %	1933	1933
				Arm 6 Ahead	Inf	93.9 %		
				Arm 7 Right	13.00	5.1 %		
5/1 (Church Rd Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Binstead Hill Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (Newnham Rd Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
8/1 (Quarr Hill Exit Lane 1)	Infinite Saturation Flow						Inf	Inf

Stage Sequence Diagram

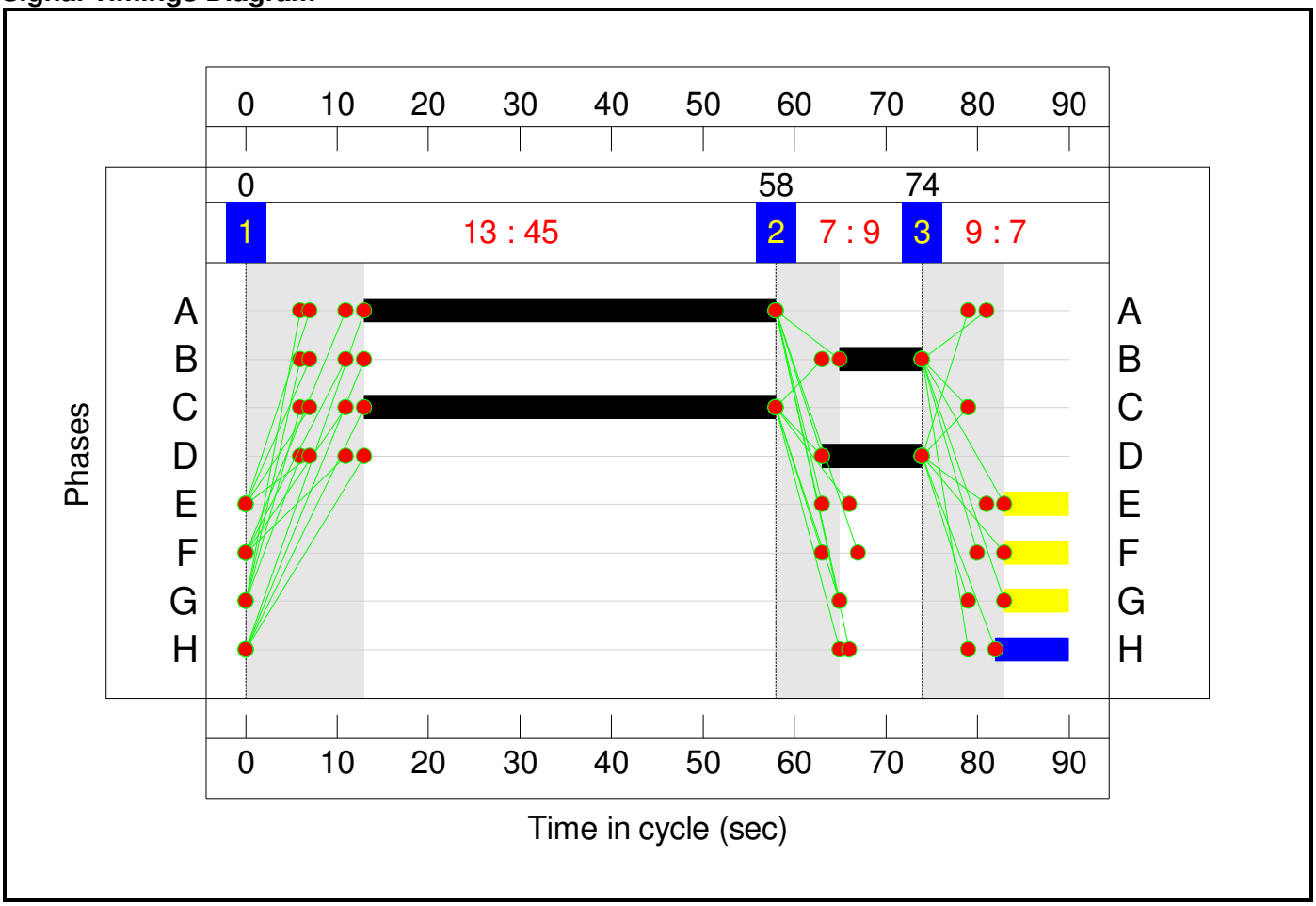


Stage Timings

Stage	1	2	3
Duration	45	9	7
Change Point	0	58	74

Full Input Data And Results

Signal Timings Diagram



Full Input Data And Results

Scenario 6: '2034 - PM - DS (105 seconds)' (FG6: '2034- PM - DS', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: HCA Tender IoW	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**90.3%**
Proposed Signalised Quarr Hill/ Newnham Road Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**90.3%**
1/1	Church Rd Entry Left Ahead Right	O	N/A	N/A	D		1	10	-	28	1673	175	16.0%
2/1	Binstead Hill Entry Right Left Ahead	O	N/A	N/A	A		1	61	-	741	1880	1098	67.5%
3/1	Newnham Rd Entry Ahead Right Left	O	N/A	N/A	B		1	8	-	131	1827	157	83.7%
4/1	Quarr Hill Entry Left Ahead Right	O	N/A	N/A	C		1	61	-	1028	1928	1138	90.3%
5/1	Church Rd Exit	U	N/A	N/A	-		-	-	-	49	Inf	Inf	0.0%
6/1	Binstead Hill Exit	U	N/A	N/A	-		-	-	-	1011	Inf	Inf	0.0%
7/1	Newnham Rd Exit	U	N/A	N/A	-		-	-	-	131	Inf	Inf	0.0%
8/1	Quarr Hill Exit	U	N/A	N/A	-		-	-	-	737	Inf	Inf	0.0%

Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: HCA Tender IoW	**-**	**-**	**173**	**0**	**0**	**10.4**	**7.6**	**0.3**	**18.4**	**-**	**-**	**-**	**-**
Proposed Signalised Quarr Hill/ Newnham Road Junction	**-**	**-**	**173**	**0**	**0**	**10.4**	**7.6**	**0.3**	**18.4**	**-**	**-**	**-**	**-**
1/1	28	28	12	0	0	0.3	0.1	0.0	0.4	56.0	0.7	0.1	0.8
2/1	741	741	20	0	0	3.0	1.0	0.2	4.2	20.3	14.4	1.0	15.4
3/1	131	131	66	0	0	1.7	2.2	0.0	3.9	107.3	3.7	2.2	5.9
4/1	1028	1028	75	0	0	5.4	4.3	0.2	9.9	34.5	26.3	4.3	30.6
5/1	49	49	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	1011	1011	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	131	131	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	737	737	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -0.3 Total Delay for Signalled Lanes (pcuHr): 18.38 Cycle Time (s): 105
PRC Over All Lanes (%): -0.3 Total Delay Over All Lanes(pcuHr): 18.38

Full Input Data And Results

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	50	671	20	741
	B	66	0	54	11	131
	C	935	75	0	18	1028
	D	10	6	12	0	28
	Tot.	1011	131	737	49	1928

Traffic Lane Flows

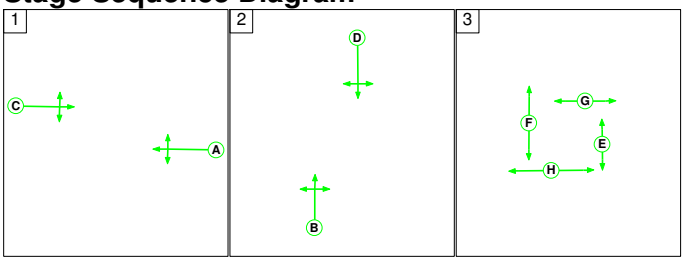
Lane	Scenario 6: 2034 - PM - DS (105 seconds)
Junction: Proposed Signalised Quarr Hill/ Newnham Road Junction	
1/1	28
2/1	741
3/1	131
4/1	1028
5/1	49
6/1	1011
7/1	131
8/1	737

Full Input Data And Results

Lane Saturation Flows

Junction: Proposed Signalised Quarr Hill/ Newnham Road Junction								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Church Rd Entry)	2.60	0.00	Y	Arm 6 Left	8.00	35.7 %	1673	1673
				Arm 7 Ahead	Inf	21.4 %		
				Arm 8 Right	12.00	42.9 %		
2/1 (Binstead Hill Entry)	3.00	0.00	Y	Arm 5 Right	7.00	2.7 %	1880	1880
				Arm 7 Left	8.00	6.7 %		
				Arm 8 Ahead	Inf	90.6 %		
3/1 (Newnham Rd Entry)	4.40	0.00	Y	Arm 5 Ahead	Inf	8.4 %	1827	1827
				Arm 6 Right	12.00	50.4 %		
				Arm 8 Left	10.00	41.2 %		
4/1 (Quarr Hill Entry)	3.30	0.00	Y	Arm 5 Left	45.00	1.8 %	1928	1928
				Arm 6 Ahead	Inf	91.0 %		
				Arm 7 Right	13.00	7.3 %		
5/1 (Church Rd Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Binstead Hill Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (Newnham Rd Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
8/1 (Quarr Hill Exit Lane 1)	Infinite Saturation Flow						Inf	Inf

Stage Sequence Diagram



Stage Timings

Stage	1	2	3
Duration	61	8	7
Change Point	0	74	89

Full Input Data And Results

Signal Timings Diagram