Technical Note

Project: Brockhill East Phase 3

Subject: Dagnell End Road - Junction Design Note

Client:	Persimmon Homes South Midlands	**Version:**	1
Project No:	2809	**Author:**	JW
Date:	16/09/20	**Approved:**	CS

1 Overview

1.1 Introduction

1.1.1 This note presents a revised mitigation scheme design for the A441 / Dagnell End Road junction. The junction has been subject to discussion with Worcestershire County Council (WCC) and Mott MacDonald (MM) since late 2019.

1.2 Background

1.2.1 The proposed development at Brockhill East Phase 3 will result in additional traffic through the A441 / Dagnell End Road junction. It has been agreed through the Transport Assessment (TA) process that the development would result in an impact on capacity of the junction that could be considered as 'severe' and requires mitigation.

1.2.2 The Redditch Infrastructure Delivery Plan (IDP) was published in 2014 and was prepared to accompany the Borough of Redditch Local Plan 4. The document identifies the infrastructure necessary to mitigate the effects of development allocated within the Local Plan, including the development site at Brockhill East Phase 3.

1.2.3 The IDP identifies a mitigation scheme for this junction, described as "*Add additional approach lane on the eastern arm and put on MOVA*", at a cost of £520,000. However, it became apparent that this scheme could not be delivered on land within the adopted highway boundary.

1.2.4 PJA then sought to investigate alternative options to mitigate the impact of the development at the junction.

1.2.5 In December 2019 PJA prepared a technical note presenting two options to improve the junction:

- **Option 1** sought to ban the right turn from Dagnell End Road to the A441, which would provide additional capacity at the junction. This option could be delivered entirely within the extent of adopted highway.
- **Option 2** provides an additional southbound exit lane on the A441, and widened the Dagnell End Road approach to the junction. This option required additional land owned by Redditch Borough Council (RBC)

1.2.6 Both options have been subject to extensive discussions with WCC and MM. Agreement has now been reached between RBC and Persimmon Homes for the purchase of additional land required to implement **Option 2**.

1.2.7 Notwithstanding the conclusions reached by PJA that **Option 1** would provide sufficient highway capacity to mitigate the impact of the development, **Option 2** has been selected as a preferred solution subject to securing of the necessary additional land. This scheme also offers the potential to provide a further benefit in the form of pedestrian crossings, discussed further below.

2 Scheme Design

2.1.1 The design of the Option 2 scheme has been subject to discussion with officers at WCC and MM. Comments received identified departures from standard relating to both the existing and proposed design, and identified an issue relating to the existing uncontrolled pedestrian crossing over Dagnell End Road.

2.1.2 In telephone conversations with WCC, officers also mentioned that there had been previous local requests for a crossing over the A441, but existing constraints had previously prevented this from being delivered.

2.1.3 Although not directly related to the proposed development, providing a crossing over the A441 would offer a local community benefit and support national and local policy objectives of supporting sustainable travel.

2.1.4 Through further development of the design it also became necessary to include a crossing over Dagnell End Road. The decision was therefore made to include staggered pedestrian crossings over both the Dagnell End Road and A441 arms of the junction.

2.1.5 In addition to this, further changes have been made to the design to extend the two-lane approach to the Dagnell End Road entry and improve the A441 southbound alignment.

2.1.6 The revised design is presented within **Appendix A**.

3 Road Safety Audit

3.1.1 The scheme design has been subject to a Stage 1 Road Safety Audit, alongside the proposed works to Weights Lane. A copy of the audit and Designer's Response report is provided by separate cover.

4 Junction Capacity

4.1 Base Model

4.1.1 The base model has previously been reviewed and approved by WCC and MM. For simplicity, three scenarios have been presented within the model:

- 2018 Base
- 2030 Future Year + Committed Development
- 2030 Future Year + Committed + Proposed Development

4.1.2 The models are based on the observed cycle times of 92s (AM peak) and 123s (PM peak). The models previously presented were based upon observed signal timings.

4.1.3 For the purpose of providing a robust comparison with the mitigation scheme, the model has been optimised for PRC. This results in a better theoretical PRC that has been observed on-site, but provides a consistent comparison with the mitigation scheme.

4.1.4 The base model results for each scenario are presented in Table 1, with output reports provided within **Appendix B**.

Table 1: Base Model (Optimised) Results

	AM			PM		
	DoS	MMQ (PCU)	Delay per PCU (s)	DoS	MMQ (PCU)	Delay per PCU (s)
Scenario - 2018 Base						
A441 (North)	93.5 : 93.5%	28	38	82.3 : 82.3%	24	33
Dagnell End Road	92.4 : 92.4%	12	78	106.3 : 106.3%	43	201
A441 (South)	81.7 : 81.7%	17	24	107.2 : 107.2%	85	182
Cycle Time (s)	92			123		
PRC	-3.9%			-19.1%		
Delay (PCUHr)	25.6			95.1		
Scenario - 2030 Base + Committed						
A441 (North)	108.2 : 108.2%	86	183	94.8 : 94.8%	38	52
Dagnell End Road	104.9 : 104.9%	25	184	119.9 : 119.9%	80	400
A441 (South)	95.8 : 105.9%	43	72	120.9 : 120.9%	165	381
Cycle Time (s)	92			123		
PRC	-20.2%			-34.4%		
Delay (PCUHr)	106.0			216.4		
Scenario - 2030 Base + Committed + Development						
A441 (North)	114.4 : 114.4%	123	274	110.4 : 110.4%	106	231
Dagnell End Road	110.9 : 110.9%	34	266	126.1 : 126.1%	97	482
A441 (South)	111.1 : 111.1%	115	224	128.8 : 128.8%	215	480
Cycle Time (s)	92			123		
PRC	-27.1%			-43.2%		
Delay (PCUHr)	214.3			341.9		

4.2 Mitigation Scheme Model

4.2.1 The mitigation scheme model has been updated to include the revised lane structure and pedestrian crossings. Intergreen periods have been re-measured between all phases, including the new pedestrian phases, and input to the model.

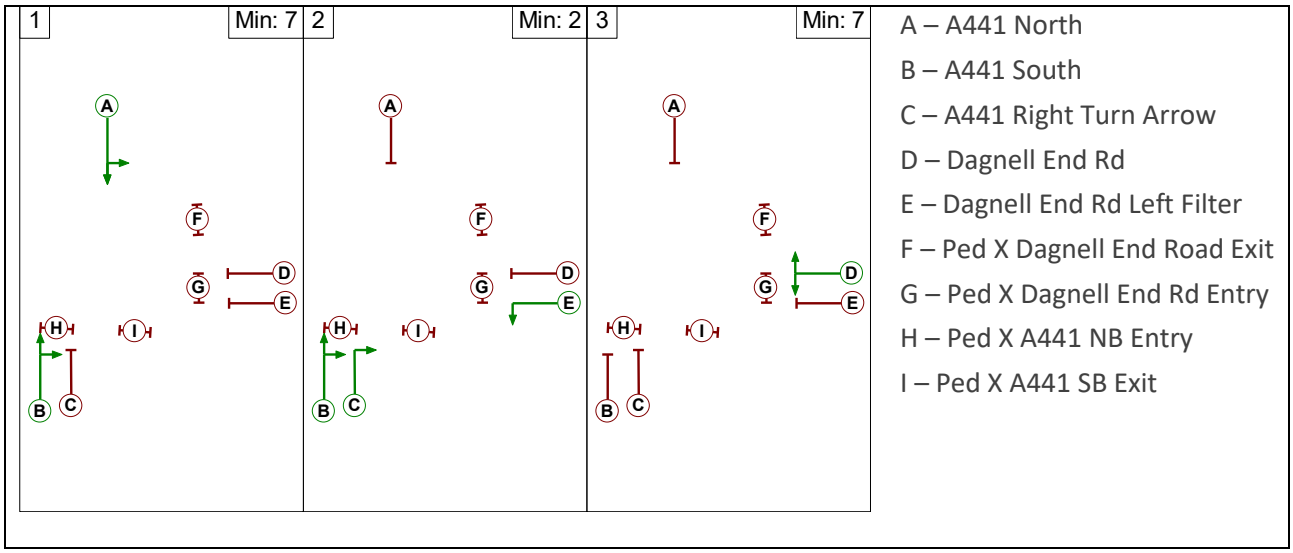
4.2.2 As with the base model, the traffic flow routes have been 'locked' in assigning traffic to the model so that 70% of the southbound traffic on the A441 uses the nearside lane.

4.2.3 Three staging options have been considered as described below.

Staging Sequence 1 – Pedestrian Crossing Not Called

4.2.4 Peak hour pedestrian crossing demand at the junction will be low, and it is anticipated that the crossings will be infrequently called. The stage sequence most accurately representing demand is where the crossing is not called. This stage sequence is presented within Figure 1, and is similar to the existing operation.

Figure 1: Stage Sequence (No Pedestrian Phases)



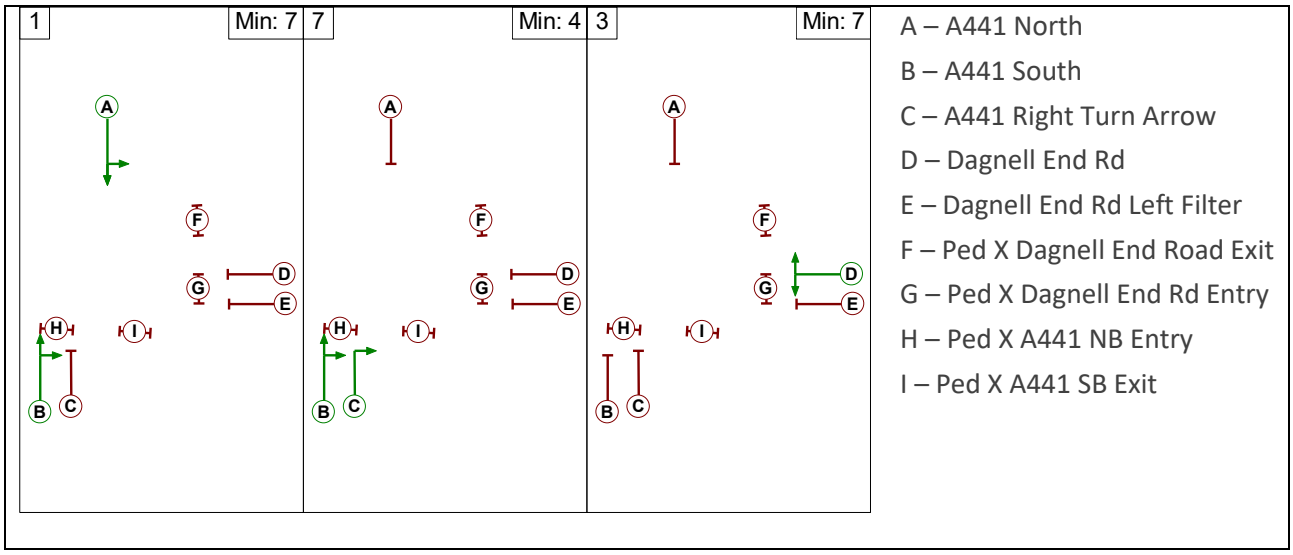
Stage Sequence 2 – Pedestrian Crossing Not Called, No Filter Arrow

4.2.5 WCC have reviewed on the model and noted that running the left turn filter arrow (Phase E) from Dagnell End Road during Stage 2 may not be safe. This is because a pedestrian wishing to cross over the A441 southbound may see a stationary vehicle in the offside lane of Dagnell End Road (controlled by Phase D), without seeing the filter arrow for Phase E which allows left-turning vehicles to proceed.

4.2.6 WCC note that this arrangement is provided at other junctions elsewhere, and this comment was not raised in the RSA. It would be appropriate for this matter to be resolved at detailed design stage, or following installation of the junction based on site observations.

4.2.7 As a further test, a stage sequence has also been run without Phase E, presented in Figure 2.

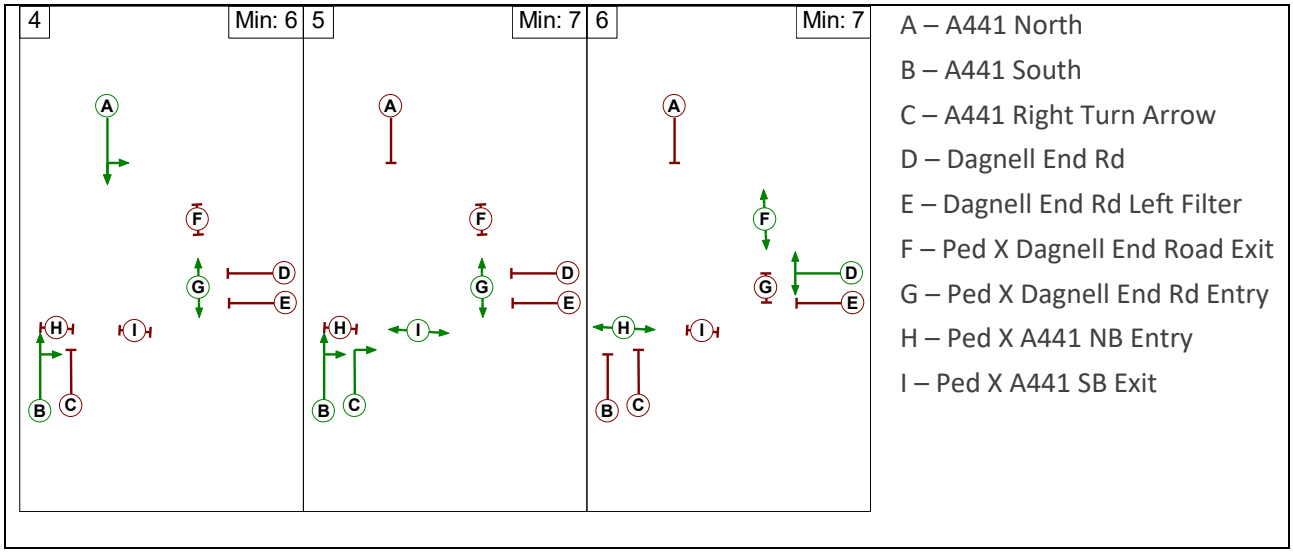
Figure 2: Stage Sequence – No Pedestrian Crossing, No Filter Arrow



Stage Sequence 3 – Pedestrian Crossing Called Every Cycle (Sensitivity Test)

4.2.8 Pedestrian demand at the junction will be low, however to test the impact of the crossing on the capacity of the junction the model has been run with all the crossings called every cycle (Figure 3). This has solely been undertaken as a sensitivity test, as during normal periods when pedestrian demand is low then stage sequences 1 or 2 would run.

Figure 3: Stage Sequence – with Pedestrian Crossing



4.3 Capacity Assessment Results

4.3.1 The tables below present the base model and then the mitigation scheme model for each stage sequence, with output reports provided within **Appendix C**.

Table 2: Mitigation Scheme Model Summary

	AM			PM		
	DoS	MMQ (PCU)	Delay per PCU (s)	DoS	MMQ (PCU)	Delay per PCU (s)
Stage Sequence 1 - Pedestrian Crossing Not Called						
A441 (North)	96.6 : 96.6%	37	40	93.9 : 93.9%	39	39
Dagnell End Road	97.8 : 97.8%	13	107	112.5 : 112.5%	58	288
A441 (South)	100.4 : 100.4%	55	69	114.2 : 114.2%	144	280
Cycle Time (s)	92			123		
PRC	-11.6%			-26.9%		
Delay (PCUHr)	52.9			169.4		
Stage Sequence 2 - Pedestrian Crossing Not Called, No Filter Arrow						
A441 (North)	96.6 : 96.6%	37	40	93.9 : 93.9%	39	39
Dagnell End Road	97.8 : 92.9%	12	95	112.5 : 112.5%	58	291
A441 (South)	100.4 : 100.4%	55	69	114.2 : 114.2%	144	280
Cycle Time (s)	92			123		
PRC	-11.6%			-26.9%		
Delay (PCUHr)	51.5			169.8		
Stage Sequence 3 - Pedestrian Crossing Called Every Cycle (Sensitivity Test)						
A441 (North)	108.0 : 108.0%	89	179	102.6 : 102.6%	67	110
Dagnell End Road	107.6 : 102.2%	21	184	115.5 : 115.5%	65	334
A441 (South)	103.2 : 103.2%	71	104	116.8 : 116.8%	158	319
Cycle Time (s)	92			123		
PRC	-20.0%			-29.8%		
Delay (PCUHr)	126.6			215.4		

4.3.2 The results demonstrate very little difference in capacity between Stage Sequences 1 and 2 (with / without the left turn filter from Dagnell End Road). This is however based on an average peak hour cycle, and it may be useful to run the left turn filter to manage fluctuations in traffic, particularly if there are high numbers of right turners from the A441 to Dagnell End Road requiring Stage 2 to be extended.

4.3.3 The figures below provide a comparison of total delay for all vehicles and Practical Reserve Capacity (PRC) between the 2030 Base model (without development) and the mitigation scheme for stage sequences 1 and 2.

Figure 4: Mitigation Comparison - AM Peak Hour

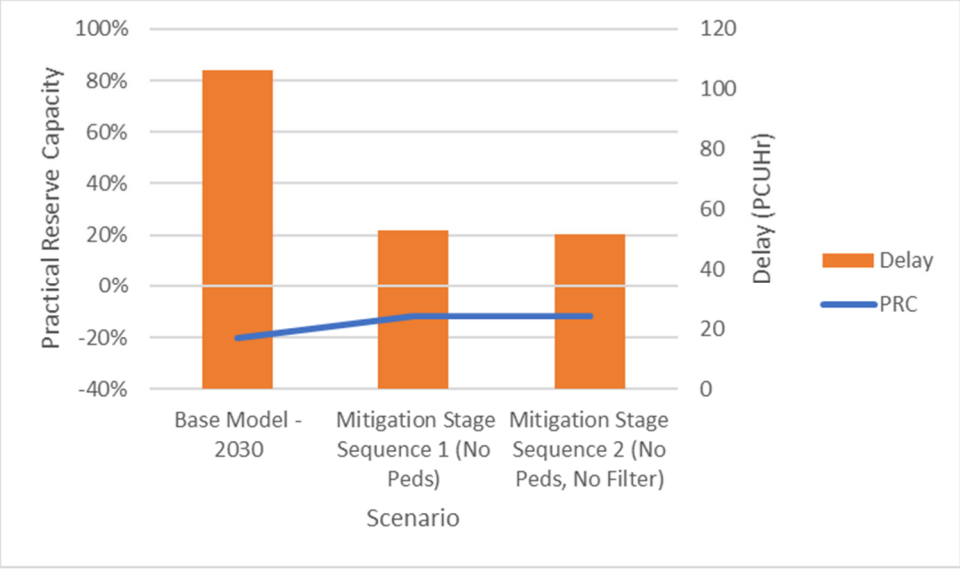
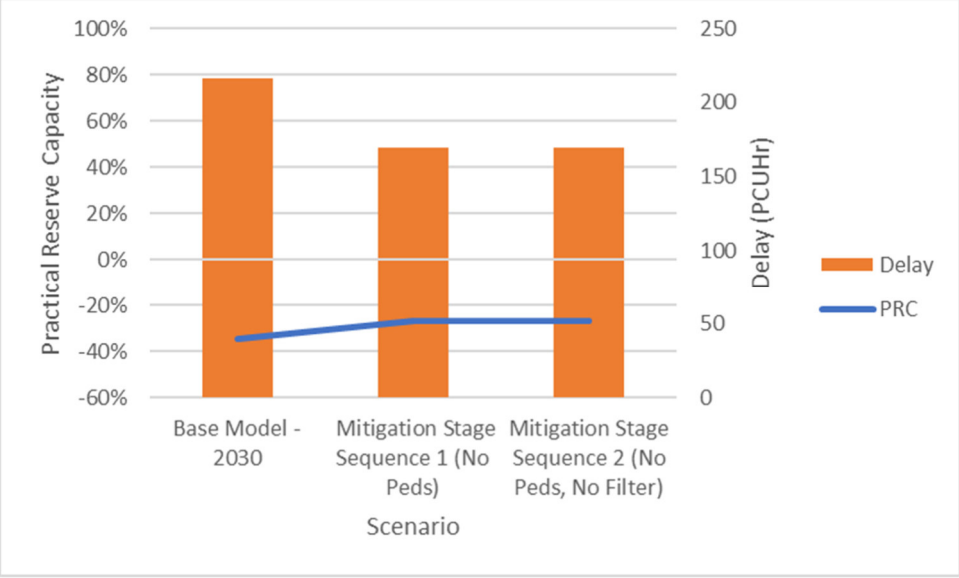


Figure 5: Mitigation Comparison - PM Peak Hour

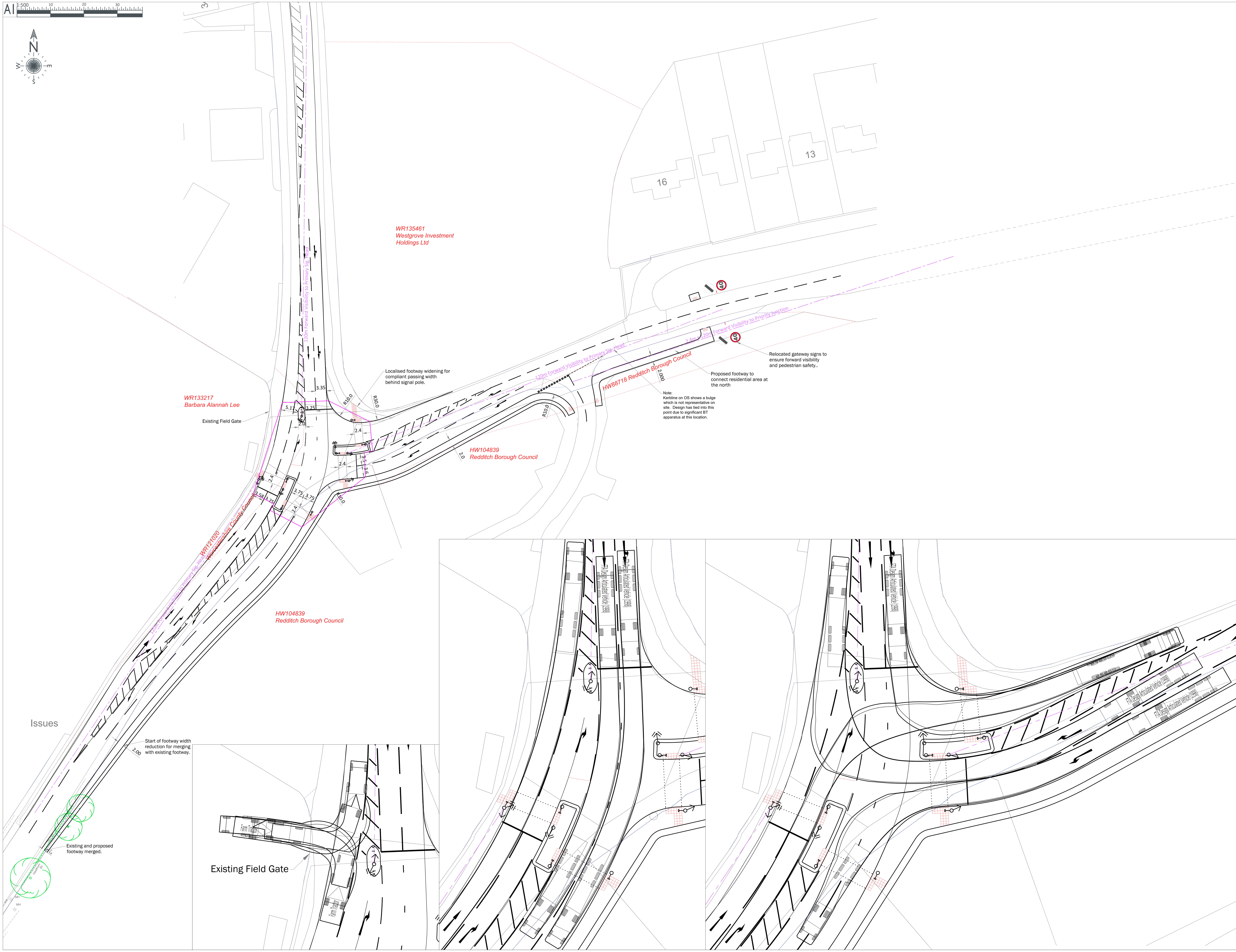


4.3.4 The figures demonstrate that in both peak hours, there would be an overall reduction in delay and increase in PRC at the junction.

5 Conclusions

5.1.1 The proposed mitigation scheme will offer an improvement to junction capacity and will provide improved access for pedestrians over Dagnell End Road and the A441.

Appendix A Mitigation Design



NOTES

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9

Notes

1. Do not scale from this drawing.
2. All dimensions in metres unless stated otherwise.
3. Drawing is based on OS mapping and is limited to a 2D design at this stage.
4. Design is based on DMRB CD116 for a 70kph design speed, reflecting the existing 40mph speed limit.
5. The design has updated in line with highway authority comments received on 08.06.2020 and incorporating controlled pedestrian facilities.
6. The design is subject to transport modelling and a stage 1 Road Safety Audit.
7. Visibility to the back of any junction queuing has been requested by the highway authority and will be determined on completion of the transport modelling.

KEY

- Highway Boundary
- Land Ownership Boundary
- Kerbing
- Tactile Paving Red (Controlled)
- Intervisibility Zone
- Forward Visibility
- Road Sign - Single/Double Sided Proposed
- Traffic Signal - Signal Head
- Traffic Signal - Push Button

REV	DATE	REVISION NOTE	BY
P1	07.08.20	Widening, staggered crossing WCC comments incorporated	GH
P0	01.12.19	Initial Design	JL

PJA
Seven House ◦ High Street
Longbridge ◦ Birmingham
B31 2UQ ◦ Tel: 0121 475 0234
Birmingham ◦ Bristol
Exeter ◦ London ◦ Reading
pja.co.uk

CLIENT

Persimmon Homes South Midlands

PROJECT

Brockhill East
Dagnell End Road
Junction

DRAWING TITLE

Proposed
Highway Works

DRAWING ISSUE STATUS

INFORMATION

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
2809	P	12	P1

Revision Letter : P - Prelim / A - Approval / T - Tender / C - Construction

BIM DRAWING REFERENCE

-

SCALE	DRAWN	REVIEWED	DATE
A1@1:500	GH	SG	12.2019

Appendix B Junction Model Outputs – Base Model

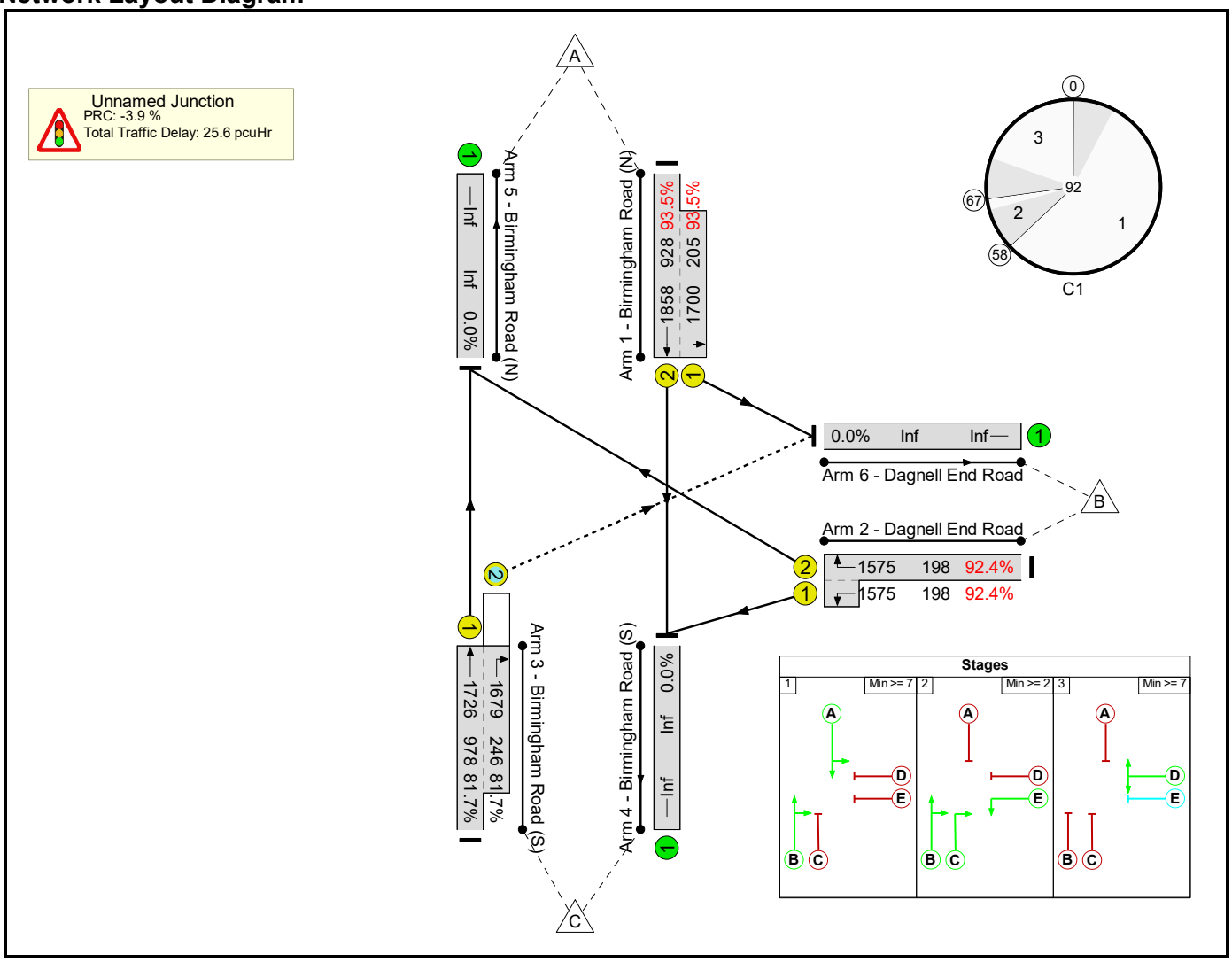
Basic Results Summary

User and Project Details

Project:	
Title:	
Location:	
Additional detail:	
File name:	2809_Birmingham-Dagnell_Base Model Optimised 11-08-20.lsg3x
Author:	
Company:	
Address:	

Scenario 1: 'Base 2018 AM' (FG1: 'Base 2018 AM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**93.5%**	**23**	**128**	**51**	**25.6**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**93.5%**	**23**	**128**	**51**	**25.6**	-	-
1/2+1/1	Birmingham Road (N) Ahead Left	U	A		1	51	-	1060	1858:1700	928+205	93.5 : 93.5%	-	-	-	11.0	37.5	28.4
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	18:27	9	366	1575:1575	198+198	92.4 : 92.4%	-	-	-	7.9	78.1	11.7
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	60	4	1000	1726:1679	978+246	81.7 : 81.7%	23	128	51	6.6	23.9	17.4

C1

PRC for Signalled Lanes (%): -3.9
PRC Over All Lanes (%): -3.9

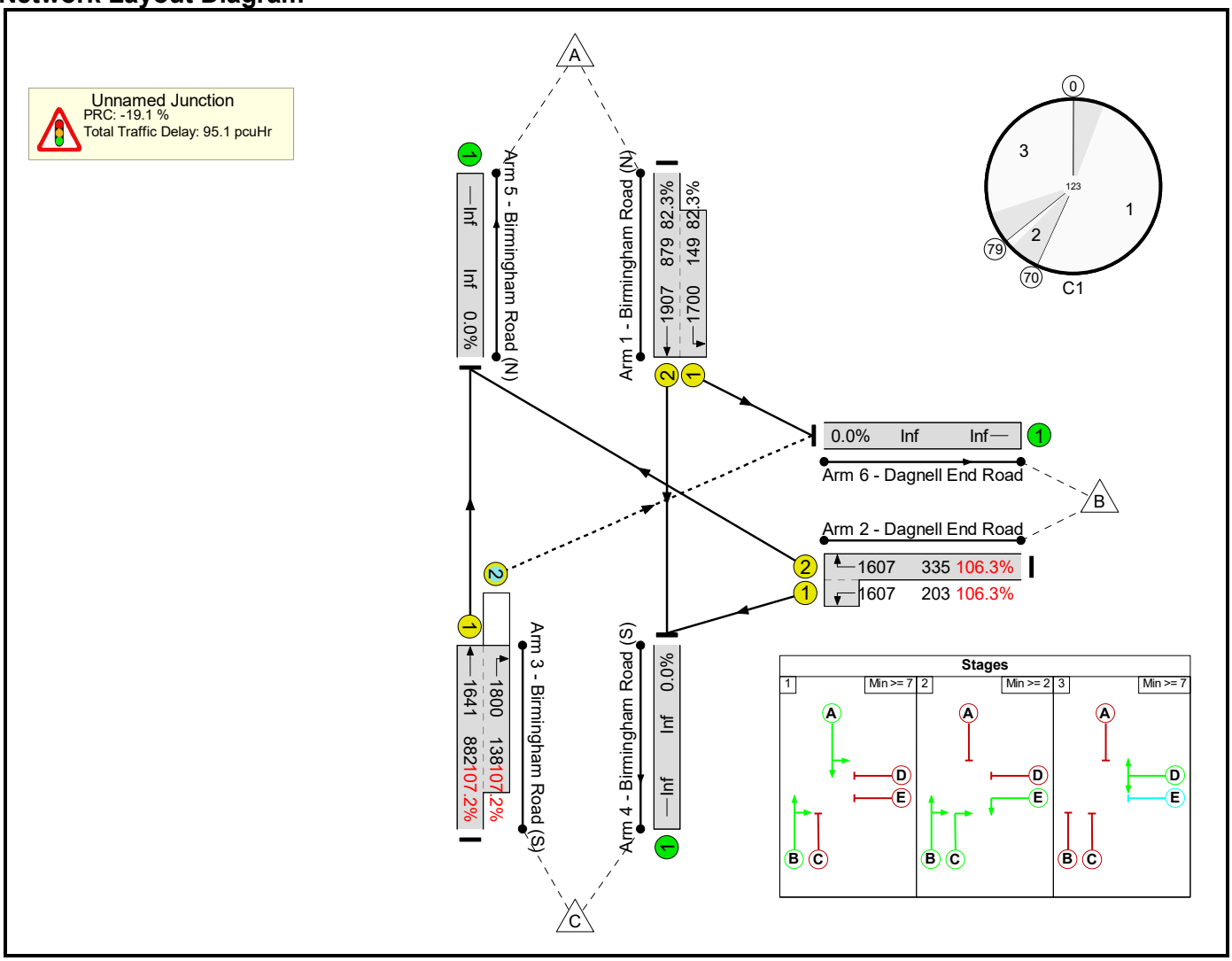
Total Delay for Signalled Lanes (pcuHr): 25.61
Total Delay Over All Lanes(pcuHr): 25.61

Cycle Time (s): 92

Basic Results Summary

Scenario 2: 'Base 2018 PM' (FG2: 'Base 2018 PM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**107.2%**	**88**	**45**	**5**	**95.1**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**107.2%**	**88**	**45**	**5**	**95.1**	-	-
1/2+1/1	Birmingham Road (N) Ahead Left	U	A		1	63	-	846	1907:1700	879+149	82.3 : 82.3%	-	-	-	7.7	32.8	24.3
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	37:46	9	572	1607:1607	335+203	106.3 : 106.3%	-	-	-	32.0	201.4	43.2
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	72	4	1094	1641:1800	882+138	107.2 : 107.2%	88	45	5	55.4	182.4	85.0

C1

PRC for Signalled Lanes (%): -19.1
PRC Over All Lanes (%): -19.1

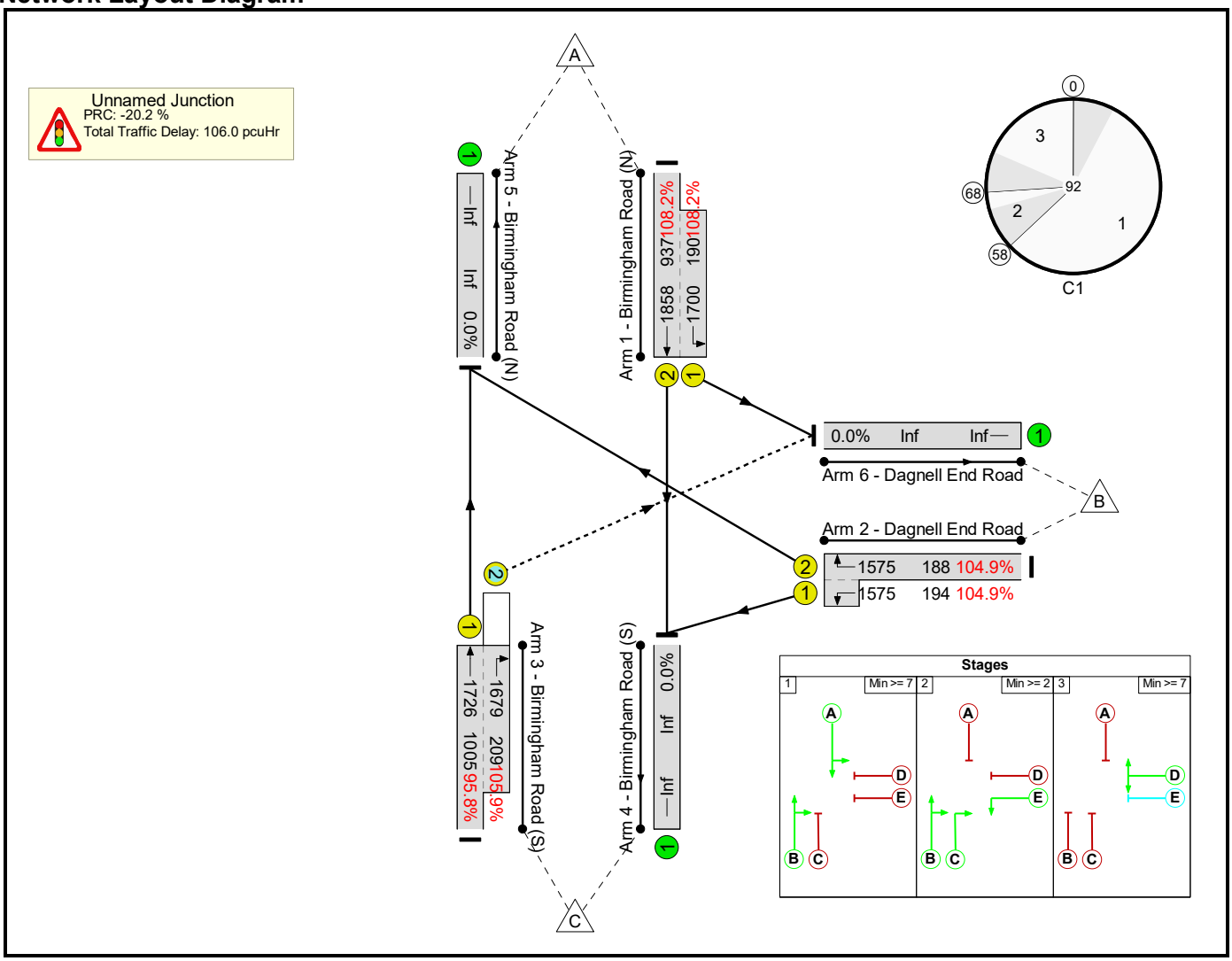
Total Delay for Signalled Lanes (pcuHr): 95.12
Total Delay Over All Lanes(pcuHr): 95.12

Cycle Time (s): 123

Basic Results Summary

Scenario 3: '2030 Base + Committed AM' (FG3: '2030 Base + Committed AM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**108.2%**	**0**	**146**	**63**	**106.0**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**108.2%**	**0**	**146**	**63**	**106.0**	-	-
1/2+1/1	Birmingham Road (N) Ahead Left	U	A		1	51	-	1219	1858:1700	937+190	108.2 : 108.2%	-	-	-	61.9	182.9	86.4
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	17:27	10	400	1575:1575	188+194	104.9 : 104.9%	-	-	-	20.4	183.5	24.6
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	61	5	1184	1726:1679	1005+209	95.8 : 105.9%	0	146	63	23.7	72.2	42.7

C1

PRC for Signalled Lanes (%): -20.2
PRC Over All Lanes (%): -20.2

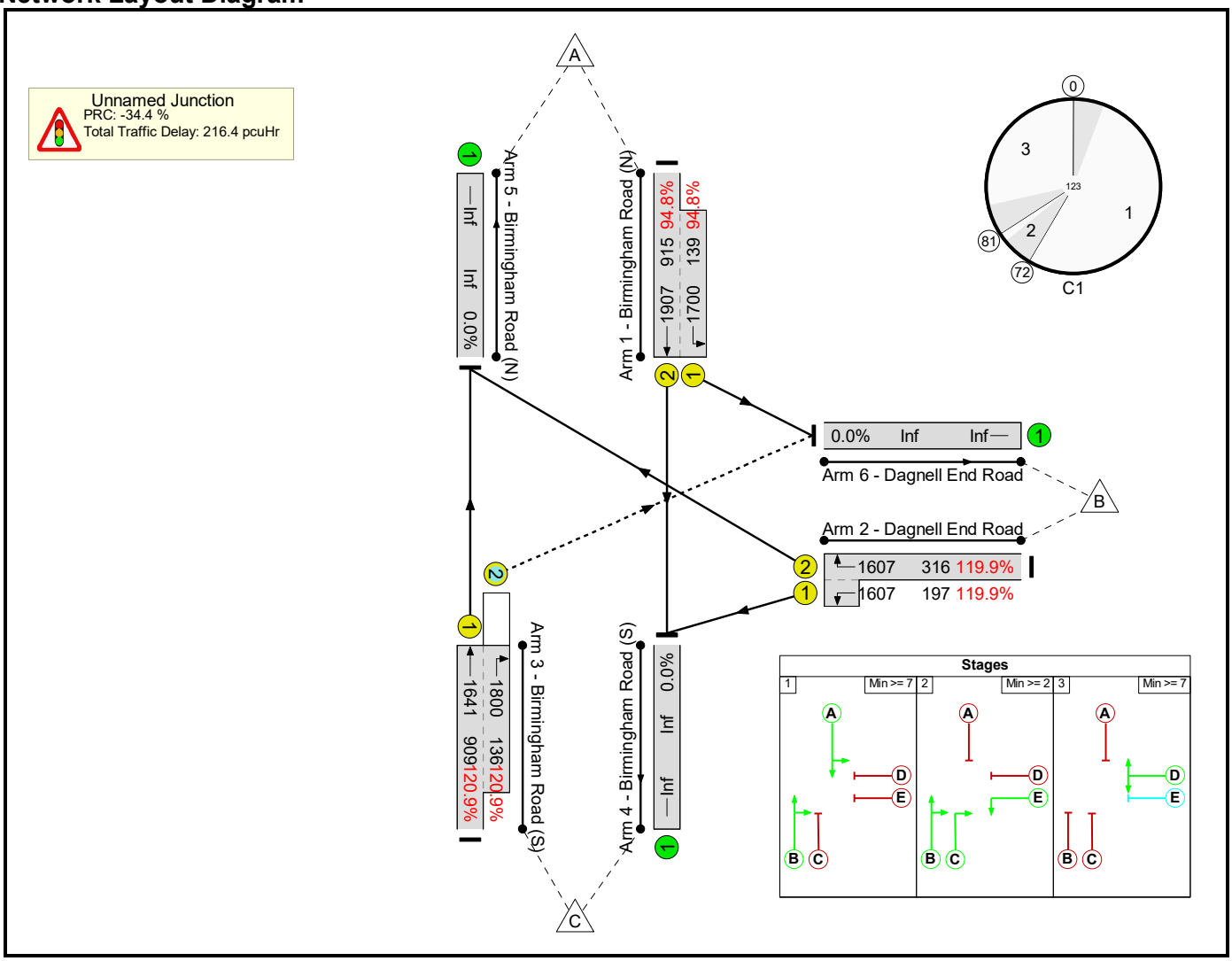
Total Delay for Signalled Lanes (pcuHr): 106.04
Total Delay Over All Lanes(pcuHr): 106.04

Cycle Time (s): 92

Basic Results Summary

Scenario 4: '2030 Base + Committed PM' (FG4: '2030 Base + Committed PM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**120.9%**	**18**	**102**	**16**	**216.4**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**120.9%**	**18**	**102**	**16**	**216.4**	-	-
1/2+1/1	Birmingham Road (N) Ahead Left	U	A		1	65	-	1000	1907:1700	915+139	94.8 : 94.8%	-	-	-	14.3	51.6	37.7
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	35:44	9	615	1607:1607	316+197	119.9 : 119.9%	-	-	-	68.4	400.2	80.0
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	74	4	1264	1641:1800	909+136	120.9 : 120.9%	18	102	16	133.6	380.6	165.3

C1

PRC for Signalled Lanes (%): -34.4
PRC Over All Lanes (%): -34.4

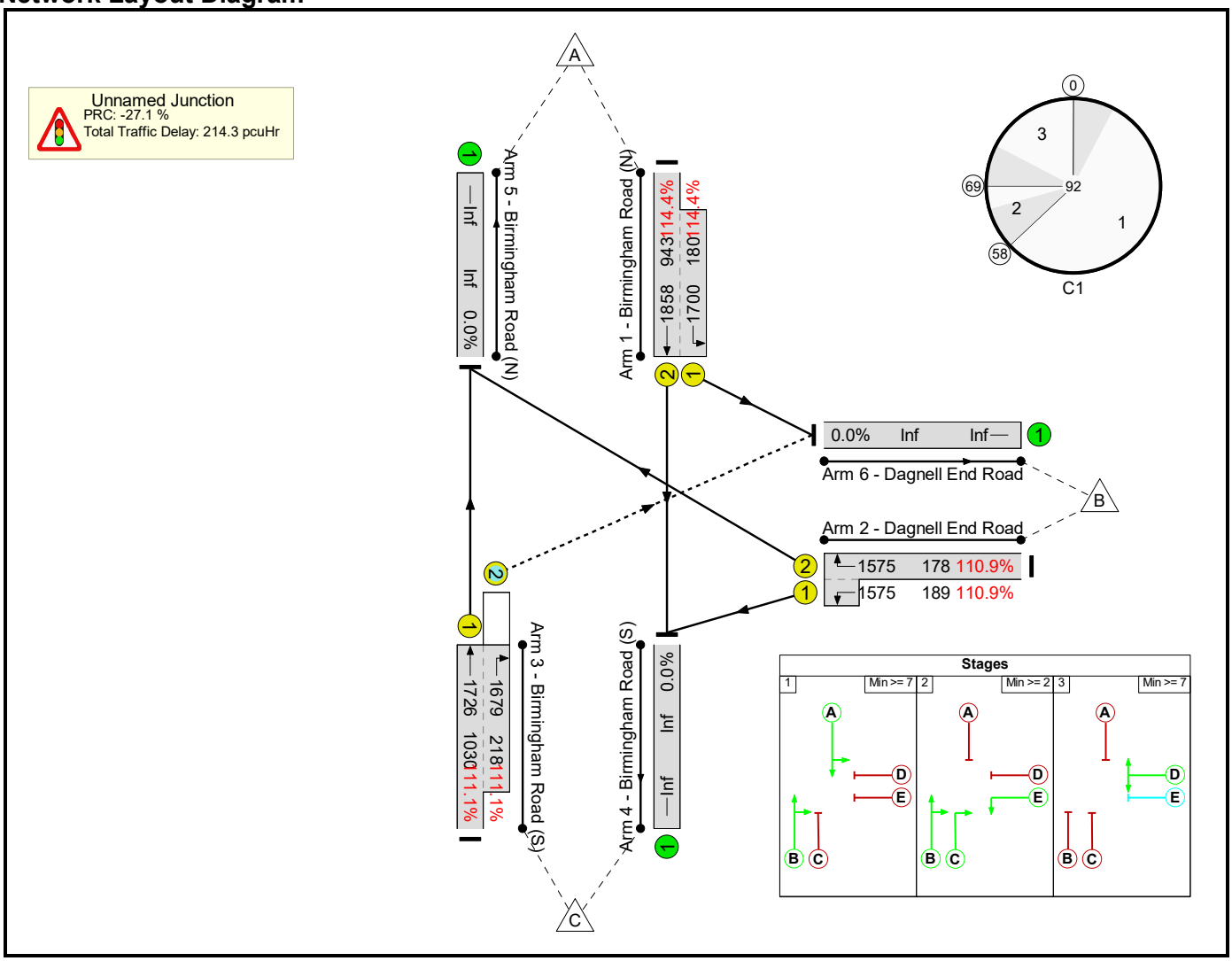
Total Delay for Signalled Lanes (pcuHr): 216.36
Total Delay Over All Lanes(pcuHr): 216.36

Cycle Time (s): 123

Basic Results Summary

Scenario 5: '2030 Base + Committed + Proposed AM' (FG5: '2030 Base + Committed + Proposed AM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**114.4%**	**0**	**164**	**54**	**214.3**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**114.4%**	**0**	**164**	**54**	**214.3**	-	-
1/2+1/1	Birmingham Road (N) Ahead Left	U	A		1	51	-	1284	1858:1700	943+180	114.4 : 114.4%	-	-	-	97.7	274.0	122.7
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	16:27	11	407	1575:1575	178+189	110.9 : 110.9%	-	-	-	30.1	266.3	34.4
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	62	6	1387	1726:1679	1030+218	111.1 : 111.1%	0	164	54	86.5	224.4	115.1

C1

PRC for Signalled Lanes (%): -27.1
PRC Over All Lanes (%): -27.1

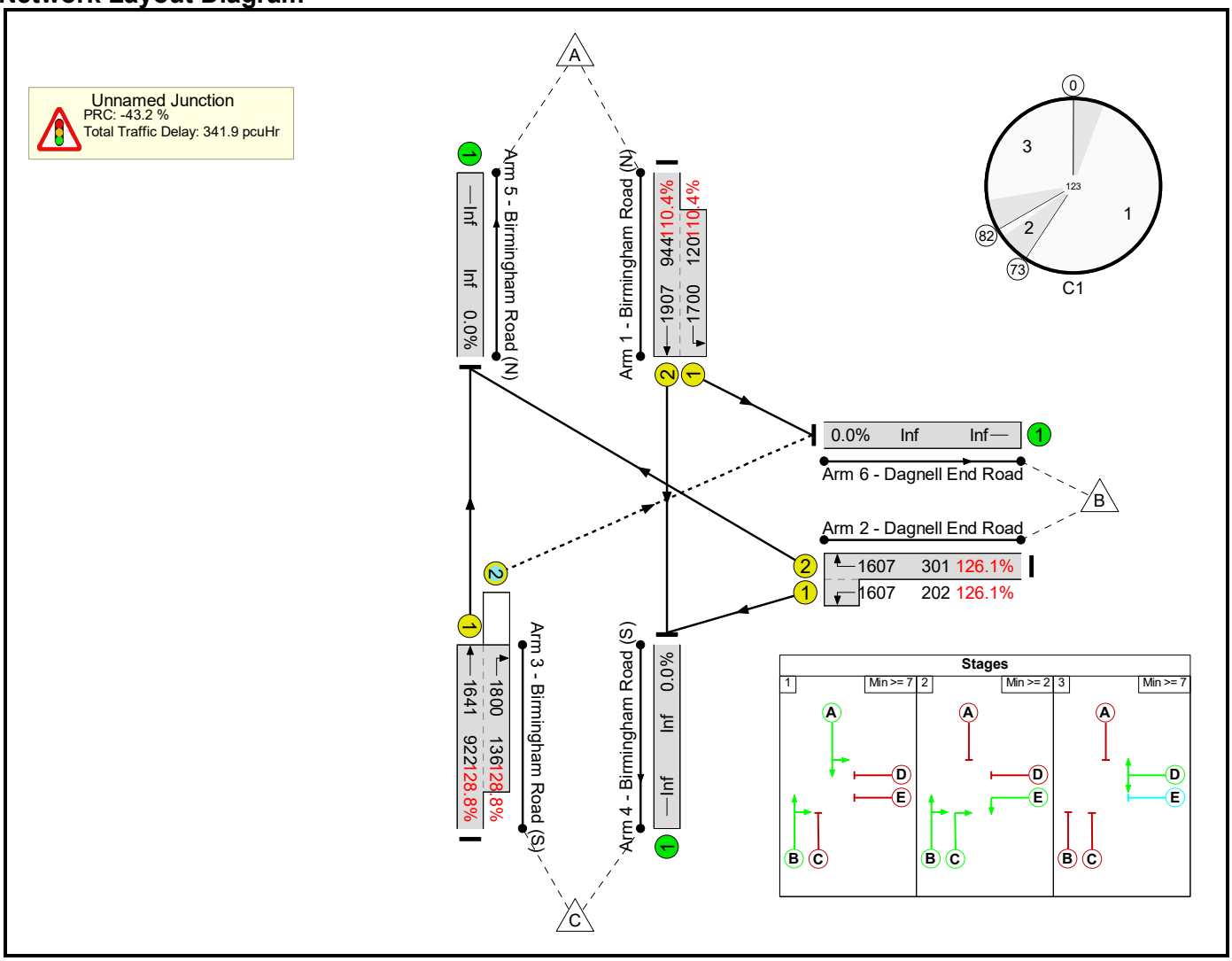
Total Delay for Signalled Lanes (pcuHr): 214.31
Total Delay Over All Lanes(pcuHr): 214.31

Cycle Time (s): 92

Basic Results Summary

Scenario 6: '2030 Base + Committed + Proposed PM' (FG6: '2030 Base + Committed + Proposed PM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**128.8%**	**0**	**102**	**33**	**341.9**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**128.8%**	**0**	**102**	**33**	**341.9**	-	-
1/2+1/1	Birmingham Road (N) Ahead Left	U	A		1	66	-	1175	1907:1700	944+120	110.4 : 110.4%	-	-	-	75.5	231.4	106.0
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	34:43	9	634	1607:1607	301+202	126.1 : 126.1%	-	-	-	84.8	481.6	96.6
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	75	4	1363	1641:1800	922+136	128.8 : 128.8%	0	102	33	181.5	479.5	214.6

C1

PRC for Signalled Lanes (%): -43.2
PRC Over All Lanes (%): -43.2

Total Delay for Signalled Lanes (pcuHr): 341.89
Total Delay Over All Lanes(pcuHr): 341.89

Cycle Time (s): 123

Appendix C Junction Model Outputs – Mitigation Model

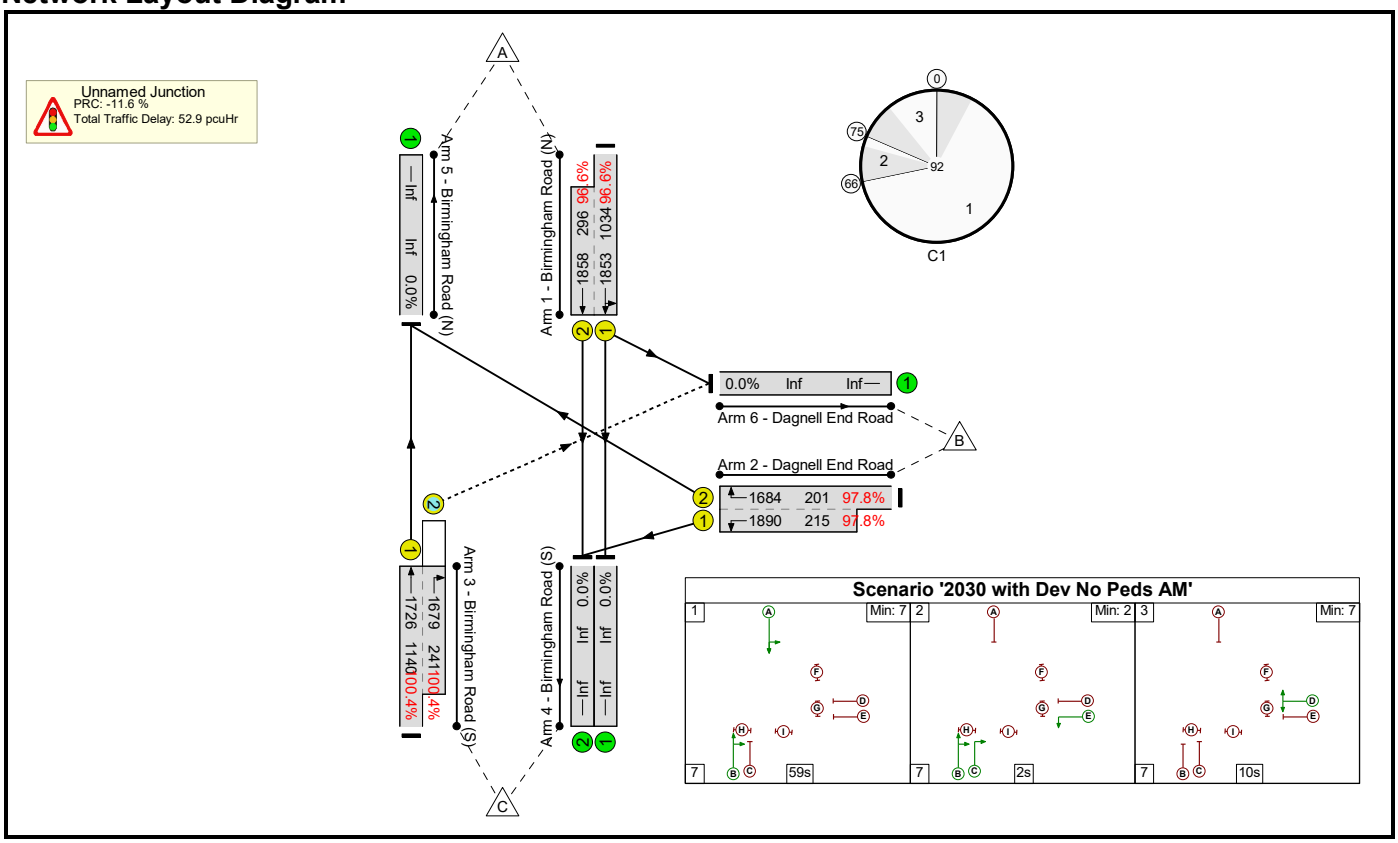
Basic Results Summary

User and Project Details

Project:	
Title:	
Location:	
Additional detail:	
File name:	2809_Dagnell End Road with Peds Model 10-08-20.lsg3x
Author:	
Company:	
Address:	

Scenario 1: '2030 with Dev No Peds AM' (FG5: '2030 Base + Committed + Proposed AM', Plan 1: 'No Peds')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**100.4%**	**3**	**128**	**110**	**52.9**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**100.4%**	**3**	**128**	**110**	**52.9**	-	-
1/1+1/2	Birmingham Road (N) Ahead Left	U	A		1	59	-	1284	1853:1858	1034+296	96.6 : 96.6%	-	-	-	14.3	40.2	36.9
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	10:19	9	407	1684:1890	201+215	97.8 : 97.8%	-	-	-	12.1	107.4	13.1
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	68	4	1387	1726:1679	1140+241	100.4 : 100.4%	3	128	110	26.4	68.6	54.9

C1

PRC for Signalled Lanes (%): -11.6
PRC Over All Lanes (%): -11.6

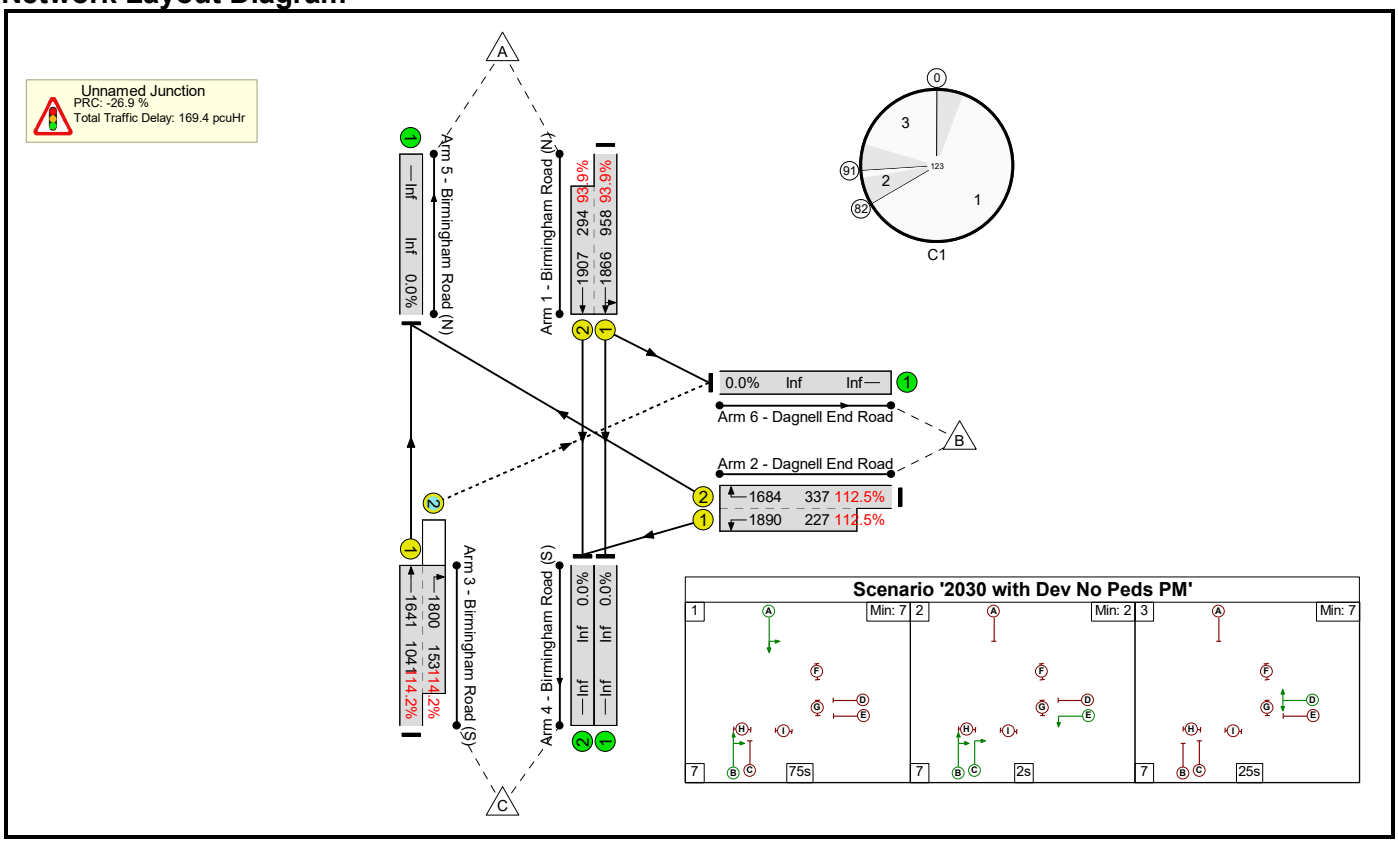
Total Delay for Signalled Lanes (pcuHr): 52.89
Total Delay Over All Lanes(pcuHr): 52.89

Cycle Time (s): 92

Basic Results Summary

Scenario 2: '2030 with Dev No Peds PM' (FG6: '2030 Base + Committed + Proposed PM', Plan 1: 'No Peds')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**114.2%**	**17**	**102**	**34**	**169.4**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**114.2%**	**17**	**102**	**34**	**169.4**	-	-
1/1+1/2	Birmingham Road (N) Ahead Left	U	A		1	75	-	1175	1866:1907	958+294	93.9 : 93.9%	-	-	-	12.7	38.8	39.1
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	25:34	9	634	1684:1890	337+227	112.5 : 112.5%	-	-	-	50.7	288.0	57.6
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	84	4	1363	1641:1800	1041+153	114.2 : 114.2%	17	102	34	106.0	280.0	143.5

C1

PRC for Signalled Lanes (%): -26.9
PRC Over All Lanes (%): -26.9

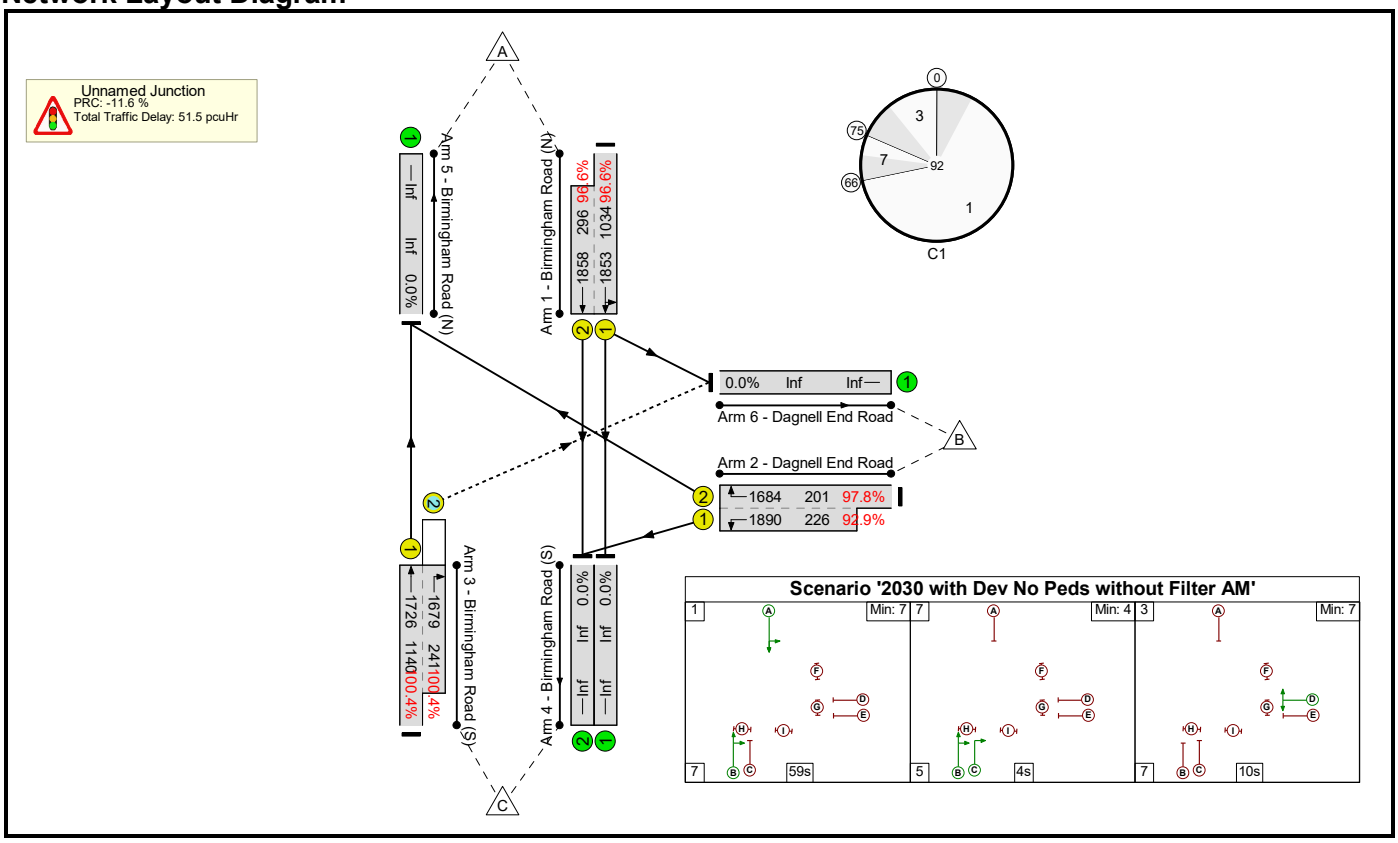
Total Delay for Signalled Lanes (pcuHr): 169.37
Total Delay Over All Lanes(pcuHr): 169.37

Cycle Time (s): 123

Basic Results Summary

Scenario 3: '2030 with Dev No Peds without Filter AM' (FG5: '2030 Base + Committed + Proposed AM', Plan 3: 'No Peds without Filter')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**100.4%**	**3**	**128**	**110**	**51.5**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**100.4%**	**3**	**128**	**110**	**51.5**	-	-
1/1+1/2	Birmingham Road (N) Ahead Left	U	A		1	59	-	1284	1853:1858	1034+296	96.6 : 96.6%	-	-	-	14.3	40.2	36.9
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	10	0	407	1684:1890	201+226	97.8 : 92.9%	-	-	-	10.8	95.2	11.5
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	68	4	1387	1726:1679	1140+241	100.4 : 100.4%	3	128	110	26.4	68.6	54.9

C1

PRC for Signalled Lanes (%): -11.6
PRC Over All Lanes (%): -11.6

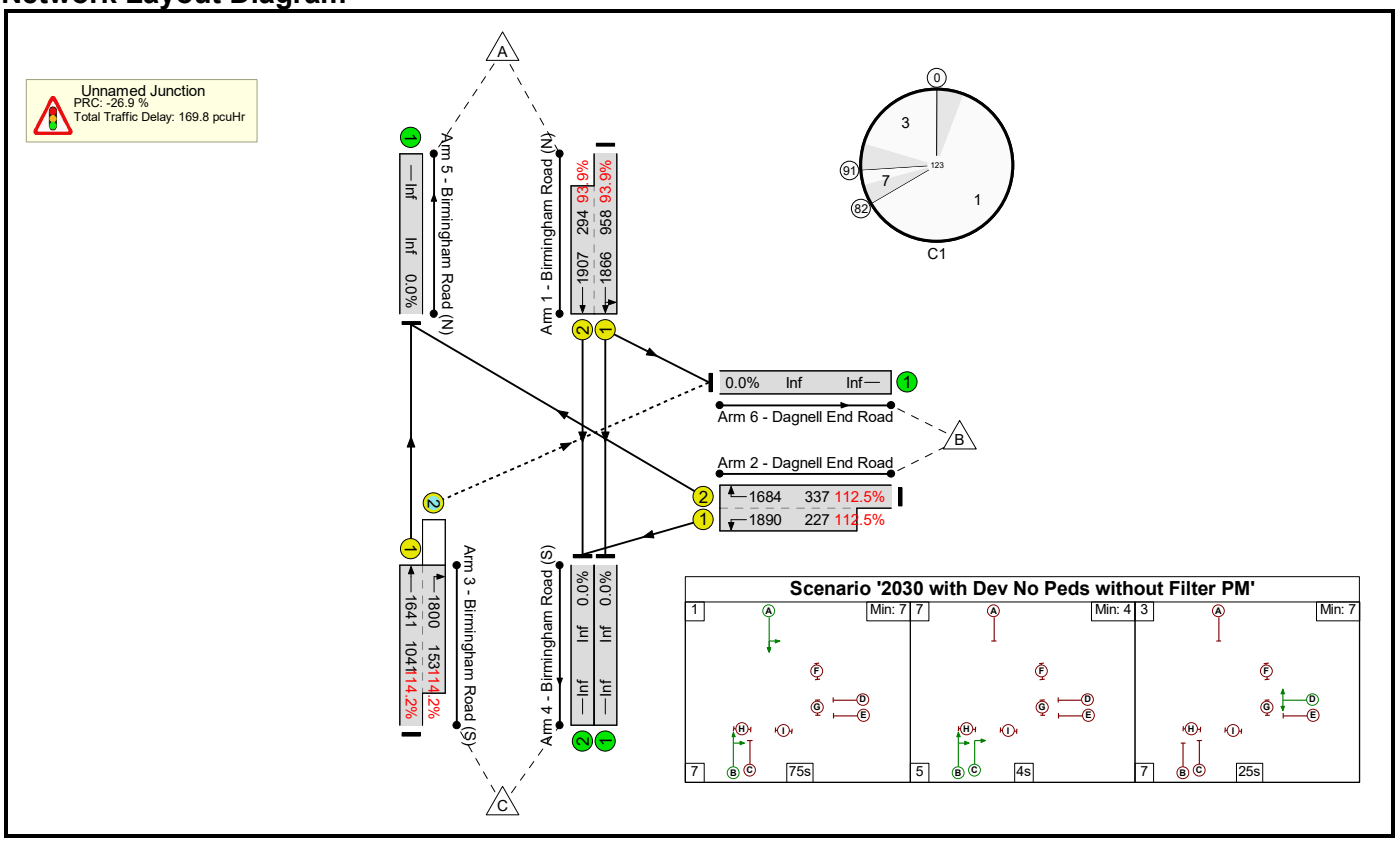
Total Delay for Signalled Lanes (pcuHr): 51.51
Total Delay Over All Lanes(pcuHr): 51.51

Cycle Time (s): 92

Basic Results Summary

Scenario 4: '2030 with Dev No Peds without Filter PM' (FG6: '2030 Base + Committed + Proposed PM', Plan 3: 'No Peds without Filter')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**114.2%**	**17**	**102**	**34**	**169.8**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**114.2%**	**17**	**102**	**34**	**169.8**	-	-
1/1+1/2	Birmingham Road (N) Ahead Left	U	A		1	75	-	1175	1866:1907	958+294	93.9 : 93.9%	-	-	-	12.7	38.8	39.1
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	25	0	634	1684:1890	337+227	112.5 : 112.5%	-	-	-	51.2	290.5	57.6
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	84	4	1363	1641:1800	1041+153	114.2 : 114.2%	17	102	34	106.0	280.0	143.5

C1

PRC for Signalled Lanes (%): -26.9
PRC Over All Lanes (%): -26.9

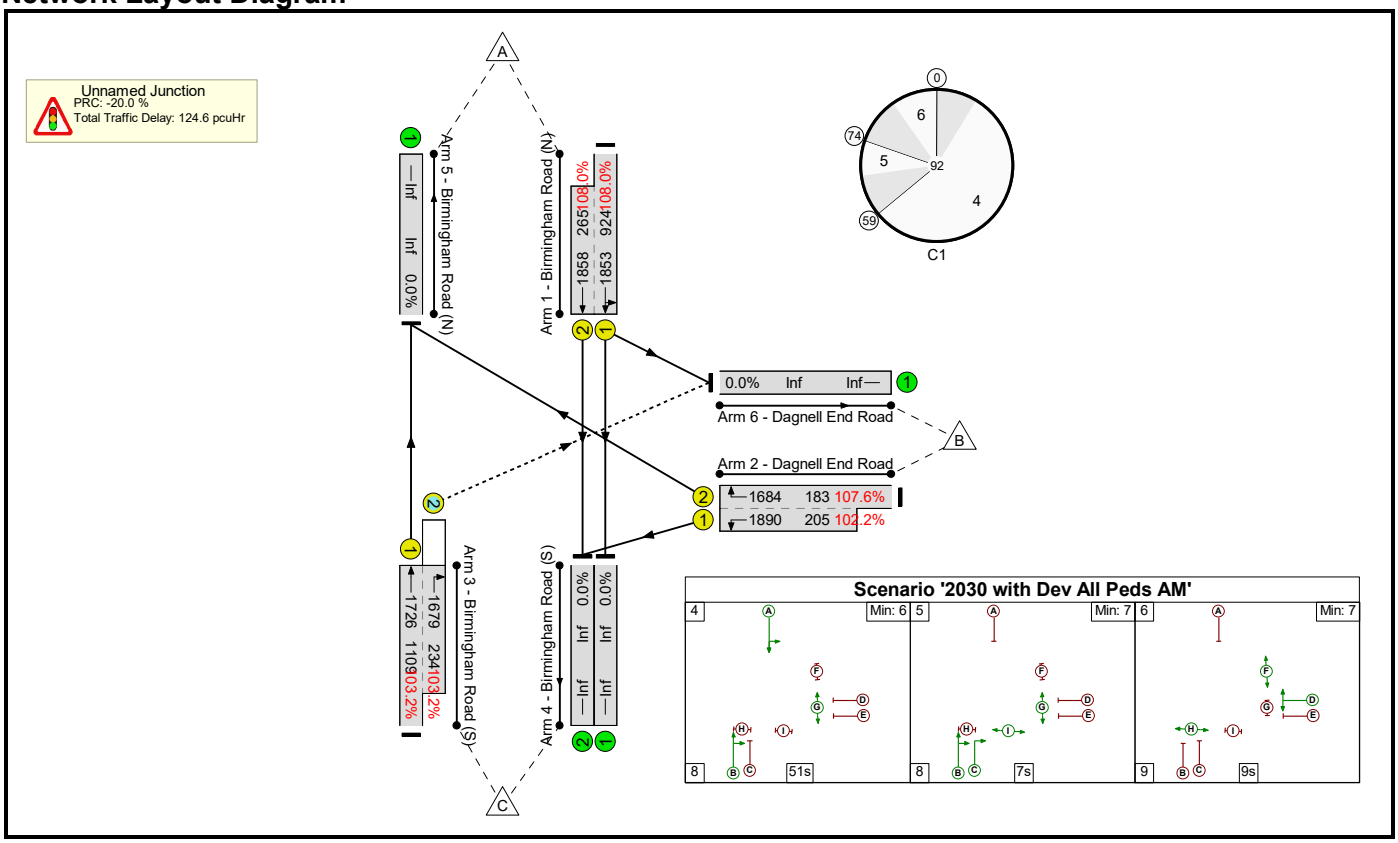
Total Delay for Signalled Lanes (pcuHr): 169.82
Total Delay Over All Lanes(pcuHr): 169.82

Cycle Time (s): 123

Basic Results Summary

Scenario 5: '2030 with Dev All Peds AM' (FG5: '2030 Base + Committed + Proposed AM', Plan 2: 'All Peds')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**108.0%**	**0**	**225**	**10**	**124.6**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**108.0%**	**0**	**225**	**10**	**124.6**	-	-
1/1+1/2	Birmingham Road (N) Ahead Left	U	A		1	52	-	1284	1853:1858	924+265	108.0 : 108.0%	-	-	-	63.8	178.9	89.2
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	9	0	407	1684:1890	183+205	107.6 : 102.2%	-	-	-	20.9	184.4	21.1
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	66	10	1387	1726:1679	1109+234	103.2 : 103.2%	0	225	10	40.0	103.8	70.7

C1

PRC for Signalled Lanes (%): -20.0
PRC Over All Lanes (%): -20.0

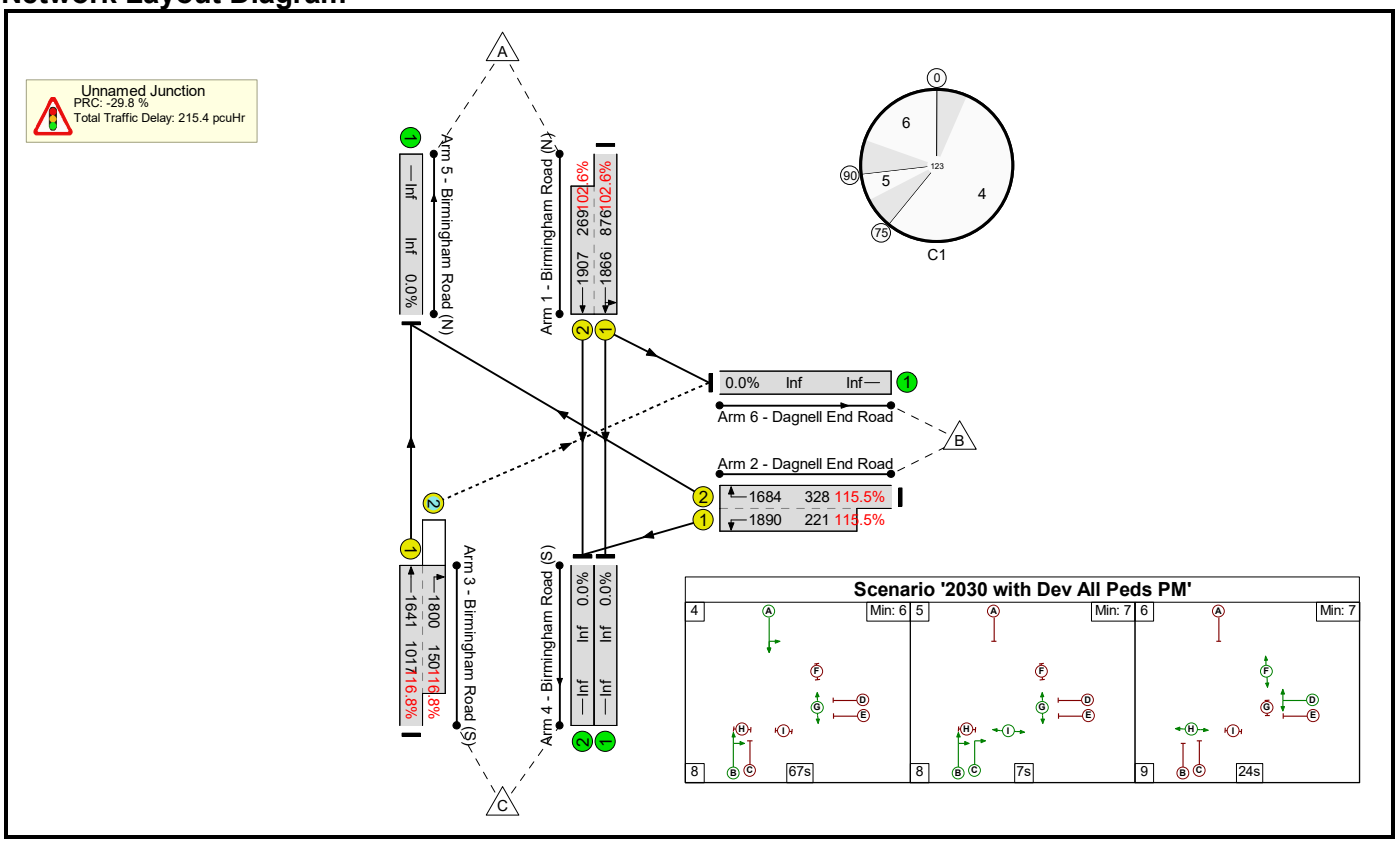
Total Delay for Signalled Lanes (pcuHr): 124.64
Total Delay Over All Lanes(pcuHr): 124.64

Cycle Time (s): 92

Basic Results Summary

Scenario 6: '2030 with Dev All Peds PM' (FG6: '2030 Base + Committed + Proposed PM', Plan 2: 'All Peds')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**116.8%**	**0**	**145**	**5**	**215.4**	-	-
Unnamed Junction	-	-	-		-	-	-	-	-	-	**116.8%**	**0**	**145**	**5**	**215.4**	-	-
1/1+1/2	Birmingham Road (N) Ahead Left	U	A		1	68	-	1175	1866:1907	876+269	102.6 : 102.6%	-	-	-	35.9	110.1	67.3
2/2+2/1	Dagnell End Road Left Right	U	D	E	1	24	0	634	1684:1890	328+221	115.5 : 115.5%	-	-	-	58.9	334.3	65.2
3/1+3/2	Birmingham Road (S) Ahead Right	U+O	B	C	1	82	10	1363	1641:1800	1017+150	116.8 : 116.8%	0	145	5	120.6	318.5	157.5

C1

PRC for Signalled Lanes (%): -29.8
PRC Over All Lanes (%): -29.8

Total Delay for Signalled Lanes (pcuHr): 215.41
Total Delay Over All Lanes(pcuHr): 215.41

Cycle Time (s): 123