Junctions 9

ARCADY 9 - Roundabout Module

Filename: 7. New Junction 7.j9
Path: \\uk.wspgroup.com\central data\Projects\700575xx\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP Transport Planning\05 Analysis\2021 Junction Models\New junctions
Report generation date: 25/03/2021 14:51:59

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2031 Do Something							
A - North Arm	0.0	0.00	0.00	A	0.0	0.00	0.00	A
B - East Arm	0.0	0.00	0.00	A	0.0	0.00	0.00	A
C - South Arm	0.0	0.00	0.00	A	0.0	0.00	0.00	A
	2048 Do Something							
A - North Arm	0.0	0.00	0.00	A	0.0	2.04	0.00	A
B - East Arm	0.0	0.00	0.00	A	0.0	0.00	0.00	A
C - South Arm	0.0	0.00	0.00	A	0.0	0.00	0.00	A

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 average delay per arriving vehicle.

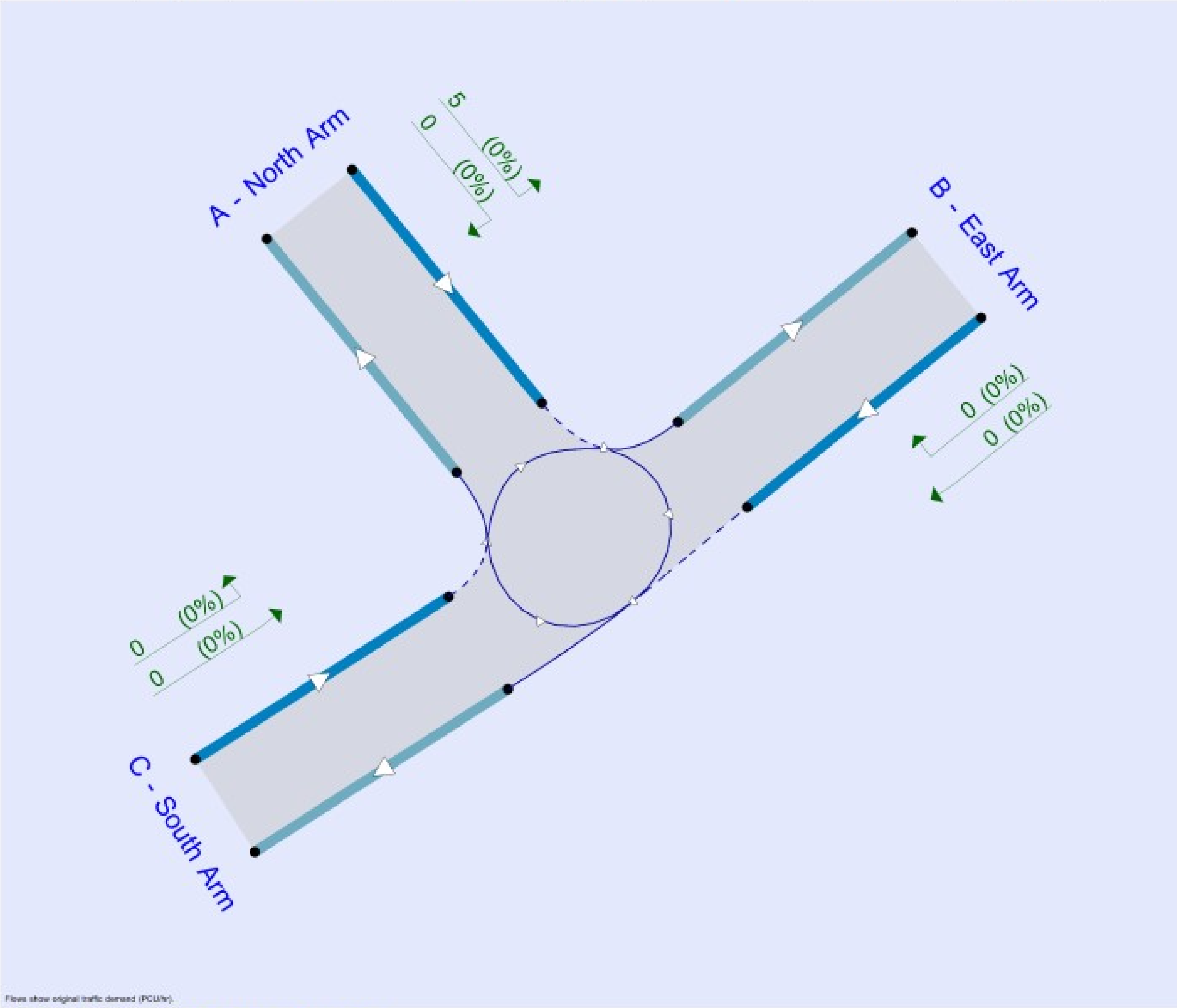
File summary

File Description

Title	
Location	
Site number	
Date	19/03/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\INVN01911
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		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	2031 Do Something	AM	ONE HOUR	07:45	09:15	15
D2	2031 Do Something	PM	ONE HOUR	16:45	18:15	15
D3	2048 Do Something	AM	ONE HOUR	07:45	09:15	15
D4	2048 Do Something	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2031 Do Something, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
7	New Junction 7	Standard Roundabout		A, B, C	0.00	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	North Arm	
B	East Arm	
C	South Arm	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - North Arm	3.65	7.00	25.7	20.0	60.0	38.8	
B - East Arm	3.38	7.00	17.2	20.0	60.0	35.8	
C - South Arm	3.65	7.00	23.7	20.0	60.0	32.7	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - North Arm	0.561	1767
B - East Arm	0.542	1646
C - South Arm	0.570	1788

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	2031 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - North Arm		✓	0	100.000
B - East Arm		✓	0	100.000
C - South Arm		✓	0	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - North Arm	B - East Arm	C - South Arm
From	A - North Arm	0	0	0
	B - East Arm	0	0	0
	C - South Arm	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - North Arm	B - East Arm	C - South Arm
From	A - North Arm	0	0	0
	B - East Arm	0	0	0
	C - South Arm	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - North Arm	0.00	0.00	0.0	A
B - East Arm	0.00	0.00	0.0	A
C - South Arm	0.00	0.00	0.0	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

2031 Do Something, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
7	New Junction 7	Standard Roundabout		A, B, C	0.00	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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	2031 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - North Arm		✓	0	100.000
B - East Arm		✓	0	100.000
C - South Arm		✓	0	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - North Arm	B - East Arm	C - South Arm
From	A - North Arm	0	0	0
	B - East Arm	0	0	0
	C - South Arm	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - North Arm	B - East Arm	C - South Arm
From	A - North Arm	0	0	0
	B - East Arm	0	0	0
	C - South Arm	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - North Arm	0.00	0.00	0.0	A
B - East Arm	0.00	0.00	0.0	A
C - South Arm	0.00	0.00	0.0	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

2048 Do Something, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
7	New Junction 7	Standard Roundabout		A, B, C	0.00	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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	2048 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - North Arm		✓	3	100.000
B - East Arm		✓	0	100.000
C - South Arm		✓	0	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - North Arm	B - East Arm	C - South Arm
From	A - North Arm	0	3	0
	B - East Arm	0	0	0
	C - South Arm	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - North Arm	B - East Arm	C - South Arm
From	A - North Arm	0	0	0
	B - East Arm	0	0	0
	C - South Arm	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - North Arm	0.00	0.00	0.0	A
B - East Arm	0.00	0.00	0.0	A
C - South Arm	0.00	0.00	0.0	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	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)	Unsignalised level of service
A - North Arm	0	0	1767	0.000	0	0.0	0.000	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

2048 Do Something, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
7	New Junction 7	Standard Roundabout		A, B, C	2.04	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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	2048 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - North Arm		✓	5	100.000
B - East Arm		✓	0	100.000
C - South Arm		✓	0	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - North Arm	B - East Arm	C - South Arm
From	A - North Arm	0	5	0
	B - East Arm	0	0	0
	C - South Arm	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - North Arm	B - East Arm	C - South Arm
From	A - North Arm	0	0	0
	B - East Arm	0	0	0
	C - South Arm	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - North Arm	0.00	2.04	0.0	A
B - East Arm	0.00	0.00	0.0	A
C - South Arm	0.00	0.00	0.0	A

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)	Unsignalised level of service
A - North Arm	4	0	1767	0.002	4	0.0	2.041	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	4	0	1767	0.003	4	0.0	2.042	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	6	0	1767	0.003	6	0.0	2.043	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

17:30 - 17:45

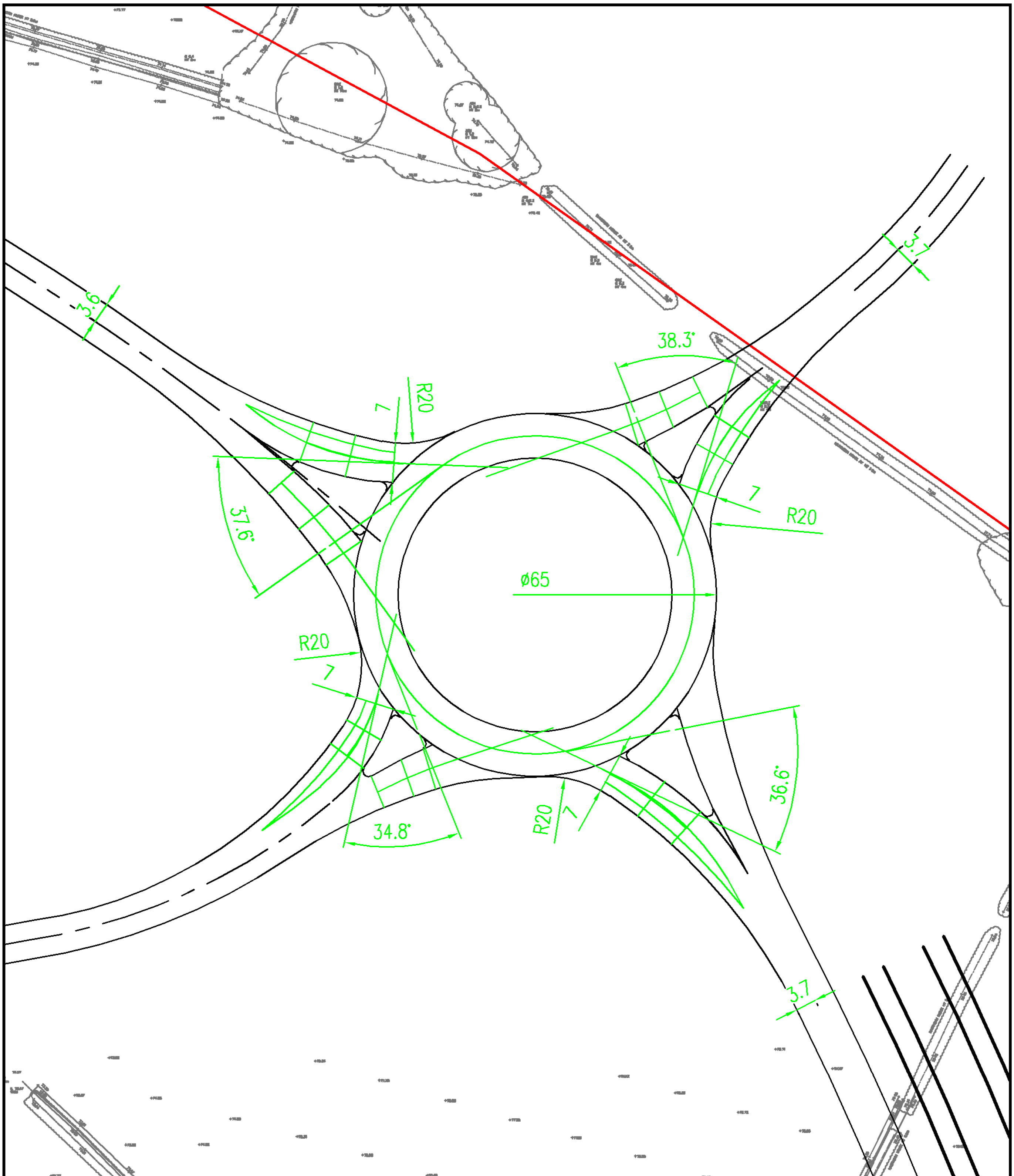
Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	6	0	1767	0.003	6	0.0	2.043	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	4	0	1767	0.003	4	0.0	2.044	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A

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)	Unsignalised level of service
A - North Arm	4	0	1767	0.002	4	0.0	2.043	A
B - East Arm	0	0	1646	0.000	0	0.0	0.000	A
C - South Arm	0	0	1788	0.000	0	0.0	0.000	A



ROUNDABOUT GEOMETRY – NEW JUNCTION 8						
Arm	Approach road half width (m)	Entry width (m)	Effective flare length (m)	Entry radius (m)	ICD (m)	Conflict angle (°)
North East	3.65	7	24.10	20.00	65.00	38.30
South East	3.65	7	33.50	20.00	65.00	36.60
South West	3.38	7	30.00	20.00	65.00	34.80
North West	3.65	7	28	20.00	65.00	37.60

wsp

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.0.6896

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: 8. New Junction 8.j9
Path: \\uk.wspgroup.com\central data\Projects\700575xx\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP Transport Planning\05 Analysis\2021 Junction Models\New junctions
Report generation date: 25/03/2021 14:57:04

»2031 Do Something, AM
»2031 Do Something, PM
»2048 Do Something, AM
»2048 Do Something, PM

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
2031 Do Something								
A - East Arm	0.0	0.00	0.00	A	0.0	0.00	0.00	A
B - South Arm	0.2	3.03	0.15	A	0.7	3.49	0.42	A
C - South West Arm	0.0	2.22	0.02	A	0.2	3.21	0.18	A
D - West Arm	1.0	4.15	0.48	A	0.2	2.45	0.13	A
2048 Do Something								
A - East Arm	0.1	4.61	0.07	A	0.0	2.41	0.04	A
B - South Arm	0.8	4.53	0.43	A	0.8	3.74	0.45	A
C - South West Arm	0.1	2.70	0.06	A	0.3	3.52	0.24	A
D - West Arm	28.8	58.80	1.00	F	0.3	2.67	0.21	A

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 average delay per arriving vehicle.

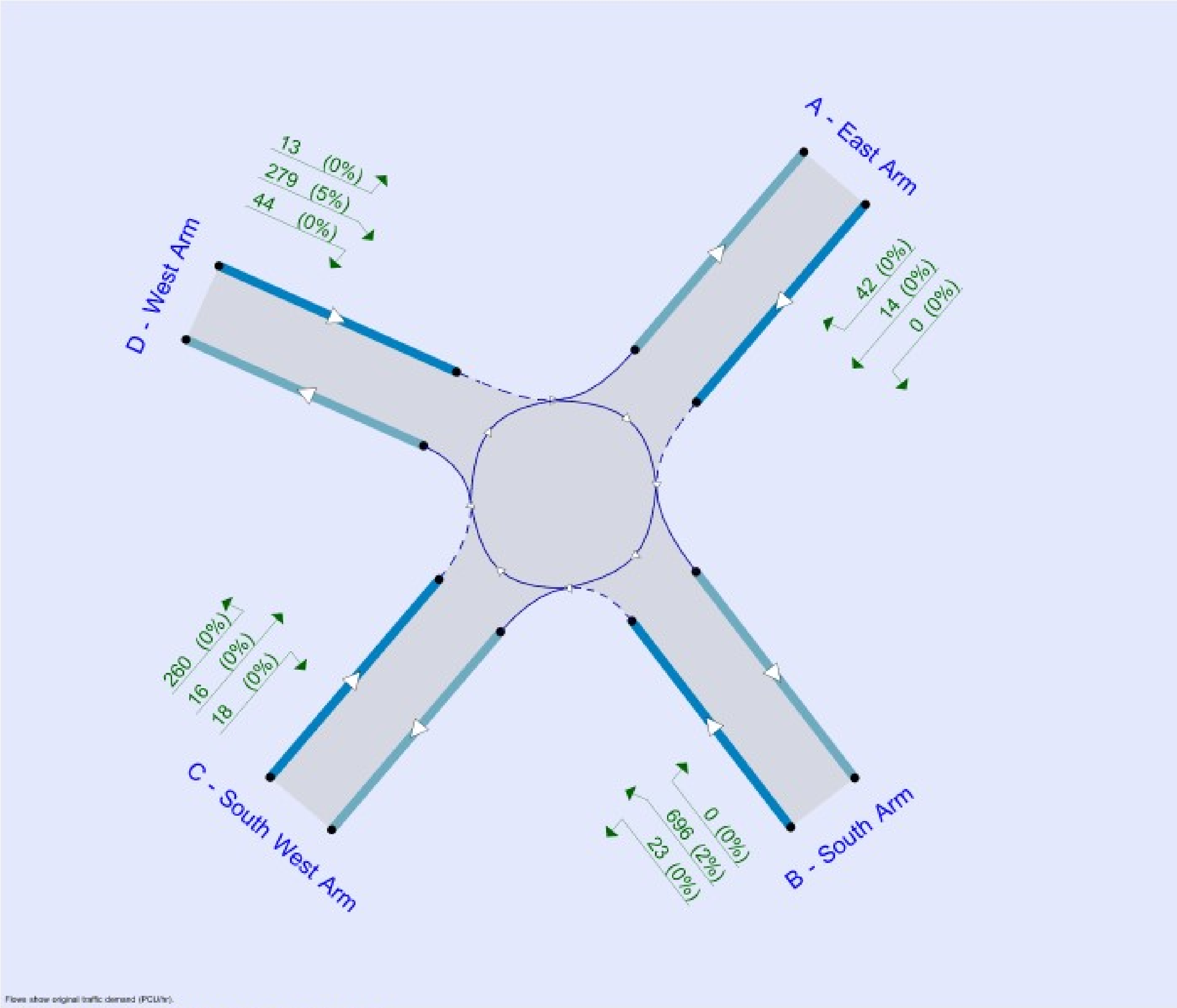
File summary

File Description

Title	
Location	
Site number	
Date	19/03/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\INVN01911
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		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	2031 Do Something	AM	ONE HOUR	07:45	09:15	15
D2	2031 Do Something	PM	ONE HOUR	16:45	18:15	15
D3	2048 Do Something	AM	ONE HOUR	07:45	09:15	15
D4	2048 Do Something	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2031 Do Something, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	B - South Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
8	New Junction 8	Standard Roundabout		A, B, C, D	3.84	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	East Arm	
B	South Arm	
C	South West Arm	
D	West Arm	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - East Arm	3.65	7.00	24.1	20.0	65.0	38.3	
B - South Arm	3.65	7.00	33.5	20.0	65.0	36.6	
C - South West Arm	3.38	7.00	30.0	20.0	65.0	34.8	
D - West Arm	3.65	7.00	28.0	20.0	65.0	37.6	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - East Arm	0.532	1756
B - South Arm	0.546	1832
C - South West Arm	0.540	1784
D - West Arm	0.538	1791

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	2031 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - East Arm		✓	0	100.000
B - South Arm		✓	243	100.000
C - South West Arm		✓	31	100.000
D - West Arm		✓	787	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - East Arm	B - South Arm	C - South West Arm	D - West Arm
From	A - East Arm	0	0	0	0
	B - South Arm	0	0	26	217
	C - South West Arm	0	0	0	31
	D - West Arm	0	674	113	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - East Arm	B - South Arm	C - South West Arm	D - West Arm
From	A - East Arm	0	0	0	0
	B - South Arm	0	0	0	30
	C - South West Arm	0	0	0	0
	D - West Arm	0	8	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - East Arm	0.00	0.00	0.0	A
B - South Arm	0.15	3.03	0.2	A
C - South West Arm	0.02	2.22	0.0	A
D - West Arm	0.48	4.15	1.0	A

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)	Unsignalised level of service
A - East Arm	0	590	1442	0.000	0	0.0	0.000	A
B - South Arm	183	85	1786	0.102	182	0.1	2.828	A
C - South West Arm	23	163	1697	0.014	23	0.0	2.151	A
D - West Arm	592	0	1791	0.331	590	0.5	3.195	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)	Unsignalised level of service
A - East Arm	0	707	1380	0.000	0	0.0	0.000	A
B - South Arm	218	101	1777	0.123	218	0.2	2.909	A
C - South West Arm	28	195	1679	0.017	28	0.0	2.179	A
D - West Arm	707	0	1791	0.395	707	0.7	3.542	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)	Unsignalised level of service
A - East Arm	0	865	1296	0.000	0	0.0	0.000	A
B - South Arm	268	124	1764	0.152	267	0.2	3.029	A
C - South West Arm	34	239	1656	0.021	34	0.0	2.219	A
D - West Arm	867	0	1791	0.484	865	1.0	4.145	A

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)	Unsignalised level of service
A - East Arm	0	866	1296	0.000	0	0.0	0.000	A
B - South Arm	268	124	1764	0.152	268	0.2	3.029	A
C - South West Arm	34	239	1656	0.021	34	0.0	2.219	A
D - West Arm	867	0	1791	0.484	866	1.0	4.155	A

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)	Unsignalised level of service
A - East Arm	0	709	1379	0.000	0	0.0	0.000	A
B - South Arm	218	102	1776	0.123	219	0.2	2.910	A
C - South West Arm	28	195	1679	0.017	28	0.0	2.181	A
D - West Arm	707	0	1791	0.395	709	0.7	3.555	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)	Unsignalised level of service
A - East Arm	0	593	1441	0.000	0	0.0	0.000	A
B - South Arm	183	85	1786	0.102	183	0.1	2.831	A
C - South West Arm	23	163	1696	0.014	23	0.0	2.151	A
D - West Arm	592	0	1791	0.331	593	0.5	3.211	A

2031 Do Something, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	B - South Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
8	New Junction 8	Standard Roundabout		A, B, C, D	3.25	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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	2031 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - East Arm		✓	0	100.000
B - South Arm		✓	698	100.000
C - South West Arm		✓	227	100.000
D - West Arm		✓	203	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - East Arm	B - South Arm	C - South West Arm	D - West Arm
From	A - East Arm	0	0	0	0
	B - South Arm	0	0	0	698
	C - South West Arm	0	11	0	216
	D - West Arm	0	181	22	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - East Arm	B - South Arm	C - South West Arm	D - West Arm
From	A - East Arm	0	0	0	0
	B - South Arm	0	0	0	2
	C - South West Arm	0	0	0	0
	D - West Arm	0	7	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - East Arm	0.00	0.00	0.0	A
B - South Arm	0.42	3.49	0.7	A
C - South West Arm	0.18	3.21	0.2	A
D - West Arm	0.13	2.45	0.2	A

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)	Unsignalised level of service
A - East Arm	0	161	1671	0.000	0	0.0	0.000	A
B - South Arm	525	17	1823	0.288	524	0.4	2.822	A
C - South West Arm	171	524	1502	0.114	170	0.1	2.704	A
D - West Arm	153	8	1787	0.086	152	0.1	2.338	A

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)	Unsignalised level of service
A - East Arm	0	192	1654	0.000	0	0.0	0.000	A
B - South Arm	627	20	1821	0.345	627	0.5	3.073	A
C - South West Arm	204	627	1446	0.141	204	0.2	2.897	A
D - West Arm	182	10	1786	0.102	182	0.1	2.383	A

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)	Unsignalised level of service
A - East Arm	0	235	1631	0.000	0	0.0	0.000	A
B - South Arm	769	24	1819	0.423	768	0.7	3.489	A
C - South West Arm	250	768	1370	0.182	250	0.2	3.212	A
D - West Arm	224	12	1785	0.125	223	0.2	2.447	A

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)	Unsignalised level of service
A - East Arm	0	236	1631	0.000	0	0.0	0.000	A
B - South Arm	769	24	1819	0.423	769	0.7	3.495	A
C - South West Arm	250	769	1370	0.182	250	0.2	3.213	A
D - West Arm	224	12	1785	0.125	224	0.2	2.447	A

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)	Unsignalised level of service
A - East Arm	0	193	1654	0.000	0	0.0	0.000	A
B - South Arm	627	20	1821	0.345	628	0.5	3.082	A
C - South West Arm	204	628	1446	0.141	204	0.2	2.900	A
D - West Arm	182	10	1786	0.102	183	0.1	2.385	A

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)	Unsignalised level of service
A - East Arm	0	161	1671	0.000	0	0.0	0.000	A
B - South Arm	525	17	1823	0.288	526	0.4	2.833	A
C - South West Arm	171	526	1501	0.114	171	0.1	2.709	A
D - West Arm	153	8	1787	0.086	153	0.1	2.339	A

2048 Do Something, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	B - South Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
8	New Junction 8	Standard Roundabout		A, B, C, D	41.99	E

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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	2048 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - East Arm		✓	50	100.000
B - South Arm		✓	588	100.000
C - South West Arm		✓	81	100.000
D - West Arm		✓	1611	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - East Arm	B - South Arm	C - South West Arm	D - West Arm
From	A - East Arm	0	0	25	25
	B - South Arm	0	0	5	583
	C - South West Arm	19	0	0	62
	D - West Arm	10	1123	478	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - East Arm	B - South Arm	C - South West Arm	D - West Arm
From	A - East Arm	0	0	0	0
	B - South Arm	0	0	0	10
	C - South West Arm	0	0	0	0
	D - West Arm	0	7	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - East Arm	0.07	4.61	0.1	A
B - South Arm	0.43	4.53	0.8	A
C - South West Arm	0.06	2.70	0.1	A
D - West Arm	1.00	58.80	28.8	F

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)	Unsignalised level of service
A - East Arm	38	1197	1120	0.034	38	0.0	3.325	A
B - South Arm	443	395	1617	0.274	441	0.4	3.361	A
C - South West Arm	61	456	1538	0.040	61	0.0	2.436	A
D - West Arm	1213	14	1784	0.680	1204	2.2	6.434	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)	Unsignalised level of service
A - East Arm	45	1431	995	0.045	45	0.0	3.786	A
B - South Arm	529	472	1574	0.336	528	0.6	3.779	A
C - South West Arm	73	546	1490	0.049	73	0.1	2.539	A
D - West Arm	1448	17	1782	0.813	1440	4.3	10.785	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)	Unsignalised level of service
A - East Arm	55	1697	854	0.064	55	0.1	4.506	A
B - South Arm	647	562	1525	0.424	646	0.8	4.497	A
C - South West Arm	89	668	1424	0.063	89	0.1	2.696	A
D - West Arm	1774	21	1780	0.996	1708	20.8	35.851	E

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)	Unsignalised level of service
A - East Arm	55	1731	836	0.066	55	0.1	4.610	A
B - South Arm	647	572	1520	0.426	647	0.8	4.534	A
C - South West Arm	89	669	1423	0.063	89	0.1	2.697	A
D - West Arm	1774	21	1780	0.996	1742	28.8	58.803	F

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)	Unsignalised level of service
A - East Arm	45	1534	940	0.048	45	0.1	4.022	A
B - South Arm	529	503	1557	0.339	530	0.6	3.854	A
C - South West Arm	73	548	1489	0.049	73	0.1	2.543	A
D - West Arm	1448	17	1782	0.813	1544	4.9	21.152	C

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)	Unsignalised level of service
A - East Arm	38	1216	1110	0.034	38	0.0	3.360	A
B - South Arm	443	401	1613	0.274	443	0.4	3.382	A
C - South West Arm	61	458	1537	0.040	61	0.0	2.440	A
D - West Arm	1213	14	1784	0.680	1223	2.3	6.877	A

2048 Do Something, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	B - South Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
8	New Junction 8	Standard Roundabout		A, B, C, D	3.39	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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	2048 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - East Arm		✓	56	100.000
B - South Arm		✓	719	100.000
C - South West Arm		✓	294	100.000
D - West Arm		✓	336	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - East Arm	B - South Arm	C - South West Arm	D - West Arm
From	A - East Arm	0	0	14	42
	B - South Arm	0	0	23	696
	C - South West Arm	16	18	0	260
	D - West Arm	13	279	44	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - East Arm	B - South Arm	C - South West Arm	D - West Arm
From	A - East Arm	0	0	0	0
	B - South Arm	0	0	0	2
	C - South West Arm	0	0	0	0
	D - West Arm	0	5	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - East Arm	0.04	2.41	0.0	A
B - South Arm	0.45	3.74	0.8	A
C - South West Arm	0.24	3.52	0.3	A
D - West Arm	0.21	2.67	0.3	A

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)	Unsignalised level of service
A - East Arm	42	256	1620	0.026	42	0.0	2.280	A
B - South Arm	541	75	1791	0.302	540	0.4	2.928	A
C - South West Arm	221	554	1486	0.149	221	0.2	2.844	A
D - West Arm	253	26	1778	0.142	252	0.2	2.455	A

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)	Unsignalised level of service
A - East Arm	50	306	1593	0.032	50	0.0	2.332	A
B - South Arm	646	90	1783	0.363	646	0.6	3.225	A
C - South West Arm	264	663	1427	0.185	264	0.2	3.095	A
D - West Arm	302	31	1775	0.170	302	0.2	2.544	A

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)	Unsignalised level of service
A - East Arm	62	375	1557	0.040	62	0.0	2.407	A
B - South Arm	792	110	1772	0.447	791	0.8	3.736	A
C - South West Arm	324	812	1347	0.240	323	0.3	3.518	A
D - West Arm	370	37	1771	0.209	370	0.3	2.674	A

17:30 - 17:45

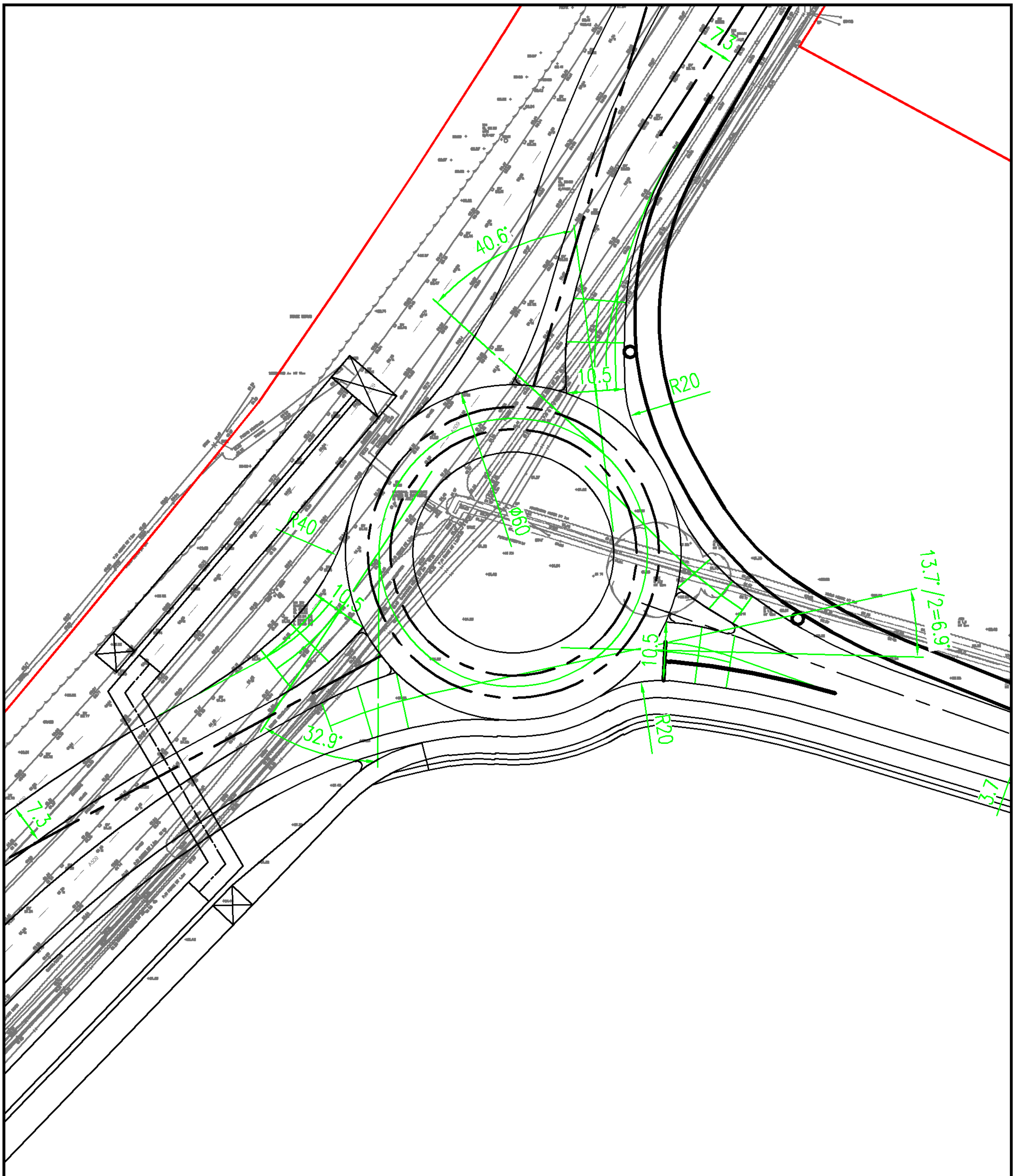
Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - East Arm	62	375	1557	0.040	62	0.0	2.407	A
B - South Arm	792	110	1772	0.447	792	0.8	3.742	A
C - South West Arm	324	813	1346	0.240	324	0.3	3.520	A
D - West Arm	370	37	1771	0.209	370	0.3	2.674	A

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)	Unsignalised level of service
A - East Arm	50	307	1593	0.032	50	0.0	2.334	A
B - South Arm	646	90	1783	0.363	647	0.6	3.233	A
C - South West Arm	264	664	1426	0.185	265	0.2	3.099	A
D - West Arm	302	31	1775	0.170	302	0.2	2.547	A

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)	Unsignalised level of service
A - East Arm	42	257	1620	0.026	42	0.0	2.283	A
B - South Arm	541	75	1791	0.302	542	0.4	2.941	A
C - South West Arm	221	556	1484	0.149	222	0.2	2.852	A
D - West Arm	253	26	1778	0.142	253	0.2	2.458	A



ROUNDABOUT GEOMETRY – NEW JUNCTION 9						
Arm	Approach road half width (m)	Entry width (m)	Effective flare length (m)	Entry radius (m)	ICD (m)	Conflict angle (°)
North	7.30	10.50	18.10	20.00	60.00	40.60
East	3.65	10.50	31.10	20.00	60.00	6.90
South	7.30	10.50	14.90	40.00	60.00	32.90

Junctions 9

ARCADY 9 - Roundabout Module

Filename: 9. New Junction 9.j9
Path: \\uk.wspgroup.com\central data\Projects\700575xx\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP Transport Planning\05 Analysis\2021 Junction Models\New junctions
Report generation date: 25/03/2021 15:00:02

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2031 Do Something							
A - North Arm	3.7	6.57	0.78	A	0.7	2.32	0.40	A
B - East Arm	0.3	3.43	0.17	A	1.2	4.23	0.54	A
C - West Arm	0.4	2.04	0.29	A	2.9	5.55	0.74	A
	2048 Do Something							
A - North Arm	158.4	184.28	1.12	F	1.1	2.91	0.52	A
B - East Arm	0.9	4.31	0.45	A	1.8	5.86	0.64	A
C - West Arm	0.6	2.49	0.36	A	1.7	3.88	0.62	A

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 average delay per arriving vehicle.

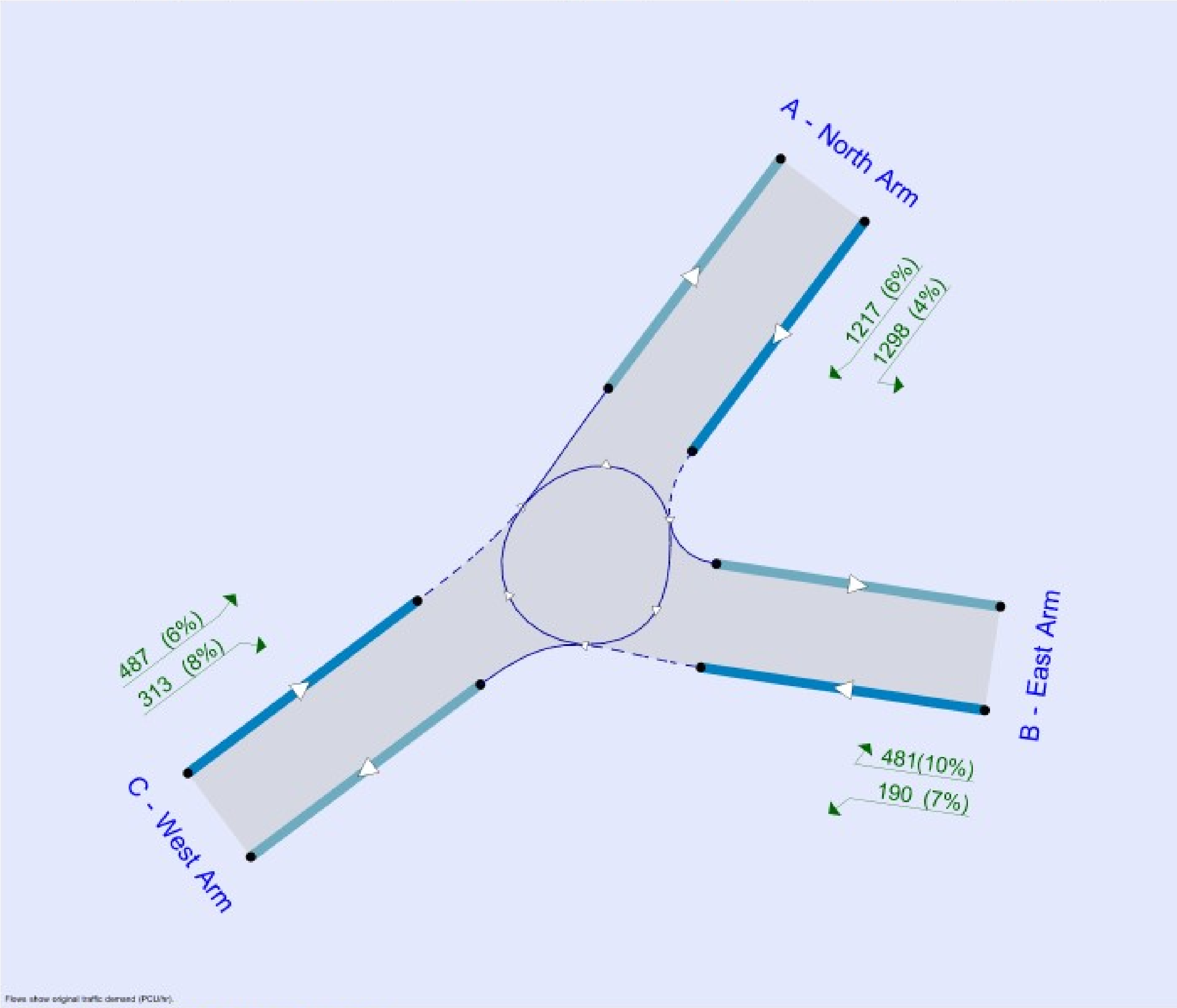
File summary

File Description

Title	
Location	
Site number	
Date	19/03/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\INVN01911
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		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	2031 Do Something	AM	ONE HOUR	07:45	09:15	15
D2	2031 Do Something	PM	ONE HOUR	16:45	18:15	15
D3	2048 Do Something	AM	ONE HOUR	07:45	09:15	15
D4	2048 Do Something	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2031 Do Something, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	B - East Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
9	New Junction 9	Standard Roundabout		A, B, C	5.18	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	North Arm	
B	East Arm	
C	West Arm	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - North Arm	7.30	10.50	18.1	20.0	60.0	40.6	
B - East Arm	3.65	10.50	31.1	20.0	60.0	6.9	
C - West Arm	7.30	10.50	14.9	40.0	60.0	32.9	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - North Arm	0.725	2727
B - East Arm	0.718	2510
C - West Arm	0.756	2827

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	2031 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - North Arm		✓	1894	100.000
B - East Arm		✓	248	100.000
C - West Arm		✓	700	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	717	1177
	B - East Arm	193	0	55
	C - West Arm	630	70	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	7	7
	B - East Arm	34	0	0
	C - West Arm	8	5	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - North Arm	0.78	6.57	3.7	A
B - East Arm	0.17	3.43	0.3	A
C - West Arm	0.29	2.04	0.4	A

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)	Unsignalised level of service
A - North Arm	1426	53	2689	0.530	1421	1.2	3.027	A
B - East Arm	187	883	1875	0.100	186	0.1	2.656	A
C - West Arm	527	145	2717	0.194	526	0.3	1.769	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)	Unsignalised level of service
A - North Arm	1703	63	2681	0.635	1700	1.8	3.915	A
B - East Arm	223	1057	1751	0.127	223	0.2	2.935	A
C - West Arm	629	173	2696	0.233	629	0.3	1.875	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)	Unsignalised level of service
A - North Arm	2085	77	2671	0.781	2078	3.7	6.412	A
B - East Arm	273	1291	1582	0.173	273	0.3	3.426	A
C - West Arm	771	212	2666	0.289	770	0.4	2.045	A

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)	Unsignalised level of service
A - North Arm	2085	77	2671	0.781	2085	3.7	6.567	A
B - East Arm	273	1296	1579	0.173	273	0.3	3.434	A
C - West Arm	771	212	2666	0.289	771	0.4	2.045	A

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)	Unsignalised level of service
A - North Arm	1703	63	2681	0.635	1710	1.9	3.995	A
B - East Arm	223	1063	1746	0.128	223	0.2	2.947	A
C - West Arm	629	174	2695	0.233	630	0.3	1.879	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)	Unsignalised level of service
A - North Arm	1426	53	2689	0.530	1429	1.2	3.062	A
B - East Arm	187	888	1872	0.100	187	0.1	2.661	A
C - West Arm	527	145	2717	0.194	527	0.3	1.772	A

2031 Do Something, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	B - East Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
9	New Junction 9	Standard Roundabout		A, B, C	4.32	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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	2031 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - North Arm		✓	995	100.000
B - East Arm		✓	914	100.000
C - West Arm		✓	1704	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	189	806
	B - East Arm	347	0	567
	C - West Arm	1690	14	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	7	4
	B - East Arm	3	0	1
	C - West Arm	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - North Arm	0.40	2.32	0.7	A
B - East Arm	0.54	4.23	1.2	A
C - West Arm	0.74	5.55	2.9	A

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)	Unsignalised level of service
A - North Arm	749	11	2719	0.275	748	0.4	1.906	A
B - East Arm	688	606	2075	0.332	686	0.5	2.635	A
C - West Arm	1283	260	2630	0.488	1279	1.0	2.710	A

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)	Unsignalised level of service
A - North Arm	894	13	2718	0.329	894	0.5	2.063	A
B - East Arm	822	724	1989	0.413	821	0.7	3.133	A
C - West Arm	1532	312	2591	0.591	1530	1.5	3.454	A

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)	Unsignalised level of service
A - North Arm	1096	15	2716	0.403	1095	0.7	2.320	A
B - East Arm	1006	887	1873	0.537	1004	1.2	4.211	A
C - West Arm	1876	381	2538	0.739	1871	2.8	5.454	A

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)	Unsignalised level of service
A - North Arm	1096	15	2716	0.403	1096	0.7	2.322	A
B - East Arm	1006	887	1872	0.538	1006	1.2	4.230	A
C - West Arm	1876	382	2538	0.739	1876	2.9	5.545	A

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)	Unsignalised level of service
A - North Arm	894	13	2718	0.329	895	0.5	2.067	A
B - East Arm	822	725	1989	0.413	823	0.7	3.147	A
C - West Arm	1532	313	2590	0.591	1537	1.5	3.506	A

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)	Unsignalised level of service
A - North Arm	749	11	2719	0.275	750	0.4	1.913	A
B - East Arm	688	607	2073	0.332	689	0.5	2.646	A
C - West Arm	1283	262	2629	0.488	1285	1.0	2.735	A

2048 Do Something, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	B - East Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
9	New Junction 9	Standard Roundabout		A, B, C	117.50	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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	2048 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - North Arm		✓	2515	100.000
B - East Arm		✓	671	100.000
C - West Arm		✓	800	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	1298	1217
	B - East Arm	481	0	190
	C - West Arm	487	313	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	4	6
	B - East Arm	10	0	7
	C - West Arm	6	8	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - North Arm	1.12	184.28	158.4	F
B - East Arm	0.45	4.31	0.9	A
C - West Arm	0.36	2.49	0.6	A

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)	Unsignalised level of service
A - North Arm	1893	235	2556	0.741	1882	2.9	5.508	A
B - East Arm	505	911	1856	0.272	504	0.4	2.902	A
C - West Arm	602	361	2554	0.236	601	0.3	1.967	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)	Unsignalised level of service
A - North Arm	2261	281	2523	0.896	2241	8.0	12.565	B
B - East Arm	603	1084	1731	0.349	603	0.6	3.480	A
C - West Arm	719	432	2500	0.288	719	0.4	2.158	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)	Unsignalised level of service
A - North Arm	2769	344	2477	1.118	2461	84.9	75.258	F
B - East Arm	739	1191	1654	0.447	738	0.9	4.282	A
C - West Arm	881	529	2427	0.363	880	0.6	2.483	A

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)	Unsignalised level of service
A - North Arm	2769	345	2477	1.118	2475	158.4	181.311	F
B - East Arm	739	1198	1649	0.448	739	0.9	4.315	A
C - West Arm	881	530	2426	0.363	881	0.6	2.486	A

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)	Unsignalised level of service
A - North Arm	2261	282	2523	0.896	2506	97.1	184.281	F
B - East Arm	603	1213	1638	0.368	604	0.6	3.801	A
C - West Arm	719	433	2499	0.288	720	0.4	2.160	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)	Unsignalised level of service
A - North Arm	1893	236	2556	0.741	2269	3.2	38.720	E
B - East Arm	505	1098	1721	0.294	506	0.5	3.234	A
C - West Arm	602	363	2552	0.236	603	0.3	1.971	A

2048 Do Something, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	B - East Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
9	New Junction 9	Standard Roundabout		A, B, C	4.08	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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	2048 Do Something	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	Average Demand (PCU/hr)	Scaling Factor (%)
A - North Arm		✓	1282	100.000
B - East Arm		✓	999	100.000
C - West Arm		✓	1414	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	289	993
	B - East Arm	390	0	609
	C - West Arm	1366	48	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	5	3
	B - East Arm	3	0	1
	C - West Arm	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
A - North Arm	0.52	2.91	1.1	A
B - East Arm	0.64	5.86	1.8	A
C - West Arm	0.62	3.88	1.7	A

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)	Unsignalised level of service
A - North Arm	965	36	2701	0.357	963	0.6	2.140	A
B - East Arm	752	746	1974	0.381	750	0.6	2.986	A
C - West Arm	1065	293	2605	0.409	1062	0.7	2.373	A

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)	Unsignalised level of service
A - North Arm	1152	43	2696	0.428	1152	0.8	2.410	A
B - East Arm	898	892	1869	0.481	897	0.9	3.764	A
C - West Arm	1271	350	2562	0.496	1270	1.0	2.837	A

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)	Unsignalised level of service
A - North Arm	1412	53	2689	0.525	1410	1.1	2.910	A
B - East Arm	1100	1092	1725	0.638	1097	1.8	5.800	A
C - West Arm	1557	428	2503	0.622	1554	1.7	3.856	A

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)	Unsignalised level of service
A - North Arm	1412	53	2689	0.525	1411	1.1	2.915	A
B - East Arm	1100	1093	1724	0.638	1100	1.8	5.865	A
C - West Arm	1557	429	2502	0.622	1557	1.7	3.882	A

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)	Unsignalised level of service
A - North Arm	1152	43	2696	0.428	1154	0.8	2.417	A
B - East Arm	898	894	1868	0.481	901	1.0	3.806	A
C - West Arm	1271	352	2561	0.496	1274	1.0	2.856	A

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)	Unsignalised level of service
A - North Arm	965	36	2701	0.357	966	0.6	2.148	A
B - East Arm	752	748	1972	0.381	753	0.6	3.010	A
C - West Arm	1065	294	2604	0.409	1066	0.7	2.386	A

Appendix P

FUTURE YEAR JUNCTION VOLUME OVER CAPACITY (VOC) DATA

20210104_Junctions to be assessed in TA_MKE.xlsx

VersionCtrl

Log of the modifications made to this workbook

Model Map

Version Number	Modification Date	Developer	Comment	Review		
				Reviewed By	Date	Comment
v1.00	*04 Jan 2021*	*APS*	*Issue to MKC officers*			

JUNCTION SUMMARY

Junction Names	To be assessed?	Notes
Core Junctions		
M1 J14 and Northfields Roundabout	Yes - Paramics	The strategic modelling does not suggest that there will be a material impact. However, this will be completed within the Paramics microsimulation model.
Tongwell Street Roundabout	Yes	The VOC shows improvements in the DS scenario, however will be assessed due to its importance in the local network
Willen Road Roundabout	Yes	The DS scenario shows minor changes at the junction, however will be assessed due to proximity and local importance
Pagoda Roundabout	Yes	The DS scenario does not indicate any material effect at the junction. This will be confirmed within Junctions 9 modelling
Woolstone Roundabout	Yes	The DS scenario shows an improvement over the DM, however will be confirmed in the TA
Blakelands Roundabout	Yes	The DS scenario shows an improvement over the DM, however will be confirmed in the TA
Fox Milne	Yes	The DS scenario does not indicate any material effect at the junction. This will be confirmed within Junctions 9 modelling
Pineham Roundabout	Yes	The VOC analysis does not show a material change overall, but does show an increase in VOC. Due to the importance of the junction with the new infrastructure - this will be assessed in detail
Renny Lodge Roundabout	Yes	The VOC shows increases in the DS scenario and this will be assessed in the TA.
Tickford Roundabout	Yes	The DS scenario shows an improvement over the DM, however will be confirmed in the TA
Marsh End Roundabout	Yes	The DS scenario shows an improvement over the DM, however will be confirmed in the TA
Tongwell Street / Carleton Gate	Yes	The DS scenario, which proposes to upgrade this junction to a roundabout shows changes to the VOC. As such, this will be reviewed in detail in the TA.
M1 J13	Yes - Link flow check	The DS shows a minor change compared to the DM. As agreed, we will review the link flow changes in the TA.
Additional Junctions – following review		
Marshend Rd/Wolverton	Yes - Link flow check	The VOC analysis does not show a material change overall, however a link / turning flow check of the junction will be undertaken in the TA.
High Street/St. John Street	Yes - Link flow check	The VOC analysis does not show a material change overall, however a link / turning flow check of the junction will be undertaken in the TA.
A509 / A422 Newport Road - Chicheley Hill Roundabout	Yes	The VOC analysis shows an increase in the AM in 2048, so a more detailed review of the junction will be in the TA.
Development Junctions – DS Only		
New Signals 1 - Willen Road (Bloor / Segro Access)	Yes	The signals junction will be checked to ascertain that the designs remain appropriate
New Signals 2 - Willen Road (New Willen Link Road)	Yes	The signals junction will be checked to ascertain that the designs remain appropriate
Jcts 1 to 9	Yes	The development roundabout and junctions will be assessed to ensure that the designs are appropriate.

DETAILED VOC REVIEW

						DO SOMETHING		DO MINIMUM							
JUNCTION	DS Nodes	DM Nodes	DS NODE A	DS NODE B	Check (if junction in DM)	VC_AM_DS	VC_PM_DS	VC_AM_DM	VC_PM_DM	VC_AM_DIFF	VC_PM_DIFF	VC_AM_DIFF %	VC_PM_DIFF %	Assessed	Further Notes
Core Junctions															
M1 J14 and Northfields Roundabout	2701						Complex multi-node junction							Yes - Paramics	The strategic results are not considered to show a material impact - however this will be tested in microsimulation
Tongwell Street Roundabout;	1302	1302	487807	241720	1302	33.99	11.27	92.32	92.52	-58.33	-81.25	-63%	-88%	Yes - Junctions 9	improved performance
Willen Road Roundabout;	1300	1300	486930	241265	1300	82.28	87.52	83.38	80.19	-1.1	7.33	-1%	9%	Yes - Junctions 9	Impacts are not considered material, however will be assessed
Pagoda Roundabout;	1326	1326	487319	240341	1326	96.79	102.27	95.9	101.27	0.89	1	1%	1%	Yes - Junctions 9	Minor changes
Woolstone Roundabout;	1372		487658	239527	1372	94.78	103.02	97.28	103.13	-2.5	-0.11	-3%	0%	Yes - Junctions 9	improved performance
Blakelands Roundabout;	5715		486494	241732	5715	110.75	96.16	111.45	97.9	-0.7	-1.74	-1%	-2%	Yes - Junctions 9	improved performance
	5311		488752	239761	5311	61.03	51.83	59.12	54.25	1.91	-2.42	3%	-4%		
	5312		488773	239722	5312	44.52	36.25	44.59	37.11	-0.07	-0.86	0%	-2%		
Fox Milne;	5313		488728	239690	5313	70.62	61.66	69.79	61.67	0.83	-0.01	1%	0%	Yes - Junctions 9 / LinSig	VOC not high enough, however will be assessed
	5310		488698	239730	5310	34.94	32.49	33.8	32.45	1.14	0.04	3%	0%		
					Average	52.7775	45.5575	51.825	46.37	0.9525	-0.8125	2%	-2%		
	4165	1305	488408	240404	4165	50.48	58.85	43.44	58.23	7.04	0.62	16%	1%		
	4162	1306	488416	240356	4162	76.51	48.72	69.32	47.35	7.19	1.37	10%	3%		
Pineham Roundabout;	1329	1307	488381	240347	1329	49.81	41.16	43.48	38.18	6.33	2.98	15%	8%	Yes - Junctions 9 / LinSig	Proximity to site
	4166	1308	488365	240394	4166	46.19	50.14	39.12	49.69	7.07	0.45	18%	1%		
					Average	55.7475	49.7175	48.84	48.3625	6.9075	1.355	14%	3%		
Renny Lodge Roundabout;	1928		488860	242913	1928	46.26	90.22	44.08	82.41	2.18	7.81	5%	9%	Yes - Junctions 9	Small increase in VOC
Tickford Roundabout	5515		488745	242865	5515	103.87	101.01	114.23	107.7	-10.36	-6.69	-9%	-6%	Yes - Junctions 9	Improved performance - proximity to site
	99609		487781	242671	99609	55.28	49.19	54.44	54.38	0.84	-5.19	2%	-10%		
	99613		487789	242582	99613	48.6	41.41	48.72	39.92	-0.12	1.49	0%	4%		
Marsh End Roundabout.	99612		487730	242557	99612	52.66	46.36	53.73	55.45	-1.07	-9.09	-2%	-16%	Yes - Junctions 9	Improved performance - proximity to site
	99608		487709	242644	99608	36.7	52.79	39.43	62.33	-2.73	-9.54	-7%	-15%		
					Average	48.31	47.4375	49.08	53.02	-0.77	-5.5825	-2%	-11%		
Tongwell Street / Carleton Gate	1327		488191	241386	1327	95.26	83.82	81.15	78.87	14.11	4.95	17%	6%	Yes - Junctions 9	Proximity to site / infrastructure
M1 J13						Complex multi-node junction								Yes - Link flow check	The strategic modelling does not suggest any material change - however, further review of the link flows will be completed.
Additional Junction															
Marshend Rd/Wolverton	1227		487201	243748	1227	101.37	99.95	104.18	96.9	-2.81	3.05	-3%	3%	Yes - link flow change	Junction already over capacity in DM, DS shows some change - but not material, link flow review in TA.
High Street/St. John Street	1228		487653	243941	1228	86.13	88.67	82.66	89.65	3.47	-0.98	4%	-1%	Yes - link flow change	Junction already over capacity in DM, DS shows some change - but not material, link flow review in TA.
A509 / A422 Newport Road - Chicheley Hill Roundabout	91237		489721	245614	91237	90.54	45.13	76.1	48.39	14.44	-3.26	19%	-7%	Yes - Junctions 9	Increases in AM, further assessment required
New Signals - Willen Road	99571		487876	242077	99571	85.9	81.08	60.32	74.81	25.58	6.27	42%	8%	Yes - LinSig	Outline signals to be checked
New Signals - Willen Road	99701		487803	242411	NO	85.45	68.06	0	0	0	0	0%	0%	Yes - LinSig	Outline signals to be checked
MKE Development Junctions (DS Only)															
Jct 1	99578		488113	241516	99578	99.74	91.79	82.62	82.18	17.12	9.61	21%	12%	Yes - Junctions 9	
Jct 2	99707		488245	242006	NO	49.88	67.78	0	0	0	0	0%	0%	Yes - Junctions 9	
Jct 3	99700		489036	242211	NO	62.54	59.48	0	0	0	0	0%	0%	Yes - Junctions 9	
Jct 4	99702		489119	241625	NO	20	19.38	0	0	0	0	0%	0%	Yes - Junctions 9	
Jct 5	99703		489452	241514	NO	64.2	35.36	0	0	0	0	0%	0%	Yes - Junctions 9	Development junctions to be checked and summarised in TA
Jct 6	99705		489839	241770	NO	47.49	29.68	0	0	0	0	0%	0%	Yes - Junctions 9	
Jct 7	99709		490101	241351	NO	21.09	17.3	0	0	0	0	0%	0%	Yes - Junctions 9	
Jct 8	99704		489739	243042	NO	43.71	22.42	0	0	0	0	0%	0%	Yes - Junctions 9	
Jct 9	99546		489214	243158	99546	57.71	46.58	30.92	36.08	26.79	10.5	87%	29%	Yes - Junctions 9	

Appendix Q

M1 JUNCTION 14 - AMEY / ARUP JV'S TECHNICAL NOTE 09

Public

PSCRG Technical Note 09

Project:	M1 J13-16 SM-ALR	To:	PSCRG
Subject:	Merge & Diverge Layout Types	From:	Cliff Topham-Steele
Date:	12th January 2017	Cc:	-

Revision	Purpose and/or Description	Author	Checked	Approved	PSCRG Status
0	PSCRG Endorsement	Cliff Topham-Steele	Matt Bithall	Neil O'Leary	For Endorsement
1	Post Meeting Update	Cliff Topham-Steele	Matt Bithall	Neil O'Leary	Endorsed

1. Purpose of this Note

This Technical Note (TN) has been prepared by Amey/Arup Joint Venture as Designer for the M1 J13- J16 Smart Motorway to provide a summary of the Relaxations from Standard that are proposed to accommodate the proposed junction layouts and layouts which require PSCRG endorsement.

This note also provides information to justify the overall junction design rationale and includes an update to the modelling outputs since DF1 when the junction strategy was first produced.

This TN is issued for consideration to the Project Safety Control Review Group (PSCRG) prior to DF3. Most of the proposed junction layouts permitted relaxations in accordance with IAN161/15 however two layouts require PSCRG endorsement.

PSCRG is asked to endorse:

- **Junction 14 Southbound Diverge as a Type A**
- **Junction 14 Northbound Merge as a Type B**

2. Background

AECOM were commissioned to develop an Operational Concept design for M1 J13 – J16, sufficient to be approved at "Design Fix 1". The process included overall endorsement by the Operational Technical Leadership Group (TLG) following Smart Motorway Programme (SMP) review of several technical notes that supported the overall intervention. AECOM, working collaboratively with other suppliers and the Highways England SMP, produced Technical Note 4 (TN4) Highways Design Strategy Record which included proposed junction layouts.

3. Standards

The preliminary study is based on IAN 161/15, IAN 149/11 and TD22/06. These requirements have been assessed against the scheme constraints and suitable relaxations identified where required.

IAN 161/15 states;

On an ALR scheme, the permanent conversion of the hard shoulder on the main line to a running lane also applies intra-junction and is the preferred operational regime, as it offers benefits in terms of a consistent customer experience. However, this shall be assessed on a junction by junction basis (including scheme terminal junctions). TJR for ALR schemes should be provided where this has been determined as the most appropriate layout following analysis of the design year traffic flows (mainline and connector road requirements) and any operational or physical constraints. Proposals for each junction on an ALR scheme (including the terminal junctions/interchanges) shall be endorsed by the PSCRG, Operations technical leadership group (TLG) and Project Board.

For Merges;

If the indicated layouts from TD 22/06 Figure 2/3 MW are not practicable within the scheme constraints, the layout may be amended by either of the following methods:

a) the Road Class in TD22/06 Table 4/3 may be relaxed to the 'Rural All-Purpose 120kph' as described in paragraphs 3.4.4 and 3.4.5 of IAN 149/11.

This amends TD22/06 paragraph 4.22.

The layout type and geometric parameter shall be recorded in the DSR.

b) where constraints exist (physical, environmental, operational or financial) the provision of a substitute layout that differs from that defined in TD22/06 Figure 2/3 MW may be used, and is an acceptable relaxation, with the exception of a merge Layout A, B or D as a substitute for a Layout F or G which shall be endorsed by the PSCRG.

The use of Layout H as a substitute for a Layout F is a permitted relaxation. This amends TD22/06 paragraph 2.30 and Figure 2/4.5.

The layouts derived from TD22/06 Figure 2/3 MW and any substitute layouts proposed shall be recorded in the DSR. The DSR shall also record the constraints on any given layout, justifying the proposal for a substitute layout, and any impacts the proposed layout will have on network performance and safety.

And for Diverges;

If the indicated layouts from TD 22/06 Figure 2/5 MW are not practicable within the scheme constraints, the layout may be amended by either of the following methods:

a) The Road Class in TD22/06 Table 4/4 may be relaxed to the 'Rural All-Purpose 120kph' as described in paragraphs 3.4.6 to 3.4.8 of IAN 149/11.

This amends TD 22/06 paragraph 4.22.

The layout type and geometric parameter shall be recorded in the DSR.

b) The provision of a substitute layout that differs from that defined in TD22/06 Figure 2/5 MW may be used, and is an acceptable relaxation, with the exception of a *diverge Layout C, B or A as a substitute for a Layout E and a diverge Layout A as a substitute for a Layout D. These substitutions shall be endorsed by the PSCRG.*

The layouts derived from TD22/06 Figure 2/5 MW and any substitute layouts proposed shall be recorded in the DSR. The DSR shall also record the constraints on any given layout, justifying the proposal for a substitute layout, and any impacts the proposed layout will have on network performance and safety.

4. Traffic Flow Forecasts

In October 2016, revised traffic flow forecasts were provided by the Lot 5 consultants (AECOM) for design years 2021 and 2036. The forecast years are representative of the opening year and design year respectively.

This data has been derived from the AECOM M1 J13-16 SMP Traffic Model and is consistent with DfT NTEM v7 trip end forecasts, and assumes and assumes lane drop/lane gain through J13 and All Lane Running (ALR) north of J13.

The total vehicle flows and HDV % are summarised in Tables 3.1 and 3.2.

Northbound	**AM Peak Hour**		**Inter Peak**		**PM Peak Hour**	
	Total Vehicles	**% HDV**	**Total Vehicles**	**% HDV**	**Total Vehicles**	**% HDV**
Mainline J12 to J13 NB	5321	10.9%	4871	16.2%	5792	9.2%
Diverge J13 NB	872	3.4%	604	5.1%	1035	2.1%
Mainline Through J13 NB	4449	12.4%	4266	17.8%	4757	10.8%
Merge J13 NB	1179	6.7%	1051	7.3%	1247	4.1%
Mainline J13 to J14 NB Merge	5626	11.2%	5316	15.8%	5998	9.5%
Mainline J13 to J14 NB	5626	11.2%	5316	15.8%	5998	9.5%
Diverge J14 NB	1790	4.2%	1265	6.1%	1912	2.0%
Mainline Through J14 NB	3837	14.5%	4050	18.8%	4085	13.0%
Merge J14 NB	1437	6.4%	1440	6.2%	1599	3.5%
Mainline J14 to J15 NB	5269	12.3%	5485	15.6%	5681	10.3%
Diverge J15 NB	953	7.0%	925	8.7%	1374	4.1%
Mainline Through J15 NB	4316	13.5%	4560	16.9%	4307	12.3%
Merge J15 NB	1208	13.6%	900	14.8%	1156	6.4%
Mainline J15 to J15a NB	5524	13.5%	5460	16.6%	5462	11.1%
Diverge J15a NB	574	6.2%	619	5.1%	507	3.4%
Mainline Through J15a NB	4949	14.4%	4841	18.1%	4955	11.9%
Merge J15a NB	617	4.4%	659	8.5%	551	2.3%
Mainline J15a to J16 NB	5566	13.3%	5498	16.9%	5504	10.9%
Diverge J16 NB	742	11.3%	595	13.6%	817	6.6%
Mainline Through J16 NB	4824	13.6%	4903	17.3%	4687	11.7%
Merge J16 NB	628	21.8%	551	23.6%	621	14.9%
Mainline J16 to J17 NB	5454	14.5%	5454	18.0%	5310	12.1%

Table 1 - Northbound 2036 DS Peak Hour Traffic Flow Forecasts

Southbound	AM Peak Hour		Inter Peak		PM Peak Hour	
	Total Vehicles	% HDV	Total Vehicles	% HDV	Total Vehicles	% HDV
Mainline J17 to J16 SB	5546	14.2%	4640	19.2%	5846	11.4%
Diverge J16 SB	772	10.3%	519	16.1%	711	11.5%
Mainline Through J16 SB	4774	14.9%	4121	19.6%	5135	11.4%
Merge J16 SB	824	11.5%	461	17.3%	543	12.8%
Mainline J16 to J15a SB	5599	14.4%	4581	19.4%	5678	11.6%
Diverge J15a SB	465	14.7%	538	24.2%	796	6.2%
Mainline Through J15a SB	5134	14.3%	4043	18.8%	4882	12.4%
Merge J15a SB	947	2.7%	829	4.8%	1151	2.6%
Mainline J15a to J15 SB	6085	12.5%	4873	16.4%	6039	10.5%
Diverge J15 SB	1307	5.2%	1063	11.3%	1181	8.0%
Mainline Through J15 SB	4778	14.4%	3810	17.8%	4858	11.1%
Merge J15 SB	1188	11.5%	845	13.2%	784	6.5%
Mainline J15 to J14 SB	5969	13.8%	4656	16.9%	5643	10.4%
Diverge J14 SB	1848	5.7%	980	9.5%	1088	6.2%
Mainline Through J14 SB	4121	17.5%	3676	18.9%	4555	11.4%
Merge J14 SB	1294	4.3%	930	7.7%	898	1.6%
Mainline J14 to J13 SB	5416	14.3%	4607	16.7%	5456	9.8%
Diverge J13 SB	1012	11.6%	781	14.7%	1027	5.6%
Mainline Through J13 SB	4404	14.9%	3826	17.1%	4429	10.7%
Merge J13 SB	1101	3.5%	808	3.7%	986	1.5%

Table 2 - Southbound 2036 DS Peak Hour Traffic Flow Forecasts

5. Junction Design

For DF2 and DF3 each merge and diverge location was re-assessed using the latest traffic figures summarised in Tables 1 and 2 and compared with the DF1 proposals. Table 3 below summarises the proposed layouts based on the latest NTEM 7 traffic figures. A more detailed description of the layouts are given in the following paragraphs.

Junction	Slip Road	Junction Type	Nose Length	Nose Ratio	Length of Taper	Aux. Lane Length	DfS or Relaxation
J13	Northbound Merge	E	115m	1:40	-	-	-
	Southbound Diverge	C	80m	1:15	170m	-	-
J14	Northbound Diverge	B	80m	1:15	170m	180m (ghost island)	Relaxation

	Northbound Merge	B	115m	1:40	75m	230m	Relaxation (PSCRG endorsement required. Given 12-01-2017)
	Southbound Diverge	A	80m	1:15	185m	-	Relaxation (PSCRG endorsement required. Given 12-01-2017)
	Southbound Merge	C	115m	1:40	205m	180m (ghost island)	Relaxation
J15	Northbound Diverge	B	80m	1:15	170m	180m (ghost island)	Relaxation
	Northbound Merge	B	115m	1:40	75m	230m	Relaxation
	Southbound Diverge	B	80m	1:15	170m	180m (ghost island)	Relaxation
	Southbound Merge	B	115m	1:40	75m	230m	Relaxation
J15a	Northbound Diverge	A	80m	1:15	185m	-	Relaxation
	Northbound Merge	A	115m	1:40	205m	-	Relaxation
	Southbound Diverge	A	80m	1:15	185m	-	Relaxation
	Southbound Merge	B	115m	1:40	75m	230m	Relaxation
J16	Northbound Diverge	A	80m	1:15	170m	-	Relaxation
	Southbound Merge	D	115m	1:40	205m	-	Relaxation

A description of the design development and rationale are included below. Existing dimensions are approximate only, as measured from available survey information. Diagrams of standard layout types are shown in Appendix A

1.1 Junction 13 Northbound Merge

The existing layout is a non-standard auxiliary lane arrangement based on a Type B Merge.

Using the current traffic figures TD 22/06 recommends that a Type E lane gain merge (3 lanes to 4) should be provided.

AECOM TN4 also proposed a Type E lane gain merge layout for DF1. Table 3 compares the layouts proposed at each design freeze stage up to the current DF3 stage.

As Through Junction Running (TJR) is not proposed at this location a lane gain arrangement will be required so the current proposals would therefore provide a Type E Lane Gain layout. This would be consistent with the predicted traffic figures and the requirements of TD22/06 and would therefore comply with standards.

	Type	Overlap	Nose			Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B	-	70m	1:24		70m	135m	-
DF1 Proposal	Type E	-	115m	1:40		-	-	-
DF2 Proposal	Type E	-	115m	1:40		-	-	-
DF3 Proposal	Type E	-	115m	1:40		-	-	-

Table 3 - J13 Northbound Merge Dimensions

1.2 Junction 13 Southbound Diverge

The existing layout for this junction is a non-standard Type B Single Lane Parallel Diverge. Using the current traffic figures, TD 22/06 recommends that a Type C lane drop diverge (4 lanes to 3) should be provided.

As Through Junction Running is not proposed at this location, a lane drop would not be appropriate so the current proposals would therefore provide a Type C Lane Drop layout. This would be consistent with the predicted traffic figures and the requirements of TD22/06 and would therefore comply with standards.

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	150m	1:19	-	70m	115m	70m
DF1 Proposal	Type C	-	80m	1:15	-	-	-	170m
DF2 Proposal	Type C	-	80m	1:15	-	-	-	170m
DF3 Proposal	Type C	-	80m	1:15	-	-	-	170m

Table 4 – J13 Southbound Diverge Dimensions

Junction 14 Northbound Diverge

The existing layout for this junction is a non-standard Type B Single Lane Parallel Diverge. Using the current traffic figures, TD 22/06 recommends that a Type D lane drop diverge should be provided.

As TJR is proposed at this location, a lane drop arrangement would not be appropriate so it is proposed that a Type B layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	95m	1:12	-	60m	120m	-
DF1 Proposal	Type A		80m	1:15	-	-	-	170m
DF2 Proposal	Type B	50m	80m	1:15	180m	-	-	170m
DF3 Proposal	Type B	50m	80m	1:15	180m	-	-	170m

Table 5 - J14 Northbound Diverge Dimensions

1.3 Junction 14 Southbound Merge

The existing layout for this junction is a non-standard Type B Single Lane Parallel Merge. Using the current traffic figures, TD 22/06 recommends that a Type E lane gain merge should be provided.

As TJR is proposed at this location, a lane gain arrangement would not be appropriate so it is proposed that a Type C layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

	Type	Overlap	Nose		Ghost Island Tail	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	90m	1:11	-	50m	155m	-
DF1 Proposal	Type C	50m	115m	1:40	180m	-	-	205m
DF2 Proposal	Type C	50m	115m	1:40	180m	-	-	205m
DF3 Proposal	Type C	50m	115m	1:40	180m	-	-	205m

Table 6 - J14 Southbound Merge Dimensions

1.4 Junction 14 Northbound Merge

The existing layout for this junction is a non-standard Type B Single Lane Parallel Merge. Using the current traffic figures, TD 22/06 recommends that a Type F lane gain merge should be provided.

As TJR is proposed at this location, a lane gain arrangement would not be appropriate. A Type C layout would be the preferred alternative however it is proposed that a Type B layout would be provided as a Type C layout would have unacceptable impacts on three existing structures including requiring widening of the River Ouzel Viaduct. See Figure 1 below. This would require additional land to be acquired outside the highway boundary and would therefore require the scheme to go through the Development Consent Order (DCO) process. This would involve considerable delay and additional cost to the project. A Type B layout is a permitted relaxation under IAN161/15 but needs PSCRG endorsement. It would not require a Departure from Standards.

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	95m	1:12	-	85m	140m	-
DF1 Proposal	Type B	-	75m	1:40	-	75m	230m	-
DF2 Proposal	Type B	-	75m	1:40	-	75m	230m	-
DF3 Proposal	Type B	-	75m	1:40	-	75m	230m	-

Table 7 - J14 Northbound Merge Dimensions

1.5 Junction 14 Southbound Diverge

The existing layout for this junction is a non-standard Type B Single Lane Parallel Diverge. Using the current traffic figures, TD 22/06 recommends that a Type D lane drop diverge should be provided.

As TJR is proposed at this location, a lane drop arrangement would not be appropriate. A Type C layout would be the preferred alternative however it is proposed that a Type A two lane layout would be provided as a Type C layout would require widening of the River Ouzel Viaduct and also require additional land to be acquired outside the highway boundary and would therefore require the scheme to go through the DCO process with the consequences of delay and additional cost to the project. See Figure 1 below.

A Type A layout is a permitted relaxation under IAN161/15 but needs PSCRG endorsement. It would not require a Departure from Standards.

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	90m	1:17	-	60m	135m	-
DF1 Proposal	Type A	-	80m	1:15	-	-	-	185m
DF2	Type A	-	80m	1:15	-	-	-	185m

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Proposal								
DF3 Proposal	Type A	-	80m	1:15	-	-	-	185m

Table 8 – J14 Southbound Diverge Dimensions

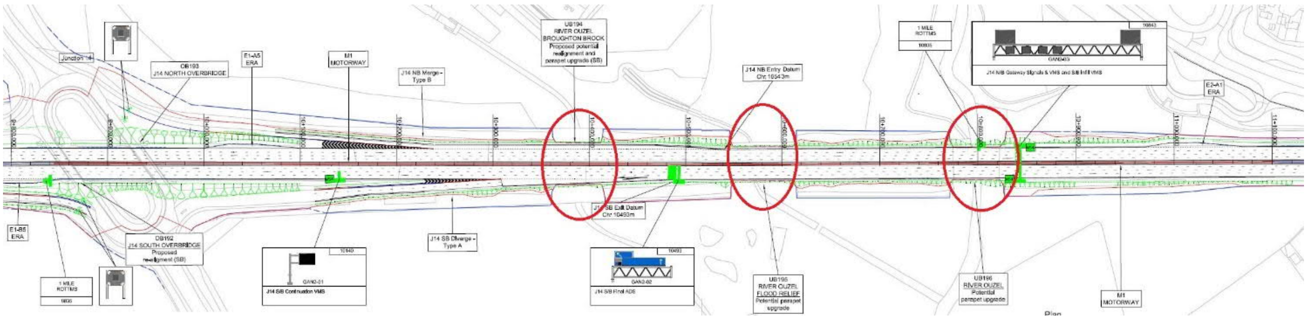


Figure 1 : Junction 14 North Facing Slip Road Constraints

1.6 Junction 15 Northbound Diverge

The existing layout for this junction is a non-standard Type B Two Lane (unmarked) Parallel Diverge. Using the current traffic figures, TD 22/06 recommends that a Type D lane drop diverge should be provided.

As TJR is proposed at this location, a lane drop arrangement would not be appropriate so it is proposed that a Type B layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	96m	1:16	-	160m	150m	-
DF1 Proposal	Type A		80m	1:15	-	-	-	170m
DF2 Proposal	Type B	50m	80m	1:15	180m	-	-	170m
DF3 Proposal	Type B	50m	80m	1:15	180m	-	-	170m

Table 9 - J15 Northbound Diverge Dimensions

1.7 Junction 15 Southbound Merge

The existing layout for this junction is a non-standard Type B Single Lane Parallel Merge with extended auxiliary lane. Using the current traffic figures, TD 22/06 recommends that a Type E lane gain merge should be provided.

As TJR is proposed at this location, a lane gain arrangement would not be appropriate so it is proposed that a Type B layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

	Type	Overlap	Nose		Ghost Island Tail	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	148m	1:22	-	70m	450m	-
DF1 Proposal	Type C	50	115m	1:40	180m	-	-	205m
DF2 Proposal	Type B	-	115m	1:40	-	-	230m	75m
DF3 Proposal	Type B	-	115m	1:40	-	-	-	75m

Table 10 - J15 Southbound Merge Dimensions

1.8 Junction 15 Northbound Merge

The existing layout for this junction is a non-standard Type B Single Lane Parallel Merge with an extended auxiliary lane. Using the current traffic figures, TD 22/06 recommends that a Type E lane gain merge should be provided.

As TJR is proposed at this location, a lane gain arrangement would not be appropriate so it is proposed that a Type B layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	188m	1:30	-	65m	295m	-
DF1 Proposal	Type C	50m	115m	1:40	180m	-	-	205m
DF2 Proposal	Type B	-	115m	1:40	-	75m	230m	-
DF3 Proposal	Type B	-	115m	1:40	-	75m	230m	-

Table 11 - J15 Northbound Merge Dimensions

1.9 Junction 15 Southbound Diverge

The existing layout for this junction is Type B Two Lane (unmarked) Parallel Diverge. Using the current traffic figures, TD 22/06 recommends that a Type D lane drop diverge should be provided.

As TJR is proposed at this location, a lane drop arrangement would not be appropriate so it is proposed that a Type B two lane layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	103m	1:17	-	150m	200m	-
DF1 Proposal	Type B	50m	80m	1:15	180m	-	-	185m
DF2 Proposal	Type B	50m	80m	1:15	180m	-	-	185m
DF3 Proposal	Type B	50m	80m	1:15	180m	-	-	185m

Table 12 – J15 Southbound Diverge Dimensions

1.10 Junction 15a Northbound Diverge

The existing layout for this junction is a non-standard Type A Two Lane Taper Diverge. Using the current traffic figures, TD 22/06 recommends that a Type C lane drop diverge should be provided which would provide two lanes on the connector road.

As TJR is proposed at this location, a lane drop arrangement would not be appropriate so it is proposed that a two lane Type A layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type A Non-Standard	-	70m	1:7	-	-	-	170m
DF1 Proposal	Type A	-	80m	1:15	-	-	-	185m
DF2 Proposal	Type A	-	80m	1:15	-	-	-	185m
DF3	Type A	-	80m	1:15	-	-	-	185m

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Proposal								

Table 13 - J15a Northbound Diverge Dimensions

1.11 Junction 15a Southbound Merge

The existing layout for this junction is a non-standard Type B Single Lane Parallel Merge with extended auxiliary lane. Using the current traffic figures, TD 22/06 recommends that a Type E lane gain merge should be provided.

As TJR is proposed at this location, a lane gain arrangement would not be appropriate so it is proposed that a Type B layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

The connector road also provides access for traffic re-joining the motorway from the Motorway service area in close proximity to the back of the nose which will require careful consideration.

	Type	Overlap	Nose		Ghost Island Tail	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	56m	1:10	-	60m	190m	-
DF1 Proposal	Type B	-	115m	1:40	-	-	230m	75m
DF2 Proposal	Type B	-	115m	1:40	-	-	230m	75m
DF3 Proposal	Type B	-	115m	1:40	-	-	230m	75m

Table 14 - J15a Southbound Merge Dimensions

1.12 Junction 15a Northbound Merge

The existing layout for this junction is a non-standard Type A Single Lane Taper Merge. Using the current traffic figures, TD 22/06 recommends that a Type E lane gain merge should be provided.

As TJR is proposed at this location, a lane gain arrangement would not be appropriate so it is proposed that a Type A layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type A Non-Standard	-	110m	1:7	-	-	-	205m

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
DF1 Proposal	Type A	-	115m	1:40	-	-	-	205m
DF2 Proposal	Type A	-	115m	1:40	-	-	-	205m
DF3 Proposal	Type A	-	115m	1:40	-	-	-	205m

Table 15 - J15a Northbound Merge Dimensions

1.13 Junction 15a Southbound Diverge

The existing layout for this junction is Type A Single Lane Diverge. Using the current traffic figures, TD 22/06 recommends that a Type C lane drop diverge should be provided.

As TJR is proposed at this location, a lane drop arrangement would not be appropriate so it is proposed that a Type A two lane taper layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type A Non-Standard	-	62m	1:7	-	-	-	166m
DF1 Proposal	Type A	-	80m	1:15	-	-	-	185m
DF2 Proposal	Type A	-	80m	1:15	-	-	-	185m
DF3 Proposal	Type A	-	80m	1:15	-	-	-	185m

Table 16 – J15a Southbound Diverge Dimensions

1.14 Junction 16 Northbound Diverge

The existing layout for this junction is a non-standard Type B Single Lane Parallel Diverge with two lane connector slip road. Using the current traffic figures, TD 22/06 recommends that a Type C lane drop diverge should be provided.

As TJR is proposed at this location, a lane drop arrangement would not be appropriate so it is proposed that a single lane Type A layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				

	Type	Overlap	Nose		Ghost Island Head	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	143m	1:18	-	80m	116m	-
DF1 Proposal	Type A	-	80m	1:15	-	-	-	170m
DF2 Proposal	Type A	-	80m	1:15	-	-	-	170m
DF3 Proposal	Type A	-	80m	1:15	-	-	-	170m

Table 17 - J16 Northbound Diverge Dimensions

1.15 Junction 16 Southbound Merge

The existing layout for this junction is a non-standard Type B Single Lane Parallel Merge. Using the current traffic figures, TD 22/06 recommends that a Type E lane gain merge should be provided.

As TJR is proposed at this location, a lane gain arrangement would not be appropriate and given that the connecting slip road is 2 lanes, it is proposed that a Type D layout would be provided. This is a permitted relaxation under IAN161/15 and would therefore not require Departure from Standards.

	Type	Overlap	Nose		Ghost Island Tail	Auxiliary Lane Taper	Auxiliary Lane	Taper
			Length	Ratio				
Existing	Type B Non-Standard	-	140m	1:19	-	60m	168m	-
DF1 Proposal	Type D	-	115m	1:40		-	-	205m
DF2 Proposal	Type D	-	115m	1:40	-	-	-	205m
DF3 Proposal	Type D	-	115m	1:40	-	-	-	205m

Table 18 - J16 Southbound Merge Dimensions

6. GD04/12 Decision Classification

GD 04/12 defines the way safety risk assessment should be undertaken on the SRN and recommends a pragmatic approach. In accordance with GD04/12 these design issues have been classified as a 'Type A' and 'Type B' decisions. Type B decisions are not considered to be routine and analysis is required to justify the proposal.

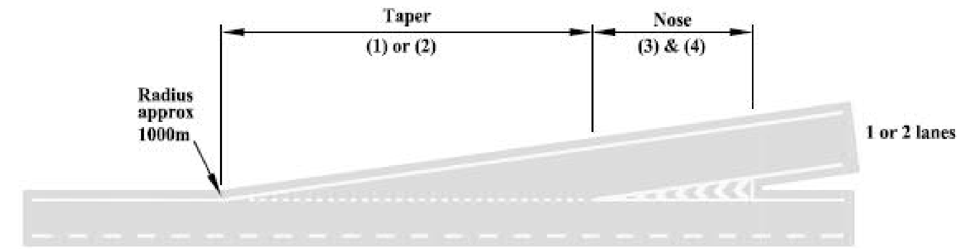
Annex B provides the reasoning for the above classifications.

7. PSCRG Meeting

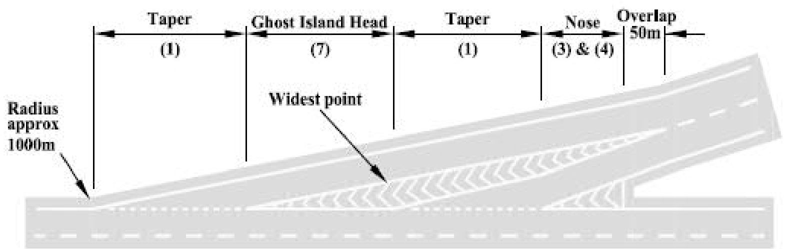
This paper was presented to the PSCRG on 12-01-2017. Both layouts were endorsed by PSCRG so will be incorporated in the design for DF3.

Annex A - Standard Diverge and Merge Layouts (TD22)

Diverges



A - Taper Diverge

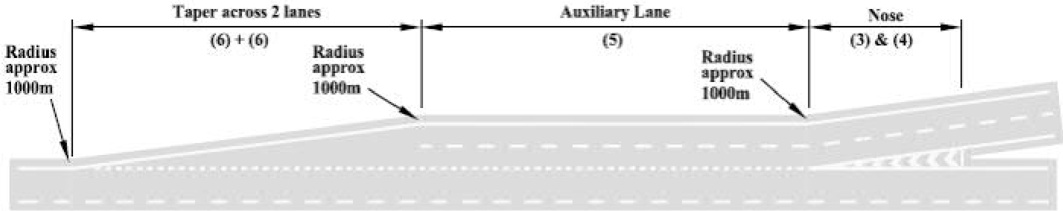


1 - Ghost Island and nose markings to Traffic Signs Regulations and General Directions Diagram No. 1042.1 and 1042.

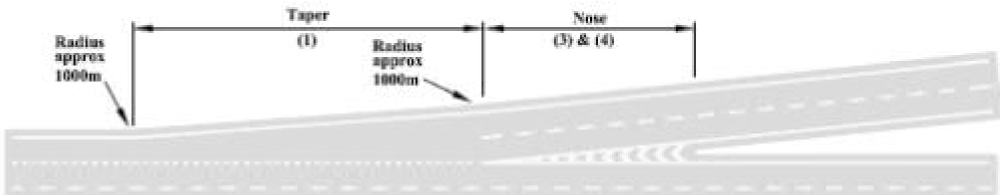
2 - Ghost Island width 2m minimum at widest point.

3 - The edge line must be laid to the radii indicated.

B (Option 1 Preferred) - Ghost Island diverge including for conversion of existing taper diverge

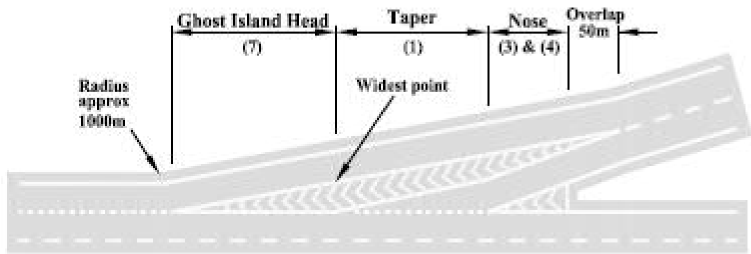


B (Option 2 Not Preferred) - Parallel Diverge
See paragraph 2.49



The edge line must be laid to the radii indicated

C - Lane Drop at Taper Diverge



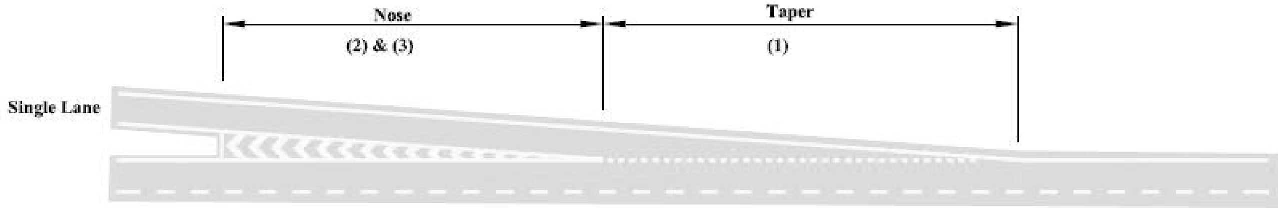
D (Option 1 Preferred) - Ghost Island diverge for Lane Drop including for conversion of existing Lane Drop at Taper Diverge

1 - Ghost Island and nose markings to Traffic Signs Regulations and General Directions Diagram No. 1042.1 and 1042.

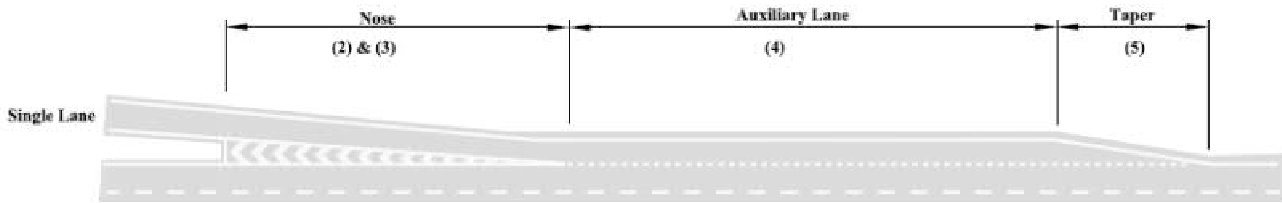
2 - Ghost Island width 2m minimum at widest point.

3 - The edge line shall be laid to the radii indicated.

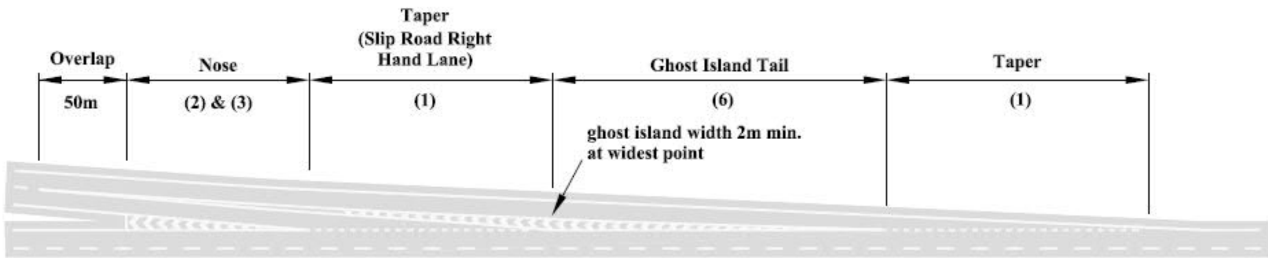
Merges



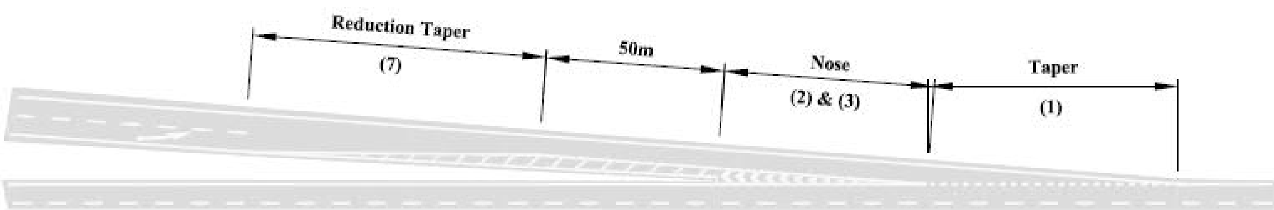
A – Taper Merge



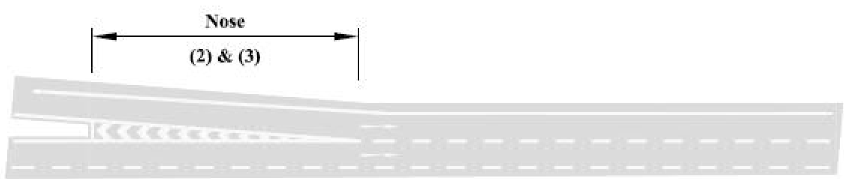
B - Parallel Merge



C - Ghost Island Merge
(Only used where design flows on mainline are light, there are 3 lanes or more on mainline and merging flow is over one lane capacity, see paragraph 2.30).



D – 2 Lane Urban Merge



E - Lane Gain

Annex B – GD04 Classifications

Decision description

As per IAN 161/15 the provision of a Type A Diverge as a substitute for a Type D

Location

J14 Southbound Diverge

Features	Type A Specialist Technical/Coordinator Roles	Type B Professional Safety Advisors	Type C Professional Roles	Feature Selection	Explanation
What is the size of the decision impact? (geographically and in impact terms; extent of the network, number of	Local, low density	Local, high density or national, low density	National, high density	A	Local to the Junction 14. Affects one connection to motorway Categorisation- Local (A)
What are the cost implications of the decision for the Agency?	Low	Medium	High	A	The cost of widening the structures to provide Type B Layout would be high, and as the compliant option requires additional land this would trigger the requirement for the DCO process together with the associated cost and programme consequences. This option is low cost. Categorisation - Low (A)
What is the lifetime of the decision? (how long will the Agency be affected by the decision)	Rest of the day	Months to a few years	Decades	C	Approved scheme will be the operating regime for foreseeable future. Categorisation - High (C)
What is the level of safety risk or uncertainty associated with the decision?	Low	Medium	High	A	Reduction in capacity is minimal. The capacity of the junction is governed by the junction at the circulatory of the junction. However at peak times there is a risk of traffic backing up. Categorisation - Medium (B)
What is the policy or stakeholder interest level? (how sensitive is it?)	Low	Medium	High	B	The decision will not have an effect on policy. The stakeholders will be able recognise the proposed design (in relation to similar layouts on the network) and a compliant design in the same way. Both layouts are standard layouts with no unusual features. Categorisation - Low (A)
			Decision Type	B	See GD04/12 Table 3 for guidance. The only type C decision relates to the longevity of the solution, as permanent infrastructure would be delivered. Therefore the overall classification as a Type B decision is most appropriate.

Decision description					
As per IAN 161/15 the provision of a Type B Merge as a substitute for a Type C					
Location					
J14 Northbound Merge					

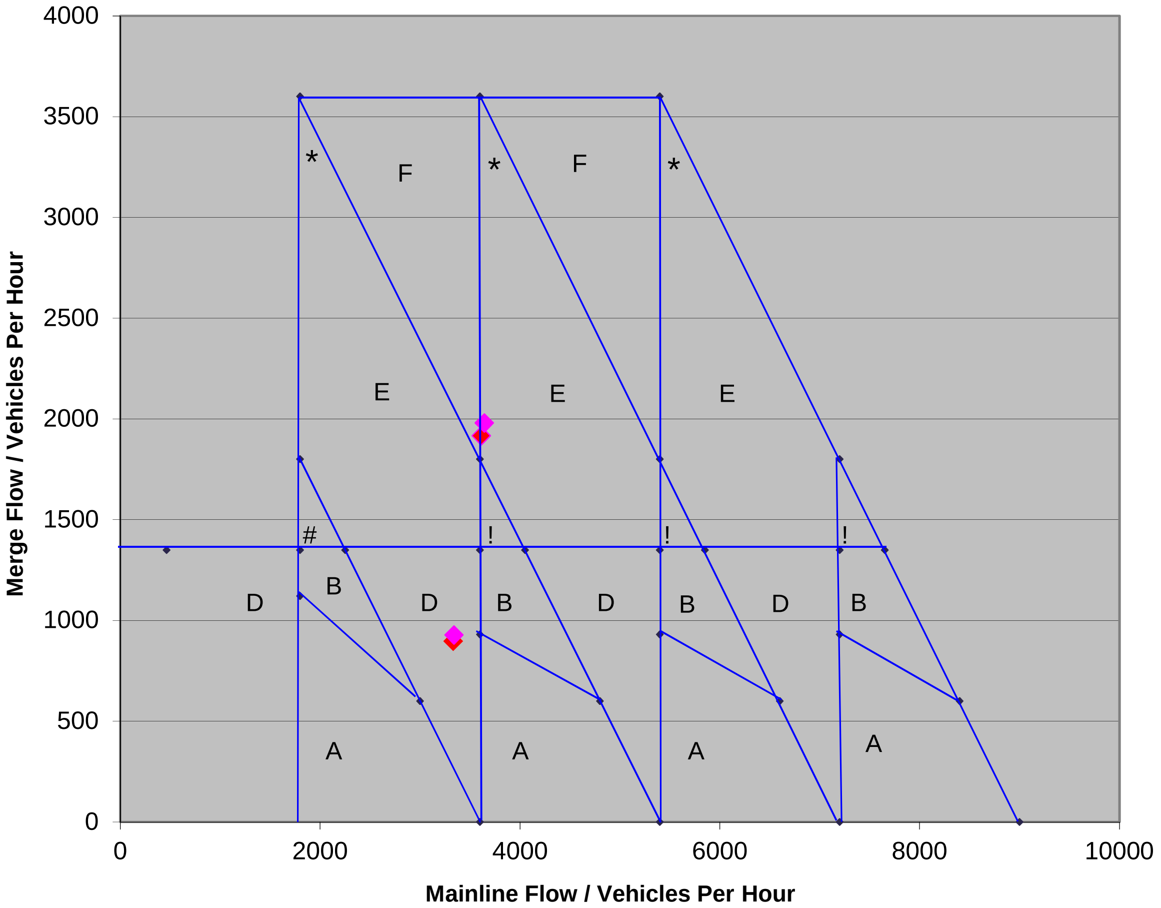
Features	Type A Specialist Technical/Coordinator Roles	Type B Professional Safety Advisors	Type C Professional Roles	Feature Selection	Explanation
What is the size of the decision impact? (geographically and in impact terms; extent of the network, number of	Local, low density	Local, high density or national, low density	National, high density	A	Local to the Junction 14. Affects one connection to motorway Categorisation- Local (A)
What are the cost implications of the decision for the Agency?	Low	Medium	High	A	The cost of widening the structures to provide Type C Layout would be high, and as the compliant option requires additional land this would trigger the requirement for the DCO process together with the associated cost and programme consequences. This option is low cost. Categorisation - Low (A)
What is the lifetime of the decision? (how long will the Agency be affected by the decision)	Rest of the day	Months to a few years	Decades	C	Approved scheme will be the operating regime for foreseeable future. Categorisation - High (C)
What is the level of safety risk or uncertainty associated with the decision?	Low	Medium	High	A	Reduction in capacity is minimal and the capacity is dictated by the circulatory carriageway of the junction.. Categorisation - Low (A)
What is the policy or stakeholder interest level? (how sensitive is it?)	Low	Medium	High	A	The decision will not have an effect on policy. The stakeholders will be able recognise the proposed design (in relation to similar layouts on the network) and a compliant design in the same way. Both layouts are standard layouts with no unusual features. Categorisation - Low (A)
			Decision Type	A	See GD04/12 Table 3 for guidance. The only type C decision relates to the longevity of the solution, as permanent infrastructure would be delivered. Therefore the overall classification as a Type A decision is most appropriate.

Appendix R

M1 JUNCTION 14 - MERGE / DIVERGE ANALYSIS

Public

Merge-Diverge Analysis **Northbound Merge - 2031**



Input Data:

Mainline Flow/VPH (x)	Merge Flow/VPH (y)	
3333	896	2031_DM_AM
3614	1916	2031_DM_PM
3340	928	2031_DS_AM
3644	1980	2031_DS_PM

Key:

A - Taper Merge
B - Parallel Merge
C - Ghost Island Merge
D - Lane Gain
E - Lane Gain with Ghost Island Merge
F - 2 Lane Gain with Ghost Island
 # - Area of Uncertainty
***** - If Layout F Option 2 is used consider extended Auxillary Lane

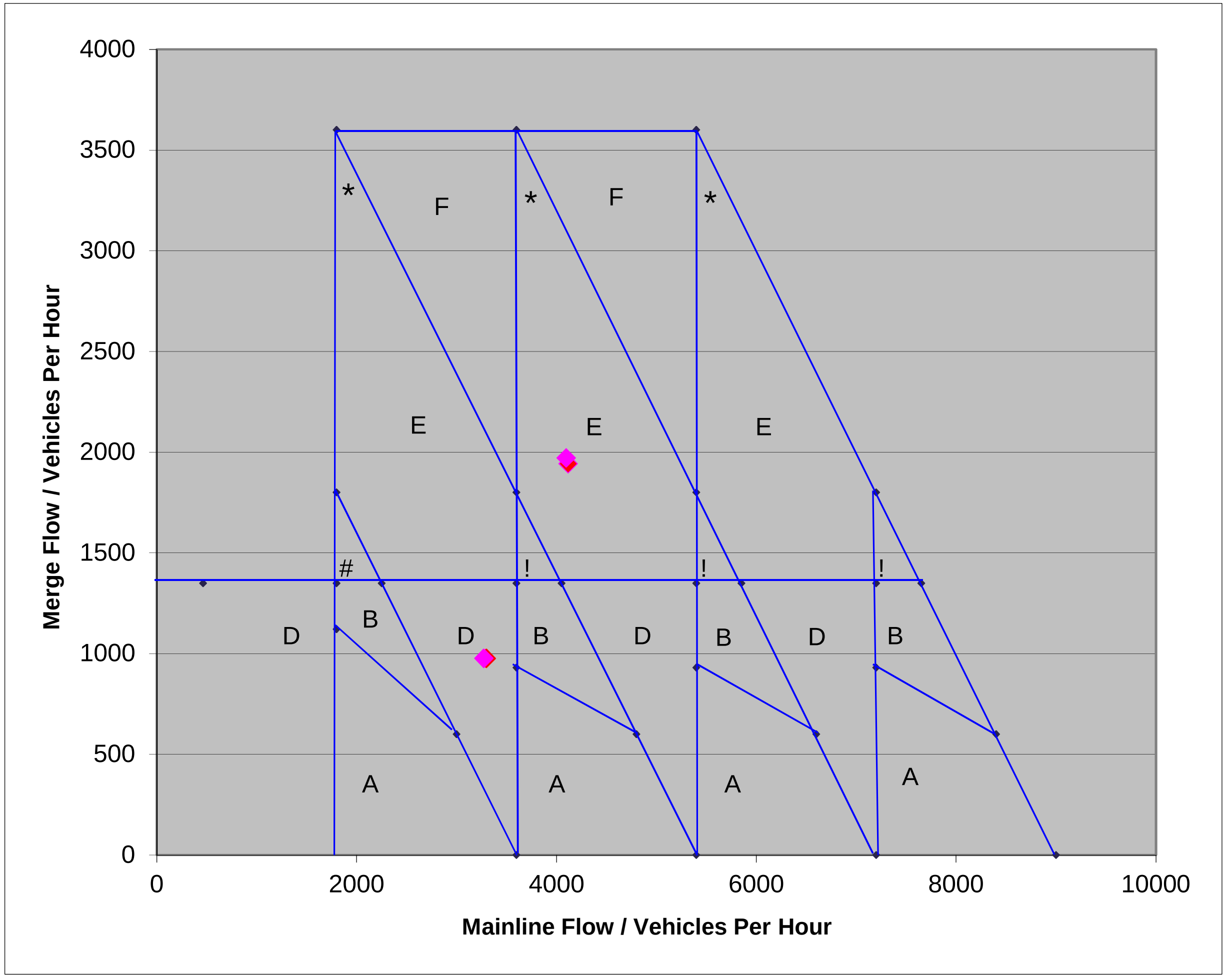
Calculation:	
2031_DM_AM	D
2031_DM_PM	E
2031_DS_AM	D
2031_DS_PM	E

Made by:	FI
Checked by:	APS
Date:	05/03/2021

CD 122 Figure 3.12b Motorway Merge

Merge-Diverge Analysis

Northbound Merge - 2048



Input Data:

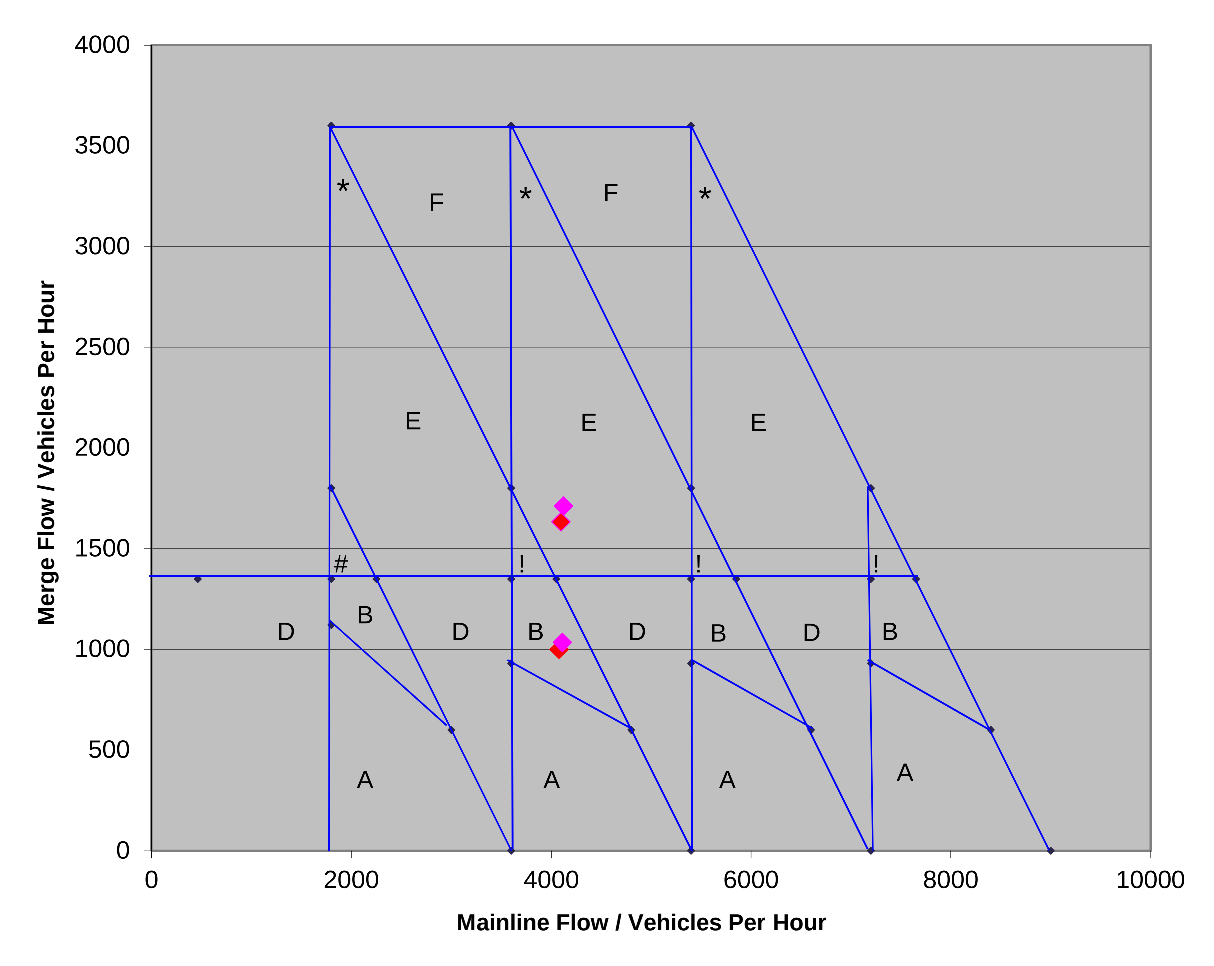
Mainline Flow/VPH (x)	Merge Flow/VPH (y)	
3300	975	2048_DM_AM
4119	1942	2048_DM_PM
3273	977	2048_DS_AM
4097	1972	2048_DS_PM

Key:
A - Taper Merge
B - Parallel Merge
C - Ghost Island Merge
D - Lane Gain
E - Lane Gain with Ghost Island Merge
F - 2 Lane Gain with Ghost Island
 # - Area of Uncertainty
***** - If Layout F Option 2 is used consider extended Auxillary Lane

Calculation:	
2031_DM_AM	D
2031_DM_PM	E
2031_DS_AM	D
2031_DS_PM	E
Made by:	FI
Checked by:	APS
Date:	05/03/2021

CD 122 Figure 3.12b Motorway Merge

Merge-Diverge Analysis **Southbound Merge - 2031**



Input Data:

Mainline Flow/VPH (x)	Merge Flow/VPH (y)	
4079	999	2031_DM_AM
4100	1632	2031_DM_PM
4112	1034	2031_DS_AM
4122	1712	2031_DS_PM

Key:

A - Taper Merge
B - Parallel Merge
C - Ghost Island Merge
D - Lane Gain
E - Lane Gain with Ghost Island Merge
F - 2 Lane Gain with Ghost Island
 # - Area of Uncertainty
***** - If Layout F Option 2 is used consider extended Auxillary Lane

Calculation:

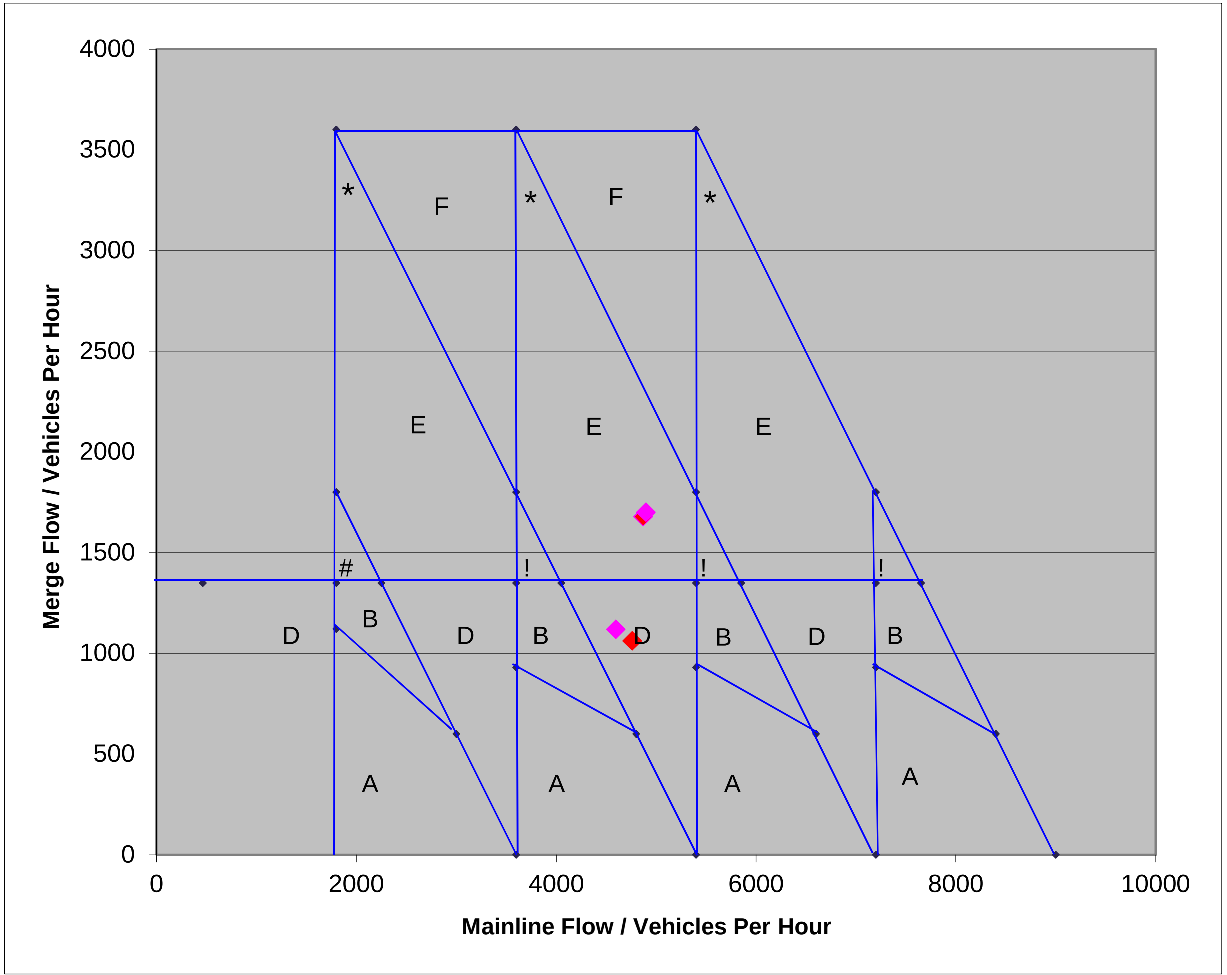
2031_DM_AM	B
2031_DM_PM	E
2031_DS_AM	B
2031_DS_PM	E

Made by:	FI
Checked by:	APS
Date:	05/03/2021

CD 122 Figure 3.12b Motorway Merge

Merge-Diverge Analysis

Southbound Merge - 2048



Input Data:

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4763	1061	2048_DM_AM
4871	1678	2048_DM_PM
4597	1120	2048_DS_AM
4897	1700	2048_DS_PM

Key:

A - Taper Merge
B - Parallel Merge
C - Ghost Island Merge
D - Lane Gain
E - Lane Gain with Ghost Island Merge
F - 2 Lane Gain with Ghost Island
 # - Area of Uncertainty
***** - If Layout F Option 2 is used consider extended Auxillary Lane

Calculation:

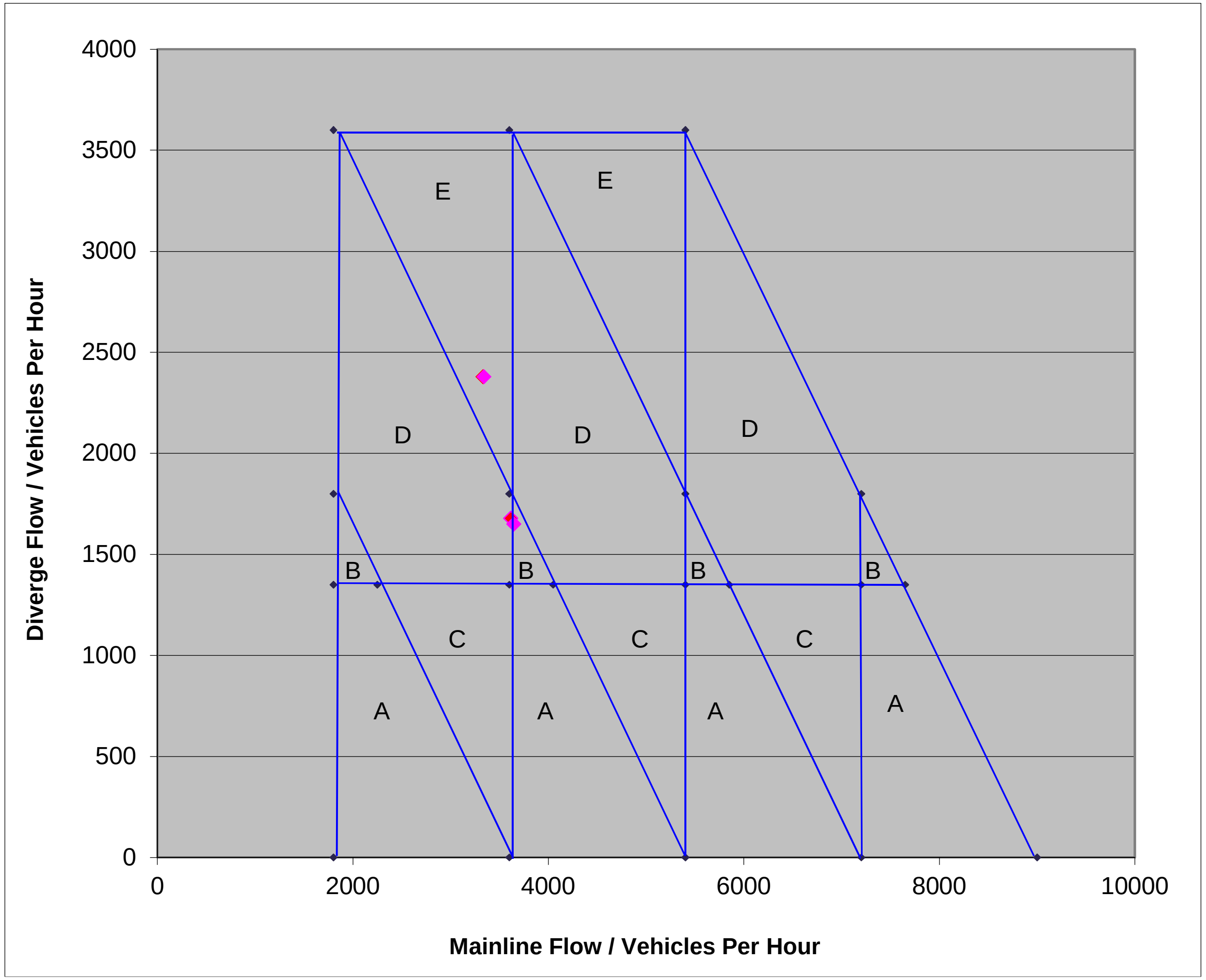
2031_DM_AM	D
2031_DM_PM	E
2031_DS_AM	D
2031_DS_PM	E

Made by:	FI
Checked by:	APS
Date:	05/03/2021

CD 122 Figure 3.12b Motorway Merge

Merge-Diverge Analysis

Northbound Diverge - 2031



CD 122 Figure 3.26b Motorway Diverge

Input Data:

Mainline Flow/VPH (x)	Diverge Flow/VPH (y)	
3333	2379	2031_DM_AM
3614	1678	2031_DM_PM
3340	2379	2031_DS_AM
3644	1649	2031_DS_PM

Key:

A - Taper Diverge
B - Op.1 Ghost Island Diverge
- Op. 2 Parallel Diverge

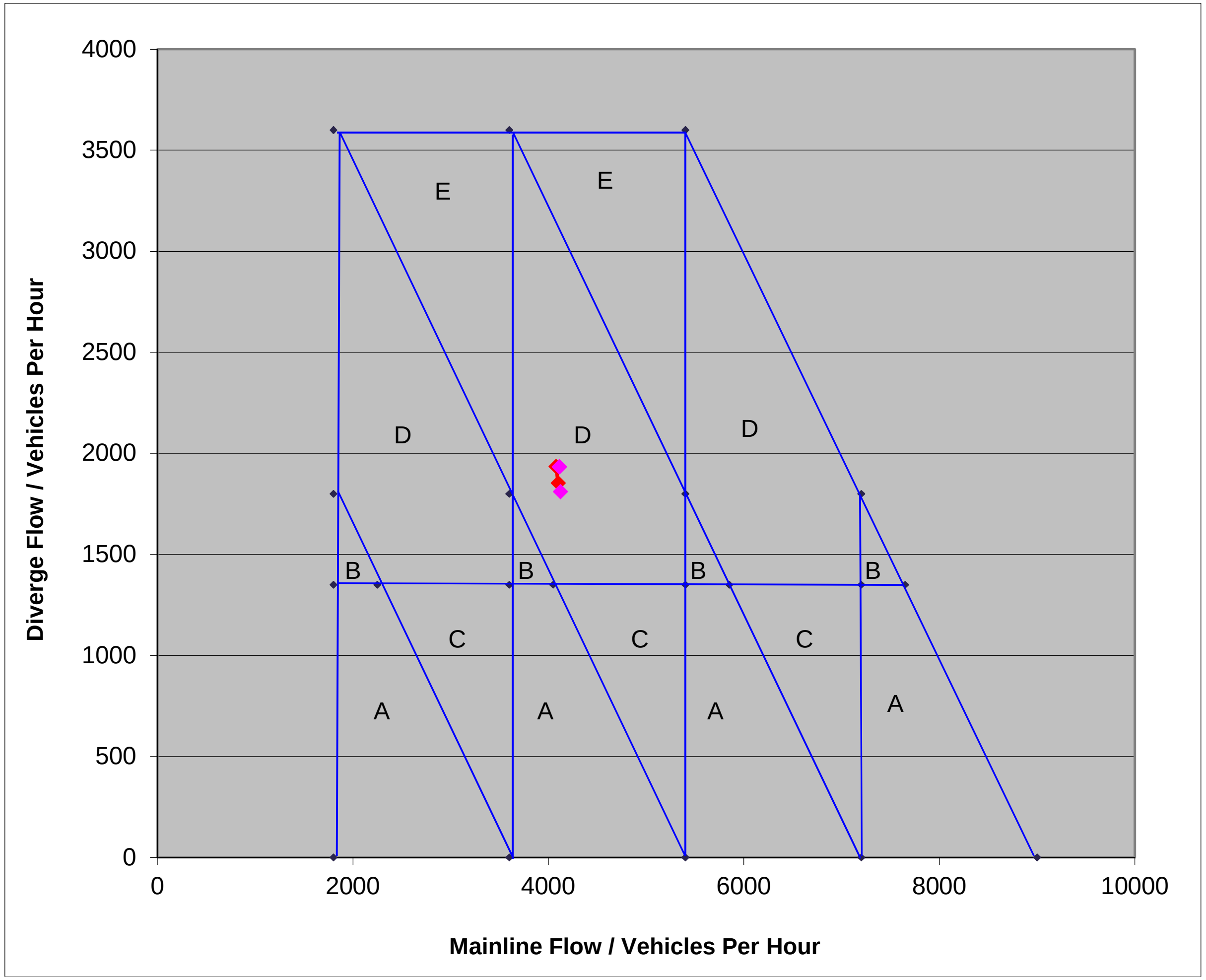
C - Lane Drop at Taper Diverge
D - Op. 1 Ghost Island Diverge for Lane Drop
- Op. 2 Lane Drop at Parallel Diverge

E - 2 Lane Drop

Calculation:	
2031_DM_AM	E
2031_DM_PM	B
2031_DS_AM	E
2031_DS_PM	B

Made by:	FI
Checked by:	APS
Date:	05/03/2021

Merge-Diverge Analysis **Southbound Diverge - 2031**



Input Data:

Mainline Flow/VPH (x)	Diverge Flow/VPH (y)	
4079	1934	2031_DM_AM
4100	1853	2031_DM_PM
4112	1934	2031_DS_AM
4122	1810	2031_DS_PM

Key:

A - Taper Diverge
B - Op.1 Ghost Island Diverge
- Op. 2 Parallel Diverge
C - Lane Drop at Taper Diverge
D - Op. 1 Ghost Island Diverge for Lane Drop
- Op. 2 Lane Drop at Parallel Diverge
E - 2 Lane Drop

Calculation:

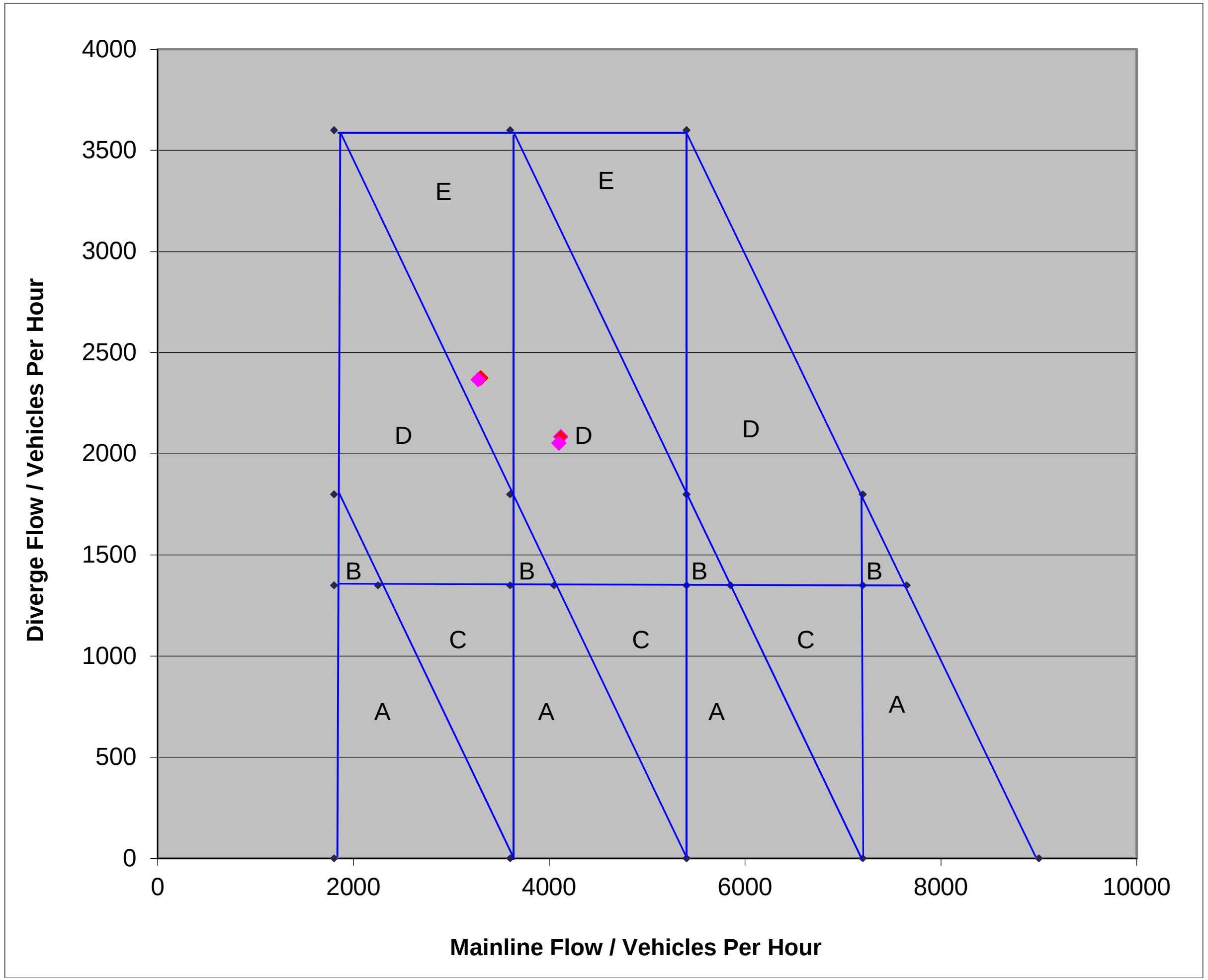
2031_DM_AM	D
2031_DM_PM	D
2031_DS_AM	D
2031_DS_PM	D

Made by:	FI
Checked by:	APS
Date:	05/03/2021

CD 122 Figure 3.26b Motorway Diverge

Merge-Diverge Analysis

Northbound Diverge - 2048



CD 122 Figure 3.26b Motorway Diverge

Input Data:

Mainline Flow/VPH (x)	Diverge Flow/VPH (y)	
3300	2374	2048_DM_AM
4119	2084	2048_DM_PM
3273	2367	2048_DS_AM
4097	2053	2048_DS_PM

Key:

A - Taper Diverge
B - Op.1 Ghost Island Diverge
- Op. 2 Parallel Diverge
C - Lane Drop at Taper Diverge
D - Op. 1 Ghost Island Diverge for Lane Drop
- Op. 2 Lane Drop at Parallel Diverge
E - 2 Lane Drop

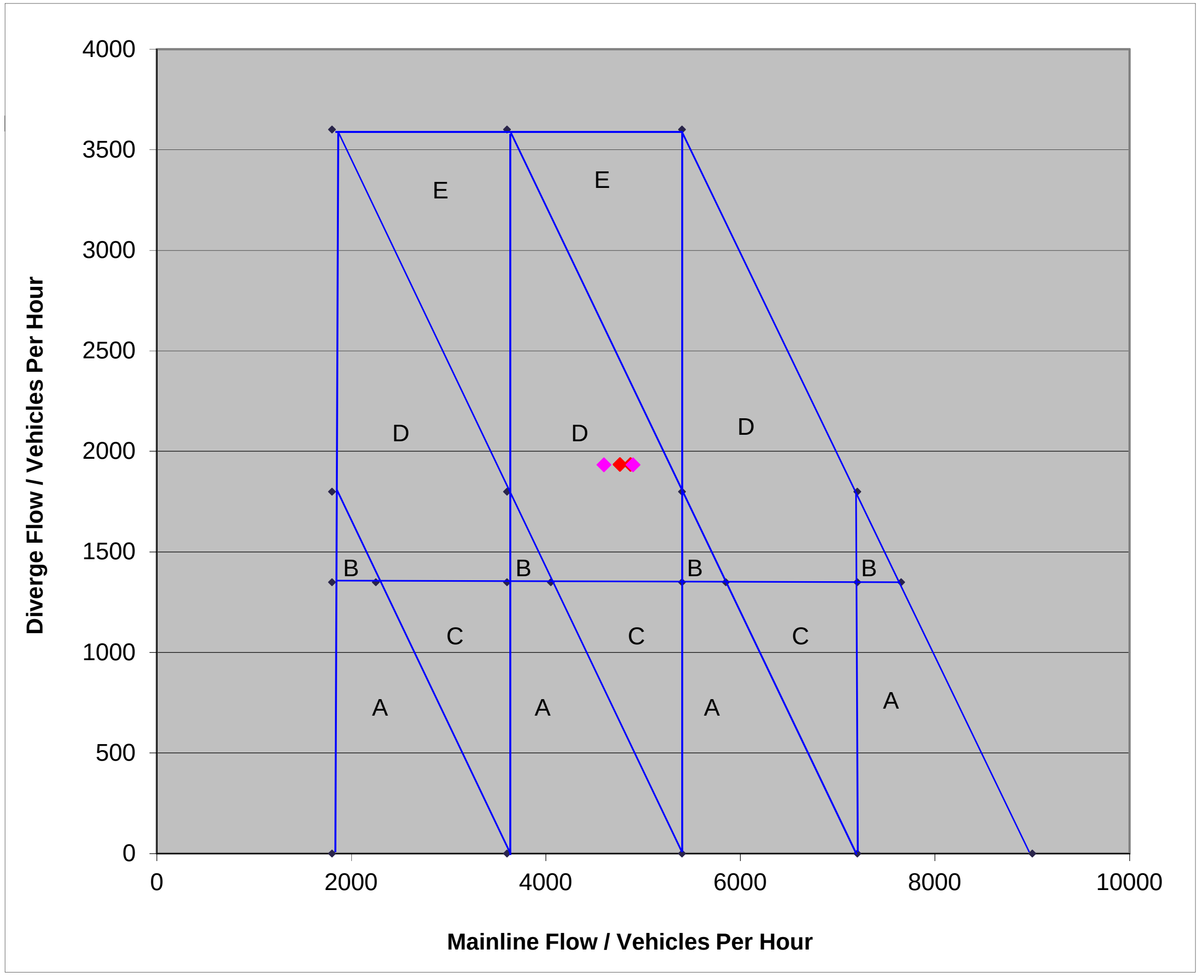
Calculation:

2048_DM_AM	E
2048_DM_PM	D
2048_DS_AM	E
2048_DS_PM	D

Made by:	FI
Checked by:	APS
Date:	05/03/2021

Merge-Diverge Analysis

Southbound Diverge - 2048



Input Data:

Mainline Flow/VPH (x)	Diverge Flow/VPH (y)	
4763	1934	2048_DM_AM
4871	1934	2048_DM_PM
4597	1934	2048_DS_AM
4897	1934	2048_DS_PM

Key:

A - Taper Diverge
B - Op.1 Ghost Island Diverge
- Op. 2 Parallel Diverge
C - Lane Drop at Taper Diverge
D - Op. 1 Ghost Island Diverge for Lane Drop
- Op. 2 Lane Drop at Parallel Diverge
E - 2 Lane Drop

Calculation:	
2031_DM_AM	D
2031_DM_PM	D
2031_DS_AM	D
2031_DS_PM	D
Made by:	FI
Checked by:	APS
Date:	05/03/2021

CD 122 Figure 3.26b Motorway Diverge

Appendix S

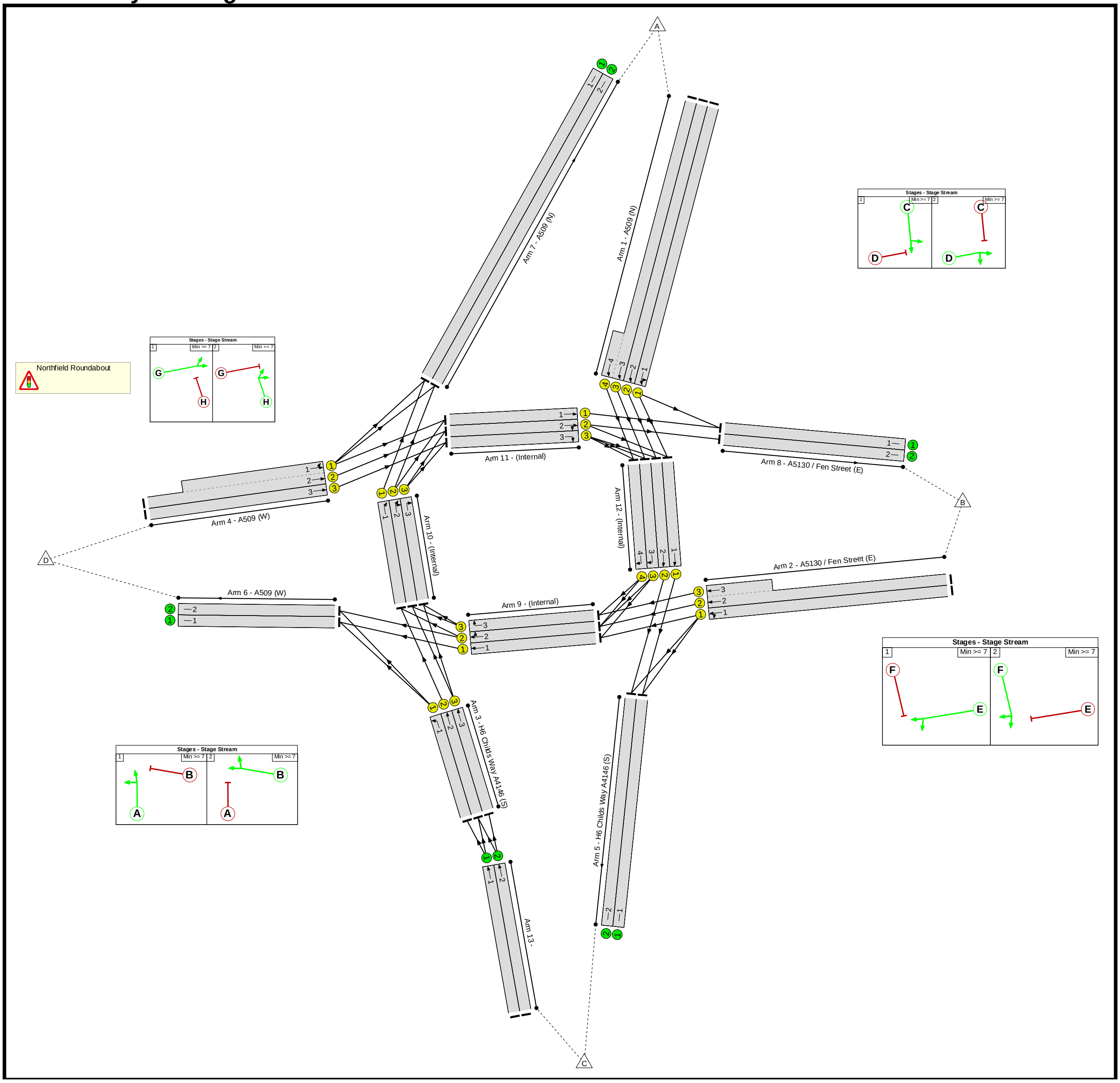
NORTHFIELDS ROUNDABOUT - LINSIG OUTPUT

TA Report

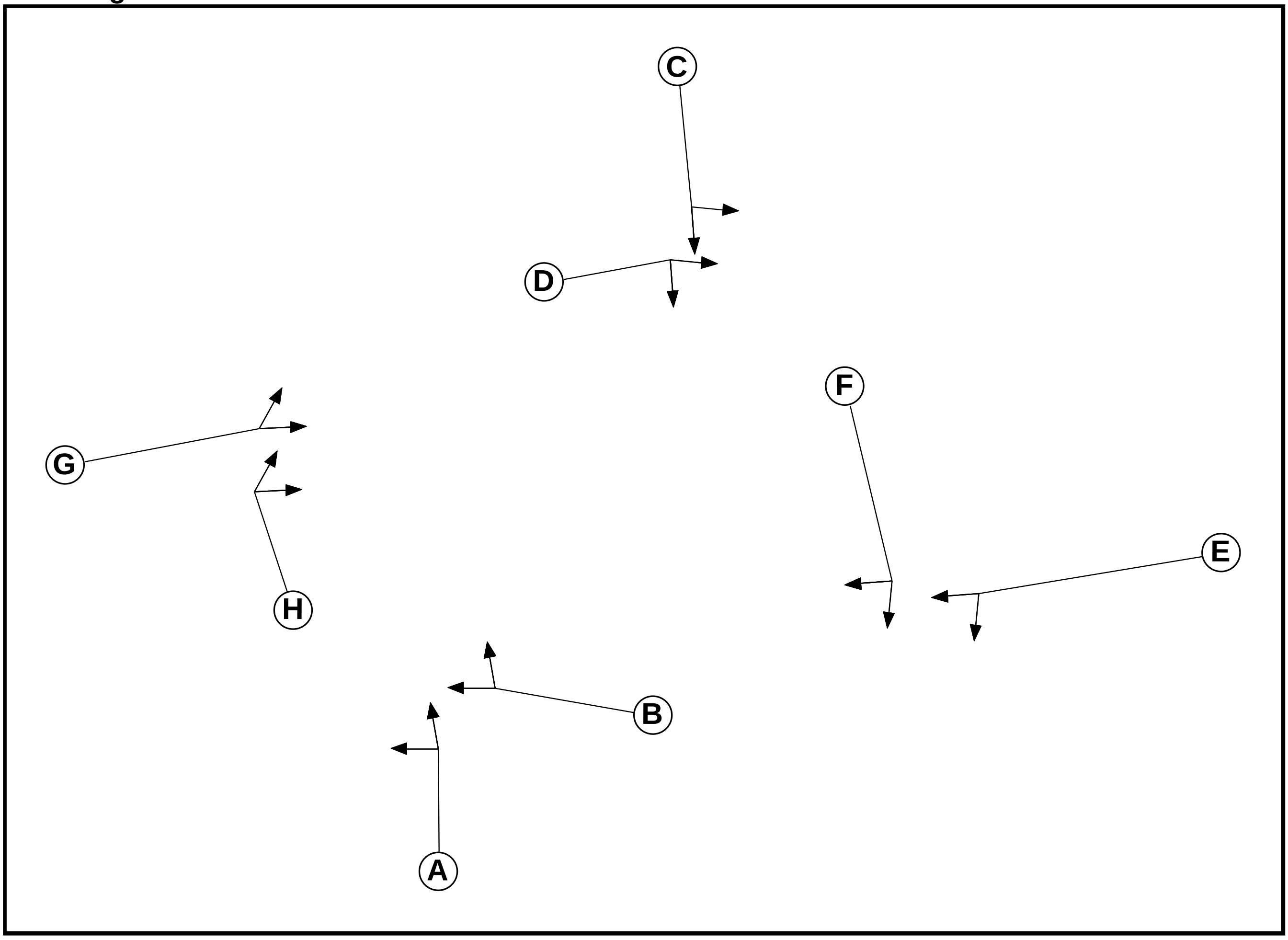
User and Project Details

Project:	
Title:	
Location:	
File name:	Northfields-FullSig.lsg3x
Author:	
Company:	
Address:	
Notes:	

Junction Layout Diagram



Phase Diagram



Phase Input Data

Phase Name	Phase Type	Stage Stream	Assoc. Phase	Street Min	Cont Min
A	Traffic	1		7	7
B	Traffic	1		7	7
C	Traffic	2		7	7
D	Traffic	2		7	7
E	Traffic	3		7	7
F	Traffic	3		7	7
G	Traffic	4		7	7
H	Traffic	4		7	7

Phase Intergreens Matrix

	Starting Phase								
		A	B	C	D	E	F	G	H
Terminating Phase	A		6	-	-	-	-	-	-
	B	6		-	-	-	-	-	-
	C	-	-		6	-	-	-	-
	D	-	-	6		-	-	-	-
	E	-	-	-	-		6	-	-
	F	-	-	-	-	6		-	-
	G	-	-	-	-	-	-		6
	H	-	-	-	-	-	-	6	

Scenario 1: '2016 Base AM' (FG1: '2016 Base AM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	17	6	23
B	(Internal) Ahead Right	Traffic	1	37	29	0
C	A509 (N) Left Ahead	Traffic	2	47	17	64
D	(Internal) Ahead Right	Traffic	2	7	4	11
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	7	5	12
F	(Internal) Ahead Right	Traffic	3	47	18	65
G	A509 (W) Left Ahead	Traffic	4	33	31	64
H	(Internal) Ahead Right	Traffic	4	21	4	25

TA Report
Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**103.6%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**103.6%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	1352	1900	1382	97.8%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	1117	1900	1382	80.8%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	1805	1950:1950	850+892	103.6 : 103.6%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	7	-	135	1900	230	58.6%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	7	-	216	1900:1900	230+230	49.1 : 44.7%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	17	-	0	1900	518	0.0%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	17	-	462	1900	518	89.2%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	17	-	356	1900	518	68.7%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	33	-	978	1900:1900	171+979	74.2 : 86.9%
4/3	A509 (W) Ahead	U	4	N/A	G		1	33	-	0	1900	979	0.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	37	-	1000	2000	1152	84.2%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	37	-	1037	2000	1152	87.2%
9/3	(Internal) Right	U	1	N/A	B		1	37	-	103	2000	1152	8.9%
10/1	(Internal) Ahead	U	4	N/A	H		1	21	-	462	2000	667	69.3%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	21	-	459	2000	667	68.9%
10/3	(Internal) Right	U	4	N/A	H		1	21	-	0	2000	667	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	128	2000	242	52.8%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	127	2000	242	52.4%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	0	2000	242	0.0%
12/1	(Internal) Ahead	U	3	N/A	F		1	47	-	1003	2000	1455	69.0%
12/2	(Internal) Ahead	U	3	N/A	F		1	47	-	1117	2000	1455	76.8%
12/3	(Internal) Right	U	3	N/A	F		1	47	-	881	2000	1455	58.4%
12/4	(Internal) Right	U	3	N/A	F		1	47	-	924	2000	1455	61.3%
13/1	Ahead	U	N/A	N/A	-		-	-	-	443	1900	1900	23.3%
13/2	Ahead	U	N/A	N/A	-		-	-	-	375	1900	1900	19.7%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**31.5**	**79.2**	**0.0**	**110.7**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**31.5**	**79.2**	**0.0**	**110.7**	**-**	**-**	**-**	**-**
1/1	1352	1352	-	-	-	3.2	12.4	-	15.6	41.5	23.3	12.4	35.7
1/2	1117	1117	-	-	-	1.8	2.1	-	3.9	12.6	13.3	2.1	15.4
1/3+1/4	1805	1742	-	-	-	4.4	42.4	-	46.8	93.3	30.2	42.4	72.5
2/1	135	135	-	-	-	1.0	0.7	-	1.7	46.1	2.3	0.7	3.0
2/2+2/3	216	216	-	-	-	1.6	0.4	-	2.1	34.4	1.9	0.4	2.4
3/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	462	462	-	-	-	3.0	3.6	-	6.6	51.4	8.1	3.6	11.7
3/3	356	356	-	-	-	2.1	1.1	-	3.2	32.4	5.8	1.1	6.9
4/2+4/1	978	978	-	-	-	3.6	2.8	-	6.4	23.5	13.5	2.8	16.2
4/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
9/1	969	969	-	-	-	2.8	2.6	-	5.3	19.9	12.9	2.6	15.5
9/2	1005	1005	-	-	-	2.7	3.3	-	5.9	21.3	15.6	3.3	18.9
9/3	103	103	-	-	-	0.6	0.0	-	0.7	22.8	1.9	0.0	1.9
10/1	462	462	-	-	-	0.0	1.1	-	1.1	8.8	0.0	1.1	1.1
10/2	459	459	-	-	-	1.1	1.1	-	2.2	17.5	2.8	1.1	3.9
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	128	128	-	-	-	0.9	0.6	-	1.4	40.3	2.3	0.6	2.9
11/2	127	127	-	-	-	1.1	0.5	-	1.6	45.9	2.3	0.5	2.9
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	1003	1003	-	-	-	0.0	1.1	-	1.1	4.1	0.1	1.1	1.2
12/2	1117	1117	-	-	-	0.0	1.6	-	1.7	5.4	0.1	1.6	1.7
12/3	850	850	-	-	-	1.3	0.7	-	2.0	8.7	8.6	0.7	9.3
12/4	892	892	-	-	-	0.1	0.8	-	0.9	3.7	0.5	0.8	1.3
13/1	443	443	-	-	-	0.0	0.2	-	0.2	1.2	0.0	0.2	0.2

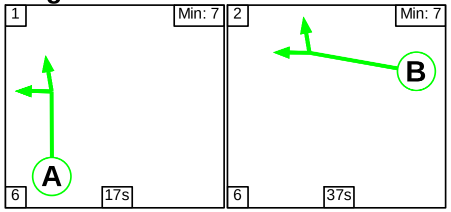
TA Report

13/2	375	375	-	-	-	0.0	0.1	-	0.1	1.2	0.0	0.1	0.1

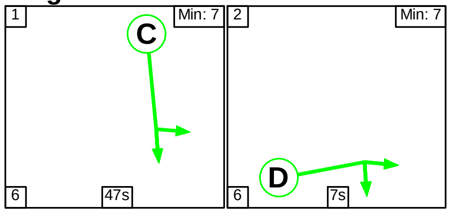
C1	Stream: 1 PRC for Signalled Lanes (%):	0.9	Total Delay for Signalled Lanes (pcuHr):	21.75	Cycle Time (s):	66
C1	Stream: 2 PRC for Signalled Lanes (%):	-15.2	Total Delay for Signalled Lanes (pcuHr):	69.35	Cycle Time (s):	66
C1	Stream: 3 PRC for Signalled Lanes (%):	17.2	Total Delay for Signalled Lanes (pcuHr):	9.55	Cycle Time (s):	66
C1	Stream: 4 PRC for Signalled Lanes (%):	3.5	Total Delay for Signalled Lanes (pcuHr):	9.73	Cycle Time (s):	66
	PRC Over All Lanes (%):	-15.2	Total Delay Over All Lanes(pcuHr):	110.66		

Staging Plan Diagram

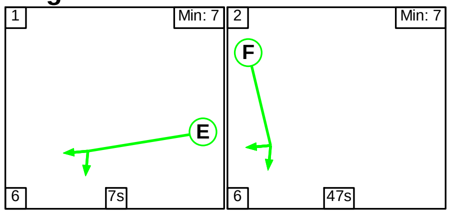
Stage Stream: 1



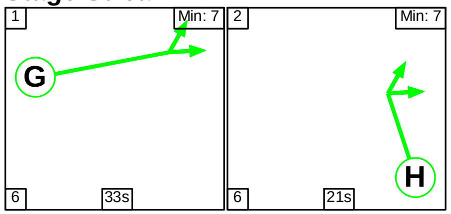
Stage Stream: 2



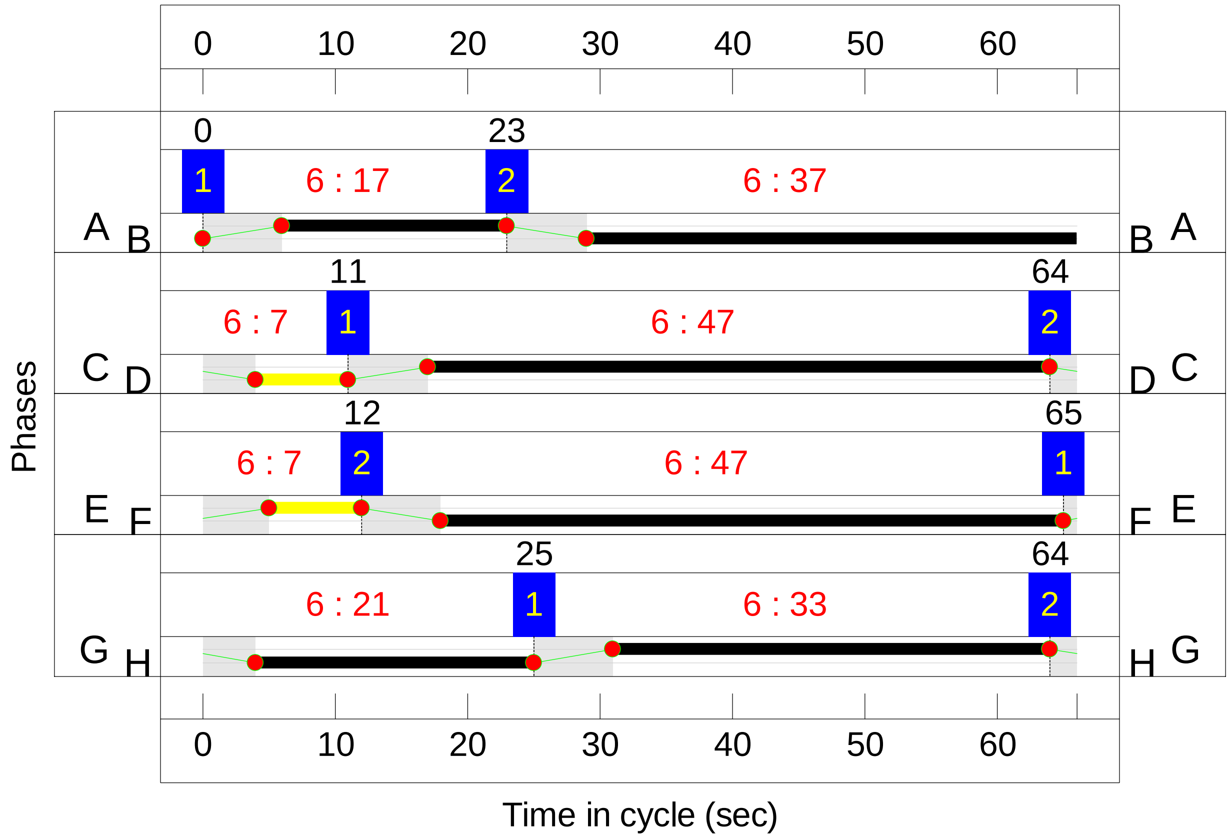
Stage Stream: 3



Stage Stream: 4



Signal Timings Diagram



Scenario 2: '2016 Base PM' (FG2: '2016 Base PM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	26	6	32
B	(Internal) Ahead Right	Traffic	1	28	38	0
C	A509 (N) Left Ahead	Traffic	2	47	52	33
D	(Internal) Ahead Right	Traffic	2	7	39	46
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	14	31	45
F	(Internal) Ahead Right	Traffic	3	40	51	25
G	A509 (W) Left Ahead	Traffic	4	38	55	27
H	(Internal) Ahead Right	Traffic	4	16	33	49

TA Report

Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**154.8%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**154.8%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	1189	1900	1382	86.0%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	528	1900	1382	38.2%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	926	1950:1950	957+715	55.4 : 55.4%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	14	-	93	1900	432	21.5%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	14	-	455	1900:1900	184+432	73.9 : 73.9%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	26	-	0	1900	777	0.0%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	26	-	530	1900	777	68.2%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	26	-	454	1900	777	58.4%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	38	-	1738	1900:1900	0+1123	0.0 : 154.8%
4/3	A509 (W) Ahead	U	4	N/A	G		1	38	-	0	1900	1123	0.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	28	-	610	2000	879	69.4%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	28	-	532	2000	879	60.5%
9/3	(Internal) Right	U	1	N/A	B		1	28	-	319	2000	879	36.3%
10/1	(Internal) Ahead	U	4	N/A	H		1	16	-	666	2000	515	129.3%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	16	-	773	2000	515	150.1%
10/3	(Internal) Right	U	4	N/A	H		1	16	-	0	2000	515	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	1	2000	242	0.3%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	0	2000	242	0.0%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	0	2000	242	0.0%
12/1	(Internal) Ahead	U	3	N/A	F		1	40	-	502	2000	1242	40.4%
12/2	(Internal) Ahead	U	3	N/A	F		1	40	-	528	2000	1242	42.5%
12/3	(Internal) Right	U	3	N/A	F		1	40	-	530	2000	1242	42.7%
12/4	(Internal) Right	U	3	N/A	F		1	40	-	396	2000	1242	31.9%
13/1	Ahead	U	N/A	N/A	-		-	-	-	393	1900	1900	20.7%
13/2	Ahead	U	N/A	N/A	-		-	-	-	591	1900	1900	31.1%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**68.1**	**528.1**	**0.0**	**596.2**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**68.1**	**528.1**	**0.0**	**596.2**	**-**	**-**	**-**	**-**
1/1	1189	1189	-	-	-	2.2	3.0	-	5.2	15.6	15.9	3.0	18.8
1/2	528	528	-	-	-	0.5	0.3	-	0.8	5.5	3.5	0.3	3.8
1/3+1/4	926	926	-	-	-	0.8	0.6	-	1.5	5.7	3.5	0.6	4.2
2/1	93	93	-	-	-	0.5	0.1	-	0.7	26.1	1.4	0.1	1.5
2/2+2/3	455	455	-	-	-	2.9	1.4	-	4.3	33.9	5.4	1.4	6.8
3/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	530	530	-	-	-	2.4	1.1	-	3.4	23.2	8.0	1.1	9.0
3/3	454	454	-	-	-	1.9	0.7	-	2.6	20.7	6.4	0.7	7.1
4/2+4/1	1738	1123	-	-	-	27.4	309.0	-	336.4	696.8	61.7	309.0	370.8
4/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
9/1	610	610	-	-	-	1.3	1.1	-	2.5	14.5	4.7	1.1	5.8
9/2	532	532	-	-	-	1.5	0.8	-	2.3	15.6	5.4	0.8	6.1
9/3	319	319	-	-	-	0.3	0.3	-	0.6	7.1	5.8	0.3	6.1
10/1	666	515	-	-	-	9.9	77.6	-	87.4	472.6	17.7	77.6	95.3
10/2	773	515	-	-	-	14.0	130.4	-	144.4	672.4	23.5	130.4	153.9
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	1	1	-	-	-	0.0	0.0	-	0.0	37.1	0.0	0.0	0.0
11/2	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	502	502	-	-	-	0.4	0.3	-	0.8	5.5	1.3	0.3	1.6
12/2	528	528	-	-	-	0.5	0.4	-	0.8	5.6	2.3	0.4	2.6
12/3	530	530	-	-	-	1.2	0.4	-	1.6	10.9	5.9	0.4	6.2
12/4	396	396	-	-	-	0.4	0.2	-	0.6	5.5	1.2	0.2	1.4
13/1	393	393	-	-	-	0.0	0.1	-	0.1	1.2	0.0	0.1	0.1

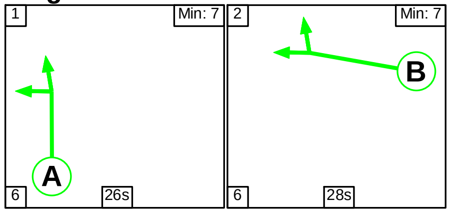
TA Report

13/2	591	591	-	-	-	0.0	0.2	-	0.2	1.4	0.0	0.2	0.2

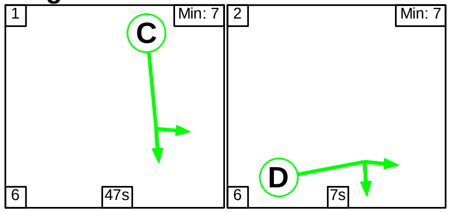
C1	Stream: 1	PRC for Signalled Lanes (%):	29.7	Total Delay for Signalled Lanes (pcuHr):	11.42	Cycle Time (s):	66
C1	Stream: 2	PRC for Signalled Lanes (%):	4.6	Total Delay for Signalled Lanes (pcuHr):	7.43	Cycle Time (s):	66
C1	Stream: 3	PRC for Signalled Lanes (%):	21.8	Total Delay for Signalled Lanes (pcuHr):	8.75	Cycle Time (s):	66
C1	Stream: 4	PRC for Signalled Lanes (%):	-72.0	Total Delay for Signalled Lanes (pcuHr):	568.22	Cycle Time (s):	66
		PRC Over All Lanes (%):	-72.0	Total Delay Over All Lanes(pcuHr):	596.17		

Staging Plan Diagram

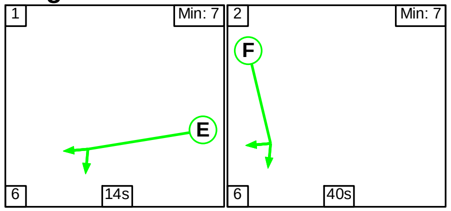
Stage Stream: 1



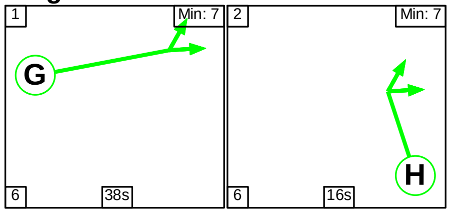
Stage Stream: 2



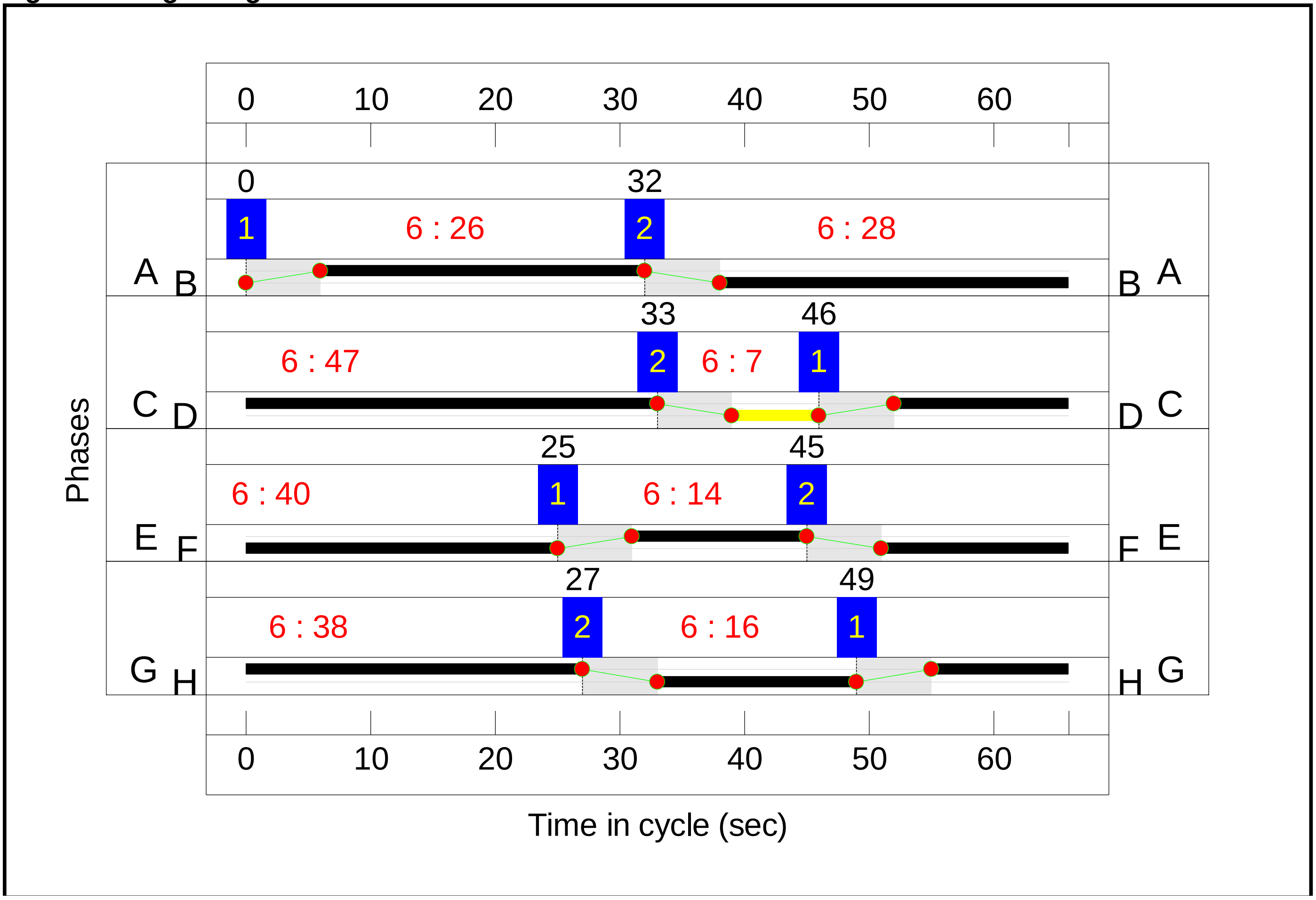
Stage Stream: 3



Stage Stream: 4



Signal Timings Diagram



Scenario 3: '2031 Do Minimum AM' (FG3: '2031 Reference Case AM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	16	45	61
B	(Internal) Ahead Right	Traffic	1	38	1	39
C	A509 (N) Left Ahead	Traffic	2	47	17	64
D	(Internal) Ahead Right	Traffic	2	7	4	11
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	10	5	15
F	(Internal) Ahead Right	Traffic	3	44	21	65
G	A509 (W) Left Ahead	Traffic	4	32	3	35
H	(Internal) Ahead Right	Traffic	4	22	41	63

TA Report

Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**110.1%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**110.1%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	1521	1900	1382	110.1%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	1177	1900	1382	85.2%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	1897	1950:1950	878+877	108.1 : 108.1%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	10	-	288	1900	317	90.9%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	10	-	86	1900:1900	317+317	13.3 : 13.9%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	16	-	1	1900	489	0.2%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	16	-	441	1900	489	90.1%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	16	-	433	1900	489	88.5%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	32	-	1002	1900:1900	426+950	59.7 : 78.7%
4/3	A509 (W) Ahead	U	4	N/A	G		1	32	-	0	1900	950	0.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	38	-	1199	2000	1182	95.5%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	38	-	990	2000	1182	77.8%
9/3	(Internal) Right	U	1	N/A	B		1	38	-	44	2000	1182	3.7%
10/1	(Internal) Ahead	U	4	N/A	H		1	22	-	483	2000	697	69.3%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	22	-	475	2000	697	68.2%
10/3	(Internal) Right	U	4	N/A	H		1	22	-	2	2000	697	0.3%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	38	2000	242	15.7%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	256	2000	242	105.6%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	0	2000	242	0.0%
12/1	(Internal) Ahead	U	3	N/A	F		1	44	-	1208	2000	1364	80.5%
12/2	(Internal) Ahead	U	3	N/A	F		1	44	-	1177	2000	1364	86.3%
12/3	(Internal) Right	U	3	N/A	F		1	44	-	949	2000	1364	64.4%
12/4	(Internal) Right	U	3	N/A	F		1	44	-	948	2000	1364	64.3%
13/1	Ahead	U	N/A	N/A	-		-	-	-	410	1900	1900	21.6%
13/2	Ahead	U	N/A	N/A	-		-	-	-	465	1900	1900	24.5%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**41.1**	**198.4**	**0.0**	**239.5**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**41.1**	**198.4**	**0.0**	**239.5**	**-**	**-**	**-**	**-**
1/1	1521	1382	-	-	-	9.8	74.7	-	84.5	200.0	32.6	74.7	107.2
1/2	1177	1177	-	-	-	2.1	2.8	-	4.9	15.0	15.4	2.8	18.2
1/3+1/4	1897	1756	-	-	-	7.0	76.9	-	83.9	159.2	32.0	76.9	108.9
2/1	288	288	-	-	-	2.2	3.9	-	6.1	76.3	5.1	3.9	9.1
2/2+2/3	86	86	-	-	-	0.6	0.1	-	0.6	26.8	0.7	0.1	0.8
3/1	1	1	-	-	-	0.0	0.0	-	0.0	22.3	0.0	0.0	0.0
3/2	441	441	-	-	-	2.9	3.9	-	6.8	55.7	7.7	3.9	11.6
3/3	433	433	-	-	-	2.8	3.4	-	6.3	52.0	7.6	3.4	11.0
4/2+4/1	1002	1002	-	-	-	3.5	1.3	-	4.8	17.4	11.2	1.3	12.6
4/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
9/1	1128	1128	-	-	-	2.0	8.1	-	10.1	32.2	11.2	8.1	19.3
9/2	919	919	-	-	-	2.3	1.7	-	4.1	15.9	8.1	1.7	9.9
9/3	44	44	-	-	-	0.0	0.0	-	0.0	1.6	0.0	0.0	0.0
10/1	483	483	-	-	-	0.3	1.1	-	1.4	10.6	0.8	1.1	1.9
10/2	475	475	-	-	-	0.4	1.1	-	1.4	11.0	0.8	1.1	1.9
10/3	2	2	-	-	-	0.0	0.0	-	0.0	3.2	0.0	0.0	0.0
11/1	38	38	-	-	-	0.4	0.1	-	0.5	43.0	0.5	0.1	0.6
11/2	256	242	-	-	-	1.8	12.1	-	13.9	195.9	4.9	12.1	17.0
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	1098	1098	-	-	-	0.2	2.0	-	2.3	7.4	5.6	2.0	7.7
12/2	1177	1177	-	-	-	0.5	3.1	-	3.6	11.0	16.7	3.1	19.7
12/3	878	878	-	-	-	1.8	0.9	-	2.7	11.3	9.5	0.9	10.4
12/4	877	877	-	-	-	0.3	0.9	-	1.2	5.1	7.4	0.9	8.3
13/1	410	410	-	-	-	0.0	0.1	-	0.1	1.2	0.0	0.1	0.1

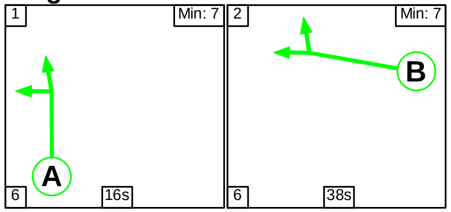
TA Report

13/2	465	465	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

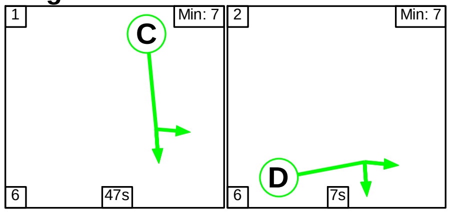
C1	Stream: 1	PRC for Signalled Lanes (%):	-6.1	Total Delay for Signalled Lanes (pcuHr):	27.26	Cycle Time (s):	66
C1	Stream: 2	PRC for Signalled Lanes (%):	-22.3	Total Delay for Signalled Lanes (pcuHr):	187.70	Cycle Time (s):	66
C1	Stream: 3	PRC for Signalled Lanes (%):	-1.1	Total Delay for Signalled Lanes (pcuHr):	16.59	Cycle Time (s):	66
C1	Stream: 4	PRC for Signalled Lanes (%):	14.3	Total Delay for Signalled Lanes (pcuHr):	7.70	Cycle Time (s):	66
		PRC Over All Lanes (%):	-22.3	Total Delay Over All Lanes(pcuHr):	239.55		

Staging Plan Diagram

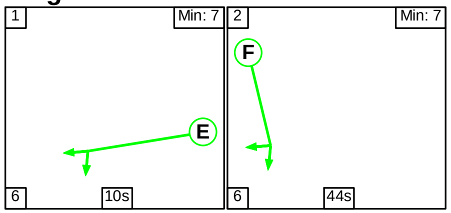
Stage Stream: 1



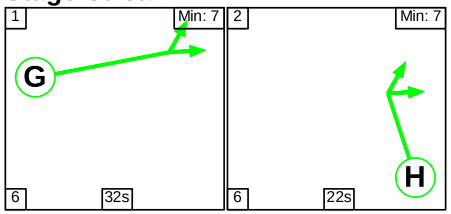
Stage Stream: 2



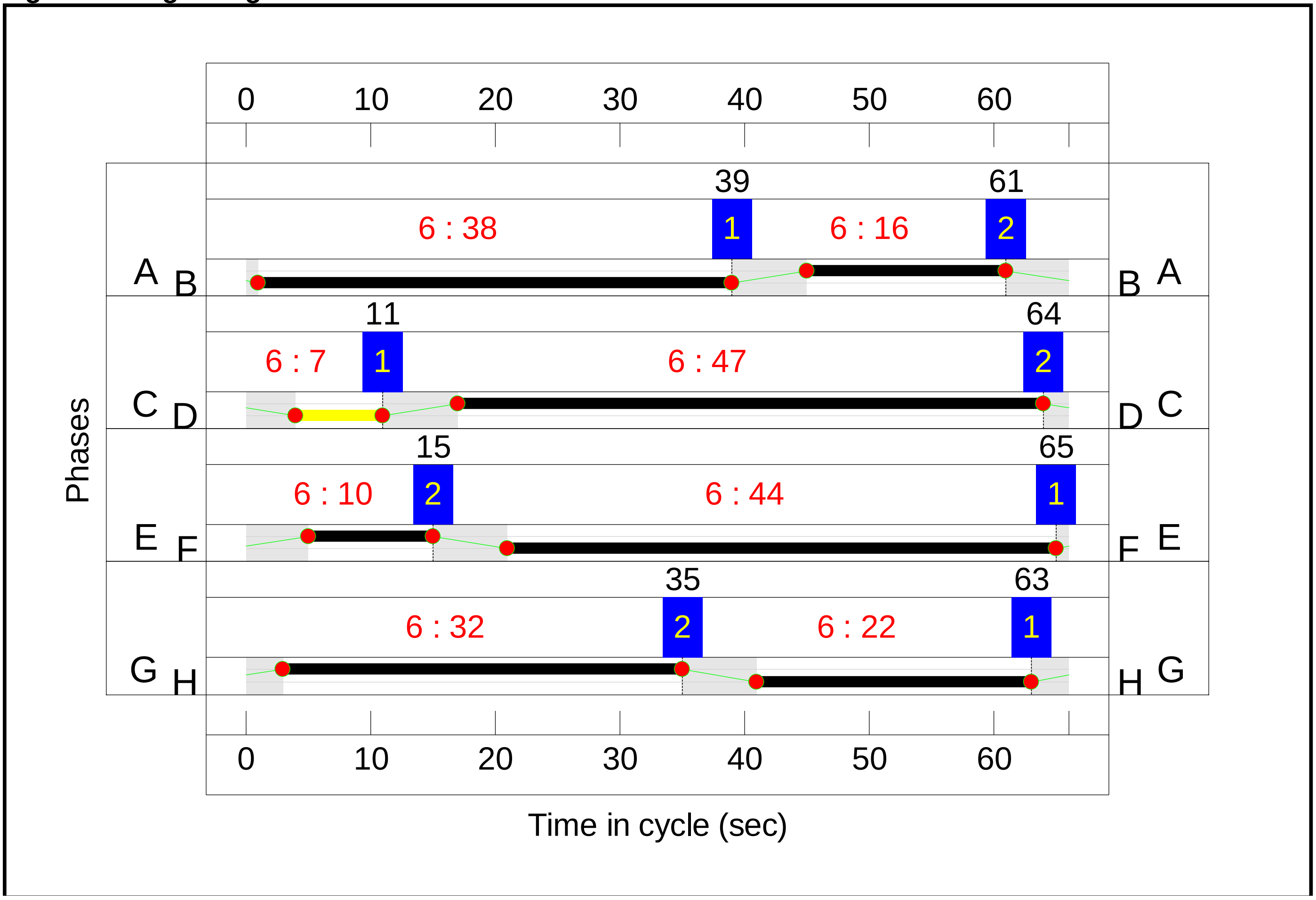
Stage Stream: 3



Stage Stream: 4



TA Report
Signal Timings Diagram



Scenario 4: '2031 Do Minimum PM' (FG4: '2031 Reference Case PM', Plan 1: 'Network Control Plan 1')
Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	8	6	14
B	(Internal) Ahead Right	Traffic	1	46	20	0
C	A509 (N) Left Ahead	Traffic	2	47	61	42
D	(Internal) Ahead Right	Traffic	2	7	48	55
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	8	48	56
F	(Internal) Ahead Right	Traffic	3	46	62	42
G	A509 (W) Left Ahead	Traffic	4	43	23	0
H	(Internal) Ahead Right	Traffic	4	11	6	17

TA Report

Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**148.6%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**148.6%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	1016	1900	1382	73.5%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	1024	1900	1382	74.1%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	1082	1950:1950	453+1107	69.4 : 69.4%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	8	-	104	1900	259	40.1%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	8	-	757	1900:1900	259+259	145.5 : 146.7%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	8	-	0	1900	259	0.0%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	8	-	385	1900	259	148.6%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	8	-	377	1900	259	145.5%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	43	-	1864	1900:1900	1+1267	143.3 : 147.1%
4/3	A509 (W) Ahead	U	4	N/A	G		1	43	-	0	1900	1267	0.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	46	-	401	2000	1424	28.2%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	46	-	1145	2000	1424	72.1%
9/3	(Internal) Right	U	1	N/A	B		1	46	-	380	2000	1424	18.2%
10/1	(Internal) Ahead	U	4	N/A	H		1	11	-	762	2000	364	142.5%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	11	-	757	2000	364	142.5%
10/3	(Internal) Right	U	4	N/A	H		1	11	-	0	2000	364	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	0	2000	242	0.0%

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11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	1	2000	242	0.3%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	0	2000	242	0.0%
12/1	(Internal) Ahead	U	3	N/A	F		1	46	-	423	2000	1424	29.7%
12/2	(Internal) Ahead	U	3	N/A	F		1	46	-	1024	2000	1424	71.9%
12/3	(Internal) Right	U	3	N/A	F		1	46	-	314	2000	1424	22.0%
12/4	(Internal) Right	U	3	N/A	F		1	46	-	768	2000	1424	53.9%
13/1	Ahead	U	N/A	N/A	-		-	-	-	377	1900	1900	19.8%
13/2	Ahead	U	N/A	N/A	-		-	-	-	385	1900	1900	20.3%

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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	**-**	**-**	**0**	**0**	**0**	**68.2**	**711.9**	**0.0**	**780.1**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**68.2**	**711.9**	**0.0**	**780.1**	**-**	**-**	**-**	**-**
1/1	1016	1016	-	-	-	1.5	1.4	-	2.9	10.2	10.7	1.4	12.1
1/2	1024	1024	-	-	-	1.5	1.4	-	2.9	10.3	11.1	1.4	12.5
1/3+1/4	1082	1082	-	-	-	1.1	1.1	-	2.2	7.5	6.4	1.1	7.5
2/1	104	104	-	-	-	0.8	0.3	-	1.1	37.6	1.7	0.3	2.1
2/2+2/3	757	518	-	-	-	12.6	121.0	-	133.6	635.2	12.6	121.0	133.6
3/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	385	259	-	-	-	7.2	64.4	-	71.7	670.4	9.9	64.4	74.3
3/3	377	259	-	-	-	6.9	60.5	-	67.4	643.9	9.5	60.5	70.0
4/2+4/1	1864	1267	-	-	-	19.9	299.9	-	319.7	617.5	50.3	299.9	350.2
4/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
9/1	401	401	-	-	-	0.3	0.2	-	0.5	4.1	1.3	0.2	1.5
9/2	1027	1027	-	-	-	2.4	1.3	-	3.7	12.9	11.7	1.3	13.0
9/3	259	259	-	-	-	0.0	0.1	-	0.1	1.5	0.0	0.1	0.1
10/1	518	364	-	-	-	6.8	78.9	-	85.7	595.2	12.3	78.9	91.2
10/2	518	364	-	-	-	6.7	78.9	-	85.6	594.5	12.3	78.9	91.2
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/2	1	1	-	-	-	0.0	0.0	-	0.0	28.9	0.0	0.0	0.0
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	423	423	-	-	-	0.0	0.2	-	0.3	2.2	0.2	0.2	0.4
12/2	1024	1024	-	-	-	0.1	1.3	-	1.4	4.9	3.9	1.3	5.2
12/3	314	314	-	-	-	0.3	0.1	-	0.5	5.2	2.1	0.1	2.2
12/4	768	768	-	-	-	0.2	0.6	-	0.7	3.5	0.6	0.6	1.2
13/1	377	377	-	-	-	0.0	0.1	-	0.1	1.2	0.0	0.1	0.1

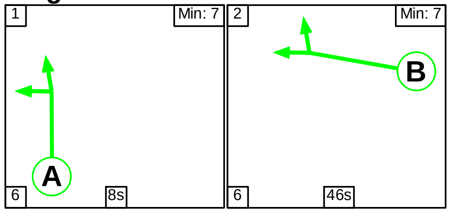
TA Report

13/2	385	385	-	-	-	0.0	0.1	-	0.1	1.2	0.0	0.1	0.1

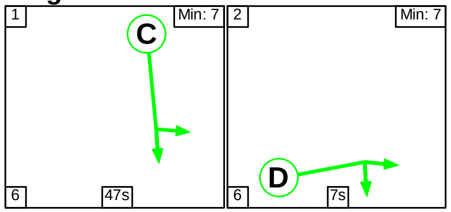
C1	Stream: 1	PRC for Signalled Lanes (%):	-65.1	Total Delay for Signalled Lanes (pcuHr):	143.37	Cycle Time (s):	66
C1	Stream: 2	PRC for Signalled Lanes (%):	21.4	Total Delay for Signalled Lanes (pcuHr):	8.06	Cycle Time (s):	66
C1	Stream: 3	PRC for Signalled Lanes (%):	-63.0	Total Delay for Signalled Lanes (pcuHr):	137.51	Cycle Time (s):	66
C1	Stream: 4	PRC for Signalled Lanes (%):	-63.4	Total Delay for Signalled Lanes (pcuHr):	490.97	Cycle Time (s):	66
		PRC Over All Lanes (%):	-65.1	Total Delay Over All Lanes(pcuHr):	780.15		

Staging Plan Diagram

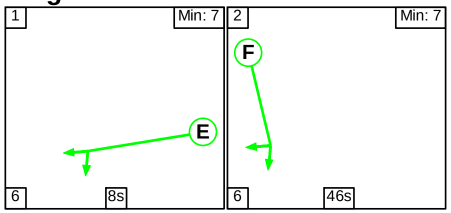
Stage Stream: 1



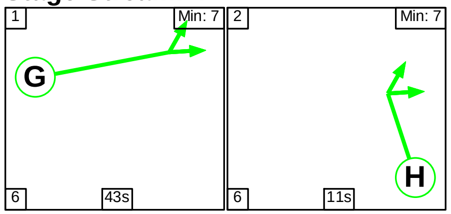
Stage Stream: 2



Stage Stream: 3

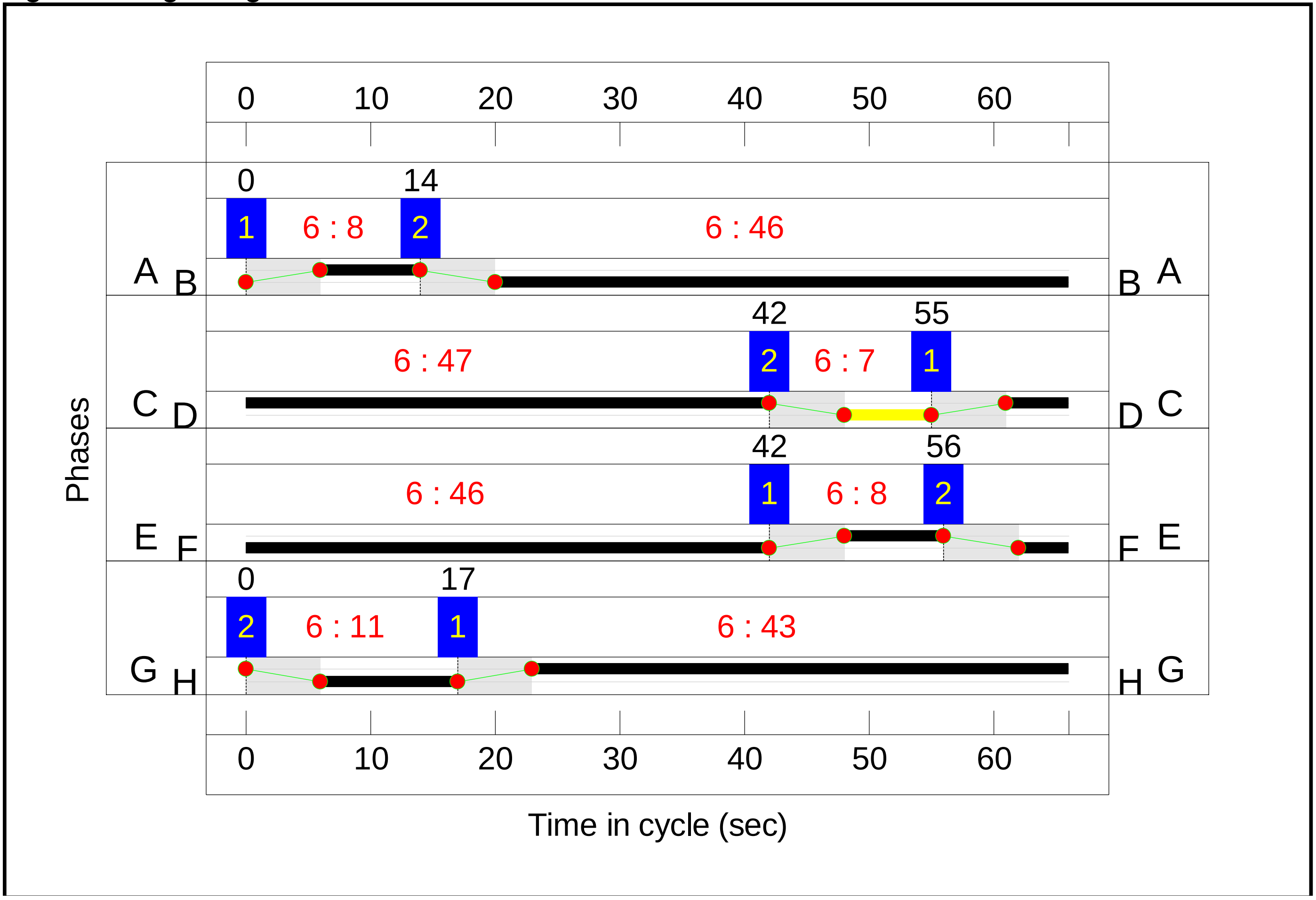


Stage Stream: 4



TA Report

Signal Timings Diagram



Scenario 5: '2031 Do Something AM' (FG5: '2031 Reference Case+Dev AM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	17	44	61
B	(Internal) Ahead Right	Traffic	1	37	1	38
C	A509 (N) Left Ahead	Traffic	2	45	18	63
D	(Internal) Ahead Right	Traffic	2	9	3	12
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	9	4	13
F	(Internal) Ahead Right	Traffic	3	45	19	64
G	A509 (W) Left Ahead	Traffic	4	32	3	35
H	(Internal) Ahead Right	Traffic	4	22	41	63

TA Report
Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**107.3%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**107.3%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	45	-	1401	1900	1324	105.8%
1/2	A509 (N) Ahead	U	2	N/A	C		1	45	-	1254	1900	1324	94.7%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	45	-	1809	1950:1950	826+859	107.3 : 107.3%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	9	-	249	1900	288	86.5%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	9	-	115	1900:1900	288+288	19.8 : 20.1%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	17	-	1	1900	518	0.2%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	17	-	452	1900	518	87.2%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	17	-	446	1900	518	86.1%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	32	-	1080	1900:1900	472+950	62.0 : 82.8%
4/3	A509 (W) Ahead	U	4	N/A	G		1	32	-	0	1900	950	0.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	37	-	1106	2000	1152	90.8%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	37	-	979	2000	1152	79.5%
9/3	(Internal) Right	U	1	N/A	B		1	37	-	58	2000	1152	5.0%
10/1	(Internal) Ahead	U	4	N/A	H		1	22	-	509	2000	697	73.0%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	22	-	503	2000	697	72.2%
10/3	(Internal) Right	U	4	N/A	H		1	22	-	1	2000	697	0.1%
11/1	(Internal) Ahead	U	2	N/A	D		1	9	-	22	2000	303	7.3%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	9	-	294	2000	303	97.0%
11/3	(Internal) Right	U	2	N/A	D		1	9	-	0	2000	303	0.0%
12/1	(Internal) Ahead	U	3	N/A	F		1	45	-	1171	2000	1394	79.5%
12/2	(Internal) Ahead	U	3	N/A	F		1	45	-	1254	2000	1394	90.0%
12/3	(Internal) Right	U	3	N/A	F		1	45	-	887	2000	1394	59.3%
12/4	(Internal) Right	U	3	N/A	F		1	45	-	922	2000	1394	61.6%
13/1	Ahead	U	N/A	N/A	-		-	-	-	417	1900	1900	21.9%
13/2	Ahead	U	N/A	N/A	-		-	-	-	482	1900	1900	25.4%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**37.9**	**156.0**	**0.0**	**193.8**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**37.9**	**156.0**	**0.0**	**193.8**	**-**	**-**	**-**	**-**
1/1	1401	1324	-	-	-	7.2	46.0	-	53.2	136.7	28.5	46.0	74.5
1/2	1254	1254	-	-	-	3.1	7.4	-	10.5	30.1	20.2	7.4	27.6
1/3+1/4	1809	1685	-	-	-	6.5	68.4	-	75.0	149.2	29.8	68.4	98.3
2/1	249	249	-	-	-	1.9	2.8	-	4.7	67.8	4.4	2.8	7.2
2/2+2/3	115	115	-	-	-	0.8	0.1	-	0.9	28.4	0.9	0.1	1.0
3/1	1	1	-	-	-	0.0	0.0	-	0.0	21.3	0.0	0.0	0.0
3/2	452	452	-	-	-	2.9	3.1	-	6.0	47.8	7.8	3.1	10.9
3/3	446	446	-	-	-	2.8	2.9	-	5.7	45.9	7.7	2.9	10.5
4/2+4/1	1080	1080	-	-	-	3.9	1.6	-	5.4	18.1	12.2	1.6	13.8
4/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
9/1	1045	1045	-	-	-	1.7	4.5	-	6.2	21.4	9.8	4.5	14.4
9/2	916	916	-	-	-	2.6	1.9	-	4.5	17.6	8.6	1.9	10.5
9/3	58	58	-	-	-	0.0	0.0	-	0.0	1.6	0.0	0.0	0.0
10/1	509	509	-	-	-	0.4	1.3	-	1.7	12.3	1.1	1.3	2.4
10/2	503	503	-	-	-	0.5	1.3	-	1.8	12.9	1.1	1.3	2.4
10/3	1	1	-	-	-	0.0	0.0	-	0.0	3.1	0.0	0.0	0.0
11/1	22	22	-	-	-	0.2	0.0	-	0.2	38.2	0.3	0.0	0.3
11/2	294	294	-	-	-	1.5	6.6	-	8.1	99.1	5.3	6.6	11.9
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	1108	1108	-	-	-	0.1	1.9	-	2.0	6.5	1.1	1.9	3.0
12/2	1254	1254	-	-	-	0.0	4.2	-	4.3	12.2	0.1	4.2	4.3
12/3	826	826	-	-	-	1.7	0.7	-	2.4	10.4	9.1	0.7	9.8
12/4	859	859	-	-	-	0.1	0.8	-	0.9	3.9	0.5	0.8	1.3
13/1	417	417	-	-	-	0.0	0.1	-	0.1	1.2	0.0	0.1	0.1

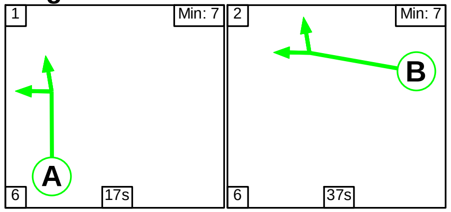
TA Report

13/2	482	482	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

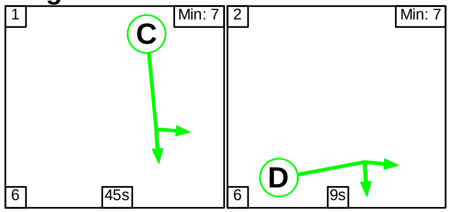
C1 Stream: 1 PRC for Signalled Lanes (%): -0.9 Total Delay for Signalled Lanes (pcuHr): 22.41 Cycle Time (s): 66
C1 Stream: 2 PRC for Signalled Lanes (%): -19.3 Total Delay for Signalled Lanes (pcuHr): 146.96 Cycle Time (s): 66
C1 Stream: 3 PRC for Signalled Lanes (%): 0.0 Total Delay for Signalled Lanes (pcuHr): 15.18 Cycle Time (s): 66
C1 Stream: 4 PRC for Signalled Lanes (%): 8.6 Total Delay for Signalled Lanes (pcuHr): 8.99 Cycle Time (s): 66
PRC Over All Lanes (%): -19.3 Total Delay Over All Lanes(pcuHr): 193.85

Staging Plan Diagram

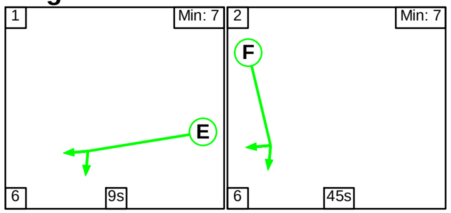
Stage Stream: 1



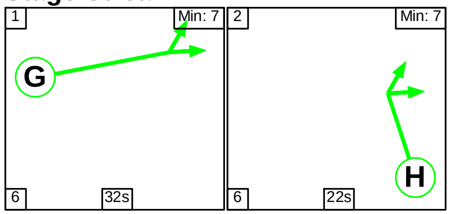
Stage Stream: 2



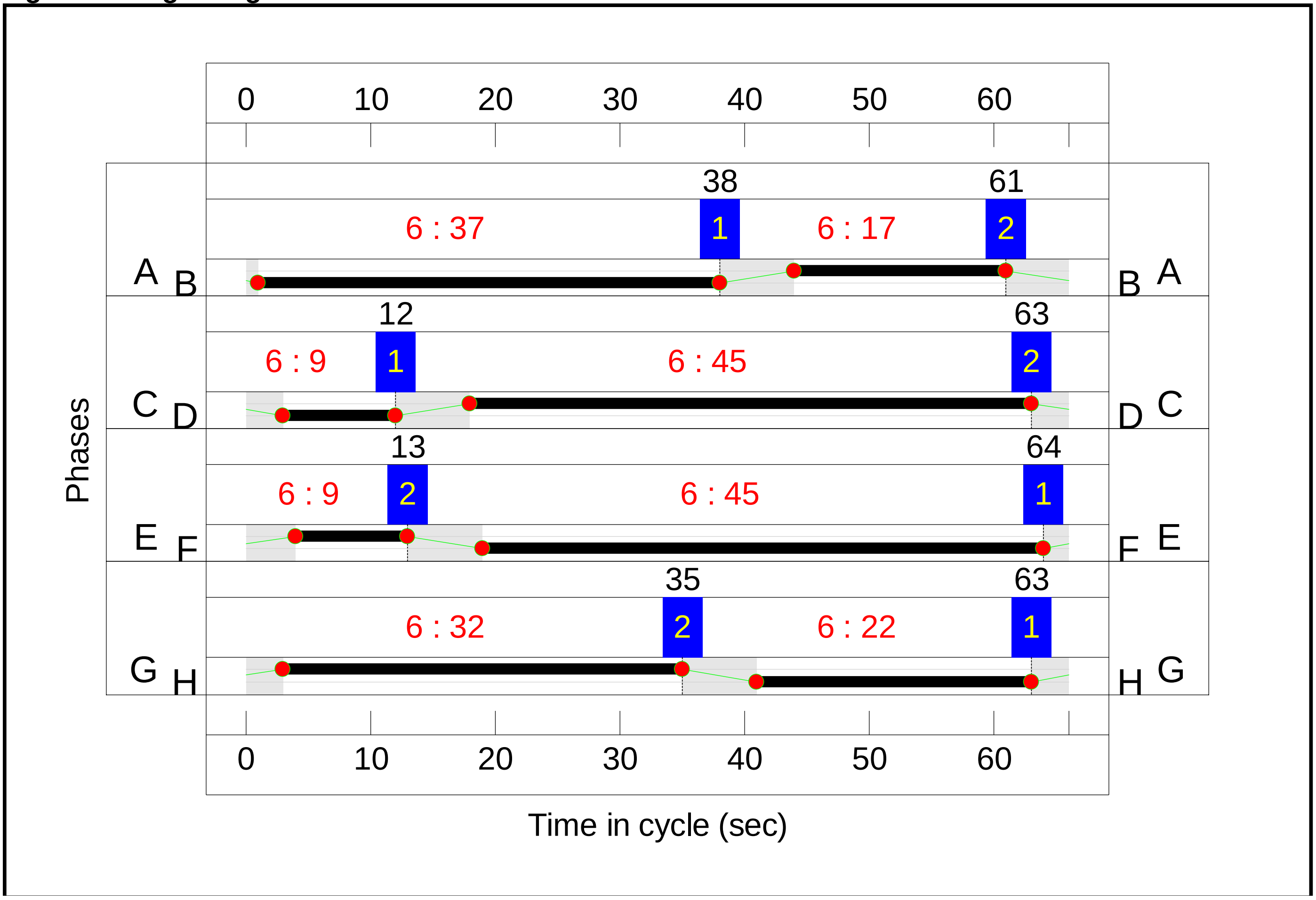
Stage Stream: 3



Stage Stream: 4



Signal Timings Diagram



Scenario 6: '2031 Do Something PM' (FG6: '2031 Reference Case+Dev PM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	11	6	17
B	(Internal) Ahead Right	Traffic	1	43	23	0
C	A509 (N) Left Ahead	Traffic	2	47	64	45
D	(Internal) Ahead Right	Traffic	2	7	51	58
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	12	42	54
F	(Internal) Ahead Right	Traffic	3	42	60	36
G	A509 (W) Left Ahead	Traffic	4	41	24	65
H	(Internal) Ahead Right	Traffic	4	13	5	18

Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**145.6%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**145.6%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	969	1900	1382	70.1%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	988	1900	1382	71.5%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	980	1950:1950	229+1255	66.0 : 66.0%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	12	-	204	1900	374	54.5%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	12	-	492	1900:1900	374+374	65.7 : 65.7%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	11	-	0	1900	345	0.0%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	11	-	503	1900	345	145.6%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	11	-	493	1900	345	142.7%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	41	-	1766	1900:1900	4+1209	141.6 : 145.6%
4/3	A509 (W) Ahead	U	4	N/A	G		1	41	-	0	1900	1209	0.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	43	-	334	2000	1333	25.1%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	43	-	1075	2000	1333	80.6%
9/3	(Internal) Right	U	1	N/A	B		1	43	-	246	2000	1333	18.5%
10/1	(Internal) Ahead	U	4	N/A	H		1	13	-	749	2000	424	139.4%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	13	-	739	2000	424	139.4%
10/3	(Internal) Right	U	4	N/A	H		1	13	-	0	2000	424	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	0	2000	242	0.0%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	5	2000	242	1.6%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	0	2000	242	0.0%
12/1	(Internal) Ahead	U	3	N/A	F		1	42	-	462	2000	1303	35.5%
12/2	(Internal) Ahead	U	3	N/A	F		1	42	-	988	2000	1303	75.8%
12/3	(Internal) Right	U	3	N/A	F		1	42	-	151	2000	1303	11.6%
12/4	(Internal) Right	U	3	N/A	F		1	42	-	829	2000	1303	63.6%
13/1	Ahead	U	N/A	N/A	-		-	-	-	492	1900	1900	25.9%
13/2	Ahead	U	N/A	N/A	-		-	-	-	504	1900	1900	26.5%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**65.9**	**615.1**	**0.0**	**681.0**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**65.9**	**615.1**	**0.0**	**681.0**	**-**	**-**	**-**	**-**
1/1	969	969	-	-	-	1.3	1.2	-	2.5	9.3	9.7	1.2	10.9
1/2	988	988	-	-	-	1.4	1.2	-	2.7	9.7	10.2	1.2	11.4
1/3+1/4	980	980	-	-	-	1.1	1.0	-	2.1	7.6	7.5	1.0	8.4
2/1	204	204	-	-	-	1.4	0.6	-	1.9	34.4	3.3	0.6	3.9
2/2+2/3	492	492	-	-	-	3.3	1.0	-	4.3	31.4	4.1	1.0	5.1
3/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	503	345	-	-	-	9.0	80.3	-	89.3	639.1	12.2	80.3	92.5
3/3	493	345	-	-	-	8.6	75.4	-	84.0	613.1	11.7	75.4	87.2
4/2+4/1	1766	1213	-	-	-	19.0	278.3	-	297.3	606.0	47.2	278.3	325.5
4/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
9/1	334	334	-	-	-	0.1	0.2	-	0.3	3.3	0.7	0.2	0.8
9/2	1075	1075	-	-	-	3.5	2.0	-	5.6	18.7	16.8	2.0	18.9
9/3	246	246	-	-	-	0.0	0.1	-	0.1	1.7	0.0	0.1	0.1
10/1	591	424	-	-	-	7.4	85.3	-	92.7	564.5	13.9	85.3	99.2
10/2	591	424	-	-	-	7.4	85.3	-	92.8	564.7	13.9	85.3	99.2
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/2	4	4	-	-	-	0.0	0.0	-	0.0	27.2	0.1	0.0	0.1
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	462	462	-	-	-	0.4	0.3	-	0.7	5.1	1.3	0.3	1.6
12/2	988	988	-	-	-	0.9	1.6	-	2.4	8.9	2.8	1.6	4.4
12/3	151	151	-	-	-	0.2	0.1	-	0.3	6.8	1.2	0.1	1.3
12/4	829	829	-	-	-	0.8	0.9	-	1.7	7.2	2.7	0.9	3.6
13/1	492	492	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

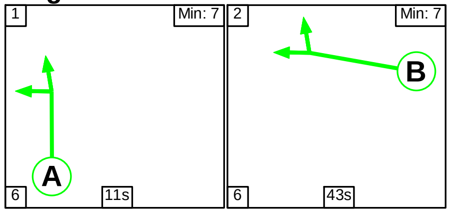
TA Report

13/2	504	504	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

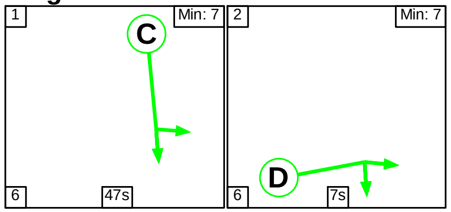
C1	Stream: 1	PRC for Signalled Lanes (%):	-61.8	Total Delay for Signalled Lanes (pcuHr):	179.27	Cycle Time (s):	66
C1	Stream: 2	PRC for Signalled Lanes (%):	25.9	Total Delay for Signalled Lanes (pcuHr):	7.27	Cycle Time (s):	66
C1	Stream: 3	PRC for Signalled Lanes (%):	18.7	Total Delay for Signalled Lanes (pcuHr):	11.28	Cycle Time (s):	66
C1	Stream: 4	PRC for Signalled Lanes (%):	-61.8	Total Delay for Signalled Lanes (pcuHr):	482.79	Cycle Time (s):	66
		PRC Over All Lanes (%):	-61.8	Total Delay Over All Lanes(pcuHr):	680.97		

Staging Plan Diagram

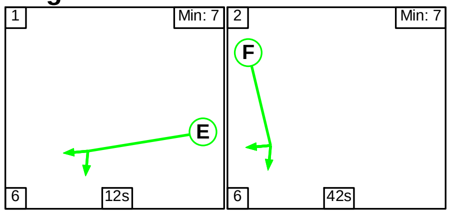
Stage Stream: 1



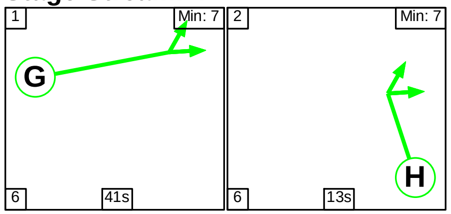
Stage Stream: 2



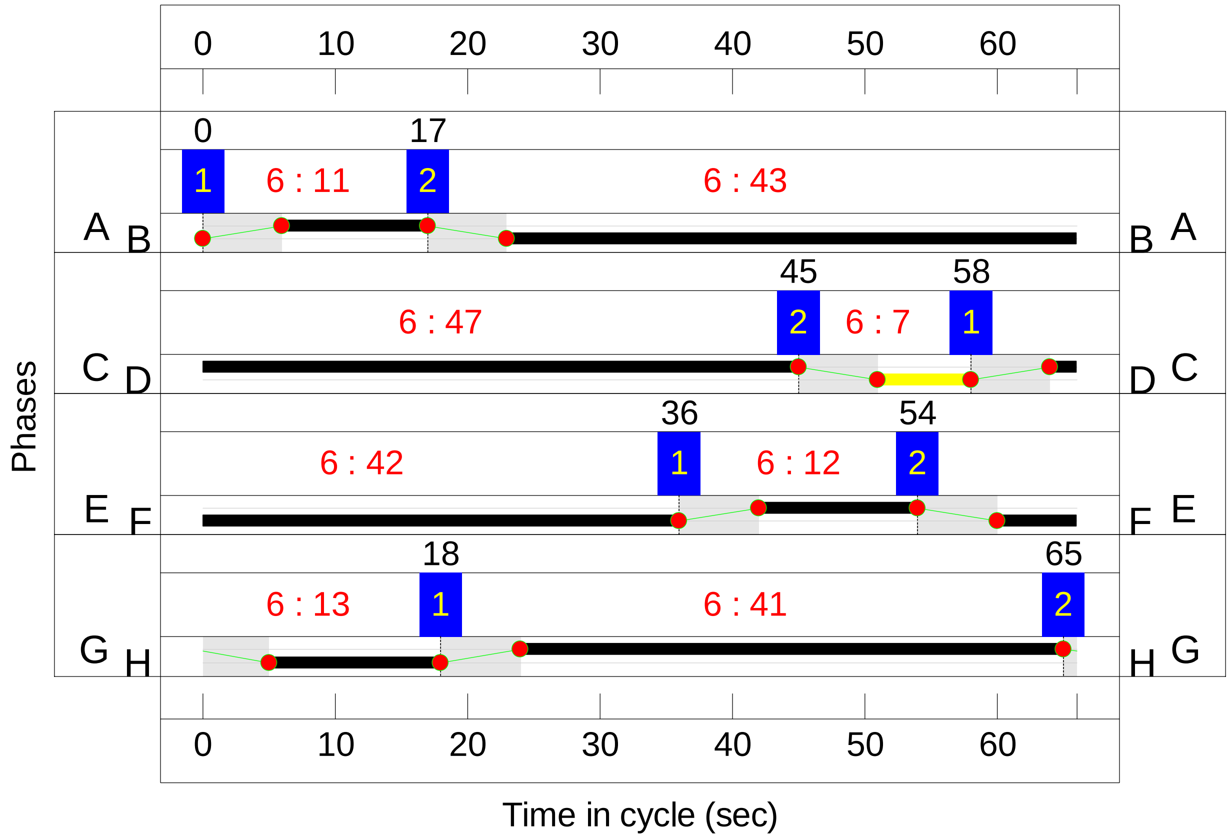
Stage Stream: 3



Stage Stream: 4



Signal Timings Diagram



Scenario 7: '2048 Do Minimum AM' (FG7: '2048 Reference Case AM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	21	37	58
B	(Internal) Ahead Right	Traffic	1	33	64	31
C	A509 (N) Left Ahead	Traffic	2	47	13	60
D	(Internal) Ahead Right	Traffic	2	7	0	7
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	8	0	8
F	(Internal) Ahead Right	Traffic	3	46	14	60
G	A509 (W) Left Ahead	Traffic	4	33	65	32
H	(Internal) Ahead Right	Traffic	4	21	38	59

Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**139.5%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**139.5%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	1547	1900	1382	112.0%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	1404	1900	1382	101.6%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	2296	1950:1950	658+988	139.5 : 139.5%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	8	-	343	1900	259	132.4%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	8	-	103	1900:1900	19+259	37.1 : 37.1%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	21	-	22	1900	633	3.5%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	21	-	607	1900	633	95.8%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	21	-	498	1900	633	78.6%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	33	-	1287	1900:1900	410+979	77.6 : 99.0%
4/3	A509 (W) Ahead	U	4	N/A	G		1	33	-	106	1900	979	10.8%
9/1	(Internal) Ahead	U	1	N/A	B		1	33	-	1242	2000	1030	87.8%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	33	-	1385	2000	1030	96.5%
9/3	(Internal) Right	U	1	N/A	B		1	33	-	96	2000	1030	9.3%
10/1	(Internal) Ahead	U	4	N/A	H		1	21	-	607	2000	667	91.1%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	21	-	594	2000	667	89.1%
10/3	(Internal) Right	U	4	N/A	H		1	21	-	0	2000	667	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	318	2000	242	131.2%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	318	2000	242	131.2%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	106	2000	242	43.7%
12/1	(Internal) Ahead	U	3	N/A	F		1	46	-	1293	2000	1424	81.1%
12/2	(Internal) Ahead	U	3	N/A	F		1	46	-	1504	2000	1424	104.0%
12/3	(Internal) Right	U	3	N/A	F		1	46	-	924	2000	1424	46.6%
12/4	(Internal) Right	U	3	N/A	F		1	46	-	1378	2000	1424	69.4%
13/1	Ahead	U	N/A	N/A	-		-	-	-	562	1900	1900	29.6%
13/2	Ahead	U	N/A	N/A	-		-	-	-	565	1900	1900	29.7%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**82.8**	**641.5**	**0.0**	**724.3**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**82.8**	**641.5**	**0.0**	**724.3**	**-**	**-**	**-**	**-**
1/1	1547	1382	-	-	-	9.9	87.0	-	96.9	225.6	33.1	87.0	120.2
1/2	1404	1382	-	-	-	4.1	25.1	-	29.2	74.8	26.1	25.1	51.2
1/3+1/4	2296	1646	-	-	-	28.2	326.9	-	355.1	556.7	58.7	326.9	385.6
2/1	343	259	-	-	-	5.7	43.9	-	49.6	520.2	8.3	43.9	52.2
2/2+2/3	103	103	-	-	-	0.7	0.3	-	1.0	36.1	1.6	0.3	1.9
3/1	22	22	-	-	-	0.1	0.0	-	0.1	17.9	0.3	0.0	0.3
3/2	607	607	-	-	-	3.6	7.4	-	11.0	65.3	10.8	7.4	18.2
3/3	498	498	-	-	-	2.8	1.8	-	4.5	32.8	8.2	1.8	10.0
4/2+4/1	1287	1287	-	-	-	5.1	5.7	-	10.8	30.2	17.5	5.7	23.2
4/3	106	106	-	-	-	0.2	0.1	-	0.3	10.3	1.0	0.1	1.0
9/1	904	904	-	-	-	1.7	3.4	-	5.1	20.4	9.4	3.4	12.8
9/2	995	995	-	-	-	3.9	9.2	-	13.1	47.5	16.8	9.2	26.0
9/3	96	96	-	-	-	0.0	0.1	-	0.1	1.9	0.0	0.1	0.1
10/1	607	607	-	-	-	0.1	4.4	-	4.5	26.6	0.1	4.4	4.5
10/2	594	594	-	-	-	1.3	3.7	-	5.0	30.1	10.3	3.7	14.0
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	318	242	-	-	-	6.0	39.8	-	45.8	518.3	7.3	39.8	47.1
11/2	318	242	-	-	-	4.4	39.8	-	44.2	500.4	7.2	39.8	47.0
11/3	106	106	-	-	-	0.6	0.4	-	0.9	31.8	1.8	0.4	2.1
12/1	1155	1155	-	-	-	0.2	2.1	-	2.3	7.1	1.8	2.1	3.9
12/2	1482	1424	-	-	-	3.2	38.4	-	41.6	101.1	28.6	38.4	67.0
12/3	664	664	-	-	-	1.0	0.4	-	1.4	7.6	6.4	0.4	6.9
12/4	988	988	-	-	-	0.2	1.1	-	1.4	5.0	1.2	1.1	2.3
13/1	562	562	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

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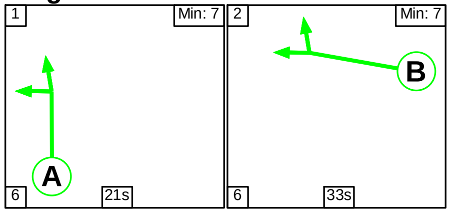
13/2	565	565	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

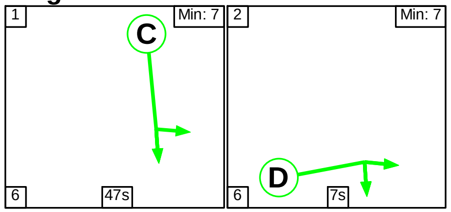
C1	Stream: 1	PRC for Signalled Lanes (%):	-7.3	Total Delay for Signalled Lanes (pcuHr):	33.97	Cycle Time (s):	66
C1	Stream: 2	PRC for Signalled Lanes (%):	-55.0	Total Delay for Signalled Lanes (pcuHr):	572.10	Cycle Time (s):	66
C1	Stream: 3	PRC for Signalled Lanes (%):	-47.1	Total Delay for Signalled Lanes (pcuHr):	97.26	Cycle Time (s):	66
C1	Stream: 4	PRC for Signalled Lanes (%):	-10.0	Total Delay for Signalled Lanes (pcuHr):	20.54	Cycle Time (s):	66
		PRC Over All Lanes (%):	-55.0	Total Delay Over All Lanes(pcuHr):	724.29		

Staging Plan Diagram

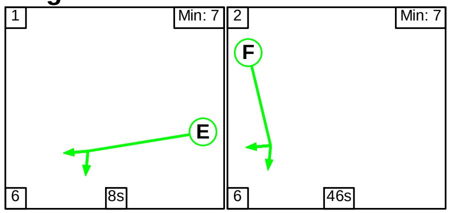
Stage Stream: 1



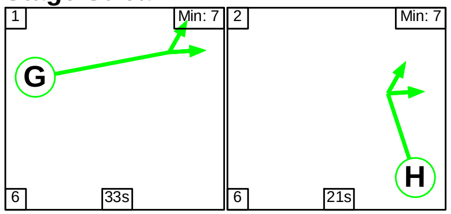
Stage Stream: 2



Stage Stream: 3

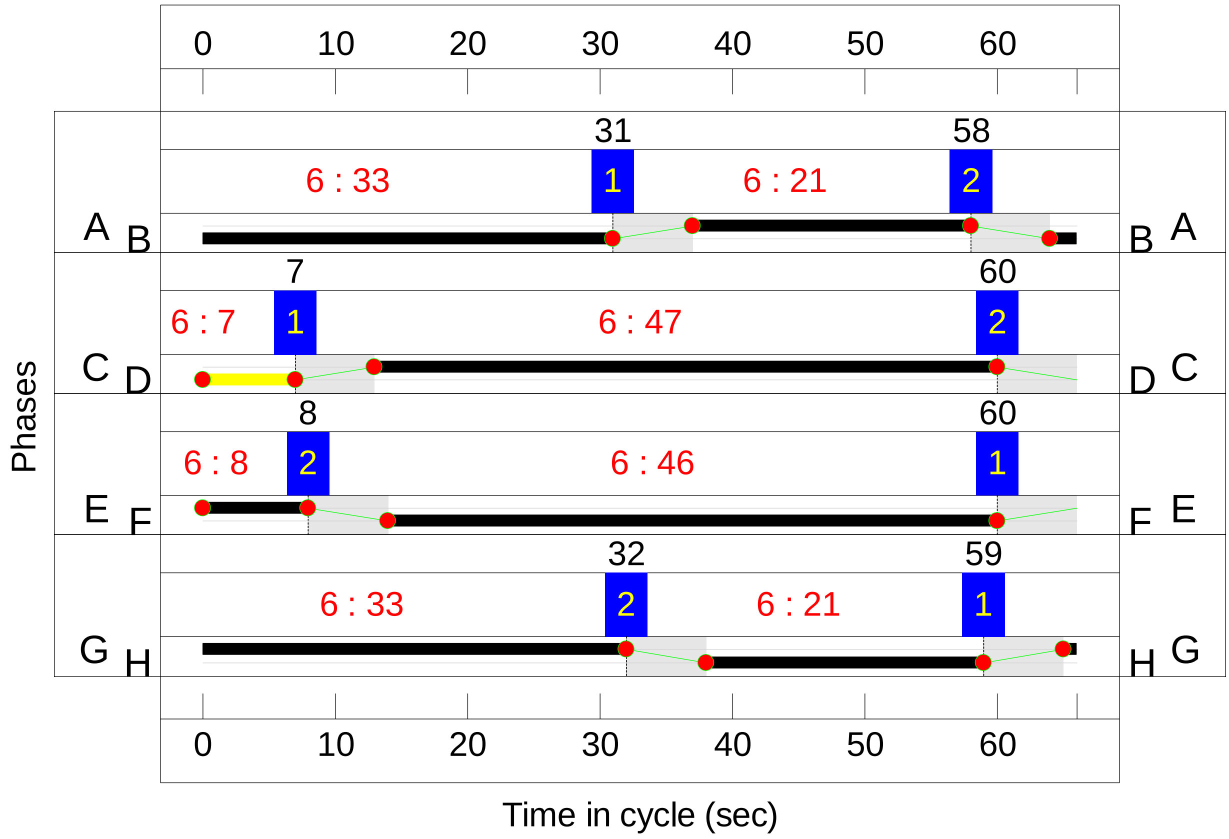


Stage Stream: 4



TA Report

Signal Timings Diagram



Scenario 8: '2048 Do Minimum PM' (FG8: '2048 Reference Case PM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	22	6	28
B	(Internal) Ahead Right	Traffic	1	32	34	0
C	A509 (N) Left Ahead	Traffic	2	47	54	35
D	(Internal) Ahead Right	Traffic	2	7	41	48
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	15	32	47
F	(Internal) Ahead Right	Traffic	3	39	53	26
G	A509 (W) Left Ahead	Traffic	4	41	28	3
H	(Internal) Ahead Right	Traffic	4	13	9	22

Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**158.3%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**158.3%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	1217	1900	1382	88.1%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	1264	1900	1382	91.5%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	1109	1950:1950	751+939	65.6 : 65.6%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	15	-	158	1900	461	34.3%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	15	-	779	1900:1900	34+461	157.4 : 157.4%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	22	-	0	1900	662	0.0%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	22	-	516	1900	662	77.9%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	22	-	211	1900	662	31.9%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	41	-	1875	1900:1900	4+1209	150.2 : 154.6%
4/3	A509 (W) Ahead	U	4	N/A	G		1	41	-	9	1900	1209	0.7%
9/1	(Internal) Ahead	U	1	N/A	B		1	32	-	635	2000	1000	63.5%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	32	-	670	2000	1000	65.0%
9/3	(Internal) Right	U	1	N/A	B		1	32	-	725	2000	1000	46.1%
10/1	(Internal) Ahead	U	4	N/A	H		1	13	-	570	2000	424	129.7%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	13	-	936	2000	424	158.3%
10/3	(Internal) Right	U	4	N/A	H		1	13	-	0	2000	424	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	0	2000	242	0.0%

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11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	6	2000	242	1.7%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	9	2000	242	3.7%
12/1	(Internal) Ahead	U	3	N/A	F		1	39	-	459	2000	1212	37.9%
12/2	(Internal) Ahead	U	3	N/A	F		1	39	-	1273	2000	1212	105.0%
12/3	(Internal) Right	U	3	N/A	F		1	39	-	493	2000	1212	40.7%
12/4	(Internal) Right	U	3	N/A	F		1	39	-	616	2000	1212	50.8%
13/1	Ahead	U	N/A	N/A	-		-	-	-	363	1900	1900	19.1%
13/2	Ahead	U	N/A	N/A	-		-	-	-	364	1900	1900	19.2%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**73.1**	**719.9**	**0.0**	**793.1**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**73.1**	**719.9**	**0.0**	**793.1**	**-**	**-**	**-**	**-**
1/1	1217	1217	-	-	-	2.3	3.5	-	5.8	17.3	16.9	3.5	20.4
1/2	1264	1264	-	-	-	2.6	4.9	-	7.5	21.4	18.6	4.9	23.6
1/3+1/4	1109	1109	-	-	-	1.1	1.0	-	2.0	6.5	4.4	1.0	5.4
2/1	158	158	-	-	-	0.9	0.3	-	1.2	26.6	2.4	0.3	2.6
2/2+2/3	779	495	-	-	-	12.7	143.4	-	156.1	721.3	20.6	143.4	164.0
3/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	516	516	-	-	-	2.8	1.7	-	4.5	31.3	8.5	1.7	10.2
3/3	211	211	-	-	-	0.9	0.2	-	1.2	19.8	2.8	0.2	3.0
4/2+4/1	1875	1213	-	-	-	21.2	332.4	-	353.6	678.8	49.9	332.4	382.3
4/3	9	9	-	-	-	0.0	0.0	-	0.0	6.0	0.1	0.0	0.1
9/1	635	635	-	-	-	1.0	0.9	-	1.9	10.9	5.4	0.9	6.3
9/2	650	650	-	-	-	1.8	0.9	-	2.7	15.2	5.4	0.9	6.3
9/3	461	461	-	-	-	0.0	0.4	-	0.4	3.3	0.0	0.4	0.4
10/1	550	424	-	-	-	6.0	65.1	-	71.1	465.2	12.9	65.1	78.0
10/2	672	424	-	-	-	13.3	125.0	-	138.3	741.6	17.9	125.0	143.0
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/2	4	4	-	-	-	0.0	0.0	-	0.0	33.7	0.1	0.0	0.1
11/3	9	9	-	-	-	0.1	0.0	-	0.1	29.1	0.1	0.0	0.2
12/1	459	459	-	-	-	0.4	0.3	-	0.7	5.8	1.3	0.3	1.6
12/2	1273	1212	-	-	-	4.2	38.7	-	42.8	121.1	24.5	38.7	63.1
12/3	493	493	-	-	-	1.2	0.3	-	1.6	11.3	5.6	0.3	6.0
12/4	616	616	-	-	-	0.7	0.5	-	1.2	6.9	2.3	0.5	2.8
13/1	363	363	-	-	-	0.0	0.1	-	0.1	1.2	0.0	0.1	0.1

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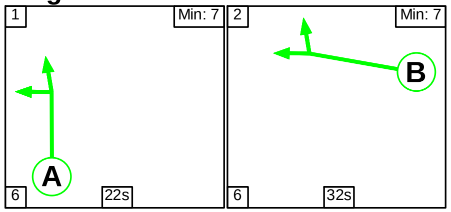
13/2	364	364	-	-	-	0.0	0.1	-	0.1	1.2	0.0	0.1	0.1

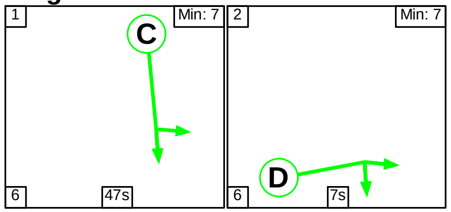
C1 Stream: 1 PRC for Signalled Lanes (%): 15.5 Total Delay for Signalled Lanes (pcuHr): 10.73 Cycle Time (s): 66
C1 Stream: 2 PRC for Signalled Lanes (%): -1.6 Total Delay for Signalled Lanes (pcuHr): 15.50 Cycle Time (s): 66
C1 Stream: 3 PRC for Signalled Lanes (%): -74.9 Total Delay for Signalled Lanes (pcuHr): 203.56 Cycle Time (s): 66
C1 Stream: 4 PRC for Signalled Lanes (%): -75.9 Total Delay for Signalled Lanes (pcuHr): 563.04 Cycle Time (s): 66
PRC Over All Lanes (%): -75.9 Total Delay Over All Lanes(pcuHr): 793.06

Staging Plan Diagram

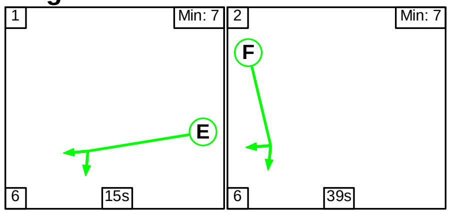
Stage Stream: 1



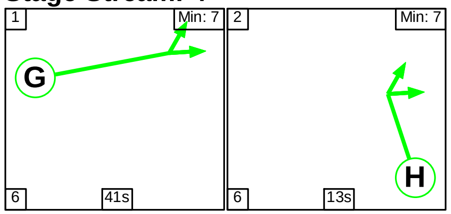
Stage Stream: 2



Stage Stream: 3

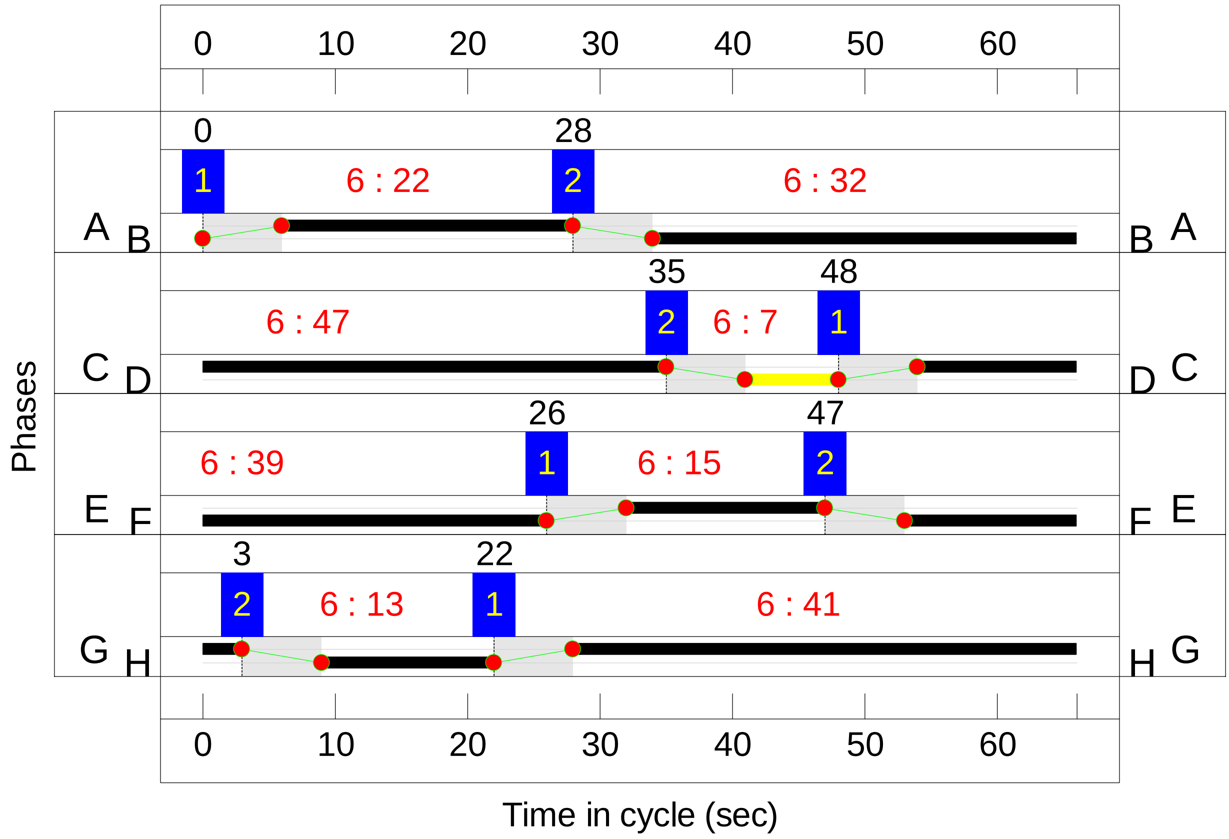


Stage Stream: 4



TA Report

Signal Timings Diagram



Scenario 9: '2048 Do Something AM' (FG9: '2048 Reference Case+Dev AM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	23	37	60
B	(Internal) Ahead Right	Traffic	1	31	0	31
C	A509 (N) Left Ahead	Traffic	2	45	18	63
D	(Internal) Ahead Right	Traffic	2	9	3	12
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	9	4	13
F	(Internal) Ahead Right	Traffic	3	45	19	64
G	A509 (W) Left Ahead	Traffic	4	30	1	31
H	(Internal) Ahead Right	Traffic	4	24	37	61

Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**147.2%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**147.2%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	45	-	1496	1900	1324	113.0%
1/2	A509 (N) Ahead	U	2	N/A	C		1	45	-	1476	1900	1324	111.5%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	45	-	2289	1950:1950	625+957	144.7 : 144.7%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	9	-	306	1900	288	106.3%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	9	-	111	1900:1900	0+288	0.0 : 38.6%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	23	-	8	1900	691	1.2%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	23	-	730	1900	691	105.7%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	23	-	269	1900	691	38.9%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	30	-	1325	1900:1900	640+892	69.7 : 98.5%
4/3	A509 (W) Ahead	U	4	N/A	G		1	30	-	68	1900	892	7.6%
9/1	(Internal) Ahead	U	1	N/A	B		1	31	-	1204	2000	970	93.6%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	31	-	1386	2000	970	98.8%
9/3	(Internal) Right	U	1	N/A	B		1	31	-	111	2000	970	11.4%
10/1	(Internal) Ahead	U	4	N/A	H		1	24	-	730	2000	758	91.2%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	24	-	380	2000	758	50.2%
10/3	(Internal) Right	U	4	N/A	H		1	24	-	0	2000	758	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	9	-	103	2000	303	34.0%

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11/2	(Internal) Ahead Right	U	2	N/A	D		1	9	-	446	2000	303	147.2%
11/3	(Internal) Right	U	2	N/A	D		1	9	-	68	2000	303	22.4%
12/1	(Internal) Ahead	U	3	N/A	F		1	45	-	1173	2000	1394	74.5%
12/2	(Internal) Ahead	U	3	N/A	F		1	45	-	1541	2000	1394	99.7%
12/3	(Internal) Right	U	3	N/A	F		1	45	-	906	2000	1394	45.0%
12/4	(Internal) Right	U	3	N/A	F		1	45	-	1386	2000	1394	68.7%
13/1	Ahead	U	N/A	N/A	-		-	-	-	502	1900	1900	26.4%
13/2	Ahead	U	N/A	N/A	-		-	-	-	505	1900	1900	26.6%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**88.6**	**688.5**	**0.0**	**777.1**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**88.6**	**688.5**	**0.0**	**777.1**	**-**	**-**	**-**	**-**
1/1	1496	1324	-	-	-	11.6	90.0	-	101.6	244.5	33.7	90.0	123.8
1/2	1476	1324	-	-	-	10.7	80.5	-	91.1	222.2	32.6	80.5	113.1
1/3+1/4	2289	1582	-	-	-	32.5	355.0	-	387.6	609.6	60.7	355.0	415.8
2/1	306	288	-	-	-	3.0	14.4	-	17.4	204.4	5.9	14.4	20.3
2/2+2/3	111	111	-	-	-	0.8	0.3	-	1.1	35.4	1.8	0.3	2.1
3/1	8	8	-	-	-	0.0	0.0	-	0.0	16.3	0.1	0.0	0.1
3/2	730	691	-	-	-	5.3	26.4	-	31.7	156.3	14.2	26.4	40.7
3/3	269	269	-	-	-	1.2	0.3	-	1.5	19.8	3.6	0.3	3.9
4/2+4/1	1325	1325	-	-	-	5.7	3.1	-	8.8	24.0	15.9	3.1	19.0
4/3	68	68	-	-	-	0.2	0.0	-	0.2	11.9	0.7	0.0	0.7
9/1	907	907	-	-	-	1.7	6.1	-	7.7	30.7	10.3	6.1	16.3
9/2	958	958	-	-	-	4.9	12.9	-	17.8	66.8	12.8	12.9	25.7
9/3	111	111	-	-	-	0.0	0.1	-	0.1	2.1	0.0	0.1	0.1
10/1	691	691	-	-	-	0.1	4.6	-	4.7	24.3	0.2	4.6	4.7
10/2	380	380	-	-	-	1.0	0.5	-	1.5	14.4	5.8	0.5	6.3
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	103	103	-	-	-	0.9	0.3	-	1.1	39.9	1.4	0.3	1.7
11/2	446	303	-	-	-	6.9	73.0	-	80.0	645.4	10.8	73.0	83.8
11/3	68	68	-	-	-	0.3	0.1	-	0.4	22.6	1.0	0.1	1.1
12/1	1038	1038	-	-	-	0.0	1.4	-	1.5	5.2	0.1	1.4	1.6
12/2	1389	1389	-	-	-	0.7	17.5	-	18.2	47.1	23.4	17.5	40.9
12/3	627	627	-	-	-	1.0	0.4	-	1.4	8.3	6.4	0.4	6.8
12/4	958	958	-	-	-	0.2	1.1	-	1.3	4.7	0.6	1.1	1.7
13/1	502	502	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

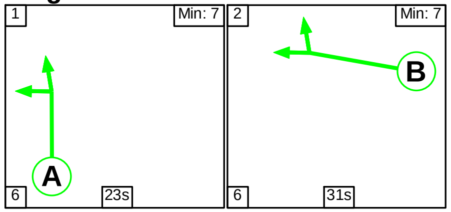
TA Report

13/2	505	505	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

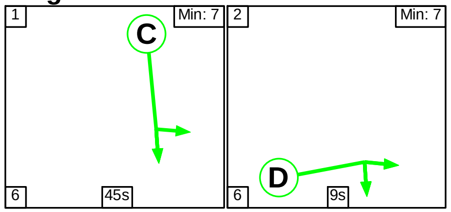
C1	Stream: 1	PRC for Signalled Lanes (%):	-17.4	Total Delay for Signalled Lanes (pcuHr):	58.79	Cycle Time (s):	66
C1	Stream: 2	PRC for Signalled Lanes (%):	-63.5	Total Delay for Signalled Lanes (pcuHr):	661.83	Cycle Time (s):	66
C1	Stream: 3	PRC for Signalled Lanes (%):	-18.1	Total Delay for Signalled Lanes (pcuHr):	40.83	Cycle Time (s):	66
C1	Stream: 4	PRC for Signalled Lanes (%):	-9.4	Total Delay for Signalled Lanes (pcuHr):	15.25	Cycle Time (s):	66
		PRC Over All Lanes (%):	-63.5	Total Delay Over All Lanes(pcuHr):	777.06		

Staging Plan Diagram

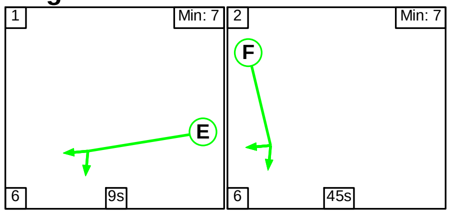
Stage Stream: 1



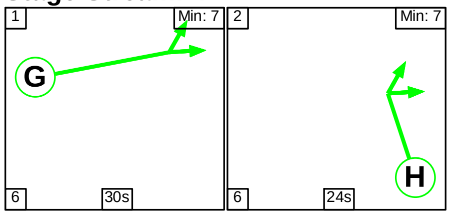
Stage Stream: 2



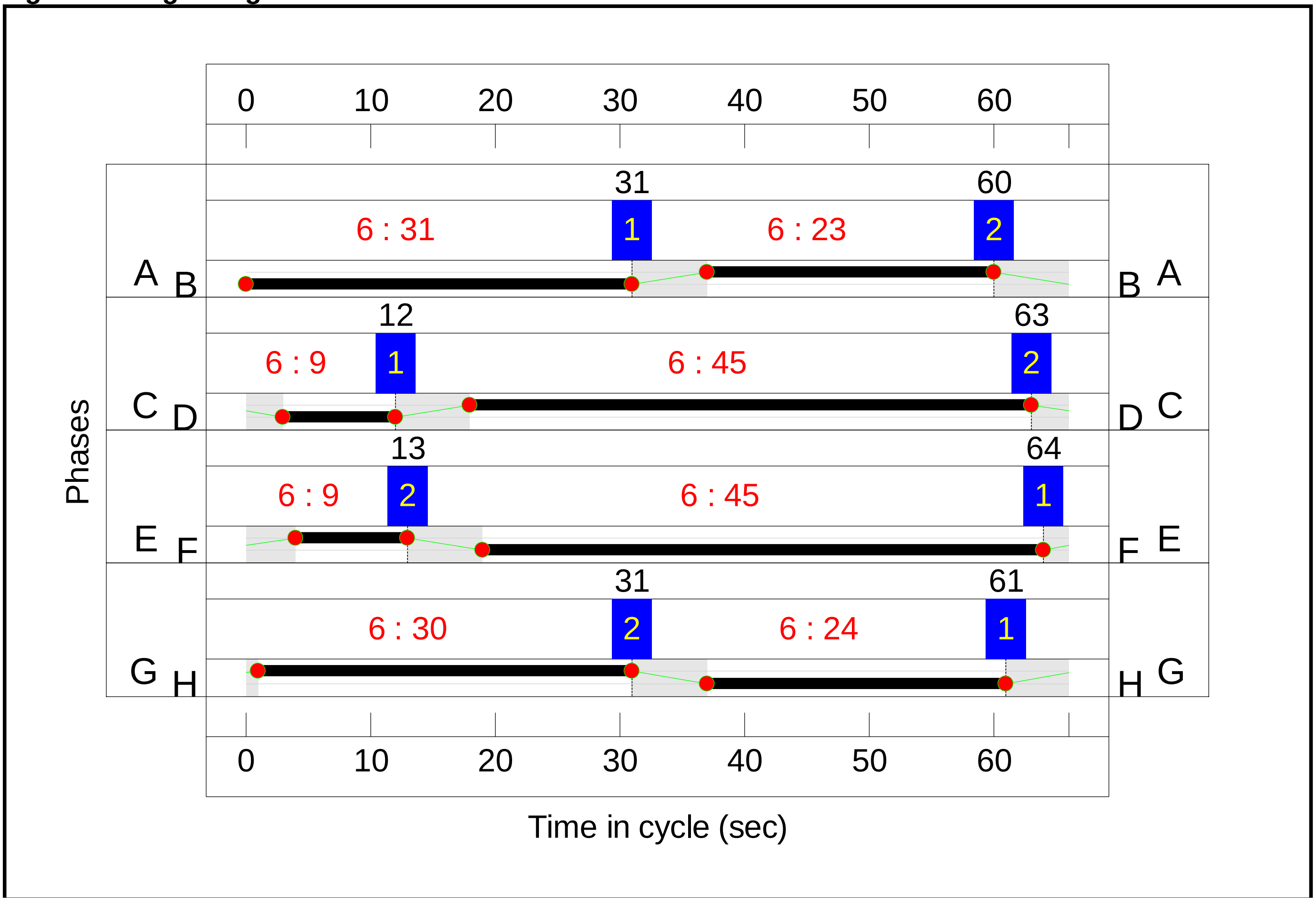
Stage Stream: 3



Stage Stream: 4



Signal Timings Diagram



Scenario 10: '2048 Do Something PM' (FG10: '2048 Reference Case+Dev PM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	23	6	29
B	(Internal) Ahead Right	Traffic	1	31	35	0
C	A509 (N) Left Ahead	Traffic	2	47	50	31
D	(Internal) Ahead Right	Traffic	2	7	37	44
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	17	32	49
F	(Internal) Ahead Right	Traffic	3	37	55	26
G	A509 (W) Left Ahead	Traffic	4	40	28	2
H	(Internal) Ahead Right	Traffic	4	14	8	22

TA Report
Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**146.7%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**146.7%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	1161	1900	1382	84.0%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	1167	1900	1382	84.5%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	1058	1950:1950	745+942	62.7 : 62.7%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	17	-	150	1900	518	28.9%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	17	-	777	1900:1900	19+518	144.7 : 144.7%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	23	-	0	1900	691	0.0%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	23	-	559	1900	691	80.9%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	23	-	148	1900	691	21.4%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	40	-	1857	1900:1900	92+1180	137.4 : 146.7%
4/3	A509 (W) Ahead	U	4	N/A	G		1	40	-	24	1900	1180	2.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	31	-	602	2000	970	62.1%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	31	-	618	2000	970	62.9%
9/3	(Internal) Right	U	1	N/A	B		1	31	-	750	2000	970	53.4%
10/1	(Internal) Ahead	U	4	N/A	H		1	14	-	586	2000	455	127.1%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	14	-	898	2000	455	146.6%
10/3	(Internal) Right	U	4	N/A	H		1	14	-	0	2000	455	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	0	2000	242	0.0%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	126	2000	242	38.9%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	24	2000	242	9.9%
12/1	(Internal) Ahead	U	3	N/A	F		1	37	-	537	2000	1152	46.6%
12/2	(Internal) Ahead	U	3	N/A	F		1	37	-	1191	2000	1152	103.4%
12/3	(Internal) Right	U	3	N/A	F		1	37	-	467	2000	1152	40.6%
12/4	(Internal) Right	U	3	N/A	F		1	37	-	591	2000	1152	51.3%
13/1	Ahead	U	N/A	N/A	-		-	-	-	355	1900	1900	18.7%
13/2	Ahead	U	N/A	N/A	-		-	-	-	352	1900	1900	18.5%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**68.4**	**629.3**	**0.0**	**697.7**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**68.4**	**629.3**	**0.0**	**697.7**	**-**	**-**	**-**	**-**
1/1	1161	1161	-	-	-	2.0	2.6	-	4.6	14.3	14.8	2.6	17.4
1/2	1167	1167	-	-	-	2.1	2.7	-	4.7	14.5	14.9	2.7	17.6
1/3+1/4	1058	1058	-	-	-	1.0	0.8	-	1.8	6.2	4.1	0.8	4.9
2/1	150	150	-	-	-	0.8	0.2	-	1.0	23.8	2.2	0.2	2.4
2/2+2/3	777	537	-	-	-	11.1	121.7	-	132.8	615.2	19.8	121.7	141.5
3/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	559	559	-	-	-	2.9	2.1	-	5.0	32.2	9.2	2.1	11.2
3/3	148	148	-	-	-	0.6	0.1	-	0.7	17.8	1.9	0.1	2.0
4/2+4/1	1857	1275	-	-	-	19.1	294.1	-	313.1	607.0	47.2	294.1	341.3
4/3	24	24	-	-	-	0.0	0.0	-	0.0	6.5	0.2	0.0	0.2
9/1	602	602	-	-	-	1.2	0.8	-	2.0	12.1	5.6	0.8	6.4
9/2	610	610	-	-	-	2.0	0.8	-	2.8	16.6	5.2	0.8	6.1
9/3	518	518	-	-	-	0.0	0.6	-	0.6	4.1	2.8	0.6	3.4
10/1	578	455	-	-	-	5.8	63.8	-	69.6	434.0	12.8	63.8	76.7
10/2	666	455	-	-	-	12.4	107.4	-	119.8	647.5	17.6	107.4	125.0
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/2	94	94	-	-	-	0.7	0.3	-	1.0	38.7	1.5	0.3	1.8
11/3	24	24	-	-	-	0.1	0.1	-	0.2	29.2	0.4	0.1	0.4
12/1	537	537	-	-	-	0.5	0.4	-	0.9	6.0	3.1	0.4	3.5
12/2	1191	1152	-	-	-	4.1	29.8	-	33.8	102.2	22.6	29.8	52.3
12/3	467	467	-	-	-	1.2	0.3	-	1.5	11.8	5.1	0.3	5.5
12/4	591	591	-	-	-	0.8	0.5	-	1.3	8.1	6.4	0.5	6.9
13/1	355	355	-	-	-	0.0	0.1	-	0.1	1.2	0.0	0.1	0.1

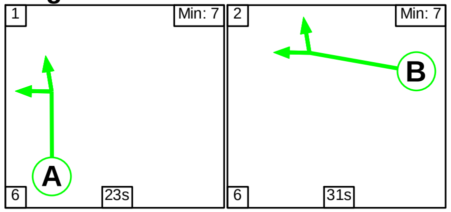
TA Report

13/2	352	352	-	-	-	0.0	0.1	-	0.1	1.2	0.0	0.1	0.1

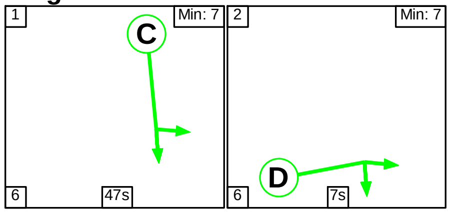
C1	Stream: 1	PRC for Signalled Lanes (%):	11.2	Total Delay for Signalled Lanes (pcuHr):	11.15	Cycle Time (s):	66
C1	Stream: 2	PRC for Signalled Lanes (%):	6.6	Total Delay for Signalled Lanes (pcuHr):	12.36	Cycle Time (s):	66
C1	Stream: 3	PRC for Signalled Lanes (%):	-60.8	Total Delay for Signalled Lanes (pcuHr):	171.34	Cycle Time (s):	66
C1	Stream: 4	PRC for Signalled Lanes (%):	-63.0	Total Delay for Signalled Lanes (pcuHr):	502.63	Cycle Time (s):	66
		PRC Over All Lanes (%):	-63.0	Total Delay Over All Lanes(pcuHr):	697.71		

Staging Plan Diagram

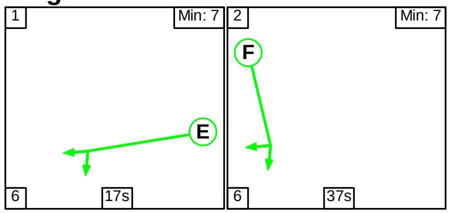
Stage Stream: 1



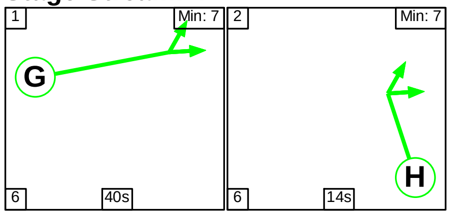
Stage Stream: 2



Stage Stream: 3

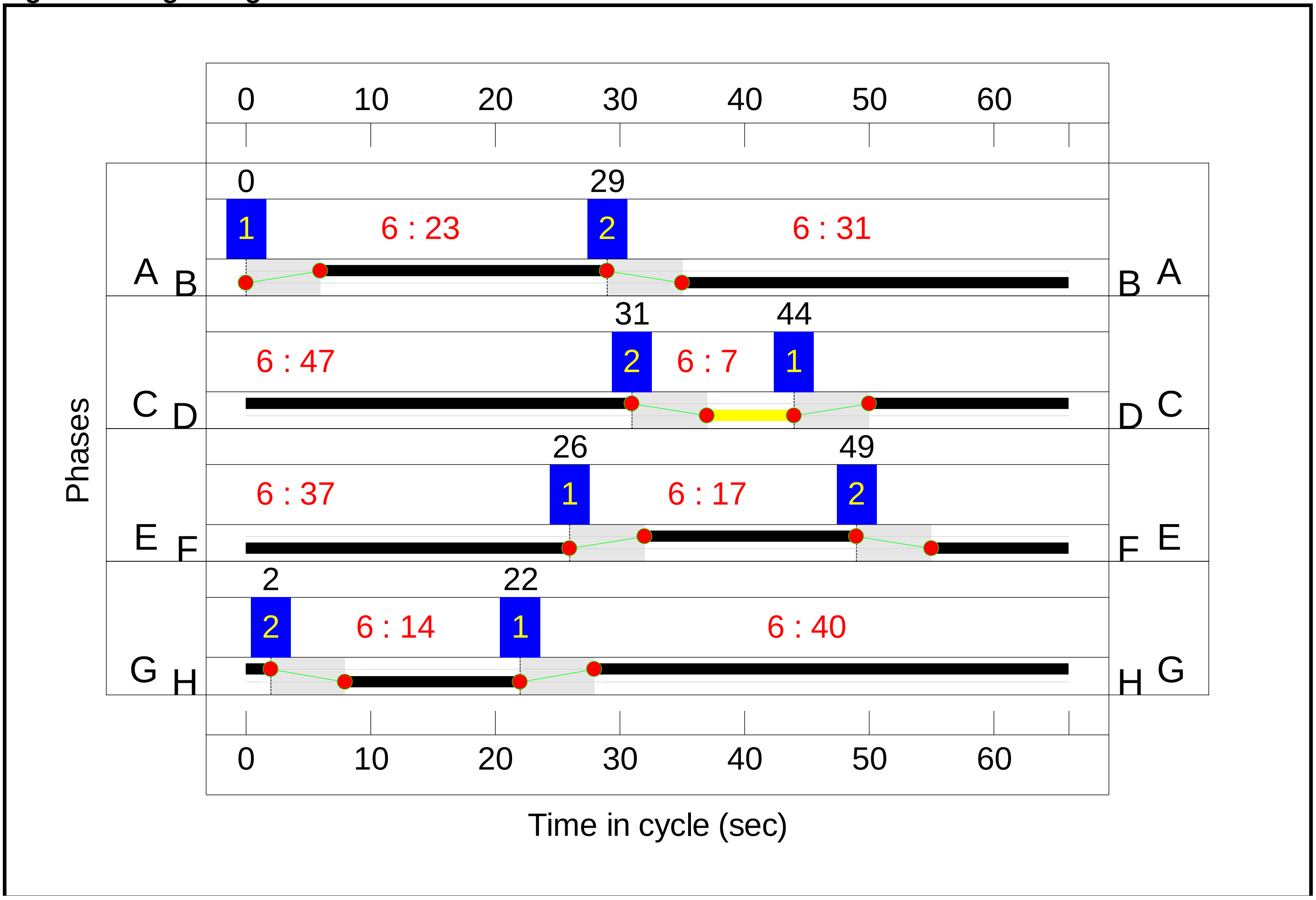


Stage Stream: 4



TA Report

Signal Timings Diagram



Scenario 11: '2031 Key Planning Test AM' (FG11: '2031 RefCase+ FULL Dev - Planning AM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	20	13	33
B	(Internal) Ahead Right	Traffic	1	34	39	7
C	A509 (N) Left Ahead	Traffic	2	47	55	36
D	(Internal) Ahead Right	Traffic	2	7	42	49
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	8	40	48
F	(Internal) Ahead Right	Traffic	3	46	54	34
G	A509 (W) Left Ahead	Traffic	4	31	40	5
H	(Internal) Ahead Right	Traffic	4	23	11	34

TA Report
Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**109.3%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**109.3%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	1290	1900	1382	93.4%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	1318	1900	1382	95.4%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	1835	1950:1950	732+949	109.2 : 109.2%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	8	-	222	1900	259	85.7%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	8	-	146	1900:1900	98+259	40.9 : 40.9%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	20	-	2	1900	605	0.3%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	20	-	554	1900	605	91.6%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	20	-	409	1900	605	67.7%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	31	-	1134	1900:1900	362+921	73.2 : 94.3%
4/3	A509 (W) Ahead	U	4	N/A	G		1	31	-	18	1900	921	2.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	34	-	992	2000	1061	87.2%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	34	-	1076	2000	1061	93.2%
9/3	(Internal) Right	U	1	N/A	B		1	34	-	106	2000	1061	10.0%
10/1	(Internal) Ahead	U	4	N/A	H		1	23	-	554	2000	727	76.2%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	23	-	515	2000	727	70.8%
10/3	(Internal) Right	U	4	N/A	H		1	23	-	0	2000	727	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	60	2000	242	24.8%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	265	2000	242	109.3%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	18	2000	242	7.4%
12/1	(Internal) Ahead	U	3	N/A	F		1	46	-	1041	2000	1424	73.1%
12/2	(Internal) Ahead	U	3	N/A	F		1	46	-	1336	2000	1424	93.8%
12/3	(Internal) Right	U	3	N/A	F		1	46	-	799	2000	1424	51.4%
12/4	(Internal) Right	U	3	N/A	F		1	46	-	1036	2000	1424	66.6%
13/1	Ahead	U	N/A	N/A	-		-	-	-	483	1900	1900	25.4%
13/2	Ahead	U	N/A	N/A	-		-	-	-	482	1900	1900	25.4%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**37.8**	**146.9**	**0.0**	**184.7**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**37.8**	**146.9**	**0.0**	**184.7**	**-**	**-**	**-**	**-**
1/1	1290	1290	-	-	-	2.7	6.2	-	8.9	24.9	20.1	6.2	26.3
1/2	1318	1318	-	-	-	2.9	8.2	-	11.1	30.4	21.2	8.2	29.4
1/3+1/4	1835	1681	-	-	-	8.2	82.7	-	90.9	178.3	34.3	82.7	117.0
2/1	222	222	-	-	-	1.7	2.6	-	4.3	70.4	3.9	2.6	6.6
2/2+2/3	146	146	-	-	-	1.0	0.3	-	1.4	34.4	1.8	0.3	2.1
3/1	2	2	-	-	-	0.0	0.0	-	0.0	18.7	0.0	0.0	0.0
3/2	554	554	-	-	-	3.3	4.6	-	8.0	51.8	9.7	4.6	14.3
3/3	409	409	-	-	-	2.2	1.0	-	3.3	28.7	6.5	1.0	7.5
4/2+4/1	1134	1134	-	-	-	4.6	3.6	-	8.3	26.3	15.0	3.6	18.6
4/3	18	18	-	-	-	0.0	0.0	-	0.1	11.0	0.2	0.0	0.2
9/1	925	925	-	-	-	1.7	3.3	-	4.9	19.1	8.6	3.3	11.8
9/2	989	989	-	-	-	3.4	5.9	-	9.3	33.9	10.7	5.9	16.6
9/3	106	106	-	-	-	0.0	0.1	-	0.1	1.9	0.0	0.1	0.1
10/1	554	554	-	-	-	0.0	1.6	-	1.6	10.4	0.1	1.6	1.6
10/2	515	515	-	-	-	1.0	1.2	-	2.2	15.3	3.9	1.2	5.1
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	60	60	-	-	-	0.6	0.2	-	0.7	44.1	0.8	0.2	1.0
11/2	265	242	-	-	-	1.9	15.5	-	17.5	237.3	5.3	15.5	20.8
11/3	18	18	-	-	-	0.1	0.0	-	0.1	25.0	0.2	0.0	0.3
12/1	1041	1041	-	-	-	0.3	1.3	-	1.6	5.6	1.0	1.3	2.3
12/2	1336	1336	-	-	-	0.4	6.6	-	7.0	18.9	6.1	6.6	12.7
12/3	732	732	-	-	-	1.2	0.5	-	1.7	8.3	7.6	0.5	8.1
12/4	949	949	-	-	-	0.4	1.0	-	1.4	5.2	1.4	1.0	2.4
13/1	483	483	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

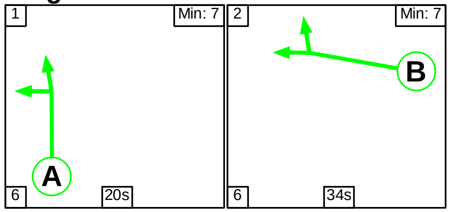
TA Report

13/2	482	482	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

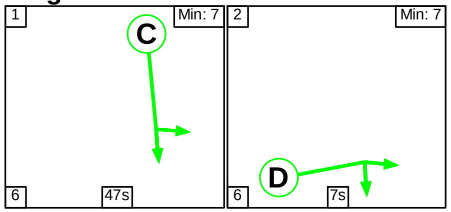
C1	Stream: 1	PRC for Signalled Lanes (%):	-3.6	Total Delay for Signalled Lanes (pcuHr):	25.52	Cycle Time (s):	66
C1	Stream: 2	PRC for Signalled Lanes (%):	-21.5	Total Delay for Signalled Lanes (pcuHr):	129.26	Cycle Time (s):	66
C1	Stream: 3	PRC for Signalled Lanes (%):	-4.2	Total Delay for Signalled Lanes (pcuHr):	17.43	Cycle Time (s):	66
C1	Stream: 4	PRC for Signalled Lanes (%):	-4.8	Total Delay for Signalled Lanes (pcuHr):	12.13	Cycle Time (s):	66
		PRC Over All Lanes (%):	-21.5	Total Delay Over All Lanes(pcuHr):	184.68		

Staging Plan Diagram

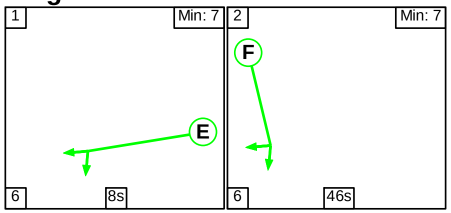
Stage Stream: 1



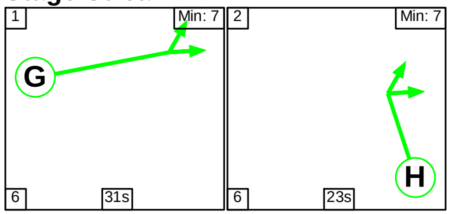
Stage Stream: 2



Stage Stream: 3

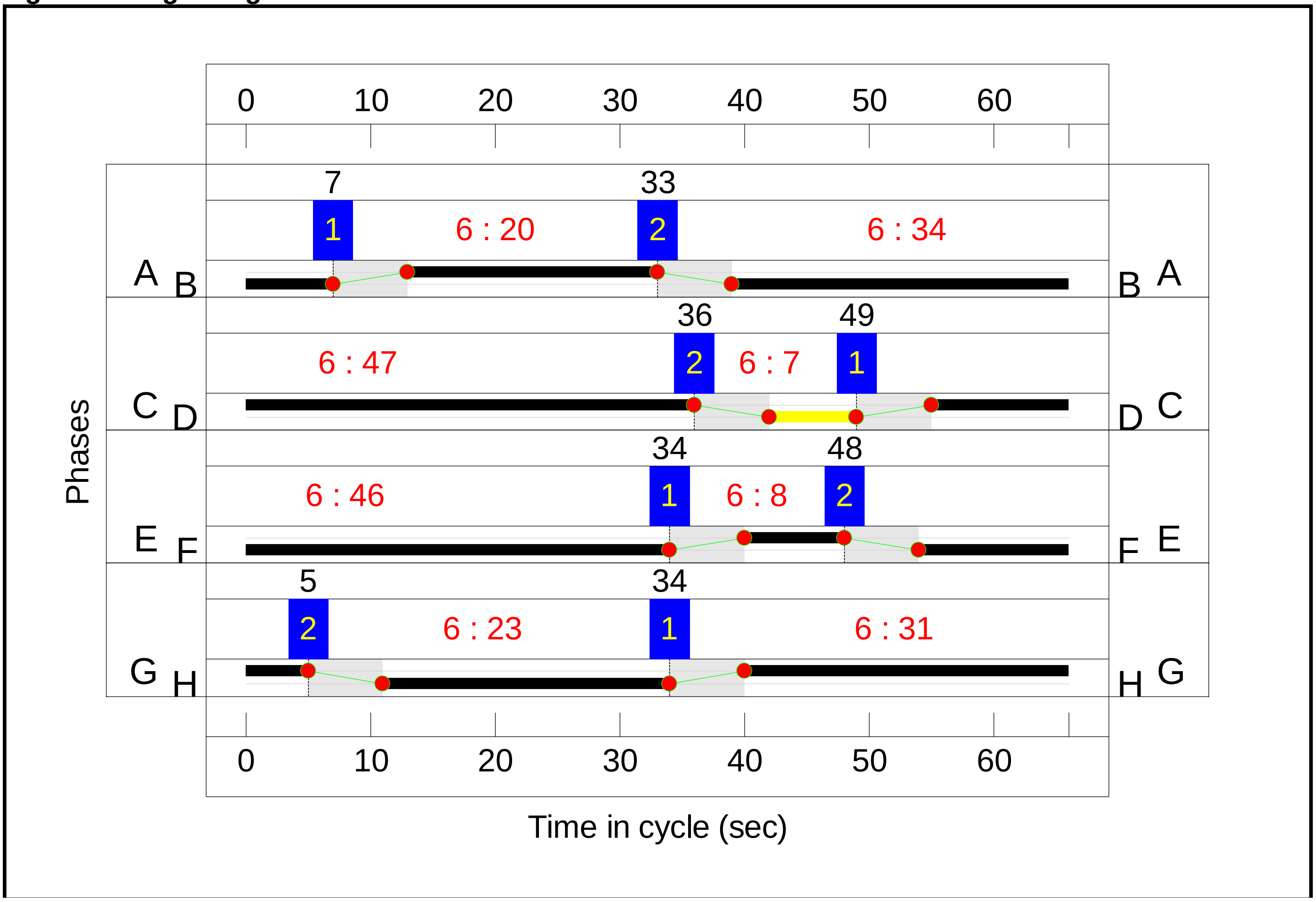


Stage Stream: 4



TA Report

Signal Timings Diagram



Scenario 12: '2031 Key Planning Test PM' (FG12: '2031 RefCase+ FULL Dev - Planning PM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	11	6	17
B	(Internal) Ahead Right	Traffic	1	43	23	0
C	A509 (N) Left Ahead	Traffic	2	47	48	29
D	(Internal) Ahead Right	Traffic	2	7	35	42
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	10	29	39
F	(Internal) Ahead Right	Traffic	3	44	45	23
G	A509 (W) Left Ahead	Traffic	4	41	49	24
H	(Internal) Ahead Right	Traffic	4	13	30	43

TA Report
Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**152.3%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**152.3%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	847	1900	1382	61.3%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	1190	1900	1382	86.1%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	978	1950:1950	726+952	58.3 : 58.3%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	10	-	225	1900	317	71.1%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	10	-	518	1900:1900	308+317	77.2 : 88.4%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	11	-	0	1900	345	0.0%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	11	-	518	1900	345	149.9%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	11	-	478	1900	345	138.4%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	41	-	1896	1900:1900	35+1209	152.3 : 152.3%
4/3	A509 (W) Ahead	U	4	N/A	G		1	41	-	0	1900	1209	0.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	43	-	622	2000	1333	46.7%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	43	-	793	2000	1333	59.5%
9/3	(Internal) Right	U	1	N/A	B		1	43	-	280	2000	1333	21.0%
10/1	(Internal) Ahead	U	4	N/A	H		1	13	-	756	2000	424	137.5%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	13	-	758	2000	424	147.4%
10/3	(Internal) Right	U	4	N/A	H		1	13	-	0	2000	424	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	0	2000	242	0.0%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	54	2000	242	14.6%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	0	2000	242	0.0%
12/1	(Internal) Ahead	U	3	N/A	F		1	44	-	329	2000	1364	24.1%
12/2	(Internal) Ahead	U	3	N/A	F		1	44	-	1190	2000	1364	87.3%
12/3	(Internal) Right	U	3	N/A	F		1	44	-	423	2000	1364	31.0%
12/4	(Internal) Right	U	3	N/A	F		1	44	-	555	2000	1364	40.7%
13/1	Ahead	U	N/A	N/A	-		-	-	-	494	1900	1900	26.0%
13/2	Ahead	U	N/A	N/A	-		-	-	-	502	1900	1900	26.4%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**78.1**	**680.3**	**0.0**	**758.4**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**78.1**	**680.3**	**0.0**	**758.4**	**-**	**-**	**-**	**-**
1/1	847	847	-	-	-	1.0	0.8	-	1.8	7.8	7.5	0.8	8.3
1/2	1190	1190	-	-	-	2.2	3.0	-	5.2	15.7	15.9	3.0	18.9
1/3+1/4	978	978	-	-	-	0.9	0.7	-	1.6	5.9	3.9	0.7	4.6
2/1	225	225	-	-	-	1.6	1.2	-	2.8	45.1	3.9	1.2	5.1
2/2+2/3	518	518	-	-	-	3.8	2.3	-	6.1	42.7	5.0	2.3	7.3
3/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	518	345	-	-	-	9.6	87.7	-	97.3	676.3	12.9	87.7	100.7
3/3	478	345	-	-	-	7.9	68.0	-	76.0	572.2	11.2	68.0	79.2
4/2+4/1	1896	1245	-	-	-	27.3	327.2	-	354.4	673.0	66.2	327.2	393.4
4/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
9/1	622	622	-	-	-	0.4	0.4	-	0.8	4.6	2.7	0.4	3.2
9/2	793	793	-	-	-	0.8	0.7	-	1.5	6.7	3.8	0.7	4.5
9/3	280	280	-	-	-	0.0	0.1	-	0.1	1.7	0.0	0.1	0.1
10/1	583	424	-	-	-	9.4	81.4	-	90.8	560.2	16.5	81.4	97.9
10/2	625	424	-	-	-	11.1	102.1	-	113.2	651.8	18.7	102.1	120.9
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/2	35	35	-	-	-	0.3	0.1	-	0.4	39.6	0.6	0.1	0.7
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	329	329	-	-	-	0.2	0.2	-	0.3	3.7	0.7	0.2	0.8
12/2	1190	1190	-	-	-	0.7	3.3	-	4.0	12.2	2.8	3.3	6.1
12/3	423	423	-	-	-	0.6	0.2	-	0.8	7.1	3.6	0.2	3.8
12/4	555	555	-	-	-	0.4	0.3	-	0.7	4.6	1.3	0.3	1.7
13/1	494	494	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

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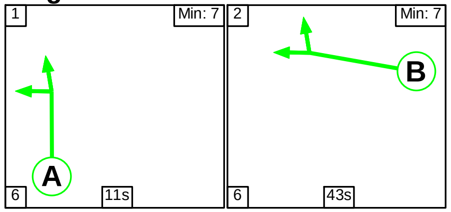
13/2	502	502	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

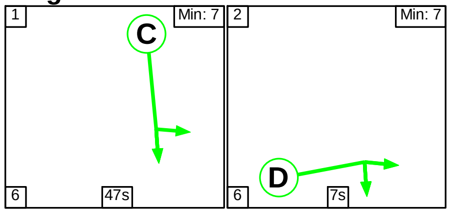
C1	Stream: 1 PRC for Signalled Lanes (%):	-66.6	Total Delay for Signalled Lanes (pcuHr):	175.70	Cycle Time (s):	66
C1	Stream: 2 PRC for Signalled Lanes (%):	4.5	Total Delay for Signalled Lanes (pcuHr):	9.00	Cycle Time (s):	66
C1	Stream: 3 PRC for Signalled Lanes (%):	1.8	Total Delay for Signalled Lanes (pcuHr):	14.87	Cycle Time (s):	66
C1	Stream: 4 PRC for Signalled Lanes (%):	-69.3	Total Delay for Signalled Lanes (pcuHr):	558.48	Cycle Time (s):	66
	PRC Over All Lanes (%):	-69.3	Total Delay Over All Lanes(pcuHr):	758.39		

Staging Plan Diagram

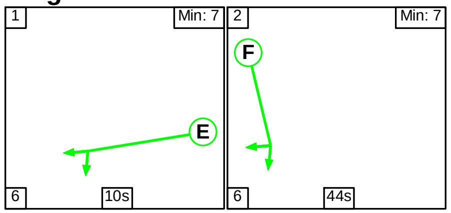
Stage Stream: 1



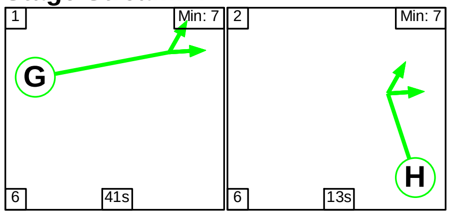
Stage Stream: 2



Stage Stream: 3

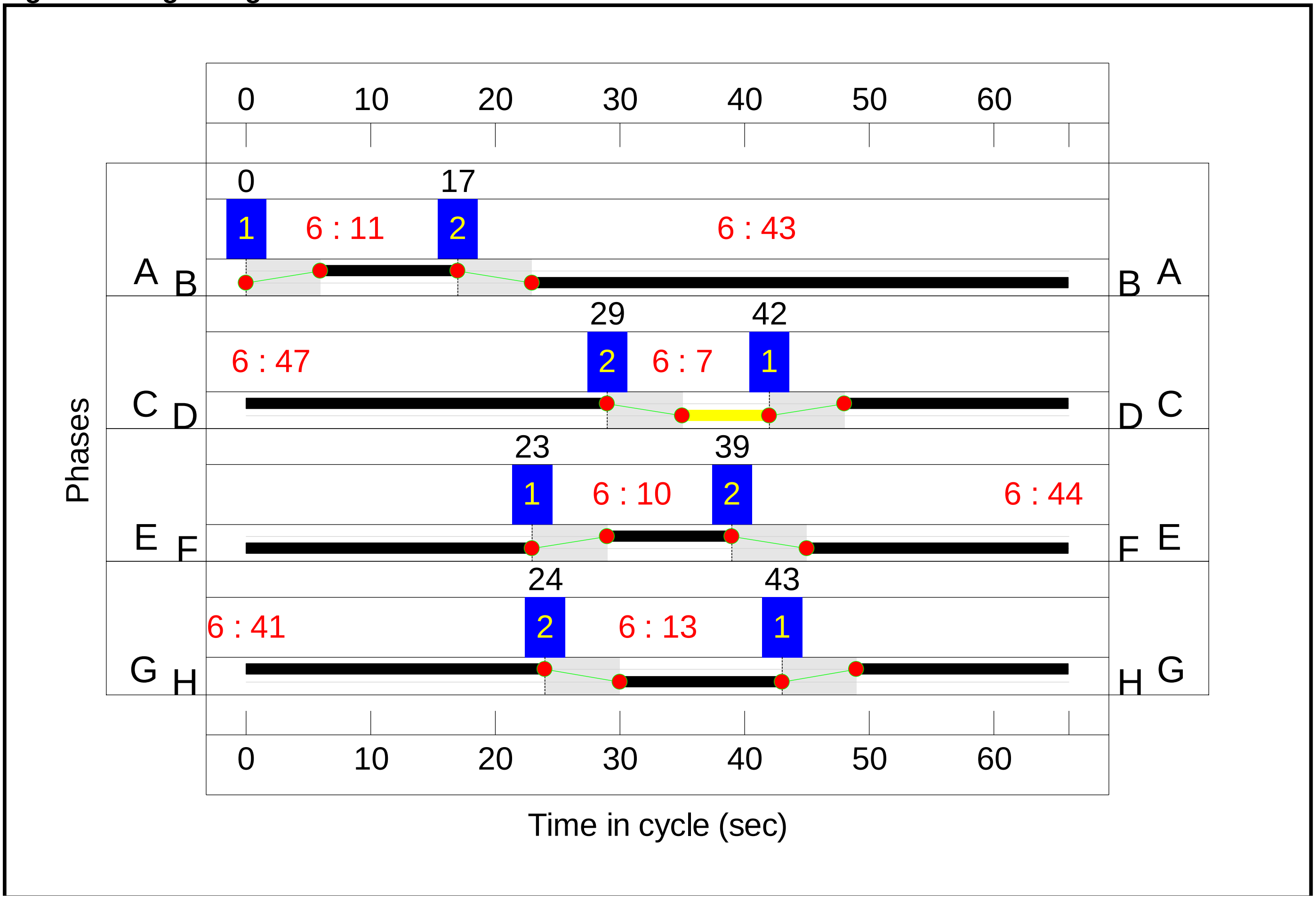


Stage Stream: 4



TA Report

Signal Timings Diagram



Scenario 13: '2031 Key Planning Test - Sensitivity AM' (FG13: '2031 RefCase+ FULL Dev - SENSITIVITY AM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	20	18	38
B	(Internal) Ahead Right	Traffic	1	34	44	12
C	A509 (N) Left Ahead	Traffic	2	46	58	38
D	(Internal) Ahead Right	Traffic	2	8	44	52
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	8	44	52
F	(Internal) Ahead Right	Traffic	3	46	58	38
G	A509 (W) Left Ahead	Traffic	4	33	45	12
H	(Internal) Ahead Right	Traffic	4	21	18	39

Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**108.9%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**108.9%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	46	-	1147	1900	1353	84.8%
1/2	A509 (N) Ahead	U	2	N/A	C		1	46	-	1279	1900	1353	94.5%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	46	-	1800	1950:1950	722+931	108.9 : 108.9%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	8	-	221	1900	259	85.3%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	8	-	147	1900:1900	104+259	40.5 : 40.5%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	20	-	2	1900	605	0.3%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	20	-	554	1900	605	91.6%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	20	-	404	1900	605	66.8%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	33	-	1210	1900:1900	346+979	83.6 : 94.1%
4/3	A509 (W) Ahead	U	4	N/A	G		1	33	-	19	1900	979	1.9%
9/1	(Internal) Ahead	U	1	N/A	B		1	34	-	974	2000	1061	85.8%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	34	-	1056	2000	1061	91.7%
9/3	(Internal) Right	U	1	N/A	B		1	34	-	105	2000	1061	9.9%
10/1	(Internal) Ahead	U	4	N/A	H		1	21	-	554	2000	667	83.1%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	21	-	509	2000	667	76.4%
10/3	(Internal) Right	U	4	N/A	H		1	21	-	0	2000	667	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	8	-	73	2000	273	26.8%

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11/2	(Internal) Ahead Right	U	2	N/A	D		1	8	-	289	2000	273	106.0%
11/3	(Internal) Right	U	2	N/A	D		1	8	-	19	2000	273	7.0%
12/1	(Internal) Ahead	U	3	N/A	F		1	46	-	925	2000	1424	64.9%
12/2	(Internal) Ahead	U	3	N/A	F		1	46	-	1298	2000	1424	91.1%
12/3	(Internal) Right	U	3	N/A	F		1	46	-	786	2000	1424	50.7%
12/4	(Internal) Right	U	3	N/A	F		1	46	-	1014	2000	1424	65.4%
13/1	Ahead	U	N/A	N/A	-		-	-	-	482	1900	1900	25.4%
13/2	Ahead	U	N/A	N/A	-		-	-	-	478	1900	1900	25.2%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**37.0**	**135.8**	**0.0**	**172.8**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**37.0**	**135.8**	**0.0**	**172.8**	**-**	**-**	**-**	**-**
1/1	1147	1147	-	-	-	2.2	2.7	-	4.9	15.4	15.0	2.7	17.7
1/2	1279	1279	-	-	-	3.0	7.2	-	10.2	28.7	20.6	7.2	27.8
1/3+1/4	1800	1653	-	-	-	8.1	79.4	-	87.5	174.9	33.5	79.4	112.9
2/1	221	221	-	-	-	1.7	2.6	-	4.3	69.5	3.9	2.6	6.5
2/2+2/3	147	147	-	-	-	1.1	0.3	-	1.4	34.2	1.8	0.3	2.1
3/1	2	2	-	-	-	0.0	0.0	-	0.0	18.7	0.0	0.0	0.0
3/2	554	554	-	-	-	3.3	4.6	-	8.0	51.8	9.7	4.6	14.3
3/3	404	404	-	-	-	2.2	1.0	-	3.2	28.4	6.4	1.0	7.4
4/2+4/1	1210	1210	-	-	-	4.6	4.9	-	9.5	28.1	15.9	4.9	20.7
4/3	19	19	-	-	-	0.0	0.0	-	0.1	9.9	0.2	0.0	0.2
9/1	910	910	-	-	-	1.8	2.9	-	4.7	18.4	8.5	2.9	11.4
9/2	973	973	-	-	-	3.3	5.0	-	8.3	30.7	10.6	5.0	15.5
9/3	105	105	-	-	-	0.0	0.1	-	0.1	1.9	0.0	0.1	0.1
10/1	554	554	-	-	-	0.0	2.4	-	2.4	15.6	0.1	2.4	2.4
10/2	509	509	-	-	-	1.3	1.6	-	2.8	20.1	8.5	1.6	10.1
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	73	73	-	-	-	0.7	0.2	-	0.9	44.5	1.1	0.2	1.2
11/2	289	273	-	-	-	2.0	13.5	-	15.4	192.4	5.6	13.5	19.1
11/3	19	19	-	-	-	0.1	0.0	-	0.1	25.3	0.1	0.0	0.2
12/1	925	925	-	-	-	0.1	0.9	-	1.0	4.0	0.3	0.9	1.3
12/2	1298	1298	-	-	-	0.2	4.8	-	5.0	13.8	2.2	4.8	7.0
12/3	722	722	-	-	-	1.2	0.5	-	1.7	8.3	7.5	0.5	8.0
12/4	931	931	-	-	-	0.2	0.9	-	1.2	4.5	0.8	0.9	1.8
13/1	482	482	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

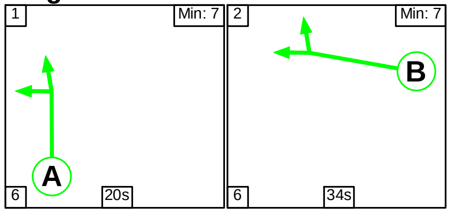
TA Report

13/2	478	478	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

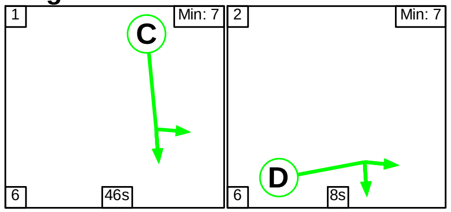
C1 Stream: 1 PRC for Signalled Lanes (%): -1.9 Total Delay for Signalled Lanes (pcuHr): 24.16 Cycle Time (s): 66
C1 Stream: 2 PRC for Signalled Lanes (%): -21.0 Total Delay for Signalled Lanes (pcuHr): 119.07 Cycle Time (s): 66
C1 Stream: 3 PRC for Signalled Lanes (%): -1.3 Total Delay for Signalled Lanes (pcuHr): 14.50 Cycle Time (s): 66
C1 Stream: 4 PRC for Signalled Lanes (%): -4.6 Total Delay for Signalled Lanes (pcuHr): 14.74 Cycle Time (s): 66
PRC Over All Lanes (%): -21.0 Total Delay Over All Lanes(pcuHr): 172.80

Staging Plan Diagram

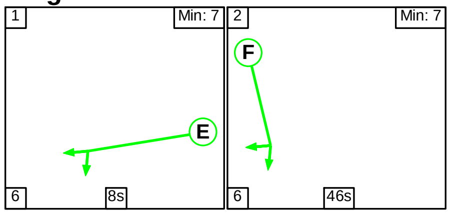
Stage Stream: 1



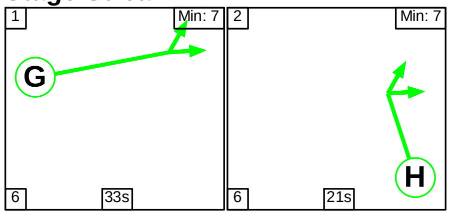
Stage Stream: 2



Stage Stream: 3

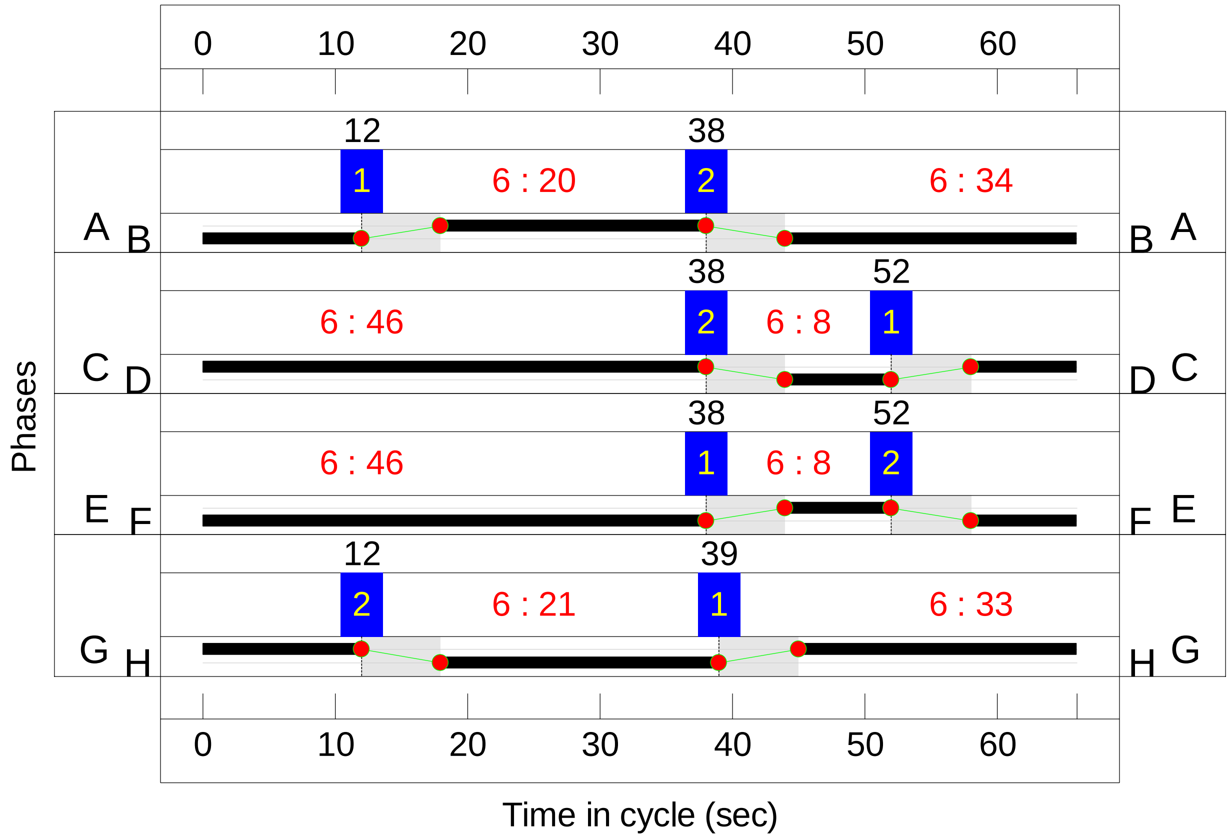


Stage Stream: 4



TA Report

Signal Timings Diagram



Scenario 14: '2031 Key Planning TestV - Sensitivity PM' (FG14: '2031 RefCase+ FULL Dev - SENSITIVITY PM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	16	6	22
B	(Internal) Ahead Right	Traffic	1	38	28	0
C	A509 (N) Left Ahead	Traffic	2	47	53	34
D	(Internal) Ahead Right	Traffic	2	7	40	47
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	11	32	43
F	(Internal) Ahead Right	Traffic	3	43	49	26
G	A509 (W) Left Ahead	Traffic	4	41	27	2
H	(Internal) Ahead Right	Traffic	4	13	8	21

Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**153.6%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**153.6%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	904	1900	1382	65.4%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	1133	1900	1382	82.0%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	978	1950:1950	654+990	59.5 : 59.5%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	11	-	225	1900	345	65.1%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	11	-	518	1900:1900	5+345	147.6 : 147.6%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	16	-	0	1900	489	0.0%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	16	-	690	1900	489	141.0%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	16	-	306	1900	489	62.5%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	41	-	1896	1900:1900	37+1209	146.1 : 152.3%
4/3	A509 (W) Ahead	U	4	N/A	G		1	41	-	0	1900	1209	0.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	38	-	588	2000	1182	49.8%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	38	-	597	2000	1182	50.3%
9/3	(Internal) Right	U	1	N/A	B		1	38	-	510	2000	1182	29.2%
10/1	(Internal) Ahead	U	4	N/A	H		1	13	-	698	2000	424	116.6%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	13	-	816	2000	424	153.6%
10/3	(Internal) Right	U	4	N/A	H		1	13	-	0	2000	424	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	0	2000	242	0.0%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	54	2000	242	15.3%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	0	2000	242	0.0%
12/1	(Internal) Ahead	U	3	N/A	F		1	43	-	386	2000	1333	29.0%
12/2	(Internal) Ahead	U	3	N/A	F		1	43	-	1133	2000	1333	85.0%
12/3	(Internal) Right	U	3	N/A	F		1	43	-	389	2000	1333	29.2%
12/4	(Internal) Right	U	3	N/A	F		1	43	-	589	2000	1333	44.2%
13/1	Ahead	U	N/A	N/A	-		-	-	-	498	1900	1900	26.2%
13/2	Ahead	U	N/A	N/A	-		-	-	-	498	1900	1900	26.2%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**66.6**	**677.9**	**0.0**	**744.5**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**66.6**	**677.9**	**0.0**	**744.5**	**-**	**-**	**-**	**-**
1/1	904	904	-	-	-	1.2	0.9	-	2.1	8.4	8.5	0.9	9.5
1/2	1133	1133	-	-	-	1.9	2.2	-	4.2	13.2	13.8	2.2	16.1
1/3+1/4	978	978	-	-	-	0.9	0.7	-	1.6	6.0	4.1	0.7	4.8
2/1	225	225	-	-	-	1.6	0.9	-	2.5	39.8	3.8	0.9	4.7
2/2+2/3	518	351	-	-	-	8.1	85.1	-	93.2	647.9	13.4	85.1	98.5
3/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	690	489	-	-	-	11.2	102.0	-	113.2	590.4	16.3	102.0	118.3
3/3	306	306	-	-	-	1.8	0.8	-	2.7	31.4	4.9	0.8	5.8
4/2+4/1	1896	1246	-	-	-	20.9	326.4	-	347.3	659.5	50.1	326.4	376.5
4/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
9/1	588	588	-	-	-	0.5	0.5	-	0.9	5.8	2.6	0.5	3.1
9/2	594	594	-	-	-	1.2	0.5	-	1.7	10.3	4.6	0.5	5.1
9/3	345	345	-	-	-	0.0	0.2	-	0.2	2.2	0.0	0.2	0.2
10/1	495	424	-	-	-	3.5	38.5	-	42.0	305.2	10.4	38.5	48.9
10/2	651	424	-	-	-	11.4	115.0	-	126.4	698.6	16.1	115.0	131.1
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/2	37	37	-	-	-	0.3	0.1	-	0.4	34.6	0.6	0.1	0.7
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	386	386	-	-	-	0.3	0.2	-	0.5	4.5	1.0	0.2	1.2
12/2	1133	1133	-	-	-	0.9	2.8	-	3.6	11.6	3.3	2.8	6.1
12/3	389	389	-	-	-	0.6	0.2	-	0.8	7.6	3.4	0.2	3.7
12/4	589	589	-	-	-	0.5	0.4	-	0.9	5.4	1.8	0.4	2.1
13/1	498	498	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

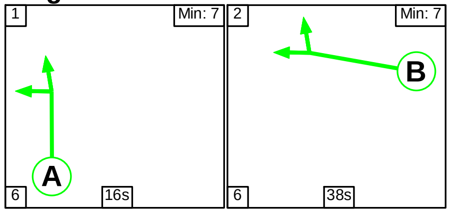
TA Report

13/2	498	498	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

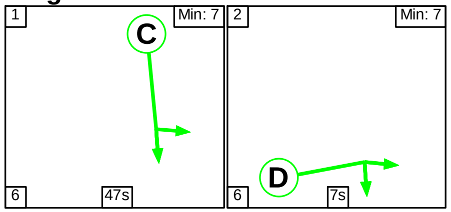
C1	Stream: 1	PRC for Signalled Lanes (%):	-56.7	Total Delay for Signalled Lanes (pcuHr):	118.68	Cycle Time (s):	66
C1	Stream: 2	PRC for Signalled Lanes (%):	9.8	Total Delay for Signalled Lanes (pcuHr):	8.27	Cycle Time (s):	66
C1	Stream: 3	PRC for Signalled Lanes (%):	-64.0	Total Delay for Signalled Lanes (pcuHr):	101.53	Cycle Time (s):	66
C1	Stream: 4	PRC for Signalled Lanes (%):	-70.6	Total Delay for Signalled Lanes (pcuHr):	515.68	Cycle Time (s):	66
		PRC Over All Lanes (%):	-70.6	Total Delay Over All Lanes(pcuHr):	744.51		

Staging Plan Diagram

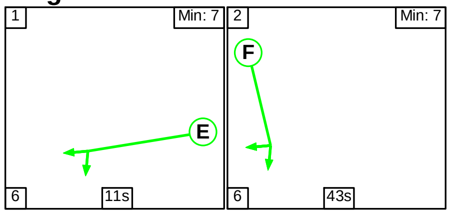
Stage Stream: 1



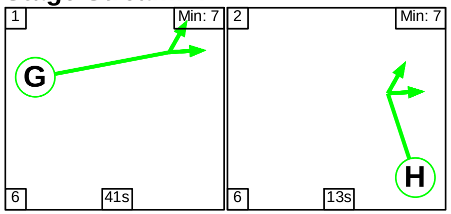
Stage Stream: 2



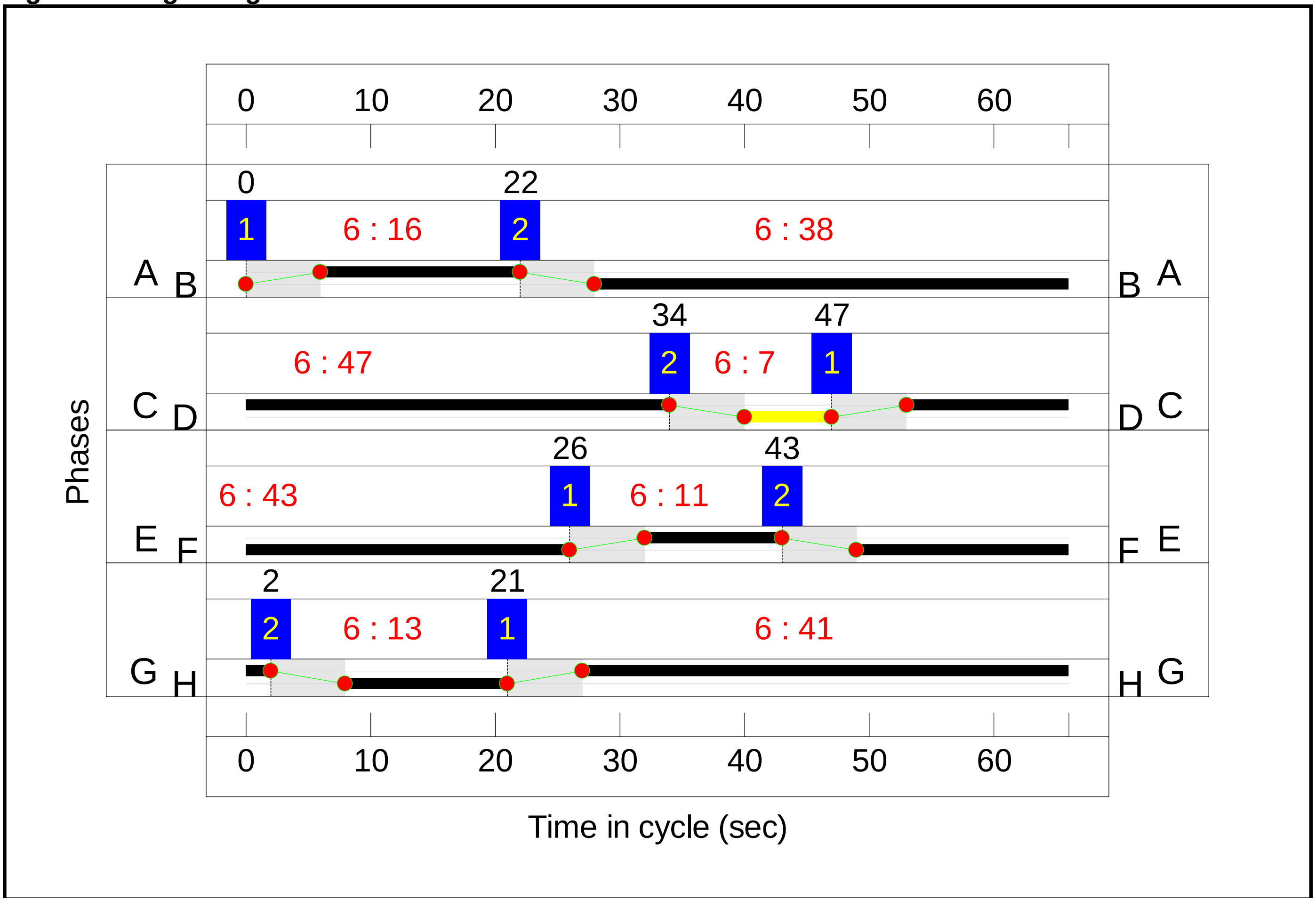
Stage Stream: 3



Stage Stream: 4



Signal Timings Diagram



Scenario 15: '2031 Do Minimum - Sensitivity AM' (FG15: '2031 Reference Case - SENSITIVITY AM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	17	45	62
B	(Internal) Ahead Right	Traffic	1	37	2	39
C	A509 (N) Left Ahead	Traffic	2	46	18	64
D	(Internal) Ahead Right	Traffic	2	8	4	12
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	9	4	13
F	(Internal) Ahead Right	Traffic	3	45	19	64
G	A509 (W) Left Ahead	Traffic	4	33	4	37
H	(Internal) Ahead Right	Traffic	4	21	43	64

TA Report

Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**114.7%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**114.7%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	46	-	1351	1900	1353	99.8%
1/2	A509 (N) Ahead	U	2	N/A	C		1	46	-	1129	1900	1353	83.4%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	46	-	1980	1950:1950	864+862	114.7 : 114.7%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	9	-	267	1900	288	92.7%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	9	-	112	1900:1900	288+288	19.1 : 19.8%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	17	-	0	1900	518	0.0%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	17	-	460	1900	518	88.8%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	17	-	451	1900	518	87.0%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	33	-	1173	1900:1900	436+979	69.3 : 89.0%
4/3	A509 (W) Ahead	U	4	N/A	G		1	33	-	0	1900	979	0.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	37	-	1216	2000	1152	94.6%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	37	-	1044	2000	1152	79.6%
9/3	(Internal) Right	U	1	N/A	B		1	37	-	57	2000	1152	5.0%
10/1	(Internal) Ahead	U	4	N/A	H		1	21	-	515	2000	667	77.3%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	21	-	506	2000	667	75.9%
10/3	(Internal) Right	U	4	N/A	H		1	21	-	2	2000	667	0.3%
11/1	(Internal) Ahead	U	2	N/A	D		1	8	-	39	2000	273	14.3%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	8	-	304	2000	273	111.5%
11/3	(Internal) Right	U	2	N/A	D		1	8	-	0	2000	273	0.0%
12/1	(Internal) Ahead	U	3	N/A	F		1	45	-	1127	2000	1394	80.8%
12/2	(Internal) Ahead	U	3	N/A	F		1	45	-	1129	2000	1394	81.0%
12/3	(Internal) Right	U	3	N/A	F		1	45	-	991	2000	1394	62.0%
12/4	(Internal) Right	U	3	N/A	F		1	45	-	989	2000	1394	61.9%
13/1	Ahead	U	N/A	N/A	-		-	-	-	421	1900	1900	22.2%
13/2	Ahead	U	N/A	N/A	-		-	-	-	490	1900	1900	25.8%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**41.5**	**202.7**	**0.0**	**244.2**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**41.5**	**202.7**	**0.0**	**244.2**	**-**	**-**	**-**	**-**
1/1	1351	1351	-	-	-	3.6	17.9	-	21.4	57.1	24.4	17.9	42.3
1/2	1129	1129	-	-	-	2.1	2.5	-	4.6	14.6	14.4	2.5	16.9
1/3+1/4	1980	1726	-	-	-	12.3	130.8	-	143.1	260.2	36.9	130.8	167.7
2/1	267	267	-	-	-	2.1	4.5	-	6.5	88.0	4.8	4.5	9.3
2/2+2/3	112	112	-	-	-	0.8	0.1	-	0.9	28.4	0.9	0.1	1.0
3/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	460	460	-	-	-	2.9	3.5	-	6.5	50.6	8.1	3.5	11.6
3/3	451	451	-	-	-	2.9	3.1	-	5.9	47.4	7.8	3.1	10.8
4/2+4/1	1173	1173	-	-	-	4.2	2.4	-	6.6	20.3	14.3	2.4	16.7
4/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
9/1	1089	1089	-	-	-	1.9	7.1	-	9.0	29.7	10.1	7.1	17.2
9/2	917	917	-	-	-	2.4	1.9	-	4.4	17.1	8.1	1.9	10.1
9/3	57	57	-	-	-	0.0	0.0	-	0.0	1.6	0.0	0.0	0.0
10/1	515	515	-	-	-	0.4	1.7	-	2.1	14.5	1.0	1.7	2.7
10/2	506	506	-	-	-	0.6	1.5	-	2.1	14.9	1.1	1.5	2.6
10/3	2	2	-	-	-	0.0	0.0	-	0.0	3.3	0.0	0.0	0.0
11/1	39	39	-	-	-	0.4	0.1	-	0.5	42.0	0.5	0.1	0.6
11/2	304	273	-	-	-	2.7	19.5	-	22.2	263.2	6.1	19.5	25.7
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	1126	1126	-	-	-	0.2	2.1	-	2.3	7.3	2.8	2.1	4.9
12/2	1129	1129	-	-	-	0.1	2.1	-	2.2	7.1	4.5	2.1	6.6
12/3	864	864	-	-	-	1.8	0.8	-	2.6	10.7	9.6	0.8	10.4
12/4	862	862	-	-	-	0.2	0.8	-	1.0	4.3	0.7	0.8	1.5
13/1	421	421	-	-	-	0.0	0.1	-	0.1	1.2	0.0	0.1	0.1

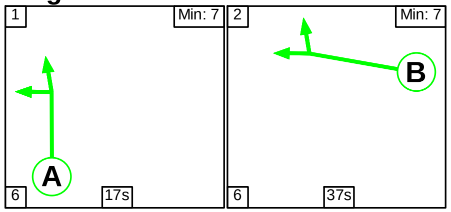
TA Report

13/2	490	490	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

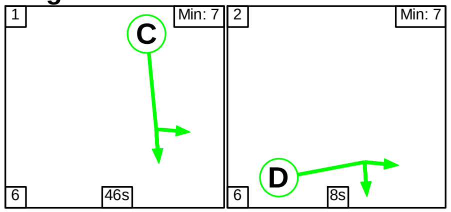
C1	Stream: 1	PRC for Signalled Lanes (%):	-5.1	Total Delay for Signalled Lanes (pcuHr):	25.77	Cycle Time (s):	66
C1	Stream: 2	PRC for Signalled Lanes (%):	-27.5	Total Delay for Signalled Lanes (pcuHr):	191.78	Cycle Time (s):	66
C1	Stream: 3	PRC for Signalled Lanes (%):	-3.1	Total Delay for Signalled Lanes (pcuHr):	15.52	Cycle Time (s):	66
C1	Stream: 4	PRC for Signalled Lanes (%):	1.1	Total Delay for Signalled Lanes (pcuHr):	10.80	Cycle Time (s):	66
		PRC Over All Lanes (%):	-27.5	Total Delay Over All Lanes(pcuHr):	244.19		

Staging Plan Diagram

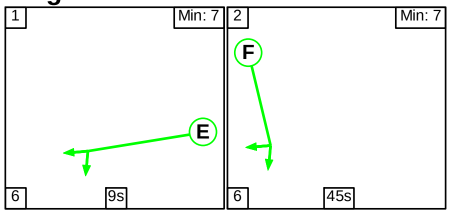
Stage Stream: 1



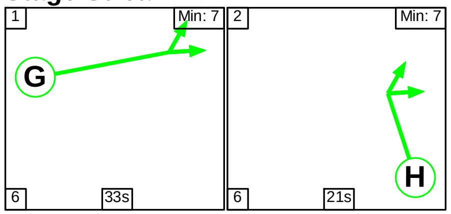
Stage Stream: 2



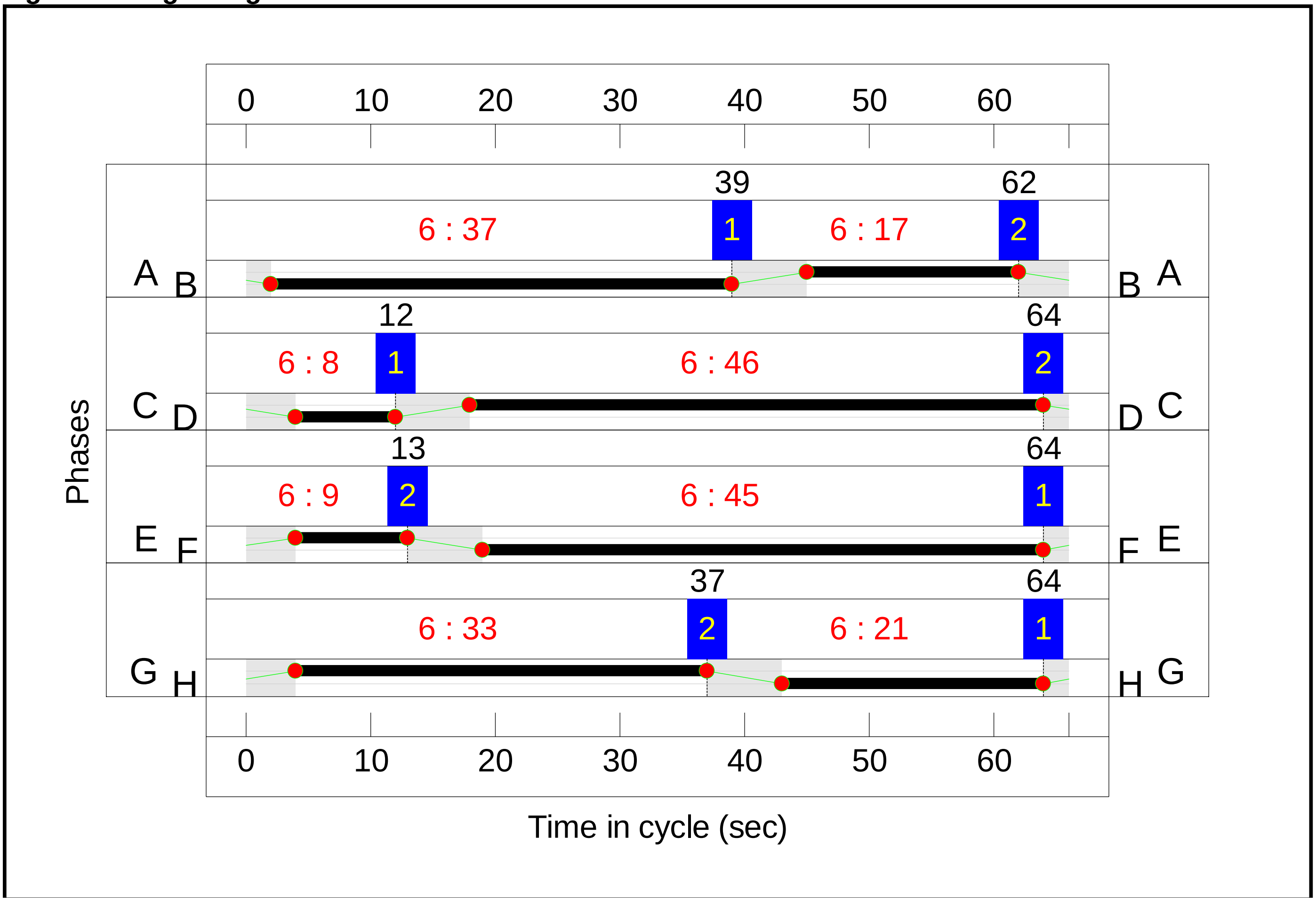
Stage Stream: 3



Stage Stream: 4



Signal Timings Diagram



Scenario 16: '2031 Do Minimum - Sensitivity PM' (FG16: '2031 Reference Case - SENSITIVITY PM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A	H6 Childs Way A4146 (S) Left Ahead	Traffic	1	12	6	18
B	(Internal) Ahead Right	Traffic	1	42	24	0
C	A509 (N) Left Ahead	Traffic	2	47	11	58
D	(Internal) Ahead Right	Traffic	2	7	64	5
E	A5130 / Fen Street (E) Left Ahead	Traffic	3	11	57	2
F	(Internal) Ahead Right	Traffic	3	43	8	51
G	A509 (W) Left Ahead	Traffic	4	41	25	0
H	(Internal) Ahead Right	Traffic	4	13	6	19

TA Report

Link Results

TA Report

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**147.5%**
Northfield Roundabout	-	-	**N/A**	-	-		-	-	-	-	-	-	**147.5%**
1/1	A509 (N) Left Ahead	U	2	N/A	C		1	47	-	974	1900	1382	70.5%
1/2	A509 (N) Ahead	U	2	N/A	C		1	47	-	982	1900	1382	71.1%
1/3+1/4	A509 (N) Ahead	U	2	N/A	C		1	47	-	1022	1950:1950	396+1143	66.4 : 66.4%
2/1	A5130 / Fen Street (E) Left Ahead	U	3	N/A	E		1	11	-	211	1900	345	61.1%
2/2+2/3	A5130 / Fen Street (E) Ahead	U	3	N/A	E		1	11	-	435	1900:1900	345+345	62.8 : 63.1%
3/1	H6 Childs Way A4146 (S) Left	U	1	N/A	A		1	12	-	0	1900	374	0.0%
3/2	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	12	-	510	1900	374	136.3%
3/3	H6 Childs Way A4146 (S) Ahead	U	1	N/A	A		1	12	-	500	1900	374	133.6%
4/2+4/1	A509 (W) Left Ahead	U	4	N/A	G		1	41	-	1788	1900:1900	3+1209	143.4 : 147.5%
4/3	A509 (W) Ahead	U	4	N/A	G		1	41	-	0	1900	1209	0.0%
9/1	(Internal) Ahead	U	1	N/A	B		1	42	-	443	2000	1303	34.0%
9/2	(Internal) Ahead Right	U	1	N/A	B		1	42	-	976	2000	1303	74.9%
9/3	(Internal) Right	U	1	N/A	B		1	42	-	218	2000	1303	16.7%
10/1	(Internal) Ahead	U	4	N/A	H		1	13	-	727	2000	424	139.4%
10/2	(Internal) Ahead Right	U	4	N/A	H		1	13	-	718	2000	424	139.6%
10/3	(Internal) Right	U	4	N/A	H		1	13	-	0	2000	424	0.0%
11/1	(Internal) Ahead	U	2	N/A	D		1	7	-	0	2000	242	0.0%

TA Report

11/2	(Internal) Ahead Right	U	2	N/A	D		1	7	-	5	2000	242	1.6%
11/3	(Internal) Right	U	2	N/A	D		1	7	-	0	2000	242	0.0%
12/1	(Internal) Ahead	U	3	N/A	F		1	43	-	434	2000	1333	32.6%
12/2	(Internal) Ahead	U	3	N/A	F		1	43	-	982	2000	1333	73.7%
12/3	(Internal) Right	U	3	N/A	F		1	43	-	263	2000	1333	19.7%
12/4	(Internal) Right	U	3	N/A	F		1	43	-	759	2000	1333	56.9%
13/1	Ahead	U	N/A	N/A	-		-	-	-	500	1900	1900	26.3%
13/2	Ahead	U	N/A	N/A	-		-	-	-	510	1900	1900	26.8%

TA Report

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	**-**	**-**	**0**	**0**	**0**	**63.3**	**604.4**	**0.0**	**667.6**	**-**	**-**	**-**	**-**
Northfield Roundabout	**-**	**-**	**0**	**0**	**0**	**63.3**	**604.4**	**0.0**	**667.6**	**-**	**-**	**-**	**-**
1/1	974	974	-	-	-	1.4	1.2	-	2.5	9.4	9.7	1.2	10.9
1/2	982	982	-	-	-	1.4	1.2	-	2.6	9.6	10.1	1.2	11.3
1/3+1/4	1022	1022	-	-	-	1.1	1.0	-	2.0	7.2	6.1	1.0	7.1
2/1	211	211	-	-	-	1.5	0.8	-	2.2	38.1	3.5	0.8	4.3
2/2+2/3	435	435	-	-	-	3.0	0.8	-	3.9	31.9	3.6	0.8	4.5
3/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	510	374	-	-	-	8.2	69.7	-	77.9	550.0	11.8	69.7	81.5
3/3	500	374	-	-	-	7.8	64.8	-	72.6	522.8	11.5	64.8	76.3
4/2+4/1	1788	1213	-	-	-	19.4	289.3	-	308.7	621.5	47.7	289.3	337.0
4/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
9/1	443	443	-	-	-	0.7	0.3	-	0.9	7.5	3.3	0.3	3.6
9/2	976	976	-	-	-	2.2	1.5	-	3.6	13.4	12.8	1.5	14.3
9/3	218	218	-	-	-	0.1	0.1	-	0.2	3.9	0.4	0.1	0.5
10/1	591	424	-	-	-	7.0	85.2	-	92.2	561.7	14.3	85.2	99.5
10/2	592	424	-	-	-	7.6	85.7	-	93.3	567.4	14.8	85.7	100.6
10/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/1	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
11/2	4	4	-	-	-	0.0	0.0	-	0.0	27.2	0.1	0.0	0.1
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	434	434	-	-	-	0.3	0.2	-	0.5	4.4	1.0	0.2	1.2
12/2	982	982	-	-	-	0.7	1.4	-	2.1	7.6	2.3	1.4	3.7
12/3	263	263	-	-	-	0.4	0.1	-	0.5	6.7	2.0	0.1	2.2
12/4	759	759	-	-	-	0.6	0.7	-	1.2	5.9	2.0	0.7	2.7
13/1	500	500	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

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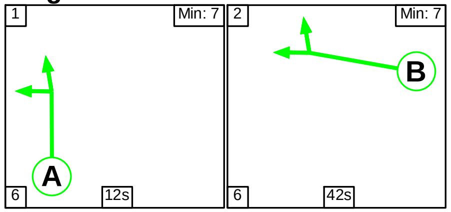
13/2	510	510	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2

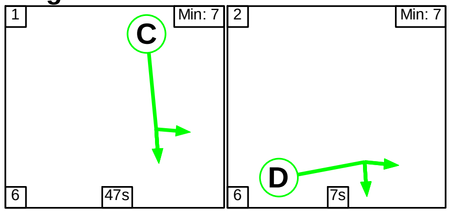
C1	Stream: 1	PRC for Signalled Lanes (%):	-51.4	Total Delay for Signalled Lanes (pcuHr):	155.33	Cycle Time (s):	66
C1	Stream: 2	PRC for Signalled Lanes (%):	26.6	Total Delay for Signalled Lanes (pcuHr):	7.23	Cycle Time (s):	66
C1	Stream: 3	PRC for Signalled Lanes (%):	22.2	Total Delay for Signalled Lanes (pcuHr):	10.43	Cycle Time (s):	66
C1	Stream: 4	PRC for Signalled Lanes (%):	-63.9	Total Delay for Signalled Lanes (pcuHr):	494.27	Cycle Time (s):	66
		PRC Over All Lanes (%):	-63.9	Total Delay Over All Lanes(pcuHr):	667.62		

Staging Plan Diagram

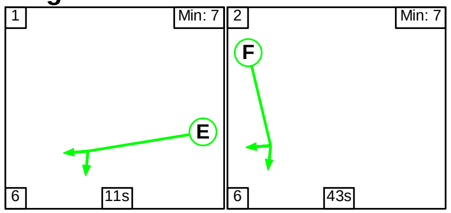
Stage Stream: 1



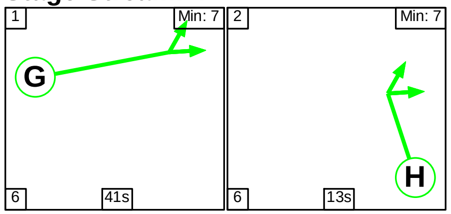
Stage Stream: 2



Stage Stream: 3

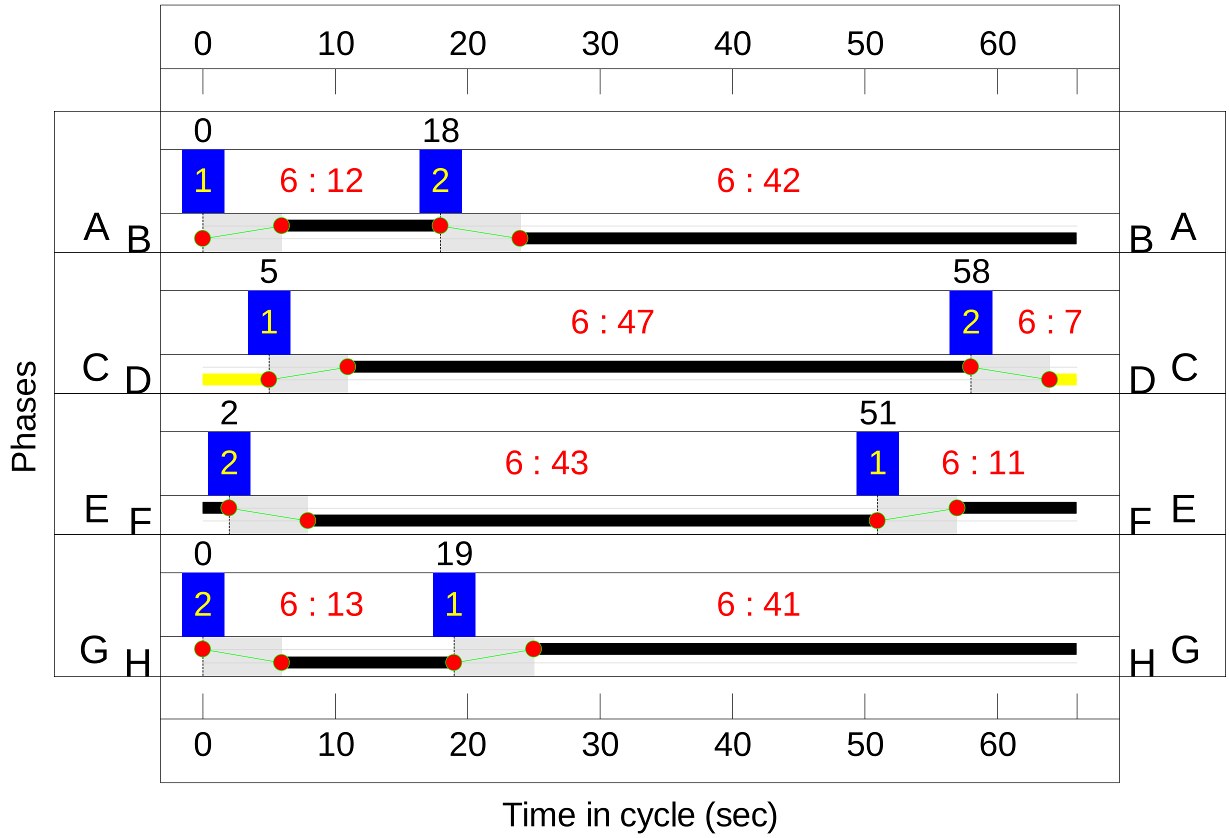


Stage Stream: 4



TA Report

Signal Timings Diagram



Appendix T

FUTURE YEAR JUNCTIONS - MITIGATION ASSESSMENTS

THE FUTURE OF TRANSPORT

Generated on 25/03/2021 15:15:58 using Junctions 9 (9.5.0.6896)

Junctions 9

ARCADY 9 - Roundabout Module

Filename: 1.Blakelands Rbt (mitigated).j9
Path: \\uk.wspgroup.com\central data\Projects\700575xx\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP Transport Planning\05 Analysis\2021 Junction Models\Existing junctions\=MITIGATION=
Report generation date: 25/03/2021 15:15:31

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2031 Do Something							
A - Brickhill St (N)	3.5	15.73	0.78	C	5.8	50.03	0.87	F
B - Monks Way (E)	9.6	20.65	0.91	C	1.3	3.35	0.55	A
C - Brickhill St (S)	5.4	48.29	0.86	E	4.1	23.04	0.81	C
D - Monks Way (W)	3.0	5.48	0.74	A	8.6	14.34	0.90	B
	2048 Do Something							
A - Brickhill St (N)	47.3	175.07	1.11	F	71.7	530.23	1.46	F
B - Monks Way (E)	38.3	58.78	1.01	F	2.7	5.20	0.73	A
C - Brickhill St (S)	16.1	162.68	1.06	F	10.5	72.36	0.95	F
D - Monks Way (W)	17.5	26.92	0.96	D	52.5	65.31	1.02	F
	2031 Key Planning Test (Full Dev)							
A - Brickhill St (N)	0.8	3.94	0.43	A	8.4	76.72	0.93	F
B - Monks Way (E)	13.4	26.95	0.94	D	1.7	4.01	0.63	A
C - Brickhill St (S)	6.2	58.13	0.88	F	4.3	28.83	0.82	D
D - Monks Way (W)	0.7	2.30	0.40	A	11.4	18.33	0.93	C

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

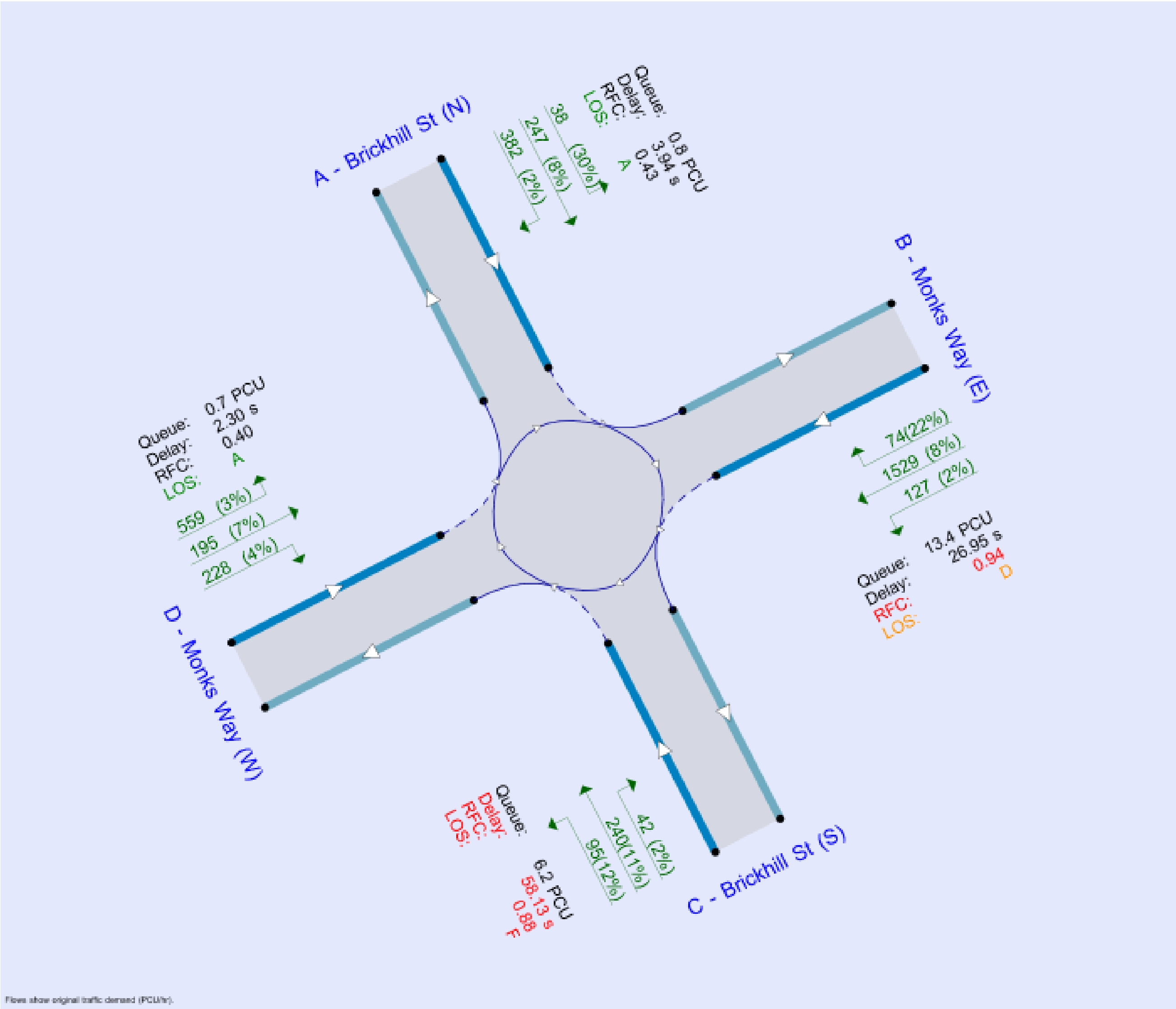
File summary

File Description

Title	H3 Monks Way/Brickhill St Roundabout
Location	Milton Keynes
Site number	
Date	19/03/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	70014859
Enumerator	CORP\UKFXI001
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				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)	Run automatically
D1	2019 Surveyed	AM	ONE HOUR	07:45	09:15	15	✓
D2	2019 Surveyed	PM	ONE HOUR	16:45	18:15	15	✓
D3	2016 MKMMM Base	AM	ONE HOUR	07:45	09:15	15	✓
D4	2016 MKMMM Base	PM	ONE HOUR	16:45	18:15	15	✓
D5	2031 Do Minimum	AM	ONE HOUR	07:45	09:15	15	✓
D6	2031 Do Minimum	PM	ONE HOUR	16:45	18:15	15	✓
D7	2048 Do Minimum	AM	ONE HOUR	07:45	09:15	15	✓
D8	2048 Do Minimum	PM	ONE HOUR	16:45	18:15	15	✓
D9	2031 Do Something	AM	ONE HOUR	07:45	09:15	15	✓
D10	2031 Do Something	PM	ONE HOUR	16:45	18:15	15	✓
D11	2048 Do Something	AM	ONE HOUR	07:45	09:15	15	✓
D12	2048 Do Something	PM	ONE HOUR	16:45	18:15	15	✓
D13	2031 Key Planning Test (Full Dev)	AM	ONE HOUR	07:45	09:15	15	✓
D14	2031 Key Planning Test (Full Dev)	PM	ONE HOUR	16:45	18:15	15	✓

Analysis Set Details

ID	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	✓	D9,D10,D11,D12,D13,D14	100.000	100.000

2031 Do Something, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Blakelands Roundabout	Standard Roundabout		A, B, C, D	16.19	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	Brickhill St (N)	
B	Monks Way (E)	
C	Brickhill St (S)	
D	Monks Way (W)	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - Brickhill St (N)	3.65	9.70	13.4	44.4	56.0	9.5	
B - Monks Way (E)	7.30	9.70	11.6	26.8	56.0	20.5	
C - Brickhill St (S)	3.20	9.00	14.8	36.0	56.0	35.0	
D - Monks Way (W)	7.30	9.60	29.2	40.4	56.0	9.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - Brickhill St (N)	0.667	2038
B - Monks Way (E)	0.784	2770
C - Brickhill St (S)	0.590	1757
D - Monks Way (W)	0.847	3039

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)	Run automatically
D9	2031 Do Something	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	757	100.000
B - Monks Way (E)		ONE HOUR	✓	1618	100.000
C - Brickhill St (S)		ONE HOUR	✓	395	100.000
D - Monks Way (W)		ONE HOUR	✓	1824	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	56	291	410
	B - Monks Way (E)	60	0	101	1457
	C - Brickhill St (S)	294	12	0	89
	D - Monks Way (W)	520	1063	241	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	20	7	2
	B - Monks Way (E)	28	0	2	7
	C - Brickhill St (S)	9	5	0	12
	D - Monks Way (W)	3	7	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	0.78	15.73	3.5	C	695	1042
B - Monks Way (E)	0.91	20.65	9.6	C	1485	2227
C - Brickhill St (S)	0.86	48.29	5.4	E	362	544
D - Monks Way (W)	0.74	5.48	3.0	A	1674	2511

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	570	142	988	1379	0.413	567	655	0.0	0.7	4.639	A
B - Monks Way (E)	1218	305	706	2216	0.550	1213	849	0.0	1.3	3.831	A
C - Brickhill St (S)	297	74	1444	904	0.329	295	475	0.0	0.5	6.455	A
D - Monks Way (W)	1373	343	274	2807	0.489	1369	1466	0.0	1.0	2.632	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	681	170	1182	1250	0.544	679	784	0.7	1.2	6.592	A
B - Monks Way (E)	1455	364	845	2107	0.690	1450	1015	1.3	2.3	5.844	A
C - Brickhill St (S)	355	89	1727	737	0.482	353	568	0.5	1.0	10.226	B
D - Monks Way (W)	1640	410	327	2761	0.594	1638	1753	1.0	1.5	3.372	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	833	208	1444	1075	0.775	825	950	1.2	3.4	14.656	B
B - Monks Way (E)	1781	445	1028	1963	0.907	1756	1241	2.3	8.7	16.923	C
C - Brickhill St (S)	435	109	2093	521	0.835	421	691	1.0	4.4	35.668	E
D - Monks Way (W)	2008	502	391	2707	0.742	2003	2123	1.5	3.0	5.343	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	833	208	1449	1072	0.778	833	959	3.4	3.5	15.726	C
B - Monks Way (E)	1781	445	1037	1957	0.910	1778	1245	8.7	9.6	20.648	C
C - Brickhill St (S)	435	109	2118	506	0.859	431	696	4.4	5.4	48.286	E
D - Monks Way (W)	2008	502	400	2700	0.744	2008	2149	3.0	3.0	5.480	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	681	170	1188	1246	0.546	689	801	3.5	1.3	6.901	A
B - Monks Way (E)	1455	364	856	2099	0.693	1483	1021	9.6	2.5	6.562	A
C - Brickhill St (S)	355	89	1764	715	0.496	372	575	5.4	1.1	12.056	B
D - Monks Way (W)	1640	410	343	2748	0.597	1646	1793	3.0	1.6	3.460	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	570	142	992	1378	0.414	572	660	1.3	0.7	4.717	A
B - Monks Way (E)	1218	305	711	2212	0.551	1223	853	2.5	1.3	3.923	A
C - Brickhill St (S)	297	74	1456	897	0.332	300	478	1.1	0.5	6.623	A
D - Monks Way (W)	1373	343	277	2804	0.490	1375	1478	1.6	1.0	2.663	A

2031 Do Something, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Blakelands Roundabout	Standard Roundabout		A, B, C, D	15.72	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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)	Run automatically
D10	2031 Do Something	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	404	100.000
B - Monks Way (E)		ONE HOUR	✓	1248	100.000
C - Brickhill St (S)		ONE HOUR	✓	603	100.000
D - Monks Way (W)		ONE HOUR	✓	2060	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	86	69	249
	B - Monks Way (E)	111	0	56	1081
	C - Brickhill St (S)	311	139	0	153
	D - Monks Way (W)	115	1945	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	6	27	1
	B - Monks Way (E)	13	0	1	4
	C - Brickhill St (S)	5	2	0	1
	D - Monks Way (W)	3	2	25	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	0.87	50.03	5.8	F	371	556
B - Monks Way (E)	0.55	3.35	1.3	A	1145	1718
C - Brickhill St (S)	0.81	23.04	4.1	C	553	830
D - Monks Way (W)	0.90	14.34	8.6	B	1890	2835

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	304	76	1563	996	0.305	302	402	0.0	0.5	5.476	A
B - Monks Way (E)	940	235	238	2583	0.364	937	1627	0.0	0.6	2.285	A
C - Brickhill St (S)	454	113	1081	1118	0.406	451	94	0.0	0.7	5.548	A
D - Monks Way (W)	1551	388	420	2683	0.578	1545	1113	0.0	1.4	3.214	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	363	91	1869	792	0.459	362	481	0.5	0.9	8.815	A
B - Monks Way (E)	1122	280	285	2547	0.441	1121	1946	0.6	0.8	2.640	A
C - Brickhill St (S)	542	136	1294	993	0.546	540	112	0.7	1.2	8.167	A
D - Monks Way (W)	1852	463	503	2613	0.709	1848	1331	1.4	2.4	4.774	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	445	111	2271	524	0.849	430	585	0.9	4.6	36.122	E
B - Monks Way (E)	1374	344	338	2504	0.549	1372	2363	0.8	1.3	3.320	A
C - Brickhill St (S)	664	166	1576	827	0.803	654	135	1.2	3.8	20.412	C
D - Monks Way (W)	2268	567	610	2522	0.899	2246	1619	2.4	8.0	12.413	B

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	445	111	2292	510	0.872	440	591	4.6	5.8	50.029	F
B - Monks Way (E)	1374	344	347	2498	0.550	1374	2386	1.3	1.3	3.350	A
C - Brickhill St (S)	664	166	1584	822	0.808	663	137	3.8	4.1	23.037	C
D - Monks Way (W)	2268	567	617	2516	0.901	2266	1630	8.0	8.6	14.339	B

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	363	91	1899	772	0.471	382	490	5.8	1.0	10.243	B
B - Monks Way (E)	1122	280	301	2534	0.443	1124	1980	1.3	0.8	2.673	A
C - Brickhill St (S)	542	136	1309	984	0.551	553	116	4.1	1.3	8.838	A
D - Monks Way (W)	1852	463	513	2604	0.711	1876	1349	8.6	2.6	5.208	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	304	76	1574	989	0.308	306	406	1.0	0.5	5.595	A
B - Monks Way (E)	940	235	241	2581	0.364	940	1639	0.8	0.6	2.296	A
C - Brickhill St (S)	454	113	1087	1115	0.407	456	94	1.3	0.7	5.661	A
D - Monks Way (W)	1551	388	424	2679	0.579	1555	1119	2.6	1.4	3.283	A

2048 Do Something, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Blakelands Roundabout	Standard Roundabout		A, B, C, D	68.44	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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)	Run automatically
D11	2048 Do Something	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	792	100.000
B - Monks Way (E)		ONE HOUR	✓	2083	100.000
C - Brickhill St (S)		ONE HOUR	✓	311	100.000
D - Monks Way (W)		ONE HOUR	✓	2256	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	261	125	406
	B - Monks Way (E)	291	0	203	1589
	C - Brickhill St (S)	44	168	0	99
	D - Monks Way (W)	701	1463	92	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	6	8	1
	B - Monks Way (E)	9	0	2	6
	C - Brickhill St (S)	14	3	0	7
	D - Monks Way (W)	2	4	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	1.11	175.07	47.3	F	727	1090
B - Monks Way (E)	1.01	58.78	38.3	F	1911	2867
C - Brickhill St (S)	1.06	162.68	16.1	F	285	428
D - Monks Way (W)	0.96	26.92	17.5	D	2070	3105

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	596	149	1291	1177	0.507	592	776	0.0	1.0	6.334	A
B - Monks Way (E)	1568	392	466	2404	0.652	1560	1418	0.0	2.0	4.481	A
C - Brickhill St (S)	234	59	1712	746	0.314	232	314	0.0	0.5	7.378	A
D - Monks Way (W)	1698	425	376	2720	0.624	1692	1568	0.0	1.7	3.593	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	712	178	1543	1009	0.706	707	928	1.0	2.4	12.143	B
B - Monks Way (E)	1873	468	556	2334	0.802	1864	1694	2.0	4.1	7.981	A
C - Brickhill St (S)	280	70	2045	550	0.509	277	376	0.5	1.1	13.851	B
D - Monks Way (W)	2028	507	449	2658	0.763	2022	1872	1.7	3.2	5.788	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	872	218	1849	805	1.083	780	1110	2.4	25.4	79.191	F
B - Monks Way (E)	2293	573	622	2282	1.005	2206	2007	4.1	26.1	33.188	D
C - Brickhill St (S)	342	86	2390	345	0.991	312	437	1.1	8.8	80.478	F
D - Monks Way (W)	2484	621	521	2598	0.956	2438	2182	3.2	14.6	19.393	C

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	872	218	1873	789	1.105	784	1126	25.4	47.3	175.068	F
B - Monks Way (E)	2293	573	627	2278	1.007	2245	2031	26.1	38.3	58.784	F
C - Brickhill St (S)	342	86	2428	323	1.059	313	443	8.8	16.1	162.680	F
D - Monks Way (W)	2484	621	527	2592	0.958	2473	2214	14.6	17.5	26.921	D

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	712	178	1617	960	0.742	887	974	47.3	3.5	85.373	F
B - Monks Way (E)	1873	468	680	2237	0.837	2002	1824	38.3	6.0	23.201	C
C - Brickhill St (S)	280	70	2262	421	0.663	335	420	16.1	2.3	61.368	F
D - Monks Way (W)	2028	507	508	2609	0.777	2083	2088	17.5	3.7	7.789	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	596	149	1307	1167	0.511	606	786	3.5	1.1	6.763	A
B - Monks Way (E)	1568	392	476	2397	0.654	1584	1437	6.0	2.0	4.785	A
C - Brickhill St (S)	234	59	1740	729	0.321	241	320	2.3	0.5	7.911	A
D - Monks Way (W)	1698	425	386	2712	0.626	1706	1596	3.7	1.7	3.728	A

2048 Do Something, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Blakelands Roundabout	Standard Roundabout		A, B, C, D	85.07	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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)	Run automatically
D12	2048 Do Something	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	429	100.000
B - Monks Way (E)		ONE HOUR	✓	1706	100.000
C - Brickhill St (S)		ONE HOUR	✓	504	100.000
D - Monks Way (W)		ONE HOUR	✓	2445	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	132	66	231
	B - Monks Way (E)	152	0	65	1489
	C - Brickhill St (S)	175	110	0	219
	D - Monks Way (W)	151	2294	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	13	9	1
	B - Monks Way (E)	8	0	0	3
	C - Brickhill St (S)	6	1	0	1
	D - Monks Way (W)	2	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	1.46	530.23	71.7	F	394	590
B - Monks Way (E)	0.73	5.20	2.7	A	1565	2348
C - Brickhill St (S)	0.95	72.36	10.5	F	462	694
D - Monks Way (W)	1.02	65.31	52.5	F	2244	3365

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	323	81	1802	837	0.386	320	358	0.0	0.7	7.330	A
B - Monks Way (E)	1284	321	222	2596	0.495	1280	1900	0.0	1.0	2.819	A
C - Brickhill St (S)	379	95	1404	928	0.409	377	98	0.0	0.7	6.673	A
D - Monks Way (W)	1841	460	327	2762	0.667	1833	1454	0.0	2.0	3.919	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	386	96	2152	603	0.640	381	428	0.7	1.8	16.801	C
B - Monks Way (E)	1534	383	264	2563	0.598	1532	2269	1.0	1.5	3.598	A
C - Brickhill St (S)	453	113	1678	766	0.592	450	117	0.7	1.4	11.600	B
D - Monks Way (W)	2198	550	391	2708	0.812	2189	1738	2.0	4.2	6.966	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	472	118	2534	349	1.355	342	509	1.8	34.5	216.466	F
B - Monks Way (E)	1878	470	236	2584	0.727	1874	2639	1.5	2.7	5.200	A
C - Brickhill St (S)	555	139	1986	584	0.950	526	124	1.4	8.6	49.858	E
D - Monks Way (W)	2692	673	465	2645	1.018	2578	2048	4.2	32.7	33.668	D

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	472	118	2571	324	1.458	323	519	34.5	71.7	530.232	F
B - Monks Way (E)	1878	470	224	2594	0.724	1878	2670	2.7	2.7	5.195	A
C - Brickhill St (S)	555	139	1981	587	0.945	547	121	8.6	10.5	72.360	F
D - Monks Way (W)	2692	673	477	2635	1.022	2613	2051	32.7	52.5	65.305	F

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	386	96	2347	473	0.816	466	454	71.7	51.6	432.778	F
B - Monks Way (E)	1534	383	323	2517	0.609	1538	2491	2.7	1.6	3.818	A
C - Brickhill St (S)	453	113	1730	735	0.616	488	130	10.5	1.7	16.999	C
D - Monks Way (W)	2198	550	413	2689	0.817	2388	1805	52.5	4.9	20.075	C

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	323	81	1821	824	0.392	527	362	51.6	0.7	28.788	D
B - Monks Way (E)	1284	321	365	2484	0.517	1286	1983	1.6	1.1	3.110	A
C - Brickhill St (S)	379	95	1521	859	0.442	383	130	1.7	0.8	7.826	A
D - Monks Way (W)	1841	460	331	2758	0.667	1852	1573	4.9	2.1	4.100	A

2031 Key Planning Test (Full Dev), AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Blakelands Roundabout	Standard Roundabout		A, B, C, D	19.55	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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)	Run automatically
D13	2031 Key Planning Test (Full Dev)	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	667	100.000
B - Monks Way (E)		ONE HOUR	✓	1730	100.000
C - Brickhill St (S)		ONE HOUR	✓	377	100.000
D - Monks Way (W)		ONE HOUR	✓	982	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	38	247	382
	B - Monks Way (E)	74	0	127	1529
	C - Brickhill St (S)	240	42	0	95
	D - Monks Way (W)	559	195	228	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	30	8	2
	B - Monks Way (E)	22	0	2	8
	C - Brickhill St (S)	11	2	0	12
	D - Monks Way (W)	3	7	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	0.43	3.94	0.8	A	612	918
B - Monks Way (E)	0.94	26.95	13.4	D	1587	2381
C - Brickhill St (S)	0.88	58.13	6.2	F	346	519
D - Monks Way (W)	0.40	2.30	0.7	A	901	1352

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	502	126	349	1805	0.278	501	655	0.0	0.4	2.906	A
B - Monks Way (E)	1302	326	643	2265	0.575	1297	206	0.0	1.4	3.993	A
C - Brickhill St (S)	284	71	1488	878	0.323	282	452	0.0	0.5	6.627	A
D - Monks Way (W)	739	185	266	2813	0.263	738	1504	0.0	0.4	1.804	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	600	150	418	1759	0.341	599	783	0.4	0.5	3.270	A
B - Monks Way (E)	1555	389	770	2166	0.718	1550	247	1.4	2.7	6.266	A
C - Brickhill St (S)	339	85	1780	706	0.480	337	541	0.5	1.0	10.690	B
D - Monks Way (W)	883	221	318	2769	0.319	882	1798	0.4	0.5	1.984	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	734	184	510	1698	0.433	733	949	0.5	0.8	3.933	A
B - Monks Way (E)	1905	476	942	2031	0.938	1869	301	2.7	11.7	20.606	C
C - Brickhill St (S)	415	104	2152	486	0.853	400	660	1.0	4.8	40.364	E
D - Monks Way (W)	1081	270	379	2718	0.398	1080	2172	0.5	0.7	2.285	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	734	184	511	1697	0.433	734	957	0.8	0.8	3.944	A
B - Monks Way (E)	1905	476	944	2030	0.938	1898	302	11.7	13.4	26.948	D
C - Brickhill St (S)	415	104	2179	470	0.883	409	662	4.8	6.2	58.127	F
D - Monks Way (W)	1081	270	387	2711	0.399	1081	2201	0.7	0.7	2.297	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	600	150	421	1757	0.341	601	800	0.8	0.5	3.287	A
B - Monks Way (E)	1555	389	772	2165	0.718	1597	250	13.4	2.8	7.353	A
C - Brickhill St (S)	339	85	1824	680	0.499	359	545	6.2	1.1	13.133	B
D - Monks Way (W)	883	221	337	2753	0.321	884	1846	0.7	0.5	2.004	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	502	126	351	1804	0.278	503	659	0.5	0.4	2.920	A
B - Monks Way (E)	1302	326	646	2263	0.575	1308	207	2.8	1.5	4.094	A
C - Brickhill St (S)	284	71	1500	871	0.326	286	454	1.1	0.5	6.805	A
D - Monks Way (W)	739	185	270	2810	0.263	740	1516	0.5	0.4	1.808	A

2031 Key Planning Test (Full Dev), PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Blakelands Roundabout	Standard Roundabout		A, B, C, D	19.98	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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)	Run automatically
D14	2031 Key Planning Test (Full Dev)	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	381	100.000
B - Monks Way (E)		ONE HOUR	✓	1426	100.000
C - Brickhill St (S)		ONE HOUR	✓	518	100.000
D - Monks Way (W)		ONE HOUR	✓	2147	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	63	62	256
	B - Monks Way (E)	122	0	42	1262
	C - Brickhill St (S)	274	129	0	115
	D - Monks Way (W)	107	2040	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Monks Way (E)	C - Brickhill St (S)	D - Monks Way (W)
From	A - Brickhill St (N)	0	9	30	1
	B - Monks Way (E)	12	0	1	3
	C - Brickhill St (S)	5	2	0	1
	D - Monks Way (W)	4	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	0.93	76.72	8.4	F	350	524
B - Monks Way (E)	0.63	4.01	1.7	A	1309	1963
C - Brickhill St (S)	0.82	28.83	4.3	D	475	713
D - Monks Way (W)	0.93	18.33	11.4	C	1970	2955

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	287	72	1627	953	0.301	285	377	0.0	0.5	5.703	A
B - Monks Way (E)	1074	268	238	2583	0.416	1071	1674	0.0	0.7	2.463	A
C - Brickhill St (S)	390	97	1231	1030	0.379	387	78	0.0	0.6	5.766	A
D - Monks Way (W)	1616	404	393	2706	0.597	1610	1225	0.0	1.5	3.338	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	343	86	1945	741	0.462	341	451	0.5	0.9	9.499	A
B - Monks Way (E)	1282	320	284	2547	0.503	1281	2001	0.7	1.0	2.945	A
C - Brickhill St (S)	466	116	1472	888	0.525	464	93	0.6	1.1	8.732	A
D - Monks Way (W)	1930	483	470	2640	0.731	1925	1465	1.5	2.7	5.105	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	419	105	2357	467	0.899	399	546	0.9	6.0	47.420	E
B - Monks Way (E)	1570	393	333	2508	0.626	1567	2423	1.0	1.7	3.954	A
C - Brickhill St (S)	570	143	1789	700	0.814	559	111	1.1	3.9	24.625	C
D - Monks Way (W)	2364	591	569	2557	0.925	2334	1779	2.7	10.2	14.857	B

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	419	105	2383	449	0.934	410	553	6.0	8.4	76.721	F
B - Monks Way (E)	1570	393	342	2502	0.628	1570	2451	1.7	1.7	4.005	A
C - Brickhill St (S)	570	143	1799	695	0.821	569	113	3.9	4.3	28.835	D
D - Monks Way (W)	2364	591	577	2550	0.927	2359	1791	10.2	11.4	18.335	C

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	343	86	1985	714	0.480	372	461	8.4	1.0	12.123	B
B - Monks Way (E)	1282	320	311	2526	0.507	1285	2047	1.7	1.1	3.011	A
C - Brickhill St (S)	466	116	1497	873	0.533	478	98	4.3	1.2	9.705	A
D - Monks Way (W)	1930	483	482	2631	0.734	1964	1493	11.4	2.9	5.787	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	287	72	1639	945	0.303	289	380	1.0	0.5	5.841	A
B - Monks Way (E)	1074	268	241	2581	0.416	1075	1686	1.1	0.7	2.482	A
C - Brickhill St (S)	390	97	1237	1026	0.380	392	79	1.2	0.6	5.889	A
D - Monks Way (W)	1616	404	397	2702	0.598	1622	1233	2.9	1.5	3.417	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: 2.Willen Rbt (mitigated).j9
Path: \\uk.wspgroup.com\central data\Projects\700575xx\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP Transport Planning\05 Analysis\2021 Junction Models\Existing junctions\=MITIGATION=
Report generation date: 25/03/2021 15:17:50

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2031 Do Something							
A - Brickhill St (N)	1.3	5.48	0.55	A	1.5	6.37	0.59	A
B - Dansteed Way (E)	1.0	3.73	0.49	A	0.6	3.24	0.38	A
C - Brickhill St (S)	1.1	4.43	0.52	A	1.1	4.13	0.52	A
D - Dansteed Way (W)	0.8	4.11	0.43	A	0.9	4.00	0.46	A
	2048 Do Something							
A - Brickhill St (N)	2.8	12.13	0.74	B	4.0	15.59	0.81	C
B - Dansteed Way (E)	1.2	4.40	0.54	A	1.9	6.77	0.65	A
C - Brickhill St (S)	2.0	6.73	0.67	A	2.6	7.51	0.72	A
D - Dansteed Way (W)	3.8	10.92	0.79	B	2.1	6.89	0.68	A
	2031 Key Planning Test (Full Dev)							
A - Brickhill St (N)	1.3	5.54	0.55	A	1.5	6.49	0.60	A
B - Dansteed Way (E)	1.2	4.02	0.54	A	0.9	3.71	0.46	A
C - Brickhill St (S)	1.1	4.55	0.51	A	1.3	4.67	0.56	A
D - Dansteed Way (W)	0.9	4.38	0.47	A	0.9	4.12	0.48	A

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 average delay per arriving vehicle.

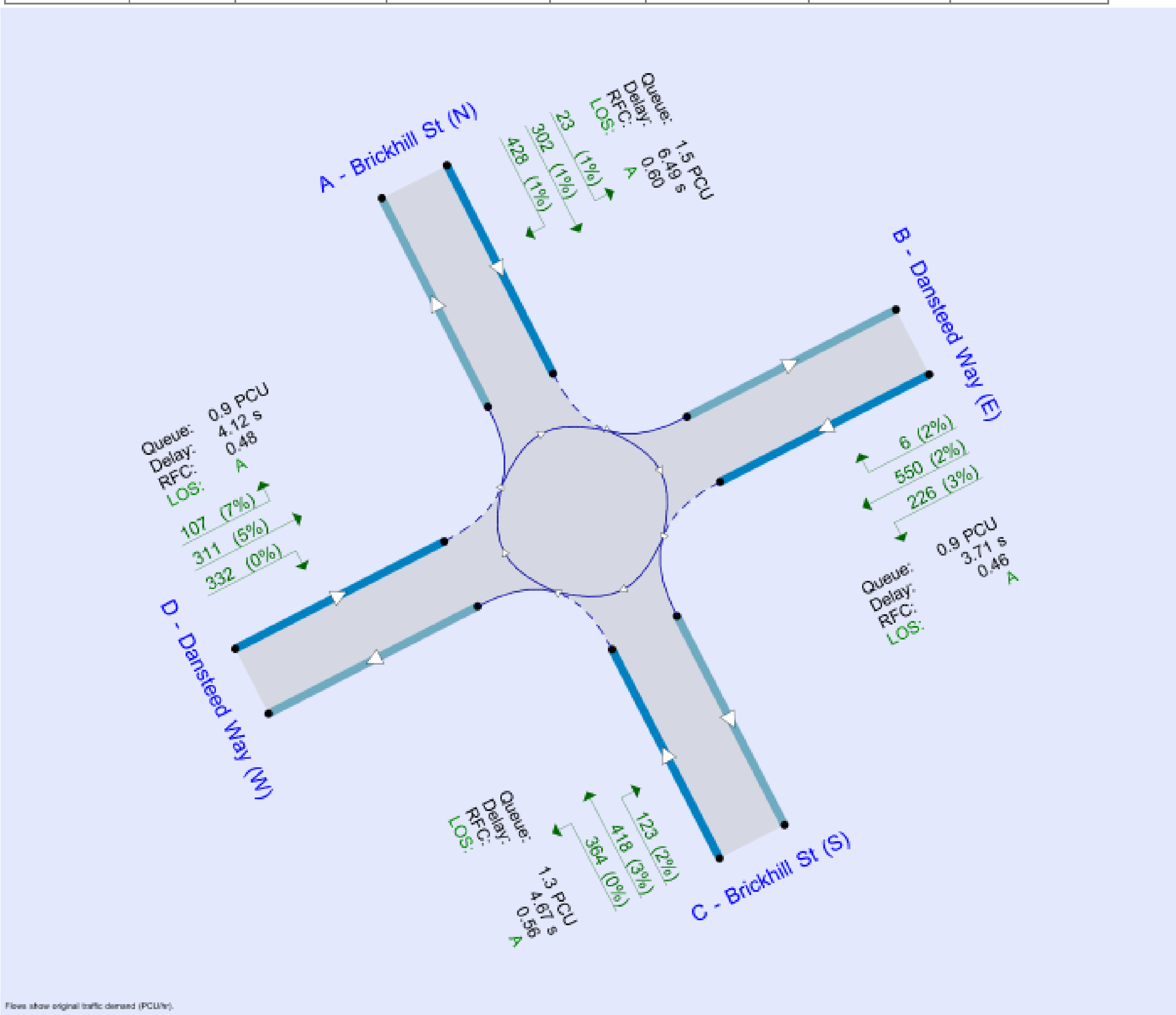
File summary

File Description

Title	Brickhill St-Dansteed W Roundabout
Location	Milton Keynes
Site number	
Date	19/03/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	70014859
Enumerator	CORP\UKFXI001
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75	✓			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)	Run automatically
D1	2019 Surveyed	AM	ONE HOUR	07:45	09:15	15	✓
D2	2019 Surveyed	PM	ONE HOUR	16:45	18:15	15	✓
D3	2016 MKMMM Base	AM	ONE HOUR	07:45	09:15	15	✓
D4	2016 MKMMM Base	PM	ONE HOUR	16:45	18:15	15	✓
D5	2031 Do Minimum	AM	ONE HOUR	07:45	09:15	15	✓
D6	2031 Do Minimum	PM	ONE HOUR	16:45	18:15	15	✓
D7	2048 Do Minimum	AM	ONE HOUR	07:45	09:15	15	✓
D8	2048 Do Minimum	PM	ONE HOUR	16:45	18:15	15	✓
D9	2031 Do Something	AM	ONE HOUR	07:45	09:15	15	✓
D10	2031 Do Something	PM	ONE HOUR	16:45	18:15	15	✓
D11	2048 Do Something	AM	ONE HOUR	07:45	09:15	15	✓
D12	2048 Do Something	PM	ONE HOUR	16:45	18:15	15	✓
D13	2031 Key Planning Test (Full Dev)	AM	ONE HOUR	07:45	09:15	15	✓
D14	2031 Key Planning Test (Full Dev)	PM	ONE HOUR	16:45	18:15	15	✓

Analysis Set Details

ID	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	✓	D9,D10,D11,D12,D13,D14	100.000	100.000

2031 Do Something, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Willen Roundabout	Standard Roundabout		A, B, C, D	4.42	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	Brickhill St (N)	
B	Dansteed Way (E)	
C	Brickhill St (S)	
D	Dansteed Way (W)	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - Brickhill St (N)	3.00	8.00	17.6	40.0	66.0	7.5	
B - Dansteed Way (E)	7.30	8.30	7.0	38.3	66.0	5.0	
C - Brickhill St (S)	7.30	7.60	3.3	65.9	66.0	9.5	
D - Dansteed Way (W)	3.65	7.80	24.7	20.0	66.0	4.5	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - Brickhill St (N)	0.579	1877
B - Dansteed Way (E)	0.713	2686
C - Brickhill St (S)	0.685	2522
D - Dansteed Way (W)	0.611	2094

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)	Run automatically
D9	2031 Do Something	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	767	100.000
B - Dansteed Way (E)		ONE HOUR	✓	901	100.000
C - Brickhill St (S)		ONE HOUR	✓	839	100.000
D - Dansteed Way (W)		ONE HOUR	✓	631	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	22	538	207
	B - Dansteed Way (E)	231	0	122	548
	C - Brickhill St (S)	380	117	0	342
	D - Dansteed Way (W)	207	313	111	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	8	5	4
	B - Dansteed Way (E)	0	0	13	7
	C - Brickhill St (S)	10	3	0	1
	D - Dansteed Way (W)	4	5	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	0.55	5.48	1.3	1.6	A	704	1056
B - Dansteed Way (E)	0.49	3.73	1.0	1.7	A	827	1240
C - Brickhill St (S)	0.52	4.43	1.1	1.6	A	770	1155
D - Dansteed Way (W)	0.43	4.11	0.8	2.8	A	579	869

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	577	144	406	1642	0.352	575	614	0.0	0.6	3.529	A
B - Dansteed Way (E)	678	170	642	2229	0.304	676	339	0.0	0.5	2.451	A
C - Brickhill St (S)	632	158	740	2016	0.313	630	578	0.0	0.5	2.729	A
D - Dansteed Way (W)	475	119	546	1760	0.270	474	823	0.0	0.4	2.904	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	690	172	486	1596	0.432	689	735	0.6	0.8	4.154	A
B - Dansteed Way (E)	810	202	769	2139	0.379	809	406	0.5	0.6	2.865	A
C - Brickhill St (S)	754	189	886	1916	0.394	753	692	0.5	0.7	3.256	A
D - Dansteed Way (W)	567	142	654	1695	0.335	567	985	0.4	0.5	3.315	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	844	211	595	1533	0.551	843	899	0.8	1.3	5.450	A
B - Dansteed Way (E)	992	248	940	2016	0.492	991	497	0.6	1.0	3.712	A
C - Brickhill St (S)	924	231	1084	1780	0.519	922	847	0.7	1.1	4.403	A
D - Dansteed Way (W)	695	174	800	1605	0.433	694	1206	0.5	0.8	4.099	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	844	211	596	1532	0.551	844	901	1.3	1.3	5.484	A
B - Dansteed Way (E)	992	248	942	2015	0.492	992	498	1.0	1.0	3.726	A
C - Brickhill St (S)	924	231	1086	1779	0.519	924	849	1.1	1.1	4.427	A
D - Dansteed Way (W)	695	174	802	1604	0.433	695	1208	0.8	0.8	4.113	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	690	172	487	1595	0.432	691	737	1.3	0.8	4.185	A
B - Dansteed Way (E)	810	202	772	2136	0.379	811	407	1.0	0.6	2.881	A
C - Brickhill St (S)	754	189	888	1914	0.394	756	695	1.1	0.7	3.273	A
D - Dansteed Way (W)	567	142	656	1693	0.335	568	988	0.8	0.5	3.328	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	577	144	408	1641	0.352	578	617	0.8	0.6	3.555	A
B - Dansteed Way (E)	678	170	645	2226	0.305	679	341	0.6	0.5	2.463	A
C - Brickhill St (S)	632	158	743	2013	0.314	632	581	0.7	0.5	2.742	A
D - Dansteed Way (W)	475	119	549	1759	0.270	476	827	0.5	0.4	2.919	A

Queue Variation Results for each time segment

07:45 - 08:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.57	0.57	1.05	1.47	1.52			N/A	N/A
B - Dansteed Way (E)	0.46	0.00	0.00	0.46	0.46			N/A	N/A
C - Brickhill St (S)	0.48	0.00	0.00	0.48	0.48			N/A	N/A
D - Dansteed Way (W)	0.38	0.00	0.00	0.38	0.38			N/A	N/A

08:00 - 08:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.79	0.09	0.86	1.49	1.57			N/A	N/A
B - Dansteed Way (E)	0.64	0.08	0.79	1.43	1.51			N/A	N/A
C - Brickhill St (S)	0.68	0.08	0.80	1.43	1.51			N/A	N/A
D - Dansteed Way (W)	0.52	0.52	1.04	1.46	1.51			N/A	N/A

08:15 - 08:30

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.27	0.03	0.27	1.27	1.27			N/A	N/A
B - Dansteed Way (E)	1.02	0.03	0.27	1.02	1.02			N/A	N/A
C - Brickhill St (S)	1.12	0.03	0.27	1.12	1.12			N/A	N/A
D - Dansteed Way (W)	0.79	0.03	0.26	0.79	0.79			N/A	N/A

08:30 - 08:45

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.28	0.03	0.28	1.28	1.53			N/A	N/A
B - Dansteed Way (E)	1.02	0.03	0.29	1.02	1.71			N/A	N/A
C - Brickhill St (S)	1.13	0.03	0.28	1.13	1.55			N/A	N/A
D - Dansteed Way (W)	0.79	0.03	0.29	0.79	2.79			N/A	N/A

08:45 - 09:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.80	0.28	1.00	1.46	1.52			N/A	N/A
B - Dansteed Way (E)	0.65	0.58	1.06	1.48	1.53			N/A	N/A
C - Brickhill St (S)	0.69	0.58	1.05	1.47	1.53			N/A	N/A
D - Dansteed Way (W)	0.53	0.53	1.04	1.46	1.51			N/A	N/A

09:00 - 09:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.57	0.06	0.61	1.38	1.48			N/A	N/A
B - Dansteed Way (E)	0.47	0.00	0.00	0.47	0.47			N/A	N/A
C - Brickhill St (S)	0.48	0.04	0.38	1.24	1.41			N/A	N/A
D - Dansteed Way (W)	0.39	0.00	0.00	0.39	0.39			N/A	N/A

2031 Do Something, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Willen Roundabout	Standard Roundabout		A, B, C, D	4.47	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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)	Run automatically
D10	2031 Do Something	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	763	100.000
B - Dansteed Way (E)		ONE HOUR	✓	645	100.000
C - Brickhill St (S)		ONE HOUR	✓	872	100.000
D - Dansteed Way (W)		ONE HOUR	✓	731	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	16	341	406
	B - Dansteed Way (E)	3	0	160	482
	C - Brickhill St (S)	444	88	0	340
	D - Dansteed Way (W)	108	301	322	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	3	5	2
	B - Dansteed Way (E)	1	0	3	2
	C - Brickhill St (S)	3	2	0	1
	D - Dansteed Way (W)	7	6	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	0.59	6.37	1.5	1.7	A	700	1050
B - Dansteed Way (E)	0.38	3.24	0.6	3.0	A	592	888
C - Brickhill St (S)	0.52	4.13	1.1	1.5	A	800	1200
D - Dansteed Way (W)	0.46	4.00	0.9	2.0	A	671	1006

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	574	144	534	1568	0.366	572	417	0.0	0.6	3.724	A
B - Dansteed Way (E)	486	121	802	2115	0.230	484	304	0.0	0.3	2.256	A
C - Brickhill St (S)	656	164	669	2065	0.318	655	617	0.0	0.5	2.604	A
D - Dansteed Way (W)	550	138	402	1849	0.298	549	922	0.0	0.4	2.860	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	686	171	639	1507	0.455	685	498	0.6	0.9	4.517	A
B - Dansteed Way (E)	580	145	960	2002	0.290	579	364	0.3	0.4	2.587	A
C - Brickhill St (S)	784	196	800	1974	0.397	783	739	0.5	0.7	3.084	A
D - Dansteed Way (W)	657	164	480	1800	0.365	657	1103	0.4	0.6	3.252	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	840	210	782	1425	0.590	838	610	0.9	1.5	6.310	A
B - Dansteed Way (E)	710	178	1174	1849	0.384	709	445	0.4	0.6	3.227	A
C - Brickhill St (S)	960	240	979	1852	0.518	958	904	0.7	1.1	4.106	A
D - Dansteed Way (W)	805	201	588	1735	0.464	804	1349	0.6	0.9	3.993	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	840	210	783	1424	0.590	840	611	1.5	1.5	6.370	A
B - Dansteed Way (E)	710	178	1177	1847	0.384	710	446	0.6	0.6	3.235	A
C - Brickhill St (S)	960	240	981	1851	0.519	960	906	1.1	1.1	4.127	A
D - Dansteed Way (W)	805	201	589	1734	0.464	805	1352	0.9	0.9	4.005	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	686	171	640	1506	0.455	688	500	1.5	0.9	4.561	A
B - Dansteed Way (E)	580	145	964	1999	0.290	581	365	0.6	0.4	2.595	A
C - Brickhill St (S)	784	196	803	1973	0.397	786	742	1.1	0.7	3.102	A
D - Dansteed Way (W)	657	164	482	1800	0.365	658	1107	0.9	0.6	3.264	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	574	144	536	1567	0.367	576	418	0.9	0.6	3.755	A
B - Dansteed Way (E)	486	121	806	2112	0.230	486	305	0.4	0.3	2.264	A
C - Brickhill St (S)	656	164	672	2062	0.318	657	620	0.7	0.5	2.619	A
D - Dansteed Way (W)	550	138	403	1848	0.298	551	926	0.6	0.4	2.871	A

Queue Variation Results for each time segment

16:45 - 17:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.59	0.57	1.03	1.45	1.50			N/A	N/A
B - Dansteed Way (E)	0.30	0.00	0.00	0.30	0.30			N/A	N/A
C - Brickhill St (S)	0.47	0.00	0.00	0.47	0.47			N/A	N/A
D - Dansteed Way (W)	0.44	0.00	0.00	0.44	0.44			N/A	N/A

17:00 - 17:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.86	0.08	0.84	1.18	1.69			N/A	N/A
B - Dansteed Way (E)	0.42	0.00	0.00	0.42	0.42			N/A	N/A
C - Brickhill St (S)	0.67	0.08	0.78	1.39	1.47			N/A	N/A
D - Dansteed Way (W)	0.59	0.08	0.79	1.40	1.48			N/A	N/A

17:15 - 17:30

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.46	0.03	0.27	1.46	1.46			N/A	N/A
B - Dansteed Way (E)	0.63	0.03	0.26	0.63	0.63			N/A	N/A
C - Brickhill St (S)	1.09	0.03	0.26	1.09	1.09			N/A	N/A
D - Dansteed Way (W)	0.89	0.03	0.26	0.89	0.89			N/A	N/A

17:30 - 17:45

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.47	0.03	0.28	1.47	1.47			N/A	N/A
B - Dansteed Way (E)	0.64	0.03	0.30	1.38	2.96			N/A	N/A
C - Brickhill St (S)	1.10	0.03	0.27	1.10	1.27			N/A	N/A
D - Dansteed Way (W)	0.89	0.03	0.28	0.89	2.04			N/A	N/A

17:45 - 18:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.87	0.17	0.97	1.48	1.55			N/A	N/A
B - Dansteed Way (E)	0.42	0.00	0.00	0.42	0.42			N/A	N/A
C - Brickhill St (S)	0.68	0.56	1.02	1.43	1.48			N/A	N/A
D - Dansteed Way (W)	0.60	0.57	1.03	1.45	1.50			N/A	N/A

18:00 - 18:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.60	0.06	0.59	1.38	1.48			N/A	N/A
B - Dansteed Way (E)	0.31	0.00	0.00	0.31	0.31			N/A	N/A
C - Brickhill St (S)	0.48	0.04	0.39	1.24	1.38			N/A	N/A
D - Dansteed Way (W)	0.44	0.00	0.00	0.44	0.44			N/A	N/A

2048 Do Something, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Willen Roundabout	Standard Roundabout		A, B, C, D	8.52	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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)	Run automatically
D11	2048 Do Something	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	773	100.000
B - Dansteed Way (E)		ONE HOUR	✓	921	100.000
C - Brickhill St (S)		ONE HOUR	✓	1005	100.000
D - Dansteed Way (W)		ONE HOUR	✓	1167	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	5	352	416
	B - Dansteed Way (E)	188	0	175	558
	C - Brickhill St (S)	257	261	0	487
	D - Dansteed Way (W)	293	627	247	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	1	3	2
	B - Dansteed Way (E)	10	0	7	6
	C - Brickhill St (S)	1	1	0	1
	D - Dansteed Way (W)	2	2	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	0.74	12.13	2.8	10.6	B	709	1064
B - Dansteed Way (E)	0.54	4.40	1.2	1.6	A	845	1268
C - Brickhill St (S)	0.67	6.73	2.0	2.9	A	922	1383
D - Dansteed Way (W)	0.79	10.92	3.8	16.1	B	1071	1606

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	582	145	851	1385	0.420	579	554	0.0	0.7	4.562	A
B - Dansteed Way (E)	693	173	760	2144	0.323	691	669	0.0	0.5	2.647	A
C - Brickhill St (S)	757	189	872	1926	0.393	754	580	0.0	0.7	3.097	A
D - Dansteed Way (W)	879	220	530	1770	0.496	875	1096	0.0	1.0	4.073	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	695	174	1018	1288	0.540	693	662	0.7	1.2	6.183	A
B - Dansteed Way (E)	828	207	910	2038	0.406	827	801	0.5	0.7	3.180	A
C - Brickhill St (S)	903	226	1043	1808	0.500	902	694	0.7	1.0	4.007	A
D - Dansteed Way (W)	1049	262	634	1707	0.615	1047	1311	1.0	1.6	5.531	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	851	213	1242	1158	0.735	845	809	1.2	2.7	11.559	B
B - Dansteed Way (E)	1014	254	1110	1895	0.535	1012	978	0.7	1.2	4.350	A
C - Brickhill St (S)	1107	277	1275	1650	0.671	1102	847	1.0	2.0	6.597	A
D - Dansteed Way (W)	1285	321	775	1621	0.793	1277	1602	1.6	3.7	10.399	B

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	851	213	1249	1154	0.738	851	812	2.7	2.8	12.128	B
B - Dansteed Way (E)	1014	254	1117	1890	0.537	1014	983	1.2	1.2	4.396	A
C - Brickhill St (S)	1107	277	1279	1646	0.672	1106	852	2.0	2.0	6.728	A
D - Dansteed Way (W)	1285	321	777	1619	0.794	1284	1608	3.7	3.8	10.917	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	695	174	1028	1282	0.542	701	667	2.8	1.2	6.416	A
B - Dansteed Way (E)	828	207	921	2030	0.408	830	808	1.2	0.7	3.215	A
C - Brickhill St (S)	903	226	1050	1804	0.501	908	701	2.0	1.0	4.077	A
D - Dansteed Way (W)	1049	262	637	1705	0.615	1058	1320	3.8	1.7	5.735	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	582	145	857	1381	0.421	584	557	1.2	0.8	4.636	A
B - Dansteed Way (E)	693	173	767	2140	0.324	694	674	0.7	0.5	2.667	A
C - Brickhill St (S)	757	189	877	1922	0.394	758	584	1.0	0.7	3.126	A
D - Dansteed Way (W)	879	220	532	1769	0.497	881	1102	1.7	1.0	4.141	A

Queue Variation Results for each time segment

07:45 - 08:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.74	0.56	1.02	1.43	1.49			N/A	N/A
B - Dansteed Way (E)	0.51	0.00	0.00	0.51	0.51			N/A	N/A
C - Brickhill St (S)	0.65	0.56	1.01	1.41	1.46			N/A	N/A
D - Dansteed Way (W)	0.99	0.56	1.02	1.43	1.48			N/A	N/A

08:00 - 08:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.18	0.06	0.70	2.62	3.77			N/A	N/A
B - Dansteed Way (E)	0.73	0.08	0.81	1.48	1.56			N/A	N/A
C - Brickhill St (S)	1.00	0.06	0.64	2.00	2.91			N/A	N/A
D - Dansteed Way (W)	1.60	0.05	0.48	4.12	6.58			N/A	N/A

08:15 - 08:30

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	2.71	0.03	0.30	2.71	10.63			N/A	N/A
B - Dansteed Way (E)	1.22	0.03	0.27	1.22	1.22			N/A	N/A
C - Brickhill St (S)	2.01	0.03	0.27	2.01	2.01			N/A	N/A
D - Dansteed Way (W)	3.69	0.03	0.30	3.69	16.05			N/A	N/A

08:30 - 08:45

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	2.80	0.03	0.28	2.80	6.32			N/A	N/A
B - Dansteed Way (E)	1.23	0.03	0.29	1.23	1.23			N/A	N/A
C - Brickhill St (S)	2.04	0.03	0.27	2.04	2.04			N/A	N/A
D - Dansteed Way (W)	3.80	0.03	0.28	3.80	7.18			N/A	N/A

08:45 - 09:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.23	0.06	0.80	2.65	3.74			N/A	N/A
B - Dansteed Way (E)	0.74	0.54	1.05	1.49	1.55			N/A	N/A
C - Brickhill St (S)	1.02	0.11	0.98	1.59	1.91			N/A	N/A
D - Dansteed Way (W)	1.65	0.06	0.77	4.03	6.00			N/A	N/A

09:00 - 09:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.75	0.04	0.39	1.74	2.84			N/A	N/A
B - Dansteed Way (E)	0.52	0.04	0.45	1.34	1.47			N/A	N/A
C - Brickhill St (S)	0.66	0.05	0.49	1.49	1.56			N/A	N/A
D - Dansteed Way (W)	1.01	0.04	0.38	2.53	4.47			N/A	N/A

2048 Do Something, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Willen Roundabout	Standard Roundabout		A, B, C, D	8.97	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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)	Run automatically
D12	2048 Do Something	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	878	100.000
B - Dansteed Way (E)		ONE HOUR	✓	918	100.000
C - Brickhill St (S)		ONE HOUR	✓	1142	100.000
D - Dansteed Way (W)		ONE HOUR	✓	1019	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	61	424	393
	B - Dansteed Way (E)	40	0	280	598
	C - Brickhill St (S)	405	210	0	527
	D - Dansteed Way (W)	163	225	631	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	3	1	1
	B - Dansteed Way (E)	0	0	3	1
	C - Brickhill St (S)	3	5	0	0
	D - Dansteed Way (W)	4	6	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	0.81	15.59	4.0	20.0	C	806	1209
B - Dansteed Way (E)	0.65	6.77	1.9	2.2	A	842	1264
C - Brickhill St (S)	0.72	7.51	2.6	4.7	A	1048	1572
D - Dansteed Way (W)	0.68	6.89	2.1	3.4	A	935	1403

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	661	165	799	1414	0.467	657	456	0.0	0.9	4.788	A
B - Dansteed Way (E)	691	173	1085	1913	0.361	689	372	0.0	0.6	2.982	A
C - Brickhill St (S)	860	215	773	1993	0.431	857	1001	0.0	0.8	3.222	A
D - Dansteed Way (W)	767	192	491	1794	0.428	764	1138	0.0	0.8	3.552	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	789	197	957	1323	0.596	787	546	0.9	1.5	6.758	A
B - Dansteed Way (E)	825	206	1299	1761	0.469	824	445	0.6	0.9	3.898	A
C - Brickhill St (S)	1027	257	925	1889	0.543	1025	1198	0.8	1.2	4.238	A
D - Dansteed Way (W)	916	229	588	1735	0.528	915	1362	0.8	1.1	4.463	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	967	242	1169	1200	0.805	957	667	1.5	3.9	14.438	B
B - Dansteed Way (E)	1011	253	1583	1558	0.649	1007	544	0.9	1.8	6.590	A
C - Brickhill St (S)	1257	314	1128	1750	0.719	1252	1462	1.2	2.5	7.297	A
D - Dansteed Way (W)	1122	280	718	1655	0.678	1118	1662	1.1	2.1	6.779	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	967	242	1174	1198	0.807	966	669	3.9	4.0	15.589	C
B - Dansteed Way (E)	1011	253	1594	1550	0.652	1011	546	1.8	1.9	6.767	A
C - Brickhill St (S)	1257	314	1135	1745	0.720	1257	1469	2.5	2.6	7.511	A
D - Dansteed Way (W)	1122	280	721	1654	0.679	1122	1671	2.1	2.1	6.894	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	789	197	963	1320	0.598	799	549	4.0	1.5	7.125	A
B - Dansteed Way (E)	825	206	1313	1750	0.472	829	448	1.9	0.9	3.985	A
C - Brickhill St (S)	1027	257	934	1883	0.545	1032	1209	2.6	1.2	4.342	A
D - Dansteed Way (W)	916	229	592	1732	0.529	920	1374	2.1	1.2	4.537	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	661	165	804	1412	0.468	664	459	1.5	0.9	4.884	A
B - Dansteed Way (E)	691	173	1093	1907	0.362	692	374	0.9	0.6	3.013	A
C - Brickhill St (S)	860	215	778	1989	0.432	862	1008	1.2	0.8	3.260	A
D - Dansteed Way (W)	767	192	494	1792	0.428	769	1146	1.2	0.8	3.591	A

Queue Variation Results for each time segment

16:45 - 17:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.88	0.56	1.01	1.42	1.47			N/A	N/A
B - Dansteed Way (E)	0.57	0.56	1.02	1.42	1.47			N/A	N/A
C - Brickhill St (S)	0.77	0.56	1.02	1.43	1.48			N/A	N/A
D - Dansteed Way (W)	0.76	0.56	1.02	1.43	1.48			N/A	N/A

17:00 - 17:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.47	0.05	0.50	3.69	5.67			N/A	N/A
B - Dansteed Way (E)	0.89	0.06	0.68	1.68	2.24			N/A	N/A
C - Brickhill St (S)	1.20	0.05	0.50	2.84	4.25			N/A	N/A
D - Dansteed Way (W)	1.13	0.06	0.71	2.41	3.43			N/A	N/A

17:15 - 17:30

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	3.87	0.03	0.33	6.38	20.00			N/A	N/A
B - Dansteed Way (E)	1.84	0.03	0.27	1.84	1.84			N/A	N/A
C - Brickhill St (S)	2.53	0.03	0.28	2.53	4.72			N/A	N/A
D - Dansteed Way (W)	2.10	0.03	0.27	2.10	2.10			N/A	N/A

17:30 - 17:45

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	4.04	0.03	0.29	4.04	14.28			N/A	N/A
B - Dansteed Way (E)	1.88	0.03	0.27	1.88	1.88			N/A	N/A
C - Brickhill St (S)	2.58	0.03	0.27	2.58	2.58			N/A	N/A
D - Dansteed Way (W)	2.12	0.03	0.27	2.12	2.12			N/A	N/A

17:45 - 18:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.53	0.05	0.50	3.88	6.01			N/A	N/A
B - Dansteed Way (E)	0.91	0.12	0.94	1.13	1.61			N/A	N/A
C - Brickhill St (S)	1.24	0.09	1.02	2.24	2.96			N/A	N/A
D - Dansteed Way (W)	1.16	0.11	1.05	1.88	2.43			N/A	N/A

18:00 - 18:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.90	0.03	0.35	2.08	4.20			N/A	N/A
B - Dansteed Way (E)	0.58	0.05	0.47	1.39	1.51			N/A	N/A
C - Brickhill St (S)	0.78	0.05	0.46	1.64	2.38			N/A	N/A
D - Dansteed Way (W)	0.77	0.05	0.55	1.39	1.90			N/A	N/A

2031 Key Planning Test (Full Dev), AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Willen Roundabout	Standard Roundabout		A, B, C, D	4.58	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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)	Run automatically
D13	2031 Key Planning Test (Full Dev)	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	753	100.000
B - Dansteed Way (E)		ONE HOUR	✓	993	100.000
C - Brickhill St (S)		ONE HOUR	✓	792	100.000
D - Dansteed Way (W)		ONE HOUR	✓	674	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	22	511	220
	B - Dansteed Way (E)	298	0	130	565
	C - Brickhill St (S)	317	129	0	346
	D - Dansteed Way (W)	220	359	95	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	4	5	2
	B - Dansteed Way (E)	0	0	12	7
	C - Brickhill St (S)	12	2	0	1
	D - Dansteed Way (W)	4	4	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	0.55	5.54	1.3	1.6	A	691	1036
B - Dansteed Way (E)	0.54	4.02	1.2	1.6	A	911	1367
C - Brickhill St (S)	0.51	4.55	1.1	1.9	A	727	1090
D - Dansteed Way (W)	0.47	4.38	0.9	2.3	A	618	928

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	567	142	437	1624	0.349	565	627	0.0	0.6	3.530	A
B - Dansteed Way (E)	748	187	619	2245	0.333	745	383	0.0	0.5	2.527	A
C - Brickhill St (S)	596	149	813	1966	0.303	594	552	0.0	0.5	2.761	A
D - Dansteed Way (W)	507	127	558	1753	0.289	506	849	0.0	0.4	2.990	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	677	169	524	1574	0.430	676	750	0.6	0.8	4.167	A
B - Dansteed Way (E)	893	223	742	2158	0.414	892	458	0.5	0.7	2.996	A
C - Brickhill St (S)	712	178	973	1856	0.384	711	661	0.5	0.7	3.309	A
D - Dansteed Way (W)	606	151	668	1686	0.359	605	1016	0.4	0.6	3.453	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	829	207	641	1506	0.550	827	918	0.8	1.3	5.502	A
B - Dansteed Way (E)	1093	273	907	2040	0.536	1091	561	0.7	1.2	3.994	A
C - Brickhill St (S)	872	218	1190	1707	0.511	870	809	0.7	1.1	4.520	A
D - Dansteed Way (W)	742	186	818	1595	0.465	741	1243	0.6	0.9	4.367	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	829	207	642	1506	0.551	829	919	1.3	1.3	5.537	A
B - Dansteed Way (E)	1093	273	909	2038	0.536	1093	562	1.2	1.2	4.015	A
C - Brickhill St (S)	872	218	1192	1706	0.511	872	810	1.1	1.1	4.546	A
D - Dansteed Way (W)	742	186	819	1594	0.466	742	1245	0.9	0.9	4.384	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	677	169	525	1573	0.430	679	752	1.3	0.8	4.198	A
B - Dansteed Way (E)	893	223	745	2156	0.414	895	459	1.2	0.7	3.012	A
C - Brickhill St (S)	712	178	976	1854	0.384	714	663	1.1	0.7	3.330	A
D - Dansteed Way (W)	606	151	670	1685	0.360	607	1019	0.9	0.6	3.471	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	567	142	439	1623	0.349	568	629	0.8	0.6	3.556	A
B - Dansteed Way (E)	748	187	623	2242	0.333	748	384	0.7	0.5	2.540	A
C - Brickhill St (S)	596	149	816	1963	0.304	597	555	0.7	0.5	2.777	A
D - Dansteed Way (W)	507	127	561	1751	0.290	508	853	0.6	0.4	3.006	A

Queue Variation Results for each time segment

07:45 - 08:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.55	0.55	1.04	1.46	1.51			N/A	N/A
B - Dansteed Way (E)	0.52	0.00	0.00	0.52	0.52			N/A	N/A
C - Brickhill St (S)	0.46	0.00	0.00	0.46	0.46			N/A	N/A
D - Dansteed Way (W)	0.42	0.00	0.00	0.42	0.42			N/A	N/A

08:00 - 08:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.78	0.09	0.85	1.48	1.55			N/A	N/A
B - Dansteed Way (E)	0.74	0.08	0.80	1.47	1.56			N/A	N/A
C - Brickhill St (S)	0.65	0.08	0.79	1.42	1.50			N/A	N/A
D - Dansteed Way (W)	0.58	0.07	0.76	1.40	1.48			N/A	N/A

08:15 - 08:30

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.26	0.03	0.27	1.26	1.26			N/A	N/A
B - Dansteed Way (E)	1.21	0.03	0.27	1.21	1.21			N/A	N/A
C - Brickhill St (S)	1.09	0.03	0.27	1.09	1.09			N/A	N/A
D - Dansteed Way (W)	0.89	0.03	0.26	0.89	0.89			N/A	N/A

08:30 - 08:45

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.27	0.03	0.28	1.27	1.27			N/A	N/A
B - Dansteed Way (E)	1.21	0.03	0.28	1.21	1.40			N/A	N/A
C - Brickhill St (S)	1.10	0.03	0.29	1.10	1.87			N/A	N/A
D - Dansteed Way (W)	0.90	0.03	0.28	0.90	2.33			N/A	N/A

08:45 - 09:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.79	0.27	0.99	1.45	1.51			N/A	N/A
B - Dansteed Way (E)	0.75	0.58	1.05	1.48	1.53			N/A	N/A
C - Brickhill St (S)	0.66	0.58	1.05	1.47	1.53			N/A	N/A
D - Dansteed Way (W)	0.59	0.57	1.04	1.45	1.50			N/A	N/A

09:00 - 09:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.56	0.06	0.59	1.37	1.46			N/A	N/A
B - Dansteed Way (E)	0.53	0.05	0.51	1.36	1.47			N/A	N/A
C - Brickhill St (S)	0.46	0.03	0.34	1.11	1.35			N/A	N/A
D - Dansteed Way (W)	0.43	0.00	0.00	0.43	0.43			N/A	N/A

2031 Key Planning Test (Full Dev), PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Willen Roundabout	Standard Roundabout		A, B, C, D	4.73	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

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)	Run automatically
D14	2031 Key Planning Test (Full Dev)	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Brickhill St (N)		ONE HOUR	✓	753	100.000
B - Dansteed Way (E)		ONE HOUR	✓	782	100.000
C - Brickhill St (S)		ONE HOUR	✓	905	100.000
D - Dansteed Way (W)		ONE HOUR	✓	750	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	23	302	428
	B - Dansteed Way (E)	6	0	226	550
	C - Brickhill St (S)	418	123	0	364
	D - Dansteed Way (W)	107	311	332	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - Brickhill St (N)	B - Dansteed Way (E)	C - Brickhill St (S)	D - Dansteed Way (W)
From	A - Brickhill St (N)	0	1	1	1
	B - Dansteed Way (E)	2	0	3	2
	C - Brickhill St (S)	3	2	0	0
	D - Dansteed Way (W)	7	5	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max 95th percentile Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Brickhill St (N)	0.60	6.49	1.5	1.7	A	691	1036
B - Dansteed Way (E)	0.46	3.71	0.9	2.5	A	718	1076
C - Brickhill St (S)	0.56	4.67	1.3	1.5	A	830	1246
D - Dansteed Way (W)	0.48	4.12	0.9	1.8	A	688	1032

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	567	142	575	1544	0.367	565	399	0.0	0.6	3.701	A
B - Dansteed Way (E)	589	147	796	2119	0.278	587	343	0.0	0.4	2.402	A
C - Brickhill St (S)	681	170	738	2017	0.338	679	645	0.0	0.5	2.732	A
D - Dansteed Way (W)	565	141	411	1843	0.306	563	1007	0.0	0.5	2.892	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	677	169	688	1479	0.458	676	477	0.6	0.8	4.522	A
B - Dansteed Way (E)	703	176	953	2007	0.350	702	410	0.4	0.5	2.821	A
C - Brickhill St (S)	814	203	884	1917	0.424	813	772	0.5	0.7	3.309	A
D - Dansteed Way (W)	674	169	491	1794	0.376	674	1205	0.5	0.6	3.308	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	829	207	842	1390	0.597	827	583	0.8	1.5	6.428	A
B - Dansteed Way (E)	861	215	1166	1855	0.464	860	502	0.5	0.9	3.694	A
C - Brickhill St (S)	996	249	1081	1782	0.559	994	945	0.7	1.3	4.633	A
D - Dansteed Way (W)	826	206	601	1727	0.478	824	1474	0.6	0.9	4.103	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	829	207	843	1389	0.597	829	585	1.5	1.5	6.493	A
B - Dansteed Way (E)	861	215	1169	1853	0.465	861	503	0.9	0.9	3.711	A
C - Brickhill St (S)	996	249	1083	1781	0.560	996	947	1.3	1.3	4.666	A
D - Dansteed Way (W)	826	206	602	1726	0.478	826	1478	0.9	0.9	4.117	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	677	169	690	1478	0.458	679	479	1.5	0.9	4.570	A
B - Dansteed Way (E)	703	176	958	2004	0.351	704	412	0.9	0.6	2.836	A
C - Brickhill St (S)	814	203	887	1915	0.425	816	775	1.3	0.8	3.333	A
D - Dansteed Way (W)	674	169	493	1793	0.376	675	1210	0.9	0.6	3.321	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Brickhill St (N)	567	142	577	1543	0.367	568	400	0.9	0.6	3.732	A
B - Dansteed Way (E)	589	147	801	2115	0.278	589	344	0.6	0.4	2.415	A
C - Brickhill St (S)	681	170	742	2014	0.338	682	648	0.8	0.5	2.748	A
D - Dansteed Way (W)	565	141	412	1842	0.307	565	1012	0.6	0.5	2.907	A

Queue Variation Results for each time segment

16:45 - 17:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.58	0.56	1.01	1.41	1.46			N/A	N/A
B - Dansteed Way (E)	0.39	0.00	0.00	0.39	0.39			N/A	N/A
C - Brickhill St (S)	0.52	0.52	1.02	1.42	1.47			N/A	N/A
D - Dansteed Way (W)	0.45	0.00	0.00	0.45	0.45			N/A	N/A

17:00 - 17:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.84	0.08	0.82	1.25	1.71			N/A	N/A
B - Dansteed Way (E)	0.55	0.06	0.66	1.36	1.45			N/A	N/A
C - Brickhill St (S)	0.74	0.07	0.77	1.22	1.22			N/A	N/A
D - Dansteed Way (W)	0.62	0.09	0.81	1.40	1.47			N/A	N/A

17:15 - 17:30

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.47	0.03	0.27	1.47	1.47			N/A	N/A
B - Dansteed Way (E)	0.88	0.03	0.26	0.88	0.88			N/A	N/A
C - Brickhill St (S)	1.27	0.03	0.26	1.27	1.27			N/A	N/A
D - Dansteed Way (W)	0.94	0.03	0.26	0.94	0.94			N/A	N/A

17:30 - 17:45

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	1.48	0.03	0.27	1.48	1.48			N/A	N/A
B - Dansteed Way (E)	0.88	0.03	0.28	0.88	2.47			N/A	N/A
C - Brickhill St (S)	1.28	0.03	0.27	1.28	1.41			N/A	N/A
D - Dansteed Way (W)	0.94	0.03	0.28	0.94	1.82			N/A	N/A

17:45 - 18:00

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.86	0.16	0.94	1.14	1.14			N/A	N/A
B - Dansteed Way (E)	0.56	0.56	1.02	1.43	1.48			N/A	N/A
C - Brickhill St (S)	0.76	0.41	0.98	1.42	1.47			N/A	N/A
D - Dansteed Way (W)	0.62	0.57	1.03	1.44	1.49			N/A	N/A

18:00 - 18:15

Arm	Mean (PCU)	Q05 (PCU)	Q50 (PCU)	Q90 (PCU)	Q95 (PCU)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
A - Brickhill St (N)	0.59	0.05	0.56	1.35	1.45			N/A	N/A
B - Dansteed Way (E)	0.40	0.00	0.00	0.40	0.40			N/A	N/A
C - Brickhill St (S)	0.52	0.05	0.50	1.32	1.42			N/A	N/A
D - Dansteed Way (W)	0.46	0.00	0.00	0.46	0.46			N/A	N/A

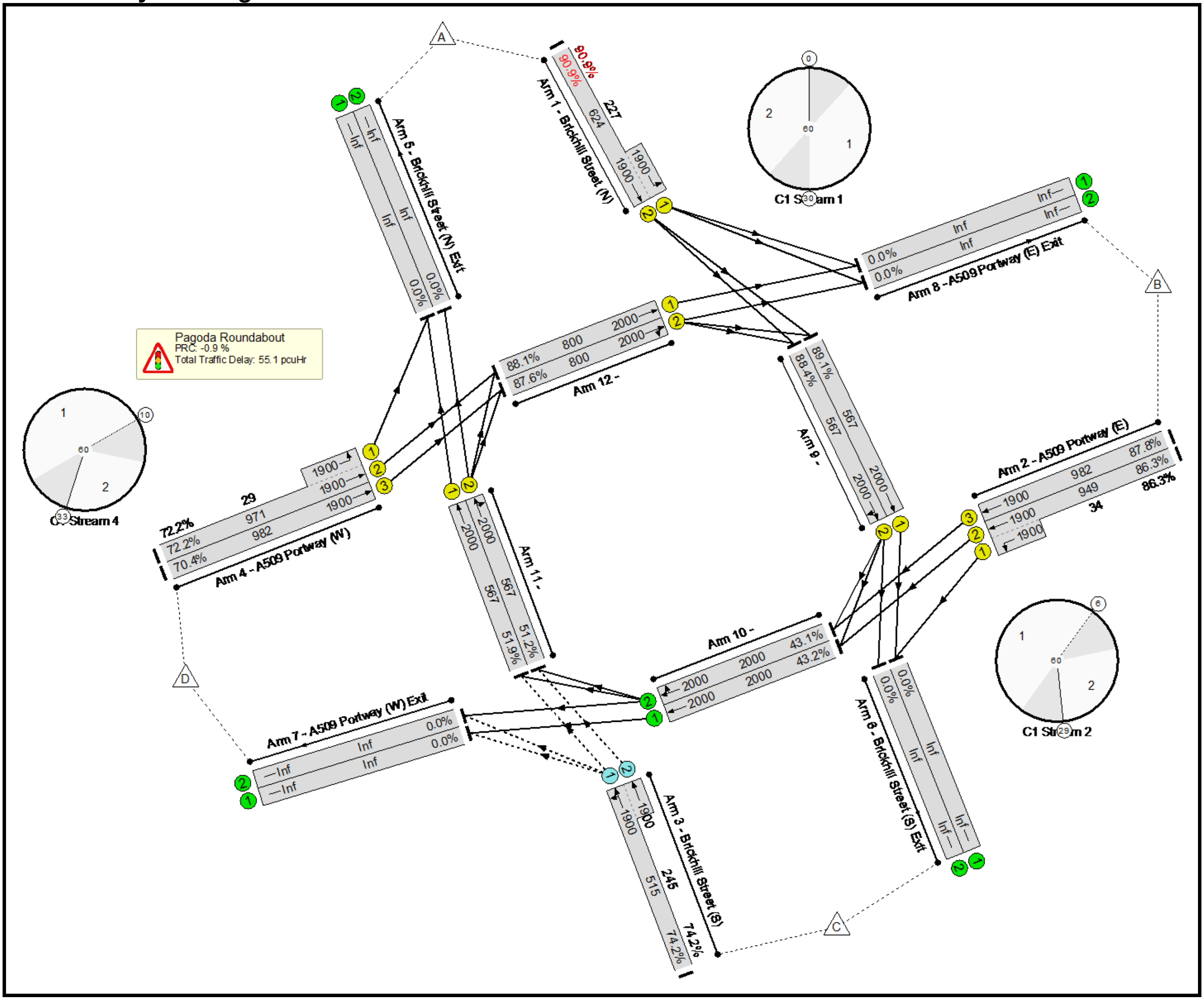
Basic Results Summary
Basic Results Summary

User and Project Details

Project:	**MILTON KEYNES EAST**
Title:	**E3 PAGODA ROUNDABOUT (MITIGATION)**
Location:	
Additional detail:	
File name:	3.PagodaRbt-3arm.lsg3x
Author:	
Company:	WSP
Address:	

Scenario 5: '2031 DS AM PEAK' (FG5: '2031 DS_AM PEAK', 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: E3 PAGODA ROUNDABOUT (MITIGATION)	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**90.9%**	**1128**	**0**	**0**	**55.1**	**-**	**-**
Pagoda Roundabout	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**90.9%**	**1128**	**0**	**0**	**55.1**	**-**	**-**
1/2+1/1	Brickhill Street (N) Left Ahead	U	A		1	23	-	773	1900:1900	624+227	90.9 : 90.9%	-	-	-	7.8	36.5	14.7
2/2+2/1	A509 Portway (E) Left Ahead	U	C		1	30	-	848	1900:1900	949+34	86.3 : 86.3%	-	-	-	6.0	25.3	15.1
2/3	A509 Portway (E) Ahead	U	C		1	30	-	862	1900	982	87.8%	-	-	-	6.5	27.1	16.1
3/1+3/2	Brickhill Street (S) Left Ahead	O	-		-	-	-	564	1900:1900	515+245	74.2 : 74.2%	1128	0	0	2.9	18.2	6.2
4/2+4/1	A509 Portway (W) Left Ahead	U	G		1	30	-	722	1900:1900	971+29	72.2 : 72.2%	-	-	-	3.5	17.5	10.2
4/3	A509 Portway (W) Ahead	U	G		1	30	-	691	1900	982	70.4%	-	-	-	3.3	17.2	9.8
9/1	Ahead	U	D		1	16	-	505	2000	567	89.1%	-	-	-	5.8	41.5	11.6
9/2	Ahead Right	U	D		1	16	-	501	2000	567	88.4%	-	-	-	5.6	40.5	11.3
10/1	Ahead	U	-		-	-	-	863	2000	2000	43.2%	-	-	-	0.4	1.6	0.4
10/2	Ahead Right	U	-		-	-	-	862	2000	2000	43.1%	-	-	-	0.4	1.6	0.4
11/1	Ahead	U	H		1	16	-	294	2000	567	51.9%	-	-	-	1.7	21.4	4.7
11/2	Ahead Right	U	H		1	16	-	290	2000	567	51.2%	-	-	-	1.9	23.4	4.8
12/1	Ahead	U	B		1	23	-	705	2000	800	88.1%	-	-	-	4.7	23.8	5.7
12/2	Ahead Right	U	B		1	23	-	701	2000	800	87.6%	-	-	-	4.7	24.0	6.0

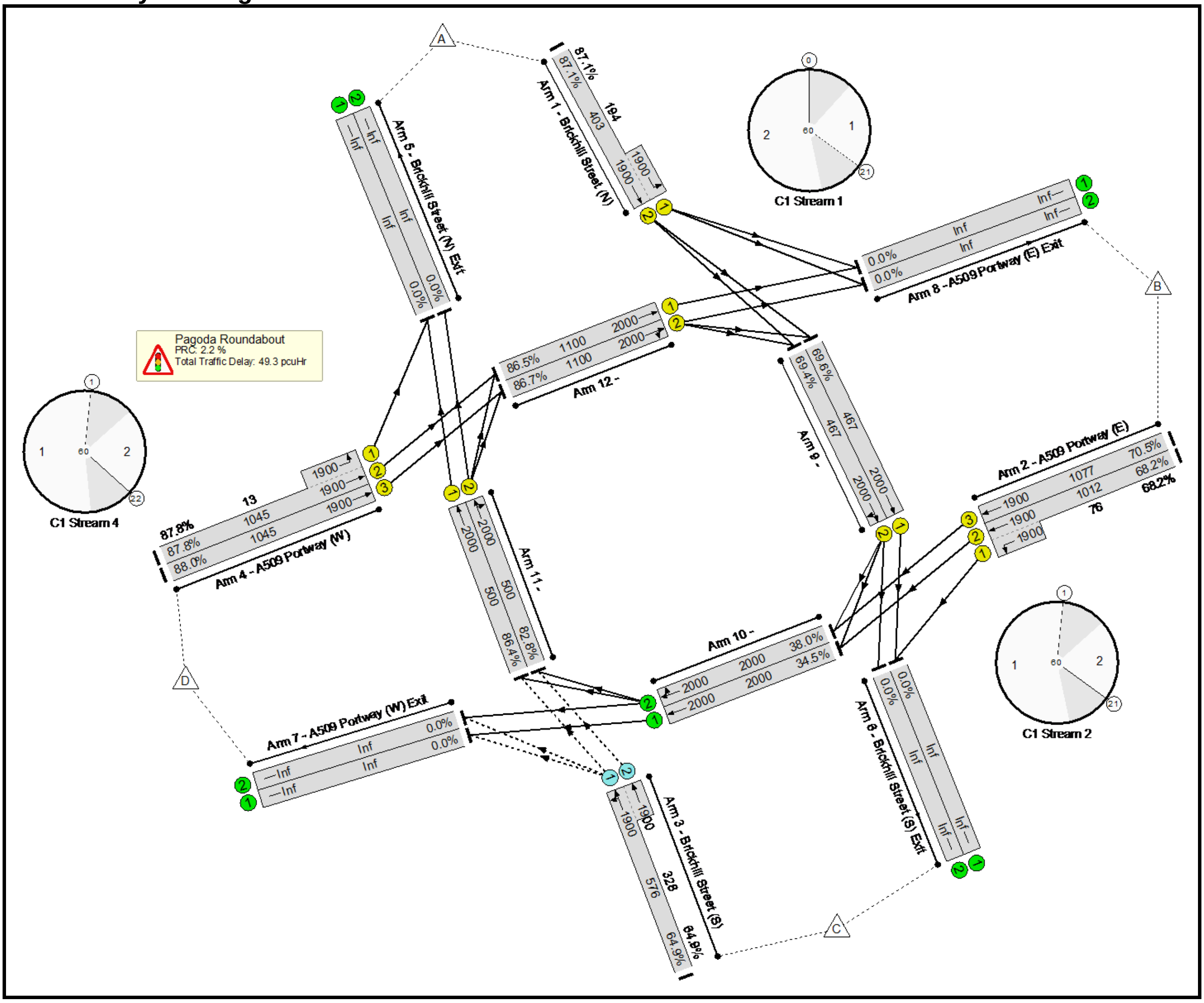
Basic Results Summary

C1	Stream: 1	PRC for Signalled Lanes (%):	-0.9	Total Delay for Signalled Lanes (pcuHr):	17.18	Cycle Time (s):	60
C1	Stream: 2	PRC for Signalled Lanes (%):	1.0	Total Delay for Signalled Lanes (pcuHr):	23.89	Cycle Time (s):	60
C1	Stream: 3	PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 4	PRC for Signalled Lanes (%):	24.6	Total Delay for Signalled Lanes (pcuHr):	10.43	Cycle Time (s):	60
		PRC Over All Lanes (%):	-0.9	Total Delay Over All Lanes(pcuHr):	55.11		

Basic Results Summary

Scenario 6: '2031 DS PM PEAK' (FG6: '2031 DS_PM PEAK', 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: E3 PAGODA ROUNDABOUT (MITIGATION)	-	-	-		-	-	-	-	-	-	**88.0%**	**1174**	**0**	**0**	**49.3**	-	-
Pagoda Roundabout	-	-	-		-	-	-	-	-	-	**88.0%**	**1174**	**0**	**0**	**49.3**	-	-
1/2+1/1	Brickhill Street (N) Left Ahead	U	A		1	14	-	520	1900:1900	403+194	87.1 : 87.1%	-	-	-	6.1	42.0	9.1
2/2+2/1	A509 Portway (E) Left Ahead	U	C		1	33	-	742	1900:1900	1012+76	68.2 : 68.2%	-	-	-	2.9	14.1	9.4
2/3	A509 Portway (E) Ahead	U	C		1	33	-	759	1900	1077	70.5%	-	-	-	3.2	15.0	10.3
3/1+3/2	Brickhill Street (S) Left Ahead	O	-		-	-	-	587	1900:1900	576+328	64.9 : 64.9%	1174	0	0	1.9	11.4	5.0
4/2+4/1	A509 Portway (W) Left Ahead	U	G		1	32	-	929	1900:1900	1045+13	87.8 : 87.8%	-	-	-	6.5	25.0	16.8
4/3	A509 Portway (W) Ahead	U	G		1	32	-	920	1900	1045	88.0%	-	-	-	6.5	25.4	16.8
9/1	Ahead	U	D		1	13	-	325	2000	467	69.6%	-	-	-	2.2	24.8	5.1
9/2	Ahead Right	U	D		1	13	-	324	2000	467	69.4%	-	-	-	2.3	25.3	5.2
10/1	Ahead	U	-		-	-	-	690	2000	2000	34.5%	-	-	-	0.3	1.4	0.3
10/2	Ahead Right	U	-		-	-	-	759	2000	2000	38.0%	-	-	-	0.3	1.4	0.3
11/1	Ahead	U	H		1	14	-	432	2000	500	86.4%	-	-	-	5.2	43.6	9.9
11/2	Ahead Right	U	H		1	14	-	414	2000	500	82.8%	-	-	-	4.9	42.7	9.0
12/1	Ahead	U	B		1	32	-	951	2000	1100	86.5%	-	-	-	3.4	13.0	4.2
12/2	Ahead Right	U	B		1	32	-	954	2000	1100	86.7%	-	-	-	3.7	13.8	4.6

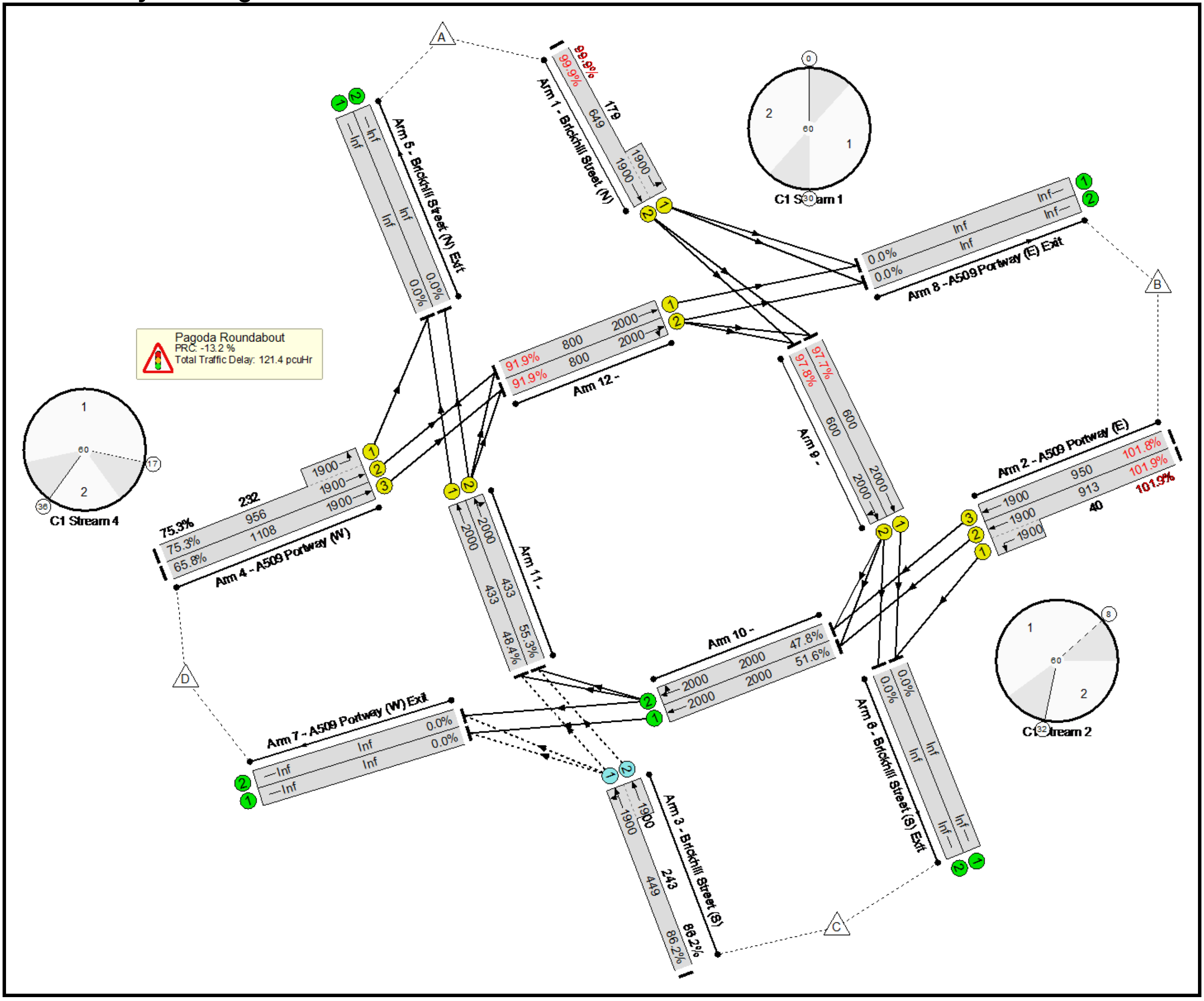
Basic Results Summary

C1	Stream: 1	PRC for Signalled Lanes (%):	3.3	Total Delay for Signalled Lanes (pcuHr):	13.16	Cycle Time (s):	60
C1	Stream: 2	PRC for Signalled Lanes (%):	27.7	Total Delay for Signalled Lanes (pcuHr):	10.58	Cycle Time (s):	60
C1	Stream: 3	PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 4	PRC for Signalled Lanes (%):	2.2	Total Delay for Signalled Lanes (pcuHr):	23.10	Cycle Time (s):	60
		PRC Over All Lanes (%):	2.2	Total Delay Over All Lanes(pcuHr):	49.26		

Basic Results Summary

Scenario 9: '2048 DS AM PEAK' (FG9: '2048 DS_AM PEAK', 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: E3 PAGODA ROUNDABOUT (MITIGATION)	-	-	-		-	-	-	-	-	-	**101.9%**	**1194**	**0**	**0**	**121.4**	-	-
Pagoda Roundabout	-	-	-		-	-	-	-	-	-	**101.9%**	**1194**	**0**	**0**	**121.4**	-	-
1/2+1/1	Brickhill Street (N) Left Ahead	U	A		1	23	-	827	1900:1900	649+179	99.9 : 99.9%	-	-	-	18.1	78.6	26.5
2/2+2/1	A509 Portway (E) Left Ahead	U	C		1	29	-	972	1900:1900	913+40	101.9 : 101.9%	-	-	-	25.5	94.4	37.7
2/3	A509 Portway (E) Ahead	U	C		1	29	-	967	1900	950	101.8%	-	-	-	25.0	93.0	36.8
3/1+3/2	Brickhill Street (S) Left Ahead	O	-		-	-	-	597	1900:1900	449+243	86.2 : 86.2%	1194	0	0	4.9	29.3	8.7
4/2+4/1	A509 Portway (W) Left Ahead	U	G		1	34	-	895	1900:1900	956+232	75.3 : 75.3%	-	-	-	3.6	14.3	10.8
4/3	A509 Portway (W) Ahead	U	G		1	34	-	729	1900	1108	65.8%	-	-	-	2.7	13.2	9.1
9/1	Ahead	U	D		1	17	-	586	2000	600	97.7%	-	-	-	12.1	74.1	18.7
9/2	Ahead Right	U	D		1	17	-	587	2000	600	97.8%	-	-	-	11.8	72.3	18.9
10/1	Ahead	U	-		-	-	-	1050	2000	2000	51.6%	-	-	-	0.5	1.9	0.5
10/2	Ahead Right	U	-		-	-	-	973	2000	2000	47.8%	-	-	-	0.5	1.7	0.5
11/1	Ahead	U	H		1	12	-	211	2000	433	48.4%	-	-	-	1.4	24.8	3.4
11/2	Ahead Right	U	H		1	12	-	240	2000	433	55.3%	-	-	-	1.5	22.9	4.2
12/1	Ahead	U	B		1	23	-	735	2000	800	91.9%	-	-	-	6.9	34.0	9.4
12/2	Ahead Right	U	B		1	23	-	735	2000	800	91.9%	-	-	-	7.0	34.4	9.2

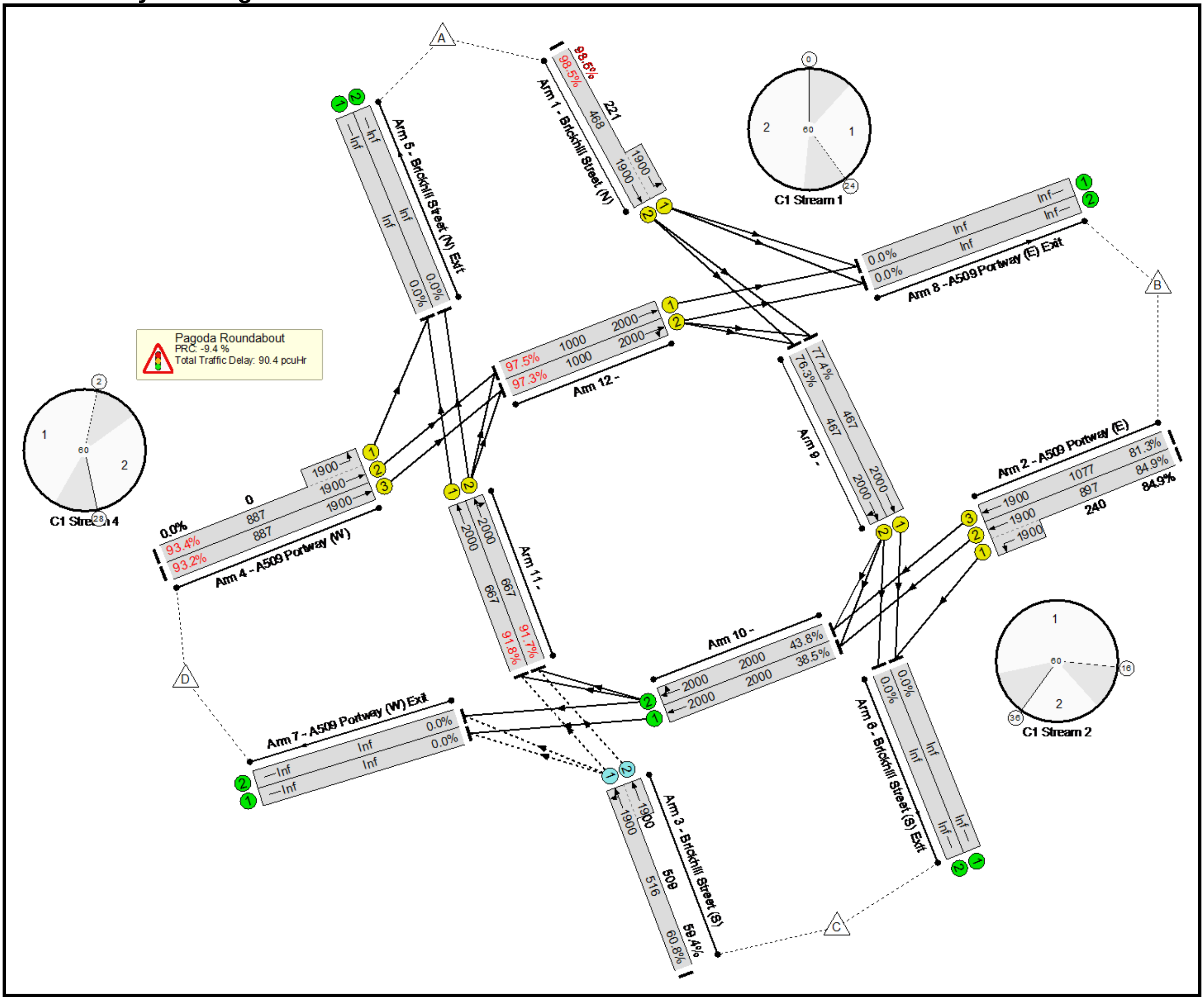
Basic Results Summary

C1	Stream: 1	PRC for Signalled Lanes (%):	-11.0	Total Delay for Signalled Lanes (pcuHr):	32.03	Cycle Time (s):	60
C1	Stream: 2	PRC for Signalled Lanes (%):	-13.2	Total Delay for Signalled Lanes (pcuHr):	74.34	Cycle Time (s):	60
C1	Stream: 3	PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 4	PRC for Signalled Lanes (%):	19.5	Total Delay for Signalled Lanes (pcuHr):	9.20	Cycle Time (s):	60
		PRC Over All Lanes (%):	-13.2	Total Delay Over All Lanes(pcuHr):	121.42		

Basic Results Summary

Scenario 10: '2048 DS PM PEAK' (FG10: '2048 DS_PM PEAK', 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: E3 PAGODA ROUNDABOUT (MITIGATION)	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**98.5%**	**1232**	**0**	**0**	**90.4**	**-**	**-**
Pagoda Roundabout	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**98.5%**	**1232**	**0**	**0**	**90.4**	**-**	**-**
1/2+1/1	Brickhill Street (N) Left Ahead	U	A		1	17	-	679	1900:1900	468+221	98.5 : 98.5%	-	-	-	14.4	76.1	19.8
2/2+2/1	A509 Portway (E) Left Ahead	U	C		1	33	-	966	1900:1900	897+240	84.9 : 84.9%	-	-	-	5.4	20.1	14.5
2/3	A509 Portway (E) Ahead	U	C		1	33	-	875	1900	1077	81.3%	-	-	-	4.7	19.2	13.8
3/1+3/2	Brickhill Street (S) Left Ahead	O	-		-	-	-	616	1900:1900	516+509	60.8 : 59.4%	1232	0	0	2.3	13.3	4.3
4/2+4/1	A509 Portway (W) Left Ahead	U	G		1	27	-	828	1900:1900	887+0	93.4 : 0.0%	-	-	-	9.4	40.7	18.8
4/3	A509 Portway (W) Ahead	U	G		1	27	-	826	1900	887	93.2%	-	-	-	9.2	40.1	18.6
9/1	Ahead	U	D		1	13	-	361	2000	467	77.4%	-	-	-	3.3	33.1	7.5
9/2	Ahead Right	U	D		1	13	-	356	2000	467	76.3%	-	-	-	3.6	36.1	7.2
10/1	Ahead	U	-		-	-	-	769	2000	2000	38.5%	-	-	-	0.3	1.5	0.3
10/2	Ahead Right	U	-		-	-	-	875	2000	2000	43.8%	-	-	-	0.4	1.6	0.4
11/1	Ahead	U	H		1	19	-	612	2000	667	91.8%	-	-	-	7.3	42.9	14.3
11/2	Ahead Right	U	H		1	19	-	611	2000	667	91.7%	-	-	-	7.1	42.0	13.8
12/1	Ahead	U	B		1	29	-	975	2000	1000	97.5%	-	-	-	11.6	42.8	20.0
12/2	Ahead Right	U	B		1	29	-	973	2000	1000	97.3%	-	-	-	11.5	42.7	17.5

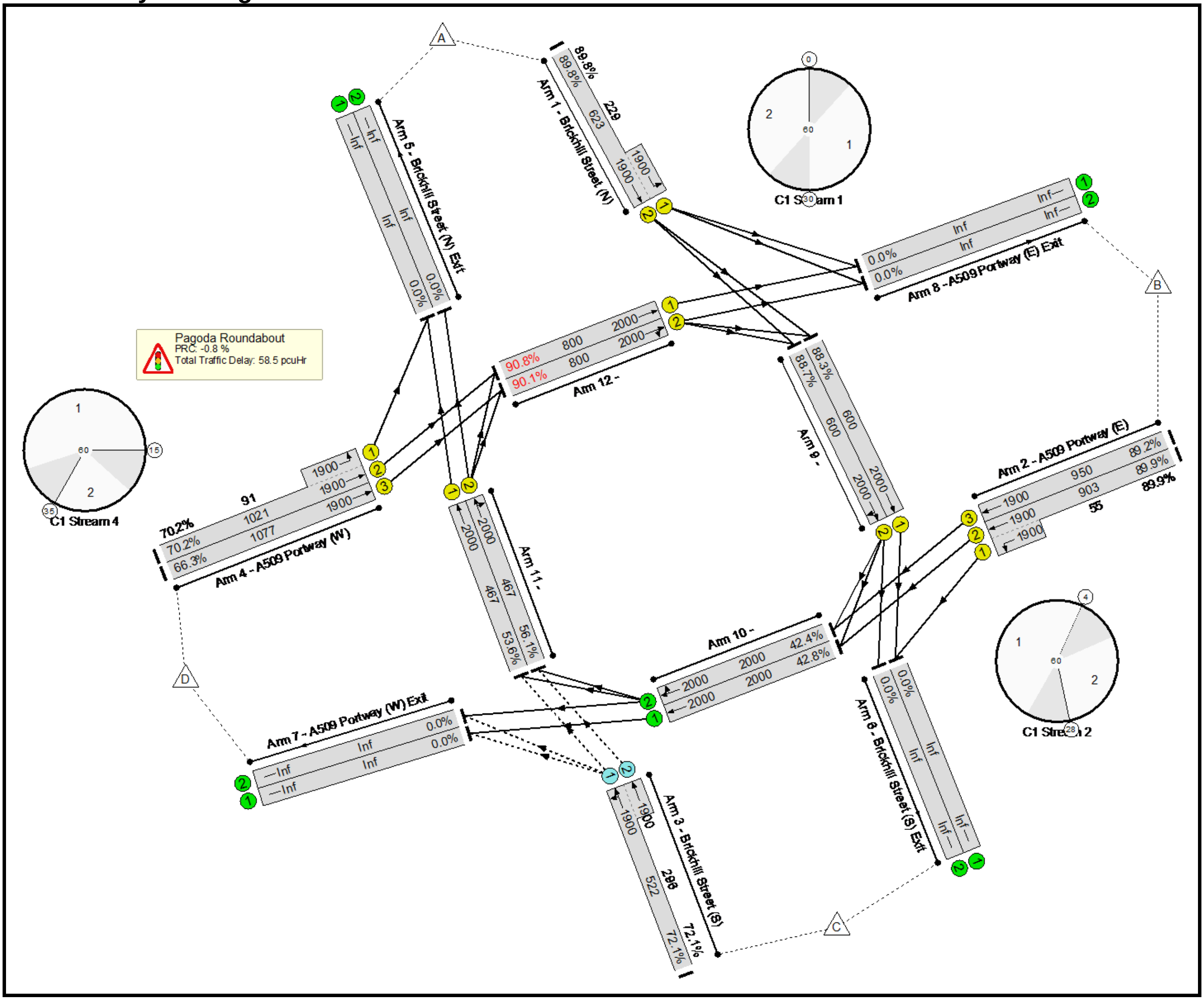
Basic Results Summary

C1	Stream: 1	PRC for Signalled Lanes (%):	-9.4	Total Delay for Signalled Lanes (pcuHr):	37.47	Cycle Time (s):	60
C1	Stream: 2	PRC for Signalled Lanes (%):	6.0	Total Delay for Signalled Lanes (pcuHr):	16.94	Cycle Time (s):	60
C1	Stream: 3	PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 4	PRC for Signalled Lanes (%):	-3.8	Total Delay for Signalled Lanes (pcuHr):	32.97	Cycle Time (s):	60
		PRC Over All Lanes (%):	-9.4	Total Delay Over All Lanes(pcuHr):	90.36		

Basic Results Summary

Scenario 11: '2031 Key Planning Test (Full Dev) AM' (FG11: '2031 Key Planning Test (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: E3 PAGODA ROUNDABOUT (MITIGATION)	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**90.8%**	**1178**	**0**	**0**	**58.5**	**-**	**-**
Pagoda Roundabout	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**90.8%**	**1178**	**0**	**0**	**58.5**	**-**	**-**
1/2+1/1	Brickhill Street (N) Left Ahead	U	A		1	23	-	765	1900:1900	623+229	89.8 : 89.8%	-	-	-	7.3	34.5	14.1
2/2+2/1	A509 Portway (E) Left Ahead	U	C		1	29	-	861	1900:1900	903+55	89.9 : 89.9%	-	-	-	7.3	30.6	16.8
2/3	A509 Portway (E) Ahead	U	C		1	29	-	847	1900	950	89.2%	-	-	-	7.0	29.8	16.5
3/1+3/2	Brickhill Street (S) Left Ahead	O	-		-	-	-	589	1900:1900	522+296	72.1 : 72.1%	1178	0	0	2.7	16.8	5.9
4/2+4/1	A509 Portway (W) Left Ahead	U	G		1	33	-	781	1900:1900	1021+91	70.2 : 70.2%	-	-	-	3.1	14.3	9.9
4/3	A509 Portway (W) Ahead	U	G		1	33	-	714	1900	1077	66.3%	-	-	-	2.8	14.0	9.1
9/1	Ahead	U	D		1	17	-	530	2000	600	88.3%	-	-	-	5.8	39.3	11.6
9/2	Ahead Right	U	D		1	17	-	532	2000	600	88.7%	-	-	-	5.8	39.1	11.7
10/1	Ahead	U	-		-	-	-	856	2000	2000	42.8%	-	-	-	0.4	1.6	0.4
10/2	Ahead Right	U	-		-	-	-	847	2000	2000	42.4%	-	-	-	0.4	1.6	0.4
11/1	Ahead	U	H		1	13	-	250	2000	467	53.6%	-	-	-	2.0	28.3	4.4
11/2	Ahead Right	U	H		1	13	-	262	2000	467	56.1%	-	-	-	1.8	25.2	4.6
12/1	Ahead	U	B		1	23	-	726	2000	800	90.8%	-	-	-	6.1	30.2	7.8
12/2	Ahead Right	U	B		1	23	-	721	2000	800	90.1%	-	-	-	6.0	29.9	7.8

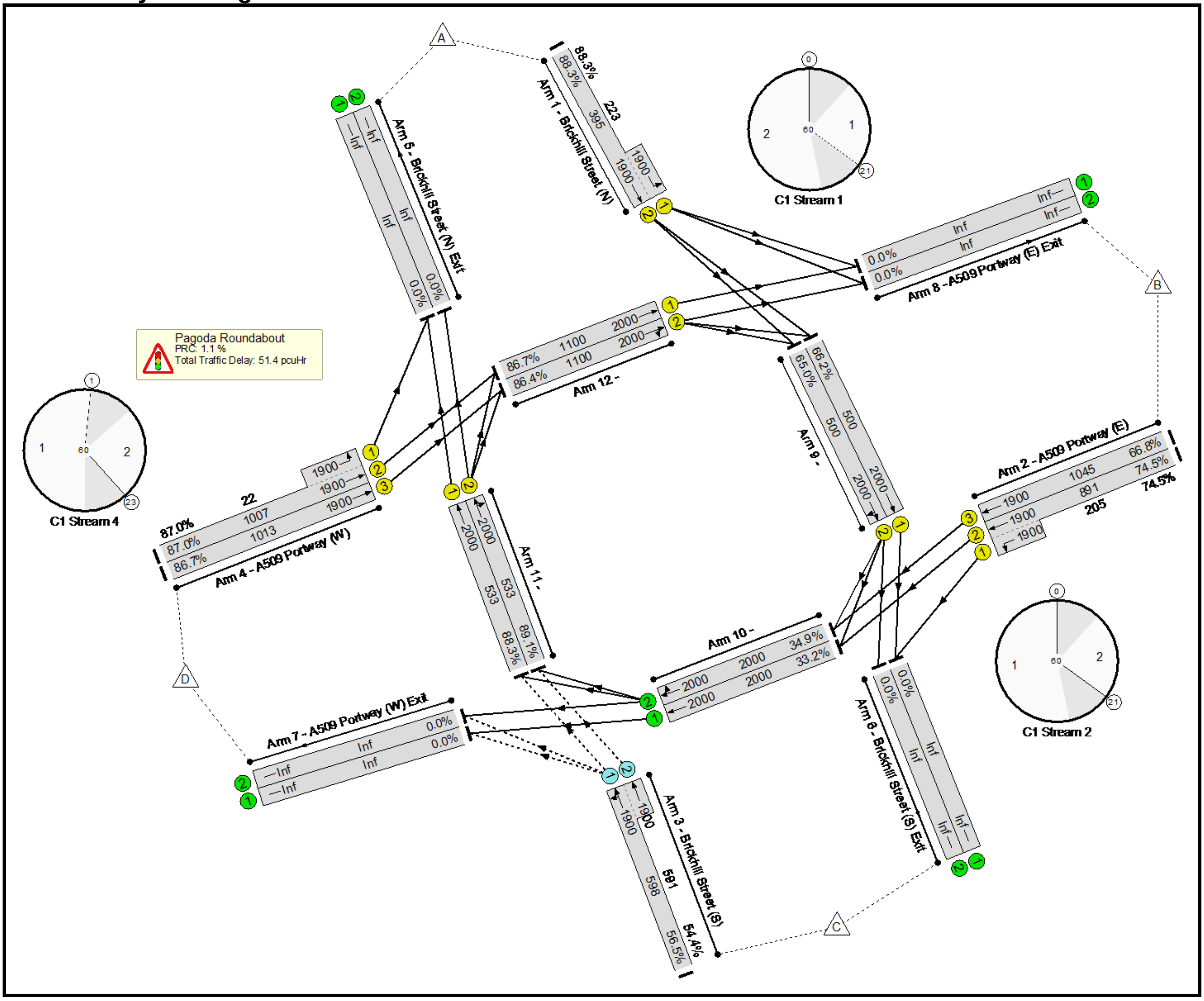
Basic Results Summary

C1	Stream: 1	PRC for Signalled Lanes (%):	-0.8	Total Delay for Signalled Lanes (pcuHr):	19.42	Cycle Time (s):	60
C1	Stream: 2	PRC for Signalled Lanes (%):	0.1	Total Delay for Signalled Lanes (pcuHr):	25.89	Cycle Time (s):	60
C1	Stream: 3	PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 4	PRC for Signalled Lanes (%):	28.2	Total Delay for Signalled Lanes (pcuHr):	9.68	Cycle Time (s):	60
		PRC Over All Lanes (%):	-0.8	Total Delay Over All Lanes(pcuHr):	58.48		

Basic Results Summary

Scenario 12: '2031 Key Planning Test (Full Dev) PM' (FG12: '2031 Key Planning Test (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: E3 PAGODA ROUNDABOUT (MITIGATION)	-	-	-		-	-	-	-	-	-	**89.1%**	**1318**	**0**	**0**	**51.4**	-	-
Pagoda Roundabout	-	-	-		-	-	-	-	-	-	**89.1%**	**1318**	**0**	**0**	**51.4**	-	-
1/2+1/1	Brickhill Street (N) Left Ahead	U	A		1	14	-	546	1900:1900	395+223	88.3 : 88.3%	-	-	-	6.5	43.0	9.5
2/2+2/1	A509 Portway (E) Left Ahead	U	C		1	32	-	817	1900:1900	891+205	74.5 : 74.5%	-	-	-	3.6	15.8	10.5
2/3	A509 Portway (E) Ahead	U	C		1	32	-	698	1900	1045	66.8%	-	-	-	2.9	14.8	9.1
3/1+3/2	Brickhill Street (S) Left Ahead	O	-		-	-	-	659	1900:1900	598+591	56.5 : 54.4%	1318	0	0	1.6	8.8	3.9
4/2+4/1	A509 Portway (W) Left Ahead	U	G		1	31	-	895	1900:1900	1007+22	87.0 : 87.0%	-	-	-	6.2	24.9	15.8
4/3	A509 Portway (W) Ahead	U	G		1	31	-	879	1900	1013	86.7%	-	-	-	6.1	25.0	15.8
9/1	Ahead	U	D		1	14	-	331	2000	500	66.2%	-	-	-	1.9	20.4	4.0
9/2	Ahead Right	U	D		1	14	-	325	2000	500	65.0%	-	-	-	2.2	24.3	5.0
10/1	Ahead	U	-		-	-	-	664	2000	2000	33.2%	-	-	-	0.2	1.3	0.2
10/2	Ahead Right	U	-		-	-	-	698	2000	2000	34.9%	-	-	-	0.3	1.4	0.3
11/1	Ahead	U	H		1	15	-	471	2000	533	88.3%	-	-	-	6.3	48.3	11.0
11/2	Ahead Right	U	H		1	15	-	475	2000	533	89.1%	-	-	-	6.3	48.0	11.3
12/1	Ahead	U	B		1	32	-	954	2000	1100	86.7%	-	-	-	3.7	13.8	5.4
12/2	Ahead Right	U	B		1	32	-	950	2000	1100	86.4%	-	-	-	3.7	13.9	5.1

Basic Results Summary

C1	Stream: 1	PRC for Signalled Lanes (%):	1.9	Total Delay for Signalled Lanes (pcuHr):	13.84	Cycle Time (s):	60
C1	Stream: 2	PRC for Signalled Lanes (%):	20.8	Total Delay for Signalled Lanes (pcuHr):	10.52	Cycle Time (s):	60
C1	Stream: 3	PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 4	PRC for Signalled Lanes (%):	1.1	Total Delay for Signalled Lanes (pcuHr):	24.94	Cycle Time (s):	60
		PRC Over All Lanes (%):	1.1	Total Delay Over All Lanes(pcuHr):	51.42		

Basic Results Summary

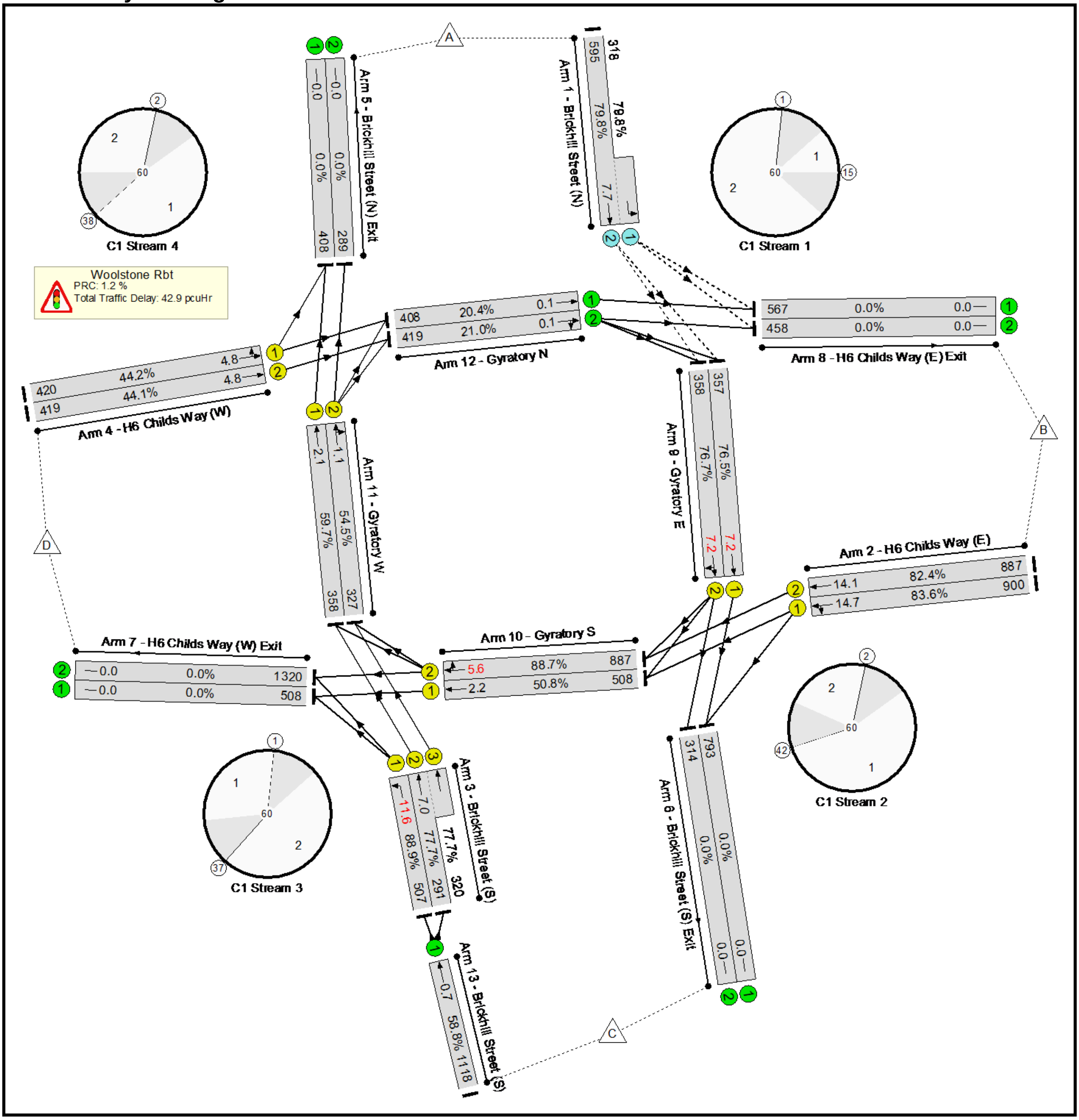
User and Project Details

Project:	**MILTON KEYNES EAST**
Title:	**E4 WOOLSTONE ROUNDABOUT (MITIGATION)**
Location:	
Additional detail:	
File name:	4. WoolstoneRbt-3arm.lsg3x
Author:	
Company:	WSP
Address:	

Basic Results Summary

Scenario 5: '2031 DS AM PEAK' (FG5: '2031 DS_AM PEAK', 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: E4 WOOLSTONE ROUNDABOUT (MITIGATION)	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**88.9%**	**1826**	**0**	**0**	**42.9**	**-**	**-**
Woolstone Rbt	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**88.9%**	**1826**	**0**	**0**	**42.9**	**-**	**-**
1/2+1/1	Brickhill Street (N) Left Ahead	O	-		-	-	-	913	1900:1900	746+399	79.8 : 79.8%	1826	0	0	2.5	9.9	7.7
2/1	H6 Childs Way (E) Left Ahead	U	C		1	33	-	900	1900	1077	83.6%	-	-	-	5.2	20.6	14.7
2/2	H6 Childs Way (E) Ahead	U	C		1	33	-	887	1900	1077	82.4%	-	-	-	4.9	19.8	14.1
3/1	Brickhill Street (S) Left	U	E		1	17	-	507	1900	570	88.9%	-	-	-	6.4	45.7	11.6
3/2+3/3	Brickhill Street (S) Ahead	U	E		1	17	-	611	1900:1900	375+412	77.7 : 77.7%	-	-	-	4.7	27.7	7.0
4/1	H6 Childs Way (W) Left Ahead	U	G		1	29	-	420	1900	950	44.2%	-	-	-	1.5	13.0	4.8
4/2	H6 Childs Way (W) Ahead	U	G		1	29	-	419	1900	950	44.1%	-	-	-	1.5	13.0	4.8
9/1	Gyratory E Ahead	U	D		1	13	-	357	2000	467	76.5%	-	-	-	3.6	36.2	7.2
9/2	Gyratory E Ahead Right	U	D		1	13	-	358	2000	467	76.7%	-	-	-	3.7	37.2	7.2
10/1	Gyratory S Ahead	U	F		1	29	-	508	2000	1000	50.8%	-	-	-	1.1	7.9	2.2
10/2	Gyratory S Ahead Right	U	F		1	29	-	887	2000	1000	88.7%	-	-	-	4.6	18.5	5.6
11/1	Gyratory W Ahead	U	H		1	17	-	358	2000	600	59.7%	-	-	-	1.3	12.9	2.1

Basic Results Summary

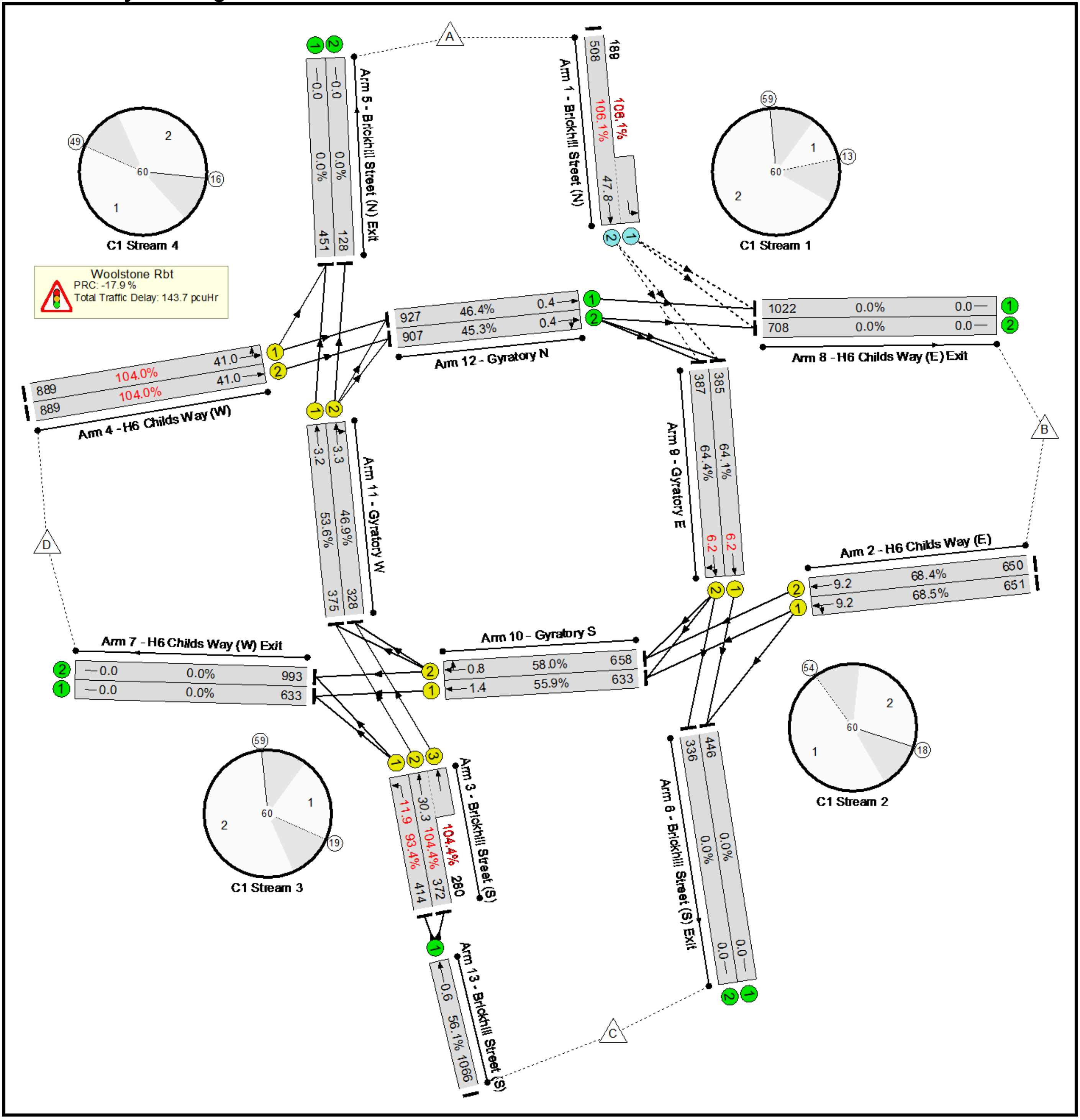
11/2	Gyratory W Ahead Right	U	H		1	17	-	327	2000	600	54.5%	-	-	-	0.9	10.0	1.1
12/1	Gyratory N Ahead	U	-		-	-	-	408	2000	2000	20.4%	-	-	-	0.1	1.1	0.1
12/2	Gyratory N Ahead Right	U	-		-	-	-	419	2000	2000	21.0%	-	-	-	0.1	1.1	0.1
13/1	Brickhill Street (S) Ahead	U	-		-	-	-	1118	1900	1900	58.8%	-	-	-	0.7	2.3	0.7

C1 Stream: 1 PRC for Signalled Lanes (%): 0.0 Total Delay for Signalled Lanes (pcuHr): 0.00 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): 7.7 Total Delay for Signalled Lanes (pcuHr): 17.33 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): 1.2 Total Delay for Signalled Lanes (pcuHr): 16.82 Cycle Time (s): 60
C1 Stream: 4 PRC for Signalled Lanes (%): 50.8 Total Delay for Signalled Lanes (pcuHr): 5.22 Cycle Time (s): 60
PRC Over All Lanes (%): 1.2 Total Delay Over All Lanes(pcuHr): 42.86

Basic Results Summary

Scenario 6: '2031 DS PM PEAK' (FG6: '2031 DS_PM PEAK', 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: E4 WOOLSTONE ROUNDABOUT (MITIGATION)	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**106.1%**	**1335**	**0**	**0**	**143.7**	**-**	**-**
Woolstone Rbt	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**106.1%**	**1335**	**0**	**0**	**143.7**	**-**	**-**
1/2+1/1	Brickhill Street (N) Left Ahead	O	-		-	-	-	697	1900:1900	479+178	106.1 : 106.1%	1335	0	0	29.8	153.8	47.8
2/1	H6 Childs Way (E) Left Ahead	U	C		1	29	-	651	1900	950	68.5%	-	-	-	3.1	17.4	9.2
2/2	H6 Childs Way (E) Ahead	U	C		1	29	-	650	1900	950	68.4%	-	-	-	3.1	17.4	9.2
3/1	Brickhill Street (S) Left	U	E		1	13	-	414	1900	443	93.4%	-	-	-	7.8	67.8	11.9
3/2+3/3	Brickhill Street (S) Ahead	U	E		1	13	-	652	1900:1900	356+268	104.4 : 104.4%	-	-	-	26.2	144.7	30.3
4/1	H6 Childs Way (W) Left Ahead	U	G		1	26	-	889	1900	855	104.0%	-	-	-	30.5	123.6	41.0
4/2	H6 Childs Way (W) Ahead	U	G		1	26	-	889	1900	855	104.0%	-	-	-	30.5	123.6	41.0
9/1	Gyratory E Ahead	U	D		1	17	-	405	2000	600	64.1%	-	-	-	2.8	26.1	6.2
9/2	Gyratory E Ahead Right	U	D		1	17	-	407	2000	600	64.4%	-	-	-	2.8	26.4	6.2
10/1	Gyratory S Ahead	U	F		1	33	-	636	2000	1133	55.9%	-	-	-	0.8	4.7	1.4
10/2	Gyratory S Ahead Right	U	F		1	33	-	658	2000	1133	58.0%	-	-	-	0.7	4.0	0.8
11/1	Gyratory W Ahead	U	H		1	20	-	391	2000	700	53.6%	-	-	-	2.1	20.3	3.2

Basic Results Summary

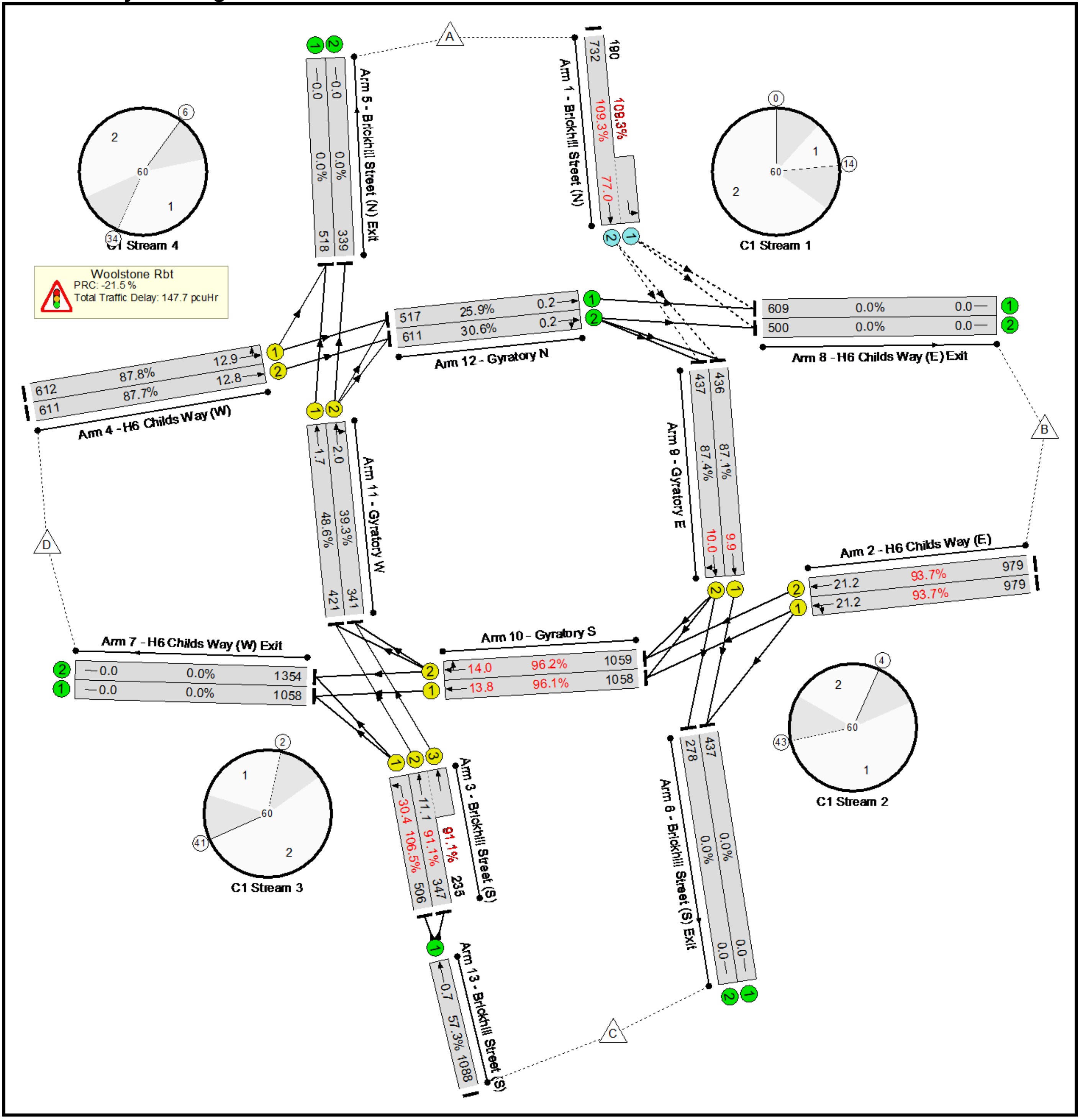
11/2	Gyratory W Ahead Right	U	H		1	20	-	340	2000	700	46.9%	-	-	-	1.9	20.6	3.3
12/1	Gyratory N Ahead	U	-		-	-	-	965	2000	2000	46.4%	-	-	-	0.4	1.7	0.4
12/2	Gyratory N Ahead Right	U	-		-	-	-	943	2000	2000	45.3%	-	-	-	0.4	1.6	0.4
13/1	Brickhill Street (S) Ahead	U	-		-	-	-	1066	1900	1900	56.1%	-	-	-	0.6	2.2	0.6

C1	Stream: 1	PRC for Signalled Lanes (%):	0.0	Total Delay for Signalled Lanes (pcuHr):	0.00	Cycle Time (s):	60
C1	Stream: 2	PRC for Signalled Lanes (%):	31.3	Total Delay for Signalled Lanes (pcuHr):	11.90	Cycle Time (s):	60
C1	Stream: 3	PRC for Signalled Lanes (%):	-16.0	Total Delay for Signalled Lanes (pcuHr):	35.56	Cycle Time (s):	60
C1	Stream: 4	PRC for Signalled Lanes (%):	-15.5	Total Delay for Signalled Lanes (pcuHr):	65.01	Cycle Time (s):	60
		PRC Over All Lanes (%):	-17.9	Total Delay Over All Lanes(pcuHr):	143.72		

Basic Results Summary

Scenario 9: '2048 DS AM PEAK' (FG9: '2048 DS_AM PEAK', 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: E4 WOOLSTONE ROUNDABOUT (MITIGATION)	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**109.3%**	**1707**	**0**	**0**	**147.7**	**-**	**-**
Woolstone Rbt	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**109.3%**	**1707**	**0**	**0**	**147.7**	**-**	**-**
1/2+1/1	Brickhill Street (N) Left Ahead	O	-		-	-	-	922	1900:1900	670+174	109.3 : 109.3%	1707	0	0	48.8	190.6	77.0
2/1	H6 Childs Way (E) Left Ahead	U	C		1	32	-	979	1900	1045	93.7%	-	-	-	9.6	35.5	21.2
2/2	H6 Childs Way (E) Ahead	U	C		1	32	-	979	1900	1045	93.7%	-	-	-	9.6	35.5	21.2
3/1	Brickhill Street (S) Left	U	E		1	14	-	506	1900	475	106.5%	-	-	-	25.6	182.4	30.4
3/2+3/3	Brickhill Street (S) Ahead	U	E		1	14	-	582	1900:1900	381+258	91.1 : 91.1%	-	-	-	7.7	47.9	11.1
4/1	H6 Childs Way (W) Left Ahead	U	G		1	21	-	612	1900	697	87.8%	-	-	-	6.4	37.5	12.9
4/2	H6 Childs Way (W) Ahead	U	G		1	21	-	611	1900	697	87.7%	-	-	-	6.3	37.2	12.8
9/1	Gyratory E Ahead	U	D		1	14	-	466	2000	500	87.1%	-	-	-	5.7	46.9	9.9
9/2	Gyratory E Ahead Right	U	D		1	14	-	469	2000	500	87.4%	-	-	-	5.7	46.9	10.0
10/1	Gyratory S Ahead	U	F		1	32	-	1065	2000	1100	96.1%	-	-	-	9.7	33.1	13.8
10/2	Gyratory S Ahead Right	U	F		1	32	-	1066	2000	1100	96.2%	-	-	-	9.8	33.5	14.0
11/1	Gyratory W Ahead	U	H		1	25	-	421	2000	867	48.6%	-	-	-	0.8	6.5	1.7

Basic Results Summary

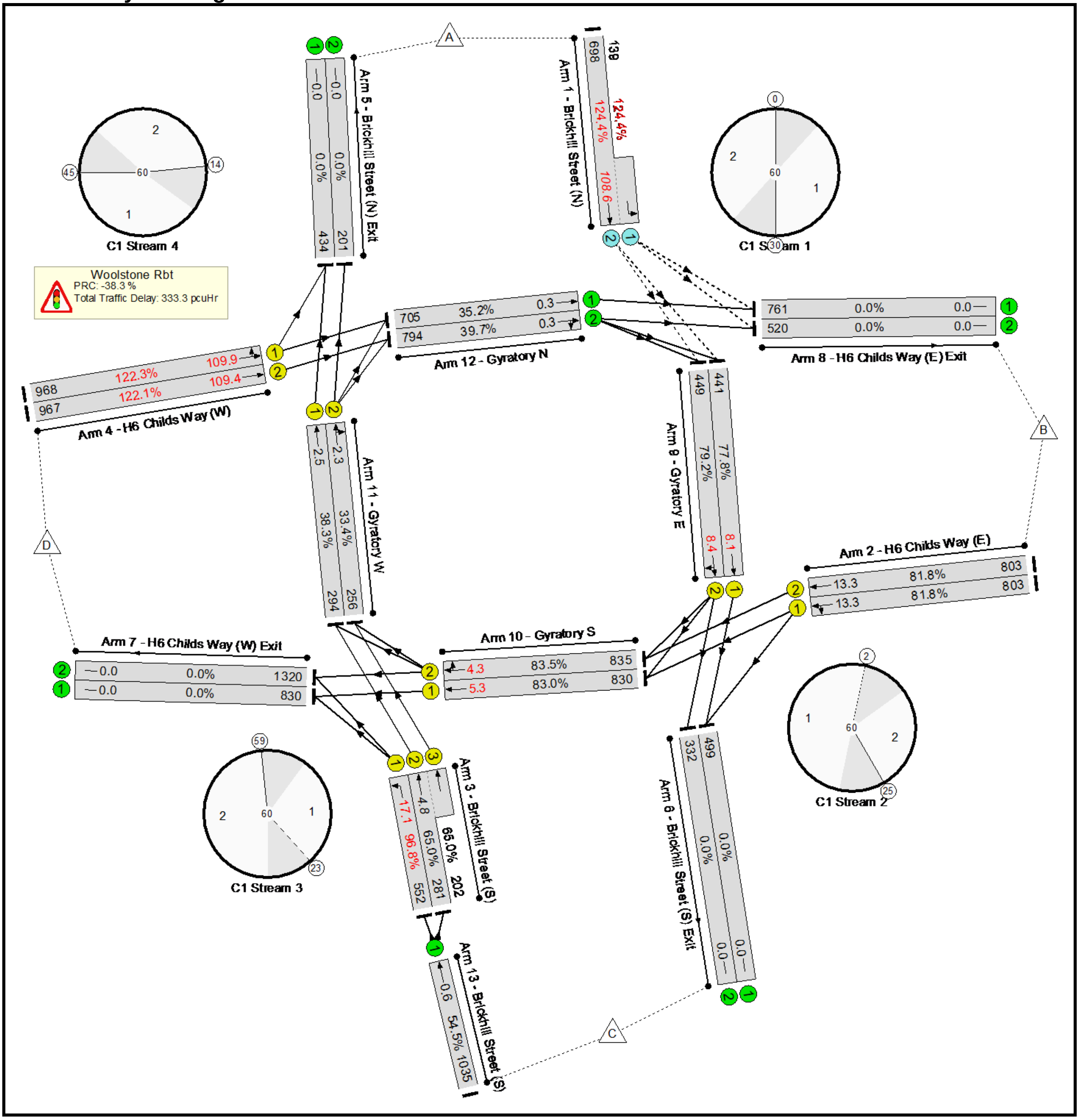
11/2	Gyratory W Ahead Right	U	H		1	25	-	341	2000	867	39.3%	-	-	-	0.7	7.8	2.0
12/1	Gyratory N Ahead	U	-		-	-	-	517	2000	2000	25.9%	-	-	-	0.2	1.2	0.2
12/2	Gyratory N Ahead Right	U	-		-	-	-	611	2000	2000	30.6%	-	-	-	0.2	1.3	0.2
13/1	Brickhill Street (S) Ahead	U	-		-	-	-	1088	1900	1900	57.3%	-	-	-	0.7	2.2	0.7

C1 Stream: 1 PRC for Signalled Lanes (%): 0.0 Total Delay for Signalled Lanes (pcuHr): 0.00 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): -4.1 Total Delay for Signalled Lanes (pcuHr): 30.67 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): -18.4 Total Delay for Signalled Lanes (pcuHr): 52.95 Cycle Time (s): 60
C1 Stream: 4 PRC for Signalled Lanes (%): 2.5 Total Delay for Signalled Lanes (pcuHr): 14.18 Cycle Time (s): 60
PRC Over All Lanes (%): -21.5 Total Delay Over All Lanes(pcuHr): 147.67

Basic Results Summary

Scenario 10: '2048 DS PM PEAK' (FG10: '2048 DS_PM PEAK', 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: E4 WOOLSTONE ROUNDABOUT (MITIGATION)	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**124.4%**	**1345**	**0**	**0**	**333.3**	**-**	**-**
Woolstone Rbt	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**124.4%**	**1345**	**0**	**0**	**333.3**	**-**	**-**
1/2+1/1	Brickhill Street (N) Left Ahead	O	-		-	-	-	837	1900:1900	561+112	124.4 : 124.4%	1345	0	0	91.8	394.9	108.6
2/1	H6 Childs Way (E) Left Ahead	U	C		1	30	-	803	1900	982	81.8%	-	-	-	4.9	22.0	13.3
2/2	H6 Childs Way (E) Ahead	U	C		1	30	-	803	1900	982	81.8%	-	-	-	4.9	22.0	13.3
3/1	Brickhill Street (S) Left	U	E		1	17	-	552	1900	570	96.8%	-	-	-	11.3	73.4	17.1
3/2+3/3	Brickhill Street (S) Ahead	U	E		1	17	-	483	1900:1900	432+311	65.0 : 65.0%	-	-	-	3.2	23.8	4.8
4/1	H6 Childs Way (W) Left Ahead	U	G		1	24	-	968	1900	792	122.3%	-	-	-	99.7	370.8	109.9
4/2	H6 Childs Way (W) Ahead	U	G		1	24	-	967	1900	792	122.1%	-	-	-	99.2	369.2	109.4
9/1	Gyratory E Ahead	U	D		1	16	-	545	2000	567	77.8%	-	-	-	4.0	32.6	8.1
9/2	Gyratory E Ahead Right	U	D		1	16	-	555	2000	567	79.2%	-	-	-	4.1	32.6	8.4
10/1	Gyratory S Ahead	U	F		1	29	-	851	2000	1000	83.0%	-	-	-	3.2	14.0	5.3
10/2	Gyratory S Ahead Right	U	F		1	29	-	843	2000	1000	83.5%	-	-	-	3.2	13.7	4.3
11/1	Gyratory W Ahead	U	H		1	22	-	294	2000	767	38.3%	-	-	-	1.5	18.8	2.5

Basic Results Summary

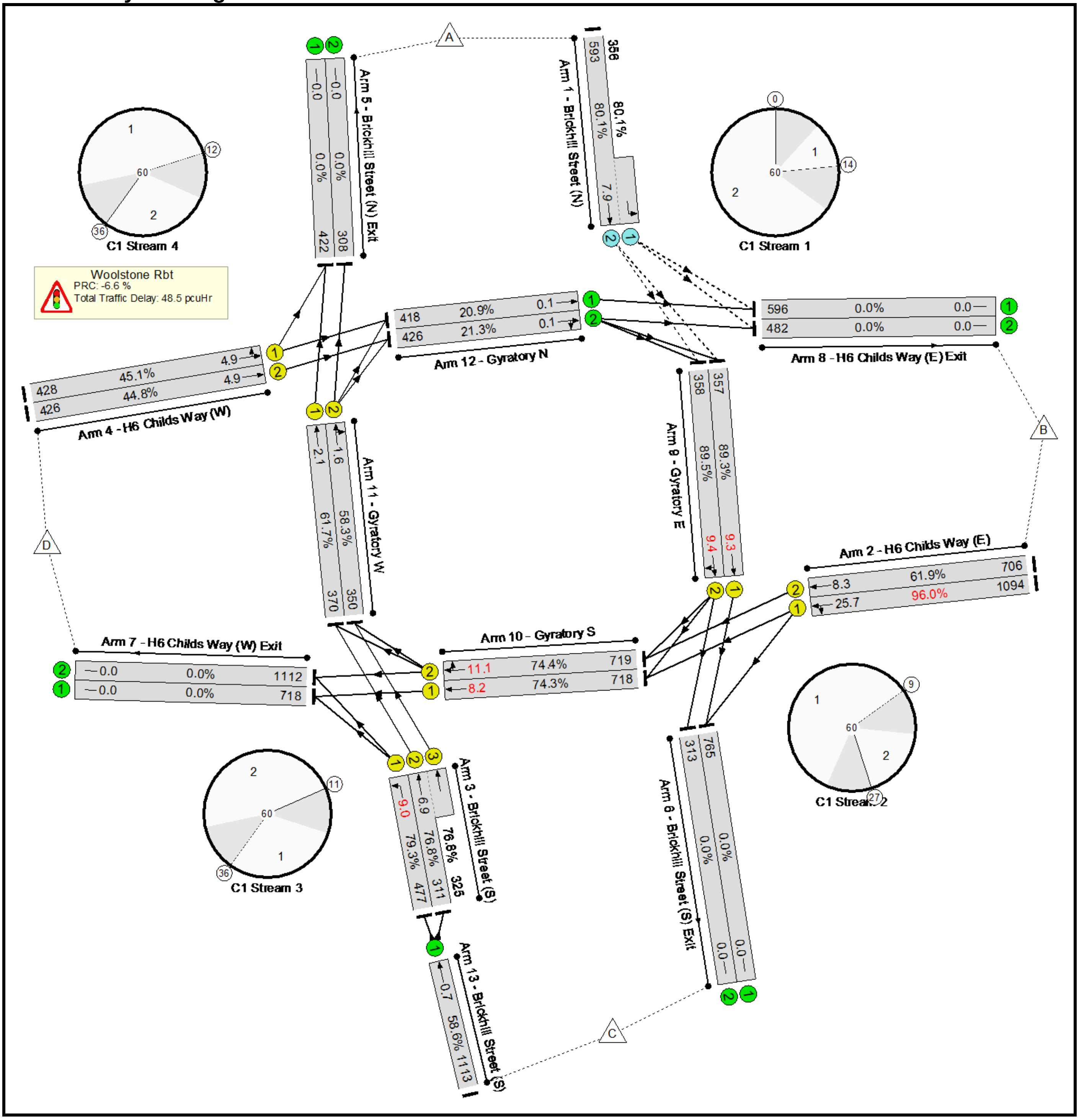
11/2	Gyratory W Ahead Right	U	H		1	22	-	256	2000	767	33.4%	-	-	-	1.1	15.9	2.3
12/1	Gyratory N Ahead	U	-		-	-	-	850	2000	2000	35.2%	-	-	-	0.3	1.4	0.3
12/2	Gyratory N Ahead Right	U	-		-	-	-	969	2000	2000	39.7%	-	-	-	0.3	1.5	0.3
13/1	Brickhill Street (S) Ahead	U	-		-	-	-	1035	1900	1900	54.5%	-	-	-	0.6	2.1	0.6

C1 Stream: 1 PRC for Signalled Lanes (%): 0.0 Total Delay for Signalled Lanes (pcuHr): 0.00 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): 10.0 Total Delay for Signalled Lanes (pcuHr): 17.86 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): -7.6 Total Delay for Signalled Lanes (pcuHr): 20.85 Cycle Time (s): 60
C1 Stream: 4 PRC for Signalled Lanes (%): -35.9 Total Delay for Signalled Lanes (pcuHr): 201.55 Cycle Time (s): 60
PRC Over All Lanes (%): -38.3 Total Delay Over All Lanes(pcuHr): 333.26

Basic Results Summary

Scenario 11: '2031 Key Planning test - AM' (FG11: '2031 Key Planning Test (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: E4 WOOLSTONE ROUNDABOUT (MITIGATION)	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**96.0%**	**1898**	**0**	**0**	**48.5**	**-**	**-**
Woolstone Rbt	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**96.0%**	**1898**	**0**	**0**	**48.5**	**-**	**-**
1/2+1/1	Brickhill Street (N) Left Ahead	O	-		-	-	-	949	1900:1900	740+444	80.1 : 80.1%	1898	0	0	2.6	9.9	7.9
2/1	H6 Childs Way (E) Left Ahead	U	C		1	35	-	1094	1900	1140	96.0%	-	-	-	12.1	39.8	25.7
2/2	H6 Childs Way (E) Ahead	U	C		1	35	-	706	1900	1140	61.9%	-	-	-	2.3	11.8	8.3
3/1	Brickhill Street (S) Left	U	E		1	18	-	477	1900	602	79.3%	-	-	-	4.3	32.7	9.0
3/2+3/3	Brickhill Street (S) Ahead	U	E		1	18	-	636	1900:1900	405+423	76.8 : 76.8%	-	-	-	4.6	26.1	6.9
4/1	H6 Childs Way (W) Left Ahead	U	G		1	29	-	428	1900	950	45.1%	-	-	-	1.6	13.1	4.9
4/2	H6 Childs Way (W) Ahead	U	G		1	29	-	426	1900	950	44.8%	-	-	-	1.6	13.1	4.9
9/1	Gyratory E Ahead	U	D		1	11	-	357	2000	400	89.3%	-	-	-	5.6	56.9	9.3
9/2	Gyratory E Ahead Right	U	D		1	11	-	358	2000	400	89.5%	-	-	-	5.7	57.5	9.4
10/1	Gyratory S Ahead	U	F		1	28	-	718	2000	967	74.3%	-	-	-	2.1	10.3	8.2
10/2	Gyratory S Ahead Right	U	F		1	28	-	719	2000	967	74.4%	-	-	-	2.5	12.5	11.1
11/1	Gyratory W Ahead	U	H		1	17	-	370	2000	600	61.7%	-	-	-	1.4	13.6	2.1

Basic Results Summary

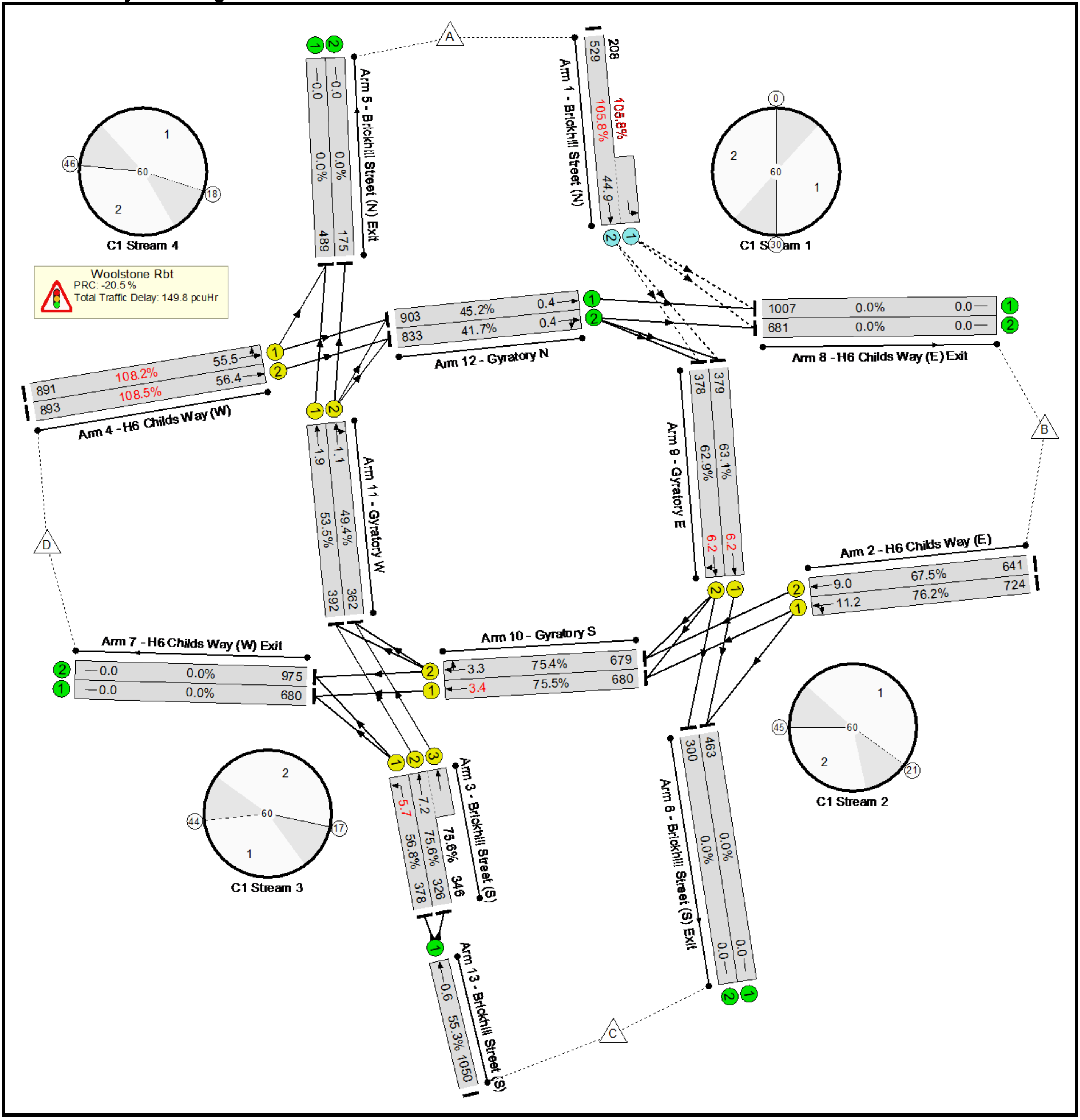
11/2	Gyratory W Ahead Right	U	H		1	17	-	350	2000	600	58.3%	-	-	-	1.2	12.1	1.6
12/1	Gyratory N Ahead	U	-		-	-	-	418	2000	2000	20.9%	-	-	-	0.1	1.1	0.1
12/2	Gyratory N Ahead Right	U	-		-	-	-	426	2000	2000	21.3%	-	-	-	0.1	1.1	0.1
13/1	Brickhill Street (S) Ahead	U	-		-	-	-	1113	1900	1900	58.6%	-	-	-	0.7	2.3	0.7

C1 Stream: 1 PRC for Signalled Lanes (%): 0.0 Total Delay for Signalled Lanes (pcuHr): 0.00 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): -6.6 Total Delay for Signalled Lanes (pcuHr): 25.75 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): 13.5 Total Delay for Signalled Lanes (pcuHr): 13.51 Cycle Time (s): 60
C1 Stream: 4 PRC for Signalled Lanes (%): 45.9 Total Delay for Signalled Lanes (pcuHr): 5.68 Cycle Time (s): 60
PRC Over All Lanes (%): -6.6 Total Delay Over All Lanes(pcuHr): 48.51

Basic Results Summary

Scenario 12: '2031 Key Planning test - PM' (FG12: '2031 Key Planning Test (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: E4 WOOLSTONE ROUNDABOUT (MITIGATION)	-	-	-		-	-	-	-	-	-	**108.5%**	**1416**	**0**	**0**	**149.8**	-	-
Woolstone Rbt	-	-	-		-	-	-	-	-	-	**108.5%**	**1416**	**0**	**0**	**149.8**	-	-
1/2+1/1	Brickhill Street (N) Left Ahead	O	-		-	-	-	737	1900:1900	500+197	105.8 : 105.8%	1416	0	0	29.9	146.3	44.9
2/1	H6 Childs Way (E) Left Ahead	U	C		1	29	-	724	1900	950	76.2%	-	-	-	4.0	20.0	11.2
2/2	H6 Childs Way (E) Ahead	U	C		1	29	-	641	1900	950	67.5%	-	-	-	3.0	17.1	9.0
3/1	Brickhill Street (S) Left	U	E		1	20	-	378	1900	665	56.8%	-	-	-	2.3	22.1	5.7
3/2+3/3	Brickhill Street (S) Ahead	U	E		1	20	-	672	1900:1900	431+458	75.6 : 75.6%	-	-	-	4.4	23.7	7.2
4/1	H6 Childs Way (W) Left Ahead	U	G		1	25	-	891	1900	823	108.2%	-	-	-	45.8	185.0	55.5
4/2	H6 Childs Way (W) Ahead	U	G		1	25	-	893	1900	823	108.5%	-	-	-	46.8	188.5	56.4
9/1	Gyratory E Ahead	U	D		1	17	-	404	2000	600	63.1%	-	-	-	2.9	27.1	6.2
9/2	Gyratory E Ahead Right	U	D		1	17	-	403	2000	600	62.9%	-	-	-	2.9	27.2	6.2
10/1	Gyratory S Ahead	U	F		1	26	-	682	2000	900	75.5%	-	-	-	2.3	12.2	3.4
10/2	Gyratory S Ahead Right	U	F		1	26	-	681	2000	900	75.4%	-	-	-	2.3	12.2	3.3
11/1	Gyratory W Ahead	U	H		1	21	-	392	2000	733	53.5%	-	-	-	1.0	9.6	1.9

Basic Results Summary

11/2	Gyratory W Ahead Right	U	H		1	21	-	362	2000	733	49.4%	-	-	-	0.8	7.6	1.1
12/1	Gyratory N Ahead	U	-		-	-	-	963	2000	2000	45.2%	-	-	-	0.4	1.6	0.4
12/2	Gyratory N Ahead Right	U	-		-	-	-	903	2000	2000	41.7%	-	-	-	0.4	1.5	0.4
13/1	Brickhill Street (S) Ahead	U	-		-	-	-	1050	1900	1900	55.3%	-	-	-	0.6	2.1	0.6

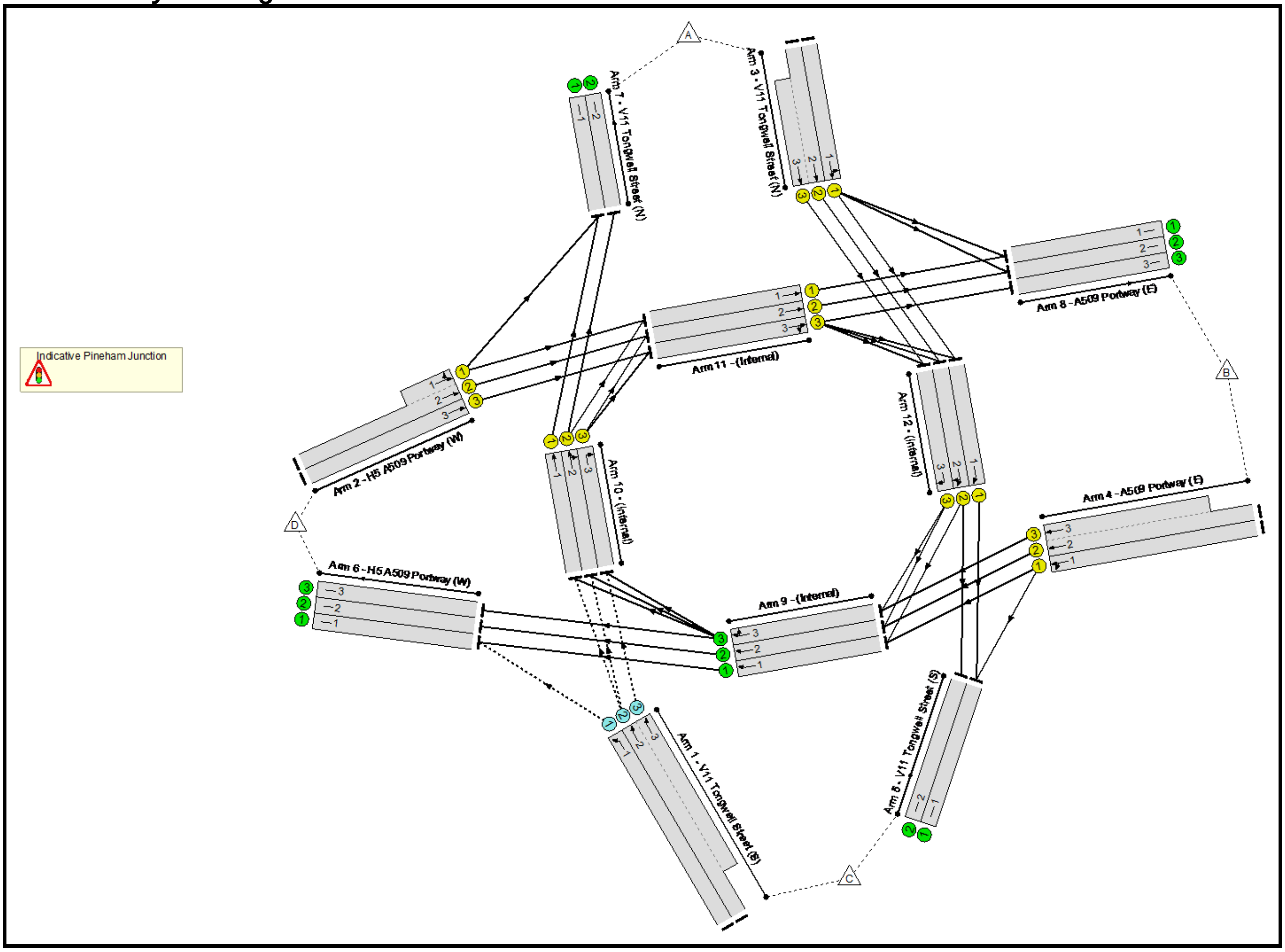
C1 Stream: 1 PRC for Signalled Lanes (%): 0.0 Total Delay for Signalled Lanes (pcuHr): 0.00 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): 18.1 Total Delay for Signalled Lanes (pcuHr): 12.77 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): 19.0 Total Delay for Signalled Lanes (pcuHr): 11.35 Cycle Time (s): 60
C1 Stream: 4 PRC for Signalled Lanes (%): -20.5 Total Delay for Signalled Lanes (pcuHr): 94.36 Cycle Time (s): 60
PRC Over All Lanes (%): -20.5 Total Delay Over All Lanes(pcuHr): 149.81

TA Report

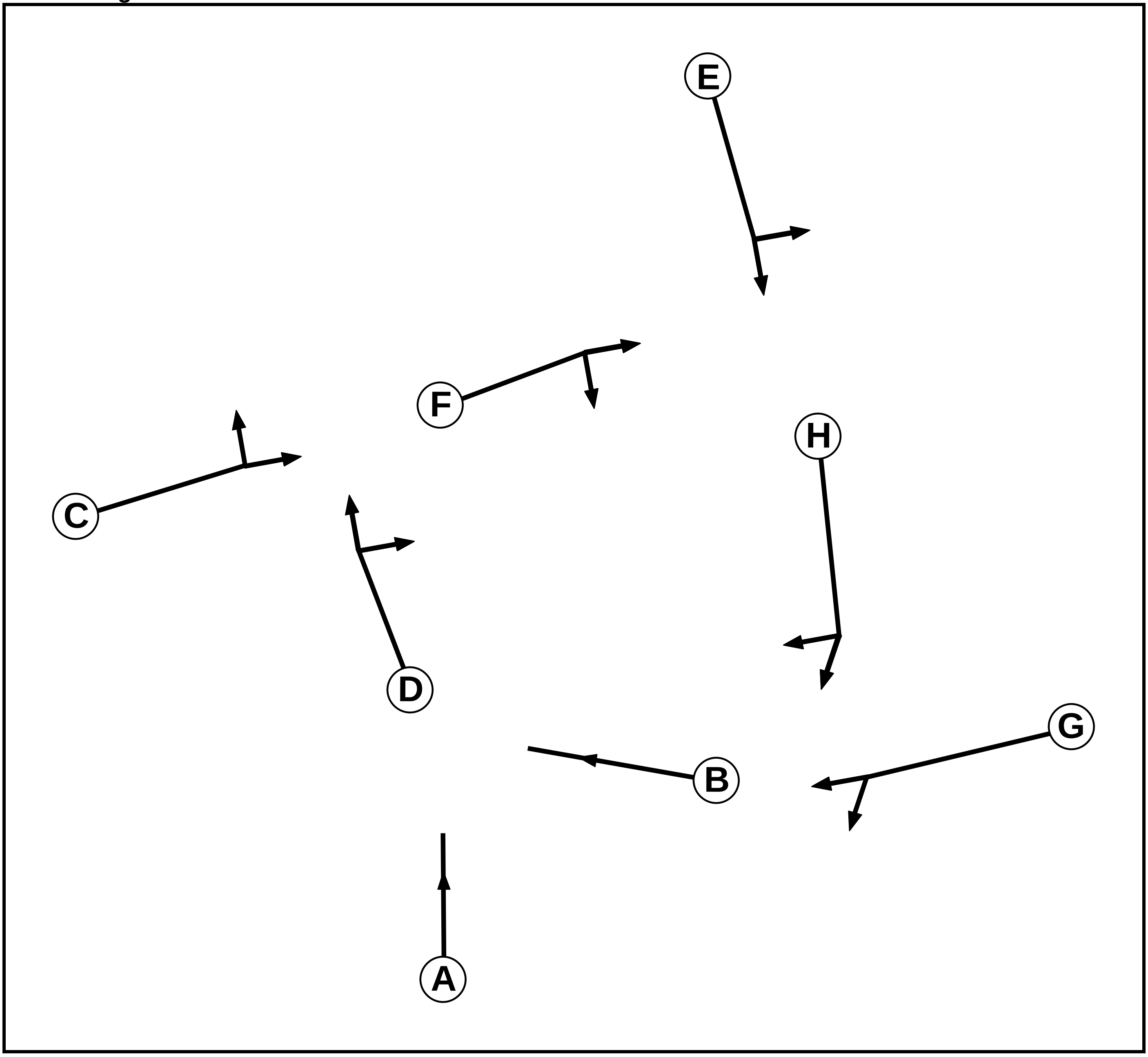
User and Project Details

Project:	**MILTON KEYNES EAST**
Title:	**E10 PINEHAM ROUNDABOUT (MITIGATION)**
Location:	
Additional detail:	
File name:	10. PinehamRbt-3arm-3circ-3EBExit.lsg3x
Author:	
Company:	WSP
Address:	

Junction Layout Diagram



Phase Diagram



Phase Input Data

Phase Name	Phase Type	Stage Stream	Assoc. Phase	Street Min	Cont Min
A	Traffic			7	7
B	Traffic			7	7
C	Traffic	3		7	7
D	Traffic	3		7	7
E	Traffic	1		7	7
F	Traffic	1		7	7
G	Traffic	2		7	7
H	Traffic	2		7	7

Phase Intergreens Matrix

		Starting Phase							
		A	B	C	D	E	F	G	H
Terminating Phase	A		-	-	-	-	-	-	-
	B	-		-	-	-	-	-	-
	C	-	-		7	-	-	-	-
	D	-	-	7		-	-	-	-
	E	-	-	-	-		7	-	-
	F	-	-	-	-	7		-	-
	G	-	-	-	-	-	-		7
	H	-	-	-	-	-	-	7	

Scenario 1: '2031 Do Something AM' (FG1: '2031 Do Something AM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A		Traffic				
B		Traffic				
C	H5 A509 Portway (W) Left Ahead	Traffic	3	27	50	17
D	(Internal) Ahead Right	Traffic	3	19	24	43
E	V11 Tongwell Street (N) Left Ahead	Traffic	1	24	19	43
F	(Internal) Ahead Right	Traffic	1	22	50	12
G	A509 Portway (E) Left Ahead	Traffic	2	19	31	50
H	(Internal) Ahead Right	Traffic	2	27	57	24

TA Report

Link 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: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**105.6%**
Indicative Pineham Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**105.6%**
1/1	V11 Tongwell Street (S) Left	O	N/A	N/A	-		-	-	-	262	1900	602	43.5%
1/2+1/3	V11 Tongwell Street (S) Ahead	O	N/A	N/A	-		-	-	-	645	1900:1900	569+42	105.6 : 105.6%
2/2+2/1	H5 A509 Portway (W) Left Ahead	U	3	N/A	C		1	27	-	1037	1900:1900	473+648	92.5 : 92.5%
2/3	H5 A509 Portway (W) Ahead	U	3	N/A	C		1	27	-	0	1900	887	0.0%
3/1	V11 Tongwell Street (N) Left Ahead	U	1	N/A	E		1	24	-	498	1900	792	62.9%
3/2+3/3	V11 Tongwell Street (N) Ahead	U	1	N/A	E		1	24	-	677	1900:1900	733+314	64.7 : 64.7%
4/1	A509 Portway (E) Left Ahead	U	2	N/A	G		1	19	-	586	1900	633	92.5%
4/2+4/3	A509 Portway (E) Ahead	U	2	N/A	G		1	19	-	1219	1900:1900	633+633	91.9 : 100.6%
9/1	(Internal) Ahead	U	N/A	N/A	-		-	-	-	585	2000	2000	29.3%
9/2	(Internal) Ahead	U	N/A	N/A	-		-	-	-	785	2000	2000	39.3%
9/3	(Internal) Ahead Right	U	N/A	N/A	-		-	-	-	637	2000	2000	31.7%
10/1	(Internal) Ahead	U	3	N/A	D		1	19	-	473	2000	667	67.5%
10/2	(Internal) Ahead Right	U	3	N/A	D		1	19	-	633	2000	667	93.1%

TA Report

10/3	(Internal) Right	U	3	N/A	D		1	19	-	72	2000	667	10.8%
11/1	(Internal) Ahead	U	1	N/A	F		1	22	-	536	2000	767	69.9%
11/2	(Internal) Ahead	U	1	N/A	F		1	22	-	510	2000	767	66.5%
11/3	(Internal) Ahead Right	U	1	N/A	F		1	22	-	0	2000	767	0.0%
12/1	(Internal) Ahead	U	2	N/A	H		1	27	-	310	2000	933	33.2%
12/2	(Internal) Ahead Right	U	2	N/A	H		1	27	-	474	2000	933	50.8%
12/3	(Internal) Right	U	2	N/A	H		1	27	-	203	2000	933	21.8%

TA Report

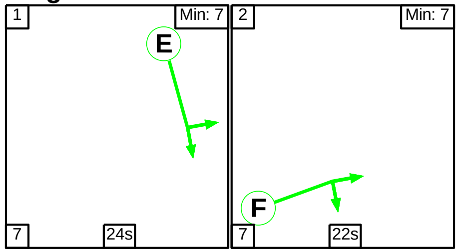
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**1488**	**0**	**0**	**34.1**	**58.0**	**0.0**	**92.2**	**-**	**-**	**-**	**-**
Indicative Pineham Junction	**-**	**-**	**1488**	**0**	**0**	**34.1**	**58.0**	**0.0**	**92.2**	**-**	**-**	**-**	**-**
1/1	262	262	262	0	0	0.3	0.4	-	0.7	9.4	1.9	0.4	2.3
1/2+1/3	645	613	1226	0	0	2.7	23.9	-	26.6	148.7	24.0	23.9	48.0
2/2+2/1	1037	1037	-	-	-	3.7	5.5	-	9.2	31.8	11.9	5.5	17.4
2/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/1	498	498	-	-	-	1.9	0.8	-	2.8	19.9	6.5	0.8	7.3
3/2+3/3	677	677	-	-	-	2.4	0.9	-	3.3	17.8	6.1	0.9	7.0
4/1	586	586	-	-	-	3.1	5.1	-	8.2	50.6	9.3	5.1	14.4
4/2+4/3	1219	1215	-	-	-	6.7	11.1	-	17.8	52.5	10.7	11.1	21.7
9/1	585	585	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2
9/2	785	785	-	-	-	0.0	0.3	-	0.3	1.5	0.0	0.3	0.3
9/3	633	633	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2
10/1	450	450	-	-	-	1.9	1.0	-	2.9	23.2	7.1	1.0	8.2
10/2	621	621	-	-	-	3.8	5.5	-	9.3	53.9	8.5	5.5	14.0
10/3	72	72	-	-	-	0.4	0.1	-	0.4	20.9	0.9	0.1	1.0
11/1	536	536	-	-	-	0.6	1.2	-	1.7	11.7	2.3	1.2	3.4
11/2	510	510	-	-	-	1.1	1.0	-	2.1	14.6	5.7	1.0	6.7
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	310	310	-	-	-	1.7	0.2	-	2.0	22.8	3.6	0.2	3.9
12/2	474	474	-	-	-	3.1	0.5	-	3.6	27.4	6.1	0.5	6.7
12/3	203	203	-	-	-	0.7	0.1	-	0.8	14.5	1.6	0.1	1.8

C1 Stream: 1 PRC for Signalled Lanes (%): 28.7 Total Delay for Signalled Lanes (pcuHr): 9.91 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): -11.8 Total Delay for Signalled Lanes (pcuHr): 32.41 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): -3.5 Total Delay for Signalled Lanes (pcuHr): 21.76 Cycle Time (s): 60
PRC Over All Lanes (%): -17.4 Total Delay Over All Lanes(pcuHr): 92.16

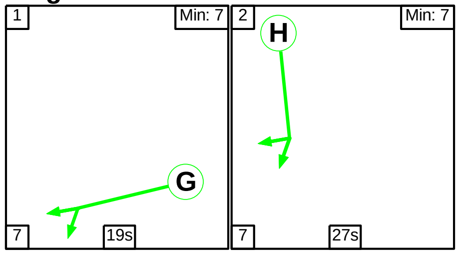
TA Report

Staging Plan Diagram

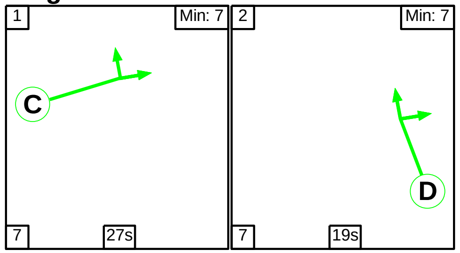
Stage Stream: 1



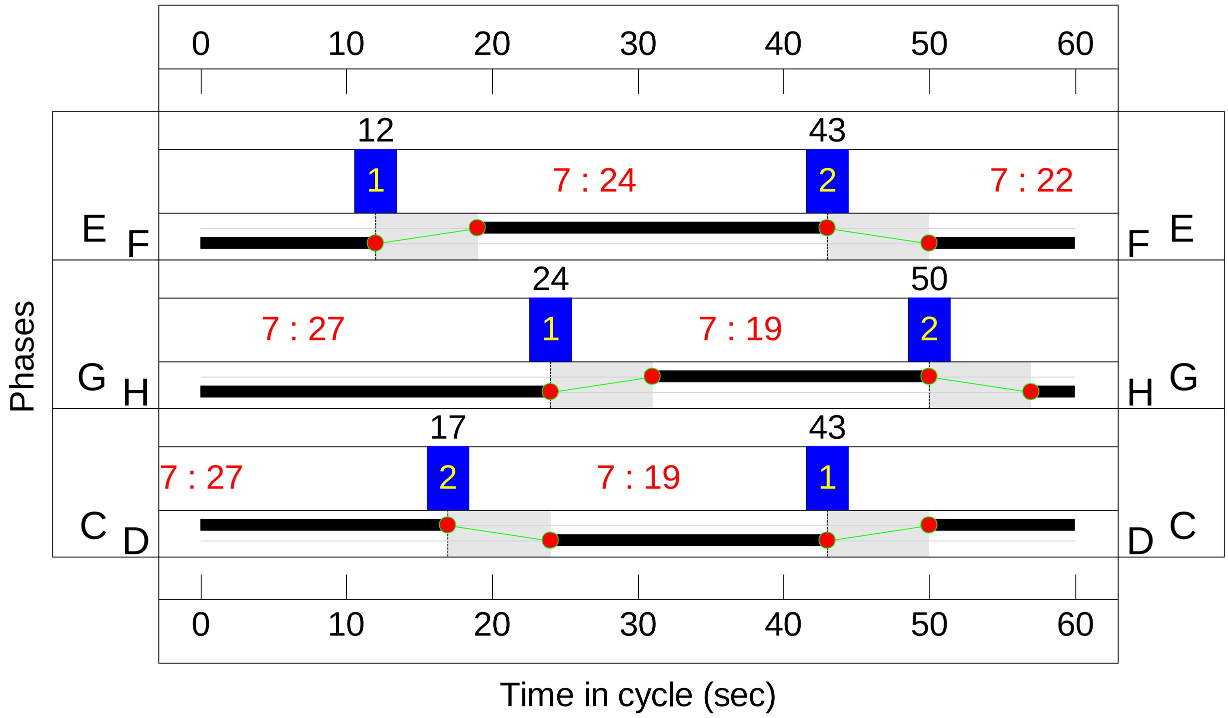
Stage Stream: 2



Stage Stream: 3



Signal Timings Diagram



Scenario 2: '2031 Do Something PM' (FG2: '2031 Do Something PM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A		Traffic				
B		Traffic				
C	H5 A509 Portway (W) Left Ahead	Traffic	3	36	40	16
D	(Internal) Ahead Right	Traffic	3	10	23	33
E	V11 Tongwell Street (N) Left Ahead	Traffic	1	24	53	17
F	(Internal) Ahead Right	Traffic	1	22	24	46
G	A509 Portway (E) Left Ahead	Traffic	2	18	28	46
H	(Internal) Ahead Right	Traffic	2	28	53	21

TA Report

Link 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: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**126.4%**
Indicative Pineham Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**126.4%**
1/1	V11 Tongwell Street (S) Left	O	N/A	N/A	-		-	-	-	372	1900	671	55.4%
1/2+1/3	V11 Tongwell Street (S) Ahead	O	N/A	N/A	-		-	-	-	1022	1900:1900	636+233	117.5 : 117.5%
2/2+2/1	H5 A509 Portway (W) Left Ahead	U	3	N/A	C		1	36	-	1647	1900:1900	363+940	126.4 : 126.4%
2/3	H5 A509 Portway (W) Ahead	U	3	N/A	C		1	36	-	0	1900	1172	0.0%
3/1	V11 Tongwell Street (N) Left Ahead	U	1	N/A	E		1	24	-	605	1900	792	76.4%
3/2+3/3	V11 Tongwell Street (N) Ahead	U	1	N/A	E		1	24	-	904	1900:1900	727+358	83.3 : 83.3%
4/1	A509 Portway (E) Left Ahead	U	2	N/A	G		1	18	-	405	1900	602	67.3%
4/2+4/3	A509 Portway (E) Ahead	U	2	N/A	G		1	18	-	729	1900:1900	602+602	53.0 : 68.1%
9/1	(Internal) Ahead	U	N/A	N/A	-		-	-	-	403	2000	2000	20.2%
9/2	(Internal) Ahead	U	N/A	N/A	-		-	-	-	617	2000	2000	30.9%
9/3	(Internal) Ahead Right	U	N/A	N/A	-		-	-	-	410	2000	2000	20.5%
10/1	(Internal) Ahead	U	3	N/A	D		1	10	-	500	2000	367	121.1%
10/2	(Internal) Ahead Right	U	3	N/A	D		1	10	-	499	2000	367	120.9%

10/3	(Internal) Right	U	3	N/A	D		1	10	-	305	2000	367	83.2%
11/1	(Internal) Ahead	U	1	N/A	F		1	22	-	609	2000	767	62.8%
11/2	(Internal) Ahead	U	1	N/A	F		1	22	-	764	2000	767	87.1%
11/3	(Internal) Ahead Right	U	1	N/A	F		1	22	-	0	2000	767	0.0%
12/1	(Internal) Ahead	U	2	N/A	H		1	28	-	158	2000	967	16.3%
12/2	(Internal) Ahead Right	U	2	N/A	H		1	28	-	606	2000	967	62.7%
12/3	(Internal) Right	U	2	N/A	H		1	28	-	298	2000	967	30.8%

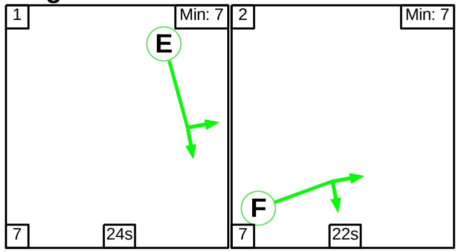
TA Report

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: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**2193**	**0**	**0**	**50.4**	**350.8**	**0.0**	**401.2**	**-**	**-**	**-**	**-**
Indicative Pineham Junction	**-**	**-**	**2193**	**0**	**0**	**50.4**	**350.8**	**0.0**	**401.2**	**-**	**-**	**-**	**-**
1/1	372	372	372	0	0	0.2	0.6	-	0.8	8.0	2.2	0.6	2.8
1/2+1/3	1022	910	1821	0	0	5.2	79.5	-	84.7	298.3	30.5	79.5	110.0
2/2+2/1	1647	1303	-	-	-	16.2	174.6	-	190.7	416.9	33.1	174.6	207.7
2/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/1	605	605	-	-	-	2.5	1.6	-	4.1	24.5	8.6	1.6	10.2
3/2+3/3	904	904	-	-	-	3.5	2.4	-	6.0	23.7	8.6	2.4	11.0
4/1	405	405	-	-	-	2.0	1.0	-	3.0	26.9	5.9	1.0	6.9
4/2+4/3	729	729	-	-	-	3.5	0.8	-	4.3	21.2	5.9	0.8	6.7
9/1	403	403	-	-	-	0.0	0.1	-	0.1	1.1	0.0	0.1	0.1
9/2	617	617	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2
9/3	410	410	-	-	-	0.0	0.1	-	0.1	1.1	0.0	0.1	0.1
10/1	444	367	-	-	-	5.0	41.4	-	46.4	376.5	8.7	41.4	50.1
10/2	443	367	-	-	-	5.0	41.0	-	45.9	373.1	8.7	41.0	49.6
10/3	305	305	-	-	-	2.0	2.3	-	4.3	50.8	4.9	2.3	7.2
11/1	482	482	-	-	-	3.0	0.8	-	3.9	28.9	6.5	0.8	7.3
11/2	668	668	-	-	-	2.2	3.2	-	5.4	29.0	9.2	3.2	12.4
11/3	0	0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
12/1	158	158	-	-	-	0.0	0.1	-	0.1	2.2	0.0	0.1	0.1
12/2	606	606	-	-	-	0.0	0.8	-	0.8	5.0	0.0	0.8	0.9
12/3	298	298	-	-	-	0.0	0.2	-	0.2	2.8	0.0	0.2	0.2

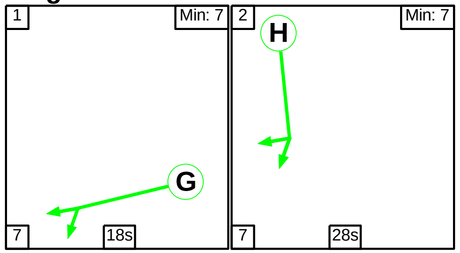
C1 Stream: 1 PRC for Signalled Lanes (%): 3.3 Total Delay for Signalled Lanes (pcuHr): 19.32 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): 32.1 Total Delay for Signalled Lanes (pcuHr): 8.49 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): -40.5 Total Delay for Signalled Lanes (pcuHr): 287.43 Cycle Time (s): 60
PRC Over All Lanes (%): -40.5 Total Delay Over All Lanes(pcuHr): 401.24

Staging Plan Diagram

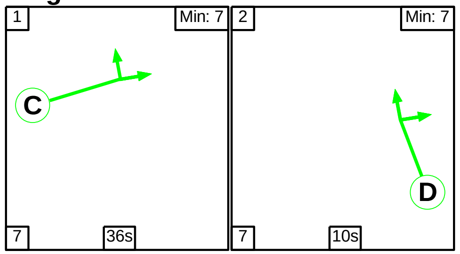
Stage Stream: 1



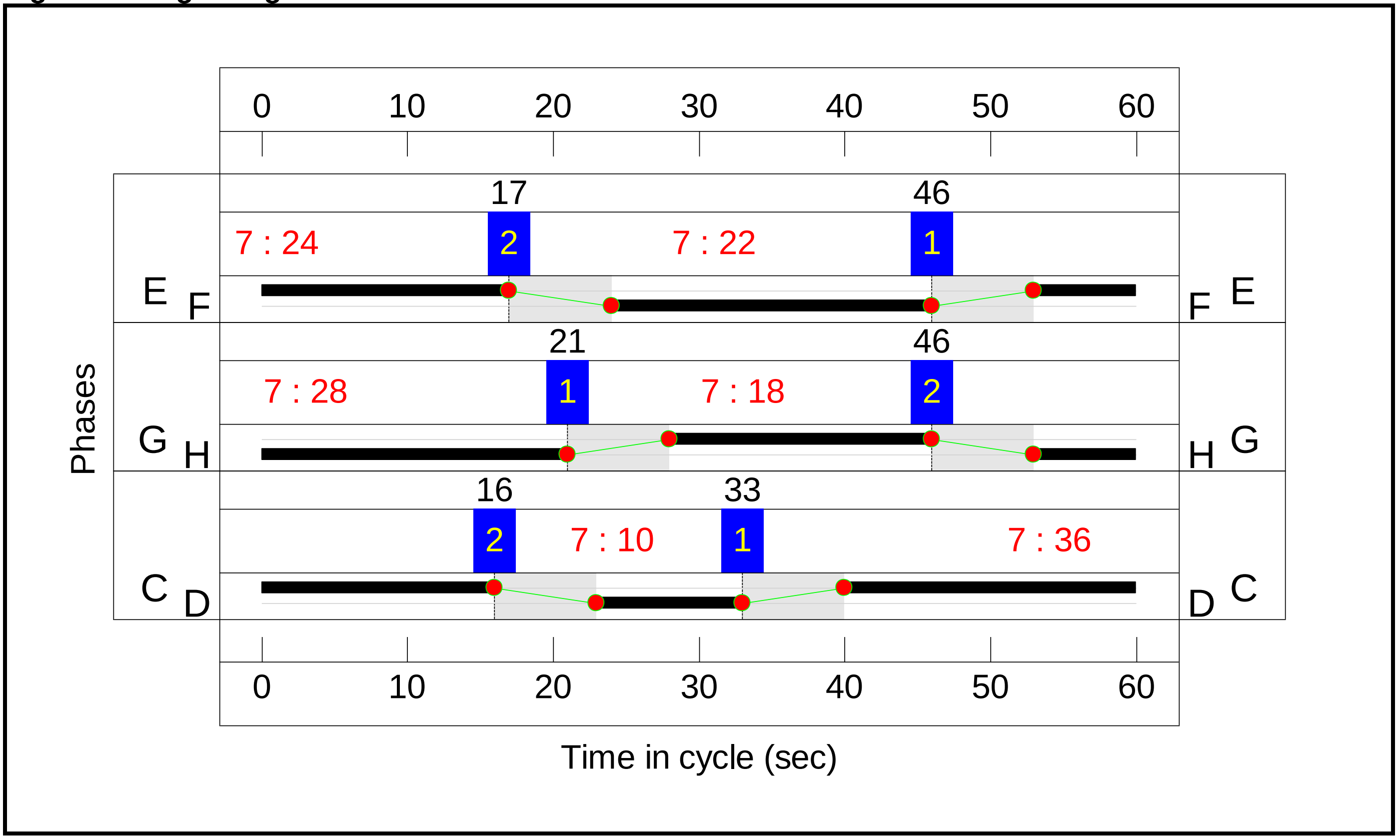
Stage Stream: 2



Stage Stream: 3



Signal Timings Diagram



Scenario 3: '2048 Do Something AM' (FG3: '2048 Do Something AM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A		Traffic				
B		Traffic				
C	H5 A509 Portway (W) Left Ahead	Traffic	3	24	10	34
D	(Internal) Ahead Right	Traffic	3	22	41	3
E	V11 Tongwell Street (N) Left Ahead	Traffic	1	32	36	8
F	(Internal) Ahead Right	Traffic	1	14	15	29
G	A509 Portway (E) Left Ahead	Traffic	2	26	49	15
H	(Internal) Ahead Right	Traffic	2	20	22	42

TA Report

Link 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: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**104.4%**
Indicative Pineham Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**104.4%**
1/1	V11 Tongwell Street (S) Left	O	N/A	N/A	-		-	-	-	404	1900	552	73.2%
1/2+1/3	V11 Tongwell Street (S) Ahead	O	N/A	N/A	-		-	-	-	470	1900:1900	414+36	104.4 : 104.4%
2/2+2/1	H5 A509 Portway (W) Left Ahead	U	3	N/A	C		1	24	-	874	1900:1900	333+632	90.6 : 90.6%
2/3	H5 A509 Portway (W) Ahead	U	3	N/A	C		1	24	-	207	1900	792	26.1%
3/1	V11 Tongwell Street (N) Left Ahead	U	1	N/A	E		1	32	-	900	1900	1045	86.1%
3/2+3/3	V11 Tongwell Street (N) Ahead	U	1	N/A	E		1	32	-	1022	1900:1900	898+440	76.4 : 76.4%
4/1	A509 Portway (E) Left Ahead	U	2	N/A	G		1	26	-	870	1900	855	101.8%
4/2+4/3	A509 Portway (E) Ahead	U	2	N/A	G		1	26	-	1242	1900:1900	350+855	103.0 : 103.0%
9/1	(Internal) Ahead	U	N/A	N/A	-		-	-	-	708	2000	2000	34.8%
9/2	(Internal) Ahead	U	N/A	N/A	-		-	-	-	697	2000	2000	34.9%
9/3	(Internal) Ahead Right	U	N/A	N/A	-		-	-	-	881	2000	2000	42.8%
10/1	(Internal) Ahead	U	3	N/A	D		1	22	-	606	2000	767	76.2%
10/2	(Internal) Ahead Right	U	3	N/A	D		1	22	-	652	2000	767	82.3%

TA Report

10/3	(Internal) Right	U	3	N/A	D		1	22	-	93	2000	767	11.9%
11/1	(Internal) Ahead	U	1	N/A	F		1	14	-	426	2000	500	85.2%
11/2	(Internal) Ahead	U	1	N/A	F		1	14	-	360	2000	500	71.7%
11/3	(Internal) Ahead Right	U	1	N/A	F		1	14	-	242	2000	500	48.4%
12/1	(Internal) Ahead	U	2	N/A	H		1	20	-	250	2000	700	35.7%
12/2	(Internal) Ahead Right	U	2	N/A	H		1	20	-	686	2000	700	98.0%
12/3	(Internal) Right	U	2	N/A	H		1	20	-	336	2000	700	48.0%

TA Report

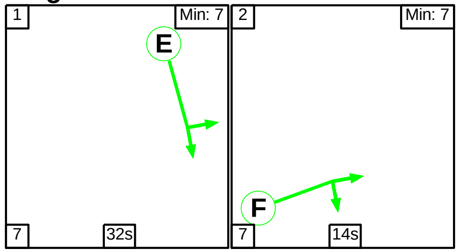
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**1307**	**0**	**0**	**40.5**	**95.4**	**0.0**	**135.9**	**-**	**-**	**-**	**-**
Indicative Pineham Junction	**-**	**-**	**1307**	**0**	**0**	**40.5**	**95.4**	**0.0**	**135.9**	**-**	**-**	**-**	**-**
1/1	404	404	404	0	0	0.4	1.3	-	1.8	15.8	3.7	1.3	5.0
1/2+1/3	470	452	903	0	0	2.1	16.9	-	19.0	145.9	15.0	16.9	31.9
2/2+2/1	874	874	-	-	-	3.5	4.4	-	7.9	32.7	10.5	4.4	14.8
2/3	207	207	-	-	-	0.7	0.2	-	0.8	14.5	2.2	0.2	2.4
3/1	900	900	-	-	-	2.9	3.0	-	5.9	23.5	12.8	3.0	15.7
3/2+3/3	1022	1022	-	-	-	2.5	1.6	-	4.1	14.5	8.0	1.6	9.6
4/1	870	855	-	-	-	4.5	19.0	-	23.4	97.0	14.8	19.0	33.7
4/2+4/3	1242	1216	-	-	-	6.0	29.0	-	35.0	101.5	15.1	29.0	44.1
9/1	696	696	-	-	-	0.0	0.3	-	0.3	1.4	0.0	0.3	0.3
9/2	697	697	-	-	-	0.0	0.3	-	0.3	1.4	0.0	0.3	0.3
9/3	855	855	-	-	-	0.0	0.4	-	0.4	1.6	0.0	0.4	0.4
10/1	584	584	-	-	-	2.6	1.6	-	4.2	25.7	8.4	1.6	10.0
10/2	631	631	-	-	-	3.6	2.3	-	5.8	33.1	7.5	2.3	9.8
10/3	91	91	-	-	-	0.4	0.1	-	0.5	19.0	1.1	0.1	1.2
11/1	426	426	-	-	-	0.9	2.7	-	3.6	30.4	5.8	2.7	8.5
11/2	358	358	-	-	-	1.2	1.2	-	2.4	24.6	4.7	1.2	5.9
11/3	242	242	-	-	-	0.7	0.5	-	1.2	18.1	3.5	0.5	4.0
12/1	250	250	-	-	-	1.2	0.3	-	1.5	21.4	3.5	0.3	3.8
12/2	686	686	-	-	-	5.6	10.1	-	15.6	82.0	9.5	10.1	19.5
12/3	336	336	-	-	-	1.7	0.5	-	2.1	22.9	3.3	0.5	3.8

C1 Stream: 1 PRC for Signalled Lanes (%): 4.5 Total Delay for Signalled Lanes (pcuHr): 17.24 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): -14.5 Total Delay for Signalled Lanes (pcuHr): 77.70 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): -0.6 Total Delay for Signalled Lanes (pcuHr): 19.22 Cycle Time (s): 60
PRC Over All Lanes (%): -16.0 Total Delay Over All Lanes(pcuHr): 135.89

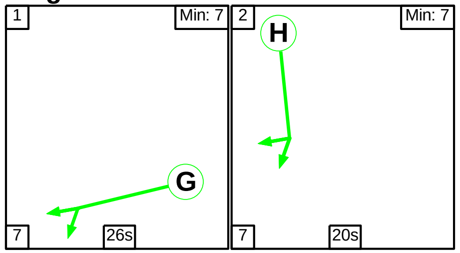
TA Report

Staging Plan Diagram

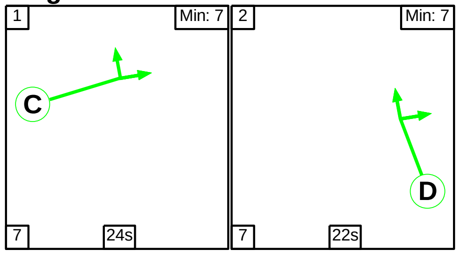
Stage Stream: 1



Stage Stream: 2

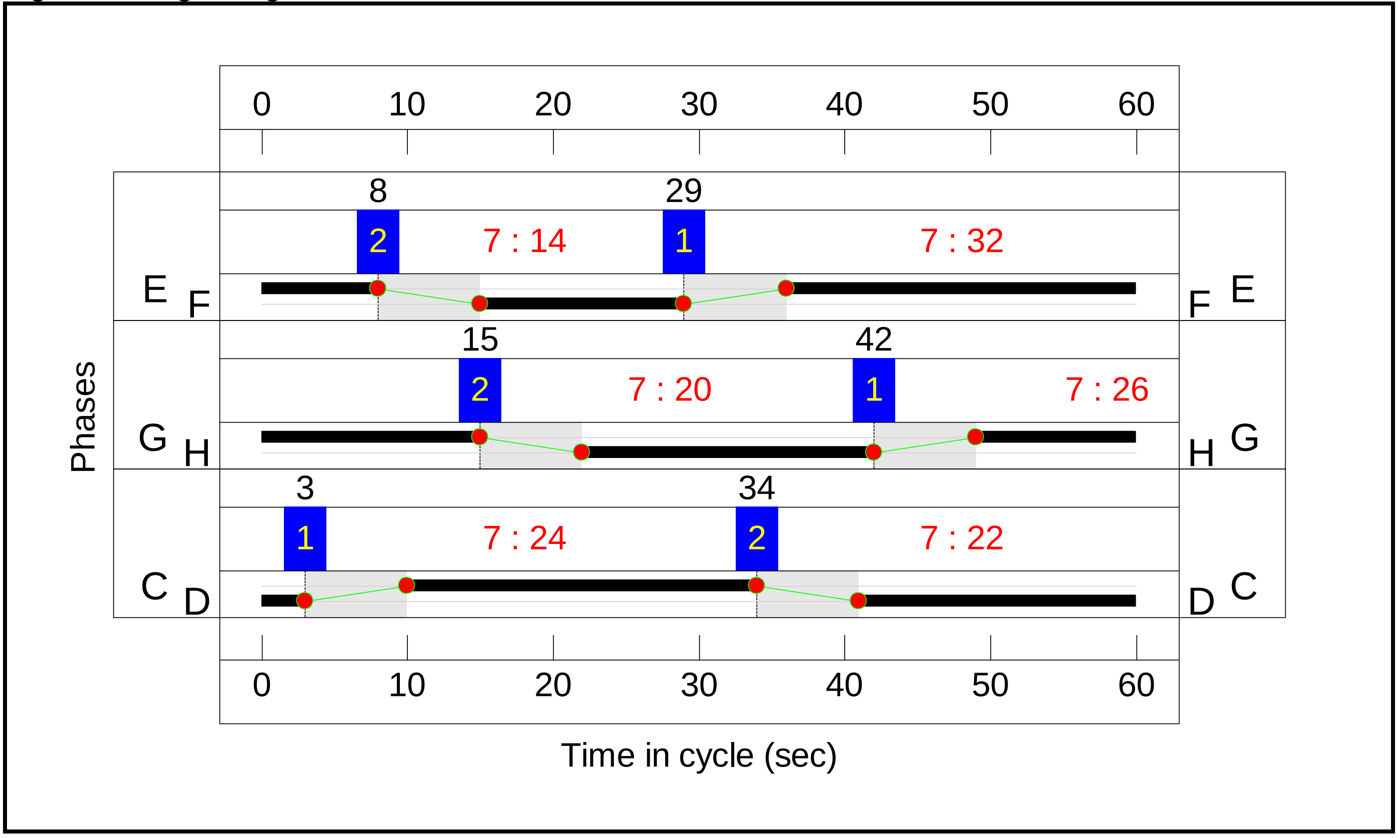


Stage Stream: 3



TA Report

Signal Timings Diagram



Scenario 4: '2048 Do Something PM' (FG4: '2048 Do Something PM', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A		Traffic				
B		Traffic				
C	H5 A509 Portway (W) Left Ahead	Traffic	3	31	5	36
D	(Internal) Ahead Right	Traffic	3	15	43	58
E	V11 Tongwell Street (N) Left Ahead	Traffic	1	17	42	59
F	(Internal) Ahead Right	Traffic	1	29	6	35
G	A509 Portway (E) Left Ahead	Traffic	2	12	9	21
H	(Internal) Ahead Right	Traffic	2	34	28	2

TA Report

Link 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: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**106.8%**
Indicative Pineham Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**106.8%**
1/1	V11 Tongwell Street (S) Left	O	N/A	N/A	-		-	-	-	620	1900	646	95.9%
1/2+1/3	V11 Tongwell Street (S) Ahead	O	N/A	N/A	-		-	-	-	946	1900:1900	637+253	106.3 : 106.3%
2/2+2/1	H5 A509 Portway (W) Left Ahead	U	3	N/A	C		1	31	-	901	1900:1900	102+958	85.0 : 85.0%
2/3	H5 A509 Portway (W) Ahead	U	3	N/A	C		1	31	-	765	1900	1013	75.5%
3/1	V11 Tongwell Street (N) Left Ahead	U	1	N/A	E		1	17	-	604	1900	570	106.0%
3/2+3/3	V11 Tongwell Street (N) Ahead	U	1	N/A	E		1	17	-	997	1900:1900	570+363	106.8 : 106.8%
4/1	A509 Portway (E) Left Ahead	U	2	N/A	G		1	12	-	366	1900	412	88.9%
4/2+4/3	A509 Portway (E) Ahead	U	2	N/A	G		1	12	-	802	1900:1900	412+412	106.4 : 88.4%
9/1	(Internal) Ahead	U	N/A	N/A	-		-	-	-	361	2000	2000	18.0%
9/2	(Internal) Ahead	U	N/A	N/A	-		-	-	-	826	2000	2000	39.1%
9/3	(Internal) Ahead Right	U	N/A	N/A	-		-	-	-	364	2000	2000	18.2%
10/1	(Internal) Ahead	U	3	N/A	D		1	15	-	431	2000	533	76.9%
10/2	(Internal) Ahead Right	U	3	N/A	D		1	15	-	420	2000	533	75.2%

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10/3	(Internal) Right	U	3	N/A	D		1	15	-	336	2000	533	63.0%
11/1	(Internal) Ahead	U	1	N/A	F		1	29	-	339	2000	1000	33.8%
11/2	(Internal) Ahead	U	1	N/A	F		1	29	-	412	2000	1000	41.2%
11/3	(Internal) Ahead Right	U	1	N/A	F		1	29	-	776	2000	1000	77.6%
12/1	(Internal) Ahead	U	2	N/A	H		1	34	-	298	2000	1167	25.0%
12/2	(Internal) Ahead Right	U	2	N/A	H		1	34	-	609	2000	1167	48.9%
12/3	(Internal) Right	U	2	N/A	H		1	34	-	388	2000	1167	31.7%

TA Report

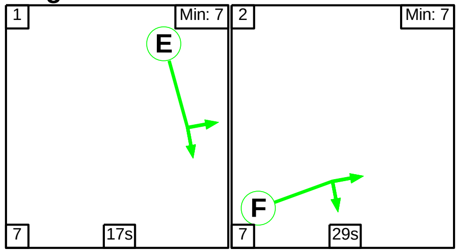
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**2432**	**0**	**0**	**37.7**	**142.4**	**0.0**	**180.2**	**-**	**-**	**-**	**-**
Indicative Pineham Junction	**-**	**-**	**2432**	**0**	**0**	**37.7**	**142.4**	**0.0**	**180.2**	**-**	**-**	**-**	**-**
1/1	620	620	620	0	0	0.8	7.5	-	8.3	48.1	9.5	7.5	17.0
1/2+1/3	946	906	1812	0	0	2.7	34.7	-	37.4	142.2	31.0	34.7	65.7
2/2+2/1	901	901	-	-	-	2.9	2.7	-	5.6	22.3	12.0	2.7	14.7
2/3	765	765	-	-	-	2.3	1.5	-	3.8	18.1	9.8	1.5	11.3
3/1	604	570	-	-	-	4.7	23.4	-	28.2	167.9	10.9	23.4	34.3
3/2+3/3	997	940	-	-	-	6.4	38.4	-	44.8	161.7	11.4	38.4	49.8
4/1	366	366	-	-	-	2.3	3.5	-	5.8	57.0	5.9	3.5	9.4
4/2+4/3	802	776	-	-	-	5.9	23.0	-	28.9	129.6	7.7	23.0	30.7
9/1	361	361	-	-	-	0.0	0.1	-	0.1	1.1	0.0	0.1	0.1
9/2	782	782	-	-	-	0.0	0.3	-	0.3	1.5	0.0	0.3	0.3
9/3	364	364	-	-	-	0.0	0.1	-	0.1	1.1	0.0	0.1	0.1
10/1	410	410	-	-	-	2.4	1.6	-	4.0	35.2	6.6	1.6	8.2
10/2	401	401	-	-	-	2.4	1.5	-	3.9	34.9	6.4	1.5	7.9
10/3	336	336	-	-	-	1.8	0.8	-	2.6	27.9	5.1	0.8	5.9
11/1	338	338	-	-	-	0.2	0.3	-	0.4	4.6	0.7	0.3	0.9
11/2	412	412	-	-	-	2.0	0.3	-	2.4	20.9	6.0	0.3	6.4
11/3	776	776	-	-	-	0.4	1.7	-	2.1	9.9	1.7	1.7	3.4
12/1	291	291	-	-	-	0.5	0.2	-	0.7	8.8	2.8	0.2	3.0
12/2	570	570	-	-	-	0.1	0.5	-	0.5	3.4	0.2	0.5	0.6
12/3	370	370	-	-	-	0.0	0.2	-	0.2	2.3	0.0	0.2	0.2

C1 Stream: 1 PRC for Signalled Lanes (%): -18.7 Total Delay for Signalled Lanes (pcuHr): 77.90 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): -18.2 Total Delay for Signalled Lanes (pcuHr): 36.17 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): 5.9 Total Delay for Signalled Lanes (pcuHr): 19.93 Cycle Time (s): 60
PRC Over All Lanes (%): -18.7 Total Delay Over All Lanes(pcuHr): 180.18

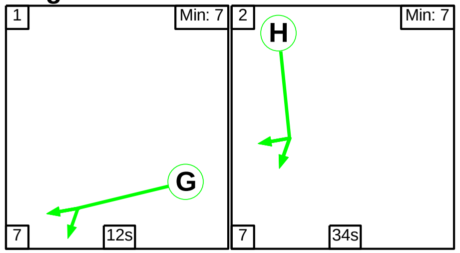
TA Report

Staging Plan Diagram

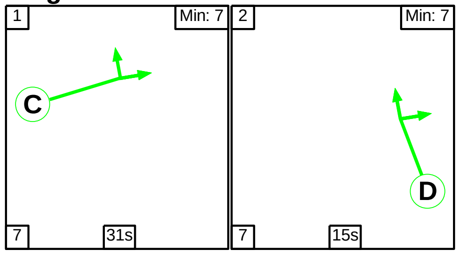
Stage Stream: 1



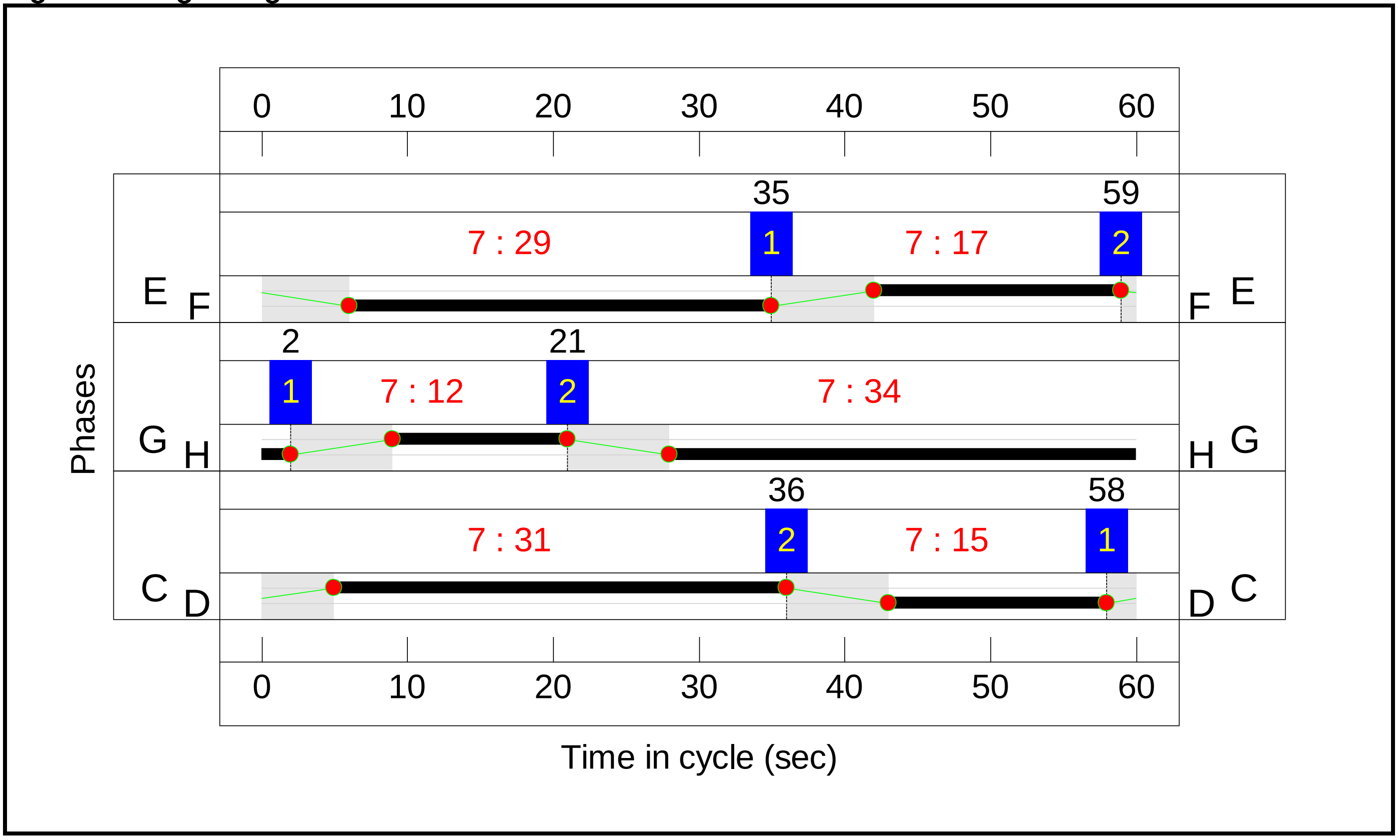
Stage Stream: 2



Stage Stream: 3



Signal Timings Diagram



Scenario 5: '2031 Key Planning Test (AM)' (FG5: '2031 Key Planning Test (AM)', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A		Traffic				
B		Traffic				
C	H5 A509 Portway (W) Left Ahead	Traffic	3	22	15	37
D	(Internal) Ahead Right	Traffic	3	24	44	8
E	V11 Tongwell Street (N) Left Ahead	Traffic	1	29	36	5
F	(Internal) Ahead Right	Traffic	1	17	12	29
G	A509 Portway (E) Left Ahead	Traffic	2	19	49	8
H	(Internal) Ahead Right	Traffic	2	27	15	42

TA Report

Link 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: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**106.7%**
Indicative Pineham Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**106.7%**
1/1	V11 Tongwell Street (S) Left	O	N/A	N/A	-		-	-	-	259	1900	574	45.1%
1/2+1/3	V11 Tongwell Street (S) Ahead	O	N/A	N/A	-		-	-	-	614	1900:1900	533+42	106.7 : 106.7%
2/2+2/1	H5 A509 Portway (W) Left Ahead	U	3	N/A	C		1	22	-	747	1900:1900	333+582	81.6 : 81.6%
2/3	H5 A509 Portway (W) Ahead	U	3	N/A	C		1	22	-	369	1900	728	50.7%
3/1	V11 Tongwell Street (N) Left Ahead	U	1	N/A	E		1	29	-	619	1900	950	65.2%
3/2+3/3	V11 Tongwell Street (N) Ahead	U	1	N/A	E		1	29	-	770	1900:1900	810+532	57.4 : 57.4%
4/1	A509 Portway (E) Left Ahead	U	2	N/A	G		1	19	-	553	1900	633	87.3%
4/2+4/3	A509 Portway (E) Ahead	U	2	N/A	G		1	19	-	1260	1900:1900	633+633	95.7 : 103.3%
9/1	(Internal) Ahead	U	N/A	N/A	-		-	-	-	552	2000	2000	27.6%
9/2	(Internal) Ahead	U	N/A	N/A	-		-	-	-	911	2000	2000	45.6%
9/3	(Internal) Ahead Right	U	N/A	N/A	-		-	-	-	654	2000	2000	31.7%
10/1	(Internal) Ahead	U	3	N/A	D		1	24	-	597	2000	833	68.3%
10/2	(Internal) Ahead Right	U	3	N/A	D		1	24	-	596	2000	833	68.2%

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10/3	(Internal) Right	U	3	N/A	D		1	24	-	75	2000	833	8.9%
11/1	(Internal) Ahead	U	1	N/A	F		1	17	-	356	2000	600	59.3%
11/2	(Internal) Ahead	U	1	N/A	F		1	17	-	347	2000	600	57.7%
11/3	(Internal) Ahead Right	U	1	N/A	F		1	17	-	369	2000	600	61.5%
12/1	(Internal) Ahead	U	2	N/A	H		1	27	-	421	2000	933	45.1%
12/2	(Internal) Ahead Right	U	2	N/A	H		1	27	-	466	2000	933	49.9%
12/3	(Internal) Right	U	2	N/A	H		1	27	-	305	2000	933	32.7%

TA Report

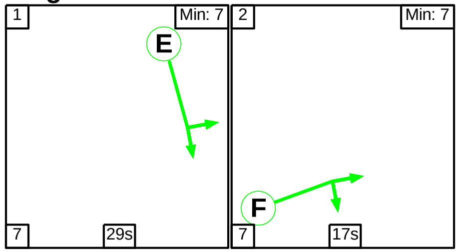
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**1415**	**0**	**0**	**33.6**	**66.1**	**0.0**	**99.7**	**-**	**-**	**-**	**-**
Indicative Pineham Junction	**-**	**-**	**1415**	**0**	**0**	**33.6**	**66.1**	**0.0**	**99.7**	**-**	**-**	**-**	**-**
1/1	259	259	259	0	0	0.3	0.4	-	0.7	9.6	1.8	0.4	2.2
1/2+1/3	614	578	1156	0	0	2.6	25.4	-	28.0	164.0	19.9	25.4	45.3
2/2+2/1	747	747	-	-	-	3.1	2.2	-	5.2	25.3	7.7	2.2	9.9
2/3	369	369	-	-	-	1.5	0.5	-	2.0	19.2	4.6	0.5	5.1
3/1	619	619	-	-	-	1.9	0.9	-	2.8	16.5	7.6	0.9	8.5
3/2+3/3	770	770	-	-	-	2.0	0.7	-	2.7	12.7	5.0	0.7	5.7
4/1	553	553	-	-	-	2.9	3.2	-	6.1	39.6	8.6	3.2	11.8
4/2+4/3	1260	1239	-	-	-	7.3	26.5	-	33.8	96.5	10.9	26.5	37.4
9/1	552	552	-	-	-	0.0	0.2	-	0.2	1.2	0.0	0.2	0.2
9/2	911	911	-	-	-	0.0	0.4	-	0.4	1.7	0.0	0.4	0.4
9/3	633	633	-	-	-	0.0	0.2	-	0.2	1.3	0.0	0.2	0.2
10/1	569	569	-	-	-	1.9	1.1	-	3.0	18.8	5.9	1.1	7.0
10/2	568	568	-	-	-	1.9	1.1	-	3.0	18.7	5.8	1.1	6.9
10/3	74	74	-	-	-	0.3	0.0	-	0.3	16.3	0.8	0.0	0.8
11/1	356	356	-	-	-	0.7	0.7	-	1.4	13.9	1.0	0.7	1.7
11/2	346	346	-	-	-	1.0	0.7	-	1.7	17.2	2.0	0.7	2.7
11/3	369	369	-	-	-	0.7	0.8	-	1.5	14.5	1.1	0.8	1.9
12/1	421	421	-	-	-	2.0	0.4	-	2.4	20.5	4.8	0.4	5.2
12/2	466	466	-	-	-	2.6	0.5	-	3.1	23.6	5.5	0.5	6.0
12/3	305	305	-	-	-	1.1	0.2	-	1.4	16.3	2.8	0.2	3.1

C1 Stream: 1 PRC for Signalled Lanes (%): 38.1 Total Delay for Signalled Lanes (pcuHr): 10.07 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): -14.7 Total Delay for Signalled Lanes (pcuHr): 46.68 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): 10.3 Total Delay for Signalled Lanes (pcuHr): 13.47 Cycle Time (s): 60
PRC Over All Lanes (%): -18.6 Total Delay Over All Lanes(pcuHr): 99.73

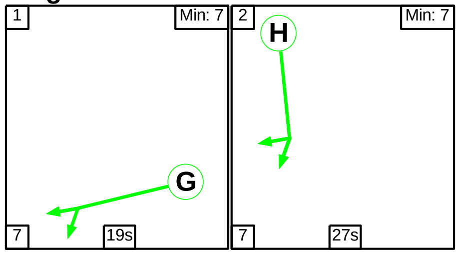
TA Report

Staging Plan Diagram

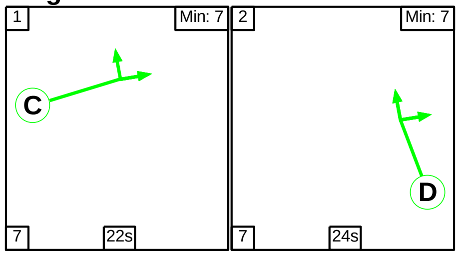
Stage Stream: 1



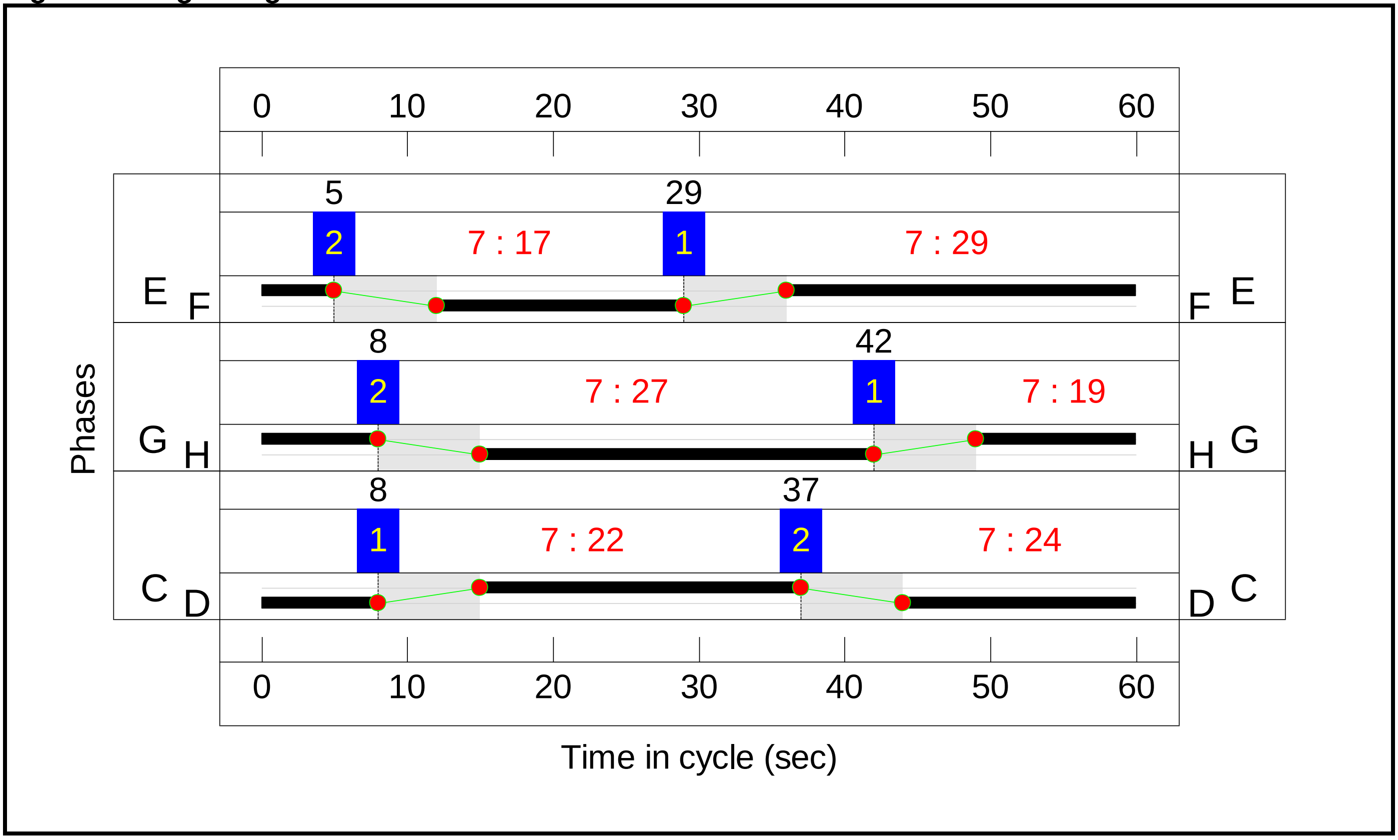
Stage Stream: 2



Stage Stream: 3



Signal Timings Diagram



Scenario 6: '2301 Key Planning Test (PM)' (FG6: '2031 Key Planning Test (PM)', Plan 1: 'Network Control Plan 1')

Phase Timings

Phase Name	Description	Phase	Stage Stream	Green Period 1		
				Total Green	Start Time	End Time
A		Traffic				
B		Traffic				
C	H5 A509 Portway (W) Left Ahead	Traffic	3	30	11	41
D	(Internal) Ahead Right	Traffic	3	16	48	4
E	V11 Tongwell Street (N) Left Ahead	Traffic	1	21	42	3
F	(Internal) Ahead Right	Traffic	1	25	10	35
G	A509 Portway (E) Left Ahead	Traffic	2	12	57	9
H	(Internal) Ahead Right	Traffic	2	34	16	50

TA Report

Link 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: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**106.0%**
Indicative Pineham Junction	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**106.0%**
1/1	V11 Tongwell Street (S) Left	O	N/A	N/A	-		-	-	-	361	1900	676	53.4%
1/2+1/3	V11 Tongwell Street (S) Ahead	O	N/A	N/A	-		-	-	-	1018	1900:1900	660+300	106.0 : 106.0%
2/2+2/1	H5 A509 Portway (W) Left Ahead	U	3	N/A	C		1	30	-	907	1900:1900	0+982	0.0 : 92.4%
2/3	H5 A509 Portway (W) Ahead	U	3	N/A	C		1	30	-	797	1900	982	81.2%
3/1	V11 Tongwell Street (N) Left Ahead	U	1	N/A	E		1	21	-	615	1900	697	88.3%
3/2+3/3	V11 Tongwell Street (N) Ahead	U	1	N/A	E		1	21	-	921	1900:1900	664+322	93.4 : 93.4%
4/1	A509 Portway (E) Left Ahead	U	2	N/A	G		1	12	-	359	1900	412	87.2%
4/2+4/3	A509 Portway (E) Ahead	U	2	N/A	G		1	12	-	772	1900:1900	412+412	98.4 : 89.1%
9/1	(Internal) Ahead	U	N/A	N/A	-		-	-	-	359	2000	2000	18.0%
9/2	(Internal) Ahead	U	N/A	N/A	-		-	-	-	706	2000	2000	35.3%
9/3	(Internal) Ahead Right	U	N/A	N/A	-		-	-	-	367	2000	2000	18.4%
10/1	(Internal) Ahead	U	3	N/A	D		1	16	-	480	2000	567	81.2%
10/2	(Internal) Ahead Right	U	3	N/A	D		1	16	-	479	2000	567	81.1%

TA Report

10/3	(Internal) Right	U	3	N/A	D		1	16	-	356	2000	567	62.8%
11/1	(Internal) Ahead	U	1	N/A	F		1	25	-	337	2000	867	38.9%
11/2	(Internal) Ahead	U	1	N/A	F		1	25	-	352	2000	867	40.6%
11/3	(Internal) Ahead Right	U	1	N/A	F		1	25	-	801	2000	867	92.4%
12/1	(Internal) Ahead	U	2	N/A	H		1	34	-	281	2000	1167	24.1%
12/2	(Internal) Ahead Right	U	2	N/A	H		1	34	-	627	2000	1167	53.7%
12/3	(Internal) Right	U	2	N/A	H		1	34	-	301	2000	1167	25.8%

TA Report

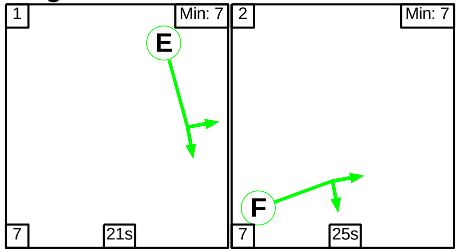
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: E10 PINEHAM ROUNDABOUT (MITIGATION)	**-**	**-**	**2318**	**0**	**0**	**38.2**	**74.7**	**0.0**	**113.0**	**-**	**-**	**-**	**-**
Indicative Pineham Junction	**-**	**-**	**2318**	**0**	**0**	**38.2**	**74.7**	**0.0**	**113.0**	**-**	**-**	**-**	**-**
1/1	361	361	361	0	0	0.2	0.6	-	0.8	7.9	2.3	0.6	2.9
1/2+1/3	1018	978	1957	0	0	2.4	35.9	-	38.3	135.5	25.1	35.9	61.0
2/2+2/1	907	907	-	-	-	3.4	5.3	-	8.7	34.5	13.9	5.3	19.2
2/3	797	797	-	-	-	2.7	2.1	-	4.8	21.6	10.8	2.1	13.0
3/1	615	615	-	-	-	3.0	3.5	-	6.5	38.1	9.6	3.5	13.0
3/2+3/3	921	921	-	-	-	4.3	6.0	-	10.2	40.0	9.6	6.0	15.6
4/1	359	359	-	-	-	2.3	3.1	-	5.3	53.3	5.7	3.1	8.7
4/2+4/3	772	772	-	-	-	5.0	6.1	-	11.0	51.5	6.6	6.1	12.7
9/1	359	359	-	-	-	0.0	0.1	-	0.1	1.1	0.0	0.1	0.1
9/2	706	706	-	-	-	0.0	0.3	-	0.3	1.4	0.0	0.3	0.3
9/3	367	367	-	-	-	0.0	0.1	-	0.1	1.1	0.0	0.1	0.1
10/1	460	460	-	-	-	2.7	2.1	-	4.8	37.4	6.9	2.1	9.0
10/2	459	459	-	-	-	2.7	2.1	-	4.8	37.4	6.9	2.1	8.9
10/3	356	356	-	-	-	1.9	0.8	-	2.7	27.6	5.2	0.8	6.1
11/1	337	337	-	-	-	0.5	0.3	-	0.8	8.9	1.0	0.3	1.3
11/2	352	352	-	-	-	2.0	0.3	-	2.3	23.7	5.9	0.3	6.2
11/3	801	801	-	-	-	1.0	5.3	-	6.3	28.3	2.3	5.3	7.6
12/1	281	281	-	-	-	0.7	0.2	-	0.9	10.9	2.4	0.2	2.6
12/2	627	627	-	-	-	2.9	0.6	-	3.5	19.8	7.1	0.6	7.7
12/3	301	301	-	-	-	0.6	0.2	-	0.7	8.9	1.7	0.2	1.9

C1 Stream: 1 PRC for Signalled Lanes (%): -3.8 Total Delay for Signalled Lanes (pcuHr): 26.21 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): -9.3 Total Delay for Signalled Lanes (pcuHr): 21.40 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): -2.7 Total Delay for Signalled Lanes (pcuHr): 25.76 Cycle Time (s): 60
PRC Over All Lanes (%): -17.8 Total Delay Over All Lanes(pcuHr): 112.97

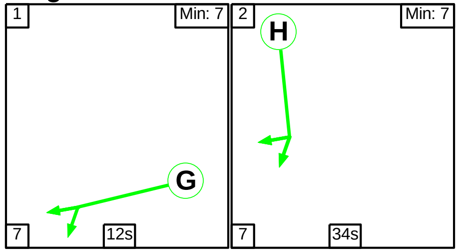
TA Report

Staging Plan Diagram

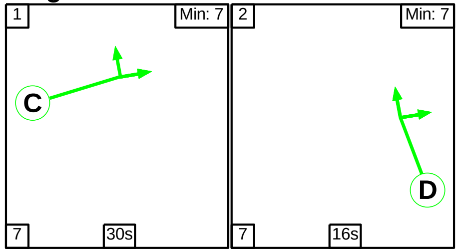
Stage Stream: 1



Stage Stream: 2

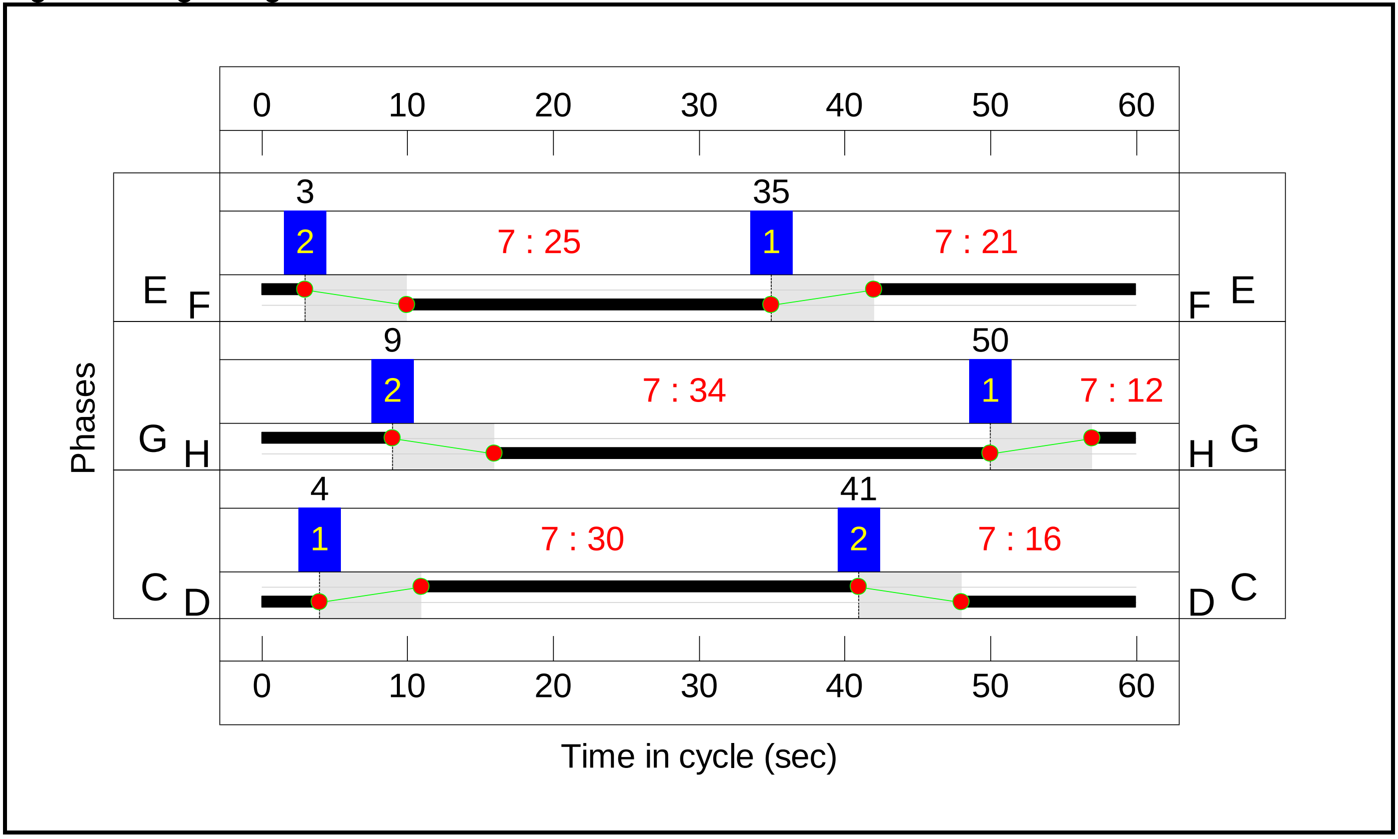


Stage Stream: 3



TA Report

Signal Timings Diagram

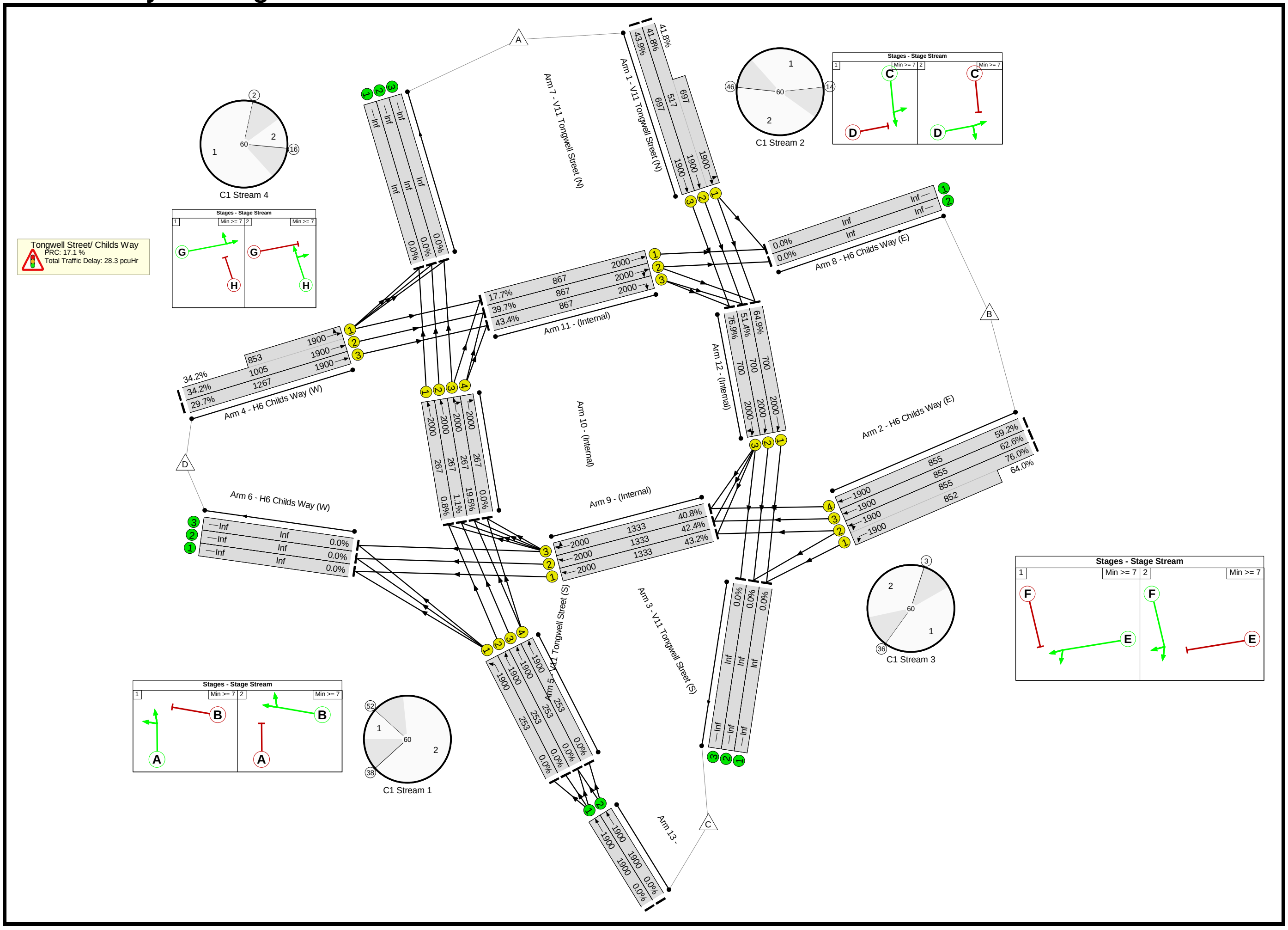


Basic Results Summary
Basic Results Summary

User and Project Details

Project:	**MILTON KEYNES EAST**
Title:	**E11 FOX MILNE ROUNDABOUT (MITIGATION)**
Location:	
Additional detail:	
File name:	11. FoxMilneRbt-FullSig.lsg3x
Author:	
Company:	WSP
Address:	

Scenario 5: '2031 Do Something AM' (FG7: '2031 Reference Case+Dev 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: E11 FOX MILNE ROUNDABOUT (MITIGATION)	-	-	-		-	-	-	-	-	-	**76.9%**	**0**	**0**	**0**	**28.3**	-	-
Tongwell Street/ Childs Way	-	-	-		-	-	-	-	-	-	**76.9%**	**0**	**0**	**0**	**28.3**	-	-
1/2+1/1	V11 Tongwell Street (N) Left Ahead	U	C		1	21	-	507	1900:1900	517+697	41.8 : 41.8%	-	-	-	2.3	16.5	3.9
1/3	V11 Tongwell Street (N) Ahead	U	C		1	21	-	306	1900	697	43.9%	-	-	-	1.6	19.0	4.2
2/2+2/1	H6 Childs Way (E) Left Ahead	U	E		1	26	-	1195	1900:1900	855+852	76.0 : 64.0%	-	-	-	5.6	16.8	10.2
2/3	H6 Childs Way (E) Ahead	U	E		1	26	-	535	1900	855	62.6%	-	-	-	2.7	18.2	7.5
2/4	H6 Childs Way (E) Ahead	U	E		1	26	-	506	1900	855	59.2%	-	-	-	2.5	17.5	6.9
3/1	V11 Tongwell Street (S) Left	U	A		1	7	-	0	1900	253	0.0%	-	-	-	0.0	0.0	0.0
3/2	V11 Tongwell Street (S) Ahead	U	A		1	7	-	0	1900	253	0.0%	-	-	-	0.0	0.0	0.0
3/3	V11 Tongwell Street (S) Ahead	U	A		1	7	-	0	1900	253	0.0%	-	-	-	0.0	0.0	0.0
3/4	V11 Tongwell Street (S) Ahead	U	A		1	7	-	0	1900	253	0.0%	-	-	-	0.0	0.0	0.0
4/2+4/1	H6 Childs Way (W) Left Ahead	U	G		1	39	-	636	1900:1900	1005+853	34.2 : 34.2%	-	-	-	1.0	5.5	2.6
4/3	H6 Childs Way (W) Ahead	U	G		1	39	-	376	1900	1267	29.7%	-	-	-	0.6	6.2	2.7

Basic Results Summary

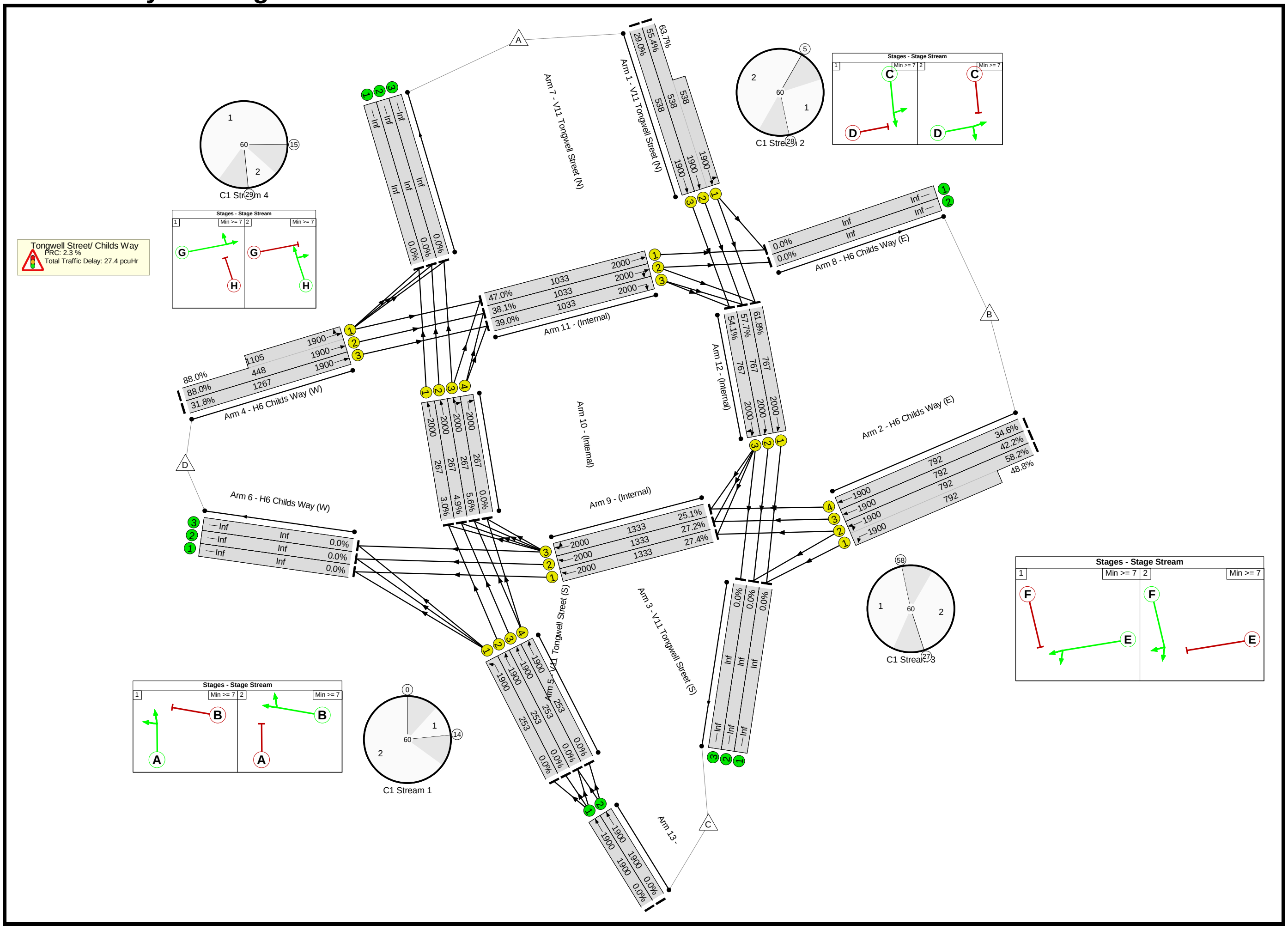
9/1	(Internal) Ahead	U	B		1	39	-	576	2000	1333	43.2%	-	-	-	0.5	3.0	1.2
9/2	(Internal) Ahead	U	B		1	39	-	565	2000	1333	42.4%	-	-	-	0.4	2.6	0.6
9/3	(Internal) Ahead Right	U	B		1	39	-	544	2000	1333	40.8%	-	-	-	0.4	2.7	0.7
10/1	(Internal) Ahead	U	H		1	7	-	2	2000	267	0.8%	-	-	-	0.0	42.5	0.0
10/2	(Internal) Ahead	U	H		1	7	-	3	2000	267	1.1%	-	-	-	0.0	42.5	0.0
10/3	(Internal) Ahead Right	U	H		1	7	-	52	2000	267	19.5%	-	-	-	0.6	44.3	0.8
10/4	(Internal) Right	U	H		1	7	-	0	2000	267	0.0%	-	-	-	0.0	0.0	0.0
11/1	(Internal) Ahead	U	D		1	25	-	153	2000	867	17.7%	-	-	-	0.4	10.1	0.8
11/2	(Internal) Ahead Right	U	D		1	25	-	344	2000	867	39.7%	-	-	-	1.1	11.2	2.0
11/3	(Internal) Right	U	D		1	25	-	376	2000	867	43.4%	-	-	-	1.2	11.5	2.2
12/1	(Internal) Ahead	U	F		1	20	-	454	2000	700	64.9%	-	-	-	2.3	18.2	4.8
12/2	(Internal) Ahead	U	F		1	20	-	360	2000	700	51.4%	-	-	-	1.6	15.9	3.7
12/3	(Internal) Ahead Right	U	F		1	20	-	538	2000	700	76.9%	-	-	-	3.4	22.9	6.7
13/1	Ahead	U	-		-	-	-	0	1900	1900	0.0%	-	-	-	0.0	0.0	0.0
13/2	Ahead	U	-		-	-	-	0	1900	1900	0.0%	-	-	-	0.0	0.0	0.0

C1 Stream: 1 PRC for Signalled Lanes (%): 108.3 Total Delay for Signalled Lanes (pcuHr): 1.29 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): 104.9 Total Delay for Signalled Lanes (pcuHr): 6.63 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): 17.1 Total Delay for Signalled Lanes (pcuHr): 18.06 Cycle Time (s): 60
C1 Stream: 4 PRC for Signalled Lanes (%): 162.9 Total Delay for Signalled Lanes (pcuHr): 2.31 Cycle Time (s): 60
PRC Over All Lanes (%): 17.1 Total Delay Over All Lanes(pcuHr): 28.28

Basic Results Summary

Scenario 6: '2031 Do Something PM' (FG8: '2031 Reference Case+Dev 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: E11 FOX MILNE ROUNDABOUT (MITIGATION)	-	-	-		-	-	-	-	-	-	**88.0%**	**0**	**0**	**0**	**27.4**	-	-
Tongwell Street/ Childs Way	-	-	-		-	-	-	-	-	-	**88.0%**	**0**	**0**	**0**	**27.4**	-	-
1/2+1/1	V11 Tongwell Street (N) Left Ahead	U	C		1	16	-	641	1900:1900	538+538	55.4 : 63.7%	-	-	-	4.0	22.7	5.7
1/3	V11 Tongwell Street (N) Ahead	U	C		1	16	-	156	1900	538	29.0%	-	-	-	0.9	21.5	2.2
2/2+2/1	H6 Childs Way (E) Left Ahead	U	E		1	24	-	847	1900:1900	792+792	58.2 : 48.8%	-	-	-	3.7	15.6	6.5
2/3	H6 Childs Way (E) Ahead	U	E		1	24	-	334	1900	792	42.2%	-	-	-	1.5	16.3	4.3
2/4	H6 Childs Way (E) Ahead	U	E		1	24	-	274	1900	792	34.6%	-	-	-	1.2	15.4	3.3
3/1	V11 Tongwell Street (S) Left	U	A		1	7	-	0	1900	253	0.0%	-	-	-	0.0	0.0	0.0
3/2	V11 Tongwell Street (S) Ahead	U	A		1	7	-	0	1900	253	0.0%	-	-	-	0.0	0.0	0.0
3/3	V11 Tongwell Street (S) Ahead	U	A		1	7	-	0	1900	253	0.0%	-	-	-	0.0	0.0	0.0
3/4	V11 Tongwell Street (S) Ahead	U	A		1	7	-	0	1900	253	0.0%	-	-	-	0.0	0.0	0.0
4/2+4/1	H6 Childs Way (W) Left Ahead	U	G		1	39	-	1366	1900:1900	448+1105	88.0 : 88.0%	-	-	-	5.8	15.4	14.3
4/3	H6 Childs Way (W) Ahead	U	G		1	39	-	403	1900	1267	31.8%	-	-	-	0.7	6.3	3.0

Basic Results Summary

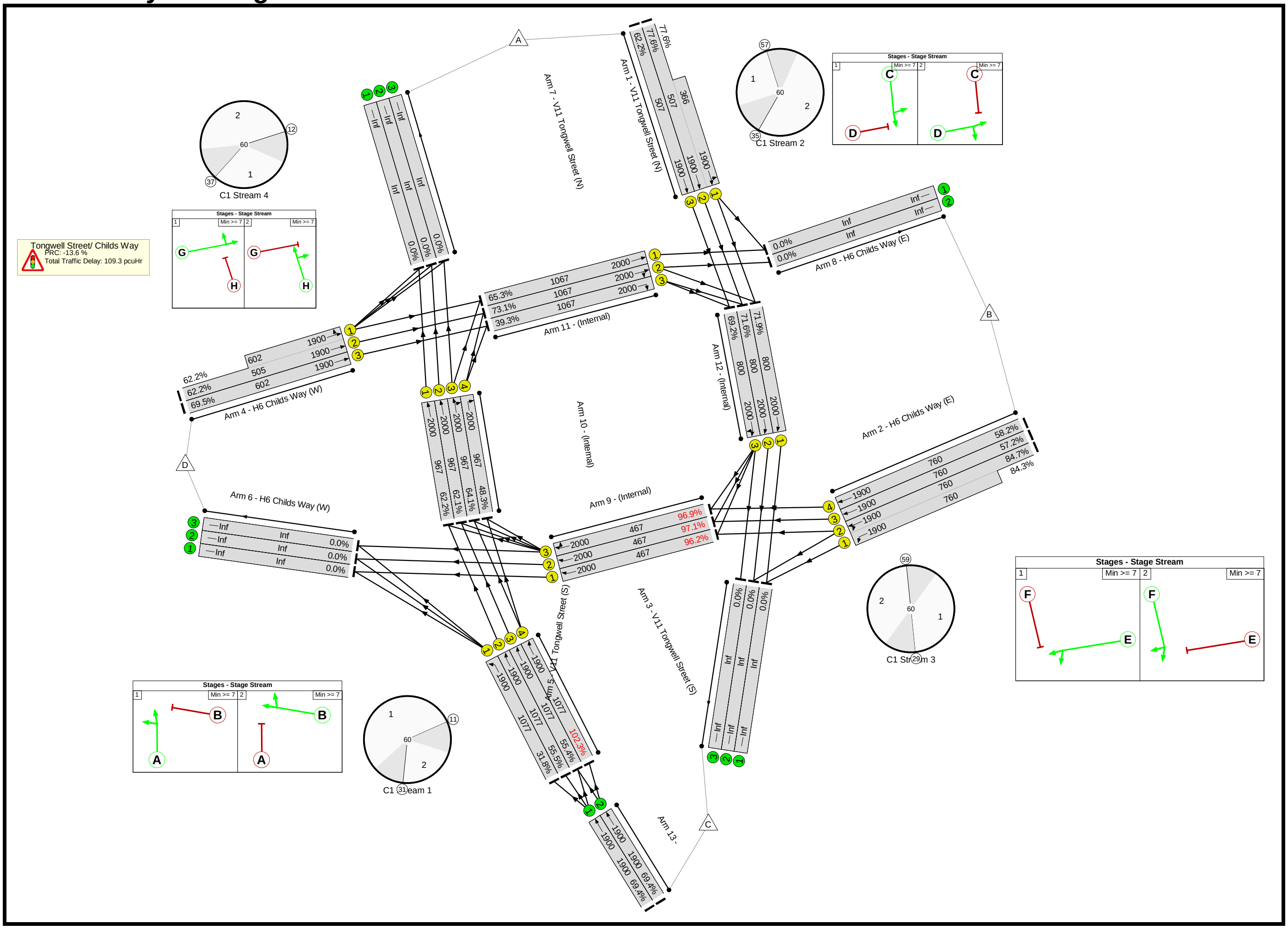
9/1	(Internal) Ahead	U	B		1	39	-	365	2000	1333	27.4%	-	-	-	0.2	2.2	0.6
9/2	(Internal) Ahead	U	B		1	39	-	363	2000	1333	27.2%	-	-	-	0.2	2.2	0.6
9/3	(Internal) Ahead Right	U	B		1	39	-	334	2000	1333	25.1%	-	-	-	0.2	2.5	1.0
10/1	(Internal) Ahead	U	H		1	7	-	8	2000	267	3.0%	-	-	-	0.1	44.3	0.1
10/2	(Internal) Ahead	U	H		1	7	-	13	2000	267	4.9%	-	-	-	0.2	44.4	0.2
10/3	(Internal) Ahead Right	U	H		1	7	-	15	2000	267	5.6%	-	-	-	0.2	44.4	0.3
10/4	(Internal) Right	U	H		1	7	-	0	2000	267	0.0%	-	-	-	0.0	0.0	0.0
11/1	(Internal) Ahead	U	D		1	30	-	486	2000	1033	47.0%	-	-	-	1.1	8.0	2.2
11/2	(Internal) Ahead Right	U	D		1	30	-	394	2000	1033	38.1%	-	-	-	0.8	7.4	1.6
11/3	(Internal) Right	U	D		1	30	-	403	2000	1033	39.0%	-	-	-	0.8	7.5	1.6
12/1	(Internal) Ahead	U	F		1	22	-	474	2000	767	61.8%	-	-	-	1.8	13.5	3.4
12/2	(Internal) Ahead	U	F		1	22	-	442	2000	767	57.7%	-	-	-	1.6	13.4	3.3
12/3	(Internal) Ahead Right	U	F		1	22	-	415	2000	767	54.1%	-	-	-	2.2	19.4	5.1
13/1	Ahead	U	-		-	-	-	0	1900	1900	0.0%	-	-	-	0.0	0.0	0.0
13/2	Ahead	U	-		-	-	-	0	1900	1900	0.0%	-	-	-	0.0	0.0	0.0

C1 Stream: 1 PRC for Signalled Lanes (%): 228.8 Total Delay for Signalled Lanes (pcuHr): 0.68 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): 41.3 Total Delay for Signalled Lanes (pcuHr): 7.70 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): 45.6 Total Delay for Signalled Lanes (pcuHr): 12.03 Cycle Time (s): 60
C1 Stream: 4 PRC for Signalled Lanes (%): 2.3 Total Delay for Signalled Lanes (pcuHr): 6.98 Cycle Time (s): 60
PRC Over All Lanes (%): 2.3 Total Delay Over All Lanes(pcuHr): 27.38

Basic Results Summary

Scenario 9: '2048 Do Something AM' (FG11: '2048 Reference Case+Dev 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: E11 FOX MILNE ROUNDABOUT (MITIGATION)	-	-	-		-	-	-	-	-	-	**102.3%**	**0**	**0**	**0**	**109.3**	-	-
Tongwell Street/ Childs Way	-	-	-		-	-	-	-	-	-	**102.3%**	**0**	**0**	**0**	**109.3**	-	-
1/2+1/1	V11 Tongwell Street (N) Left Ahead	U	C		1	15	-	677	1900:1900	507+366	77.6 : 77.6%	-	-	-	5.4	28.8	7.7
1/3	V11 Tongwell Street (N) Ahead	U	C		1	15	-	315	1900	507	62.2%	-	-	-	2.5	28.7	5.4
2/2+2/1	H6 Childs Way (E) Left Ahead	U	E		1	23	-	1285	1900:1900	760+760	84.7 : 84.3%	-	-	-	8.5	23.8	12.3
2/3	H6 Childs Way (E) Ahead	U	E		1	23	-	435	1900	760	57.2%	-	-	-	2.4	19.5	6.2
2/4	H6 Childs Way (E) Ahead	U	E		1	23	-	442	1900	760	58.2%	-	-	-	2.4	19.7	6.3
3/1	V11 Tongwell Street (S) Left	U	A		1	33	-	342	1900	1077	31.8%	-	-	-	0.9	9.3	3.2
3/2	V11 Tongwell Street (S) Ahead	U	A		1	33	-	598	1900	1077	55.5%	-	-	-	2.0	12.0	6.8
3/3	V11 Tongwell Street (S) Ahead	U	A		1	33	-	596	1900	1077	55.4%	-	-	-	2.0	11.9	6.7
3/4	V11 Tongwell Street (S) Ahead	U	A		1	33	-	1101	1900	1077	102.3%	-	-	-	28.6	93.4	42.5
4/2+4/1	H6 Childs Way (W) Left Ahead	U	G		1	18	-	688	1900:1900	505+602	62.2 : 62.2%	-	-	-	4.1	21.4	6.1
4/3	H6 Childs Way (W) Ahead	U	G		1	18	-	418	1900	602	69.5%	-	-	-	3.2	27.6	7.2

Basic Results Summary

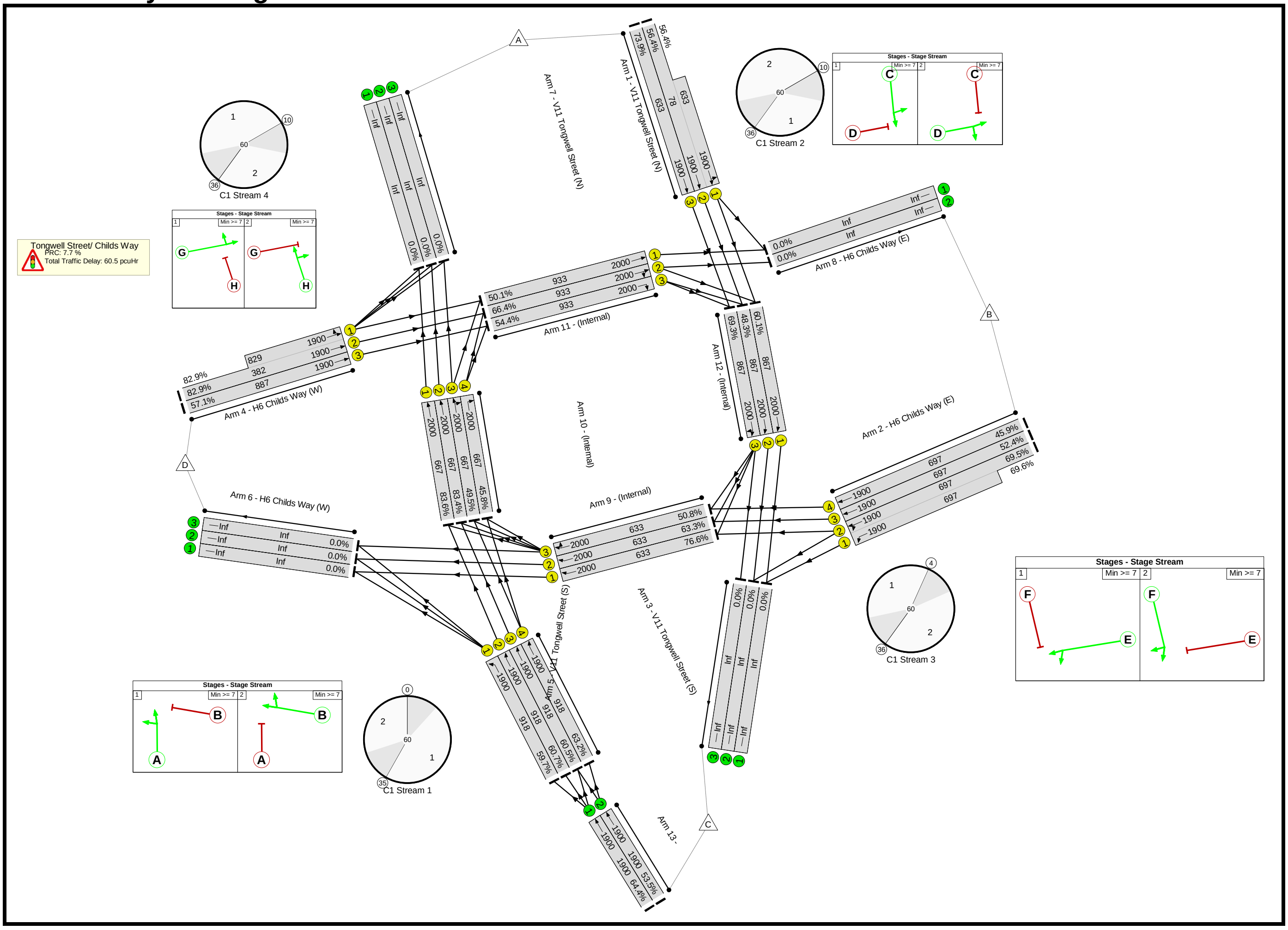
9/1	(Internal) Ahead	U	B		1	13	-	449	2000	467	96.2%	-	-	-	9.0	72.0	14.5
9/2	(Internal) Ahead	U	B		1	13	-	453	2000	467	97.1%	-	-	-	9.1	72.2	15.3
9/3	(Internal) Ahead Right	U	B		1	13	-	452	2000	467	96.9%	-	-	-	8.7	69.6	15.0
10/1	(Internal) Ahead	U	H		1	28	-	601	2000	967	62.2%	-	-	-	1.4	8.2	8.2
10/2	(Internal) Ahead	U	H		1	28	-	600	2000	967	62.1%	-	-	-	1.4	8.3	8.2
10/3	(Internal) Ahead Right	U	H		1	28	-	633	2000	967	64.1%	-	-	-	1.1	6.6	4.3
10/4	(Internal) Right	U	H		1	28	-	477	2000	967	48.3%	-	-	-	0.7	5.5	2.3
11/1	(Internal) Ahead	U	D		1	31	-	710	2000	1067	65.3%	-	-	-	3.5	18.3	11.5
11/2	(Internal) Ahead Right	U	D		1	31	-	790	2000	1067	73.1%	-	-	-	3.2	14.9	9.4
11/3	(Internal) Right	U	D		1	31	-	419	2000	1067	39.3%	-	-	-	0.5	4.3	0.7
12/1	(Internal) Ahead	U	F		1	23	-	575	2000	800	71.9%	-	-	-	2.7	16.8	10.3
12/2	(Internal) Ahead	U	F		1	23	-	573	2000	800	71.6%	-	-	-	1.9	11.6	4.3
12/3	(Internal) Ahead Right	U	F		1	23	-	554	2000	800	69.2%	-	-	-	1.9	12.5	5.2
13/1	Ahead	U	-		-	-	-	1319	1900	1900	69.4%	-	-	-	1.1	3.1	1.1
13/2	Ahead	U	-		-	-	-	1318	1900	1900	69.4%	-	-	-	1.1	3.1	1.1

C1 Stream: 1 PRC for Signalled Lanes (%): -13.6 Total Delay for Signalled Lanes (pcuHr): 60.21 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): 16.0 Total Delay for Signalled Lanes (pcuHr): 15.18 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): 6.2 Total Delay for Signalled Lanes (pcuHr): 19.73 Cycle Time (s): 60
C1 Stream: 4 PRC for Signalled Lanes (%): 29.5 Total Delay for Signalled Lanes (pcuHr): 11.90 Cycle Time (s): 60
PRC Over All Lanes (%): -13.6 Total Delay Over All Lanes(pcuHr): 109.28

Basic Results Summary

Scenario 10: '2048 Do Something PM' (FG12: '2048 Reference Case+Dev 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: E11 FOX MILNE ROUNDABOUT (MITIGATION)	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**83.6%**	**0**	**0**	**0**	**60.5**	**-**	**-**
Tongwell Street/ Childs Way	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**83.6%**	**0**	**0**	**0**	**60.5**	**-**	**-**
1/2+1/1	V11 Tongwell Street (N) Left Ahead	U	C		1	19	-	401	1900:1900	78+633	56.4 : 56.4%	-	-	-	2.4	21.9	5.5
1/3	V11 Tongwell Street (N) Ahead	U	C		1	19	-	468	1900	633	73.9%	-	-	-	3.7	28.4	8.3
2/2+2/1	H6 Childs Way (E) Left Ahead	U	E		1	21	-	969	1900:1900	697+697	69.5 : 69.6%	-	-	-	5.5	20.4	8.0
2/3	H6 Childs Way (E) Ahead	U	E		1	21	-	365	1900	697	52.4%	-	-	-	2.1	20.3	5.3
2/4	H6 Childs Way (E) Ahead	U	E		1	21	-	320	1900	697	45.9%	-	-	-	1.7	19.2	4.4
3/1	V11 Tongwell Street (S) Left	U	A		1	28	-	548	1900	918	59.7%	-	-	-	2.5	16.1	7.3
3/2	V11 Tongwell Street (S) Ahead	U	A		1	28	-	557	1900	918	60.7%	-	-	-	2.5	16.3	7.4
3/3	V11 Tongwell Street (S) Ahead	U	A		1	28	-	556	1900	918	60.5%	-	-	-	2.5	16.3	7.4
3/4	V11 Tongwell Street (S) Ahead	U	A		1	28	-	580	1900	918	63.2%	-	-	-	2.7	16.8	7.9
4/2+4/1	H6 Childs Way (W) Left Ahead	U	G		1	27	-	1004	1900:1900	382+829	82.9 : 82.9%	-	-	-	5.8	20.9	11.9
4/3	H6 Childs Way (W) Ahead	U	G		1	27	-	506	1900	887	57.1%	-	-	-	2.3	16.3	6.7

Basic Results Summary

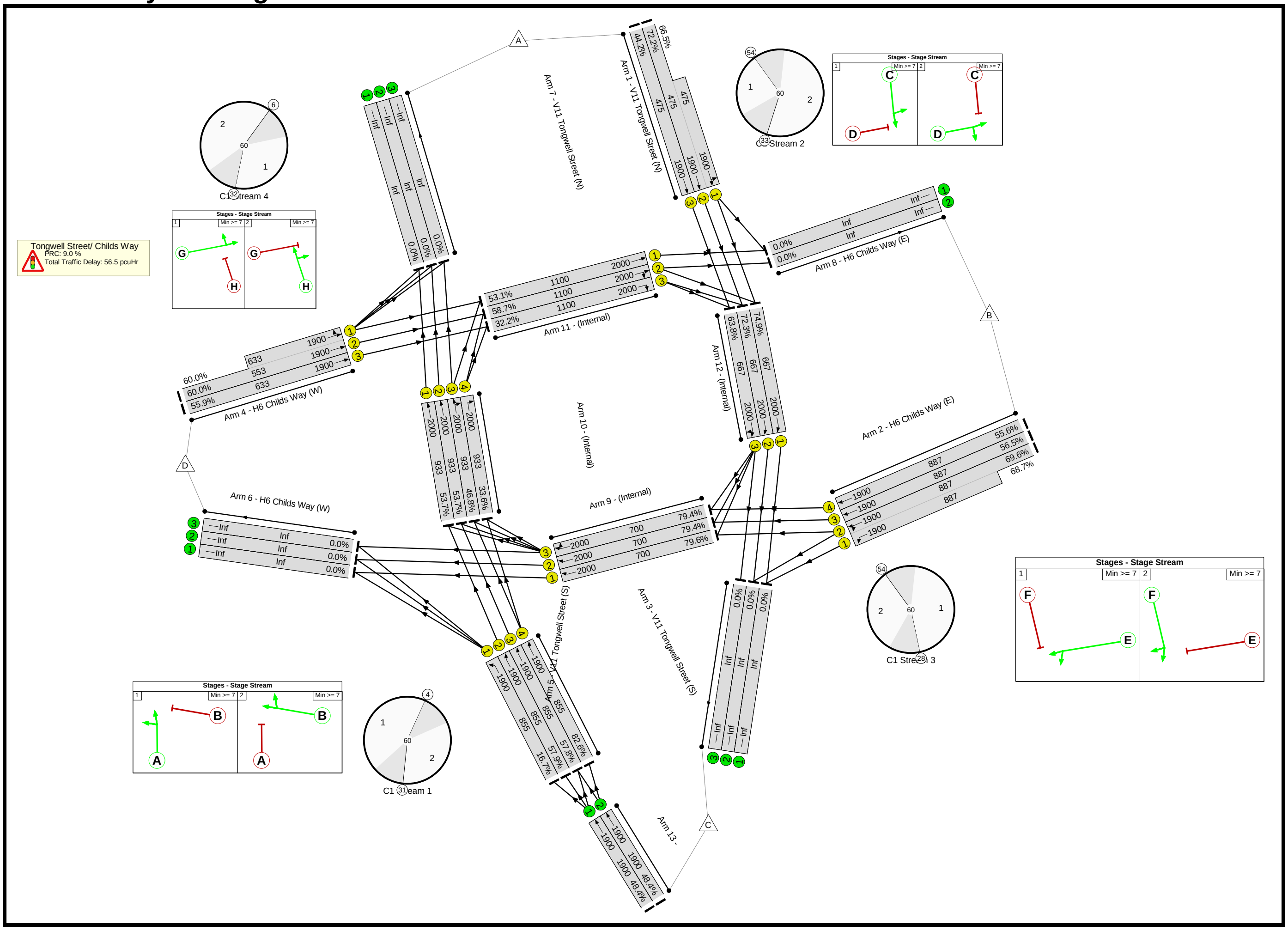
9/1	(Internal) Ahead	U	B		1	18	-	485	2000	633	76.6%	-	-	-	2.7	20.2	7.7
9/2	(Internal) Ahead	U	B		1	18	-	401	2000	633	63.3%	-	-	-	1.4	12.3	2.0
9/3	(Internal) Ahead Right	U	B		1	18	-	322	2000	633	50.8%	-	-	-	0.9	10.1	1.1
10/1	(Internal) Ahead	U	H		1	19	-	557	2000	667	83.6%	-	-	-	3.5	22.9	10.9
10/2	(Internal) Ahead	U	H		1	19	-	556	2000	667	83.4%	-	-	-	3.5	22.7	10.9
10/3	(Internal) Ahead Right	U	H		1	19	-	330	2000	667	49.5%	-	-	-	1.3	14.1	5.1
10/4	(Internal) Right	U	H		1	19	-	305	2000	667	45.8%	-	-	-	0.8	9.3	4.4
11/1	(Internal) Ahead	U	D		1	27	-	468	2000	933	50.1%	-	-	-	0.6	4.9	0.8
11/2	(Internal) Ahead Right	U	D		1	27	-	620	2000	933	66.4%	-	-	-	3.5	20.5	10.3
11/3	(Internal) Right	U	D		1	27	-	508	2000	933	54.4%	-	-	-	0.7	5.0	0.8
12/1	(Internal) Ahead	U	F		1	25	-	521	2000	867	60.1%	-	-	-	1.6	10.8	3.8
12/2	(Internal) Ahead	U	F		1	25	-	419	2000	867	48.3%	-	-	-	2.8	24.1	7.3
12/3	(Internal) Ahead Right	U	F		1	25	-	601	2000	867	69.3%	-	-	-	2.0	11.8	3.7
13/1	Ahead	U	-		-	-	-	1224	1900	1900	64.4%	-	-	-	0.9	2.7	0.9
13/2	Ahead	U	-		-	-	-	1017	1900	1900	53.5%	-	-	-	0.6	2.0	0.6

C1 Stream: 1 PRC for Signalled Lanes (%): 17.5 Total Delay for Signalled Lanes (pcuHr): 15.18 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): 21.8 Total Delay for Signalled Lanes (pcuHr): 11.00 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): 29.3 Total Delay for Signalled Lanes (pcuHr): 15.58 Cycle Time (s): 60
C1 Stream: 4 PRC for Signalled Lanes (%): 7.7 Total Delay for Signalled Lanes (pcuHr): 17.24 Cycle Time (s): 60
PRC Over All Lanes (%): 7.7 Total Delay Over All Lanes(pcuHr): 60.49

Basic Results Summary

Scenario 11: '2031 Key Planning Test (AM)' (FG13: '2031 Key Planning Test (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: E11 FOX MILNE ROUNDABOUT (MITIGATION)	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**82.6%**	**0**	**0**	**0**	**56.5**	**-**	**-**
Tongwell Street/ Childs Way	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**82.6%**	**0**	**0**	**0**	**56.5**	**-**	**-**
1/2+1/1	V11 Tongwell Street (N) Left Ahead	U	C		1	14	-	659	1900:1900	475+475	72.2 : 66.5%	-	-	-	4.9	26.6	6.3
1/3	V11 Tongwell Street (N) Ahead	U	C		1	14	-	210	1900	475	44.2%	-	-	-	1.5	25.8	3.3
2/2+2/1	H6 Childs Way (E) Left Ahead	U	E		1	27	-	1226	1900:1900	887+887	69.6 : 68.7%	-	-	-	5.4	15.9	9.2
2/3	H6 Childs Way (E) Ahead	U	E		1	27	-	501	1900	887	56.5%	-	-	-	2.3	16.2	6.6
2/4	H6 Childs Way (E) Ahead	U	E		1	27	-	493	1900	887	55.6%	-	-	-	2.2	16.1	6.5
3/1	V11 Tongwell Street (S) Left	U	A		1	26	-	143	1900	855	16.7%	-	-	-	0.5	12.4	1.5
3/2	V11 Tongwell Street (S) Ahead	U	A		1	26	-	495	1900	855	57.9%	-	-	-	2.4	17.3	6.7
3/3	V11 Tongwell Street (S) Ahead	U	A		1	26	-	494	1900	855	57.8%	-	-	-	2.4	17.2	6.7
3/4	V11 Tongwell Street (S) Ahead	U	A		1	26	-	706	1900	855	82.6%	-	-	-	5.1	26.2	12.5
4/2+4/1	H6 Childs Way (W) Left Ahead	U	G		1	19	-	712	1900:1900	553+633	60.0 : 60.0%	-	-	-	4.0	20.2	6.0
4/3	H6 Childs Way (W) Ahead	U	G		1	19	-	354	1900	633	55.9%	-	-	-	2.2	22.8	5.4

Basic Results Summary

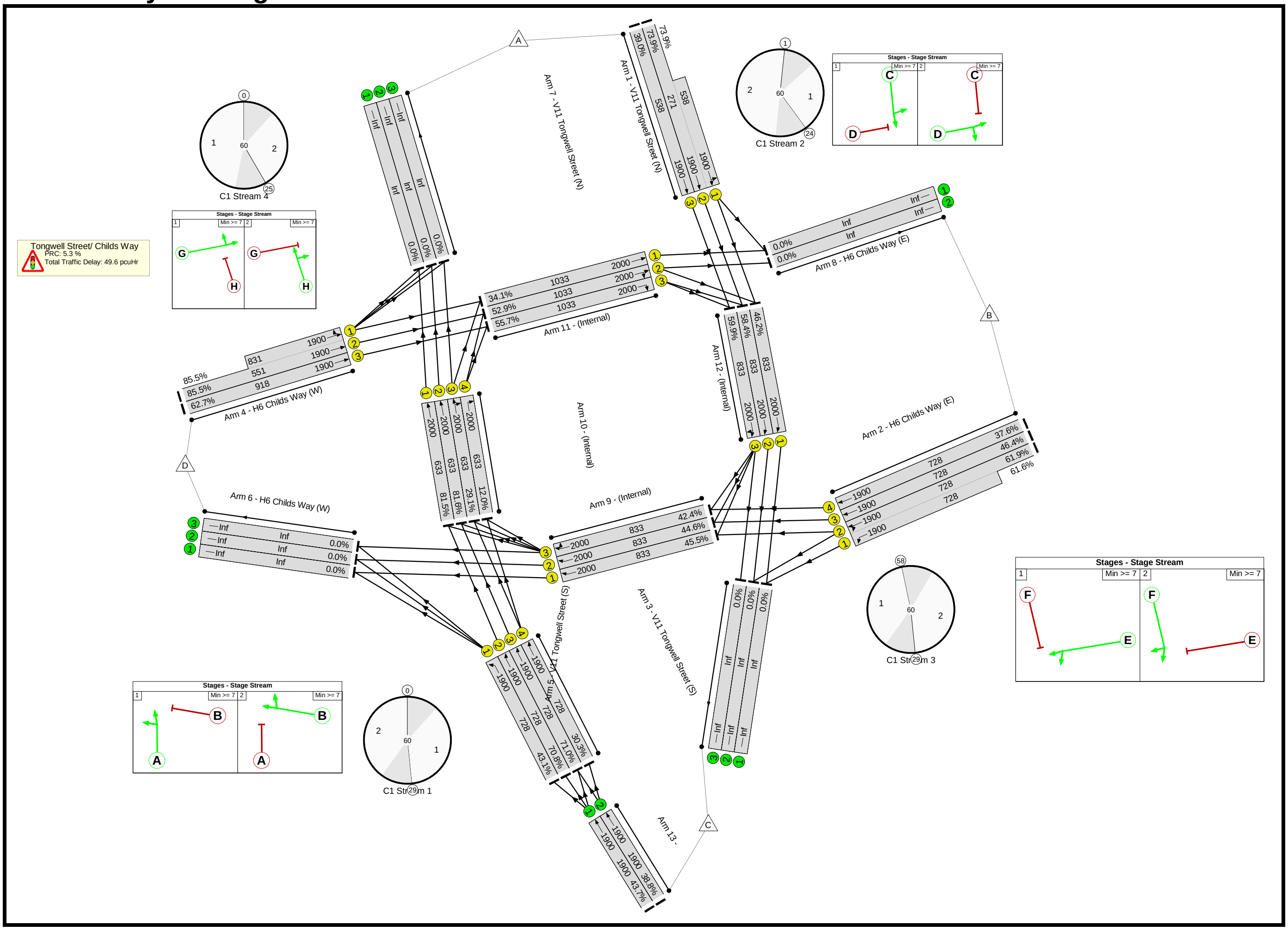
9/1	(Internal) Ahead	U	B		1	20	-	557	2000	700	79.6%	-	-	-	3.3	21.2	10.6
9/2	(Internal) Ahead	U	B		1	20	-	556	2000	700	79.4%	-	-	-	3.4	22.1	10.5
9/3	(Internal) Ahead Right	U	B		1	20	-	556	2000	700	79.4%	-	-	-	3.3	21.5	10.4
10/1	(Internal) Ahead	U	H		1	27	-	501	2000	933	53.7%	-	-	-	0.6	4.4	0.7
10/2	(Internal) Ahead	U	H		1	27	-	501	2000	933	53.7%	-	-	-	0.6	4.4	0.7
10/3	(Internal) Ahead Right	U	H		1	27	-	437	2000	933	46.8%	-	-	-	0.7	5.6	1.7
10/4	(Internal) Right	U	H		1	27	-	314	2000	933	33.6%	-	-	-	0.3	3.3	0.3
11/1	(Internal) Ahead	U	D		1	32	-	584	2000	1100	53.1%	-	-	-	2.2	13.4	7.1
11/2	(Internal) Ahead Right	U	D		1	32	-	646	2000	1100	58.7%	-	-	-	1.8	10.2	6.0
11/3	(Internal) Right	U	D		1	32	-	354	2000	1100	32.2%	-	-	-	0.3	2.6	0.3
12/1	(Internal) Ahead	U	F		1	19	-	499	2000	667	74.9%	-	-	-	2.4	17.6	4.9
12/2	(Internal) Ahead	U	F		1	19	-	482	2000	667	72.3%	-	-	-	2.0	14.7	3.7
12/3	(Internal) Ahead Right	U	F		1	19	-	425	2000	667	63.8%	-	-	-	1.9	16.0	4.6
13/1	Ahead	U	-		-	-	-	919	1900	1900	48.4%	-	-	-	0.5	1.8	0.5
13/2	Ahead	U	-		-	-	-	919	1900	1900	48.4%	-	-	-	0.5	1.8	0.5

C1 Stream: 1 PRC for Signalled Lanes (%): 9.0 Total Delay for Signalled Lanes (pcuHr): 20.38 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): 24.6 Total Delay for Signalled Lanes (pcuHr): 10.62 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): 20.2 Total Delay for Signalled Lanes (pcuHr): 16.17 Cycle Time (s): 60
C1 Stream: 4 PRC for Signalled Lanes (%): 50.0 Total Delay for Signalled Lanes (pcuHr): 8.43 Cycle Time (s): 60
PRC Over All Lanes (%): 9.0 Total Delay Over All Lanes(pcuHr): 56.54

Basic Results Summary

Scenario 12: '2031 Key Planning Test (PM)' (FG14: '2031 Key Planning Test (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: E11 FOX MILNE ROUNDABOUT (MITIGATION)	-	-	-		-	-	-	-	-	-	**85.5%**	**0**	**0**	**0**	**49.6**	-	-
Tongwell Street/ Childs Way	-	-	-		-	-	-	-	-	-	**85.5%**	**0**	**0**	**0**	**49.6**	-	-
1/2+1/1	V11 Tongwell Street (N) Left Ahead	U	C		1	16	-	598	1900:1900	271+538	73.9 : 73.9%	-	-	-	4.5	27.2	7.4
1/3	V11 Tongwell Street (N) Ahead	U	C		1	16	-	210	1900	538	39.0%	-	-	-	1.3	22.8	3.1
2/2+2/1	H6 Childs Way (E) Left Ahead	U	E		1	22	-	900	1900:1900	728+728	61.9 : 61.6%	-	-	-	4.5	18.2	6.8
2/3	H6 Childs Way (E) Ahead	U	E		1	22	-	338	1900	728	46.4%	-	-	-	1.7	18.5	4.7
2/4	H6 Childs Way (E) Ahead	U	E		1	22	-	274	1900	728	37.6%	-	-	-	1.3	17.3	3.6
3/1	V11 Tongwell Street (S) Left	U	A		1	22	-	314	1900	728	43.1%	-	-	-	1.6	18.0	4.2
3/2	V11 Tongwell Street (S) Ahead	U	A		1	22	-	516	1900	728	70.8%	-	-	-	3.4	24.0	8.4
3/3	V11 Tongwell Street (S) Ahead	U	A		1	22	-	517	1900	728	71.0%	-	-	-	3.5	24.1	8.4
3/4	V11 Tongwell Street (S) Ahead	U	A		1	22	-	221	1900	728	30.3%	-	-	-	1.0	16.5	2.7
4/2+4/1	H6 Childs Way (W) Left Ahead	U	G		1	28	-	1181	1900:1900	551+831	85.5 : 85.5%	-	-	-	6.8	20.6	12.5
4/3	H6 Childs Way (W) Ahead	U	G		1	28	-	576	1900	918	62.7%	-	-	-	2.7	16.7	7.9

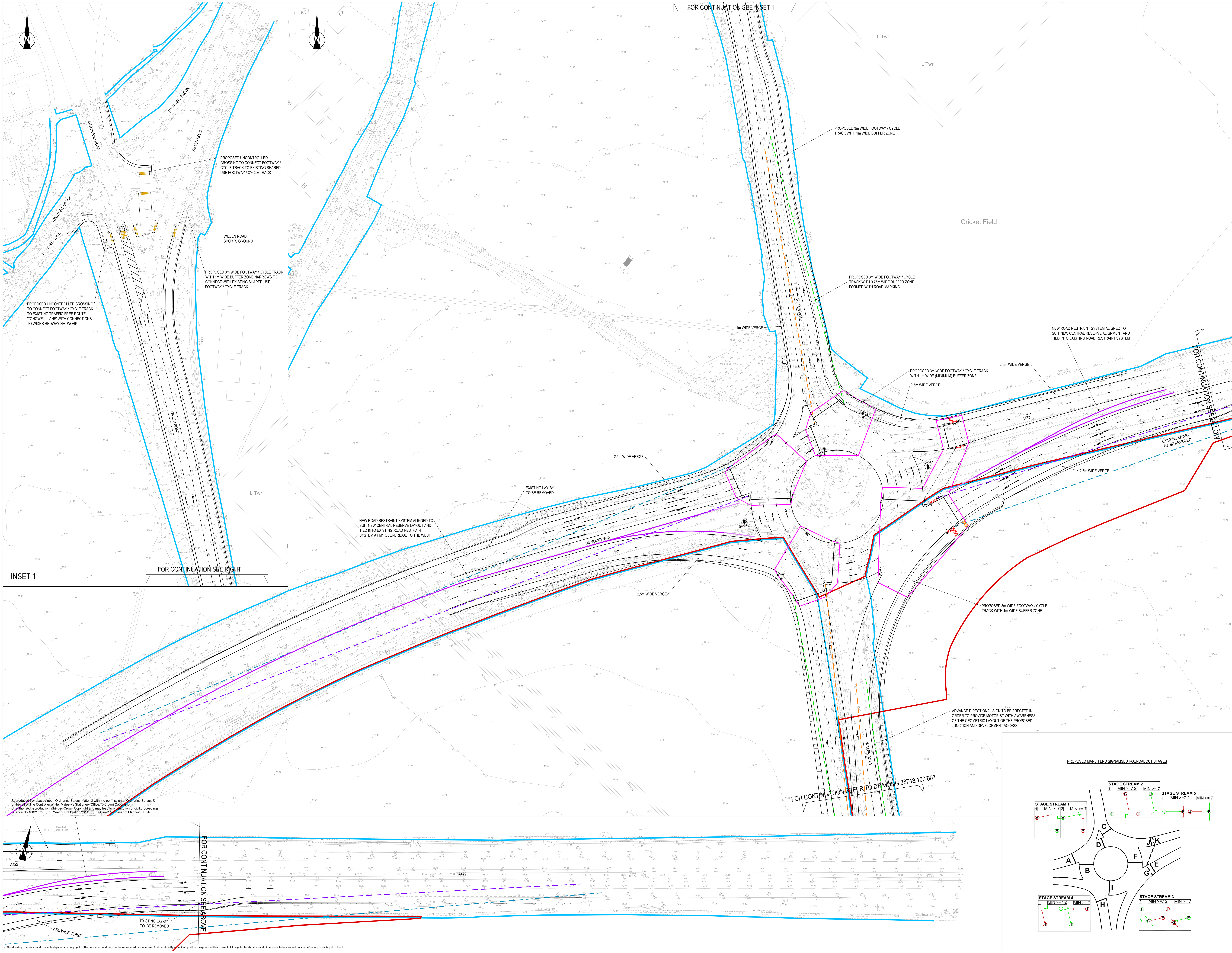
Basic Results Summary

9/1	(Internal) Ahead	U	B		1	24	-	379	2000	833	45.5%	-	-	-	0.5	4.9	0.8
9/2	(Internal) Ahead	U	B		1	24	-	372	2000	833	44.6%	-	-	-	0.6	5.6	1.0
9/3	(Internal) Ahead Right	U	B		1	24	-	353	2000	833	42.4%	-	-	-	0.8	7.9	2.0
10/1	(Internal) Ahead	U	H		1	18	-	516	2000	633	81.5%	-	-	-	2.6	18.3	3.3
10/2	(Internal) Ahead	U	H		1	18	-	517	2000	633	81.6%	-	-	-	2.6	18.4	3.3
10/3	(Internal) Ahead Right	U	H		1	18	-	184	2000	633	29.1%	-	-	-	0.6	11.4	1.3
10/4	(Internal) Right	U	H		1	18	-	76	2000	633	12.0%	-	-	-	0.2	7.5	0.2
11/1	(Internal) Ahead	U	D		1	30	-	352	2000	1033	34.1%	-	-	-	1.1	10.8	3.1
11/2	(Internal) Ahead Right	U	D		1	30	-	547	2000	1033	52.9%	-	-	-	1.0	6.3	2.3
11/3	(Internal) Right	U	D		1	30	-	576	2000	1033	55.7%	-	-	-	0.7	4.1	0.7
12/1	(Internal) Ahead	U	F		1	24	-	385	2000	833	46.2%	-	-	-	0.4	4.0	0.4
12/2	(Internal) Ahead	U	F		1	24	-	487	2000	833	58.4%	-	-	-	2.8	20.9	8.4
12/3	(Internal) Ahead Right	U	F		1	24	-	499	2000	833	59.9%	-	-	-	2.7	19.7	8.5
13/1	Ahead	U	-		-	-	-	830	1900	1900	43.7%	-	-	-	0.4	1.7	0.4
13/2	Ahead	U	-		-	-	-	738	1900	1900	38.8%	-	-	-	0.3	1.5	0.3

C1 Stream: 1 PRC for Signalled Lanes (%): 26.8 Total Delay for Signalled Lanes (pcuHr): 11.36 Cycle Time (s): 60
C1 Stream: 2 PRC for Signalled Lanes (%): 21.7 Total Delay for Signalled Lanes (pcuHr): 8.52 Cycle Time (s): 60
C1 Stream: 3 PRC for Signalled Lanes (%): 45.3 Total Delay for Signalled Lanes (pcuHr): 13.58 Cycle Time (s): 60
C1 Stream: 4 PRC for Signalled Lanes (%): 5.3 Total Delay for Signalled Lanes (pcuHr): 15.45 Cycle Time (s): 60
PRC Over All Lanes (%): 5.3 Total Delay Over All Lanes(pcuHr): 49.62

Appendix U

MARSH END ROUNDABOUT IMPROVEMENTS (PBA DRAWING)



KEY:-

- HIGHWAYS ENGLAND HIGHWAY BOUNDARY
- MILTON KEYNES COUNCIL HIGHWAY BOUNDARY
- PROPOSED FULL HEIGHT SAFETY BARRIER
- PROPOSED ROAD RESTRAINT TERMINAL
- PROPOSED TRAFFIC SIGNALS
- PROPOSED TRAFFIC SIGNAL CONTROL BOX WITH MAINTENANCE ACCESS BAY FORMED USING PERMEABLE PAVING
- JUNCTION INTERVISIBILITY ZONE
- FORWARD VISIBILITY TO PRIMARY SIGNAL (NEARSIDE) 120m SSD - DESIGN SPEED 70kph
- FORWARD VISIBILITY TO PRIMARY SIGNAL (OFFSIDE) 120m SSD - DESIGN SPEED 70kph
- FORWARD VISIBILITY TO PRIMARY SIGNAL (NEARSIDE) 295m SSD - DESIGN SPEED 120kph
- FORWARD VISIBILITY TO PRIMARY SIGNAL (OFFSIDE) 295m SSD - DESIGN SPEED 120kph

NOTES:-

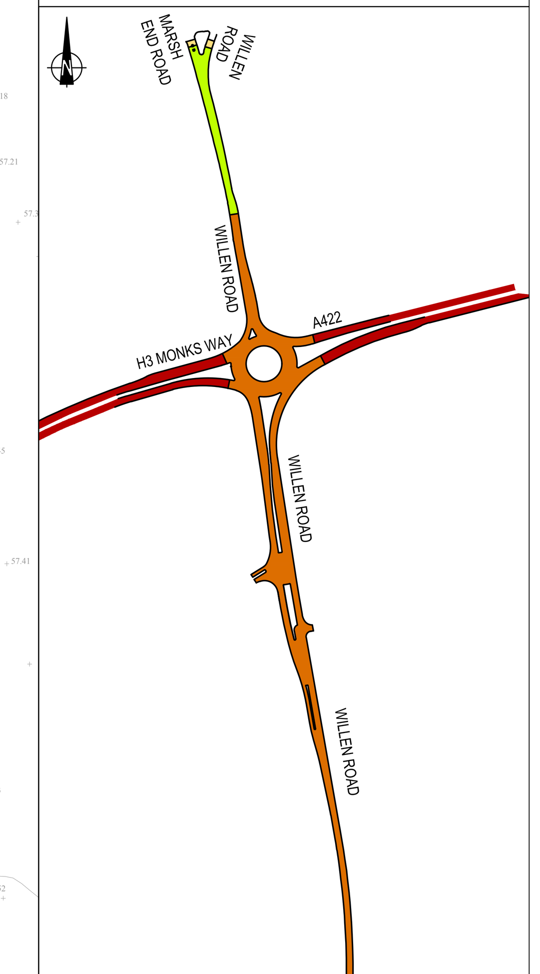
1. ALIGNMENT OF MILTON KEYNES COUNCIL HIGHWAY BOUNDARY BASED ON HIGHWAY BOUNDARY INFORMATION PROVIDED BY MILTON KEYNES COUNCIL INTERPOLATED AND ALIGNED TO PHYSICAL FEATURES ON THE TOPOGRAPHICAL SURVEY. HIGHWAYS ENGLAND HIGHWAY BOUNDARY BASED ON HIGHWAYS ENGLAND GIS OPEN DATA DATED 28.10.2016.
2. MKC'S DRAFT 'A HIGHWAY GUIDE FOR MILTON KEYNES' DOCUMENT (DATED SEPTEMBER 2018), FIG 1 - 'HIGHWAY NETWORK PLAN' AND TABLE 3.12 - 'TABLE OF LAYOUT STANDARDS' INDICATE THAT THE DESIGN STANDARDS FOR WILLEN ROAD SHOULD BE BASED ON THE DESIGN MANUAL FOR ROADS AND BRIDGES DESIGN STANDARDS.
3. EXISTING POSTED SPEED LIMIT OF WILLEN ROAD AND MONKS WAY IS NATIONAL SPEED LIMIT (60mph). MKC HAVE CONFIRMED THAT A TRAFFIC REGULATION ORDER (TRO) WILL BE REQUIRED TO REDUCE THE SPEED LIMIT TO 40mph ON APPROACH TO THE ROUNDABOUT. THEREFORE, THE DESIGN SPEED FOR THIS JUNCTION WILL BE 70kph.
4. THE DESIGN OF THE SIGNALISED ROUNDABOUT HAS BEEN BASED ON ADC INFRASTRUCTURE LINSIG MODEL - 'App XX - PROPOSED ACCESS AND MARSH END MITIGATION v5.lsg3x'.
5. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH:-
   - PBA TECHNICAL NOTE TN2003/002 - 'A422, SIGNALISED ROUNDABOUT';

DESIGN RISK

TRAFFIC REGULATION ORDER (TRO) WILL BE REQUIRED TO REDUCE THE SPEED LIMIT ON APPROACH TO MARSH END ROUNDABOUT FROM MONKS WAY WESTBOUND AND EASTBOUND AND REINFORCE THE 70kph DESIGN SPEED. A TRO MAY NOT BE GRANTED, AND THIS PROCESS IS SEPARATE TO THE PLANNING PROCESS.

THE EXISTING LAY-BYS ADJACENT TO H3 MONKS WAY AND THE A422 ARE TO BE REMOVED BY THE SCHEME PROPOSALS AND NOT REPLACED (AS DISCUSSED AND AGREED WITH MKC DATED 20th JUNE 2018). HOWEVER, IF THE HIGHWAY AUTHORITY REQUIRE THESE LAY-BYS TO BE REINSTATED IN ACCORDANCE WITH CURRENT DMRB STANDARDS, THIS WOULD REQUIRE AN ALTERATION TO THE PROPOSED PRELIMINARY DESIGN.

THE EXISTING CROSS SECTION OF H3 MONKS WAY DOES NOT PROVIDE ROAD RESTRAINT SYSTEMS (RRS) WITHIN THE CENTRAL RESERVE. MKC HAVE INSTRUCTED RRS TO BE PROVIDED WITHIN THIS CENTRAL RESERVE. PLEASE NOTE, WE HAVE REVIEWED THE VERTICAL PROFILE AND VISIBILITY ON THE IMMEDIATE APPROACH TO THE PROPOSED JUNCTION AND CAN CONFIRM THAT DESIRABLE MINIMUM STOPPING SIGHT DISTANCE OF 295m (DESIGN SPEED 120kph) IS NOT RESTRICTED TO THE 'OBJECT HEIGHT' BY THE PROPOSED RRS.



SPEED LIMITS:-

- PROPOSED 40mph SPEED LIMIT
- PROPOSED 30mph SPEED LIMIT
- EXISTING 30mph SPEED LIMIT
- EXISTING NATIONAL SPEED LIMIT

SCALE: 1:2000

Rev.	Description	Drawn	Date	Chkd
A	REVISED TO REFLECT CLIENT COMMENTS & STAGE 1 RSA	DL	21.05.19	JSH

LAND AT CALDECOTE FARM NEWPORT PAGNELL

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PROPOSED MARSH END SIGNALISED ROUNDABOUT - GENERAL ARRANGEMENT

Drawing Status:	PRELIMINARY
CAD Reference:	38748/100/008
Drawn:	DL
Date:	05.07.2018
Scale: 1: @ A0	1:500 & 1:2000

Project No:	Drawing No:	Rev:
38748	100/008	A

Appendix V

FUTURE YEAR JUNCTIONS - MANUAL RE-ASSIGNMENT OUTPUTS

Public

Junctions 9

ARCADY 9 - Roundabout Module

Filename: 7.A Tickford Roundabout - reassignment.j9
Path: \\uk.wspgroup.com\central data\Projects\700575xx\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP Transport Planning\05 Analysis\2021 Junction Models\Existing junctions
Report generation date: 25/03/2021 14:31:35

Summary of junction performance

	AM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2048 Do Something - reassignment				
A - B256 London Rd	D13	2.5	11.72	0.71	B
B - A509 (E)		17.4	41.47	0.97	E
C - A509 London Rd		2.1	9.53	0.65	A
D - A422		5.5	11.11	0.85	B

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 average delay per arriving vehicle.

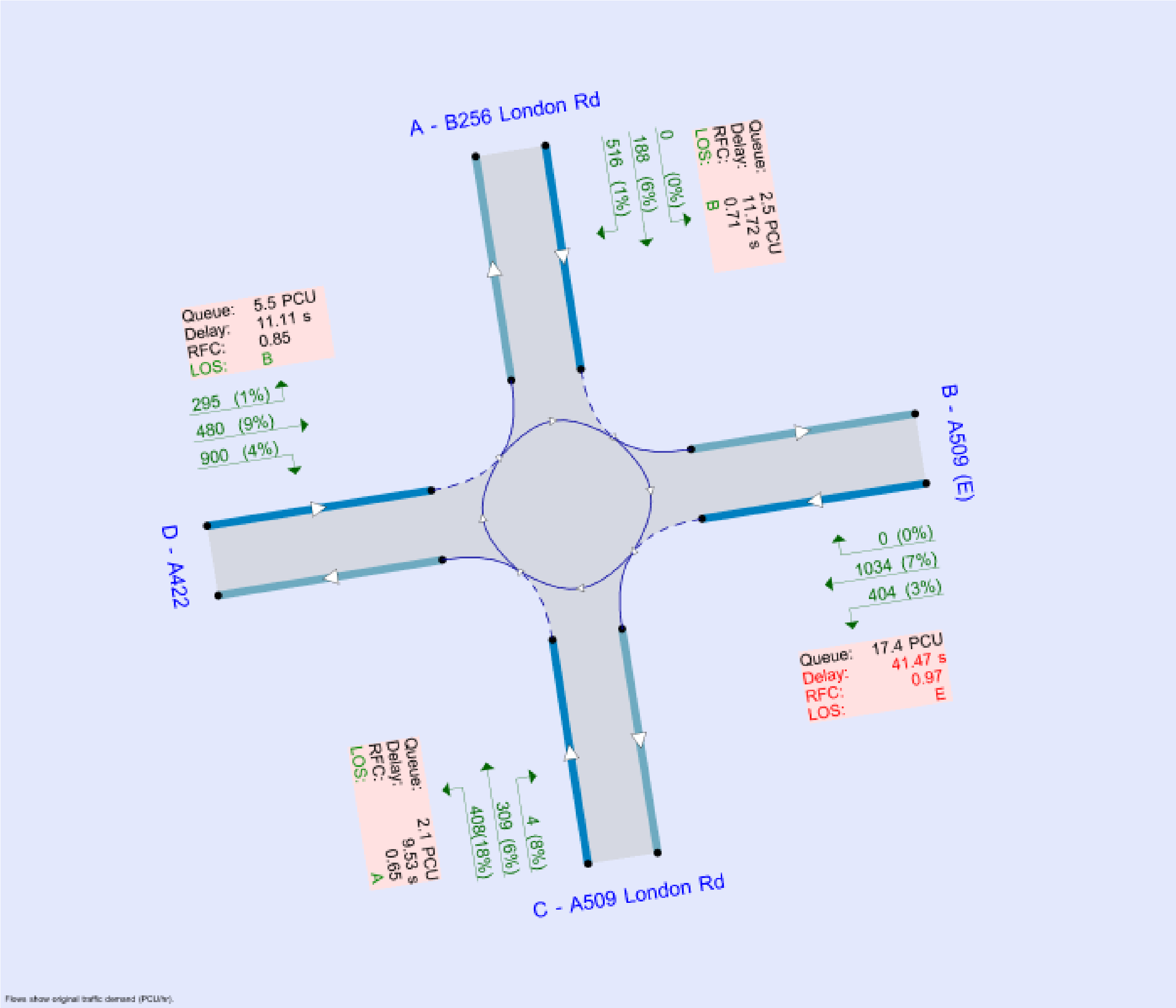
File summary

File Description

Title	(untitled)
Location	
Site number	
Date	18/03/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\UKRJM015
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Analysis Set Details

ID	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	✓	D13	100.000	100.000

2048 Do Something - reassignment, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	C - A509 London Rd - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Tickford Roundabout	Standard Roundabout		A, B, C, D	20.56	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	B256 London Rd	
B	A509 (E)	
C	A509 London Rd	
D	A422	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - B256 London Rd	3.65	9.10	16.7	95.0	60.0	17.0	
B - A509 (E)	10.50	10.50	0.0	30.0	60.0	51.0	
C - A509 London Rd	3.50	9.70	31.9	62.0	60.0	13.5	
D - A422	7.30	8.00	3.2	30.0	60.0	23.5	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - B256 London Rd	0.644	2074
B - A509 (E)	0.768	3002
C - A509 London Rd	0.705	2419
D - A422	0.693	2427

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)	Run automatically
D13	2048 Do Something - reassignment	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - B256 London Rd		ONE HOUR	✓	704	100.000
B - A509 (E)		ONE HOUR	✓	1438	100.000
C - A509 London Rd		ONE HOUR	✓	721	100.000
D - A422		ONE HOUR	✓	1682	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - B256 London Rd	B - A509 (E)	C - A509 London Rd	D - A422
From	A - B256 London Rd	0	0	188	516
	B - A509 (E)	0	0	404	1034
	C - A509 London Rd	309	4	0	408
	D - A422	295	480	900	7

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - B256 London Rd	B - A509 (E)	C - A509 London Rd	D - A422
From	A - B256 London Rd	0	0	6	1
	B - A509 (E)	0	0	3	7
	C - A509 London Rd	6	8	0	18
	D - A422	1	9	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - B256 London Rd	0.71	11.72	2.5	B	646	969
B - A509 (E)	0.97	41.47	17.4	E	1320	1979
C - A509 London Rd	0.65	9.53	2.1	A	662	992
D - A422	0.85	11.11	5.5	B	1543	2315

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - B256 London Rd	530	133	1043	1403	0.378	528	453	0.0	0.6	4.197	A
B - A509 (E)	1083	271	1208	2074	0.522	1078	363	0.0	1.1	3.806	A
C - A509 London Rd	543	136	1167	1596	0.340	541	1118	0.0	0.6	3.828	A
D - A422	1266	317	235	2265	0.559	1261	1473	0.0	1.3	3.739	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - B256 London Rd	633	158	1248	1271	0.498	631	542	0.6	1.0	5.746	A
B - A509 (E)	1293	323	1445	1892	0.683	1288	434	1.1	2.2	6.265	A
C - A509 London Rd	648	162	1395	1435	0.452	647	1338	0.6	0.9	5.130	A
D - A422	1512	378	281	2233	0.677	1509	1761	1.3	2.2	5.187	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - B256 London Rd	775	194	1521	1095	0.708	770	661	1.0	2.4	11.143	B
B - A509 (E)	1583	396	1761	1649	0.960	1538	529	2.2	13.6	27.281	D
C - A509 London Rd	794	198	1678	1236	0.642	790	1622	0.9	2.0	8.991	A
D - A422	1852	463	343	2190	0.846	1839	2124	2.2	5.3	10.400	B

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - B256 London Rd	775	194	1531	1088	0.712	775	665	2.4	2.5	11.717	B
B - A509 (E)	1583	396	1773	1640	0.965	1568	533	13.6	17.4	41.473	E
C - A509 London Rd	794	198	1703	1218	0.652	793	1638	2.0	2.1	9.525	A
D - A422	1852	463	344	2189	0.846	1851	2152	5.3	5.5	11.110	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - B256 London Rd	633	158	1261	1262	0.502	639	547	2.5	1.0	5.962	A
B - A509 (E)	1293	323	1461	1880	0.688	1353	439	17.4	2.4	8.055	A
C - A509 London Rd	648	162	1447	1398	0.463	652	1367	2.1	1.0	5.460	A
D - A422	1512	378	283	2231	0.678	1525	1816	5.5	2.2	5.442	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - B256 London Rd	530	133	1050	1398	0.379	532	456	1.0	0.6	4.259	A
B - A509 (E)	1083	271	1216	2068	0.524	1087	365	2.4	1.2	3.907	A
C - A509 London Rd	543	136	1177	1589	0.342	544	1127	1.0	0.6	3.881	A
D - A422	1266	317	236	2264	0.559	1270	1485	2.2	1.3	3.812	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: 8.A Renny Lodge Roundabout - reassignment.j9
Path: \\uk.wspgroup.com\central data\Projects\700575xx\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP Transport Planning\05 Analysis\2021 Junction Models\Existing junctions
Report generation date: 25/03/2021 14:32:37

Summary of junction performance

	AM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2048 Do Something - reassignment				
A - Renny Park Rd	D13	0.5	3.48	0.32	A
B - A509 (E)		6.3	11.82	0.86	B
C - A509 (W)		0.3	2.26	0.24	A

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

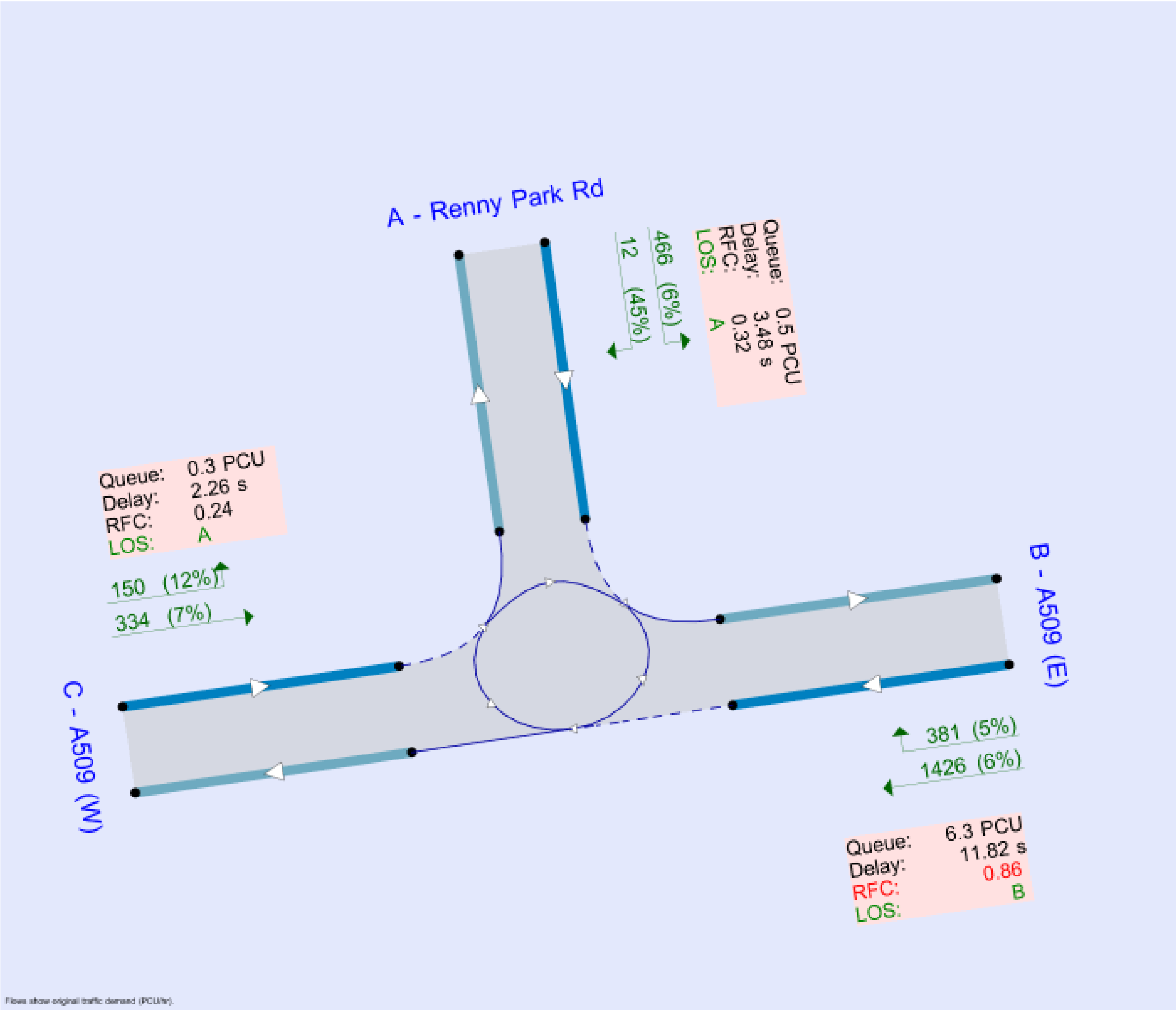
File summary

File Description

Title	(untitled)
Location	
Site number	
Date	18/03/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\UKRJM015
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Analysis Set Details

ID	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	✓	D13	100.000	100.000

2048 Do Something - reassignment, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Renny Lodge roundabout	Standard Roundabout		A, B, C	8.71	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	Renny Park Rd	
B	A509 (E)	
C	A509 (W)	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - Renny Park Rd	3.65	8.00	16.5	39.0	66.0	35.0	
B - A509 (E)	7.30	7.80	14.9	28.0	66.0	38.0	
C - A509 (W)	8.00	8.00	0.0	34.0	66.0	22.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - Renny Park Rd	0.548	1833
B - A509 (E)	0.622	2316
C - A509 (W)	0.674	2540

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)	Run automatically
D13	2048 Do Something - reassignment	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Renny Park Rd		ONE HOUR	✓	478	100.000
B - A509 (E)		ONE HOUR	✓	1807	100.000
C - A509 (W)		ONE HOUR	✓	484	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - Renny Park Rd	B - A509 (E)	C - A509 (W)
From	A - Renny Park Rd	0	466	12
	B - A509 (E)	381	0	1426
	C - A509 (W)	150	334	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - Renny Park Rd	B - A509 (E)	C - A509 (W)
From	A - Renny Park Rd	0	6	45
	B - A509 (E)	5	0	6
	C - A509 (W)	12	7	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - Renny Park Rd	0.32	3.48	0.5	A	439	658
B - A509 (E)	0.86	11.82	6.3	B	1658	2487
C - A509 (W)	0.24	2.26	0.3	A	444	666

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Renny Park Rd	360	90	251	1695	0.212	359	398	0.0	0.3	2.872	A
B - A509 (E)	1360	340	9	2311	0.589	1354	601	0.0	1.5	3.958	A
C - A509 (W)	364	91	286	2348	0.155	364	1078	0.0	0.2	1.967	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Renny Park Rd	430	107	300	1668	0.258	429	476	0.3	0.4	3.101	A
B - A509 (E)	1624	406	11	2310	0.703	1621	719	1.5	2.5	5.496	A
C - A509 (W)	435	109	342	2310	0.188	435	1290	0.2	0.3	2.083	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Renny Park Rd	526	132	368	1631	0.323	526	581	0.4	0.5	3.473	A
B - A509 (E)	1990	497	13	2308	0.862	1975	880	2.5	6.1	10.982	B
C - A509 (W)	533	133	416	2260	0.236	533	1572	0.3	0.3	2.261	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Renny Park Rd	526	132	368	1631	0.323	526	584	0.5	0.5	3.476	A
B - A509 (E)	1990	497	13	2308	0.862	1989	881	6.1	6.3	11.823	B
C - A509 (W)	533	133	419	2258	0.236	533	1583	0.3	0.3	2.264	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Renny Park Rd	430	107	300	1668	0.258	430	481	0.5	0.4	3.104	A
B - A509 (E)	1624	406	11	2310	0.703	1639	720	6.3	2.6	5.807	A
C - A509 (W)	435	109	346	2307	0.189	435	1305	0.3	0.3	2.086	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - Renny Park Rd	360	90	252	1695	0.212	360	401	0.4	0.3	2.881	A
B - A509 (E)	1360	340	9	2311	0.589	1365	603	2.6	1.5	4.042	A
C - A509 (W)	364	91	288	2346	0.155	365	1086	0.3	0.2	1.972	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: 3.A New Junction 3 - reassignment.j9
Path: \\uk.wspgroup.com\central data\Projects\700575xx\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP Transport Planning\05 Analysis\2021 Junction Models\New junctions
Report generation date: 25/03/2021 14:33:53

Summary of junction performance

	AM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2048 Do Something - reassignment				
A - North Arm	D5	4.4	9.94	0.82	A
B - East Arm		4.1	17.41	0.81	C
C - South Arm		5.8	38.10	0.85	E
D - West Arm		0.2	2.15	0.17	A

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 average delay per arriving vehicle.

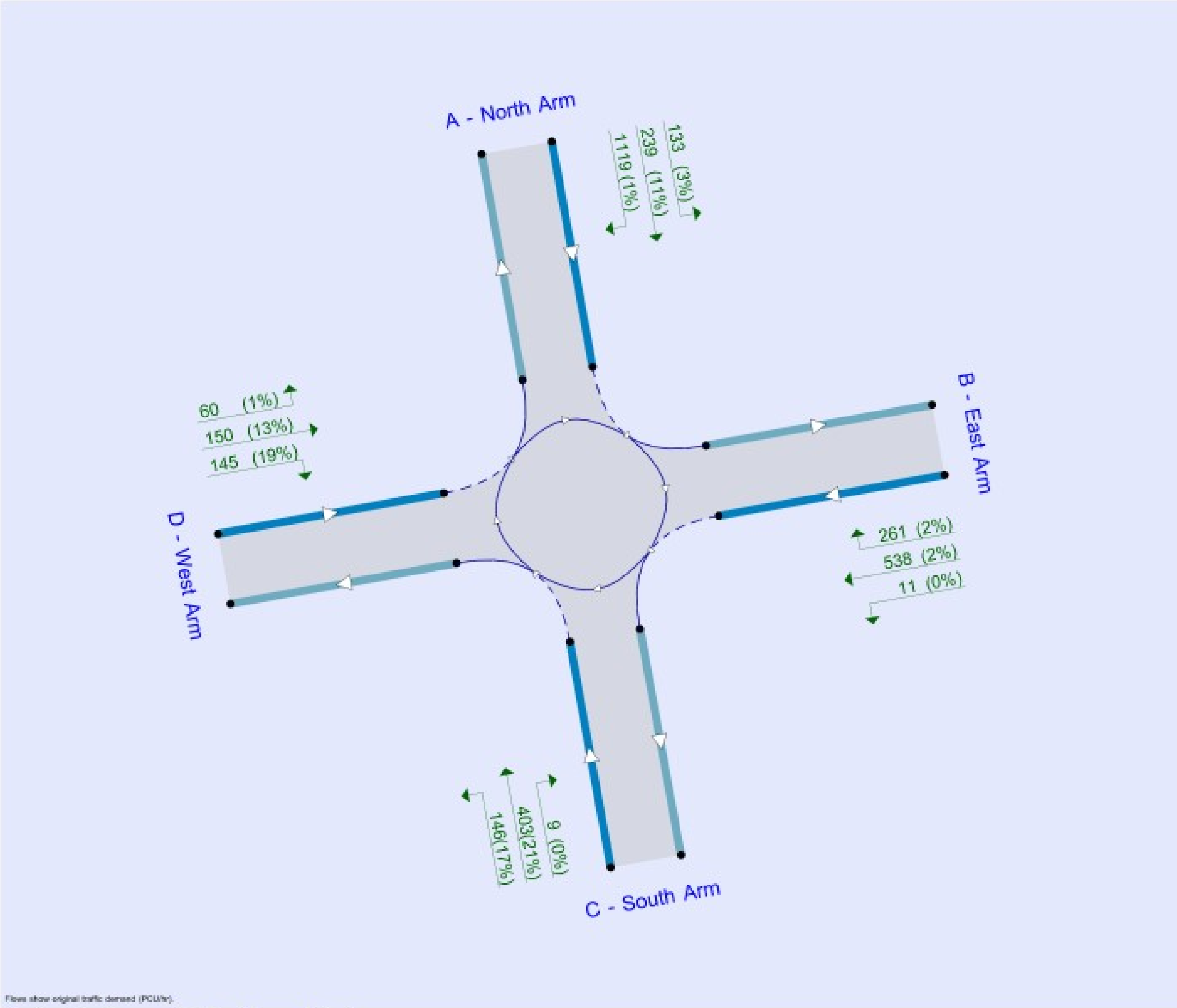
File summary

File Description

Title	
Location	
Site number	
Date	19/03/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\INVN01911
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Analysis Set Details

ID	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	✓	D5	100.000	100.000

2048 Do Something - reassignment, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	A - North Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
3	New Junction 3	Standard Roundabout		A, B, C, D	15.50	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	North Arm	
B	East Arm	
C	South Arm	
D	West Arm	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - North Arm	3.65	10.50	32.0	20.0	65.0	45.4	
B - East Arm	3.38	10.50	25.1	20.0	65.0	43.7	
C - South Arm	3.38	10.50	17.6	20.0	65.0	41.0	
D - West Arm	7.30	10.50	21.6	20.0	65.0	36.5	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - North Arm	0.601	2213
B - East Arm	0.576	2053
C - South Arm	0.551	1889
D - West Arm	0.706	2805

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)	Run automatically
D5	2048 Do Something - reassignment	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - North Arm		ONE HOUR	✓	1491	100.000
B - East Arm		ONE HOUR	✓	810	100.000
C - South Arm		ONE HOUR	✓	558	100.000
D - West Arm		ONE HOUR	✓	355	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - North Arm	B - East Arm	C - South Arm	D - West Arm
From	A - North Arm	0	133	239	1119
	B - East Arm	261	0	11	538
	C - South Arm	403	9	0	146
	D - West Arm	60	150	145	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - North Arm	B - East Arm	C - South Arm	D - West Arm
From	A - North Arm	0	3	11	1
	B - East Arm	2	0	0	2
	C - South Arm	21	0	0	17
	D - West Arm	1	13	19	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - North Arm	0.82	9.94	4.4	A	1368	2052
B - East Arm	0.81	17.41	4.1	C	743	1115
C - South Arm	0.85	36.10	5.8	E	512	768
D - West Arm	0.17	2.15	0.2	A	326	489

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	1123	281	228	2076	0.541	1118	542	0.0	1.2	3.839	A
B - East Arm	610	152	1127	1403	0.435	607	219	0.0	0.8	4.590	A
C - South Arm	420	105	1437	1097	0.383	417	296	0.0	0.7	6.305	A
D - West Arm	267	67	504	2449	0.109	267	1351	0.0	0.1	1.864	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	1340	335	273	2049	0.654	1338	648	1.2	1.9	5.176	A
B - East Arm	728	182	1349	1276	0.571	726	262	0.8	1.3	6.650	A
C - South Arm	502	125	1720	941	0.533	499	355	0.7	1.3	9.688	A
D - West Arm	319	80	603	2379	0.134	319	1617	0.1	0.2	1.975	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	1642	410	334	2012	0.816	1632	783	1.9	4.3	9.494	A
B - East Arm	892	223	1646	1104	0.807	881	320	1.3	3.9	15.785	C
C - South Arm	614	154	2094	734	0.836	599	433	1.3	5.1	29.178	D
D - West Arm	391	98	727	2292	0.171	391	1967	0.2	0.2	2.140	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	1642	410	335	2012	0.816	1641	795	4.3	4.4	9.939	A
B - East Arm	892	223	1654	1100	0.811	891	321	3.9	4.1	17.412	C
C - South Arm	614	154	2111	726	0.847	612	435	5.1	5.8	36.097	E
D - West Arm	391	98	739	2283	0.171	391	1983	0.2	0.2	2.150	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	1340	335	274	2048	0.654	1350	667	4.4	2.0	5.367	A
B - East Arm	728	182	1360	1269	0.574	739	264	4.1	1.4	7.068	A
C - South Arm	502	125	1742	929	0.540	519	357	5.8	1.4	10.932	B
D - West Arm	319	80	621	2366	0.135	319	1640	0.2	0.2	1.990	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	1123	281	229	2075	0.541	1126	548	2.0	1.2	3.905	A
B - East Arm	610	152	1134	1399	0.436	612	220	1.4	0.8	4.678	A
C - South Arm	420	105	1449	1091	0.385	423	298	1.4	0.8	6.469	A
D - West Arm	267	67	509	2445	0.109	267	1362	0.2	0.1	1.868	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: 8.A New Junction 8 - reassignment.j9
Path: \\uk.wspgroup.com\central data\Projects\700575xx\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP Transport Planning\05 Analysis\2021 Junction Models\New junctions
Report generation date: 25/03/2021 14:34:59

Summary of junction performance

	AM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2048 Do Something - reassignment				
A - East Arm	D5	0.1	3.61	0.05	A
B - South Arm		0.6	3.57	0.37	A
C - South West Arm		0.1	2.70	0.06	A
D - West Arm		3.1	8.57	0.75	A

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 average delay per arriving vehicle.

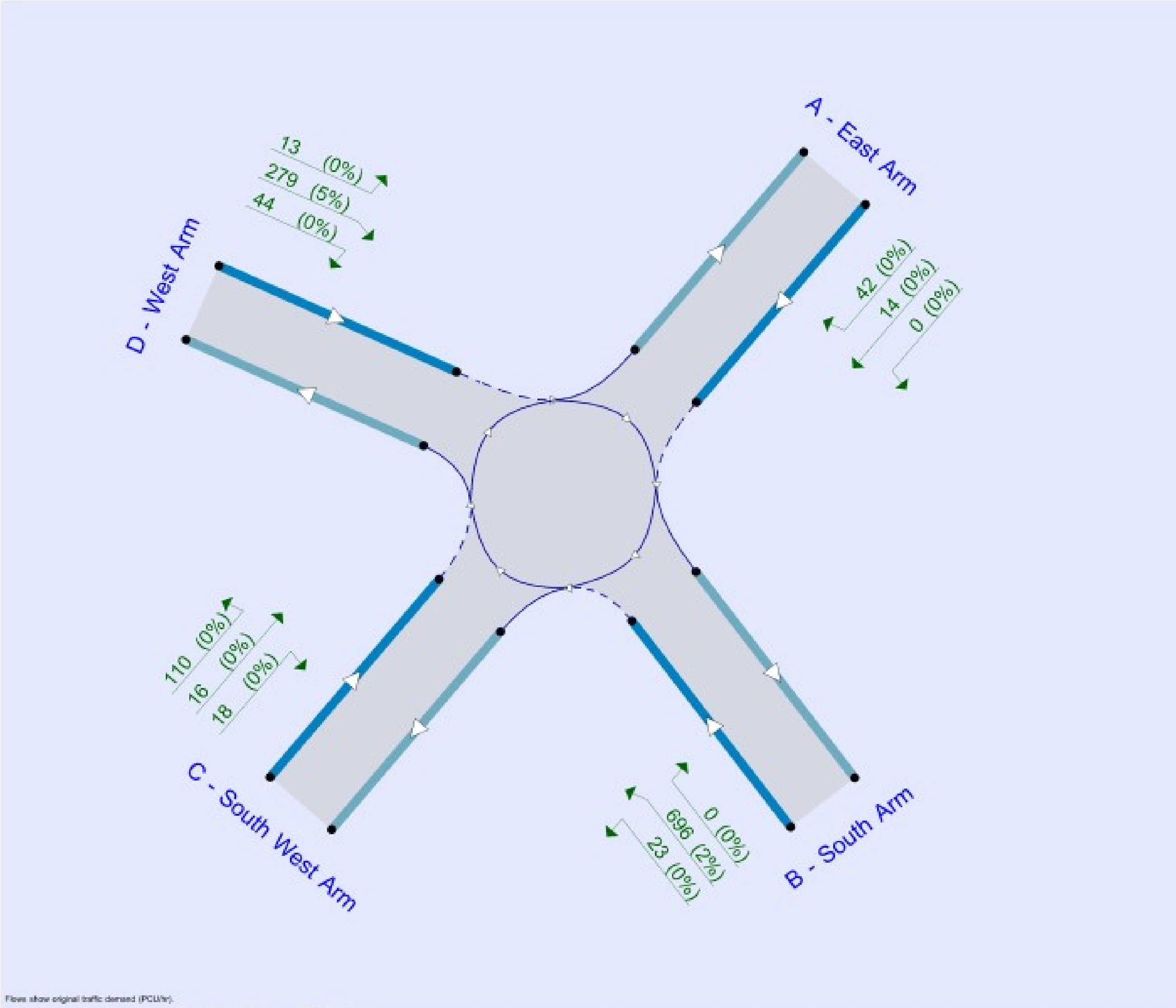
File summary

File Description

Title	
Location	
Site number	
Date	19/03/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\INVN01911
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Analysis Set Details

ID	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	✓	D5	100.000	100.000

2048 Do Something - reassignment, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	B - South Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
8	New Junction 8	Standard Roundabout		A, B, C, D	6.67	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	East Arm	
B	South Arm	
C	South West Arm	
D	West Arm	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - East Arm	3.65	7.00	24.1	20.0	65.0	38.3	
B - South Arm	3.65	7.00	33.5	20.0	65.0	36.6	
C - South West Arm	3.38	7.00	30.0	20.0	65.0	34.8	
D - West Arm	3.65	7.00	28.0	20.0	65.0	37.6	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - East Arm	0.532	1756
B - South Arm	0.546	1832
C - South West Arm	0.540	1784
D - West Arm	0.538	1791

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)	Run automatically
D5	2048 Do Something - reassignment	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - East Arm		ONE HOUR	✓	50	100.000
B - South Arm		ONE HOUR	✓	588	100.000
C - South West Arm		ONE HOUR	✓	81	100.000
D - West Arm		ONE HOUR	✓	1211	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A - East Arm	B - South Arm	C - South West Arm	D - West Arm
From	A - East Arm	0	0	25	25
	B - South Arm	0	0	5	583
	C - South West Arm	19	0	0	62
	D - West Arm	10	1123	78	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		A - East Arm	B - South Arm	C - South West Arm	D - West Arm
From	A - East Arm	0	0	0	0
	B - South Arm	0	0	0	10
	C - South West Arm	0	0	0	0
	D - West Arm	0	7	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - East Arm	0.05	3.61	0.1	A	46	69
B - South Arm	0.37	3.57	0.6	A	540	809
C - South West Arm	0.06	2.70	0.1	A	74	111
D - West Arm	0.75	8.57	3.1	A	1111	1667

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - East Arm	38	9	900	1278	0.029	38	22	0.0	0.0	2.902	A
B - South Arm	443	111	96	1780	0.249	441	841	0.0	0.4	2.954	A
C - South West Arm	61	15	456	1538	0.040	61	81	0.0	0.0	2.436	A
D - West Arm	912	228	14	1784	0.511	907	503	0.0	1.1	4.354	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - East Arm	45	11	1078	1183	0.038	45	26	0.0	0.0	3.161	A
B - South Arm	529	132	115	1769	0.299	528	1008	0.4	0.5	3.188	A
C - South West Arm	73	18	546	1490	0.049	73	97	0.0	0.1	2.540	A
D - West Arm	1089	272	17	1782	0.611	1086	602	1.1	1.6	5.494	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - East Arm	55	14	1317	1056	0.052	55	32	0.0	0.1	3.595	A
B - South Arm	647	162	141	1755	0.369	647	1231	0.5	0.6	3.567	A
C - South West Arm	89	22	669	1424	0.063	89	119	0.1	0.1	2.697	A
D - West Arm	1333	333	21	1780	0.749	1328	737	1.6	3.1	8.369	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - East Arm	55	14	1322	1053	0.052	55	32	0.1	0.1	3.605	A
B - South Arm	647	162	141	1755	0.369	647	1236	0.6	0.6	3.571	A
C - South West Arm	89	22	669	1423	0.063	89	119	0.1	0.1	2.697	A
D - West Arm	1333	333	21	1780	0.749	1333	738	3.1	3.1	8.567	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - East Arm	45	11	1085	1179	0.038	45	26	0.1	0.0	3.176	A
B - South Arm	529	132	115	1769	0.299	529	1015	0.6	0.5	3.192	A
C - South West Arm	73	18	547	1489	0.049	73	97	0.1	0.1	2.543	A
D - West Arm	1089	272	17	1782	0.611	1094	603	3.1	1.7	5.622	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - East Arm	38	9	906	1274	0.030	38	22	0.0	0.0	2.910	A
B - South Arm	443	111	97	1779	0.249	443	848	0.5	0.4	2.963	A
C - South West Arm	61	15	458	1537	0.040	61	81	0.1	0.0	2.440	A
D - West Arm	912	228	14	1784	0.511	914	505	1.7	1.1	4.420	A

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.1.7462

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: 9.A New Junction 9 - reassignment.j9
Path: \\uk.wspgroup.com\central data\Projects\700575xx\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP Transport Planning\05 Analysis\2021 Junction Models\New junctions
Report generation date: 25/03/2021 14:35:54

Summary of junction performance

	AM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2048 Do Something - reassignment				
A - North Arm	D5	158.4	184.34	1.12	F
B - East Arm		1.3	6.26	0.54	A
C - West Arm		0.6	2.49	0.36	A

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 average delay per arriving vehicle.

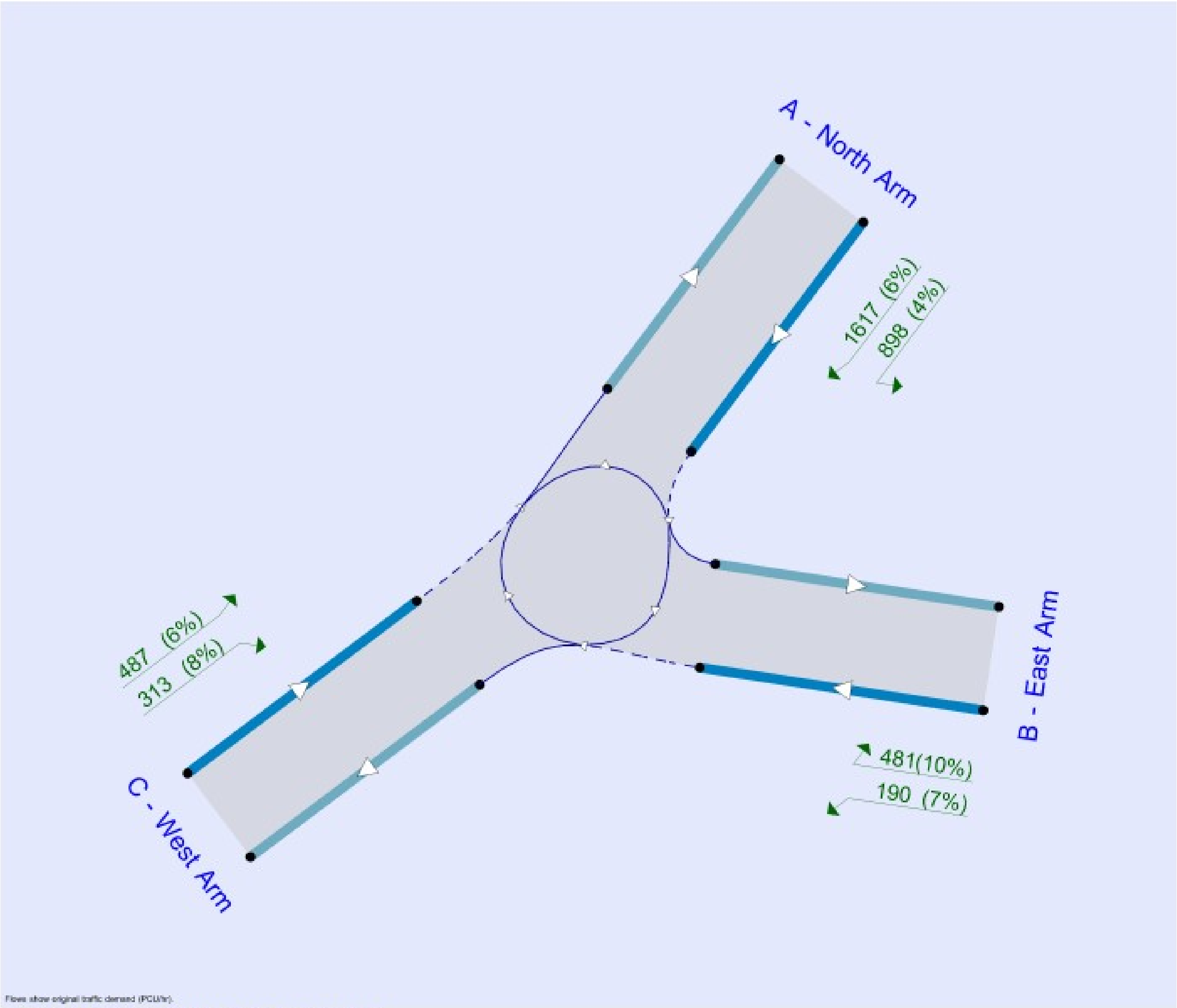
File summary

File Description

Title	
Location	
Site number	
Date	19/03/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\INVN01911
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Analysis Set Details

ID	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	✓	D5	100.000	100.000

2048 Do Something - reassignment, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	B - East Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
9	New Junction 9	Standard Roundabout		A, B, C	117.87	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	North Arm	
B	East Arm	
C	West Arm	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - North Arm	7.30	10.50	18.1	20.0	60.0	40.6	
B - East Arm	3.65	10.50	31.1	20.0	60.0	6.9	
C - West Arm	7.30	10.50	14.9	40.0	60.0	32.9	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - North Arm	0.725	2727
B - East Arm	0.718	2510
C - West Arm	0.756	2827

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)	Run automatically
D5	2048 Do Something - reassignment	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - North Arm		ONE HOUR	✓	2515	100.000
B - East Arm		ONE HOUR	✓	671	100.000
C - West Arm		ONE HOUR	✓	800	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	898	1617
	B - East Arm	481	0	190
	C - West Arm	487	313	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	4	6
	B - East Arm	10	0	7
	C - West Arm	6	8	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - North Arm	1.12	184.34	158.4	F	2308	3462
B - East Arm	0.54	6.26	1.3	A	616	924
C - West Arm	0.36	2.49	0.6	A	734	1101

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	1893	473	235	2556	0.741	1882	727	0.0	2.9	5.525	A
B - East Arm	505	126	1210	1641	0.308	503	907	0.0	0.5	3.448	A
C - West Arm	602	151	361	2554	0.236	601	1352	0.0	0.3	1.967	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	2261	565	281	2523	0.896	2241	869	2.9	8.0	12.597	B
B - East Arm	603	151	1441	1475	0.409	602	1081	0.5	0.7	4.497	A
C - West Arm	719	180	432	2500	0.288	719	1611	0.3	0.4	2.157	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	2769	692	344	2477	1.118	2461	1064	8.0	85.0	75.315	F
B - East Arm	739	185	1582	1373	0.538	737	1223	0.7	1.3	6.156	A
C - West Arm	881	220	528	2427	0.363	880	1791	0.4	0.6	2.483	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	2769	692	345	2477	1.118	2475	1066	85.0	158.4	181.372	F
B - East Arm	739	185	1592	1366	0.541	739	1228	1.3	1.3	6.260	A
C - West Arm	881	220	530	2426	0.363	881	1801	0.6	0.6	2.486	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	2261	565	282	2523	0.896	2506	872	158.4	97.1	184.342	F
B - East Arm	603	151	1611	1352	0.446	605	1176	1.3	0.9	5.269	A
C - West Arm	719	180	434	2499	0.288	720	1782	0.6	0.4	2.162	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A - North Arm	1893	473	236	2556	0.741	2269	730	97.1	3.2	38.805	E
B - East Arm	505	126	1459	1462	0.346	506	1046	0.9	0.6	4.119	A
C - West Arm	602	151	363	2552	0.236	603	1602	0.4	0.3	1.973	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: 9.A New Junction 9 - reassignment - with SLT lane(N).j9
Path: \\uk.wspgroup.com\central data\Projects\700575xx\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP Transport Planning\05 Analysis\2021 Junction Models\New junctions
Report generation date: 25/03/2021 14:37:06

Summary of junction performance

	AM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2048 Do Something - reassignment				
A - North Arm	D5	4.7	8.44	0.82	A
B - East Arm		1.6	7.98	0.60	A
C - West Arm		0.6	2.49	0.36	A

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 average delay per arriving vehicle.

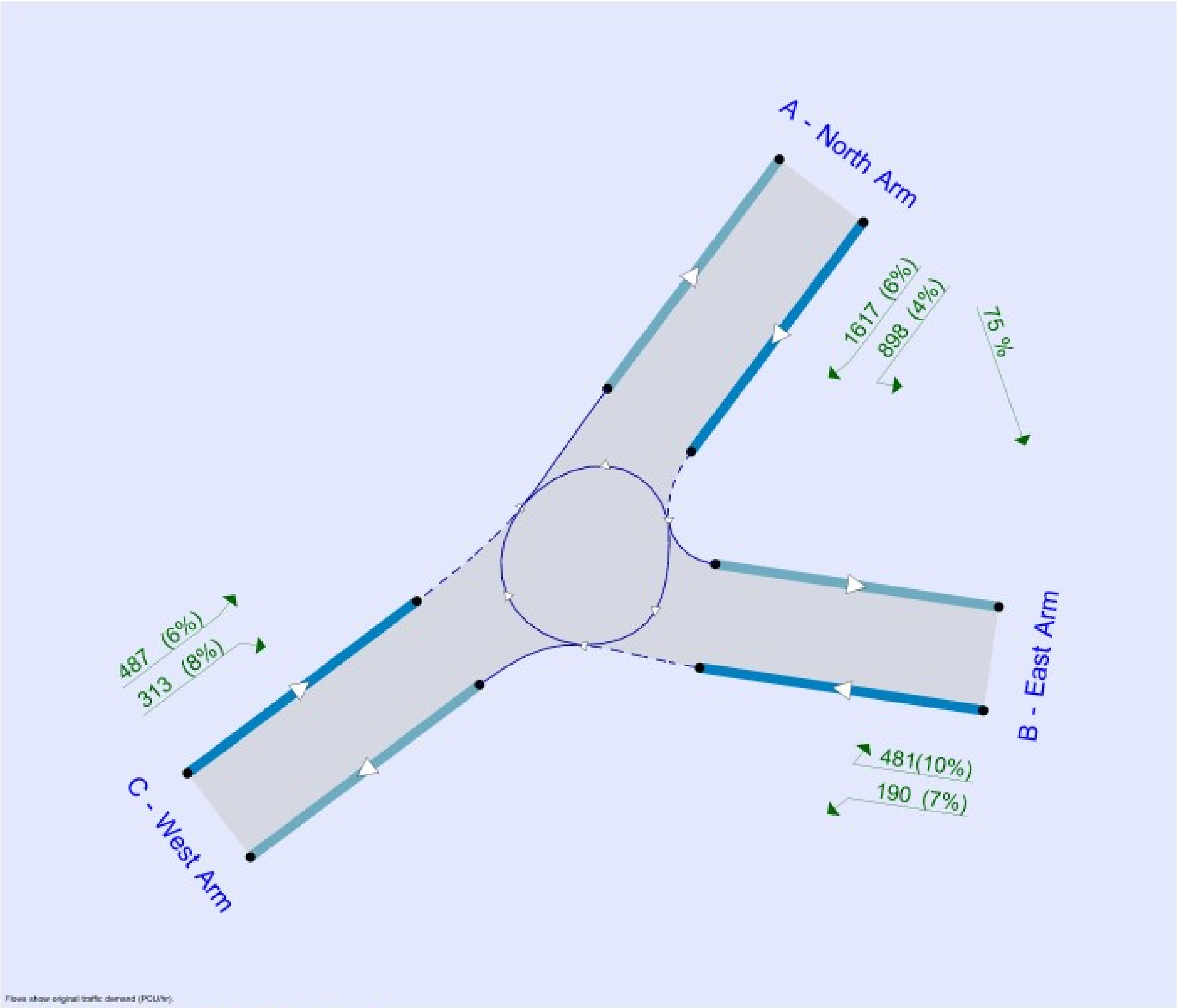
File summary

File Description

Title	
Location	
Site number	
Date	19/03/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\INVN01911
Description	

Units

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



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Analysis Set Details

ID	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	✓	D5	100.000	100.000

2048 Do Something - reassignment, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	B - East Arm - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
9	New Junction 9	Standard Roundabout		A, B, C	7.17	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	North Arm	
B	East Arm	
C	West Arm	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A - North Arm	7.30	10.50	18.1	20.0	60.0	40.6	
B - East Arm	3.65	10.50	31.1	20.0	60.0	6.9	
C - West Arm	7.30	10.50	14.9	40.0	60.0	32.9	

Bypass

Arm	Arm has bypass	Bypass utilisation (%)
A - North Arm	✓	75
B - East Arm		
C - West Arm		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A - North Arm	0.725	2727
B - East Arm	0.718	2510
C - West Arm	0.756	2827

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)	Run automatically
D5	2048 Do Something - reassignment	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - North Arm		ONE HOUR	✓	2515	100.000
B - East Arm		ONE HOUR	✓	671	100.000
C - West Arm		ONE HOUR	✓	800	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	898	1617
	B - East Arm	481	0	190
	C - West Arm	487	313	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A - North Arm	B - East Arm	C - West Arm
From	A - North Arm	0	4	6
	B - East Arm	10	0	7
	C - West Arm	6	8	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A - North Arm	0.82	8.44	4.7	A	2308	2535
B - East Arm	0.60	7.98	1.6	A	616	924
C - West Arm	0.36	2.49	0.6	A	734	1101

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Junction demand (PCU/hr)	Junction Arrivals (PCU)	Bypass demand (PCU/hr)	Bypass exit flow (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalise level of service
A - North Arm	1893	1386	347	507	0	235	2556	0.542	1381	727	0.0	1.2	3.227	A
B - East Arm	505	505	126	0	507	1213	1638	0.308	503	404	0.0	0.5	3.455	A
C - West Arm	602	602	151	0	0	361	2554	0.236	601	1355	0.0	0.3	1.967	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction demand (PCU/hr)	Junction Arrivals (PCU)	Bypass demand (PCU/hr)	Bypass exit flow (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalise level of service
A - North Arm	2261	1655	414	605	0	281	2523	0.656	1652	869	1.2	2.0	4.358	A
B - East Arm	603	603	151	0	605	1451	1467	0.411	602	483	0.5	0.8	4.535	A
C - West Arm	719	719	180	0	0	432	2500	0.288	719	1622	0.3	0.4	2.157	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction demand (PCU/hr)	Junction Arrivals (PCU)	Bypass demand (PCU/hr)	Bypass exit flow (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalise level of service
A - North Arm	2769	2028	507	742	0	344	2477	0.818	2017	1063	2.0	4.5	8.101	A
B - East Arm	739	739	185	0	742	1771	1237	0.597	735	590	0.8	1.6	7.780	A
C - West Arm	881	881	220	0	0	527	2428	0.363	880	1980	0.4	0.6	2.481	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction demand (PCU/hr)	Junction Arrivals (PCU)	Bypass demand (PCU/hr)	Bypass exit flow (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalise level of service
A - North Arm	2769	2028	507	742	0	345	2477	0.819	2027	1066	4.5	4.7	8.439	A
B - East Arm	739	739	185	0	742	1780	1231	0.600	739	592	1.6	1.6	7.976	A
C - West Arm	881	881	220	0	0	529	2426	0.363	881	1989	0.6	0.6	2.486	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction demand (PCU/hr)	Junction Arrivals (PCU)	Bypass demand (PCU/hr)	Bypass exit flow (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalise level of service
A - North Arm	2261	1655	414	605	0	282	2523	0.656	1666	873	4.7	2.0	4.495	A
B - East Arm	603	603	151	0	605	1463	1459	0.414	607	485	1.6	0.8	4.627	A
C - West Arm	719	719	180	0	0	435	2498	0.288	720	1635	0.6	0.4	2.164	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction demand (PCU/hr)	Junction Arrivals (PCU)	Bypass demand (PCU/hr)	Bypass exit flow (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalise level of service
A - North Arm	1893	1386	347	507	0	236	2556	0.542	1390	730	2.0	1.3	3.271	A
B - East Arm	505	505	126	0	507	1220	1633	0.309	506	405	0.8	0.5	3.491	A
C - West Arm	602	602	151	0	0	363	2552	0.236	603	1363	0.4	0.3	1.973	A

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft for Client Review	Final		
Date	26 February 2021	30 March 2021		
Prepared by	Laure Davis / Elena Cristobal	Laure Davis / Elena Cristobal		
Signature		*LD & EC*		
Checked by	Filip Imramovsky / Alex Smith	Filip Imramovsky / Alex Smith		
Signature		*AS*		
Authorised by	Allan Norcutt	Allan Norcutt		
Signature		*AN*		
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Figure 2 – Site location (Local Context and Highway Network)

Figure 3 – Local Pedestrian & Cycle Network

Figure 4 – Public Transport Network

Figure 5 – PIA Review

Figure 6 – Local Facilities

Figure 7 – Junction Locations

WSP Drawing 70057521-SK-001-A

WSP Drawing 70057521-SK-002-A

WSP Drawing 70057521-SK-003-A

WSP Drawing 70057521-SK-004-A

WSP Drawing 70057521-SK-005-A

WSP Drawing 70057521-SK-006-A

WSP Drawing 70057521-SK-007-A

(provide as full-scale drawings at rear of report)

APPENDICES

Please see TA Volume 2: Appendices for full documents

Appendix	Sub-App	Title / Description
A		WSP Transport Technical Notes
	A-1	TTN1 - MKE Modelling Approach
	A-2	TTN2 - 2019 to 2016 Survey Comparison
	A-3	TTN3 - Trip Generation
	A-4	TTN4 - Future Year Assumptions
	A-5	TTN5 - Link Flow Capacity Review
	A-6	TTN6 - P&R and MRT Research

	A-7	TTN7 - Do Something model inputs
	A-8	TTN8 - MKE Parking Strategy
	A-9	TTN9 - MKE Walking and Cycling Strategy
	A-10	TTN10 - MKE PRoW Strategy
	A-11	TTN11 - MKE Outline Public Transport Strategy
	A-12	TTN12 - Tongwell Street Junction Design
	A-13	not used
	A-14	TTN14 - Newport Pagnell Connections
B		Transport Scoping Report and MKC Correspondence
	B-1	WSP Transport Assessment Scoping Report
	B-2	MKC Correspondence
C		Highways England / AECOM Technical Notes and Correspondence
D		WCHAR
E		PIA Data
F		PIA Analysis
G		Indicative Masterplan
H		Indicative Stopping Up Drawings
I		Indicative Signage Strategy
J		Mobility Providers letters
K		AECOM Technical Notes (MKMMM Strategic Modelling)
	K-1	TN29 - Baseline Validation and Re-calibration
	K-2	TN30 - MKE Impact Summary
L		J14 and Northfields Roundabout - Paramics Analysis
	L-1	WSP LMVR
	L-2	WSP LMVR Addendum / Notes
	L-3	WSP LMVR Addendum 2
	L-4	Highways England / AECOM Paramics Technical Notes
M		Paramics Technical Note - PTN1a - Future Year Impacts
N		TRICS Outputs
O		Junction Assessments and Validation measurements
P		Node VOC Data
Q		M1 J14 - Amey / Arup JV's TN09
R		M1 J14 - Merge / Diverge Analysis
S		Northfields LinSig Outputs
T		Junction Mitigation Outputs
U		Marsh End Roundabout Improvement (PBA Dwg 100/008)
V		Selected Junctions manual re-assignment tests

NON-TECHNICAL SUMMARY

Proposed Development

The Milton Keynes East (MKE) allocation is a large-scale mixed-use urban extension (creating a new community) consisting of residential, employment, education facilities (secondary school and primary schools), community hub, new linear park along the River Ouzel corridor, open space, new Redways, access roads and associated highways improvements.

New Highway Infrastructure

The MKE site will benefit from a number of new Grid roads, which will be delivered prior to the delivery of any new housing or employment uses. This new infrastructure includes a new bridge over the M1 providing connectivity between the A509 London Road and Tongwell Street including a new roundabout at the junction of Carleton Gate with Tongwell Street. Between the new M1 bridge and Tongwell Roundabout, Tongwell Street is to become one-way northbound.

A new Grid road will also be provided around the eastern perimeter of the site between the A509 and M1 J14 which will principally serve motorists wishing to access the M1. A connection will be provided between this and the existing A509 as well as back to Newport Road and Moulsoe.

Walking and Cycling

MKE will be highly accessible, with all uses on the site accessible to MKE residents and employees within a 15-minute walk or cycle journey time, thereby maximising opportunities for people to walk or cycle to destinations within the site; e.g. schools, health care facilities, shops, etc.

Grid Roads will have Redways running adjacent to them which will be connected to the external Redway network as well as pedestrian and cycle facilities provided throughout the development. These will be further complemented by links with existing and new Public Rights of Way, including both footpaths and bridleways.

All pedestrian / cycle crossings of the Grid Road network will be via either a subway or bridge. Connections between Newport Pagnell and MKE will be improved including a bridge crossing of the A509 south of North Crawley Road and a crossing of the A509 within the vicinity of Tickford Roundabout. A third crossing, delivered by others, would be provided across the A422, east of Marsh End Roundabout.

Cycle parking will be provided for residents, employees and visitors including services at a transport interchange within the community hub at the heart of the site.

Public Transport

MKE will be served by a number of existing bus services which will re-route via the site thereby serving new residents and employees. These will be complemented by new Demand Responsive Transport (DRT) bus services which provide a more flexible demand-based service connecting residents, employees and visitors to destinations within the site, to a transport interchange at the centre of the site and to wider MK.

The new highway infrastructure has also been future-proofed to facilitate the delivery of mass rapid transport services should these come forwards in the future.

Car Parking

A mix of car parking standards that reflect the character areas of MKE proposals are proposed, initially adopting the most appropriate and current MKC parking standards.

Traffic

The impacts from traffic generated by MKE has been assessed on the local and strategic highway network in close consultation with both Milton Keynes Council and Highways England. This has shown that the new M1 bridge attracts non-motorway traffic away from M1 J14 and other crossings of the M1 thereby reducing stress at M1 J14 itself. The MKE development will not have a material impact on J14, with queues on the slip roads used by motorists associated with the development able to be accommodated without extending back on to the M1 itself.

Traffic generated by MKE will have an impact at some junctions on the wider MKC highway network leading to those junctions experiencing delays and congestion. Where this is apparent, potential junction improvements have been identified for future discussion with MKC. The costs associated with these improvements would be contributed towards through the MK Tariff, with these being proportionate to the level of impact MKE traffic has at those junctions.

Conclusion

Overall it is considered that MKE will be highly accessible with the opportunities for many journeys to be made on foot, by cycle or public transport. Furthermore, all highway impacts associated with the new development can be mitigated accordingly through the introduction of new infrastructure, improvements to existing infrastructure (delivered through financial contributions via the MK Tariff) and management plans as appropriate.

EXECUTIVE SUMMARY

WSP has been appointed by Berkeley St James to provide transportation and highways advice in respect of the proposed development of land to the northeast of Milton Keynes (hereinafter referred to as 'Milton Keynes East' or 'MKE').

The Milton Keynes East site has been identified as an allocation for a Strategic Urban Extension (SUE) within the current local plan entitled Plan:MK 2016 – 2031 (hereinafter referred to as Plan:MK). Milton Keynes Council's (MKC) aspirations for the allocation are set out in Policy SD12 of Plan:MK. Policy SD12 states, inter alia, that key strategic infrastructure improvements are required over the M1 *"…to support the connectivity of this strategic urban extension to the existing Milton Keynes urban area"*.

This Transport Assessment (TA) provides an assessment of the transportation impacts of the MKE development on the highway and public transport networks.

POLICY CONTEXT

This TA outlines the key national, regional and local policy and guidance documents that have been reviewed in detail and will influence the assessment and strategy in relation to the development proposals. The MKE site will be developed in accordance with local, regional and national policy and will seek to adhere to additional MKC and other guidance documents where appropriate.

Given the scale of the proposed development, it is acknowledged that the proposals may generate significant amounts of movement. As such, and in line with the National Planning Policy Framework (NPPF), the application includes this Transport Assessment providing a detailed assessment of the potential impacts of the site. Further aligning with NPPF as well as other national policies, the MKE site has considered opportunities to promote sustainable transport modes throughout its design process, including the use of Redways, leisure routes, green corridors, public rights of way and bridleways. The site promotes safe and suitable access for all users.

The masterplan and Development Framework ensure that sustainable connections are paramount, giving priority to pedestrian and cycle movements and facilitating access to high-quality public transport. This, alongside supporting measures, such as the Framework Travel Plan, will support new residents in adopting sustainable travel habits. This approach ensures that the MKE site delivers against the national policy requirements.

At a local level, the MKE site is identified in the Plan:MK as a Strategic Site Allocation. This means that it will provide a sustainable urban extension as part of the Local Plan process. Therefore, the application proposals for MKE have taken into account the policies identified in the Plan:MK to ensure the site meets the criteria for developing a sustainable urban extension site. The MKE masterplan accords with the principles set out within the MKE Development Framework and Plan:MK, particularly policies CT2, CT3, CT5, CT6, CT8, CT10, SD1, SD9 and SD12.

The MKE development aligns with the transport objectives identified in the MK Mobility Strategy and the MK 2050 plan by implementing future mobility within the site early on. This includes assisting in the facilitation of a mass rapid transit (MRT) network. The proposed development will help support growth and mobility while providing an effective transport network that maximises travel choices and protects the environment.

EXISTING CONDITIONS

Existing strategic and local highway accessibility has been reviewed for the MKE site and nearby locations. The review of walking and cycling connections, alongside existing public transport through the site, has been used to identify where the MKE development can improve the local area.

The site is located north-east of Milton Keynes in the jurisdiction of Milton Keynes Council unitary authority. The site is strategically located immediately north of Junction 14 of the M1, one of the two main motorway junctions serving Milton Keynes. It is situated approximately 3.5 kilometres north-east of Central Milton Keynes (the central business district of Milton Keynes), with some existing walking, cycling and highway links to the city centre.

The application site is currently accessible to vehicular traffic via the A509 through the centre of the site and Newport Road bisecting the site from the east and connecting with the A509 to the north of the Junction 14 of the M1. Given the site's predominantly agricultural use, it is currently accessible to farm vehicles via several field access points at various locations around the site perimeter, including an accommodation bridge over the M1, providing a connection with Tongwell Street.

The site is also accessible to pedestrians and cyclists via several PRoW traversing the site and cycle routes in its vicinity. In addition, there is a relatively good bus network surrounding the development and in and around Milton Keynes generally.

There are several bus stops in the vicinity of the MKE site, with two stops on Willen Road, one hail-only stop on London Road and two stops along Newport Road. Several additional services are also available just outside of the site boundary at Tickford End, north of H3 Monks Way, and south-west of the M1 along Fern Street.

A detailed review of Personal Injury Access data highlights that generally, there are no existing trends on the local highway network which the Proposed Development could exacerbate, and the transport strategy has been developed to minimise any increases in accidents that the proposed MKE sites vehicular trip generation could cause, mainly through the use of public transport strategies, including Demand Responsive Travel (DRT) and the potential for Mass Rapid Transit (MRT).

DEVELOPMENT PROPOSALS

The current description of development is as follows:

"Hybrid planning application encompassing:

(i) outline element (with all matters reserved) for a large-scale mixed-use urban extension (creating a new community) comprising: residential development; employment including business, general industry and storage/distribution uses; a secondary school and primary schools; a community hub containing a range of commercial and community uses; a new linear park along the River Ouzel corridor; open space and linked amenities; new redways, access roads and associated highways improvements; associated infrastructure works; demolition of existing structures and

(ii) detailed element for strategic highway and multi-modal transport infrastructure, including: new road and redway extensions; a new bridge over the M1 motorway; a new bridge over the River Ouzel; works to the Tongwell Street corridor between Tongwell roundabout and Pineham roundabout including new bridge over the River Ouzel; alignment alterations to A509 and Newport Road; and associated utilities, earthworks and drainage works."

The land allocated for the MKE development consists of several sites under different ownership, with Berkeley St James controlling the majority of the allocated land.

It is acknowledged that other landholders will also prepare separate applications under the framework umbrella. The table below provides a summary of the application with respect to the wider allocation.

Berkeley St James Application	Allocation total (with residential uplift)
Up to 4,600 homes (including houses, flats and specialist elderly accommodation with or without care)	5,750
Circa 85Ha of employment	105 Ha
A secondary school	A secondary school
3 x primary schools	Up to 4 primary schools (assuming one is located within the Bloor land)
A community hub/centre including healthcare, retail and leisure facilities	A community hub/centre including healthcare, retail and leisure facilities
Community Space/Open Space/Burial Space	Also included in the allocation

As set out in the Development Framework, the MKE site will also deliver key infrastructure and features for the new community. The key elements of the MKE being delivered are:

- a linear park based around the River Ouzel corridor;
- a landscape buffer to Moulsoe;
- a mixed-use community hub at the heart of the main residential area;
- a secondary school close to the community hub;
- four primary schools spread equidistantly around the residential areas;
- a new road bridge over the M1 providing an improved link to Central MK and the urban area of MK;
- reducing pressure on the key M1 road crossings of the A422, Willen Road and M1 J14;
- safeguarded route for a fast mass transit route;
- land for a potential future park and ride site;
- employment development along the edge of the motorway;
- pedestrian/cycle connections across the M1 and A422 as well as the new infrastructure itself;
- an outer road to allow through traffic to move through the site without conflicting with areas of housing and the people-centric places within the site;
- Willen Road to be retained and upgraded to a grid road; and
- downgrading of part of the A509 London Road through the site to avoid it becoming a through route.

WALKING AND CYCLING STRATEGY / MASTERPLAN

The masterplan has been designed with a focus on providing future users of the development with an interconnected network of active travel infrastructure to make walking, cycling, and the use of micro-mobility modes the most attractive way of travelling to, from and within the site. This has also considered connectivity to the existing footpath and bridleway network.

The active travel network comprises green routes crossing the site and infrastructure provided alongside vehicular routes. This way, connection to origins and destinations both off and on-site (including different land uses and links to public transport hubs) has been achieved by providing different types of active travel infrastructure that follow different expected desire lines and preferred routes.

The network of active travel infrastructure has also been adapted accordingly to the defined hierarchy of routes across the site. It is consequently comprised of Primary, Secondary and Tertiary Green Corridors, Redways (including Super Routes), Bridleways, PRoWs and footways and cycleways along the relevant primary, secondary and tertiary streets. It has also been ensured that adequate links and crossings are provided where needed to follow desire lines and achieve a high degree of non-vehicular permeability into and across the development.

As set out in the Design and Access Statement (DAS) and the Movement and Access Parameter plan, the development proposals include a mixture of grade-separated (either bridge or subway) and at-grade crossing points across the network. A strategy for crossing points has been developed at grid roads to ensure all parcels can safely navigate and connect to wider linkages, ensuring permeability and negating the risk of severance. These crossing points tie into the wider Walking and Cycling strategy and provide an attractive and cohesive set of crossing points for all residents and workplaces to utilise.

In addition, the floodplain link through the site is elevated, a subway beneath the floodplain link will be integrated with the bridge; i.e. the "subway" effectively passes beneath the bridge to allow connections to the A509, through the linear park and beyond.

At the new M1 bridge crossing, the existing farm track accommodation bridge will be retained for pedestrian and cycle access, with connections between that and the new redways and PROW through the development. This will also provide connectivity into a reconfigured subway on Tongwell Street.

Furthermore, as outlined above, the development is safeguarding land for future improvements to walking and cycling connections, such as crossing point south-east of J14, should MKC wish to pursue these at a later date.

The Development Framework SPD for MKE also identifies three crossing points across the A422/A509. These locations are across the A422 east of Marsh End Roundabout, across the A422/A509 in the vicinity of Tickford Roundabout and the A509 in the vicinity of Howard Way or Jenna Way.

PUBLIC TRANSPORT STRATEGY

The public transport proposals for the MKE site consider not only local trips but also tying into wider locations such as Central Milton Keynes and Newport Pagnell. A summary of the public transport strategy is below:

- Provision of high-frequency bus connections to most popular destinations such as Milton Keynes Central and Newport Pagnell together with providing new routes or extending existing routes to cater for main external trips in both directions. This will target the extension of Route 1 (which serves Newport Pagnell – Milton Keynes – Bletchley) to the MKE site and the implementation of a new high quality and high-frequency Principal Bus Route (PBR) between MKE and Milton Keynes Central operating with electric buses.
- Providing demand-responsive travel (DRT) services to flexibly support travel between internal residential, leisure and employment zones as well as connecting with the high-frequency bus services and destinations further afield.

- Maximising benefits from bus services already serving MKE to widen destination choices nearby such as Moulsoe and further afield such as Bedford. This, in particular, will incorporate the provision of convenient stopping arrangements for Route X5 (which serves the route Bedford – Oxford) and a minor re-routeing of Cranfield services.
- Creating a multi-modal Transport Interchange for the MKE site, which will include public transport (scheduled services and DRT), cycle facilities (pedal and electric), micro-scooters, etc. The multimodal hub will be located within the community hub and create a focal point for transport modes at the heart of the site, underpinned by solid walking and cycling connections from all the development areas – thus reducing the need to use private transport.

The multi-modal hub will accommodate infrastructure to support the operation of the bus and active travel proposals in terms of a terminus, layover facilities, electric charging, parking and information/smart selling points.

The implementation of the public transport proposals will be progressive and tightly aligned with the development, construction and occupation phases, starting with a low level of service rising as the demand builds up, albeit with enough early critical mass to encourage early take-up of public transport services.

The public transport strategy supports the proposed future implementation of the MRT and potential P&R site by MKC. It is envisaged that if and when those are implemented, the proposed network within the MKE site, notably the PBR, will be adjusted to prioritise feeding the MRT rather than competing with it.

TRAVEL PLANS

A Residential Travel Plan (RTP) and Workplace Travel Plan (WTP) have been produced in conjunction with this TA.

Both the RTP and WTP outline a long-term management strategy to ensure that all residents and workers of the MKE development adopt sustainable travel behaviour where possible and practical. The targets and measures aim to minimise the number of single-occupancy vehicle journeys made to and from MKE and increase travel by sustainable modes, including walking, cycling, public transport and ridesharing/ride-hailing.

It is proposed that the RTP and WTP will be managed by a Travel Plan Steering Group (TPSG), which will act as an advisory body to review and guide the development of the travel plans over time. The group will be chaired by the Travel Plan Manager and is anticipated to include representation from Berkeley St James and other key stakeholders, including MKC.

The RTP and WTP set out a series of potential measures that can be implemented from development completion and measures that could be considered in the future. Future measures can be devised through funding made available from the MKC tariff contributions applied to the site. This will allow for expenditure on related infrastructure, services or promotional initiatives that support the objectives and target outcomes. This will allow the Travel Plan Manager and associated stakeholders to consider new technologies and respond to changing social norms and travel demands as they materialise over time.

Progress against targets will be reviewed using monitoring which is proposed to take place regularly for five years following the full occupation of the development or a date to be otherwise agreed with the TPSG. The travel plans will be monitored and reviewed using various approaches to provide a robust understanding of the travel plan's effectiveness over time and how travel patterns at MKE are positively supported.

PARKING STRATEGY

A car parking and cycle parking strategy for the site has been developed that considers current MKC standards and applies a mechanism as to how the development can flex and re-evaluate these over time as public transport and other mobility choices become prevalent within the development and wider MK.

It is proposed that a mix of parking standards that reflect the character areas of the Development Framework and MKE proposals are applied initially. These adopt the most appropriate and current MKC parking standards.

The proposals at MKE, therefore, balance the need between parking provision for residents that is at a suitable level without promoting car use, whilst at the same time offering real alternatives to private vehicle use through walking, cycling and public transport options.

TRIP GENERATION

A series of Technical notes have been provided detailing the methodology to identify the potential trip generation from the MKE allocation.

Whilst it was agreed between MKC and WSP for the HIF application that the MKMMM would be used as a consistent basis for the HIF-specific modelling runs, the highway impacts of the proposed MKE development are proposed to be assessed using bespoke trip rates and future years applied to the MKMMM. This would ensure that the proposed infrastructure is adequate to accommodate forecast demand associated with the proposals.

The trip generation applies a traditional methodology and a future mobility methodology to forecast the potential vehicular trips on the network. Whilst no adjustment has been made for Mass Rapid Transit (MRT) or Park and Ride (P&R), the future mobility trip generation uses forecast trends in shifts away from private vehicle use onto shared mobility services (such as ride-sharing). The future mobility trip generation has been used in the assessments as this presents a realistic forecast that is not based on current practices. The trip generation is underpinned by the Walking and Cycling strategy, the Public Transport Strategy and the Travel plans, ensuring that the development reduces car dominance.

MODELLING METHODOLOGY

The methodology that has been followed to determine the forecast traffic impact of the MKE development forms its basis on Milton Keynes Multi-Modal Model (so-called MKMMM in this TA), which, after being used to obtain the HIF funding, has been refined to more accurately reflect the zoning of the development, complementary additional traffic data obtained in 2019 and bespoke trip rates associated with the MKE development and, that way, represent an accurate forecast of the potential impacts. This strategic model has then fed into a detailed Paramics model associated only with M1 J14 and Northfields.

Once the multi-modal traffic generation of the MKE development has been forecasted in consideration of Future Mobility trends, these have been distributed and assigned within the internal and external network, different modelling scenarios have been tested. These have been determined in agreement with MKC and HE and include 2016 as the base year, 2031 as the base future reference and 2031 with development, and 2048 as further base future reference and also with development.

HIGHWAY IMPACT AND MITIGATION STRATEGIES

A review of junction performance in Section 9 of this TA identifies several locations across the local highway network where potential intervention and mitigation strategies should be considered as a result of the changes in performance and operation which is realised under the Do Something traffic scenarios (i.e. with MKE) compared to the Do Minimum (i.e. without MKE) situation.

The mitigation strategies seek to balance improvements against development impacts. It should be noted that the modelling has tested the whole MKE allocation. As such, further analysis will be required to ascertain each individual land holders' impact, and therefore a proportional contribution to each junction upgrade. Furthermore, much of the impact at off-site junctions arise not only as a result of the development but also due to the re-routeing of other traffic and wider MK growth beyond 2031.

It is recognised that in order to accommodate wider growth across MK beyond 2031, intervention beyond that identified within this TA may be required at some junctions. Consequently, intervention at those junctions needs to be considered holistically by MKC in the context of growth beyond Plan:MK and not piecemeal such that MKC can ensure that their network is future-proofed to accommodate its planned growth aspirations, with MKE then providing contributions towards that holistic intervention. It is anticipated that details of this and any financial contributions towards such mitigation will need to be discussed further with MKC and, particularly, as Reserved Matters Applications come forwards.

CONSTRUCTION LOGISTICS PLAN

An outline Construction Logistics Plan (CLP) has been developed to limit any impacts of the construction period of the MKE site on the existing highway network within the vicinity of the proposed development. The CLP is a live document that will evolve and be updated as the development gets constructed but sets the framework to minimise any disruption from the build period.

1. INTRODUCTION

1.1. PREAMBLE

1.1.1. WSP has been appointed by Berkeley St James to provide transportation and highways advice in respect of the proposed development of land to the northeast of Milton Keynes (hereinafter referred to as 'Milton Keynes East' or 'MKE').

1.1.2. The Milton Keynes East site has been identified as an allocation for a Strategic Urban Extension (SUE) within the current local plan entitled Plan:MK 2016 – 2031 (hereinafter referred to as Plan:MK). Milton Keynes Council's (MKC) aspirations for the allocation are set out in Policy SD12 of Plan:MK. Policy SD12 states, inter alia, that key strategic infrastructure improvements are required over the M1 "…to support the connectivity of this strategic urban extension to the existing Milton Keynes urban area".

1.1.3. Given the strategic nature of the MKE SUE, MKC prepared and adopted a Development Framework Supplementary Planning Document (DF SPD) in March 2020, which establishes a vision, disposition of land uses, core principles and infrastructure delivery for the site.

1.1.4. The MKE site is strategically located immediately north-east of Junction 14 of the M1, one of the two main motorway junctions serving Milton Keynes. It is situated approximately 3.5 kilometres north-east of Central Milton Keynes (the central business district of Milton Keynes), with some limited walking, cycling and highway links to the city centre.

1.1.1. The location of the MKE site is shown for illustration in Diagram 1-1 below as extracted from the DF SPD, with the application site's red line boundary in a wider regional context shown in Figure 1. The MKE site is wedged between the M1 motorway forming its southern boundary and the A422 and A509 delineating its western boundary. Open land of predominantly agricultural character then borders the site from the west and east.

Diagram 1-1 – MKE SUE Allocation Boundary

Source: MKE Development Framework Supplementary Planning Document (MKC, March 2020)

1.2. BACKGROUND

1.2.1. Policy SD12 of Plan:MK seeks to deliver a mixed-use development at MKE of circa 5,000 new homes, employment in the order of 105 hectares and supporting ancillary uses, including primary and secondary schools, health care and community facilities.

1.2.2. As noted in Plan:MK, the delivery of the MKE SUE is constrained by the artificial barrier created by the M1 and capacity constraints on bridge crossings over the M1, particularly at M1 Junction 14 (J14). Therefore, it is evident that the growth east of the M1 is reliant upon the strategic highway and social infrastructure being provided to accommodate the demand from the strategic extension at MKE, most notably delivering satisfactory transport connections across the M1 into the centre of Milton Keynes.

1.2.3. MKC was successful in their bid for a Housing Infrastructure Funding (HIF) and secured funding for the strategic infrastructure required to enable the site to come forwards, in line with Policy SD12 of Plan:MK. The new strategic infrastructure enabling the delivery of the MKE development would include:

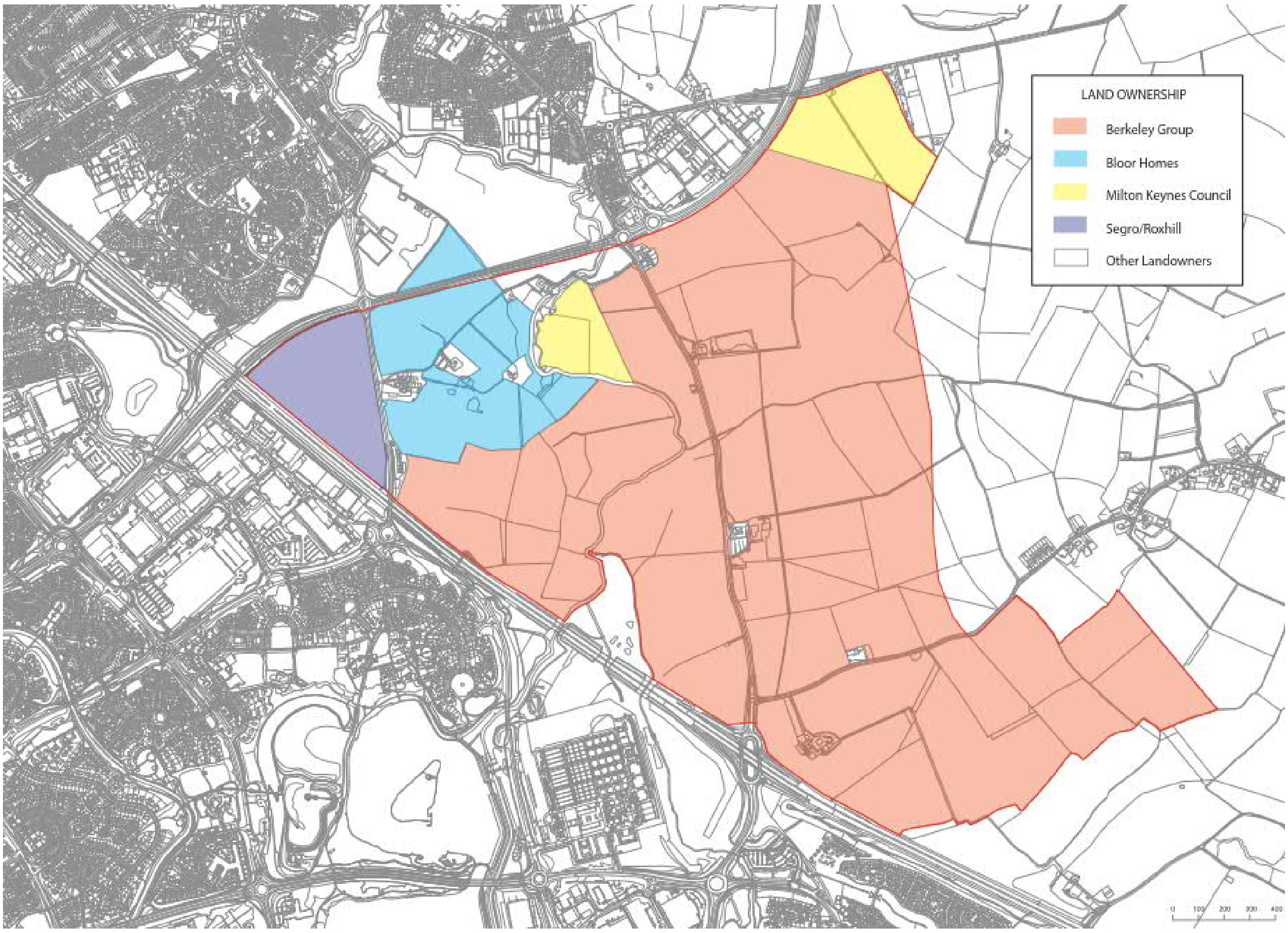
- A new bridge over the M1;
- A new north-south connection to the A422 into the MKE SUE;
- A new east-west connection leading to the bridge crossing over the M1 and part of a new link road around the eastern perimeter of the site connecting into M1 J14;
- Dualling of the A509 southbound approach to M1 J14; and
- Closure of the Newport Road junction with the A509 and reconfiguration of Newport Road to form a new junction with the eastern perimeter road and connection to the village of Moulsoe.

1.2.4. In addition to the above, the MK SUE DF SPD has also been adopted in March 2020 for the site, setting out key considerations and parameters for bringing development on the site forwards.

1.2.5. As set out in Plan:MK, growth east of the M1 is reliant upon the strategic highway and social infrastructure being provided to accommodate the demand from the strategic extension at MKE, most notably delivering satisfactory transport connections across the M1 into the centre of Milton Keynes. This is reflected both in Plan:MK Policy SD12 and the aforementioned DF SPD.

1.1.2. The overall MKE site (as illustrated in Diagram 1-1 above) includes parcels, which will be delivered by independent third parties (i.e. not Berkeley), including Bloor, Segro (Roxhill) and MKC. This TA relates solely to the approach proposed by Berkeley, albeit it is recognised that it may be beneficial for this approach to be adopted by others in due course if accepted by both MKC and Highways England. Diagram 1-2 below, as taken from the DF SPD, outlines the current land ownership boundaries.

Diagram 1-2 – MKE SUE - Land Ownership Boundaries



Source: MKE Development Framework Supplementary Planning Document (MKC, March 2020)

1.2.6. WSP is acting on behalf of Berkeley St James as the majority landholder. Therefore, the application submitted will be for the land controlled by Berkeley and will be assessed independently from the other holdings. However, the other areas of the MKE SUE allocation will be included as part of the cumulative testing in the modelling.

1.3. SUPPORTING DOCUMENTS

1.3.1. This TA has been prepared as part of the suite of transportation documents supporting the planning application and should be read in conjunction with the following:

Supporting Transport Documents

- Framework Residential Travel Plan (RTP) setting out several measures and incentives to achieve the ultimate objective of reducing reliance on single-occupancy vehicle trips and increasing the opportunity to travel by sustainable modes.
- Framework Workplace Travel Plan (WTP) similar to the Residential Travel Plan, but focusing on the workplace and potential employees of the site and how workplaces can promote sustainable trips from the outset;

- Public Transport Strategy (PTS) examining the viability of public transport provisions, including a review of existing services in the vicinity of the site and outlining the requirements for operation of new services providing additional public transport access for residents/employees and visitors of the proposed development.
- Outline Construction Logistics Plan (CLP) providing a summary of the likely construction numbers expected, as well as distribution and measures to reduce construction impacts during the build-out program.
- Walking Cycling and Horse-riding Assessment and Review (WCHAR) assessing the proposals for pedestrians, cyclists, and equestrian connectivity throughout the highways focused elements of the development. *Appendix D*

Transport Technical Notes – within Appendix A

- Transport Technical Note 1: Modelling Approach discussing the Milton Keynes Multi-Modal Model (MKMMM) and the adjustments deemed appropriate to make the model fit for purpose (i.e. assessment of the proposals). *Appendix A-1*
- Transport Technical Note 2: Review of Growth between 2016 and 2019 – Traffic Data discussing the suggested approach for factoring the 2019 data to be included in the MKMMM, the base year of 2016. *Appendix A-2*
- Transport Technical Note 3: Trip Generation exploring the options and methodology for developing bespoke trip rates. *Appendix A-3*
- Transport Technical Note 4: Trip Generation Growth and Future Year Modelling Approach considering potential growth in the MKE locality beyond 2031 up to 2048 for information purposes. *Appendix A-4*
- Transport Technical Note 5: Review of Link Capacity reviewing the available modelling data for several key links in the area. *Appendix A-5*
- Transport Technical Note 6: MRT and Park and Ride Supplementary Information supporting the Transport Technical Note 3 by providing an evidence base for developing the bespoke trip rates for the proposals. *Appendix A-6*
- Transport Technical Note 7: Do Something Model Inputs identifying the specific inputs of the modelling scenarios for the proposed development. *Appendix A-7*
- Transport Technical Note 8: Parking Strategy summarising the design assumptions made and provisional strategy developed with respect to vehicular parking. *Appendix A-8*
- Transport Technical Note 9: Walking and Cycling Strategy looking at the strategies to facilitate walking and cycling to and from the site. *Appendix A-9*
- Transport Technical Note 10: PRoW Strategy assessing how the existing redway, leisure route and Public Rights of Way (PRoW) networks can be expanded to enhance the site's connectivity. *Appendix A-10*
- Transport Technical Note 11: Outline Public Transport Strategy a summary of the PTS document. *Appendix A-11*
- Transport Technical Note 12: Tongwell Street Junction Design a summary of the design process undertaken for the new Tongwell Street Junction with the new M1 bridge crossing. *Appendix A-12*
- Transport Technical Note 14: Newport Pagnell Connections a presentation of the potential crossing locations towards Newport Pagnell. *Appendix A-14*

*Please note TTN13 was for internal use only and it is therefore not listed or used

Third Party Technical notes – *Supporting the strategic modelling*

- AECOM Technical Note 29 – MKMMM Revalidation and Calibration
- AECOM Technical Note 30 – Future Year Impacts

1.4. DEVELOPMENT PROPOSALS

1.4.1. As identified above, the land allocated for the MKE development consists of several sites under different ownership, with Berkeley St James controlling the majority of the allocated land.

1.4.2. The Berkeley land covers the majority of the developable area within the allocated site. It is acknowledged that other landholders will also prepare separate applications under the framework umbrella. Those separate applications may wish to test a different number of households and, as such, could result in several dwellings higher than the development framework and allocation.

1.4.3. This TA focuses on the Berkeley St James site. However, it acknowledges that there is a requirement to ensure that the wider MKE allocation is also factored within any modelling supporting the development moving forward.

1.4.4. It should be noted that through discussions with MKC, it was agreed that a higher number of residential units is tested to account for the potential variability in unit numbers across multiple land ownerships.

1.4.5. This approach was considered sensible to ensure that a suitable level of infrastructure is provided at the site and that any off-site mitigation is reviewed appropriately. It was suggested that up to a 15% uplift on the allocation number could be suitable. This was agreed via an online meeting on 30 April 2020. Meeting notes of those discussions are contained within TTN3 – Trip Generation, attached to this TA within Appendix A.3.

1.4.6. Section 5 of this TA provides further details on the development proposals within the Berkeley St James elements of the site, with Table 1-1 below providing a summary of the application and allocation as a whole.

Table 1-1 – Planning Application vs Site Allocation - Summary

Berkeley St James Application	Allocation total (with residential uplift)
Up to 4,600 homes (including houses, flats and specialist elderly accommodation with or without care)	5,750
Circa 85Ha of employment	105 Ha
A secondary school	A secondary school
3 x primary schools	Up to 4 primary schools (assuming one is located within the Bloor land)
A community hub/centre including healthcare, retail and leisure facilities	A community hub/centre including healthcare, retail and leisure facilities
Community Space/Open Space/Burial Space	Also included in the allocation

1.4.7. The modelling methodology used in the strategic modelling regarding the application and wider allocation was also discussed during the 30 April 2020 meeting. This modelling methodology is set out in further detail in Section 6 of this TA.

1.4.8. This TA has therefore been produced to support the Berkeley St James development, which is indicatively described as follows:

Hybrid planning application encompassing:

(i) outline element (with all matters reserved) for a large-scale mixed-use urban extension (creating a new community) comprising: residential development; employment including business, general industry and storage/distribution uses; a secondary school and primary schools; a community hub containing a range of commercial and community uses; a new linear park along the River Ouzel corridor; open space and linked amenities; new redways, access roads and associated highways improvements; associated infrastructure works; demolition of existing structures; and

(ii) detailed element for strategic highway and multi-modal transport infrastructure, including: new road and redway extensions; a new bridge over the M1 motorway; a new bridge over the River Ouzel; works to the Tongwell Street corridor between Tongwell roundabout and Pineham roundabout including new bridge over the River Ouzel; alignment alterations to A509 and Newport Road; and associated utilities, earthworks and drainage works.

1.4.9. This TA addresses the feasibility of the proposed Milton Keynes East development in terms of transportation impact, access, mobility and sustainability credentials and has been prepared in accordance with the guidance set out in the Planning Practice Guidance (PPG) under a category entitled 'Travel Plans, Transport Assessments and Statements' published in March 2014.

1.5. LIAISON WITH STAKEHOLDERS

1.5.1. WSP assisted MKC in preparing their successful HIF bid for the site and assisted Berkeley in the promotion of the site through the Local Plan. As such, WSP has had numerous consultations, meetings and discussions with MKC and other stakeholders regarding the site over several years.

1.5.2. As the development application has progressed, WSP has continued its engagement with MKC officers (Planning, Modelling, Highways, Public Transport, Travel Plan, Public Rights of Way, etc.). The TA sets out the matters related to the impact of the proposed development on the local highway network, managed by MKC as the local highway authority. WSP's Transport Assessment Scoping Report and subsequent correspondence with MKC regarding the proposed development is included in Appendix B.

1.5.3. WSP has also liaised with Highways England as the strategic highway authority regarding the assessment of the Strategic Road Network (SRN). Correspondence with Highways England is included in Appendix C. Recent technical notes from Highways England have provided feedback, comments and specific recommendations for additional data or clarifications to be included in the TA. Following submission of WSP's Transport Technical Note 3.1 (TTN3.1) focusing on the trip generation aspects of the site and responding to comments to Transport Assessment Scoping Report for MKE SUE development, as provided in AECOM’s Technical Note 07 (TN07), AECOM provided further comments on behalf of Highways England. These comments are summarised in Table 1-2 below, with the specific chapter signposted for ease of review. The comments related to trip generation (comments 1 to 14) are discussed in detail in Section 6.3 of this TA.

1.5.4. It should be noted that the MKE proposals have been and continue to be subject to extensive consultations with both authorities, and further information can be found in the associated supporting documents prepared to aid these discussions.

Table 1-2 – Highways England Comments on the TA Scoping Note

Ref	Comment / Area	TA Section / Document
Recommendations regarded as important but not critical to the acceptability of the Transport Assessment		
15	Consideration should be given as to which mode will be used to access rail and underground modes from the site.	Mode shares are discussed in TTN3, with further information in the RTP/WTP and PTS Documents
16	The internalisation assumptions and build-out of the site	Discussed in Section 5 (build out), TTN3, TTN3.1 and TTN3.2 within Appendix A.3 (internalisation)
17	Further information on the trip generation for education uses for the proposed assessment years	Discussed in Section 6.3 and TTN3 and TTN3.1
18	Further detail on which modes are anticipated to accommodate the forecast modal shift	Discussed in Section 6, Walking and Cycling Strategy, RTP and WTP's.
19	Additional evidence to demonstrate that all of the sustainable modes of travel can be sufficiently supported by the proposed infrastructure associated with the development	Discussed in Section 5, 6, TTNs 3,6,8,9, 10,11 and , PTS and RTP/WTP
20	Internalisation factors updated to reflect the latest modelling	Discussed in TTNs 3, 3.1 and 3.2
Outstanding recommendations from AECOM's TN07		
21	Site access strategy to be defined	Discussed in Section 5 and DAS
22	Consideration should be given to: a. the number of trips using M1 J14 (and slips); b. how downgrading of the A509 will decrease through route trips; c. details of the location and operation of the new junction with the A509 proposed to the north of M1 J14; d. the dualling of the A509 southbound approach to M1 J14 and the impact of the proposed revisions on the operation and safety of the junction; e. the impact the construction of a new bridge across the M1 may have on the operation of the SRN mainline; and f. the level of HGV flow into the site from M1 J14 during the construction period.	Discussed in Section 8, Section 10, Section 12, AECOM TNs 29 and 30, Paramics Note PTN1a
23	Consideration should also be given to the scope of the impact of the proposed development on the SRN, including the potential for the proposed development to adversely impact the safety and operation of M1 J13, M1 J15 and the A5	Discussed in TN1 (please note it was agreed that J13 would be reviewed), Section 10
24	Highways England should be engaged in discussions regarding the vehicular accesses and off-site highway works to better understand potential impacts on the SRN	Regular meetings with Highways England on various topics, including modelling and impacts have been held. It is envisaged that further dialogue and discussions will be organised to discuss SRN and junctions.

Ref	Comment / Area	TA Section / Document
25	Detail should be provided on the proposed build-out of the site	Discussed in Section 5.3 and DAS
26	Confirmation on modelling scenario used and assessments	Discussed in Section 6.2
27	Further detail should be provided about which modes are anticipated to accommodate the forecast modal shift.	Discussed in Section 5, 11, RTP, WTP and PTS
28	The proposed scope of the Travel Plans (TP) is acceptable. They will be expected to include SMART (Specific, Measurable, Achievable, Realistic, Time-bound) targets set which reflect the levels of modal shift anticipated by the 'Future Mobility' methodology	Discussed in RTP and WTP
29	Approach to the Public Transport Strategy (PTS) is considered acceptable, but we would expect to see the information provided on proposed bus corridors and delivery timelines to ensure consistency with the trip generation methodology	Discussed further in PTS
30	Further information is requested on the delivery timescales of the P&R site, together with details of how traffic would access and egress the P&R site	Discussed in Section 5 Please note that the MKE site is safeguarded the land for the P&R and not including
31	A recommendation that reference should be made to the emerging Milton Keynes: Strategy for 2050 to inform the 'Future Mobility' approach of the Site.	Discussed in Section 2

1.6. SUPPORT FOR THE SCHEME AT HIF STAGE

1.6.1. As noted above, WSP supported MKC during its successful HIF bid for the MKE site. During the process, extensive collaboration and discussions were held with multiple stakeholders, resulting in positive support for the scheme overall.

MILTON KEYNES COUNCIL

1.6.2. Whilst MKC were the applicant for the HIF bid, several internal stakeholders were consulted about the proposed infrastructure and the MKE site. In the context of transport, key consultation and dialogue were held between the MKC Highways team, MK 2050 Vision team and urban designers through the Development Framework process.

1.6.3. During the HIF stage, these discussions informed the layout of the infrastructure, which has been developed in recognition of both local design guidance and the Design Manual for Roads and Bridges (DMRB) and its impact on placemaking within the final scheme.

1.6.4. Prior to submitting the TA Scoping Report, initial pre-application discussions took place between Berkeley St James and MKC Highway Officers regarding the scope of the transport assessment required for both the new highway infrastructure and the development itself. The principles of the approach to traffic modelling, trip generation, etc., were agreed subject to receiving further details. These details are set out in this TA and supporting documentation.

HIGHWAYS ENGLAND

1.6.5. At the HIF stage, Highways England confirmed that they support the principles of a new bridge crossing over the M1 and recognise the benefits this would bring to J14 in freeing up capacity and extending its life in advance of any improvements coming forward sometime in the future. Highways England confirmed at the time that it has no objection to a proposed bridge over the M1 subject to the usual legal agreements and obligations around its delivery and ongoing maintenance. A copy of Highways England's letter confirming this was included within the Stage 1 HIF bid.

1.6.6. Following the bid, a further dialogue has taken place with Highways England, particularly with their Smart Motorways team, Planning team, Highways team and Bridges team.

SMART MOTORWAYS

1.6.7. Highways England are currently implementing all lane running between junctions 13 and 16 of the M1 as part of the Smart Motorways programme being rolled out across the UK. As part of those works, there are improvements proposed to the slip roads at M1 J14, including widening at the top and bottom of the slips allowing for merge over-runs, some relining, and Advanced Motorway Indicators at the top of the on-slips. Highways England have provided details of those improvements, which have been acknowledged. Physical changes have been included in the updated Reference Case traffic model and all other future year modelling runs set out in this report.

1.6.8. A Statement of Common Ground (SoCG) between Berkeley St James, Highways England and MKC relating to the works required to deliver the bridge and the smart motorway upgrades has been prepared and is due to be signed shortly.

HIGHWAYS

1.6.9. The majority of the highway infrastructure works will be either within the existing MKC public highway (e.g. Tongwell Street) or a new highway subsequently adopted by MKC as a public highway. The exception to this is the new M1 overbridge (up to and including the waterproofing later and parapets) and any works required in the future at M1 J14, which will be adoptable by HE. Early dialogue about this has taken place with Highways England and their S278 team.

BRIDGES

1.6.10. Meetings and several conversations have taken place with the Highways England and MKC bridge teams with input from the Highways England Smart Motorways team. These discussions resulted in preparing an M1 bridge optioneering report that considered the options for designing and constructing the new M1 over-bridge. This was submitted as part of the HIF bid. Furthermore, several Agreements in Principle (AiP) have been prepared for the new bridge structures proposed as part of the highway infrastructure.

1.7. REVIEW STATUS AND AGREEMENTS

1.7.1. Whilst MKC will determine the application, it is deemed essential to acknowledge key stakeholders in the review and analysis of the proposed MKE development.

1.7.2. Table 1-3 below provides the current status of specific documents and elements of the assessment of the proposed MKE development. Where confirmation from a party has been provided this is included either in Appendix B (MKC), or within Appendix C (Highways England).

Table 1-3 – Document Sign off and Assessment Status

Item	Date originally Issued	Latest Position
TTN1 Modelling Approach Note (WSP)	March 2019 (and updated May 2019)	Agreed by MKC and confirmed by Highways England on 21/06/2019
Transport Assessment Scoping Note (WSP)	28/04/2020 (draft)	Confirmed as acceptable by MKC on 25/09/2020 General Principles commented on by Highways England - some outstanding comments/need to be addressed and responded (see comments in response to TTN3 as discussed in Table 1-2 above)
TTN3 Trip Generation and Future Mobility (WSP)	26/06/2020	Confirmed by MKC on 25/09/2020 Highways England have requested further justification, and where this is addressed in the TA, it is set out in Table 1-2 above
TTN3a Future Mobility (Appendix of TTN3 (WSP)	26/06/2020	*See above (included as part of TTN3)*
TTN6 MRT Review (Appendix of TTN3) (WSP)	26/06/2020	*See above (was originally included as part of TTN3)*
TTN4 Growth Note (WSP)	28/04/2020 (draft)	Confirmed by MKC on 25/09/2020 Highways England/AECOM Confirmed that they were happy with the response, and subsequently, use of the future year reference models has been agreed – 09/10/2020.
TTN5 Link Capacity (WSP)	28/04/2020 (draft)	Confirmed by MKC on 25/09/2020
Removal of southbound access from Tongwell Street onto the new M1 bridge link	01/05/2020 (email)	Discussed with MKC and optioneering presented detailing those safety considerations reduced the options available at the tie in point. TTN12 Tested within the Stage 3 models. Further commentary on the Tongwell Street link is provided in Section 5.7 of this TA.
M1 J14 Paramics LMVR (WSP)	29/04/2020	MKC Confirmed acceptance in principle of the LMVR at that stage. Further dialogue and review have been undertaken with Highways England. Discussed further in Paramics technical notes, including LMVR Addendum2.
MKMMM – Stage 1, Base Model Calibration and Validation (AECOM on BEHALF of MKC)	Draft outputs provided by MKC early March 2020 (05/03/2020) for discussion. Draft TN provided in full (with appendices) 22/04/2020	MKC Formally signed off the acceptance of Stage 1 modelling – 18/09/2020 Highways England provided comments on Stage 1 and deemed acceptable - 28/07/2020
MKMMM - Stage 2 (2031 and 2048 Reference case outputs	Draft preliminary outputs provided by MT 12/08/2020 Revised outputs provided by MT 14/08/2020	MKC Formally signed off - – 18/09/2020 Highways England confirmed acceptance of Stage 2 future year reference models - 09/10/2020.
MKMMM – Stage 3 (with development assessments – 2031 and 2048)	Outputs provided and tests completed	MKC confirmed happy with the use of Stage 3 to determine development impacts. Highways England will continue to review following issue of the AECOM supporting note (TN30 – Appendix K), and further information set out in this TA.

1.8. REPORT STRUCTURE

1.8.1. The remainder of the TA report is presented in the following chapters:

- Section 2 provides an overview of national and local policy relevant to the site and the proposed development;
- Section 3 details the site location and existing conditions in the vicinity of the site;
- Section 4 considers the accessibility of the site to local facilities;
- Section 5 describes the development proposals;
- Section 6 outlines the approach to the assessment of the MKE allocation;
- Section 7 summarises the highway baseline conditions;
- Section 8 sets out the high-level strategic modelling outputs, including sensitivity tests and planning tests;
- Section 9 assesses the impact of the proposed development on the local highway network;
- Section 10 considers the impact of the proposed development on the Strategic Road Network;
- Section 11 provides an overview of the development's sustainable transportation strategy;
- Section 12 discusses the proposed transport strategy related to highways;
- Section 13 briefly discusses the construction traffic; and
- Section 14 summarises and concludes this TA.

2. POLICY CONTEXT

2.1. INTRODUCTION

2.1.1. This section sets out an overview of the relevant transport policy, which has provided the context for the assessment of the transport impact of the proposed MKE development. Relevant national and local policy and guidance have been examined and reviewed.

2.1.2. It is acknowledged that there are other policy and guidance documents, such as those from the Department for Transport (DfT), which have not been presented in detail in this TA but have been reviewed and used where appropriate as best practice guidance.

2.2. NATIONAL POLICY

National Planning Policy Framework, MHCLG, February 2019


National Planning
Policy Framework

Policy Content	Relevance to this Assessment
The NPPF paragraph 10 mentions that *"so that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development."* Specifically, from a highways and transportation perspective, Chapter 9 (paragraphs 102 to 111) of the NPPF is entitled Promoting Sustainable Transport. In paragraph 104, the NPPF states that *"Planning Policies should:* *support an appropriate mix of uses across an area, and within larger scale sites, to minimise the number and length of journeys needed for employment, shopping, leisure, education and other activities*, and; *provide for high quality walking and cycling networks and supporting facilities such as cycle parking (drawing on Local Cycling and Walking Infrastructure Plans);"* The NPPF discusses the parking requirements in paragraph 106, stating that *"Maximum parking standards for residential …development should only be set where there is a clear and compelling justification that they are necessary for managing the local road network…"* and also that the quality parking should be *"…convenient, safe and secure,*	The proposed development comprises new residential dwellings, educational facilities and employment areas accessible by several sustainable modes. It will be an urban extension to the northeast of Milton Keynes with access to existing local facilities within the town and links to existing transport infrastructure and services with opportunities to improve current and future sustainable transport patterns. The parking across the proposed development has been designed to align with the current MKC zone parking standards. Consideration has also been given to the provision of electric vehicle charging points. The layout seeks to provide excellent permeability for residents to use sustainable transport modes such as public transport, walking and cycling. Consideration has been given to existing pedestrian and cycle routes, the existing PROW and redway network provision and provision of cycle parking through the development. A comprehensive Public Transport Strategy has been prepared to complement the proposals. This discusses the provision of smaller vehicles providing a more on-demand and personalised mobility service. It is envisaged that conventional bus services will remain at the heart of the strategy, and

alongside measures to promote accessibility for pedestrian and cyclists."

Paragraph 108 outlines the requirements for a development that should be considered during the assessment of the proposals stating: *"It should be ensured that:*

- *a) appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;*
- *b) safe and suitable access to the site can be achieved for all users; and*
- *c) any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree."*

Paragraph 110 considers that applications for development should:

"*a) give priority first to pedestrian and cycle movements, both within the scheme and with neighbouring areas; and second – so far as possible – to facilitating access to high-quality public transport, with layouts that maximise the catchment area for bus or other public transport services, and appropriate facilities that encourage public transport use"* and

e) be designed to enable charging of plug-in and other ultra-low emission vehicles in safe, accessible and convenient locations.

Paragraph 111 requires that *"…All developments that will generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed."*

Importantly, NPPF states in paragraph 109 that *"…Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe."*

the potential delivery of a Mass/Bus Rapid Transit Hub is discussed.

Due consideration has also been given to highway safety and potential safety implications resulting from the development proposals. The TA provides a comprehensive review of the existing safety record within the local highway network and identifies key locations where the proposed development may have an impact.

Given the scale of the proposed development, it is acknowledged that the proposals may generate significant amounts of movement. As such, and in line with NPPF, the application will include this Transport Assessment providing a detailed assessment of the potential impacts of the site and the Framework Travel Plan, which will support new residents in adopting sustainable travel habits.

Planning Practice Guidance: Travel Plans, Transport Assessments and Statements

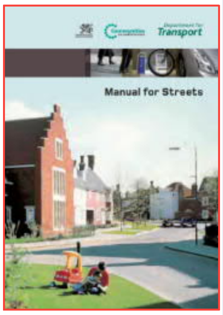
March 2014


Guidance
Travel Plans, Transport Assessments and Statements

Policy Content	Relevance to this Assessment
The Planning Practice Guidance 2014 provides advice on what Transport Assessments should contain. The guidance states that the following needs to be considered: *"Information about the proposed development, site layout* *Information about neighbouring uses, amenity and character, existing functional classification of the nearby road network;* *Data about existing public transport provision, including provision/ frequency of services and proposed public transport changes;* *A qualitative and quantitative description of the travel characteristics of the proposed development;* *An assessment of trips from all directly relevant committed development in the area;* *Data about current traffic flows on links and at junctions;* *An analysis of the injury accident records on the public highway in the vicinity of the site access;* *An assessment of the likely associated environmental impacts of transport related to the development;* *Measures to improve the accessibility of the location;* *A description of parking facilities in the area and the parking strategy of the development;* *Ways of encouraging environmental sustainability by reducing the need to travel; and* *Measures to mitigate the residual impacts of development."*	By following the guidance, this TA is comprehensive and written to a high-quality standard. Following the guidance, it enables all areas and relevant information to be addressed within a suitable structure.

Manual for Streets, 2007 &

Manual for Streets 2, 2010



Policy Content	Relevance to this Assessment
Manual for Streets (MfS) was published in March 2007 (MfS1), and Manual for Streets 2 was published in September 2010 (MfS2) to provide guidance to a range of practitioners on efficient residential street design. It is not policy as such, but it provides a design framework that strongly influences the layout of the planning application proposals. MfS recognises that there is a need to transform the quality of residential streets. Some of its principles may be applied to other road types where appropriate. Streets should not be designed only to accommodate the movement of motor vehicles; a prime consideration is that they meet the needs of pedestrians and cyclists. Section 1.3 of MfS emphasises the importance of joint working among practitioners. MfS2 does not supersede MfS, but it explains how the principles of MfS can be applied more widely. MfS2 explains in greater detail how and where its fundamental principles can be applied to busier streets and non-trunk roads, thus helping to fill the perceived gap in design guidance between MfS and the DMRB.	The principles of MfS and MfS2 have been instilled in the planning of the proposed development, ensuring it delivers a high-quality streetscape and supports the sustainable living of future residents. The site layout will be prepared with due consideration given to the principles set out in MfS and MfS2. It will consider the user hierarchy recommended in MfS and connectivity through the site for users of all modes, including pedestrians and cyclists. Within site, footways and cycleways will be consistent with predicted desire lines and consider factors such as perceived safety and general amenity. The development proposals are discussed in detail in Section 5 of this TA.

Department for Transport – Circular 02/2013

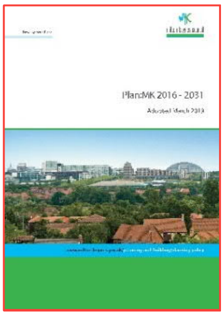
September 2013

Policy Content	Relevance to this Assessment
This circular explains how Highways England will engage with the planning system to fulfil its remit to be a delivery partner for sustainable economic growth whilst maintaining, managing and operating a safe and efficient strategic road network. The Circular provides details on the assessment approach, including the forecast flows to be used and future scenarios for consideration.	Paragraph 25 of the circular sets out that *"The overall forecast demand should be compared to the ability of the existing network to accommodate traffic over a period up to ten years after the date of registration of a planning application or the end of the relevant Local Plan whichever is the greater. This is known as the review period."* This planning test has been reviewed in more depth in the Paramics analysis of J14 and Northfields, discussed further in Section 10 of this TA.

2.3. LOCAL POLICY

Plan:MK 2016-2031

March 2019



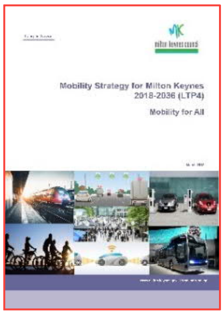
Policy Content	Relevance to this Assessment
Plan:MK sets out the Council's vision, strategy and policies for development in the Borough of Milton Keynes up to 2031. **Policy SD1** (Place-Making Principles for Development) identifies that proposals should demonstrate that the following place-making principles have been considered: *"Development integrates well with the surrounding built and natural environments to enable a high degree of connectivity with them, particularly for pedestrians and cyclists and for access to connected green infrastructure for people and wildlife.* *Public transport stops are located in the most accessible locations. The layout of development and network of routes are designed to provide direct, safe, and pleasant routes for pedestrians and cyclists.* *The layout and design enables easy, safe and pleasant access for pedestrians and cyclists of all abilities from residential neighbourhoods to the facilities including the redway network, open spaces and play areas, public transport nodes, employment areas, schools shops and other public facilities in order to promote recreation walking and cycling.* *Impacts on the road network have been thoroughly identified through appropriate technical assessments and appropriate mitigation measures and improvements to the road network and public transport have been identified and incorporated into the development or the wider area as required."* **Policy SD9** (General Principles for Development Proposals for Strategic Urban Extensions) states that a transport assessment should support proposals for Strategic Urban Extensions. The proposals should be prepared in accordance with the principles set out below:	Land East of the M1: Milton Keynes East is identified in the Plan:MK as a Strategic Site Allocation. This means that it will provide a sustainable urban extension after 2031. Therefore, the application proposals for MKE have taken into account the policies identified in the Plan:MK to ensure the site meets the criteria for developing a sustainable urban extension site.

"Design, Land use, transport routes and mobility measures that integrate the SUE with the existing built up area. *Transport solutions maximise the opportunities provided by smart, shared and sustainable mobility solutions to deliver real alternatives to the private car (e.g. connectivity with existing and forthcoming rail services; rapid transit; driverless vehicles; shared vehicle schemes; coaches and buses)."* **Policy SD12** (Milton Keynes East Strategic Urban Extension) states that proposals will be expected to meet the following transport-related criteria: ▪ *"The phased introduction of a comprehensive network of transport infrastructure in line with the Local investment plan, to include grid road connections.* ▪ *A corridor of land safeguarding for a fast mass-transit system, and associated infrastructure, enabling connectivity to CMK and other key destinations.* ▪ *A network of segregated and where appropriate grade-separated, new and enhanced footpaths, cycleways and bridleways (including redways) to connect to existing routes."*	

Mobility Strategy for Milton Keynes 2018-2036 (LTP4):

Mobility for All

March 2018



Policy Content	Relevance to this Assessment
The MK Mobility Strategy sets out the strategic framework for the Milton Keynes Transport system along with a series of interventions needed to achieve the growth ambitions outlined in Plan:MK and supports the longer-term growth planned by MK Futures 2050. The Transport Objectives and Outcomes identified in the Strategy are as follows: *"Support the growth and provide mobility for all:* ▪ *Reliable journey times* ▪ *A transport system to support growth* ▪ *Modern regulatory system – work to improve the way transport regulations support improvements in our transport system* ▪ *Provide an effective network:* ▪ *An integrated traffic management system to allow swift journeys and selective prioritisation of traffic during peak periods.* ▪ *A well maintained transport system* ▪ *A transport system that is available, well maintained and assessable and safe* ▪ *Maximise Travel Choices* ▪ *Integrated journey planning available on smartphones* ▪ *Making the most of autonomous vehicles* ▪ *Increasing mobility as a service, reducing the need for car ownership* ▪ *Protect Transport Users and the Environment* ▪ *Supporting and encouraging the use of active modes* ▪ *Supporting and encouraging travel patterns which minimise CO2 and other emissions* ▪ *Ensuring the safety of all travellers."* Section 3 of the report covers the Delivery Plan. The objectives are set out at various terms of completion. The most relevant objectives for the development are outlined below:	The MKE site application ensures the proposals align with the transport objectives identified in the MK Mobility Strategy. By implementing the following strategies below, the proposed development will help support growth and mobility while providing an effective transport network that maximises travel choices and protects the environment. Smart Mobility Supplementary Information (TTN6) Parking Strategy (TTN8) Walking and Cycling Strategy (TTN9) Public Right of Way Strategy (TTN10) Public Transport Strategy and PT Outline Summary (TTN11)

"MK Grid Expansion – Expand the MK grid system in parallel with expansion of Milton Keynes' urban area along high frequency, high density transit corridor and direct cycle corridors that link existing areas, transport hubs and CMK to new and existing residential areas *Local highway Infrastructure – Provide additional road capacity at congestion hotspots where required and ensure infrastructure is future proofed.* *Redway network upgrade and extension – The redway network will be extended to new developments and where possible the old towns, cultural venues and sports centres."*	

Mobility Strategy for Milton Keynes 2018-2036 (LTP4):

Transport Infrastructure Delivery Plan (TIDP)

October 2019

Policy Content	Relevance to this Assessment
The TIDP sets out the objectives and short-to-medium term transport infrastructure required to support existing and new communities in Milton Keynes within the Local Plan (Plan:MK) to 2031. The Mobility Strategy Objectives are to: ▪ *"Support growth and provide mobility for all* ▪ *Provide an effective network* ▪ *Maximise travel choices* ▪ *Protect transport users and the environment."* The Transport Infrastructure Objectives are to: ▪ *"Support sustainable development in MK* ▪ *Future Mobility* ▪ *Promote Active Travel* ▪ *Support growth in the Oxford to Cambridge corridor* ▪ *Manage demand* ▪ *Safer transport networks* ▪ *Enhance the natural and built environment."*	The proposed development aligns with the TIDP objectives as all site users will be taken into account (highlighted under 'Mobility Impaired' in the 'Development Proposals' chapter of this TA). The Walking and Cycling Strategy, also developed as part of the planning application (see TTN9), seeks to maximise travel choices and promote active travel. Ultimately the focus of the development of sustainable travel modes will help protect transport users and the environment.

Milton Keynes East Strategic Urban Extension

Development Framework

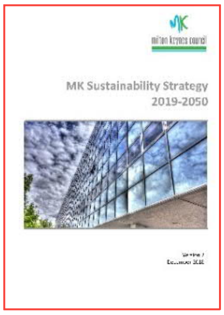
Supplementary Planning Document

March 2020

Policy Content	Relevance to this Assessment
The Development Framework has been adopted as a Supplementary Planning Document (SPD). The Development Framework provides guidance and further detail to the development principles set out in the adopted Plan:MK. It sets out some key considerations and parameters for bringing development on the site forwards. A key objective of the Development Framework is to ensure that the MKE site is brought forward strategically and comprehensively. Given that MKE land holdings are owned by several parties, the Development Framework looks holistically at the development of the site. The Development Framework will help to speed up housing delivery by adding certainty to the planning process.	The planning application for the proposed development will ensure that the design of the scheme will have the principles and guidance set out in the Development Framework within the heart of the design. The proposed development will follow the over-arching principles as set out in the Development Framework SPD, which include: • Active modes • Permeability • New Strategic routes & connections • Sustainable movement & rapid transit • Minimised impact of transport corridors • Quality placemaking and density • Social & Community • Economic Role • Retail & Centre • Green and Blue infrastructure • Biodiversity

MK Sustainability Strategy 2019-2050

December 2018



Policy Content	Relevance to this Assessment
The MK Sustainability Strategy 2019-2050 sets out MKC's long-term vision to create a world-leading sustainable city, which embraces innovation and creates jobs. The strategy recognises that it has a vital role in tackling the global challenges of climate change. In terms of transport, the strategy builds on sustainable principles that include reducing the level of transport-related emissions by promoting low-carbon vehicles and public transport and ensuring that the energy required for transport originates from sustainable sources.	The proposed development has several proposals surrounding sustainable transport principles. As explained further in this TA, a Future Mobility Strategy provides the details of how MKE will support a Mass Rapid Transit and Park and Ride should they come forwards. There are also proposals to maximise opportunities for pedestrian and cycle journeys through the provision of cycle routes, traffic-free routes and cycle parking.

Imagine MK Strategy for 2050

January 2021

Policy Content

The Imagine MK Strategy for 2050 sets the way forward for Milton Keynes Borough (MKB) and provides a long-term approach to spatial development.

The Strategy includes a commitment to provide essential infrastructure and services, including transit systems. It also commits to keep and strengthen areas such as – green spaces and trees, ease of movement with grid roads and redways, vibrant economy and diverse communities.

The Strategy includes proposals to help achieve MKC's ambition to be carbon neutral by 2030 and to support the mental and physical health of the community.

The Strategy is concerned, inter alia, about sustainable growth in the area and emphasises the importance of high-quality environments. Several quality principles are established in the document for any development, including:

- *"Creating Healthy Neighbourhoods;*
- *Fully integrated with the natural and historic environment;*
- *Supporting compact, mixed-use neighbourhoods that work for public transport;*
- *Designing for active travel – walking and cycling;*
- *Creating places that support community ownership;*
- *Strong connections to the public transport network and reducing the reliance on cars;*
- *Reducing the environmental impact of new developments;*
- *Sense of place and innovation;*
- *Providing for a mix of uses within neighbourhoods;*
- *New development that is sensitive to existing communities;*
- *Making space for culture; and*
- *Sharing opportunities for growth across all communities."*

The Strategy also states that *"Major allocations for new communities will be required to include a significant proportion of the site for green space,*

Relevance to this Assessment

The planning application for the proposed development will ensure that the scheme's design represents a high-quality environment, which will incorporate the creation of a green infrastructure network, active travel infrastructure and EV charging provision. Furthermore, the proposed development is closely aligned with the future provision of a fast Mass Rapid Transit, as explained in TTN6.

The supporting Travel Plans (RTP and WTP) will also help contribute positively to the environmental ambition of MKC to become carbon neutral by 2030 by developing measures that incentivise and encourage sustainable and active travel.

The Travel Plans also seek to ensure that all MKE users are aware of the sustainable mobility options and will use promotional measures to increase public transport patronage.

ensuring it is delivered as an intrinsic part of the community. Development should result in a net gain to the environment, making positive improvements rather than just mitigating impacts." Consideration is also given in the Strategy to reducing transport-related emissions by providing mobility for all. This includes provision for electric vehicles, increased public transport patronage, and the introduction of Mass Rapid Transit (MRT) and the promotion of active modes of travel (i.e. walking and cycling).	

2.4. POLICY - SUMMARY

2.4.1. This chapter outlines the key national, regional and local policy and guidance documents that have been reviewed in detail and influence the Transport Assessment and Transport Strategy concerning the development proposals. The MKE site will be developed in accordance with local, regional and national policy and, where possible, seek to adhere to additional guidance documents that impact the assessment and strategy.

3. EXISTING CONDITIONS

3.1. SITE LOCATION

3.1.1. The site is located north-east of Milton Keynes in the jurisdiction of Milton Keynes Council unitary authority. The site is strategically located immediately north of Junction 14 of the M1, one of the two main motorway junctions serving Milton Keynes. It is situated approximately 3.5 kilometres north-east of Central Milton Keynes (the central business district of Milton Keynes), with some existing walking, cycling and highway links to the city centre. The site location is illustrated in Figure 1 and Figure 2, in the regional and local context respectively, at the end of this TA.

3.1.2. The site consists of 461 hectares of predominantly open land currently used for agricultural purposes. The site is wedged between the M1 motorway forming its southwestern boundary and the A422 and A509 delineating its northern boundary. Open land of predominantly agricultural character then borders the site from the west and east.

3.2. CURRENT SITE ACCESS

3.2.1. The site is accessible to vehicular traffic via the A509 through the centre of the site, and Newport Road bisecting the site from the east and connecting with the A509 to the north of the Junction 14 of the M1. Given the site's predominantly agricultural use, it is currently accessible to farm vehicles via several field access points at various locations around the site perimeter, including an accommodation bridge over the M1, providing a connection with Tongwell Street. The site is, in the context of the local highway network, illustrated in Figure 2.

3.2.2. The site is also accessible to pedestrians and cyclists via several PRoW traversing the site and cycle routes in its vicinity. These connections are illustrated in Figure 3 and outlined in this section. A detailed description and evaluation of these facilities are provided in the TTN9 (Walking and Cycling Strategy) and TTN10 (PROW Strategy), both included in Appendix A as A.9 and A.10.

3.2.3. The development proposals seek to provide access for both motorised and Non-Motorised Users (NMU), and it is described in detail in Section 5.12 of this TA.

3.3. STRATEGIC ROAD NETWORK (SRN)

M1

3.3.1. The M1 motorway is a major road running the length of the country from central London to Leeds. The M1 links Milton Keynes to national urban centres such as Luton, Leicester and Sheffield, as well as links to other major highway routes further afield.

3.3.2. In the locality of the Proposed Development, the M1 runs in broadly northwest to southeast direction, with the Project Site situated just north of Junction 14. Junction 14 is a large grade-separated junction acting as the primary national route into Milton Keynes via the A509. The M1 is a dual carriageway major road, with three lanes in either direction along the section bordering the site. The M1 is subject to standard motorway regulations and speed limits.

3.3.3. The section of the M1 between Junctions 13 and 16 is currently being upgraded to an All-Lane Running (ALR) smart motorway to support economic growth and ease congestion in the area. The works are currently estimated to be completed in 2022-23.

3.4. PRIMARY ROAD NETWORK (PRN)

A509

3.4.1. The A509 provides a connection between the A5 to the west of Milton Keynes and the A14 to the south of Kettering via Milton Keynes, Newport Pagnell and Wellingborough, as well as several other villages and settlements. The A509 is formed by a combination of single and dual carriageway sections along its length.

3.4.2. In the vicinity of the Project Site, the A509 forms part of the northern site boundary, deviating south from its course at Tickford Roundabout and bisecting the Project Site as the A509 London Road reaching the M1 Junction 14 to the south. From the M1, the A509 continues south for a short distance to Northfield Roundabout and then runs west through Central Milton Keynes towards the A5.

3.4.3. The section of the A509 traversing the Project Site is a single carriageway road subject to a 60mph speed limit. The A509 provides direct access to several private properties (mainly farms and horse stables) and the Holiday Inn Milton Keynes hotel. It forms a major arm of the priority-controlled T-junction with Caldecote Lane immediately south of Tickford Roundabout. The junction with the hotel access road is in the form of a priority-controlled T-junction junction with a ghost island right-turn provision. This also the case at the junction with Newport Road immediately to the north of Junction 14 of the M1, albeit no right turn out of Newport Road on to the A509 is permitted.

3.4.4. There is no street lighting along the length of this section of the A509, except for the streetlights provided at the junctions with Caldecote Lane and Newport Road. No pedestrian or cyclist facilities are provided along the road's length through the Project Site, with only an informal 'trodden' verge available for sections between properties.

3.4.5. A bus layby is provided in each direction in the vicinity of the Holiday Inn hotel, with these being served by bus services 24 (northbound) and 25 (southbound). However, the bus stops are not marked by a pole and flag, and the timetable information is also not provided. The holiday Inn hotel is equipped with an electric vehicle charging station with a capacity for two vehicles.

3.4.6. To the south of the M1 junction 14, as well as for its length through Milton Keynes to the A5, the A509 is in the form of a dual carriageway subject to a variable speed limit between 40 and 70mph depending on the location it passes through.

3.5. LOCAL ROAD NETWORK

A422

3.5.1. The A422/A422 H3 Monks Way forms the north-western boundary of the Project Site and sandwiches its western part along with the M1. The A422 runs in a broadly east to west direction from Tickford Roundabout through the centre of Milton Keynes towards the A5 west of the city. The A422/A422 H3 Monks Way is a dual carriageway for its full extent, with two lanes in either direction.

3.5.2. The A422/A422 H3 Monks Way forms several priority-controlled roundabouts with other 'grid' roads across the city. The A422 has street lighting for the entirety of its length from the A5 to the petrol stations to the east of its junction with Brickhill Street. From there, the character of A422/A422 H3 Monks Way is more rural, and streetlights are only provided at Marsh End Roundabout and then at Tickford Roundabout.

WILLEN ROAD

3.5.3. Willen Road forms a southern arm of Marsh End Roundabout. From the roundabout, Willen Road runs with a southern trajectory towards the M1, which crosses over a bridge, and subsequently terminates at Tongwell Roundabout. Willen Road borders the Project Site from the west for a short section.

3.5.4. Willen Road is a single carriageway road, and it is subject to the National Speed Limit of 60mph. Street lighting is present along its whole length. There are no pedestrian/cyclist facilities along Willen Road.

3.5.5. Along its length, Willen Road provides access to a group of private properties accessed via Glen Fields, direct access to the existing quarry site and a cluster of private residential/industrial properties. A bus stop is provided in each direction in the vicinity of the access to the cluster of private residential/industrial properties, with these stops being served by bus services 1 and C10. The bus stops in each location are marked by a pole and flag and provided with the timetable information.

3.6. PEDESTRIAN & CYCLE NETWORK

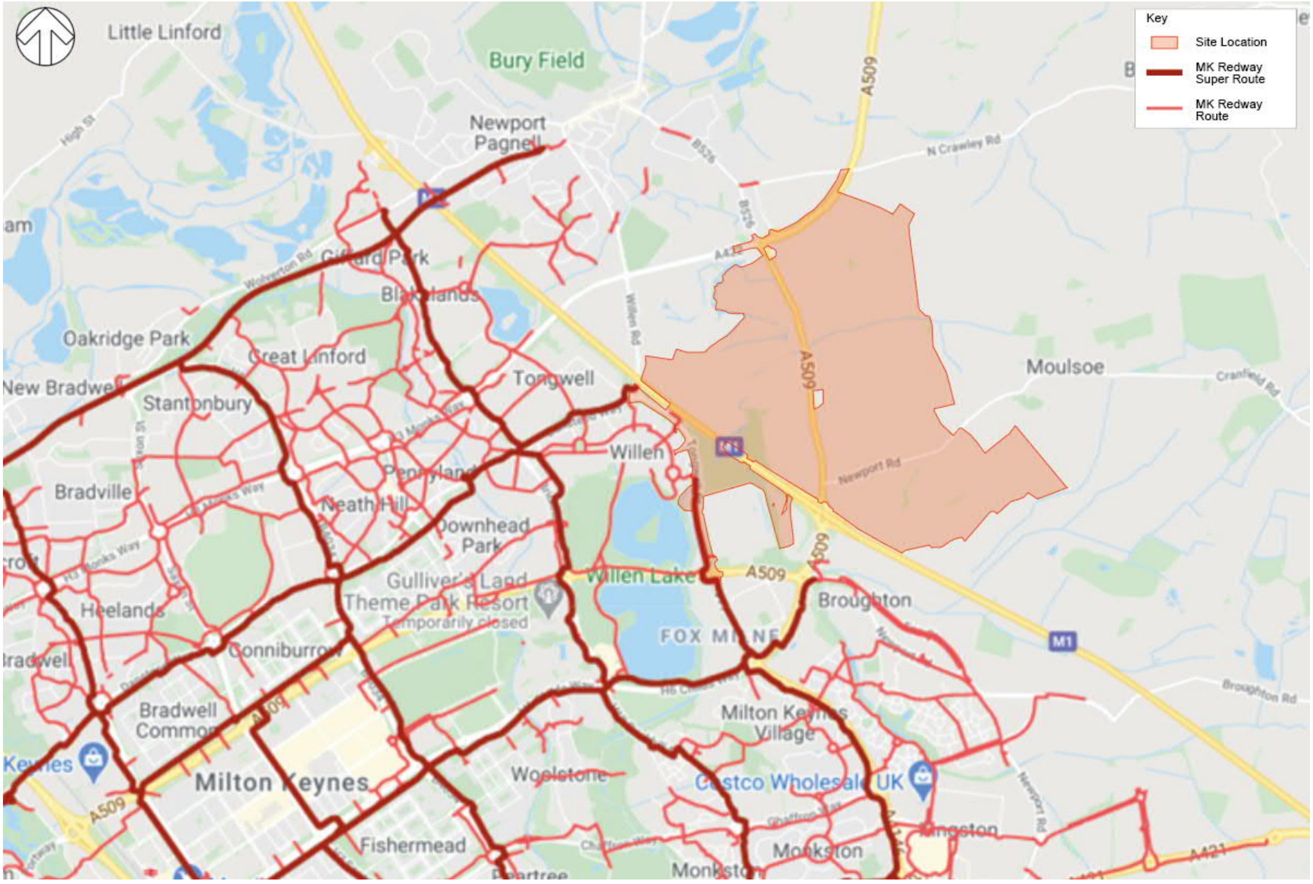
3.6.1. As described in detail in the TTN9 – Walking and Cycling Strategy, with further emphasis on Public Rights of Way (PRoW), included in the TTN10 – PRoW Strategy, the MKE site is accessible to several PRoW and designated cycle routes in and around Milton Keynes. Many of the routes provide more direct connections to the key destinations in the area than the footway network, while other more rural routes are likely to be used for leisure walking and cycling.

3.6.2. Several PRoW consisting of public footpaths and bridleways run through or in the vicinity of the site and provide connections to the wider area via the existing footway network and/or so-called Redways. The Redways are shared-use traffic-free routes for people on foot or cycles and are popular for both leisure and commuting. The traffic-free network covers most of the city with connections to nearby towns, such as Newport Pagnell to the northwest of the proposed MKE development.

3.6.3. Redway Super Routes closely align to the grid roads and are ideal for cycling commuters or people who wish to travel longer distances across the city by bicycle. The Redway Super Route network relative to the site location is shown in Figure 3, with a full Redway network extracted from KMC's Smarter Travel Portal[1], shown in Diagram 3-1 below.

[1] *https://www.getsmartertravelmk.org/*

Diagram 3-1 – The Redway Network, Milton Keynes



Source: MKC, 18/02/2021 (https://www.getsmartertravelmk.org/cycling/redways)

3.6.4. The Redway network is accessible from the site via Willen Road and Tongwell Roundabout, where one of the Super Routes currently terminates. The other can be accessed via Tongwell Street further to the south. Several secondary Redways are accessible from the site, providing connections to the Super Routes.

3.6.5. In addition to the Redway network, there are several leisure traffic-free cycle paths across Milton Keynes. These predominantly leisure routes can be found in parks and by rivers and lakes and are accessible from the Redway network.

3.6.6. Several waymarked routes utilising predominantly the Redway and leisure route infrastructure are also available throughout the city and include the Millenium Route, four Heritage Trails and five Cultural Routes. These routes are circular routes covering a range of distances and difficulty, linking the cultural and heritage sites in the city.

3.6.7. In combination with the PROW (public bridleways) and the Redway routes, Milton Keynes and its immediate vicinity (including the proposed development) benefit from an extensive network of both on and off-road cycle routes providing both leisure and commuting opportunities in the area.

3.6.8. There are two National Cycle Network (NCN) routes running in the proximity of the Project Site, National Cycle Route (NCR) 6 and 51. The NCRs are illustrated in Figure 3 in the context of the site.

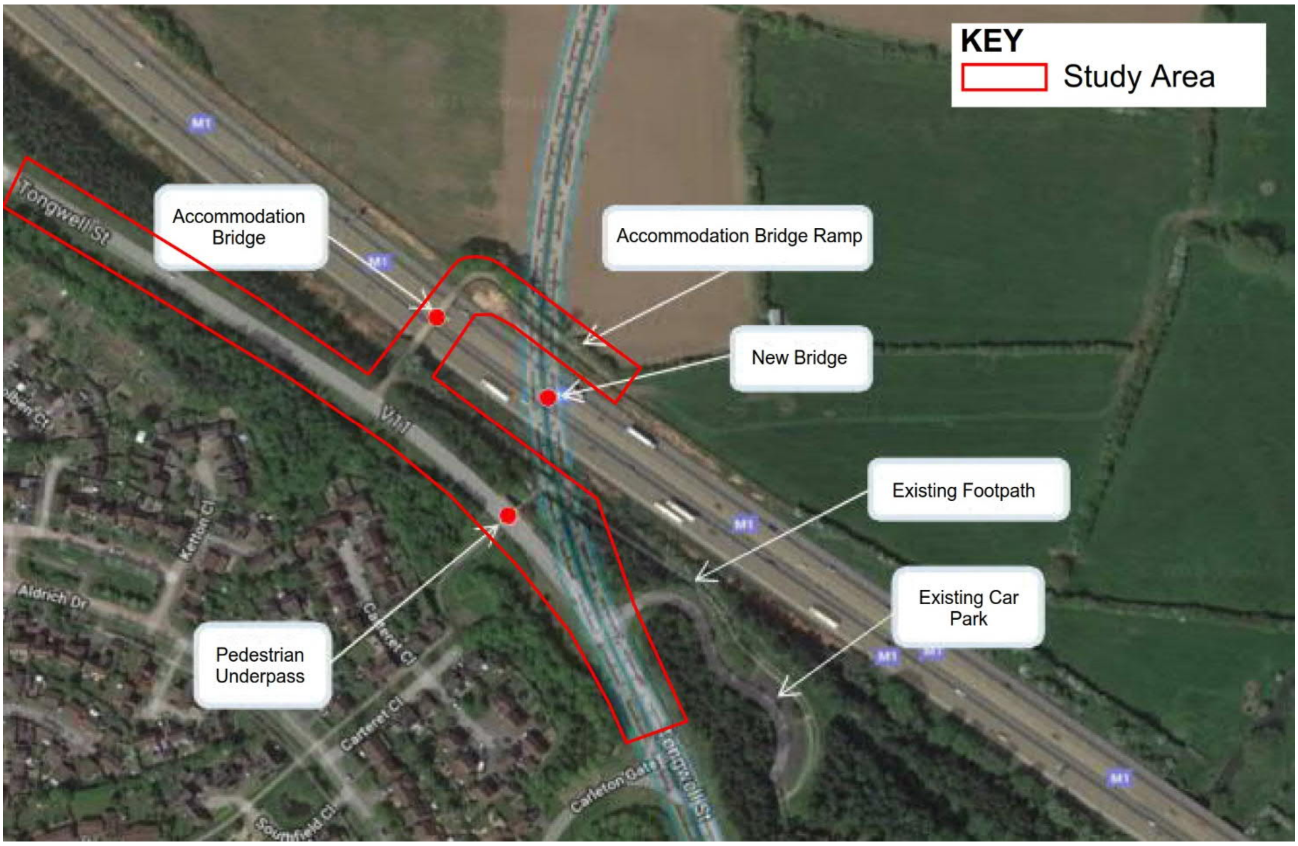
3.6.9. NCR 6 is a long-distance route between London and the Lake District via Luton, Milton Keynes, Northampton, Leicester, Sheffield and Manchester, amongst others. Through Milton Keynes, NCR 6 runs in a broadly south to north direction approximately 1.6km from the Project Site, and it is predominantly traffic-free. NCR 6 can be accessed from the Proposed Development via the local cycle routes with a typical journey time of approximately six minutes (based on a typical cycling speed of 16km/h).

3.6.10. NCR 51 is also a long-distance route that connects major cities in the south of England. It links Oxford with Cambridge via Milton Keynes and Bedford. Past Cambridge, it continues via Bury St Edmunds and Ipswich to the coast at Felixstowe before continuing to Harwich and Colchester. The route of NCR 51 through Milton Keynes is traffic-free with becoming an on-road route upon its way out of the city towards the M1 motorway and further northeast. NCR 51 runs through Milton Keynes at a distance of approximately 2.5km from the Project Site. It is accessible via the local cycle routes and NCR 6 with a typical journey time of approximately nine minutes (based on a typical cycling speed of 16km/h).

3.6.11. In addition to the above, a Walking, Cycling and Horse-Riding Assessment and Review (WCHAR) has been undertaken, which considers the potential effects of the new MKE infrastructure on active travel users associated with the Highways England network. The methodology of the WCHAR was agreed with Highways England and is provided in full in Appendix D.

3.6.12. The WCHAR considers that the level of the permanent impact associated with walking, cycling and horse-riding modes on the Highways England network can only be attributed to the proposed bridge over the M1 motorway as illustrated in Diagram 3-2 below. Therefore, the WCHAR focuses on the existing provision.

Diagram 3-2 – WCHAR Study Area



3.7. PUBLIC TRANSPORT NETWORK

3.7.1. The existing local public transport network is depicted in Figure 4 at the end of this TA.

BUS NETWORK

Local service provision

3.7.2. There is a relatively good bus network surrounding the Project Site and in and around Milton Keynes generally.

3.7.3. There are several stops in the vicinity of the Project Site, with two stops on Willen Road, one hail-only stop on London Road and two stops along Newport Road. Several additional services are also available just outside of the site boundary at Tickford End, north of H3 Monks Way, and south-west of the M1 along Fern Street.

3.7.4. The following services operate in the vicinity of the site:

- C1/10/11: Bedford – Cranfield University – Milton Keynes
- CX: Cranfield University – Milton Keynes
- 1: Newport Pagnell – Milton Keynes – Bletchley
- 24/25: Bletchley – Milton Keynes – Newport Pagnell – Bletchley

3.7.5. The C1, C10, C11 and CX services are run by Uno Bus. Bus route 1 is run by Arriva Beds and Bucks. The X5 service is provided by Stagecoach UK Bus. The 24 and 25 services are operated by Z&S Transport.

3.7.6. Due to the current situation with COVID-19, it is important to note that bus timetables and frequencies may change. A summary of the bus services serving Milton Keynes can be seen in Table 3-1 below.

Table 3-1 – Bus services in the vicinity of the Site

Service/Route	Frequency			Earliest Departure	Latest Departure
	Weekday	Saturday	Sunday		
1 Newport Pagnell – Milton Keynes - Bletchley	2 per hour	2 per hour	1 every 2 hours	05:38	23:04
25/24 Bletchley – Milton Keynes – Newport Pagnell - Bletchley	1 per hour	1 per hour		08:03	18:03
C1 Bedford – Cranfield University – Milton Keynes	1 every 2 hours	1 every 2 hours	1 every 2 hours	08:03	23:38
C10 Bedford – Cranfield University – Milton Keynes	1 per hour			06:33	18:50
C11 Bedford – Cranfield University – Milton Keynes	1 every 2 hours	1 every 2 hours	1 every 2 hours	09:03	20:58
CX Cranfield University – Milton Keynes	4 per day			07:55	18:46

Source: Milton-Keynes.gov.uk (up to date as of February 2021, timetables temporarily disrupted by the COVID 19 outbreak at the time of writing)

Wider Milton Keynes service provision

3.7.7. There are several different bus stops in the Central Milton Keynes area. These include: stops directly outside Milton Keynes Central Railway Station, The Point Bus Interchange stops, Central Business Exchange stops, Theatre District stops and Santander House stops. These bus stops are located approximately 6km south west of MKE, south of the A509. They can be accessed from the MKE development site by the C1, C10, C11, CX, 24, 25 and 1 bus services in approximately 30 minutes.

3.7.8. The Central Milton Keynes area acts as an interchange for approximately 50 different bus services serving the wider Milton Keynes area and neighbouring towns and cities. The full list of these services is demonstrated in Table 3-2 below.

Table 3-2 – Bus services in the Central Milton Keynes area

Service	Route
1	Newport Pagnell Renny Lodge – Newton Leys St Helena Avenue
2	Newport Pagnell Renny Lodge – Grange Farm Dunthorne Way
4	Central Milton Keynes – Bletchley Bus Station
5/6	Wolverton Church Street – Water Eaton Buttermere Close
7	Wolverton Church Street – Bletchley Bus Station
8A	Powis Lane – Lichfield Down
11/12	Caldecotte – Open University – Monkston – Central Milton Keynes
11A	Caldecotte – Monkston – Central Milton Keynes
12A	Caldecotte – Open University – Kents Hill– Central Milton Keynes
14	Church Street – Central Milton Keynes Railway Station
18	Woburn Sands – Bletchley – Hospital – Central Milton Keynes
21	Lavendon – Central Milton Keynes Railway Station
23	Wolverton – Great Linford – Central Milton Keynes
24/25	Bletchley – Newport Pagnell – Central Milton Keynes
33/3A	Northampton – Roade – Hanslope – Wolverton – Central Milton Keynes
34	Central Milton Keynes – The Point to Ampthill Heights – Wagstaff Way
50	Newton Longville – Milton Keynes
89	Milton Keynes – Old Stratford – Deanshanger – Potterspury – Yardley Gobion - Cosgrove
99	Milton Keynes – Luton Airport
100/150/X60	Aylesbury - Milton Keynes
300	Westcroft District Centre – The Swan
301	Wolverton Road – Kingston District Centre
310	Wolverton Bus Station – Magna Park Fen Street
602	Central Milton Keynes – Broughton – Kingston – Walnut Tree – Monkston – St Pauls Catholic School
609	Bradville - Central Milton Keynes - Leadenhall
A1	Kempston – Stewartby – Cranfield – Milton Keynes
A2	Kempston – Wood End – Bromham – Cranfield – Milton Keynes

Service	Route
C1/C11	Milton Keynes - Bedford
CX	Cranfield University – Milton Keynes
D	Kempston – Milton Keynes
F70	Luton Station Interchange – Central Milton Keynes Railway Station
FL2	Haynes West End – Houghton Conquest – Lidlington – Milton Keynes
FL3	Hayes – Clophill – Maulden – Ampthill – Milton Keynes
FL4	Silsoe – Flitwick – Milton Keynes
FL11	Harlington – Milton Keynes
VL4	Thurleigh – Milton Keynes
VL6	Clapham – Milton Keynes
VL7	Melchbourne – Riseley – Milton Keynes
VL15	Sharnbrook – Harrold – Newton Blossomville – Milton Keynes
W11	Meppershall – Stondon – Shillington – Gravenhurst – Clophill – Milton Keynes
W13	Meppershall – Shefford – Milton Keynes
X5	Bedford - Oxford
X6	Milton Keynes – Northampton
X91	Silverstone – Milton Keynes

Source: Bustimesorg (February 2021)

3.7.9. In addition to Central Milton Keynes Bus Stop, Milton Keynes Coachway, providing access to National Express services, is located on the A509, less than 1km to the south of the MKE development site. It can be accessed from the MKE by the 24, 25, C1 and C11 bus services.

3.7.10. National Express services offer direct routes to many towns and cities across the country. For example, London Victoria can be accessed within 1hr 30minutes from Milton Keynes Coachway. Whilst timetables are currently disrupted by the COVID 19 pandemic, services before the pandemic were operating morning and night with approximately 10 coaches per day running from Milton Keynes Coachway.

RAIL NETWORK

3.7.11. The wider Milton Keynes area is served by several railway stations. There are two railway stations in proximity to the proposed development. These railway stations include Central Milton Keynes Railway Station and Woburn Sands Railway Station.

Milton Keynes Central Railway Station

3.7.12. Milton Keynes Central railway station is located in the west of Central Milton Keynes, close to the junction between the A5 and the A509. The station opened in 1982, has seven platforms and step-free access.

3.7.13. The station is situated on the West Coast Main Line and served by Avanti West Coast intercity services, West Midlands Trains and Southern regional services. The ticket office is currently staffed all week (Monday to Friday 04:45-22:00, Saturday 06:00-22:00 and Sunday 06:45-21:30), with passenger-operated ticket machines used at other times.

3.7.14. Based on the data available from the Office of Rail and Road (ORR) data (June 2020), Central Milton Keynes railway station attracted about 7 million passengers plus other 470,000 interchanges in 2018/2019. This has increased from 6.8 million passengers in 2017/2018.

3.7.15. A summary of the rail services serving Milton Keynes Central Railway Station can be seen be in Table 3-3 below.

Table 3-3 – Summary of direct rail services serving Milton Keynes Central Station

Destination	Frequency Per Hour		First and Last Services (Mon-Fri)	Last Service returning from Destination (Mon-Fri)	Approximate Duration
	AM Peak (Outbound)	PM Peak (Return)			
London Euston	5	7	00:25 23:50	23:42	51 mins
Watford Junction	4	4	00:25 23:50	23:38	34 mins
Leighton Buzzard	4	4	03:30 23:50	23:35	11 mins
Wolverton	3	3	00:17 23:23	23:46	3 mins
Northampton	3	3	00:17 23:23	23:34	21 mins
Birmingham New Street	3	4	00:29 23:29	23:10	1 hr 15 mins

Source: National Rail (Up to date as of February 2021, timetables temporarily disrupted by the COVID 19 outbreak at the time of writing)

3.7.16. Cycle parking is provided at the station in the form of 900 sheltered stands. Cycle hire is also available from outside of the station through Santander Cycles.

3.7.17. The station has a car park with 964 spaces, with 18 of these spaces being accessible spaces. Parking is free for disabled users.

3.7.18. Milton Keynes Central Railway Station is located approximately 6km (corresponding to approximately 1hr 20-minute walk time at a typical walking speed of 4.8km/h) south-west from the nearest site access via Willen Road, forming its western boundary. It is therefore unlikely that the station is accessed on foot from the site. This is in line with the historic DMRB's (TA 91/05) findings that most walking journeys do not tend to exceed a distance of two miles (approx 3.2km).

3.7.19. The station is located 7.2km (corresponding to approximately 26-minute cycle time at a typical cycling speed of 16km/h), the nearest site access on Willen Road via the local cycle routes. Whilst the DMRB (TA 91/05) states that trips of up to five miles (approx. 8km) "could easily be cycled by the majority of people", the National Travel Survey (2019 data) suggests that the average cycle trip is currently 3.3 miles (approx. 5.3km). There are potential barriers to cycling in the form of major roads in the local area. Cyclists would have to cycle and/or cross the A509 in addition to several B Roads.

3.7.20. To access Milton Keynes Central Railway Station by bus from the site, users would take the bus service no. C10 from the bus stops on Willen Road, forming its western boundary. The C10 service stops directly at Milton Keynes Central Railway Station, and the journey time is approximately 30 minutes.

Woburn Sands Railway Station

3.7.21. Woburn Sands Railway Station is located on Station Road, less than 1km east of the city centre. The station opened in 1846 and is situated on the Marston Vale Line, between Bedford and Bletchley. The London Northwestern Railways serves this station and operates Mondays – Saturdays only. The station has two platforms and step-free access. Woburn Sands Railway Station does not have a ticket office or ticket machines.

3.7.22. Based on the data available from the Office of Rail and Road (ORR) data (June 2020), Woburn Sands railway station attracted about 52,000 passengers in 2018/2019. This has increased from 47,000 passengers in 2017/2018.

3.7.23. A summary of the rail services serving Woburn Sands Railway Station can be seen be in Table 3-4 below.

Table 3-4 – Summary of direct rail services serving Woburn Sands Railway Station

Destination	Frequency Per Hour		First and Last Services (Mon-Fri)	Last Service returning from Destination (Mon-Fri)	Approximate Duration
	AM Peak (Outbound)	PM Peak (Return)			
Bletchley	1	2	06:51 23:32	21:32	11 mins
Ridgmont	2	4	05:33 21:51	23:17	7 mins
Stewartby	2	4	05:33 21:51	22:55	17 mins
Kempston Hardwick	1	2	05:35 23:32	22:47	21 mins
Bedford St Johns	2	4	05:33 23:32	22:52	27 mins
Bedford	2	4	05:33 23:32	22:28	29 mins

Source: National Rail (Up to date as of February 2021, timetables temporarily disrupted by the COVID 19 outbreak at the time of writing)

3.7.24. Woburn Sands Railway Station provides cycle parking in the form of 12 sheltered Sheffield stands. There is no car park at the station.

3.7.25. Woburn Sands Railway Station is located approximately 6.5km (corresponding to approximately 1hr 21-minute walk time) south-east of the nearest site access on the A509 London Road. It is therefore unlikely that the station is accessed on foot from the site. This is in line with the historic DMRB's (TA 91/05) findings that most walking journeys do not tend to exceed a distance of two miles (approx. 3.2km).

3.7.26. The station is located 7.4km (corresponding to approximately 27-minute cycle time at a typical cycling speed of 16km/h) from the nearest site access on the A509 London Road via the local cycle routes. Whilst the DMRB (TA 91/05) states that trips of up to five miles (approx. 8km) "could easily be cycled by the majority of people", the National Travel Survey (2019 data) suggests that the average cycle trip is currently 3.3 miles (approx. 5.3km). There are barriers to cycling in the form of major roads in the local area. Cyclists would have to cycle along the A509, leaving the site and cross the A421, in addition to several B Roads.

3.7.27. To access Woburn Sands Railway Station by bus from the site, users would take the bus service no. 1 from the bus stops on Willen Road and change at stops B3/B4 (Theatre District) to board the service no. 301 to Woburn Sands Railway Station. The journey time would be approximately 1hr 15minutes (excluding wait time).

3.8. PERSONAL INJURY ACCIDENTS REVIEW

3.8.1. Personal Injury Accident (PIA) data was obtained from MKC for the latest available five-year period between 01/06/2015 and 31/05/2020 for a study area covering the site and its vicinity as agreed within the Transport Assessment Scoping Report (WSP, June 2020).

3.8.2. The data, as supplied by MKC, is included in full in Appendix E, with the PIA within the study area plotted by location in Figure 5.

3.8.3. A summary of the PIA data recorded within the study area during the five-year study period is provided in Table 3-5 below.

Table 3-5 – PIA Data Summary

Severity	Total PIA		PIAs involving pedestrians		PIAs involving cyclists		PIAs involving motorcycles	
	No.	%	No.	%	No.	%	No.	%
Slight	274	86.4%	11	3.5%	21	6.6%	14	4.4%
Serious	36	11.4%	5	1.6%	5	1.6%	8	2.5%
Fatal	7	2.2%	1	0.3%	0	0.0%	0	0.0%
Total	**317**	**100.0%**	**17**	**5.4%**	**26**	**8.2%**	**22**	**6.9%**

3.8.4. As shown in Table 3-5, 317 accidents took place during the five-year period within the study area, of which 274 resulted in slight injury, 36 in serious injury and seven were fatal casualties.

3.8.5. In addition to the above, the analysis of the data indicates that 17 of the recorded PIAs (5.4%) involved a pedestrian, 26 involved a cyclist (8.2%), and 22 involved a motorcyclist (6.9%).

3.8.6. For clarity, the analysis of the obtained PIA data has been aimed at locations where clusters (i.e. two or more PIA) or recurrent incident patterns in a specific area have been identified. As a result, any potential safety issues in each identified location could be analysed in more detail, in particular:

Junctions

- Great Linford roundabout;
- Blakelands roundabout;
- Marsh End roundabout;

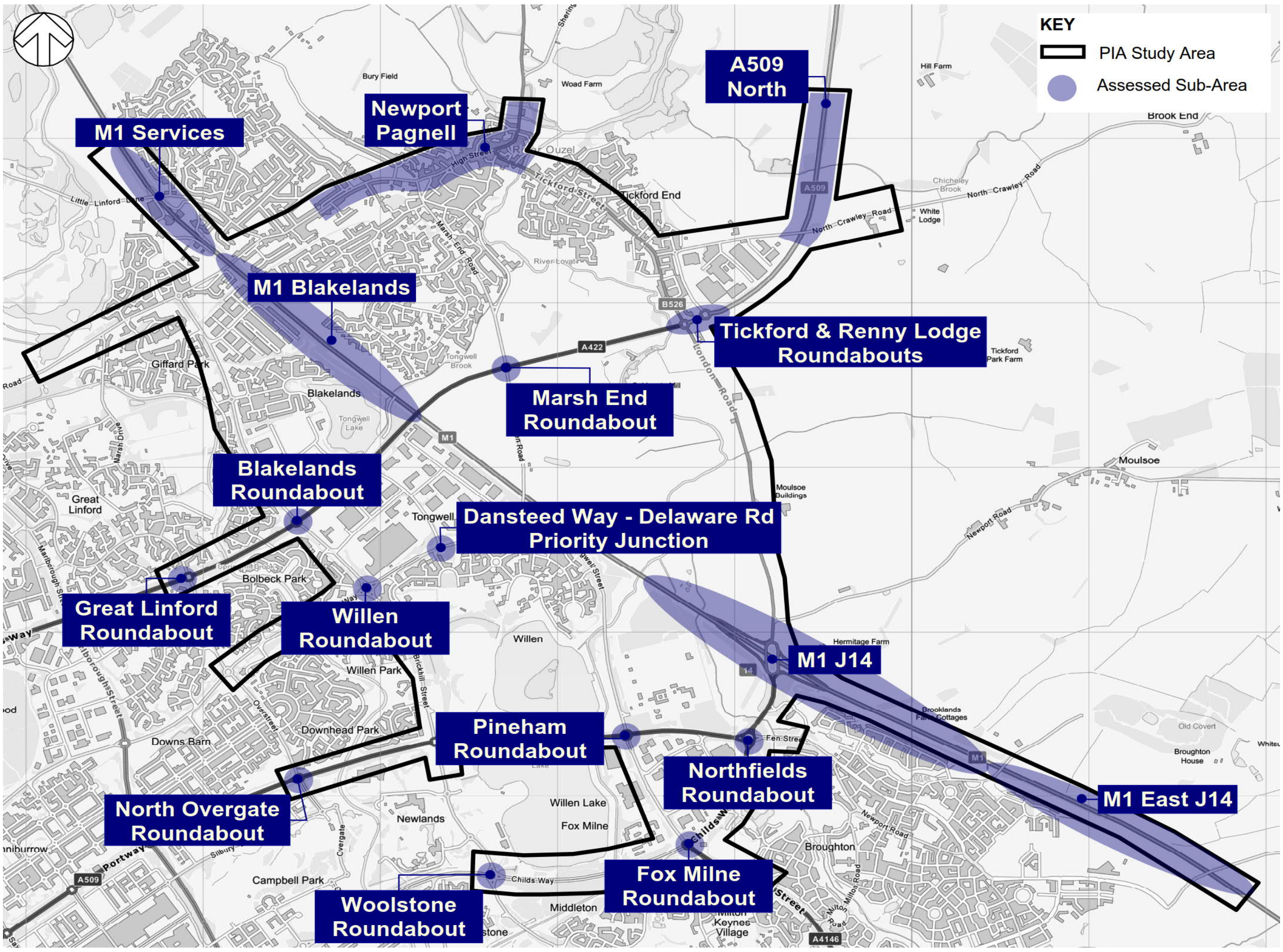
- Tickford & Renny Lodge roundabouts;
- Willen roundabout;
- Dansteed Way – Delaware Road priority junction;
- M1 Junction 14;
- North Overgate roundabout;
- Pineham roundabout;
- Northfields roundabout;
- Woolstone roundabout; and
- Fox Milne roundabout.

Links

- Newport Pagnell;
- A509 North;
- M1 Services;
- M1 Blakelands; and
- M1 East J14.

3.8.7. The indicative locations of junctions and links identified for detailed analysis listed above are illustrated in Diagram 3-3 below.

Diagram 3-3 – PIA Study Sub-Areas



3.8.8. A summary of the conclusions devised from analysing the areas illustrated in Diagram 3-2 above is provided below, with the detailed analysis provided in Appendix F.

JUNCTIONS

Great Linford Roundabout

3.8.9. There were six PIA recorded during the five-year study period at this roundabout, all of which resulted in slight injuries.

3.8.10. Whilst there was a cluster of three PIA by the western arm of the roundabout within the circulatory carriageway, the analysis of these incidents suggests there are no longstanding highway safety issues at this roundabout.

Blakelands Roundabout

3.8.11. There were nine PIA recorded during the five-year study period at this roundabout, all of which were of slight severity. One of them involved a pedal cycle.

3.8.12. Whilst the PIA analysis suggests that signage may be required to warn drivers of slippery conditions, this is potentially unnecessary in association with the MKE development. It is recommended that the relevant authority undertakes a further investigation.

Marsh End Roundabout

3.8.13. There were five PIA recorded at this roundabout, four of which resulted in slight and one in serious injuries. The analysis has concluded that there are no highway safety issues at this roundabout.

Tickford & Renny Lodge Roundabouts

3.8.14. 13 PIA during the five-year study period took place at these two linked roundabouts, 12 of which resulted in slight severity injury and one in serious severity.

3.8.15. The PIA recorded at these two roundabouts are primarily attributed to driver carelessness/error, with no other clusters having been identified and no apparent highway safety issues.

Willen Roundabout

3.8.16. There were five slight and one serious incident PIA recorded in the five-year study period at the Willen Roundabout.

3.8.17. No PIA clusters have been identified at this roundabout. It has been concluded that there are no highway safety issues at this location which could be exacerbated by the proposed MKE development.

Dansteed Way – Delaware Drive Junction

3.8.18. A cluster of seven PIA was recorded at this junction, six of which were classified as of slight severity and one of serious severity. The majority of incidents took place during dry conditions and in daylight.

3.8.19. The proposed development is not expected to increase turning movements at this junction, and it is therefore not considered to materially influence the operation or safety at the junction. Furthermore, the modelling (discussed in Sections 6 and 7) suggests that flows along Dansteed Way in that location reduce with the development. Therefore, upon review, it is suggested that improved signage is delivered by the operator of the existing industrial estate, alongside training for staff and operatives accessing the site.

M1 Junction 14

3.8.20. 41 PIA's have been recorded at the M1 J14 during the five-year study period. Of the recorded PIA, 36 were classified as slight, four serious and one fatal. These have also been analysed by location to enable the identification of clusters.

3.8.21. No highway safety issues have been identified other than on the M1 carriageway approaching the eastern (southbound) on-slip arm. Eight of the 14 PIA recorded at this location took place in slow or static traffic conditions, suggesting a high propensity for slow shunt type incidents. Drivers may not have sufficient warning or regularly not respect recommended gap distances to vehicles ahead.

3.8.22. Whilst these collisions are predominantly caused by drivers' error, implementing signs to warn drivers of potential queues ahead may be beneficial following a review of the PIA analysis at this location. Given that Smart Motorway Scheme, including all lane running and works to the slips at J14, is currently being delivered, it is expected that it will reduce queueing and improve associated static traffic conditions. Consequently, the scheme would result in mitigating the potential safety issue.

Northfields Roundabout

3.8.23. There were 10 PIA recorded during the five-year study period at this roundabout, nine of which were classified as slight and one as serious. The majority of the recorded PIA occurred in dry conditions and daylight.

3.8.24. Three PIA clusters have been identified at this roundabout. However, all PIA were different in their nature and not representing a consistent pattern. Consequently, it is concluded that these PIA resulted from driver error/carelessness instead of longstanding highway safety issues.

North Overgate Roundabout

3.8.25. There were six PIA recorded during the five-year study period at this roundabout, five of which resulted in slight and one in serious injuries.

3.8.26. A cluster of three PIA has been identified in the southwestern section of the roundabout. The cluster comprises two slight and one serious PIA; however, the analysis demonstrated that the incidents were due to driver error and carelessness instead of longstanding highway safety issues.

3.8.27. The analysis suggests there are no safety issues around this location.

Pineham Roundabout

3.8.28. There were seven PIA recorded during the five-year study period at this roundabout, six of which resulted in slight and one in serious injuries. No clusters have been identified at this roundabout.

Woolstone Roundabout

3.8.29. Nine incidents occurred at the Woolstone Roundabout over the five-year study period, all of which resulted in slight severity. No recurring patterns or clusters that can be attributed to specific highway safety issues have been identified.

Fox Milne Roundabout

3.8.30. Eight PIA occurred at this roundabout and respective approach arms during the five-year study period. Seven of the recorded PIA were of slight severity and one of serious severity. One of the slight PIA and the serious PIA involved a motorcycle. The serious PIA did not involve any other vehicle.

3.8.31. Where a cluster has been identified, the analysis suggests that there are no highway safety issues present.

ROAD LINKS

Newport Pagnell

3.8.32. 19 PIA took place in the Newport Pagnell area over the five-year study period. 16 were classified as slight and three as serious. The majority of PIA occurred in dry conditions and daylight conditions.

A509 North

3.8.33. Four PIA occurred in this section of road within the PIA study area, where no patterns or highway safety issues have been identified.

M1 Services

3.8.34. There were 20 PIA recorded during the five-year study period at the M1 services, 16 of which were classified as slight, one being serious and three being fatal incidents. The majority of the recorded PIA occurred in dry conditions and darkness.

3.8.35. Three clusters have been identified in this area, analysis of which concluded that there are no highway safety issues evident along this section of the M1.

"M1 Blakelands" – M1 Mainline, North of H3 Monks Way Crossing

3.8.36. Eight slight PIA and one serious PIA took place at the southbound carriageway in the five-year study period. None of the recorded PIA involved vulnerable road users.

3.8.37. Seven PIA occurred on the northbound carriageway, all of them in dry conditions. All recorded PIA were of slight severity, with no clusters evident at any particular location on this link. None of these PIA involved vulnerable users.

3.8.38. The analysis has concluded that there are no highway safety issues to be considered along this road link.

M1 East of Junction 14

3.8.39. 18 PIA were recorded along this section of the M1 in the five-year study period. Two serious and 16 PIA classified as slight, two of which involved motorcycles, were recorded.

3.8.40. The detailed PIA analysis suggests that each PIA was different in its nature, and no patterns have been identified. No clusters which could be exacerbated by traffic generated by the proposed MKE development have been identified.

3.9. EXISTING CONDITIONS SUMMARY

3.9.1. A comprehensive review of the existing conditions in the vicinity of the site has been undertaken. The review included an investigation of the current active travel accessibility, public transport connections and services, conditions of the strategic and local highway networks, and a summary of accident data.

3.9.2. Accessibility to the existing strategic and local highway networks has been reviewed, focusing on the M1 Junction 14 and the key transport corridors of the A509 and A422, which bisect and form the northern boundary of the site respectively.

3.9.3. Several site visits and transport audits have been undertaken during WSP's involvement in the scheme, including walkovers during the HIF bid stage, observing existing walking and cycling conditions, identifying opportunities and recommendations for inclusion in the transport strategy, and reviewing the public transport accessibility of the MKE sites. These visits have been used alongside desk-based to ensure existing condition information is as reliable as possible given the current Covid-19 pandemic.

3.9.4. A detailed review of the PIA data has been undertaken (included in Appendix F). The analysis highlights that generally, there are no existing accident trends on the local highway network, which the proposed development could exacerbate.

4. SITE ACCESSIBILITY TO FACILITIES AND KEY SERVICES

4.1. INTRODUCTION

4.1.1. As detailed in Chapter 3, the site is located with good connections to pedestrian and cycle networks. This section considers the site's location in the context of distance and accessibility by walking and cycling to key local facilities.

4.1.2. More detail of accessibility (regarding the existing site conditions and considering proposed infrastructure as part of the development) is provided in TTN9 (Appendix A-9), where the Walking and Cycling Strategy for MKE is discussed in detail.

4.2. WALKING AND CYCLING ACCESSIBILITY

WALKING

4.2.1. The Design Manual for Roads and Bridges (DMRB) TA 91/05 Provision for Non-Motorised Users (superseded by DMRB CD 143 Designing for walking, cycling and horse-riding) states that a distance of two miles (3.2 Km) could easily be walked by the majority of people. Paragraphs 2.2 and 2.3 states the following:

"2.2 Walking is a means of travel in its own right, but is an essential part of many other journeys, including those by car and public transport. However, there has been a decline in both the number and distance of journeys on foot since the mid-1980s. Nearly half of all journeys are less than 2 miles, a distance that could easily be walked by the majority of people.

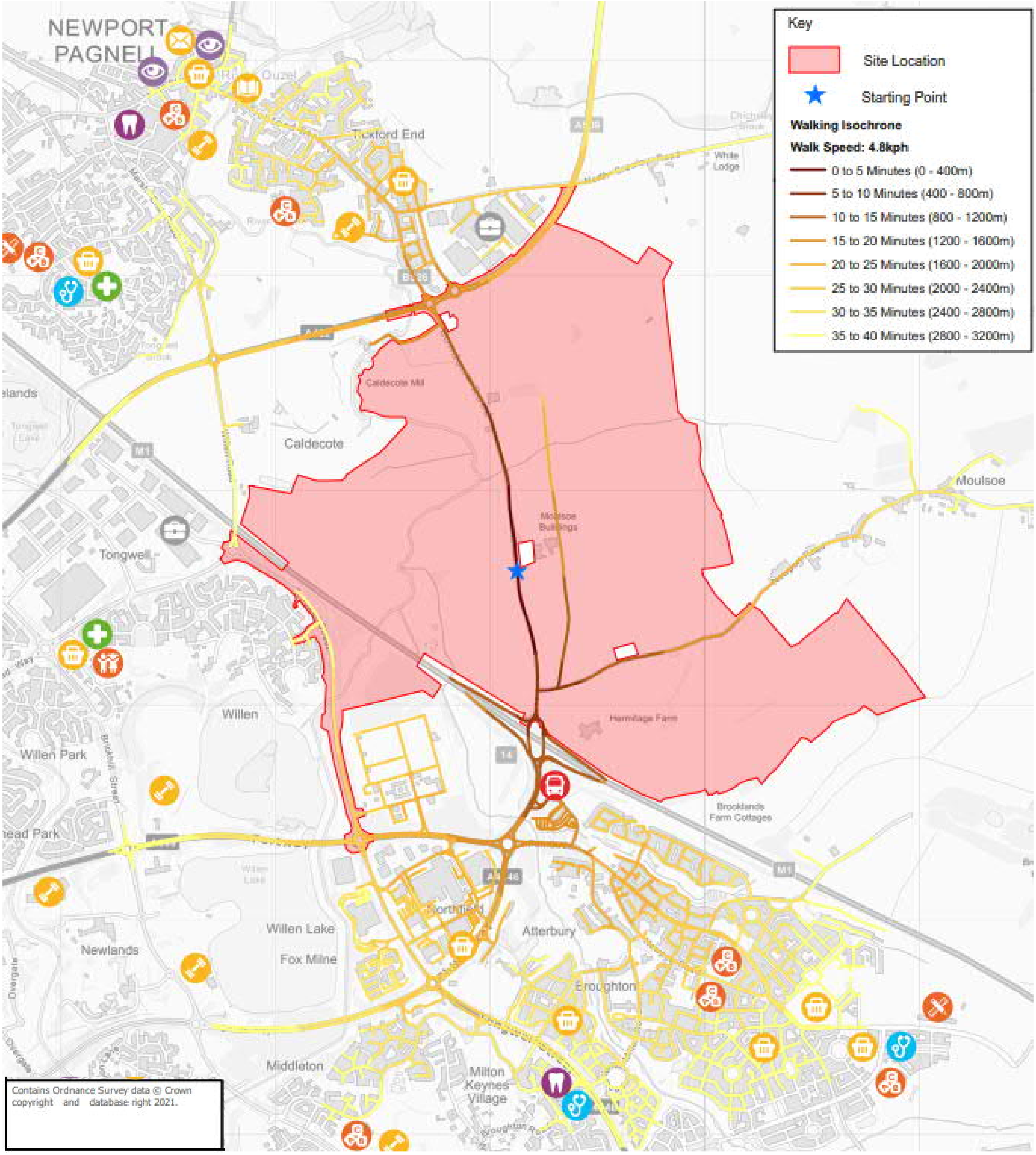
2.3 Walking is used to access a wide variety of destinations including educational facilities, shops, and places of work, normally within a range of up to 2 miles. Walking and rambling can also be undertaken as a leisure activity, often over longer distances."

4.2.2. Although it is acknowledged that TA 91/05 has been replaced by CD 143, it is considered, in the absence of similar or new guidance in CD143, that the previous guidance in TA91/05 still provides a valid indication of a typical walking range applicable to the residents of the proposed development.

4.2.3. Diagram 4-1 below shows the 2-mile (3.2km) walking threshold set out in DMRB TA 91/05. This threshold is based on a typical walking speed of 4.8km/h. Diagram 4-1 demonstrates that Tickford End and Broughton are accessible in approximately a 20 to 25-minute walk from the site. The diagram is also provided in full within TTN9. Other nearby villages, including Willen and Moulsoe, can be accessed from the site in a 30 to 40-minute walk. A list of the nearest examples[2] of local facilities that can be accessed within walking distance from the site is provided in Table 4-1 Below.

[2] *Please note this is not an exhaustive list of facilities and covers those within the reviewed walking and cycling distances. This analysis provides an indication of the various options available.*

Diagram 4-1 – Existing Pedestrian Accessibility



CYCLING

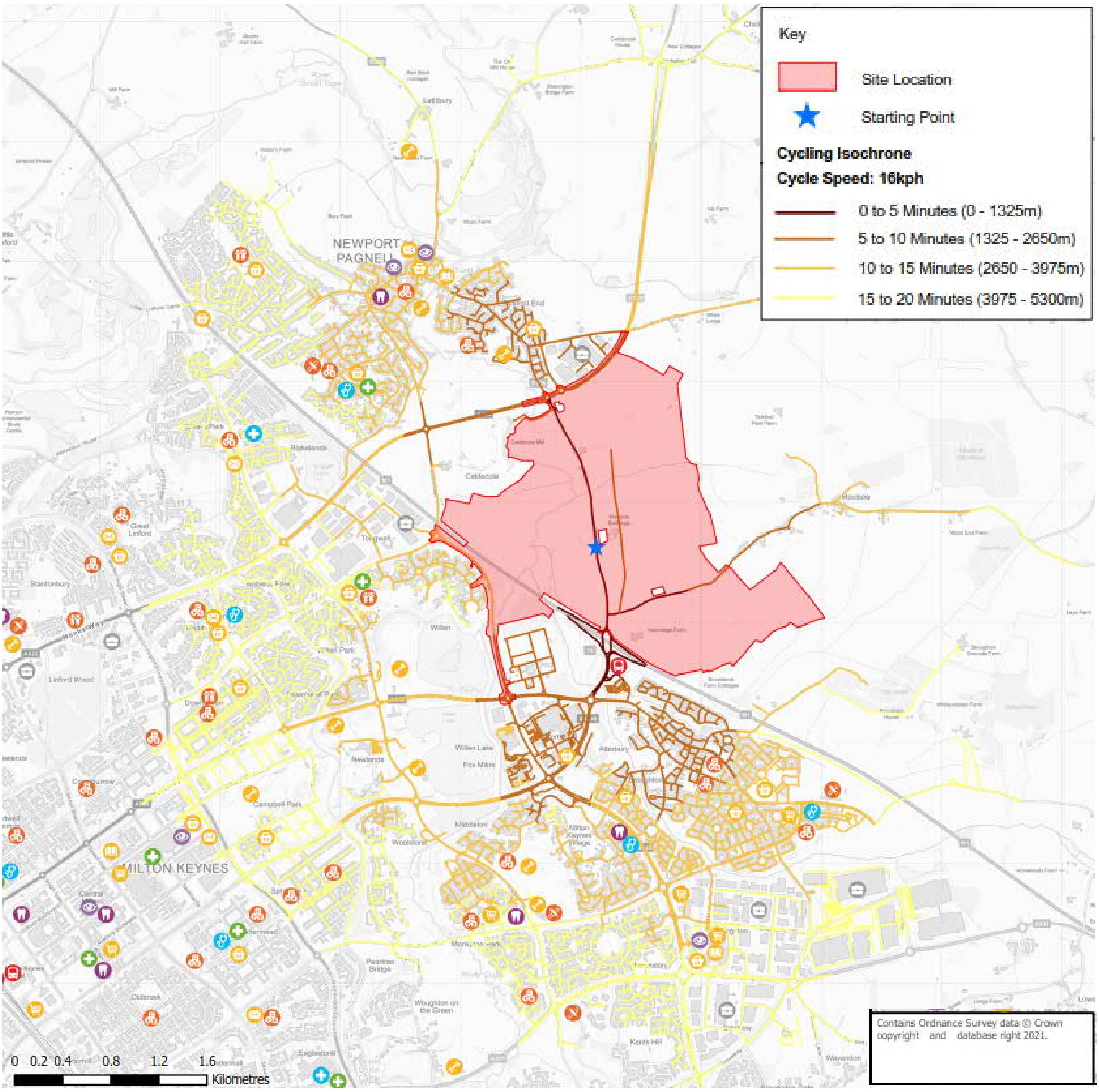
4.2.4. DMRB TA 91/05 also refers to cycling distances, stating that trips of up to five miles (8km) *"…could easily be cycled by the majority of people"*, and also that *"…cycling is used for accessing a variety of different destinations, including educational facilities, shops and places of work, up to a range of around 5 miles."*

4.2.5. Similar to walking, CD143 does not indicate a distance that could be cycled by the majority of the people. TA91/05, therefore, still provides valid guidance in terms of typical cycling distances.

4.2.6. The National Travel Survey (2019 data) suggests that the average cycle trip is currently 3.3 miles (5.3 km) long, which is a slightly shorter distance than that suggested by TA91/05. However, the distance cycled by a person depends on several factors such as fitness level, confidence and ability. As such, it is deemed appropriate to utilise the lower value that represents an average cyclist, albeit it should be acknowledged that people undertaking specific trip journeys, such as commuting, will be prepared to cycle greater distances.

4.2.7. Diagram 4-2 below shows the 3.3-mile (5.3km) cycling threshold set out in the National Travel Survey (2019). This has been created assuming a typical cycling speed of 16 km/h. Diagram 4-2 demonstrates that Tickford End and Broughton are accessible in approximately a 5 to 10-minute cycle journey from the site. The diagram is also provided in full within TTN9.Other nearby towns/villages, including Newport Pagnell, Willen, Tongwell, Middleton and Moulsoe, can be accessed from the site within a 10 to 15-minute cycle. As with the walking review, a list of examples of the local facilities that can be accessed within 5.3km cycling distance from the site is provided in Table 4-1.

Diagram 4-2 – Existing Cycling Accessibility



4.3. ACCESSIBLE FACILITIES AND SERVICES

4.3.1. Table 4-1 below presents examples of various types of facilities within two miles (3.2km) of the site, a distance which can be covered in approximately 40 minutes on foot or 12 minutes by bike. The distances provided in Table 4-1 have been measured from the approximate centre of the site. It should, therefore, be noted that the distance below may vary depending on the start point within the proposed development.

Table 4-1 - Accessibility to Local Facilities

Facility Name	Facility Type	Approximate Distance from the Site	Approximate Walking / Cycling Time
Crossfit Milton Keynes	Gym	1.4km	18 / 5 min
Interchange Park	Employment	1.5km	19 / 6 min
BP Chicheley Park Simply Food	Convenience Store	2.0km	25 / 8 min
Brooklands Farm Primary School	Primary School	2.4km	30 / 9 min
M&S Simply Food	Food Store	2.5km	31 / 9 min
Broughton Dental Practice	Dental Practice	2.6km	33 / 10 min
Newport Pagnell Library	Library	2.8km	35 / 11 min
D W Roberts Optometrists	Optician	2.9km	36 / 11 min
Newport Pagnell Post Office	Post Office	3.0km	38 / 11 min
Newport Pagnell	Centres (City, Town, District)	3.2km	40 / 12 min
Pineham	Recreation Ground/Park	3.2km	40 / 12 min

4.3.2. Additional services are available further east and south-west of the site in Cranfield and central Milton Keynes respectively. Examples include Willen Pharmacy, Oakgrove School and Blakelands Hospital. Further details of these facilities and their approximate distance to the site can be found within TTN9 and graphically presented in Figure 6 at the end of this TA.

4.4. SITE ACCESSIBILITY - SUMMARY

4.4.1. The site is located within reasonable walking and cycling distance from the key destinations and facilities outlined above. Nearby towns and villages are accessible on both foot and bike, whereas central Milton Keynes forms part of a wider area that is only likely to be accessed by bike or a bus.

4.4.2. Additionally, it is anticipated that the proposed development will provide a wide range of facilities to maximise opportunities for pedestrian and cycle journeys within the MKE site. The proposed extensive on-site facilities will ensure that the needs of the residents are catered for, reducing the need to travel by car to off-site destinations and thus enhancing the sustainability of the proposed residential development. These proposals are outlined in Section 5 of this TA.

5. DEVELOPMENT PROPOSALS

5.1. INTRODUCTION

5.1.1. The MKE scheme is a mixed development seeking to deliver Housing, Employment, Social infrastructure (including primary and secondary schools), community hubs alongside green spaces and public transport interchanges.

5.1.2. Linked with the above, the proposed development includes a comprehensive package of highway infrastructure works, which will be delivered early as per the HIF bid conditions. The early delivery of the road infrastructure, including the new M1 bridge crossing, will enable the residents of the initial phases to benefit from the new infrastructure. Furthermore, the early delivery of the road infrastructure will benefit existing MKC residents and commuters, facilitate Local Plan development and future growth, and reduce stress on key junctions such as the M1 J14.

5.1.3. The development quantum and access proposals for all modes of transport are also discussed in detail in this chapter.

5.2. DEVELOPMENT FRAMEWORK SPD

5.2.1. A Development Framework (DF) has been adopted as a Supplementary Planning Document (SPD) in March 2020. The DF accords with Plan:MK and the National Planning Policy and sets out some key considerations and parameters for bringing forward development on the site .

5.2.2. The DF SPD establishes:

- Vision;
- Spatial disposition of land uses;
- Development principles; and
- Infrastructure delivery.

5.2.3. A key objective of the DF is to ensure that the MKE site is brought forward in a strategic and comprehensive manner. Given that MKE land holdings are owned by several parties, the DF looks holistically at the development of the site as a whole. The DF will help to speed up housing delivery by adding certainty to the planning process.

5.2.4. The DF provides guidance, and further detail to the development principles set out in the adopted Plan:MK.

5.2.5. The development delivered by Berkeley will follow the over-arching principles as set out in the DF SPD, which include, inter-alia;

- Active modes;
- Permeability;
- New Strategic routes & connections;
- Sustainable movement & rapid transit;
- Minimised impact of transport corridors;
- Quality placemaking;
- Density;
- Social & Community;
- Economic Role;

- Retail & Centre;
- Green and Blue infrastructure; and
- Biodiversity.

5.2.6. DF's Concept Plan was developed to spatially interpret the vision and development principles for the new community. The key features of the concept plan are:

- a linear park based around the River Ouzel corridor;
- a landscape buffer to Moulsoe;
- a mixed-use community hub at the heart of the main residential area;
- a secondary school close to the community hub;
- four primary schools spread equidistantly around the residential areas;
- a new road bridge over the M1 providing an improved link to CMK and the urban area of MK;
- reducing pressure on the key M1 road crossings of the A422, Willen Road and M1 J14;
- safeguarded route for a fast mass transit route;
- land for a potential future park and ride site;
- employment development along the edge of the motorway;
- pedestrian/cycle connections across the M1 and A422 as well as the new infrastructure itself;
- an outer road to allow through traffic to move through the site without conflicting with areas of housing and the people-centric places within the site;
- Willen Road to be retained and upgraded to a grid road; and
- downgrading of part of the A509 London Road through the site to avoid it becoming a through route.

5.2.7. The current masterplan is set out in the Parameter Plans and the Design and Access Statement (DAS). This builds upon the principles set out in the DF SPD.

5.3. DEVELOPMENT QUANTUM

5.3.1. The current description of development is as follows:

"Hybrid planning application encompassing:

(i) outline element (with all matters reserved) for a large-scale mixed-use urban extension (creating a new community) comprising: residential development; employment including business, general industry and storage/distribution uses; a secondary school and primary schools; a community hub containing a range of commercial and community uses; a new linear park along the River Ouzel corridor; open space and linked amenities; new redways, access roads and associated highways improvements; associated infrastructure works; demolition of existing structures and

(ii) detailed element for strategic highway and multi-modal transport infrastructure, including: new road and redway extensions; a new bridge over the M1 motorway; a new bridge over the River Ouzel; works to the Tongwell Street corridor between Tongwell roundabout and Pineham roundabout including new bridge over the River Ouzel; alignment alterations to A509 and Newport Road; and associated utilities, earthworks and drainage works."

5.3.2. As discussed in Section 1, this TA and the above description cover the Berkeley St James portion of the MKE site allocation only.

ELEMENTS IN OUTLINE

5.3.3. As outlined in the description, the hybrid application includes both outline and detailed proposals. Table 5-1 below sets out the proposals/elements contained in the outline proposals. The accompanying parameter plans submitted as part of the planning application should also be reviewed.

Table 5-1 – Development Quantum / Proposals – Elements in Outline

Use/ Component	Location(s) Within Site	Maximum Amount Parameter Sought
Homes	Residential Parcels Community Hub	**4,600** homes (including houses, flats and specialist elderly accommodation with or without care).
Employment	Employment Areas: - Zone A; West Parcel - Zone B, Centre Parcel - Zone C; East Parcel	403,650 sqm of which: - Maximum 37,160 sqm Class E offices/light industrial (within Zone A) - Maximum 92,900 sqm Class B2 industrial - Maximum 403,650 sqm Class B8 warehousing (with ancillary offices)
Secondary School	SS1: Community Hub	SS1: 10 Form of Entry
Primary Schools (x3)	PS1: Community Hub PS2: Central South PS3: S. of Moulsoe	PS1: 2 Form of Entry PS2: 3 Form of Entry PS3: 3 Form of Entry
Commercial	Community Hub S. of Moulsoe Local Parade	Maximum 10,000 sqm (gross) Class E/Sui Generis floorspace in the community hub Maximum of 500 sqm (gross) Class E/Sui Generis floorspace
Community Space	Community Hub Sports Pitches	Community hub community hall: max 400 sqm Class F2 Sports field pavilion/clubhouse: max 600 sqm Class F2
Open Space	As per parameter plans	n/a – as per parameter plans
Burial Space	As per parameter plans	n/a – as per parameter plans
Grid Road Overbridges	As per parameter plans	n/a – as per parameter plans
Tree Nursery (Temporary)	As per parameter plans	Temporary use for max 15 years

5.3.4. The planning statement alongside the application and the parameter plans set out the maximum scale per land use.

5.3.5. Section 6 of this TA sets out the elements included in determining the trip generation aspects of the proposed development.

ELEMENTS IN DETAIL

5.3.6. The Berkeley elements of the MKE allocation seeks to submit a hybrid application that covers an outline application for those elements listed in Table 5-1, encompassing the main elements of the mixed-use development, alongside detail application, covering strategic highway and multi-modal transport infrastructure.

5.3.7. The accompanying general arrangement plans and long sections supplied as part of the application should be reviewed in conjunction with the Design and Access Statement (DAS) which details the elements covered as part of the Detailed application. Table 5-2 below provides a summary of the detailed element of hybrid planning application.

Table 5-2 – Development Quantum / Proposals – Elements in Detail

Use/ Component	Location(s) Within Site	Broad Parameters for Testing (see draft plans for detail/exact measurements)
Eastern Link – Grid Road	Existing M1 J14 to New Eastern Link Roundabout on A509 s. of N. Crawley Rd overbridge (Links 101-104, 301-306, 501-505)	- Layout/AOD as per draft general arrangements and long sections - Height of Moulsoe stream bridge c.5m above existing.
Western Link – Grid Road	Existing Pineham Roundabout (V11 Tongwell Street/H5 Portway [A509]) to Existing Tickford Roundabout (A509/A422) (Links 105-108, 506-510)	- Tongwell Street bridge over River Ouzel to run parallel and broadly match the existing structure, parapets and heights of existing overbridge (which will become southward lanes of new dual carriageway) - M1 overbridge (Link 106) – max AOD +70 at deck. (c.+9m on M1 carriageway) - River Ouzel valley bridge (Link 107) – max AOD +65 at the deck (c.+8.7m on valley). See preliminary earthworks strategy for embankment details.
Highways Drainage	As indicated by general arrangements plans	n/a
Construction compound	To be confirmed	n/a
Materials working areas	To be confirmed	n/a

5.3.8. A separate pack of drawings is included within the planning submission relating to the detail elements.

DEVELOPMENT PHASING

5.3.9. A site of this size will take several years to deliver. It is anticipated that the construction of the proposed highway infrastructure will commence in 2022, with housing and social elements to follow in 2023/4. The approach adopted outlines a staged delivery of the proposed development - ensuring the early delivery of key infrastructure including a health hub, primary school, landscape and open space, as well as residential development to support these uses. It is essential that people moving in early feel they belong to the place, and it is an attractive and health-promoting place to live from day one.

5.3.10. The Indicative residential phasing schedule (full allocation) is shown in Diagram 5-1 below.

Diagram 5-1 – Indicative Development Quantum and build-out schedule

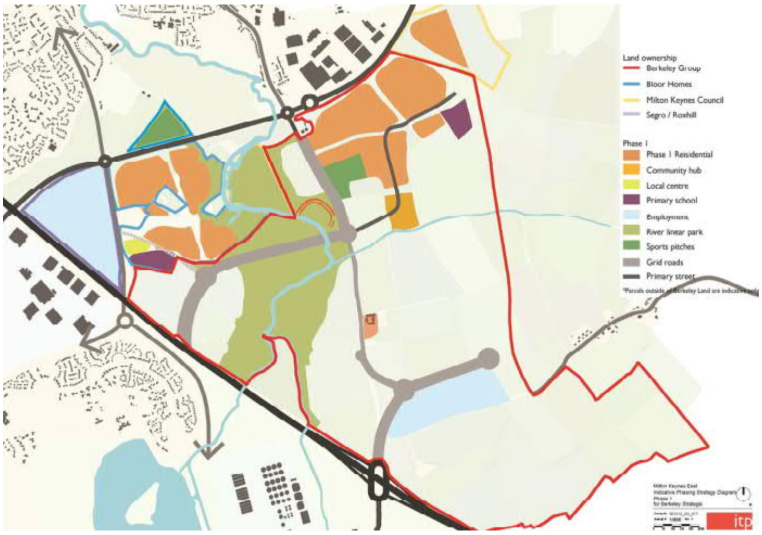
Year	St James	Bloor	MKC	Annual Total	Cumulative	Phasing Information	
2021							
2022							
2023							
2024		50		50	50	1250	Phase 1
2025	100	100		200	250		
2026	100	100		200	450		
2027	100	100		200	650		
2028	100	100		200	850		
2029	100	100		200	1050		
2030	100	100		200	1250		
2031	150	100	50	300	1550	1600	Phase 2
2032	150	50	50	250	1800		
2033	150		50	200	2000		
2034	150		50	200	2200		
2035	150		50	200	2400		
2036	150		50	200	2600		
2037	200		50	250	2850		
2038	200			200	3050	2900	Phase 3
2039	200			200	3250		
2040	200			200	3450		
2041	200			200	3650		
2042	200			200	3850		
2043	200			200	4050		
2044	200			200	4250		
2045	200			200	4450		
2046	200			200	4650		
2047	500			500	5150		
2048	600			600	5750		
Total	**4600**	**800**	**350**	**5750**			

5.3.11. The residential build-out is broadly associated with 3 phases, each of which also contains other supporting infrastructure.

5.3.12. Each phase must make sense independently and deliver part of the Development Framework vision. The approach to phasing at this stage is indicative at this stage and is described as follows:

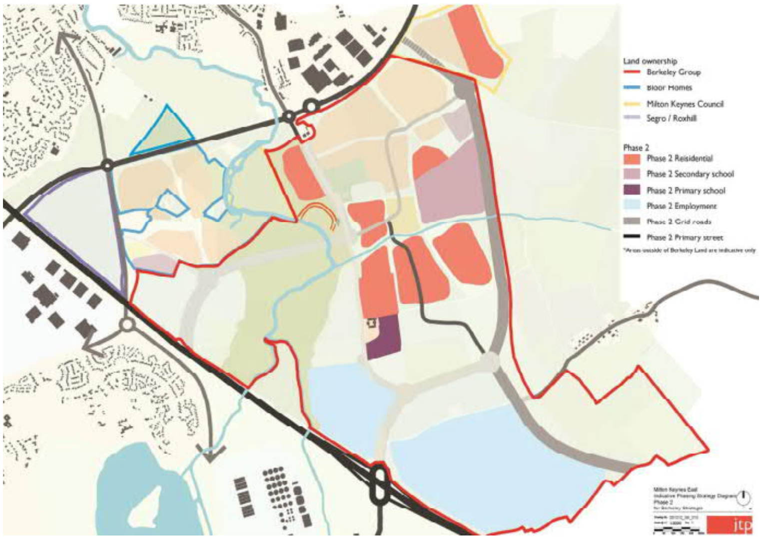
- **Phase 1**

  The first development phase will deliver the community hub (including health hub) and adjacent residential parcels. This phase will also see the delivery of the Bloor masterplan, grid roads, primary street and employment.



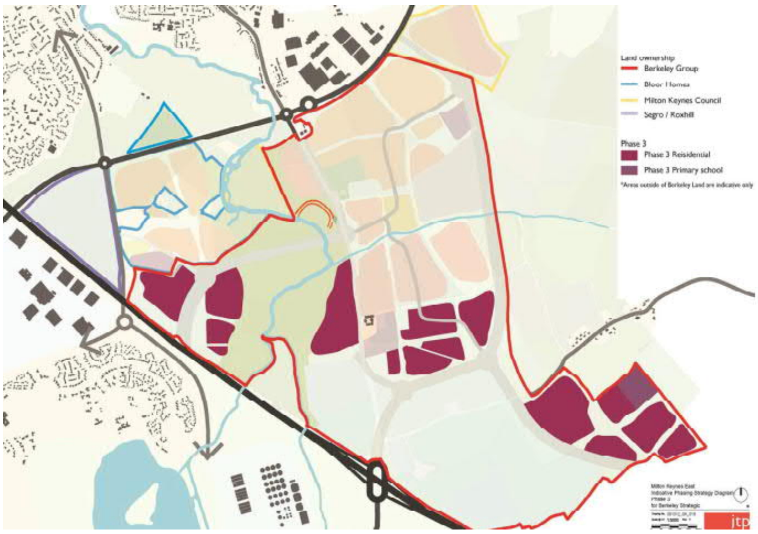
- **Phase 2**

  The second phase will see the central/northern section of the masterplan come forward alongside further employment areas.



- **Phase 3**

  The third phase will see the rest of the masterplan come forward, including the central area of the site, the western edge and the eastern edge.

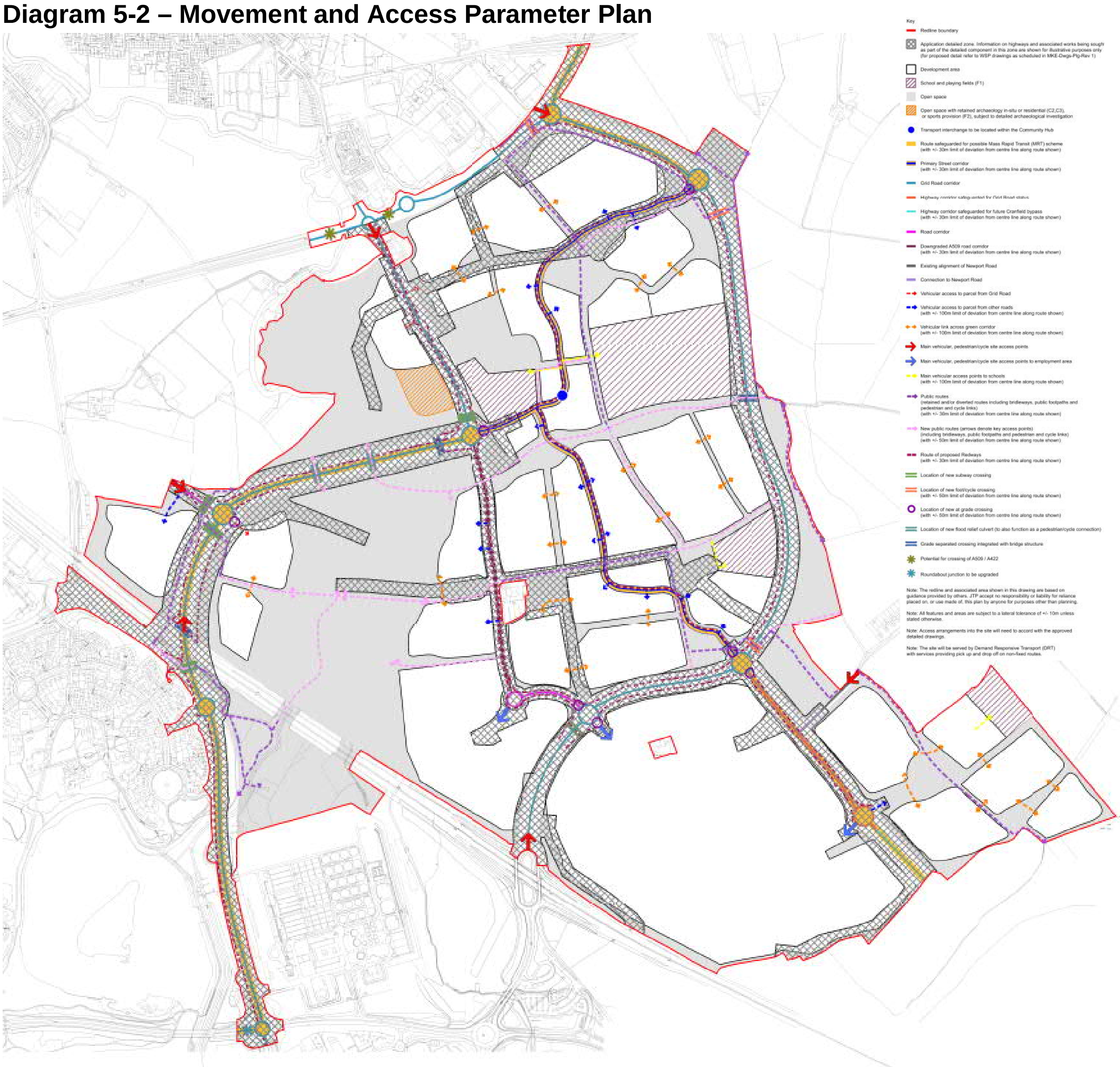


5.4. ACCESS STRATEGY

5.4.1. Several site access points have been designed to accommodate all transport modes and to connect to principal highway routes around the site (such as the M1 and the A509) or to nearby key destinations (such as the residential area of Willen located to the south of the site or Newport Pagnell to the west of the site).

5.4.2. Diagram 5-2 below shows a snapshot of the Access and Movement Parameter Plan.

Diagram 5-2 – Movement and Access Parameter Plan



Source: Berkeley St James, Extract of Movement and Access Parameter Plan

5.4.3. Six vehicular access points have been designed along the site boundary, connecting the site to the M1 J14, the A509 and Tongwell Street via a new bridge over the M1. These vehicular connections also provide walking and cycling infrastructure and form the basis of the internal movement network. The accesses include appropriate infrastructure depending on their scale, such as new crossings (either at grade, subways or footbridges). This is further detailed in the Movement and Access Parameter Plan illustrated in Diagram 5-2 above.

5.4.4. Additional exclusive means of access for pedestrians and cyclists are also proposed as part of the access strategy by connecting the proposed internal infrastructure to the existing bridleways and/or public footpaths. Four of these connections are provided along the site's eastern boundary and two along the north-western boundary.

5.4.5. Internally, and as part of the connectivity and mobility strategy, specific access provision is proposed to land uses with particular requirements such as the Employment Hub.

5.5. HIGHWAY INFRASTRUCTURE EVOLUTION

5.5.1. Whilst the broad principles of the proposed strategic highway infrastructure associated with MKE have remained the same since the site was promoted through the Local Plan process, the layout and alignment of that infrastructure have subtly evolved into the proposals, which form part of the planning application for Milton Keynes East.

5.5.2. The fundamental objectives of the new infrastructure are to deliver additional strategic links in the local highway network, providing an alternative route for motorists and public transport services wishing to access Central MK to/from the north and reduce pressures on the existing road crossing points of the M1, most notably the M1 J14, which experiences heavy volumes of traffic travelling into and out of Central MK and not accessing the M1 itself.

LOCAL PLAN STAGE

5.5.3. The strategy was presented during the Local Plan EiP. It consisted of a new bridge over the M1 providing a direct connection between the A509 at Renny Lodge Roundabout and Tongwell Street (the M1 bridge link), thereby serving motorists wishing to access Central MK without having to pass through the M1 J14. This was complemented by a new road around the eastern perimeter of the site connecting the A509 with the M1 J14 to predominantly serve motorists wishing to access the motorway network. An east-west connection was also proposed between the road around the eastern perimeter of the site and the new M1 bridge link.

HOUSING INFRASTRUCTURE FUND (HIF) STAGE

5.5.4. In early 2019, MKC submitted a bid to Homes England for Housing Infrastructure Funding (HIF) to facilitate the delivery of the strategic highway infrastructure needed to deliver a new road crossing of the M1, alongside a new primary school and health centre. The bid was based on a slightly reconfigured highway alignment from that presented at the Local Plan, further to more detailed work, including, inter-alia, traffic modelling, land ownership, and flood modelling.

5.5.5. From the analysis work undertaken as part of the HIF bid, it was considered that there are only two feasible options for increasing capacity across the M1 and enabling development at MKE to come forwards. These are capacity enhancements to the Willen Road corridor or the introduction of a new bridge.

5.5.6. An assessment of these two options was initially undertaken using the version of the Milton Keynes Multi Modal Model (MKMMM) which formed part of the Local Plan evidence base to understand how they perform relative to one another, notwithstanding several other aspects that require consideration in arriving at the preferred solution. A summary of this assessment was included within the HIF bid documentation.

5.5.7. From that analysis , it was considered that whilst both the Willen Bridge and new bridge options provide betterment over the Reference Case scenario (i.e. no enhancements to crossings over the M1) and could provide the capacity needed to accommodate growth at MKE, the new bridge option draws more traffic away from M1 J14 and reduces delays and journey times across the M1 corridor beyond that achieved by the Willen Bridge option.

5.5.8. Furthermore, there are other benefits that the new bridge option provides over the Willen Bridge option, most notably:

- The new bridge over the M1 is still considered to provide the most legible and intuitive route for motorists and public transport services wishing to access areas of Central MK, South and SE MK instead of using J14;
- The new bridge aligns with MKC aspirations for providing rapid transit between the north and CMK;
- The new bridge aligns with the preferred options, which were identified through consultation with stakeholders during the Development Framework process for the site;
- The new bridge provides additional resilience in the network insofar as there would be four bridge crossings of the M1 (J14, Willen Road, the A422 and the new bridge). Not only does this, therefore, provide resilience during times of road maintenance, accidents, etc. it also provides the ability for further housing growth to occur in the future; and
- The cost of the Willen Bridge option is broadly the same as the cost of the New Bridge option.

5.5.9. As a result, the proposed infrastructure on which the HIF bid was made provides a new bridge over the M1.

HIGHWAY INFRASTRUCTURE – MKE DEVELOPMENT FRAMEWORK STAGE

5.5.10. Following the adoption of Plan:MK in March 2019, a Supplementary Planning Document on how the allocation of Milton Keynes East (Policy SD12 and other relevant policies) within Plan:MK should be planned and developed was prepared in the form of a Development Framework. The Development Framework was adopted in March 2020 and incorporated a concept plan for the site, including the proposed strategic highway infrastructure.

5.5.11. The proposed highway alignment in the Development Framework broadly reflected the layout which formed the HIF bid with one notable exception. The key difference was the shifting eastwards of the central links, such that the dog-leg connecting the A509 with the perimeter road around the eastern edge of the site was removed, with this revised perimeter road, referred to as the Eastern Perimeter Road, then forming a continuous north-south route between the M1 J14 and the A509. Diagram 5-3 below shows the concept plan from the Development Frameworks, with the eastern perimeter road.

Diagram 5-3 – Concept Plan from MKE Development Framework

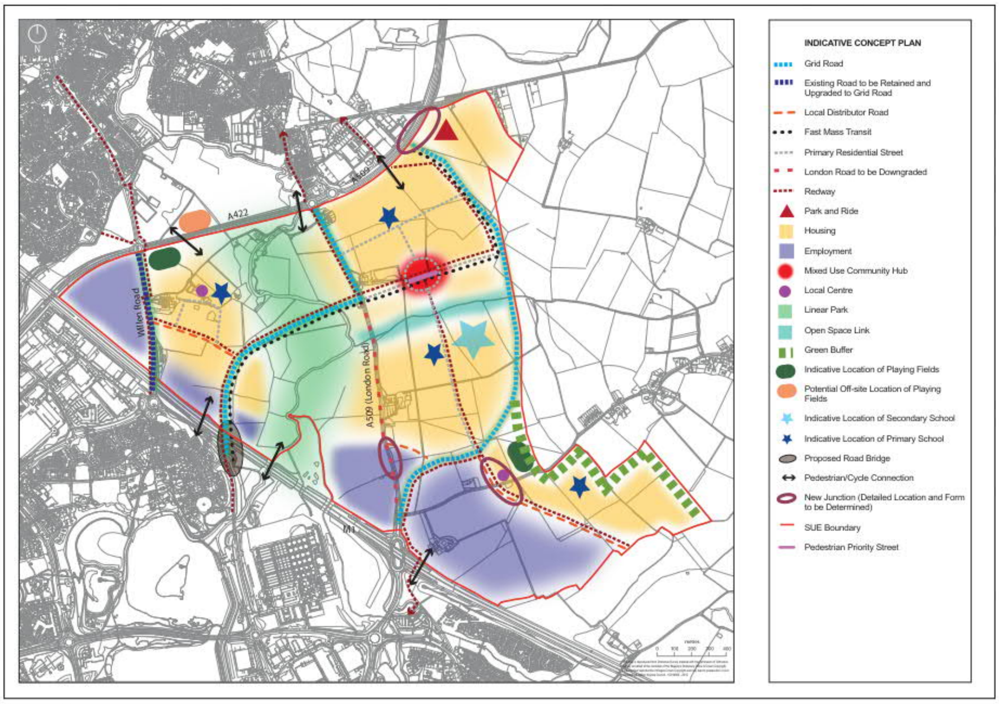


Figure 3.1 Concept Plan

5.5.12. The principal reasoning behind this was to remove the severance that could be potentially caused by a dual carriageway aligned directly through the residential, schools and community hub within that area. As a result of shifting the central links, other links could also be downgraded to become a street that essentially serves as access into the development only rather than a through route carrying large traffic volumes.

5.5.13. This meant that the Eastern Perimeter Road would primarily cater for motorists wishing to access the motorway at M1 J14, whilst the retained A509 London Road between Tickford Roundabout and the new link over the floodplain would function as the primary route for motorists wishing to access Central MK via the new M1 bridge.

HIGHWAY INFRASTRUCTURE – MKE MASTERPLAN

5.5.14. Following the adoption of the DF SPD, the detailed proposals for MKE and the strategic highway infrastructure which facilitates it have been developed by the design team and Client in close consultation with several key stakeholders, including, inter alia, MKC, Highways England, the Environment Agency and the Parks Trust. That consultation accompanied by the detailed technical work undertaken by the design team has resulted in the layout of the strategic highway infrastructure being as presented in the illustrative masterplan, as shown in Appendix G.

5.5.15. The strategic infrastructure presented in the masterplan achieves the same objectives and principles that have been adhered to throughout the evolution of the scheme, from the site promotion through the Local Plan to the adoption of a DF for the site.

5.5.16. The masterplan outlines that the development includes a new dual carriageway crossing of the M1, which provides a direct connection between the existing A509 London Road and the existing grid road of Tongwell Street, which itself is proposed to be dualled down to Pineham Roundabout. The purpose of this link is to cater for motorists and public transport wishing to travel into and out of Central MK without the need to use the M1 J14.

5.5.17. This infrastructure is complemented by a new, realigned A509, which connects the M1 J14 with the A509 in the NE corner of the site. This link is referred to as the Eastern Perimeter Road, which predominantly serves three key functions:

- as a strategic link serving traffic wishing to access the motorway network at M1 J14;
- its southernmost section serving the proposed MKE employment areas, which are focussed around M1 J14; and
- providing the initial section of the future Cranfield link, which also serves part of the employment and residential parcels of MKE and connects to Moulsoe Village

5.5.18. While the Eastern Perimeter Road also facilitates access into areas of MKE, this is not its primary function or purpose and never has been. Whilst the southernmost section between M1 J14 and the Cranfield Link serves to facilitate access into the development, it is required as part of the HIF infrastructure to form a connection back to the A509 London Road to provide ongoing connectivity with the Strategic Road Network (i.e. the M1) in advance of the rest of the Eastern Perimeter Road being delivered (i.e. between the Cranfield Link and the A509 just west of North Crawley Road).

5.5.19. Similarly, whilst the northernmost section of the Eastern Perimeter Road (between the A509 just west of North Crawley Road and the roundabout serving the potential future Park-and-Ride site) serves the MKE development, it's primary function will be to cater for motorists accessing the Strategic Road Network thereby avoiding the A509 London Road. The A509 London Road can then then be downgraded southwards from the roundabout which forms the connection with the new dual carriageway link across the floodplain such that it is used predominantly by motorists accessing the residential development parcels either side of the A509 and the Holiday Inn.

5.5.20. Whilst it is acknowledged that it will be used by motorists associated with the development, the primary function of the section of the Eastern Perimeter Road between the Cranfield Link and the roundabout serving the potential future Park-and-Ride site is to serve motorists accessing the Strategic Road Network at M1 J14. Indeed, access into and out of the MKE development does not rely on this section of the Eastern Perimeter Road.

5.5.21. As explained above, the existing A509 London Road will be downgraded between the M1 J14 and the roundabout connecting the A509 with the new link over the floodplain, with a section of that link stopped up. A section of Newport Road will also be stopped up between the A509 and the new Cranfield link.

5.5.22. Finally, a new link is to be provided between Willen Road and the new M1 bridge link, with this to be partially delivered by Berkeley St James and partially by Bloor, whose land forms part of the wider MKE allocation.

5.5.23. It is evident that the proposed strategic highway infrastructure reflects what is shown in the DF but has been refined such that the alignment:

- is fully cognisant of land ownership;
- accords with national and local highway design geometry standards as appropriate;
- provides the appropriate level of road capacity needed to cater for predicted levels of traffic and in recognition of the infrastructure's primary focus, which is to help re-route through traffic away from the M1 J14;

- recognises the topography of the site and, in doing so, aims to try and achieve a cut/fill balance such that the quantum of material needing to be brought onto or taken off site is minimised;
- is future-proofed to accommodate potential Mass Rapid Transit route through the site;
- avoids archaeologically sensitive areas, most notably the Viking encampment between the A509 London Road and River Ouzel;
- recognises the constraints of the River Ouzel floodplain and in ensuring that the new link across the floodplain does not increase flood risk;
- maximises the retention of hedgerows across the site;
- acknowledges the corridor widths required for Grid Roads; and
- is contiguous with the proposed Non-Motorised User strategy, including PROWs

5.6. DUAL AND SINGLE CARRIAGEWAYS

5.6.1. The new highway infrastructure delivered as part of the development will include a mixture of dual and single carriageway. The justification for this has been based on historical and current modelling outputs and is discussed further in Section 12.6 of this TA.

5.6.2. The key links that are proposed for dualling are as follows;

- Floodplain link over the River Ouzel;
- New M1 Bridge;
- Tongwell Street (Southern Section); and
- Southern section of the Eastern Perimeter Road (EPR) up to its connection to the Cranfield Link at the second roundabout north along the EPR from the M1 J14.

5.7. TONGWELL STREET JUNCTION

5.7.1. The new M1 bridge crossing will provide a tie in point from the development to the existing Tongwell Street. TTN12 (provided in Appendix A-12) summarises the design process undertaken in reaching the safest and most appropriate design choice for this connection and the treatment of Tongwell Street between this point and Tongwell Roundabout.

5.7.2. This design process concluded that the northernmost section of Tongwell Street between Tongwell Roundabout and the M1 bridge link would become one-way northbound; i.e. a left turn into this section of Tongwell Street from the northbound carriageway of the M1 bridge link only. This was for several reasons, the most noted of which was the tying in of Tongwell Street to the new M1 bridge vertical profile, the difficulties with movements interacting with the southbound lane, land constraints, meeting highway geometry standards and ensuring that the M1 bridge link retains priority as an efficient free-flowing link towards CMK. Several discussions on this were held with MKC highways officers.

5.7.3. As a result of the conversion of the northernmost section of Tongwell Street to one-way northbound, motorists wishing to head south down Tongwell Street from Newport Pagnell, etc. will instead use either the A509 and new M1 bridge link or use the new Willen Link, which connects Willen Road with the new M1 bridge link. Any motorists exiting the light industrial areas north of Dansteed Way could also use this link to access Tongwell Street south or use the grid road corridor of Dansteed Way and Brickhill Street. Whilst it is not envisaged that motorists would seek to route through the Willen Estate, the introduction of signage and associated Traffic Regulation Orders (TROs) preventing access through the Willen Estate except for access could be implemented to address this should it become prevalent in due course.

5.7.4. Set out in TTN12, journey time assessments have been undertaken to ascertain how the travel times for motorists would be affected with this northernmost section of Tongwell Street being made one-way northbound against the retention of the southbound movement and a signal-controlled junction provided at its junction with the M1 bridge link.

5.7.5. This shows that the journey times via the alternative routes are comparable with that which would be realised if a signal-controlled junction is introduced at the retained Tongwell Street link/M1 bridge link. There would be no significant difference in the journey time if the decision were, for example, to deliver a left-in/left-out junction.

5.8. MKC & PARKS TRUST CLOSED CAR PARK

5.8.1. The Parks Trust has existing access on Tongwell Street approximately midway between the new M1 bridge link and Carleton Gate, which serves a car park and the associated parkland, the access to which is currently restricted.

5.8.2. Dialogue has taken place with the Parks Trust over their car park and how the access to this area can be maintained. This has concluded in agreement that the car park does not need to be retained, with the existing car park adjacent to the BMX track next to the Cotton Valley STW being utilised.

5.8.3. As a result, access into the area is only required for maintenance, which will be achieved via the new subway proposed for walking/cycling access under Tongwell Street with a headroom of 4.3m provided to facilitate the Parks Trust's machines used for maintenance purposes. A link will be provided between this subway and the northbound section of Tongwell Street, which will double up as a footway/cycleway link and a maintenance vehicle access. The detailed alignment drawings for the proposed development illustrate these proposals.

5.9. STOPPING UP PROPOSALS

5.9.1. As part of the MKE proposals, two sections of existing road infrastructure will become redundant due to the new infrastructure to be delivered. These are the southern end of the A509 and part of Newport Road. Diagram 5-4 shows the two areas in relation to the local network.

Diagram 5-4 – Stopping Up areas

A) Southern section of A509

- The new strategic highway infrastructure to be delivered include the Eastern Perimeter Road. The Eastern Perimeter Road ties into the northern arm of J14 (A509) and essentially serves as a connection between J14 and the existing A509, providing a dual carriageway up to the new roundabout. At the first roundabout on the Eastern Perimeter Road north of J14, a link which connects the Eastern Perimeter Road back on to the A509 is provided, such that this facilitates access to M1 J14 (and principally the motorway network, given that the new bridge over the M1 will be the primary route for trips into and out of Central MK) until the Eastern Perimeter Road is fully delivered.
- As a result of the above, the section of the A509 between the Eastern Perimeter Road and the new roundabout on the A509 will provide the link connection between the Eastern Perimeter Road and the A509. The southern end of the A509 will become redundant and will need to be stopped up.

B) Newport Road

- Similarly, as the new Eastern Perimeter Road severs the connection between the M1 J14 and the A509, it also serves Newport Road. As the new Eastern Perimeter Road will be dualled where it connects with the M1 J14, it is considered that the re-provision of the Newport Road junction is inappropriate, particularly given its proximity to the junction.

- Consequently, it is proposed that Newport Road is stopped up between the Eastern Perimeter Road and the new Cranfield Link where a new connection is made to Newport Road to facilitate continued connectivity to Moulsoe Village, Cranfield and beyond. Motorists associated with these areas will in the future access the A509 and the M1 J14 via the Cranfield Link and the all movement roundabout junction on the Eastern Perimeter Road.
- The highway drawings accompanying the application include a connection to the section of Newport Road to be stopped up from both the first roundabout on the Eastern Perimeter Road north of M1 J14 and from the Cranfield Link. The reason for this is to cover the improbable scenario that Newport Road cannot be stopped up (see below).
- The existing connection between Newport Road and the A509 will be closed to allow employment parcels to come forward.

5.9.2. The stopping up order will be sought under Section 247 of the Town and Country Planning Act 1990 (incorporating changes to application requirements following the Growth and Infrastructure Act 2013), which allows the Secretary of State for Transport to stop up a road if he/she is satisfied that it is necessary for development to be carried out. The application for this will be made in parallel to the planning application for the proposed MKE development.

5.9.3. It should be noted that should it not be possible to secure the ability to stop up these sections of the public highway, these would be retained with their function and finish to be agreed with MKC highways. A Traffic Regulation Order (TRO) would be sought to then restrict vehicle movement along the links and, in particular, preventing the ability for motorised vehicles to travel between the A509/Newport Road and the Eastern Perimeter Road at the points at which they coincide.

5.9.4. Appendix H contains the provisional drawings (MKE_WSP-ZZ-ZZ-C-SK-0058-P01 and MKE_WSP-ZZ-ZZ-C-SK-0059-P01) showing the areas of highway proposed for stopping up. Final drawings for the s247 application will be submitted in due course.

5.10. SIGNAGE STRATEGY

5.10.1. As well as signage required on the new road infrastructure and associated junctions, there will be alterations needed to the existing off-site signage to reflect the changes in traffic routeing. For example, motorists travelling to/from Central MK from the north are to be directed to use the new M1 overbridge and to reflect the reconfiguration of Tongwell Street to one-way northbound. These signage alterations may be phased as the new infrastructure comes forwards. For example, signage changes will be required to accompany the new HIF infrastructure being delivered initially, with further changes needed when the Eastern Perimeter Road (non-HIF) comes forward for delivery.

5.10.2. Consideration of additional changes to the wider signage strategy has been undertaken, including promoting the new M1 bridge for routes to Bedford or Newport Pagnell. This is also contained in Appendix I.

5.10.3. As set out earlier in this report, whilst it is not envisaged that the changes to the highway network would result in any HGV traffic re-routeing through the Willen Estate, it is suggested that signage restricting access by vehicles greater than 7.5T gross weight could be introduced at the entrances to the Willen Estate except for access to properties within the Estate itself. Associated TROs would be required to support this.

5.10.4. Appendix I illustrates the proposed signage strategy for the introduction of the HIF and Non-HIF infrastructure.

5.11. SPEED LIMITS (CHANGES AND PROPOSALS)

5.11.1. As well as signage strategy, the MKE development proposes to alter speeds limits on several existing links. These links include Tongwell Street, which will be reduced to a 50mph speed limit. This reduction will facilitate the safe transition from the link onto the new M1 overbridge into the site.

5.11.2. The downgraded section of the A509 will be reduced to 30 mph to facilitate side accesses and connectivity to development parcels.

5.11.3. The new development internal distributor links will be predominantly subject to a 30mph speed limit. Where these links connect to side roads or parcel accesses, speed limits may be reduced to 20mph zones. The proposed grid roads will be subject to 50mph limits.

5.12. NON-MOTORISED USER ACCESS

5.12.1. The masterplan has been developed with a focus on providing future users of the development with an interconnected network of active travel infrastructure to make walking, cycling, and the use of micro-mobility modes the most attractive way of travelling to, from and across the proposed MKE development. The proposed layout also considers the connectivity to the existing PROW network.

5.12.2. The active travel network will comprise green routes crossing the site and infrastructure provided alongside vehicular routes. This way, connection to origins and destinations both off and on-site (including different land uses and links to public transport hubs) will be achieved by providing different type of active travel infrastructure following the expected desire lines and preferred routes.

5.12.3. The network of active travel infrastructure will be adapted to the defined hierarchy of routes across the site accordingly. It will consequently comprise Primary, Secondary and Tertiary Green Corridors, Redways (including Super Routes), Bridleways, PRoWs, and footways and cycleways along the relevant primary, secondary and tertiary streets. The proposed NMU provision will also ensure that adequate links and crossings (with these being grade-separated where deliverable across the SRN) are provided where needed to follow desire lines and achieve a high degree of non-vehicular permeability into and across the development.

NEWPORT PAGNELL CROSSINGS

5.12.4. As part of the development proposals, improvements to the permeability across the A422 and A509 north to south are also proposed. These will improve the connectivity to and from Newport Pagnell and the MKE. This improved connectivity, in turn, will improve the onward connections from Newport Pagnell to central Milton Keynes. The proposals include at-grade and grade-separated crossing opportunities.

5.12.5. The MKE DF identifies three grade-separated crossing points; one to the east of Marsh End Roundabout, which would be delivered by Bloor as part of their masterplan, one west of North Crawley Road bridge, which would be delivered by Berkeley in association with an accompanying Reserved Matters Application for part of the development in that area and, finally, one within the vicinity of Tickford and Renny Lodge Roundabouts. The latter of these crossings is challenging to deliver, and several options have been considered for this, which are set out at TTN14 and have been discussed with MK officers. It has been agreed that ongoing studies looking into the potential ability to deliver a crossing in this location can be secured by an appropriately worded condition.

5.12.6. The proposed Walking and Cycling strategy is discussed in more detailed in TTN9 and summarised in Section 11.2 below.

5.13. PUBLIC TRANSPORT

5.13.1. A separate Public Transport Strategy (PTS) has been prepared, setting out the principles for the site. Furthermore, a summary of the bus strategy has been provided at TTN11 and shared with officers during the overall PTS development. The PTS has been developed in consultation with MKC Public Transport Officers, who agreed in principle to the aspirations set out.

5.13.2. It is evident that both employment and residential trips will be generated by the proposed MKE development. The public transport proposals intelligently blend different services to provide an efficient, sustainable and attractive network to fulfil both external and internal trips. There is an opportunity to provide a new model at MKE, including the combination of Demand Responsive Travel (DRT) alongside traditional services and future strategic options, such as the Mass Rapid Transit (MRT).

5.13.3. The public transport proposals, illustrated in Diagram 5-3 below, include:

- Providing high bus frequency connections to most popular destinations such as Milton Keynes Central and Newport Pagnell together with providing new routes or extending existing routes to cater for main external trips in both directions. This will target the extension of Route 1 to the MKE site and the implementation of a new high quality and high-frequency Principal Bus Route (PBR) between MKE and Milton Keynes Central operating with electric buses.
- Providing DRT services to flexibly support travel between internal residential, leisure and employment zones and connecting with the high-frequency bus services for destinations further afield.
- Maximising benefits from bus services already serving MKE to widen destination choices nearby such as Moulsoe and further afield such as Bedford. This, in particular, will incorporate the provision of convenient stopping arrangements for Route X5 and a minor rerouting of Cranfield services.
- Creating a multi-modal Transport Interchange for the MKE development, which will include public transport (scheduled services and DRT). The multimodal hub will be located within the community hub and create a focal point for transport modes at the heart of the site, underpinned by solid walking and cycling connections from all the development areas – thus reducing the need to use private transport.

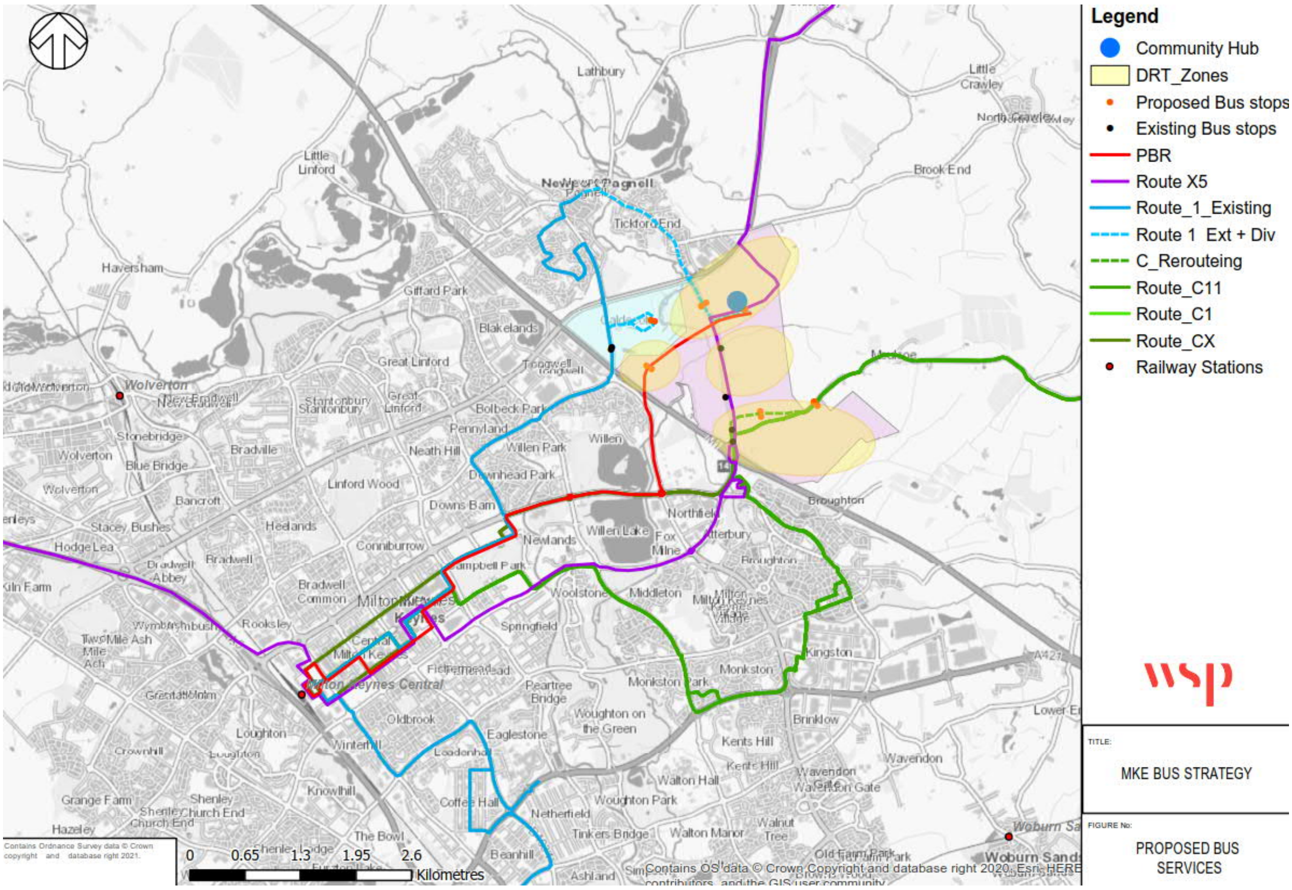
5.13.4. The multi-modal hub will accommodate infrastructure to support the operation of the bus and active travel proposals in terms of a terminus, layover facilities, electric charging, parking and information/smart selling points.

5.13.5. Bus stops will be placed in strategic locations to maximise the public transport coverage so that as many residents as possible are within 400m of a bus stop, without compromising attractive journey times (see indicative bus stop locations in Diagram 5-3). DRT stopping arrangements will be more flexible without compromising safety and, as such, will not always need dedicated stopping areas.

5.13.6. The implementation of the public transport proposals will be progressive and tightly aligned with the development, construction and occupation phases, starting with a low level of service rising as the demand builds up, albeit with enough early critical mass to encourage early take-up of public transport services. The PTS measures will be funded through proportionate developer contributions via the MK tariff.

5.13.7. The public transport strategy supports the proposed future implementation of the MRT and potential P&R site by MKC. It is envisaged that if and when those are implemented, the proposed network within the MKE site, notably the PBR, will be adjusted to prioritise feeding the MRT rather than competing with it.

Diagram 5-5 – Public Transport Strategy



5.14. SITE LAYOUT

ACCESSIBILITY FOR ALL

5.14.1. The development masterplan sets out an interconnected vision for the site, tying together vehicular and sustainable modes into a cohesive access strategy. The Design and Access Statement (DAS) sets outs processes undertaken to develop the site layout.

5.14.2. Therefore, the MKE development will be cognisant of accessibility for all, promoted through a walkable and cyclable network that takes advantage of the green corridors across the site. The green lattices throughout the MKE development provide an opportunity for a biodiversity driven green corridor network and layout, which will be continuously revived as each RMA comes forward.

5.14.3. The accessibility across the development will allow residents and workers to have a real choice in accessing their homes and businesses. This will reduce the reliance on private vehicles from the outset as this accessibility will be design-driven and a fundamental principle of the development from the very beginning.

5.14.4. The MKE development parcels will also be aimed at promoting dementia-friendly routes. One example is using different coloured planting at key junctions to assist people with orienting themselves within the MKE development. This accessibility will also be applied to the community hub and the schools throughout the whole allocation. Schools will be connected to walking and cycling routes, and the hierarchy of provision will be aimed at sustainable modes instead of private vehicles.

COMMUNITY HUB

5.14.5. The mixed-use community hub will form the heart of the community since:

- It will be located on pedestrian priority street.
- It will be served by a mass rapid boarding point.
- It will be located at the centre of high-density housing. The mix of uses and pedestrian-friendly public realm, including civic space, will be designed to create an active, vibrant centre.
- The scale of the community hub will be sufficient to meet the day to day needs of the new community at MKE.
- It will provide a mix of uses, including convenience shopping, housing, leisure facilities, small scale employment and community uses.
- The co-location of facilities and shared use of parking will be actively encouraged.

5.14.6. At the heart of the development, the community hub will deliver a range of uses to support the day to day needs of the new community. It is carefully positioned to maximise the benefits of the 15-minute neighbourhood concept, with the majority of homes being within a 15-minute walk of the hub. As well as delivering a mix of uses, including homes, the community hub will contain formal areas of the public realm and a mobility hub to serve as a transport interchange between modes of sustainable transport.

MOBILITY / INTERCHANGE HUB

5.14.7. The MKE development will include a mobility interchange hub within the Community centre of the site. This will present an opportunity to integrate public transport and shared transport (such as bike share and e-bikes etc.) to enhance connectivity and user experience, encouraging and facilitating more sustainable travel in the heart of the development as well as key areas around the site.

5.14.8. Through implementing joined-up transport-services more effectively, there is the potential to maximise the benefits of more sustainable transport and minimise the negative impacts of private car travel such as congestion and poor air quality.

5.14.9. The masterplan sets out how the community and mobility hubs are designed to be easily accessible places that integrate different transport modes and supplement them with enhanced facilities, services, and information to encourage more sustainable travel, create a sense of place, and improve journeys travel choices.

5.14.10. This bottom-up provision ensures that sustainable based travel behaviour is set out at MKE from the onset. This bottom-up provision ensures that sustainable based travel behaviour is set out at MKE from the outset.

5.14.11. There is not a universal approach to the implementation of mobility hubs. However, there is an underlying requirement for high-quality places that encourage the use and a place to access and change modes. The MKE mobility hub will be a unique and tailor-made approach that reflects the locality and future aspirations of the Council. The hub will include both mobility-related elements such as; Car club bays, Taxi, DRT drop off/pick up, secure bike storage, bike repair stand, bike pump, EV charging infrastructure, as well as non-mobility elements such as Real Time Passenger Information (ticketing, wayfinding etc.), lighting urban realm improvements (e.g. art/planting/parklets) Wi-Fi and phone charging, Refreshments (e.g. café, food stalls, coffee carts etc.).

Source: CIVITAS, UK Mobility Hub Guidance 2019/20

5.14.12. The example of an integrated hub showing public transport adjacent to car share spaces and information points is depicted in the photo to the right.

5.15. CAR AND CYCLE PARKING PROVISION

5.15.1. TTN8, within Appendix A.8 sets out the car parking and cycle parking strategy for the development and should be read in conjunction with the below. It is proposed that a mix of parking standards that reflect the character areas of the Development Framework and MKE proposals are applied.

5.15.2. MKC's 'The Mobility Strategy 2018 – 2036' acknowledges that MK has a historical reliance on car use and relative high car ownership in Central MK (compared to the rest of England). The Mobility strategy seeks to continue the programmes set out in Local Transport Plan 3 (LTP 3), to influence travel behaviour and challenge the embedded default use of the private vehicle.

5.15.3. The proposals at MKE, therefore, need to balance the need between parking provision for residents that is at a suitable level without promoting car use, whilst at the same time offering real alternatives to private vehicle use through walking, cycling and public transport options.

5.15.4. The pattern of car ownership is changing with the traditional hire purchase method being phased out, and in its place, car manufacturers have been offering personal leasing. The uptake in personal car leasing has meant that the length of time people own a car has reduced.

5.15.5. Combined with this is the growth in personal travel. Initially, this was seen with the growth of smartphones that could journey plan from A to B. However, this is now evolving with ride-hailing services, car clubs, cycle hire, and demand-responsive bus travel. Combined, these services are known as Mobility as a Service (MaaS). Over time it is anticipated that levels of car ownership will reduce, albeit the travel demand will still exist, but catered for across multiple modes of transport within a MaaS transport ecosystem.

5.15.6. Whilst strategic developments that plan for this future MaaS scenario are currently rare, the current MKC parking SPD acknowledges that parking demands based on dwelling types do change but does not necessarily account for how complimentary services can assist in reducing private vehicle use. This also aligns with the LTP4 strategy to capitalise on MaaS where possible to respond to changes in private vehicle use.

5.15.7. TTN8 sets out a mechanism for reviewing the parking standards over the build-out of the development and in relation to the character areas. A summary of the standards is set out below.

RESIDENTIAL PARKING STANDARDS APPLIED

5.15.8. Reviewing the distinct character areas, the likely housing density and supporting infrastructure, it is considered appropriate to apply a varying standard across the areas. Preliminary discussions with MKC Officers have indicated that where Zone 3 is indicated, this should be provided in full, and Zone 2 could be applicable in higher density areas. It is considered that the use of Zone 1 in the central/district areas would also be applicable on the basis that it is supported by the green links, cycle parking, public transport (including high-frequency bus services and potential MRT).

5.15.9. It is acknowledged that parking provision in line with current standards will be required for the initial phases. This is such that the development can be flexible whilst sustainable infrastructure is being introduced. Subsequent phases of MKE would then be monitored to ensure that the parking provided was adequate but did not promote private car use over sustainable options.

5.15.10. The parking standards applied at this stage are shown in Table 5-3 below.

Table 5-3 – Car Parking Provision – Zones and Standards

Character Area	Density	Parking Standards Applied	Comments
District Centre	80 – 100dph	Zone 2*	Highest level of public transport accessibility, access to other land uses, access to interchange and mobility hubs.
Central Area	80 – 100dph	Zone 2*	Highest level of public transport accessibility, access to other land uses, access to interchange and mobility hubs.
Primary Street	40 – 60dph	Zone 2 or 3 (Zone 3 adopted for the purposes of the application)	Good level of public transport access and access to key walking and cycling links. Lower density reflected in standards.
Riverside	40 – 60dph	Zone 2 or 3 (Zone 3 adopted for the purposes of the application)	Good level of public transport access and access to key walking and cycling links. Lower density reflected in standards.
General Area	25 – 40dph	Zone 3	Good level of public transport access and access to key walking and cycling links. Lower density reflected in standards.
Rural Edge	10 – 30dph	Zone 4	Medium level of public transport access, still good access to walking and cycling but standards reflect the distance to other uses.

*****The early delivery of some of the Community facilities, alongside public transport and mobility provision, will ensure that sustainable trips are prioritised over private vehicle use. As such, reduced or shared parking may be utilised in the Hub and central areas to provide flexibility as the site develops.

5.15.11. The development proposals also include a provision of a local centre with a range of facilities such as healthcare, retail and leisure.

5.15.12. The uses within the Community Hub are being kept flexible at this stage to allow types to be developed as market conditions evolve. It is suggested that some shared parking between some of the land uses (e.g. small supermarket, café, community hall, etc., and the use of school parking facilities at weekends) is utilised to maximise the efficiency of the space.

5.15.13. The Community Hub is designed with walking/cycling connections and the promotion of green routes to encourage the use of sustainable modes at its forefront. The use of shared parking facilities also fits the MKE Development Framework requirements, which suggests *"The co-location of facilities and shared use of parking will be actively encouraged. Public parking should be provided that will be available to all users of the centre".*

5.15.14. The Community Hub and central areas will seek to reduce car dominance and reliance on private vehicle use where possible. This will be achieved through the design and implementation of sustainable measures, such as public transport and walkable neighbourhoods. As such, these areas may apply lower parking provision in certain areas. The masterplan has the flexibility to provide additional parking areas nearby to the community hub should the demand arise

5.15.15. The parking standards for the Employment, Education, Community and other uses are all set out in TTN8 and the DAS in more detail.

ELECTRIC VEHICLE CHARGING/PARKING

5.15.16. TTN8 (Appendix A.8) provides further details on the electric charging provision at the site. The current parking SPD acknowledges the need for electric vehicle parking in future developments. As a significant and sustainable development, the MKE development will accommodate the standards set out by MKC as a minimum but actively seek to improve on this across all areas.

5.15.17. The MKC Parking SPD sets out EV standard for non-residential developments only. Berkeley St James are committed to delivering flexibility and EV provision to its new residents and is looking to deliver 100% active chargers for houses and 100% passive provision for apartments. This will be reviewed as each RMA stage comes forward but outlines their commitment to EV use at MKE from the outset.

5.15.18. For employment areas specifically, it is proposed to have 10% passive charging EV spaces, with an ability to provide further passive provision for conversion at a later date. This will include reviewing EV technology for vans, LGVs and HGVs as well as employees' private vehicles.

PARKING FOR PEOPLE WITH DISABILITIES

5.15.19. Car parking for people with disabilities would be provided in accordance with the relevant guidance provided in the document entitled Inclusive Mobility (Department for Transport, 2005). It is suggested that as a minimum, 5% of provision for employment uses and 6% of all other non-residential use classes should be suitable for blue badge holders. As each RMA comes forward, a review of residential disability parking will also be undertaken.

5.15.20. The parking would entail larger parking bays to allow easier access, as well as any additional circulation zones that may be required.

CYCLE PARKING

5.15.21. The development would seek to supply high-quality cycle parking facilities for residents, employees and visitors of the development and locate these in the proximity of cycle routes and desired lines of travel throughout the site as a means of maximising the ability for people to cycle.

5.15.22. Cycle parking standards are also detailed in the SPD. TTN8 provides a summary of the residential cycle parking standards.

5.15.23. Similar to the vehicular parking for other uses, the cycle parking standards provided in the Parking Standards SPD would be applied to other land use classes accordingly.

5.15.24. The MKE site will, as a minimum, provide cycle parking in line with the standards above. However, the site will likely go above this, especially at key areas, such as interchange points and the community hub. Cycle parking will therefore be connected by the Redway network throughout the site. As part of the Travel Plan strategy, it is also envisaged that cycling facilities (such as consideration of a shop or community-led servicing centre) at the Community hub will be provided.

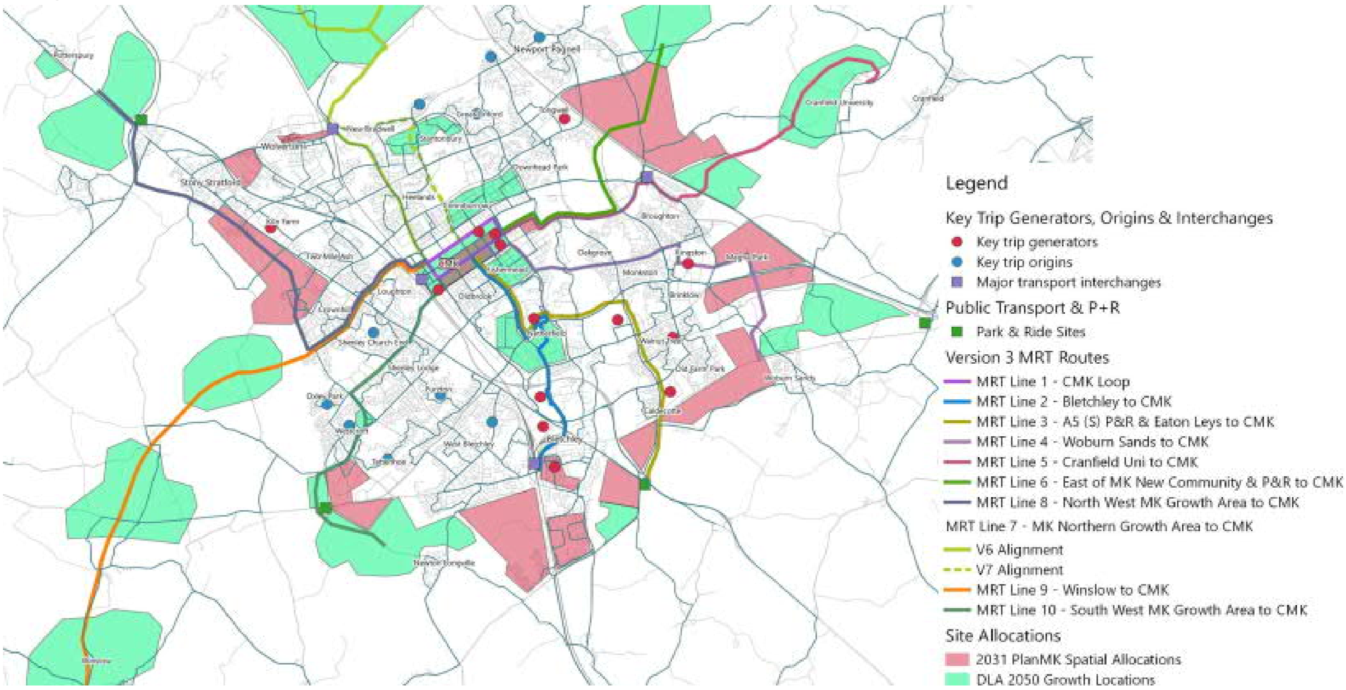
5.16. SMART MOBILITY

MASS RAPID TRANSIT (MRT)

5.16.1. In the Milton Keynes: Strategy for 2050 document, MKC propose a long-term 2050 vision. As part of that, the MK 2050 mobility strategy looks to develop a movement network that works for everyone so that there are efficient, cost-effective and reliable alternatives to using the private car.

5.16.2. A key element in the delivery of the Council's Mobility Strategy is to optimise mass transit access in new development areas. Therefore, the development of MKE is closely aligned with the future provision of a fast Mass Rapid Transit (MRT) system linking the urban extension with CMK. The proposed MRT strategy for MK is set out indicatively in Diagram 5-5,

Diagram 5-6 – Proposed 2050 MRT network



Source: ITP - MK2050 Growth Study - Mobility and Mass Rapid Transit Study, March 2019

5.16.3. The MRT will be supported by a feeder network of other local mobility services to cater for 'first/last mile' demand. This will provide links to the MRT network for those people who live some distance from a stop. It will also meet the need for journeys that are likely to be in less demand and for which the cost of providing MRT services is not viable.

5.16.4. This wider network of mobility services is crucial to the success of the MRT system in a low-density city like Milton Keynes because it will significantly increase access to the system for more people. This supportive feeder network of solutions is likely to include:

- City-wide public bike, e-Bike and scooter hire, with an improved cycle network;
- Local buses;
- On-demand minibus and taxi services; and
- Car clubs and flexible car hire services.

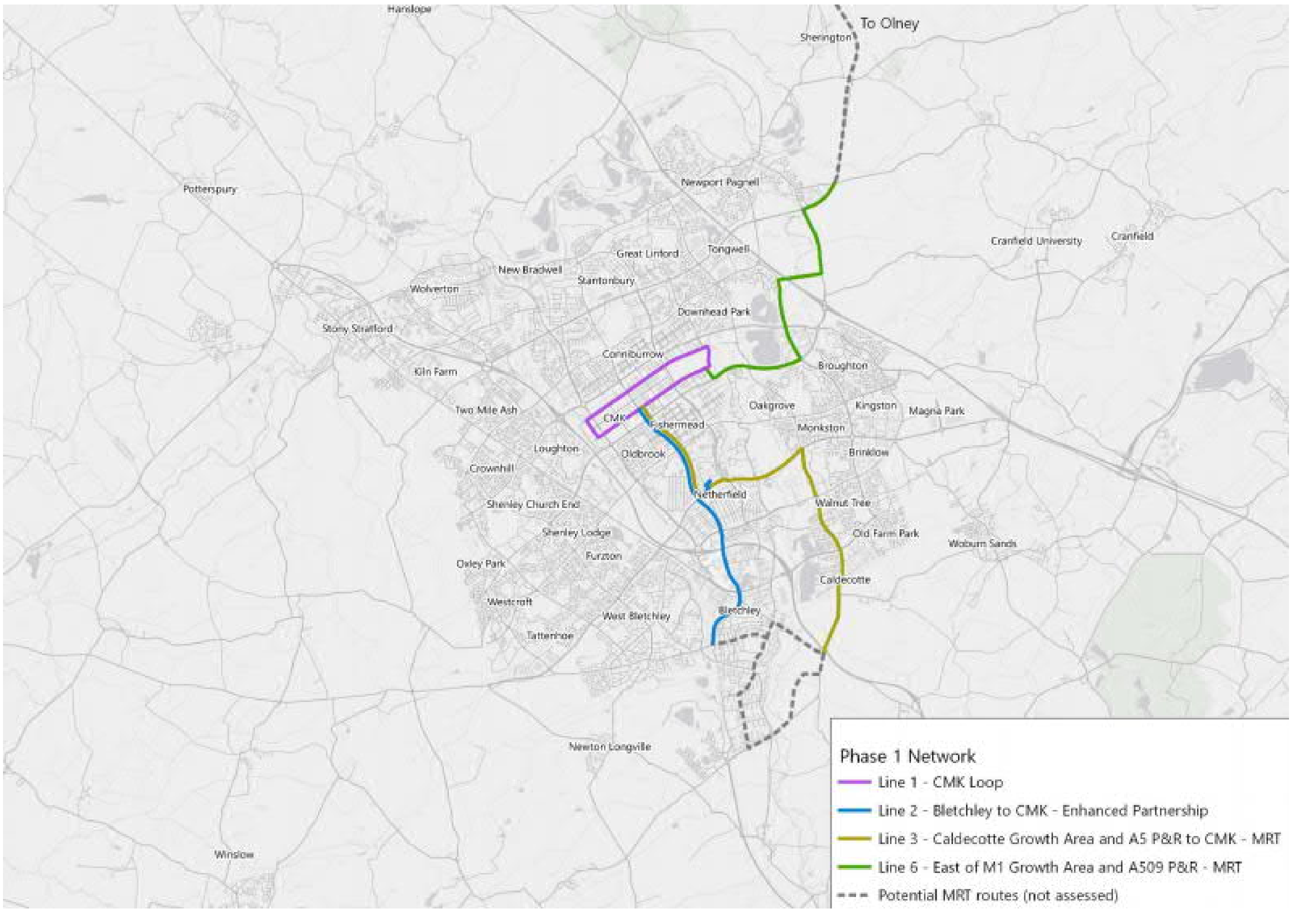
5.16.5. As shown in Diagram 5-6 above, the indicative alignment of MRT Line 6 connects the proposed MKE development area to the MRT network and Central Milton Keynes. The development proposals are therefore well placed to build upon this vision. Further description of Line 6 is provided below.

5.16.6. Discussions have been underway with MKC regarding the potential for an MRT system to pass through the site and be integrated into the development to provide fast, efficient and frequent sustainable movement within Milton Keynes and Milton Keynes East. Similarly, MKC have aspirations to introduce a new Park-and-Ride facility to the north-east of Milton Keynes, on land just to the north-east of the MKE development site and adjacent to the A509.

5.16.7. A study refresh for the MRT around MK was undertaken in August 2020, which confirmed that Line 6 (East of M1 Growth Area and A509 P&R to CMK) was one of the two lines that would be the most resilient to falling levels of passenger demand and would therefore be recommended for inclusion within a reduced core MRT network.

5.16.8. Diagram 5-7 below replicates Figure 3-1 taken from the August 2020 study. It shows that in terms of Phase 1 of MRT, Lines 1, 2, 3 and 6 are to be delivered in line with initial recommendations before 2031.

Diagram 5-7 – Proposed Phase 1 of MRT



Source: ITP, Milton Keynes Strategy for 2050 Review of 2050 MRT Strategy, August 2020

5.16.9. The MKE site is therefore well placed and well suited for an MRT line as described above. The development has safeguarded land and corridors widths where appropriate, such as the new M1 Bridge to enable a lane in either direction to be reallocated to MRT in the future should this be deemed appropriate to facilitate fast journey times and an attractive alternative to using the private car.

Safeguarding for MRT

5.16.10. The MKE development includes routes for a 'mass rapid transit' scheme (likely bus-led) that have been safeguarded as a parameter. This ensures that a corridor is provided through the site within which any public transport prioritisation would occur (e.g. segregated route).

5.16.11. The current strategy is that the dual carriageway over the floodplain, the M1 link and Tongwell Street would be converted into a single carriageway for general traffic with one lane in either direction then reallocated to the MRT once it is delivered. It is considered that this would provide an attractive and realistic alternative to using the private car by switching carriageway space in this way.

5.16.12. Based on the modelling outputs, and as discussed further in Section 12.6 below, dualling is needed on certain links when applying the 2048 future growth assumptions. Whilst dualling is not required from the outset, the early delivery of dual carriageways allows MRT to be facilitated. It is expected that by 2048 if the MRT take-up is as predicted, this would suppress traffic flows down such that a single carriageway would provide sufficient link capacity across the MKE network.

PARK AND RIDE (P&R)

5.16.13. The MKE allocation includes the consideration of a Park and Ride (P&R) element, which at this stage would be located in the north eastern corner of the site – interlinking with the future MRT.

5.16.14. The proposed development seeks to safeguard the land for the P&R to be delivered by MKC at a suitable date. The public transport and accessibility proposals put forward by the site (discussed further in TTN11 and the standalone Public Transport Strategy) do not rely on the P&R being in operation, and whilst it is acknowledged that this would bring benefits for both the site and wider MK traffic – MKC can therefore deliver the P&R element as part of is LTP4 and Future 2050 strategies.

5.17. MK FUTURES 2050 & SMART MOBILITY

5.17.1. In addition to the provision of the site layout as outlined above, due consideration would be given to emerging technologies such as mobility as a service, connected and autonomous vehicles, and others.

5.17.2. The potential measures that could be employed to future proof the proposed development would be subject to discussions with MKC as the site develops. The prospective future mobility measures are discussed in TTN3 and the supporting Technical notes. As the MKE site progresses, it is sensible to continuously review the services and facilities provided, in terms of mobility, for its new residents and employment areas. As such, as part of the Travel Plans, a monitoring strategy is set out that reviews key metrics of the site over time. This then allows a review of the most appropriate strategies and initiatives to be applied that reflect the best practice at the time. More details are provided in the Residential and Workplace Travel Plans.

5.17.3. Whilst mobility as a service and shared mobility for staff and residents can be implemented, the servicing and delivery aspects of the site have also been considered. As technology progresses, it is suggested that Redways could be used by the automated delivery robots which run around Milton Keynes for small deliveries. The Redways could also be used to move small parcels around the development, helping relieve reliance on vehicle-based movements in and out of the site. Consolidation and micro-consolidation areas provide an opportunity within the employment areas to enable site controlled delivery centres, which would minimise the impact of deliveries and HGVs across MKE and wider networks.

5.17.4. WSP has also approached a select number of existing mobility providers and got their views on how their services could potentially be implemented at MKE. These are included in Appendix J.

5.17.5. As mentioned in Section 2, in MKC's 2016 report 'Making a Great City Greater', the MK Futures 2050 Commission proposed a long-term 2050 vision and Six Big Projects to create a stronger future for the city. The MKE site will also seek to incorporate the strategies set out in the MK Future 2050 plan where possible.

5.17.6. The MKE site seeks to deliver the development needed to meet Milton Keynes's needs now and be sufficiently flexible and forward-thinking to pave the way for a future Milton Keynes that aligns with the 2050 Strategy.

5.17.7. The adoption of a Future Mobility approach follows the 2050 strategy and sets out ambitious targets to apply to the site's future year assessments.

6. TRAFFIC MODELLING ASSESSMENT APPROACH

6.1. INTRODUCTION

6.1.1. There was an understanding that, following the HIF bid, there would be a need to assess the impact of the development on the surrounding highway network in a greater level of detail than has been undertaken previously, as appropriate for the stage in the planning lifecycle.

6.1.2. It was agreed with both MKC and Highways England that the use of a Strategic Transport model, combined with more detailed analysis tools, including Paramics microsimulation and junction assessment packages, would be utilised to assess the scheme. As such, the Milton Keynes Multi-Modal Model (MKMMM) was used with updated information as the basis for the assessment of the proposed development. The MKMMM is held by MKC and managed by AECOM (MKC's consultants) on MKC's behalf.

6.1.3. Whilst the MKMMM model used as the evidence base to support Plan:MK was deemed appropriate to assess the scheme as part of the HIF submission, it was considered that some refinement of the model, particularly within the area of the MKE site, was required to ensure that it is deemed robust and defensible for use in a planning application. This refinement includes accurately reflecting bespoke trip rates associated with the proposed development and, subsequently, an accurate representation of development impacts.

6.1.4. The previous versions of the MKMMM existed for several scenarios, with those most applicable to the MKE site being the 2031 Reference Case scenario and a 2031 MKE scenario. It was recognised that for the purposes of the planning application, the MKMMM requires further validation and calibration in the area where the MKE development is proposed.

6.1.5. The TTN1 document sets out the intentions to assess the scheme, alongside the likely modelling years and scenarios. The modelling approach was issued to MKC and Highways England in March 2019 (with minor updates re-issued in May 2019). TTN1 was issued and prepared such that MKC and Highways England could review the proposed methodology for refining the model. The traffic survey specification was signed off, and that the approach to assessment was agreed in principle.

6.1.6. MKC's modelling team (AECOM) notes TN29 and TN30, contained in Appendix K, should also be read in conjunction with the below as these provide details on how the model baseline validation and calibration were improved, as well as how the proposed MKE development has been incorporated into the Do Something (with development) tests.

6.1.7. Highways England, through their consultants, AECOM[3], provided a Modelling Review note on 21 June 2019, which reviewed the MKMMM, the suggested approach, and the intended traffic surveys to be used to improve the detail in the MKE modelled area. The Highways England review note is included within the correspondence in Appendix C.

[3] *Please note: this a different team to MKCs incumbent modelling consultants AECOM*

6.1.8. The Highways England review note outlined that the application of trip rates different from the default MKMMM rates was acceptable in principle but required further information. With regards to the modelling approach set out, the Highways England note continues that whilst further information on the modelling would be required as data is reviewed further, *"In overall terms, the proposals by WSP for the modelling of Milton Keynes East are consistent with the recommendation that the model is enhanced in the local area when developments are proposed."*

6.1.9. As part of the ongoing modelling discussions regarding the modelling methodology (set out in TTN1), meetings were held in December 2019 with MKC and Highways England. It was agreed that a review of the trip generation and mobility measures adopted at the development in the future years should be concluded.

6.1.10. It was previously agreed that a review of the growth between the Plan:MK period ending in 2031 and the expected full build-out year should also be undertaken for informative purposes. This exercise would aim to ensure that the model accounts for planned growth in the Milton Keynes area and sites in the wider area delivered after 2031, potentially impacting the locality of the proposed MKE development. The suggested approach and its application are discussed in detail in a separate TTN 4: Growth and Future Year Modelling Approach, which is appended to this TA in A.4.

6.1.11. The current MKMMM has the future year of 2031 to align with the local plan period. As discussed in TTN1, it was initially agreed that a 2031 year and 2039 year test would be adopted, with the latter representing the full build-out year of development at that time.

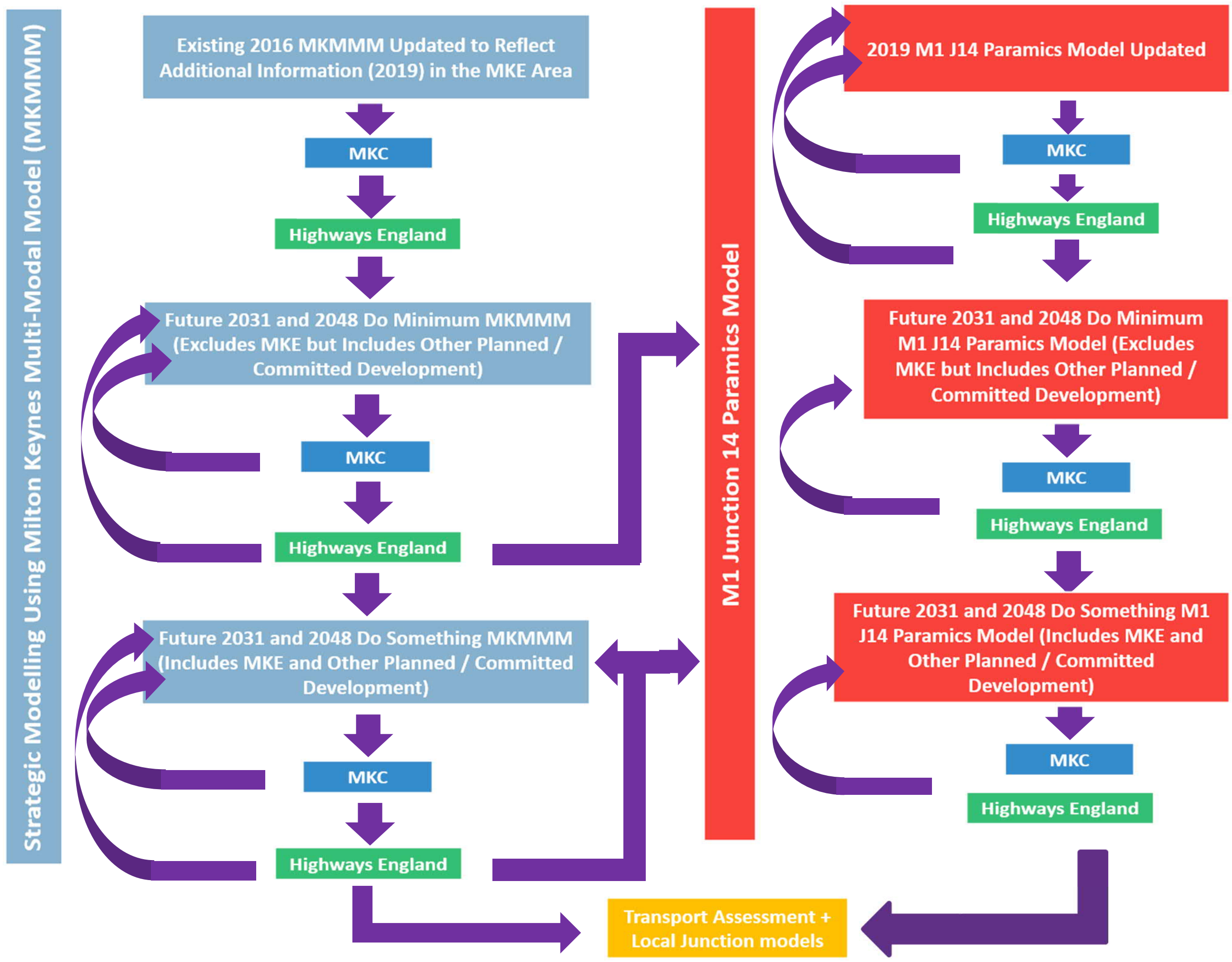
6.1.12. Subsequent updates to the build-out schedule and further discussions with MKC have resulted in the revised full build-out year of 2048. This is to ensure that completion and delivery rates are robust, defendable and realistic for the MKE development and are based on existing delivery rates by developers in the MK area. The modelling scenarios, therefore, being considered in the Core runs are:

- 2016 Base year
  - This is supplemented with traffic flow information from 2019 surveys in the MKE area
- A - 2031 Future year reference case - without Development (2031 Do Minimum)
  - To align with the Local Plan period
  - Includes MKMMM development growth up to 2031 plus the committed developments
- B - 2031 Future year with Development (2031 Do Something)
  - The above scenario, with the interim built out development
- C - 2048 Future year reference case - without Development (2048 Do Minimum)
  - Built upon the 2031 year with further growth and committed developments up to 2048 applied
  - This will include, where possible[4],strategic sites relevant from other boroughs
- D - 2048 Future year with Development (2048 Do Something)
  - The above 2048 scenario, with the full build-out of the development

[4] The MKMMM is limited to what sites can be explicitly modelled outside of a core modelled area, however a separate TTN (TTN4) on the 2048 growth was issued and agreed with MKC and Highways England.

6.1.13. Diagram 6-1 below sets out the modelling process adopted for the assessment of the MKE development. The diagram sets out how the strategic model progresses through various stages, with liaison and agreement with stakeholders before progressing. The strategic model (MKMMM) then feeds into the detailed Paramics model associated with M1 J14 and Northfields. This was set out in TTN1 – previously submitted in May 2019.

Diagram 6-1 – Modelling Process adopted for MKE – Strategic and Paramics



6.1.14. It should be noted that Stage 1 (base model revalidation) and Stage 2 (future year Do Minimum, 2031 and 2048) models have been agreed upon by both Highways England and MKC. A Stage 2 covering letter summarising the results was issued on 24 August 2020, and it is also contained in Appendix C.

6.1.15. Whilst Stage 3 (with development, Do Something 2031 and 2048) has been agreed for use in the assessments by MKC. It is acknowledged that Highways England had requested further information on some of the development-specific inputs. This is covered in more detail in Section 6.3 of this TA.

6.1.16. However, it is considered that the impacts and modelling and associated routeing would follow similar patterns as set out in summary below – and as such, any changes in development inputs are not considered to be material at this stage.

6.1.17. As outlined in the diagram above, the strategic model (MKMMM) feeds into the Paramics model. In the case of MKE, the Paramics model has been used to inform a sensitivity test of the MKMMM. This is discussed further in Section 8.5. This is standard/normal modelling practice, and it is often seen with strategic models that cover a wider extent, including junctions/corridors that are also covered by more detailed modelling tools. Paramics modelling is discussed further in Section 6.5 below. The baseline Paramics model was subject to a local model validation report (LMVR) and further liaison with Highways England and Milton Keynes. The LMVR and associated notes/updates are contained within Appendix L. The baseline local junction models and assessments, utilising the MKMMM outputs are discussed in Section 7.

6.2. STRATEGIC MODELLING - CORE ASSESSMENTS AND OTHER RUNS

6.2.1. As further analysis of the development was completed, it was apparent that further MKMMM runs would be required to fully ascertain the potential impacts of the development on the local road network and the strategic road network.

6.2.2. As set out above, the 'Core' scenarios have been run using the strategic MKMMM model, with these being 2031 Do Minimum/Do Something and 2048 Do Minimum/Do Something.

6.2.3. The core runs have been used in the TA and the Paramics modelling to understand the impacts relative to the wider MK area as a result of background traffic, route displacement, development proposals and infrastructure.

6.2.4. During the modelling exercises, it became evident that further MKMMM and Paramics runs would be of benefit to assist in the assessment of the development to enable a greater understanding of impacts and solutions.

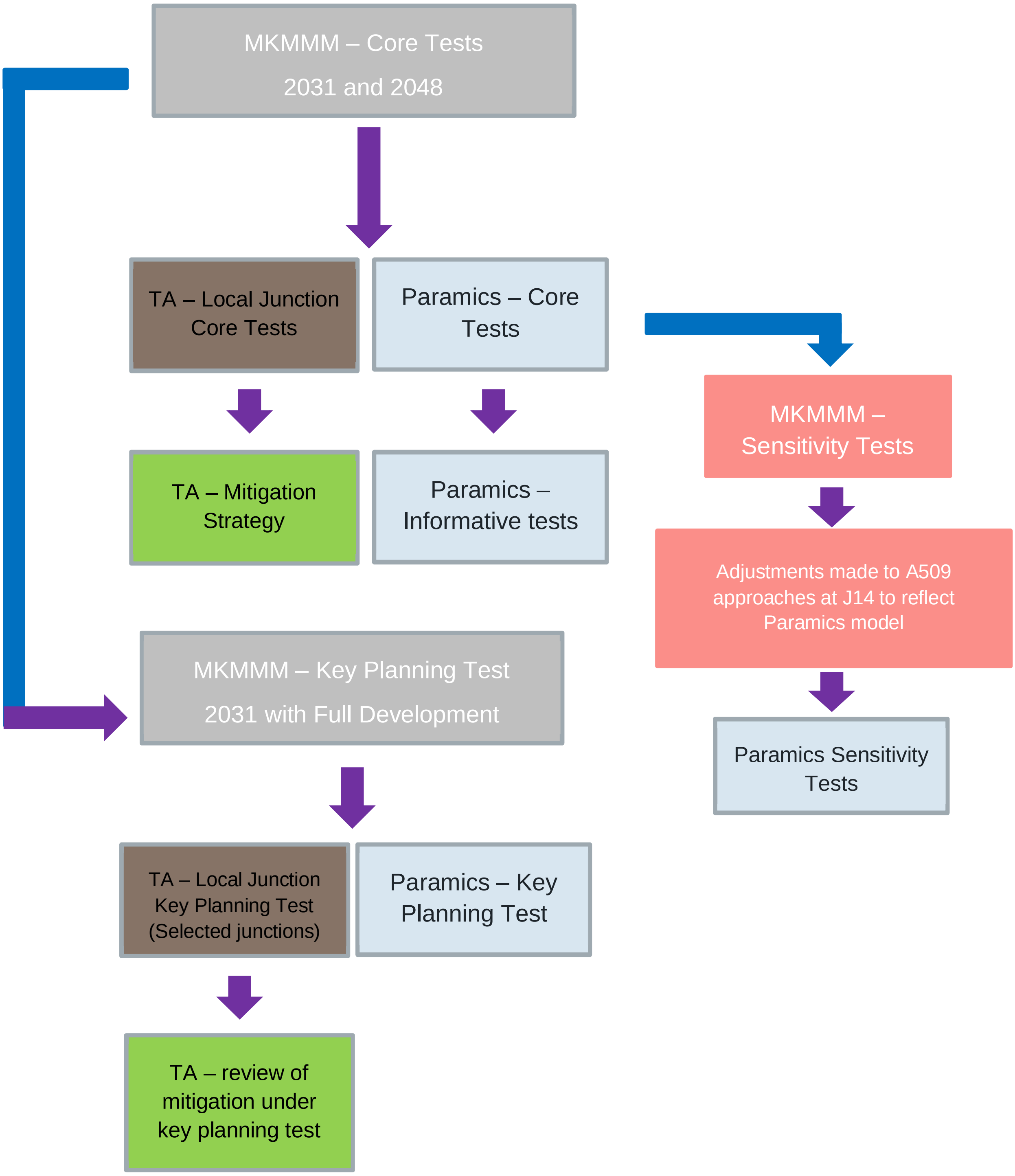
6.2.5. The use of modelling iterations and sensitivity tests is standard practice to inform decision-makers on the outcomes of the impacts should certain key variables be altered.

6.2.6. Diagram 6-2 below sets out the modelling tests undertaken and the data used across the three key modelling tools (Strategic – MKMMM, Paramics and TA local junction tests).

6.2.7. As outlined in Diagram 6-2, the MKMMM has been run for three main tests. The modelling scenarios are discussed in more detail below and summarised in Table 6-1:

- **Core:** Core models represent the outputs from the Saturn MKMMM without any adjustments and have been used in both the TA and Paramics models. These represent a partial build in 2031 and a full build-out in 2048. These provide the definitive tests that have been reviewed in detail in the local junction modelling.
- **Sensitivity:** these outputs represent adjustments to the MKMMM at J14, following capacity review at the A509 approaches. These were used in Paramics modelling only.
- **Key Planning Test:** these add the full development (assuming full build-out) onto the 2031 DM flows. These have been run with and without the sensitivity tests. These are the outputs from the MKMMM and have been used primarily in the Paramics modelling but have also been used to review certain junctions on the local network.

Diagram 6-2 – Modelling Tests Undertaken in the MKMMM



6.2.8. Table 6-1 below provides a breakdown of the scenarios and what was considered in terms of general build-out.

Table 6-1 – Modelling Scenarios completed

Type	Year / Scenario	Development Test
Core	2031 Do Minimum	n/a
	2031 Do Something	Partial build-out
	2048 Do Minimum	n/a
	2048 Do Something	Full build-out
Sensitivity	2031 Do Minimum – Sensitivity	n/a
	2031 Do Something – Sensitivity	Partial build-out
	2048 Do Minimum – Sensitivity	n/a
	2048 Do Something – Sensitivity	Full build out
Key Planning Tests	2031 Key Planning Test (DM + Full development)	Equivalent to full build-out – run through MKMMM
	2031 Key Planning Test – Sensitivity (DM + Full Development)	Equivalent to full build-out – run through MKMMM

CORE TESTS

6.2.9. As described above, the core results provide a definitive test using the calibrated MKMMM model. These outputs have been used in the following sections of the TA to understand junction impacts, both at a micro-simulation (Paramics) and local junction level. These outputs represent a key scenario to assess the impacts of the development against the future baseline.

SENSITIVITY TESTS

6.2.10. As shown in Diagrams 6-1 and 6-2, an MKMMM sensitivity test has been run, which applies specific alternative assumptions, focusing on the A509 approaches to J14. This was due to a review of the Paramics modelling (using the core results) against the MKMMM (core test) to understand whether the strategic model was reflecting the delays and queuing observed in the micro-simulation (Paramics) model. This iterative approach is a common practice, and the adjustments and results of these sensitivity tests are set out in Section 8.5.

KEY PLANNING TESTS

6.2.11. As outlined in Diagram 6-1, the MKMMM has been run for two future years, 2031 and 2048. The 2048 year includes significant growth beyond the Local Plan period and includes assumptions about the level of growth that may or may not occur. The 2031 year has a greater level of certainty and accuracy, as this represents the MK Local Plan period. The 2031 future growth has also been reviewed by WSP and MK planning officers in depth before being utilised in the recent MKMMM outputs.

6.2.12. In the February 2021 meeting, it was discussed that the 2031 future year would be considered the key planning test for the MKE impacts at J14. This was predominantly focused on the Paramics tests applied at this junction (discussed further below).

6.2.13. Whilst the 2048 future year presents a useful indication of the likely stresses across the network, it is considered likely that further Local Plans and infrastructure development programmes would be implemented between 2031 and 2048. Therefore, whilst used as an informative, the 2048 years cannot be considered an entirely accurate position of growth in the MK area. This is particularly true given that the 2048 DM scenarios do not account for the planned growth as part of the MK2050 Strategy, the omission of which was agreed with MKC during the modelling process.

6.2.14. The key planning test on the Strategic Road Network (i.e. that for which Highways England are responsible), in accordance with Circular 02/2013, is to assess the impact of committed development (the Reference Case) alongside the proposed development against a period of 10-years after the date of the planning application or the end of the Local Plan period, whichever is the greater. For MKE, these dates coincide with 2031.

6.2.15. Strictly speaking, the circular test for the Reference Case should be based on development already permitted development only. It has, however, been agreed with MKC and Highways England to undertake a test that compares a 2031 Do Minimum Reference Case (i.e. full Local Plan growth) with a 2031 Do Minimum plus development scenario (Do Something), including both the proposed MKE highway infrastructure plus the full proposed build-out at MKE.

6.2.16. Therefore, it is considered more appropriate and accurate to assess the development against the 2031 future year. This is because this time period reflects the full Local Plan build-out, would be 10-years beyond planning submission and would be 6+ Years beyond the first occupation at the site.

6.2.17. The key planning test is a theoretical exercise to fulfil the planning requirements of the development. It is acknowledged that even with an accelerated build out, the MKE development is unlikely to be fully completed by 2031. However, the MKE allocation is included and accounted for, at a strategic level, in the MK 2031 Local Plan. It has been discussed with MKC officers that work is due to start on preparation of the next Local Plan, that will consider the future and aspirational growth in the MK area further, including where strategic infrastructure or mitigation measures may be required.

6.2.18. The key planning test, creating an alternative 2031 Do Something test (including full build-out) was undertaken within the MKMMM such that any potential re-routeing of 2031 Do Minimum traffic resulting from the introduction of the new infrastructure is fully accounted for.

6.2.19. To ensure that the impacts at J14 and Northfields are adequately assessed, the demand from the full development (equivalent to the total development flows at 2048) was added to the 2031 DM flows. As a result, two planning tests have been completed:

- 2031 Do Min and 2031 Key Planning Test (DM + Full MKE Development and Infrastructure) Compared; and
- 2031 Do Min and 2031 Key Planning Test (DM + Full MKE Development and Infrastructure) Compared – Sensitivity Test (for information).

6.2.20. These outputs will be used primarily within the Paramics modelling platform, but will also be used to review certain key junctions across the MK network. The additional supplemental information is provided in Technical Note PTN1 (Appendix M of this TA).

6.3. TRIP GENERATION

6.3.1. Whilst it was agreed between MKC and WSP for the HIF application that the MKMMM would be used as a consistent basis for the HIF-specific modelling runs, the highway impacts of the proposed MKE development are proposed to be assessed using bespoke trip rates and future years applied to the MKMMM. This would ensure that the proposed infrastructure is adequate to accommodate forecast demand associated with the proposals.

6.3.2. Whilst TTN7 (Appendix A.7) provides further details on the final modelling inputs used within the MKMMM scenarios, the rationale behind the future years and their associated trip rate assumptions have also been set out in a separate Trip Generation Note (TTN3), attached within Appendix A.3.

6.3.3. The Trip Generation TTN3 discusses how to implement an assessment of the proposed MKE development based on a traditional methodology and methodology that embraces future mobility strategies, design and targets. The scenarios that are set out in TTN3 are:

A. **2031 with Development Scenario – traditional methodology** (i.e. the scheme forecast derived under the traditional trip generation analysis comprising scheme vehicular trip generation + 2031 committed development);
B. **2031 with Development Scenario – Future Mobility Scenario** vehicular forecasts applied to 2031 Mobility Masterplanning scenario to form interim year test;
C. **2048 with Development Scenario – traditional methodology** (similar to 2031, but with a bespoke future year + committed development; and
D. **2048 with Development Scenario – Future Mobility Scenario** – 2048 with Development Scenario forecasts applied to relevant Mobility Masterplanning scenario to represent the total build-out scenario.

6.3.4. As outlined above, TTN3 sets out two methodologies. A 'traditional' approach that focuses on applying current mode shares to forecast trip generation and a 'Future Mobility' approach that looks at emerging technologies and the uptake of shared mobility. As such, the traditional methodology trip outputs are shown for information, but are considered to be a sensitivity test that are effectively superseded by the Future mobility approach.

6.3.5. It should be noted that neither approach considers the use of MRT of P&R facilities, and so remains private vehicle focused. However, as agreed with MKC, the assessments in this TA have been based on the Future Mobility with development tests (B and D) assessed against the relevant reference cases (2031 and 2048).

DIFFERENCES BETWEEN THE TRIP GENERATION APPROACHES

6.3.6. TTN3 provided a summary of the difference in approach between the traditional focused assessment and those partially accounting for Future Mobility trends.

Future Mobility

6.3.7. It is important to consider how travel will change in the future and incorporate it into the forecasts. The increasing digitisation of society, with connected and autonomous technologies, zero-emission vehicles, shared service models, and new forms of electronic payment, are already causing disruption and blurring the boundaries of traditional transport modes.

6.3.8. As it is envisaged that full build-out of the proposed development is not likely to be completed until some time, currently assumed as 2048, it is essential to consider the evolving transportation landscape and how this may affect the future vehicular and parking infrastructure requirements across the site. This is a key consideration to ensure that proposals are future-facing.

6.3.9. With that in mind, the masterplan and supporting analysis has considered the emerging megatrends related to new mobility, which impacts our society and highlights user's future needs for travel. These trends are key considerations when designing for the future.

6.3.10. For example, emerging trends away from diesel and petrol propulsion, as seen through policy initiatives in places like Paris and London, the consideration of Low and Ultra Low Emission Zones, the phasing out of diesel rail vehicles and increasing levels of research into greener fuels and technologies for ships, coupled with commercially viable environmentally alternatives, could see reductions start to occur as the vehicle fleet changes. This uptake is especially observed in Milton Keynes, for instance.

6.3.11. The development has been designed to ensure that the provision for public transport, mobility services and layout (such as increased car sharing/opportunities for taxi and shared mobility) result in the MKE scheme being Future Ready, i.e. a scheme design that is resilient and can accommodate likely potential future mobility scenarios through to 2048. The resultant outcome is incrementally realised throughout the build period as new technologies and mobility services are introduced and adopted, and emerging technologies and mobility services come forwards over time.

6.3.12. Flexibility is key within the final design, particularly to recognise several probable mobility futures. There are significant changes in the short-medium term from electrification and from new mobility business models, which will influence how people access private or shared mobility. A very different set of impacts will subsequently arrive from the likely penetration of autonomous vehicles within the vehicle fleet.

6.3.13. These forecasts can be attributed to:

- Initially, the continued evolution of new mobility business models will increase the breadth of mobility services available and offer a viable alternative to personal vehicle ownership. These mobility business models capitalise on the ability to match customers and trips in real-time to offer customers a more personalised form of mobility:
  - Ride Sharing – Schemes/digital platforms that match drivers and passengers who share similar destinations. These operate at both individual and corporation levels. E.g. ViaVan's operations in Milton Keynes since its launch in 2018, which include a new ride-sharing trial where concessionary bus passes can be used as payment for ViaVan trips (for old age pensioners and disabled people).
  - Ride Sourcing – Real-time, dynamic allocation of customers to drivers based on origin and destination and payment services using pre-approved accounts. Usually, rides are in private hire vehicles. However, the increasing offering of micro-transit vehicles to use operating model, e.g. Uber, is operational in the Milton Keynes area.
  - Car Sharing – On-demand short-term car rentals with the vehicle owned and managed by a fleet operator or private individual. E.g. Enterprise Car Club, as available in locations across Milton Keynes, including Newport Pagnell, Pineham and Bletchley.

- The emergence of Mobility as a Service (MaaS) schemes, which unlock the use and adoption of both shared and public transport through seamless and personalised information, reservation, booking and payments integration. e.g. Initially Whim (in Birmingham) and, more recently, CityMapper (in London).
- Lastly, the adoption of increasingly automated connected and autonomous vehicles enabling travellers to migrate to shared potentially cheaper to operate/use assets; they also provide door-to-door transport whilst providing access on a personal or shared basis. These advances are expected to be commercially deployed at scale within private hire and city taxi fleets from 2025-2030.

6.3.14. Recent changes in government policy support an increased ridership in buses, which will be complemented by several different forms of shared mobility options. An example is micro-transit services, such as those already being offered by Uber Pool services, classified as Light Duty Vehicles (having fewer than 16 seats) and offering more on-demand and personalised mobility in comparison with conventional bus services.

6.3.15. WSP has approached mobility providers regarding the services and offers that could be included in the proposed MKE development to understand their business models, plans, appetite for serving the site, etc. A selected number of mobility providers offered their initial views, and these responses are included in Appendix J.

6.3.16. Reviewing these strategies within MKE will ensure that the site provides the infrastructure in line with expected trends and ensures that supporting schemes and designs are in place from the beginning of the project.

DIFFERENCES IN TRIP GENERATION

6.3.17. The updated summary reflecting the latest position in terms of development quantum tested is provided below for ease of review. As such, there are differences in those values presented in TTN3. The data presented below supersede the values in TTN3. However, the approach to assessment and principles set out remain unchanged.

6.3.18. The numbers focus on the change from private vehicle to shared mobility services whilst keeping other modes constant. In reality, sustainable modes will be promoted, as shown in the Travel Plans that will increase the uptake of cycling, walking and public transport modes. Please note that the numbers below represent the trip generation for the residential units and the employment land uses only. As discussed in 6.3.35, within the modelling, additional trips were included to account for the secondary school jobs and the community hub jobs, ensuring a robust approach was applied.

TOTAL MASTERPLAN – 2031

6.3.19. Table 6-2 below presents the traditional methodology trips, using the future mobility mode classifications, with Table 6-3 showing the total masterplan trips if a Future Mobility approach were adopted. Table 6-4 outlines the total difference between the approaches in the 2031 year.

Table 6-2 – 2031 – Total Masterplan, Traditional Methodology Trips

Masterplan - unadjusted	AM Peak			PM Peak		
	Arr	Dep	2way	Arr	Dep	2way
Work mainly at or from home	*14*	*50*	*65*	*73*	*41*	*114*
Underground, metro, light rail, tram	*6*	*1*	*7*	*2*	*1*	*2*
Train	*81*	*17*	*98*	*29*	*85*	*115*
Privately Owned Vehicle	**864**	**631**	**1495**	**666**	**983**	**1649**
Shared Mobility	**111**	**134**	**244**	**100**	**112**	**212**
Bicycle	*34*	*32*	*66*	*31*	*42*	*74*
On foot	*145*	*335*	*480*	*70*	*91*	*161*
Other method of travel to work	*2*	*7*	*8*	*3*	*1*	*4*
Total	**1258**	**1207**	**2464**	**973**	**1357**	**2330**

Table 6-3 – 2031 – Total Masterplan, accounting for Future Mobility Trips

Masterplan – adjusted / FM Scenario	AM Peak			PM Peak		
	Arr	Dep	2way	Arr	Dep	2way
Work mainly at or from home	*14*	*50*	*65*	*73*	*41*	*114*
Underground, metro, light rail, tram	*6*	*1*	*7*	*2*	*1*	*2*
Train	*81*	*17*	*98*	*29*	*85*	*115*
Privately Owned Vehicle	**811**	**505**	**1316**	**486**	**865**	**1351**
Shared Mobility	**146**	**286**	**433**	**293**	**207**	**500**
Bicycle	*34*	*32*	*66*	*31*	*42*	*74*
On foot	*145*	*335*	*480*	*70*	*91*	*161*
Other method of travel to work	*2*	*7*	*8*	*3*	*1*	*4*
Total	**1240**	**1235**	**2474**	**986**	**1335**	**2320**

Table 6-4 – 2031 – Total Masterplan - Difference

Difference – Traditional versus FM scenario	AM Peak			PM Peak		
	Arr	Dep	2way	Arr	Dep	2way
Work mainly at or from home	*0*	*0*	*0*	*0*	*0*	*0*
Underground, metro, light rail, tram	*0*	*0*	*0*	*0*	*0*	*0*
Train	*0*	*0*	*0*	*0*	*0*	*0*
Privately Owned Vehicle	**-54**	**-125**	**-179**	**-181**	**-118**	**-298**
Shared Mobility	**36**	**153**	**189**	**193**	**95**	**288**
Bicycle	*0*	*0*	*0*	*0*	*0*	*0*
On foot	*0*	*0*	*0*	*0*	*0*	*0*
Other method of travel to work	*0*	*0*	*0*	*0*	*0*	*0*
Total Difference	**-18**	**28**	**10**	**13**	**-23**	**-10**

6.3.20. Adopting a Future Mobility based approach shifts approximately 180 and 300 two way private vehicle trips onto shared mobility modes. The number of trips across the development does not materially change, but what modes those trip use shift.

TOTAL MASTERPLAN – 2048

6.3.21. Table 6-5 below presents the traditional methodology trips, using the future mobility mode classifications for the full build-out 2048 year, with Table 6-6 showing the total masterplan trips if a Future Mobility approach were to be adopted. Table 6-7 outlines the total difference between the approaches in the 2048 year.

Table 6-5 - 2048 – Total Masterplan, Traditional Methodology Trips

Masterplan (unadjusted)- 2048	AM Peak			PM Peak		
	Arr	Dep	2way	Arr	Dep	2way
Work mainly at or from home	*57*	*199*	*256*	*289*	*161*	*450*
Underground, metro, light rail, tram	*12*	*4*	*16*	*6*	*3*	*10*
Train	*187*	*67*	*254*	*101*	*214*	*315*
Privately Owned Vehicle	**1926**	**2149**	**4075**	**2271**	**2461**	**4732**
Shared Mobility	**288**	**515**	**803**	**362**	**313**	**675**
Bicycle	*86*	*124*	*210*	*107*	*110*	*218*
On foot	*479*	*1318*	*1797*	*266*	*256*	*522*
Other method of travel to work	*7*	*26*	*34*	*10*	*6*	*16*
Total	**3042**	**4403**	**7445**	**3412**	**3525**	**6938**

Table 6-6 - 2048 – Total Masterplan, accounting for Future Mobility Trips

Masterplan (FM Scenario)- 2048	AM Peak			PM Peak		
	Arr	Dep	2way	Arr	Dep	2way
Work mainly at or from home	*57*	*199*	*256*	*289*	*161*	*450*
Underground, metro, light rail, tram	*12*	*4*	*16*	*6*	*3*	*10*
Train	*187*	*67*	*254*	*101*	*214*	*315*
Privately Owned Vehicle	**1619**	**1431**	**3050**	**1235**	**1789**	**3023**
Shared Mobility	**528**	**1323**	**1851**	**1451**	**910**	**2361**
Bicycle	*86*	*124*	*210*	*107*	*110*	*218*
On foot	*479*	*1318*	*1797*	*266*	*256*	*522*
Other method of travel to work	*7*	*26*	*34*	*10*	*6*	*16*
Total	**2975**	**4493**	**7468**	**3466**	**3449**	**6915**

Table 6-7 - 2048 – Total Masterplan, Difference

Difference 2048 – Unadjusted versus FM scenario	AM Peak			PM Peak		
	Arr	Dep	2way	Arr	Dep	2way
Work mainly at or from home	*0*	*0*	*0*	*0*	*0*	*0*
Underground, metro, light rail, tram	*0*	*0*	*0*	*0*	*0*	*0*
Train	*0*	*0*	*0*	*0*	*0*	*0*
Privately Owned Vehicle	**-307**	**-718**	**-1025**	**-1036**	**-673**	**-1709**
Shared Mobility	**240**	**808**	**1048**	**1090**	**596**	**1686**
Bicycle	*0*	*0*	*0*	*0*	*0*	*0*
On foot	*0*	*0*	*0*	*0*	*0*	*0*
Other method of travel to work	*0*	*0*	*0*	*0*	*0*	*0*
Total Difference	**-67**	**90**	**23**	**54**	**-76**	**-23**

6.3.22. In 2048, the adoption of future mobility trends shows that there could be a shift away from the private vehicle onto shared mobility in the region of 1,000 and 1,700 two way trips in the AM and PM peaks respectively. As with the 2031 analysis, the total trips do not materially change overall, but how people travel adjusts.

6.3.23. It should be noted that neither the 2031 or 2048 analysis considers the MRT or P&R potential influence on modal choice.

6.3.24. Therefore, as discussed above, as the MKMMM is primarily a vehicular based model (whilst it also has a public transport model within it, the adjustments in the analysis have been applied to the vehicular trips), the differences shown are naturally focused on vehicular movements.

6.3.25. As shown in the Travel Plan, promotion of walking, cycling and public transport will be prioritised. Therefore, it is likely that these modes will see greater changes as the development evolves.

COMMENTS ON TRIP GENERATION APPROACH

6.3.26. The Trip Generation TTN3 note was issued to both MKC and Highways England for comment and review. As outlined in Section 1, MKC have signed off on the use of the trip generation within the modelling and accept its use in the assessments.

6.3.27. Highways England have provided further comments on the trip generation assumptions applied. This was set out in AECOMs TN08, provided by Highways England on 07 January 2021. Table 6-8 below summarises the latest comments received by Highways England (related explicitly to Trip Generation, as TN08 also included elements in relation to the TA scoping). Response to initial queries from Highways England was provided as TTN3.1, also in Appendix A.3. A further response and information are included in TTN3.2, also located within Appendix A.3.

Table 6-8 – Highways England Comments (TN08 - Trip Generation comments only)

Ref	Comment / Area	Response
AECOM agrees to the following responses provided in WSP's TTN3.1:		
1	TA should demonstrate the differences in terms of trip generation between the two methodologies identified in TTN3.	TTN3 provides a comparison in the trip generation methodologies and numbers. TTN3.1 also sets out additional information. The differences were reviewed by Highways England and represent an average 11% peak period mode shift to future mobility modes by 2031 and a 20% shift by 2048. This is considered a reasonable target given that Travel Plan mode shift targets typically seek to achieve a 20% reduction in single-occupancy peak hour vehicle trips within the first five years post-occupation.
2	The TA and other supporting documentation should outline all the specific sustainable infrastructure to be delivered along with its corresponding phasing schedule.	See Section 11 and TTN's 8,9, 10 and 11 that set out the supporting Walking and Cycling, PRoW and parking strategies for the site. Please also see the Residential and Workplace Travel Plans that provide further information on what measures can be adopted and the monitoring strategy and implementation for the site. The Public Transport Strategy document also sets out the proposals for the site, included dedicated bus services, changes to existing services and the implementation of Demand Responsive Travel (DRT).
3	No further adjustment is taken into account from either the travel plans or the MRT & PR for robustness purposes.	Agreed, and no further amendment has been applied.
4	TRICS trip rate output files are to be appended to the TA.	See Appendix N of this TA.
5	The methodology of using multi-modal trip rates and census data in determining vehicular trips and non-vehicular trips is accepted.	Noted. For reference, this is set out within TTN3.
6	An approach in which internalisation is not applied to trips associated with employment uses is accepted.	Noted. For reference, this is set out within TTN3.
7	An evidence-based approach of selecting appropriate surrounding MSOAs to provide a comparison with the proposed development is accepted.	Noted. For reference, this is set out within TTN3.
8	Internalisation factor of 73% for Education and Escort Education once the site is fully built out and occupied is accepted.	Noted. For reference, this is set out within TTN3.
9	Journey purpose - holiday/day trip/other, no internalisation factor was applied. AECOM agrees with this proposed assumption.	Noted. For reference, this is set out within TTN3.

Recommendations regarded as critical to the acceptability of the upcoming Transport Assessment associated with WSP's TTN3.1:		
10	AECOM generally agree with the proposed approach for using the identified multi-modal trip rates. Nonetheless, it is recommended that the proposed Gross Floor Area (GFA) per development type	Please see additional text in Section 5 and Table 6.9 below.
11	Recommended that, for a consistent and robust approach, the average of all the selected MSOA's used to define the mode share percentage is used instead, or that additional evidence is provided to confirm that a percentage towards the upper end of the range, e.g. 15%, is appropriate.	Please see additional text in TTN3.2, in Appendix A-3.
12	The evidence-based justification that 'a third' adopted for the Shopping internalisation factor is a reasonable assumption is provided.	Please see additional text in TTN3.2, in Appendix A-3.
13	The evidence-based justification that 25% of trips adopted for 'other work, other escort and personal business' internalisation factor is a reasonable assumption is provided	Please see additional text in TTN3.2, in Appendix A-3.
14	The evidence-based justification that 20% internalisation factor adopted for visiting friends/entertainment/sports is a reasonable assumption is provided	Please see additional text in TTN3.2, in Appendix A-3.

DEVELOPMENT TESTED IN THE MKMMM

6.3.28. The trajectory and phasing of the development with the split of houses in 2031 and 2048 used in the modelling are shown in Table 6-9 below. The employment uses for each future year have also been provided.

Table 6-9 – MKE Development 2031 and 2048 Assumptions

Land Use	Type	MKE - 2031	MKE - 2048
Residential	Mixed Houses / Apartments – private	1,001	3,968
	Mixed Houses / Apartments – affordable	450	1,783
	TOTAL	*1,450*	*5,750**
Employment	B1a	16,387 m²	37,161 m²
	B1c / B2**	40,967 m²	92,903 m²
	B8***	201,938 m²	354,889 m²
	TOTAL	*259,292 m²*	*484,954 m²*

**Updated post submission of TN3*

***Assumed as B2*

****Combined Segro and Berkeley (full allocation)*

6.3.29. It should be noted that as the modelling tests the whole allocation, the employment elements included in the modelling are different from those set out in the parameter plans. However, for clarity, with regards to the Berkeley site, the worst-case assumptions in terms of traffic generation have been applied.

- Berkeley Site - Employment Total floorspace (GIA): 4,345,000 sq ft (403,650 m2), of which:
  - Max 400,000 sq ft (37,160m2) Class E (Offices/Light Industrial)
  - Max 1,000,000 sq ft (92,900 m2) B2
  - Max 4,345,000 sq ft (403,650 m2) B8

6.3.30. Subsequently, the traffic modelling worst-case scenario would be:

- 400,000 sq ft Class E (Offices / Light Industrial);
- 1,000,000 sq ft B2; and
- 2,945,000 sq ft B8.

6.3.31. The above assumptions have been included in the modelling.

6.3.32. It should be noted that the parameter plans allow for flexibility on site. As such, the development could also implement full (4,345,000 sq ft) of B8 use (with 250,000 sq ft ancillary offices). As B8/warehousing units will generate less traffic than other office uses, this would result in less traffic being generated by the proposed MKE development.

6.3.33. As part of the Stage 3 modelling (with development tests), an allowance has also been made to account for the jobs generated by the Community Hub and the Secondary School:

- Community Hub – 50 jobs; and
- Secondary School – 250 jobs (with 50% of trips being external)

6.3.34. The above is considered a robust inclusion in terms of additional vehicular demand on the network. It is likely that a number of the jobs both in the Community and Schools would be served by those living close, and it is not considered that a high number would be from external zones. For the purposes of the modelling, though, the Community Hub trips have been added, and half of the Secondary School trips have been added. These are on top of the residential and other employment trips previously set out in TTN3.

Further evidence on Internalisation

6.3.35. The points raised by Highways England are acknowledged. However, given the large scale employment and leisure opportunities proposed at MKE, it is considered that there is an opportunity for internal trips to be accommodated. To provide Highways England with further information, TTN3.2, in Appendix A.3, provides evidence to justify the assumptions applied.

6.4. TRIP DISTRIBUTION AND ASSIGNMENT

6.4.1. The distribution and assignment of the traffic generated by the proposed MKE development have been undertaken using the variable demand calculations in the MKMMM. It is understood that the default position is to use the existing base year zone distributions in the model for the forecasts unless there are zero trips, in which case the distribution is based on a gravity model.

6.4.2. Given the minimal number of base year trips in the MKMMM zones representing the MKE location, which may not necessarily represent the proposed development, it is proposed to override the MKMMM zoning and use the gravity model used instead.

6.4.3. The gravity model uses calibrated functions developed for the base year matrices (trip-length profiles) to estimate a trip distribution based on available attractions. This ensures that the distribution for the development is not swayed by existing zones (that have little or no development within them) and ensures that the distribution is a fair representation of a large-scale site.

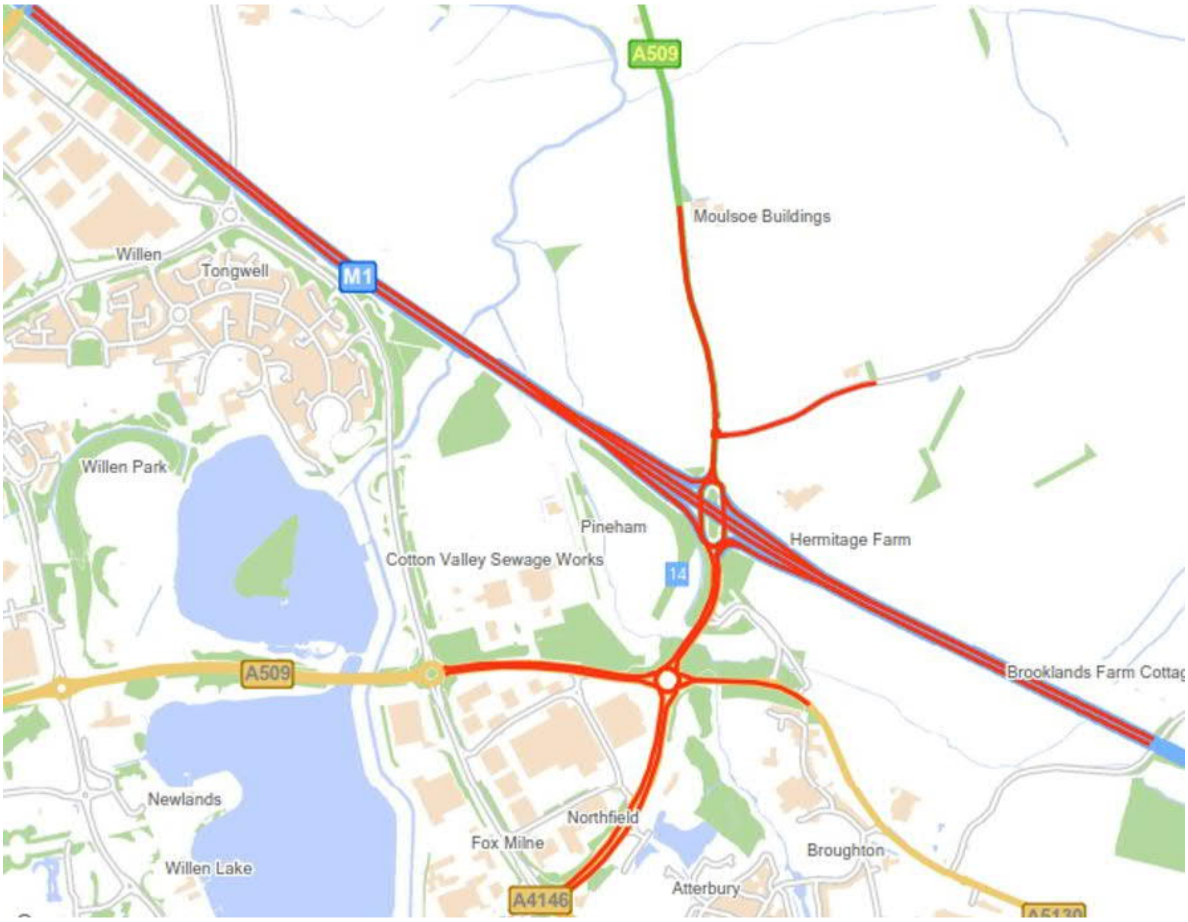
6.5. DETAILED MODELLING ASSESSMENTS

PARAMICS - M1 JUNCTION 14

6.5.1. As set out in TTN1, key junctions requiring further assessment include the M1 J14 and its interaction with Northfields Roundabout to the south and the new southernmost roundabout junction on the proposed eastern link road through the MKE site.

6.5.2. As part of the evidence-base used for the HIF analysis, Junction 14 of the M1 had been assessed within the microsimulation platform, Paramics, albeit the model at that stage was validated to a 2012 level. As discussed in TTN1, this platform continues to be used, but as with the update to the MKMMM, new traffic survey data has been used to update and re-validate the model. The baseline Paramics model covers the extent highlighted red in Diagram 6-3 below.

Diagram 6-3 – Paramics Study (Base) Extent



6.5.3. The Paramics model uses the outputs from the MKMMM and applies the extracted flows to the calibrated and validated base year Paramics model in the assessment of the future year scenarios.

6.5.4. The future Do Something Paramics modelling covers a similar extent but also includes the new development roundabout north of the M1 J14.

6.5.5. The base model local model validation report (LMVR) and associated update notes for the Paramics have been issued to MKC and Highways England and are contained in Appendix L.

6.6. LOCAL JUNCTION ASSESSMENT METHODOLOGY

6.6.1. This section of the TA details the assessment methodology for the junctions on the local highway network.

6.6.2. An assessment of the outputs from the MKMMM model runs was undertaken to identify those off-site junctions deemed to require further review and assessment as part of the modelling process. These include:

- M1 J14;
- Northfields Roundabout;
- Tongwell Street Roundabout;
- Willen Road Roundabout;
- Pagoda Roundabout;
- Woolstone Roundabout;
- Blakelands Roundabout;
- Fox Milne;
- Pineham Roundabout;
- Renny Lodge Roundabout;
- Tickford Roundabout; and
- Marsh End Roundabout.

6.6.3. In addition to the above, and following previous meetings with Highways England in February 2019, discussions outlined that the M1 J13 should also be reviewed as part of any forthcoming application in terms of percentage impacts. The M1 J13 is located approximately 7.5km south-east of J14, and whilst it is not envisaged that traffic from MKE will utilise J13 (in terms of merge or diverge and internal movements), it is important that the development adequately assesses the junction in terms of potential impacts. As such, a link flow comparison with and without the MKE development has been completed.

6.6.4. Following the review of the MKMMM outputs, the junction list for further assessments was issued to MKC, and it is described in detail in Section 9.3. As agreed, the junctions have been subject to individual modelling to determine development impact, employing Junctions 9/LinSig software except for J14 and Northfields, which, as set out previously, have been assessed using Paramics.

7. HIGHWAY NETWORK – BASELINE CONDITIONS

7.1. INTRODUCTION

7.1.1. This section of the TA provides an indication of current baseline conditions at the key junctions highlighted in Chapter 6.

7.1.2. The outputs have utilised the recalibrated 2016 MKMMM base year outputs. The baseline tests indicate what junctions perform within theoretical capacity levels and those already under stress or constraint.

7.2. SOFTWARE AND JUNCTION VALIDATION

PRIORITY CONTROLLED JUNCTION ASSESSMENT

7.2.1. Priority-controlled junctions on the local highway network have been assessed using the industry-standard Junctions 9 software package, with the Demand Data Type option set to One Hour. When reviewing Junctions 9 outputs, it is essential to note that it is generally accepted that a junction is approaching capacity and will begin to display characteristics indicating delay when the Ratio of Flow to Capacity (RFC) of one or more of the arms exceeds 0.85. However, it is important to note that this does not indicate that the junction is at capacity, more that instability has a greater chance of occurring as the RFC approaches 1.0. The maximum queue is displayed in Passenger Car Units (PCU) and is rounded from the Junctions 9 output to the nearest PCU.

SIGNAL CONTROLLED JUNCTION ASSESSMENT

7.2.2. The signal-controlled junctions have been assessed using the industry-standard LinSig signal junction assessment software. The LinSig modelling provides forecasts of queue lengths, the Degree of Saturation (DoS) and the Practical Reserve Capacity (PRC) of a junction. The DoS is a ratio of demand to capacity on each approach to the junction, with a value of 100%, meaning that demand and capacity are equal and no additional traffic can progress through the junction. The design capacity of a junction is typically a DoS of 90%. Above 90%, characteristics indicating delay may be seen.

7.2.3. The overall junction performance is considered in terms of the Practical Reserve Capacity (PRC). A positive PRC indicates that a junction has spare capacity and may be able to accept more traffic. A negative PRC indicates that the junction is exceeding its capacity.

LOCAL JUNCTION VALIDATION PROCESS

7.2.4. The local junction models baseline conditions have been validated against the 2019 survey data where possible. The geometries have been taken from OS data, plus supplementary topographical information where available and aerial information. The measurements of the geometry used in the assessments and the assessments themselves are provided within Appendix O. Figure 7 shows the junctions considered.

7.2.5. The validation process ensures that the junctions reflect surveyed conditions. The use of the 2019 survey data, which included queue surveys at one-minute intervals, ensures that the tested models reflect current (pre-COVID 19 pandemic) traffic patterns and provide a suitable basis for future years testing.

7.3. E1 - BLAKELANDS ROUNDABOUT

7.3.1. Blakelands Roundabout was assessed f for the 2016 baseline scenario. The results of the 2016 AM and PM peak hour assessments are summarised in Table 7-1 below.

Table 7-1 – Blakelands Roundabout –AM / PM Peak Hour – 2016 MKMMM base

Arm	2016	
	RFC	MAX Q
AM Peak		
A - Brickhill St (N)	0.78	4
B - Monks Way (E)	0.82	5
C - Brickhill St (S)	0.85	5
D - Monks Way (W)	0.72	3
PM Peak		
A - Brickhill St (N)	0.75	3
B - Monks Way (E)	0.48	1
C - Brickhill St (S)	0.90	8
D - Monks Way (W)	0.88	7

Source: Junctions 9 results

7.3.2. The assessment outlines that the junction is forecast to be approaching its theoretical operational capacity using the 2016 baseline flows. In both the AM and PM peaks, certain arms are either at 0.85 RFC or above, albeit queue lengths are relatively short. The RFC may indicate that the junction may not accommodate much further growth in traffic in the future year scenarios subject to the impact on queueing. In the AM peak, Brickhill Street South is forecast to operate with a 0.85 RFC, whereas in the PM peak, Brickhill Street South and Monks Way West are shown to operate with RFC's of 0.90 and 0.88 respectively.

7.4. E2 - WILLEN ROUNDABOUT

7.4.1. Willen Roundabout was assessed for the 2016 baseline scenario. The results of the AM and PM peak hour assessments are summarised in Table 7-2 below.

Table 7-2 – Willen Roundabout – AM / PM Peak Hour – 2016 MKMMM base

Arm	2016	
	RFC	MAX Q
AM Peak		
A - Brickhill St (N)	0.72	3
B - Dansteed Way (E)	0.40	1
C - Brickhill St (S)	0.56	1
D - Dansteed Way (W)	0.52	1

PM Peak		
A - Brickhill St (N)	0.79	4
B - Dansteed Way (E)	0.26	0
C - Brickhill St (S)	0.46	1
D - Dansteed Way (W)	0.43	1

Source: Junctions 9 results

7.4.2. From the assessment results outlined in Table 7-2 above, it is evident that Willen Roundabout is forecast to operate with residual capacity in both the AM and PM peaks. Whilst the model flows show that Brickhill St (N) experiences the highest RFC, this is still under capacity thresholds, with a minimal queuing forecast.

7.5. E3 - PAGODA ROUNDABOUT

7.5.1. Pagoda Roundabout was assessed for the 2016 baseline scenario. The results of the AM and PM peak hour assessments are summarised in Table 7-3 below.

Table 7-3 - Pagoda Roundabout – AM / PM Peak Hour – 2016 MKMMM Base

Arm	2016	
	RFC	MAX Q
AM Peak		
A - Brickhill St (N)	0.95	14
B - A509 Portway (E)	0.91	10
C - Brickhill St (S)	0.82	4
D - A509 Portway (W)	0.48	1
PM Peak		
A - Brickhill St (N)	0.94	10
B - A509 Portway (E)	0.62	2
C - Brickhill St (S)	0.67	2
D - A509 Portway (W)	0.83	5

Source: Junctions 9 results

7.5.2. From the assessment results outlined in Table 7-3 above, it is evident that Pagoda Roundabout is forecast to operate close to its theoretical operational capacity in both peak hours. Brickhill St (N) is shown to result in RFC of 0.95 and 0.94 in the AM and PM peaks respectively, albeit the queue lengths are relatively modest with queues of 14 and 10 vehicles in those peak hours respectively.

7.6. E4 - WOOLSTONE ROUNDABOUT

7.6.1. The results of the AM and PM peak hour assessments for Woolstone Roundabout are summarised in Table 7-4 below.

Table 7-4 – Woolstone Roundabout – AM / PM Peak Hour – 2016 MKMMM base

Arm	2016 MKMMM Base	
	RFC	MAX Q
AM Peak		
A - Brickhill St (N)	0.59	2
B - Childs Way (E)	0.85	6
C - Brickhill St (S)	0.67	2
D - Childs Way (W)	0.36	1
PM Peak		
A - Brickhill St (N)	0.82	4
B - Childs Way (E)	0.60	2
C - Brickhill St (S)	0.62	2
D - Childs Way (W)	0.78	4

Source: Junctions 9 results

7.6.2. From the results, it is evident that Woolstone Roundabout is forecast to operate within its theoretical operational capacity on most arms in the AM, albeit Childs Way (E) is approaching a 0.85 RFC.

7.6.3. In the PM peak hour, whilst all arms are under 0.85 RFC, Brickhill St (N) is shown to be approaching that operational threshold, with an RFC of 0.82. However, queues in both peak hours are small.

7.7. E5 - MARSH END ROUNDABOUT

7.7.1. Marsh End Roundabout was assessed for the 2016 baseline scenario. The results of the AM and PM peak hour assessments are summarised in Table 7-5 below.

Table 7-5 – Marsh End Roundabout – AM / PM Peak Hour – 2016 MKMMM base

Arm	2016 MKMMM base	
	RFC	MAX Q
AM Peak		
A - Willen Road (N)	1.18	109
B - A422	1.01	39
C - Willen Road (S)	0.71	2
D - Monks Way	0.53	1
PM Peak		
A - Willen Road (N)	0.71	2
B - A422	0.55	1
C - Willen Road (S)	0.99	20
D - Monks Way	0.99	23

Source: Junctions 9 results

7.7.2. From the assessment results outlined in Table 7-5 above, it is evident that Marsh End Roundabout is forecast to operate beyond its theoretical operational capacity in both peak hours. In the AM peak, Willen Road (N) and the A422 are forecast to operate above capacity with RFCs over 1.0. It is clear that these higher RFCs then cause instability, with high maximum queues recorded on Willen Road (N). In the PM peak, Willen Road South and D Monks Way are forecast to operate close to their maximum capacity, with both arms recording RFCs of 0.99.

7.8. E6 - TONGWELL ROUNDABOUT

7.8.1. Tongwell Roundabout was assessed for the 2016 baseline scenario. The results of the AM and PM peak hour assessments are summarised in Table 7-6 below.

Table 7-6 – Tongwell Roundabout – AM / PM Peak Hour – 2016 MKMMM Base

Arm	2016 MKMMM base	
	RFC	MAX Q
AM Peak		
A - Willen Rd	0.83	5
B - Tongwell St	0.56	1
C - Dansteed Way	0.15	0
D - Michigan Dr	0.07	0
PM Peak		
A - Willen Rd	0.38	1
B - Tongwell St	0.26	0
C - Dansteed Way	0.49	1
D - Michigan Dr	0.25	0

Source: Junctions 9 results

7.8.2. From the 2016 baseline assessment results outlined in Table 7-6 above, it is evident that Tongwell Roundabout is forecast to operate within its theoretical operational capacity in both the AM and PM peaks. No significant queuing is suggested, although, in the AM peak, Willen Road is shown to have the highest RFC of 0.83.

7.9. E7 - TICKFORD ROUNDABOUT

7.9.1. Tickford Roundabout was assessed for the 2016 baseline scenario. The results of the AM and PM peak hour assessments are summarised in Table 7-7 below.

Table 7-7 – Tickford Roundabout – AM / PM Peak Hour – 2016 MKMMM Base

Arm	2016 MKMMM base	
	RFC	MAX Q
AM Peak		
A - B256 London Rd	0.63	2
B - A509 (E)	0.72	3
C - A509 London Rd	0.51	1
D - A422	0.56	1
PM Peak		
A - B256 London Rd	0.54	1
B - A509 (E)	0.53	1
C - A509 London Rd	0.63	2
D - A422	0.89	8

Source: Junctions 9 results

7.9.2. From the assessment results outlined in Table 7-7 above, it is evident that Tickford Roundabout is forecast to operate within its theoretical operational capacity in the AM peak. In the PM peak, the A422 arm is shown to be approaching its capacity threshold, with an RFC of 0.89. However, queueing in both peaks is considered to be relatively short.

7.10. E8 - RENNY LODGE ROUNDABOUT

7.10.1. Renny Lodge Roundabout was assessed for the 2016 baseline scenario. The results of the AM and PM peak hour assessments are summarised in Table 7-8 below.

Table 7-8 – Renny Lodge Roundabout – AM / PM Peak Hour – 2016 MKMMM Base

Arm	2016 MKMMM base	
	RFC	MAX Q
AM Peak		
A - Renny Park Rd	0.07	0
B - A509 (E)	0.72	3
C - A509 (W)	0.32	1
PM Peak		
A - Renny Park Rd	0.37	1
B - A509 (E)	0.55	1
C - A509 (W)	0.65	2

Source: Junctions 9 results

7.10.2. From the assessment results outlined in Table 7-8 above, it is evident that Renny Lodge Roundabout is forecast to operate within its theoretical operational capacity in both the AM and PM peaks with low forecast queue lengths.

7.11. E9 - CARLETON GATE / TONGWELL STREET

7.11.1. The Carleton Gate/Tongwell Street priority-controlled T-junction was assessed for the 2016 baseline scenario. The results of the AM and PM peak hour assessments are summarised in Table 7-9 below.

Table 7-9 – Carleton Gate / Tongwell Priority Junction – AM / PM Peak Hour – 2016 MKMMM Base

Arm	2016 MKMMM base	
	RFC	MAX Q
AM Peak		
Carleton Gate to Tongwell Street (N)	0	0
Carleton Gate to Tongwell Street (S)	0.59	1
Tongwell Street (N)	0	0
PM Peak		
Carleton Gate to Tongwell Street (N)	0	0
Carleton Gate to Tongwell Street (S)	0.35	1
Tongwell Street (N)	0	0

Source: Junctions 9 results

7.11.2. From the assessment results outlined in Table 7-9 above, it is evident that the Carleton Gate/Tongwell Street T-junction is forecast to operate with spare capacity in both peak hours. The RFC calculated for the Carleton Gate to Tongwell Street (S) movement reflects motorists trying to exit the Willen Estate onto the fast-moving Tongwell Street and struggling to find gaps to make that manoeuvre safely. The associated queue with that movement is only a single vehicle in each of the peak hours.

7.12. E10 - PINEHAM ROUNDABOUT

7.12.1. Pineham Roundabout was assessed for the 2016 baseline scenario. The results of the AM and PM peak hour assessments are summarised in Table 7-10 below.

Table 7-10 – Pineham Roundabout – AM / PM Peak Hour – 2016 MKMMM Base

Arm	2016 MKMMM base	
	RFC	MAX Q
AM Peak		
A – Tongwell Street (N)	0.42	1
B – A509 (E)	0.80	4
C – Tongwell Street (S)	0.66	2
D – A509 (W)	0.54	1

PM Peak		
A – Tongwell Street (N)	0.67	2
B – A509 (E)	0.42	1
C – Tongwell Street (S)	0.68	2
D – A509 (W)	0.76	3

Source: Junctions 9 results

7.12.2. From the results of the assessment outlined in Table 7-10 above, it is evident that Pineham Roundabout is forecasting to perform within its theoretical operational capacity in the AM and PM peaks. In the AM peak hour, the A509 (E) approaches the threshold value of 0.85 (RFC of 0.80) but still operating with spare capacity. The junction operates with spare capacity on all arms in the PM peak. As with many of the junctions assessed, the queues in both peak periods are relatively short.

7.13. E 11 - FOX MILNE ROUNDABOUT

7.13.1. Fox Milne Roundabout was assessed for the 2016 baseline scenario. This is a signal-controlled junction, and as such, it has been assessed using LinSig. The results of the AM and PM peak hour assessments are summarised in Table 7-11 below.

Table 7-11 – Fox Milne Roundabout – AM / PM Peak Hour – 2016 MKMMM Base

Arm	2016 MKMMM base	
	DoS	MMQ
AM Peak		
V11 Tongwell Street (N) Left Ahead	49.7%	6
V11 Tongwell Street (N) Ahead	7.1%	1
H6 Childs Way (E) Left Ahead	103.4%	60
H6 Childs Way (E) Ahead	83.7%	7
H6 Childs Way (E) Ahead	83.2%	7
V11 Tongwell Street (S) Left Ahead	63.4%	7
V11 Tongwell Street (S) Ahead	74.4%	9
H6 Childs Way (W) Left Ahead	42.5%	2
H6 Childs Way (W) Ahead	22.5%	1
PM Peak		
V11 Tongwell Street (N) Left Ahead	79.4%	13
V11 Tongwell Street (N) Ahead	13.2%	1
H6 Childs Way (E) Left Ahead	57.4%	3
H6 Childs Way (E) Ahead	26.2%	0
H6 Childs Way (E) Ahead	24.4%	0
V11 Tongwell Street (S) Left Ahead	78.0%	7
V11 Tongwell Street (S) Ahead	76.3%	8
H6 Childs Way (W) Left Ahead	81.4%	8
H6 Childs Way (W) Ahead	41.0%	2

Source: LinSig results

7.13.2. From the results of the assessment outlined in Table 7-9 above, it is evident that the Fox Milne signals are over the theoretical operational capacity of the junction on the H6 arm in the AM peak, resulting in significant queues. The PM results indicate that the junction does not exhibit the same levels of demand. While some queues are observed, these suggest that the junction in the PM is operating with residual capacity. This is most likely due to the more dispersed nature of trips during the PM Peak hour, which tends to be less concentrated than in the AM Peak.

7.14. CHICHELEY HILL ROUNDABOUT

7.14.1. Chicheley Hill Roundabout was assessed for the 2016 baseline scenario. The results of the AM and PM peak hour assessments are summarised in Table 7-12 below.

Table 7-12 – Chicheley Hill Roundabout – AM / PM Peak Hour – 2016 MKMMM Base

Arm	2016 MKMMM base	
	RFC	MAX Q
AM Peak		
A - Chicheley Hill West	0.10	0
B - A509 North	0.52	1
C - A422 East	0.25	0
D - A509 South	0.33	1
PM Peak		
A - Chicheley Hill West	0.29	0
B - A509 North	0.52	1
C - A422 East	0.12	0
D - A509 South	0.57	1

Source: Junctions 9 results

7.14.2. From the results of the assessment outlined in Table 7-12 above, it is evident that Chicheley Hill Roundabout is forecast to perform within its theoretical operational capacity in the AM and PM peak with virtually no queuing.

7.15. PARAMICS BASELINE – LOCAL MODEL VALIDATION REPORT (LMVR)

7.15.1. The Paramics model, which covers the M1 J14, Northfields Roundabout and, in the baseline scenario, the Newport Road junction with the A509, uses the outputs from the MKMMM and applies the extracted flows to the calibrated and validated base year Paramics model in the assessment of the future year scenarios.

7.15.2. The base model LMVR for the Paramics has been issued to MKC and Highways England and is contained within Appendix L.

7.15.3. The LMVR and addendum notes conclude that, following amendments, the model validation statistics show an excellent journey time and queue length calibration and a very good journey time performance.

8. STRATEGIC MODELLING OUTPUTS

8.1. INTRODUCTION

8.1.1. This chapter sets out a summary of the strategic modelling undertaken, the assumptions applied in the future years, the various scenarios completed and a presentation of the overarching results across the MKC networks.

8.2. FUTURE YEAR GROWTH

8.2.1. TTN4 sets out the growth assumptions reviewed as part of the future year assessments, 2031 and 2048. This should be read in conjunction with AECOM TNs 29 and 30 that also set out how growth was applied within the MKMMM. These notes are contained within Appendix K.

8.2.2. It is acknowledged that 2048 represents a worst-case in terms of the build-out schedule. The assumptions applied over such a forecast period also result in a level of uncertainty that should be treated with caution. The future year assessments have focused on largely continued uptake of private vehicle use and do not explicitly consider other sustainable traffic strategies that MKC are seeking to deliver, such as the MRT or Park and Ride elements.

8.2.3. The future year traffic data and the growth assumptions (e.g. the sites and infrastructure) were agreed with MKC and their planning officers during the model build and were refined as recently as 2020. These cover, especially in 2031, all planned and committed developments (both residential and employment) up to the end of the MK Local Plan period 2031. Subsequently, Highways England have confirmed that they are content with the assumptions applied in the 2031 and 2048 future year reference case models.

8.2.4. Beyond 2031, specific growth data has been applied at certain sites, e.g. those that had information on the build-out post 2031 or failing that, Tempro growth factors were included to account for background and committed growth. The future year reference case models have been signed off by both MKC and Highways England for use in the assessments.

8.3. CORE RESULTS SUMMARY

8.3.1. AECOM TN 30 provides a review of the MKMMM strategic modelling outputs, assessing the future year without Development scenario (Do Minimum) and the future year with Development scenario (Do Something) for both the 2031 and 2048 assessed periods. It should be noted that the AECOM note primarily covers the Core modelling scenarios, but also includes commentary on the sensitivity and key planning tests (referred to a Sensitivity 2 tests in the AECOM report).

8.3.2. The future year traffic flows presented in AECOM TN 30 are considered to provide a robust estimate of the traffic flows likely to occur in the proposed MKE development in 2031 and 2048.

FUTURE YEAR DO MINIMUM – CORE RESULTS

8.3.3. With the introduction of committed growth and associated infrastructure, flows around MKC increase and, as such, begin to identify where specific areas in the Do Minimum scenario are under pressure, which can be seen when one looks at the ratio of Vehicles to Capacity (V/C). AECOM TN 30 sets out the Do Minimum (or reference case) outputs.

8.3.4. For example, in the 2031 AM peak period, the northbound and southbound approaches to Tickford Roundabout and Willen Road (southbound) is approximately 85% to 114% V/C. In the PM peak period, Tickford Roundabout, including the northbound and southbound approaches, are approximately 85% to 99% V/C and the eastbound approach is above 115% V/C.

8.3.5. The M1 junction 14 southbound off-slip is approximately 85% to 99% V/C, and the northbound off-slip is at approximately 100 to 114% capacity in the 2031 AM peak period. In the PM peak period, the southbound off-slip is between 85% to 99% V/C.

8.3.6. In the 2031 AM and PM peak periods at Tickford Roundabout, the average delay time (per vehicle) is greater than 90 seconds. In the AM peak period, the delay at the southbound and northbound off-slip at junction 14 of the M1 exceeds 90 seconds per vehicle. In the PM peak period, delay at the southbound M1 junction 14 off-slip is approximately 60 to 89 seconds per vehicle.

8.3.7. In the 2048 AM peak period, the average delay times at the Marsh End Roundabout, Tickford Roundabout and Tongwell Roundabout are all above 90 seconds per vehicle. The northbound and southbound off-slips at junction 14 on the M1 also increase to above 90 seconds per vehicle.

8.3.8. In the PM peak period, the average delay times are broadly consistent with the AM in the MKE development area.

8.3.9. Therefore, the Do Minimum outputs confirm that certain junctions will be operating over typical capacity thresholds before the introduction of the development.

MKE IMPACT – CORE RESULTS

Traffic Flows

8.3.10. AECOM TN30 provides a comparison between the 2031 and 2048 Do-Something flows with those of the 2031 and 2048 Reference Case (Do Minimum). A summary of TN30 is presented below.

8.3.11. In the 2031 and 2048 AM peak period, there is an increase in flow travelling towards Milton Keynes via the A509; approximately 400 PCUs in 2031 and 900 vehicles PCUs in 2048. Likewise, there is a decrease in traffic continuing on the A422 (via Tickford Roundabout) in the AM peak period; approximately 300 PCUs in 2031 and 400 PCUs in 2048.

8.3.12. This decrease can be attributed to vehicles travelling either via the eastern perimeter road of the MKE development, towards junction 14 on the M1 or via the proposed new bridge over the M1 resulting in an increase in traffic on Tongwell Street. Re-routing of traffic flows also see an increase in traffic travelling through Moulsoe on Newport Road.

8.3.13. On the A422 between Marsh End Roundabout and the A509, there is also a decrease in flow travelling away from Milton Keynes in the AM peak period in 2031 and 2048; approximately 200 PCUs in 2031 and 150 PCUs in 2048.

8.3.14. At Junction 14 of the M1, there is a moderate increase in northbound traffic leaving the M1; approximately 20 PCUs in 2031 and 50 PCUs in 2048.

8.3.15. In the 2031 and 2048 PM peak period, there is an increase in flow travelling away from Milton Keynes via the A509; approximately 600 PCUs in 2031 and 300 PCUs in 2048.

8.3.16. Similar to the AM peak period, there is a decrease in traffic on the A422 between the Marsh End Roundabout and the A509. Approximately 400 PCUs are travelling eastbound in 2031, and approximately 350 PCUs in 2048 and approximately 200 PCUs in 2031, and 250 PCUs in 2048 are travelling westbound.

8.3.17. In both the AM and PM peak periods in 2031 and 2048, there is a decrease in traffic using Willen Road in the Do-Something scenario and an increase in traffic using Tongwell Street. This can be attributed to the proposed new bridge, which Tongwell Street adjoins to. Further detail regarding traffic crossing over the M1 can be found below.

Delay Differences

8.3.18. In 2031 in both the AM and PM peak periods, there is an approximate 60-second reduction in delay (per vehicle) at Tickford Roundabout in the Do Something compared to the Do Minimum. In the AM peak, there is also a reduction of approximately 60 seconds (per vehicle) at the southbound approach on the Marsh End Roundabout and approximately 30 seconds (per vehicle) at Tongwell Roundabout.

8.3.19. In the 2031 PM peak period, there is an increase in delay at Marsh End Roundabout, approximately 30 seconds (per vehicle) at the eastbound approach when reviewed against the same Do Minimum time period. There is an increase in the delay time of approximately 30 seconds (per vehicle) at the M1 southbound junction 14 off-slip in the 2031 AM peak period and approximately 30 seconds on the northbound on-slip in the PM peak period.

8.3.20. In 2048 in the AM peak period, there is an increase in delay at both the southbound and northbound off-slips on the M1 at junction 14; approximately 70 seconds (per vehicle) southbound and approximately 30 seconds (per vehicle) northbound.

8.3.21. There is also a further reduction in delay time greater than 60 seconds (per vehicle) at Tickford Roundabout in both the AM and PM peak periods. There is an increase in delay time greater than 60 seconds (per vehicle) on the M1 junction 14 circulatory at the southbound off-slip exit in the PM peak period.

Vehicle Trips Crossing the M1

8.3.22. Table 8-1 and 8-2 below show the total flow (PCU) travelling inbound and outbound of Milton Keynes via the A422, Willen Road, the proposed new bridge (DS only) and Junction 14 on the M1 in the AM and PM peak periods in 2031 and 2048.

8.3.23. In both the AM and PM peak periods in 2031 and 2048, there is a reduction in traffic travelling towards Milton Keynes and travelling east of Milton Keynes via Willen Road. In the Do Minimum and Do-Something scenarios, the A422 attracts the highest level of flow, followed by Willen Road in the Reference Case and the proposed new bridge in the Do-Something scenario. This is because of the existing high level of demand, which already exists on the A422 crossing of the M1.

8.3.24. In the Do-Something scenario, there is a reduction in both the AM and PM peak periods in traffic travelling through Junction 14 towards Milton Keynes. In the Do-Something AM peak period (only), there is an increase in traffic travelling towards the MKE in 2031 and 2048. Table 8-1 below summarises the vehicular trips between the two scenarios (Do Minimum and Do Something) on key crossing points and links on the network. The movements have been split into two broad directions:

- Southbound to Central Milton Keynes (SB to CMK)
- Northbound to Milton Keynes East (NB to MKE).

Table 8-1 –Trips (PCUs) on Key Links - 2031

Time	Dir	2031	Link							
			A422 (Bridge)	Willen Road	New MKE Bridge	J14 Through Traffic	Tongwell Street (Oneway Section in DS)	Tongwell Street (Immediately north of Carleton Gate*)	Tongwell Street (South of Carleton Gate)	Dansteed Way
AM	SB to CMK	Do Min	1500	1406		665	840	840	949	732
		Do Something	1618	808	1144	578		1144	1172	754
		diff	*118*	*-598*	*1144*	*-87*	*-840*	*304*	*223*	*22*
		%	*7.9%*	*-42.5%*	*-*	*-13.1%*	*-100.0%*	*36.2%*	*23.5%*	*3.0%*
	NB to MKE	Do Min	1089	608		128	984	984	1174	342
		Do Something	1125	265	379	298	744	1123	1245	84
		diff	*36*	*-343*	*379*	*170*	*-240*	*139*	*71*	*-258*
		%	*3.3%*	*-56.4%*	*-*	*132.8%*	*-24.4%*	*14.1%*	*6.0%*	*-75.4%*
PM	SB to CMK	Do Min	1181	657		364	1022	1022	1120	170
		Do Something	1248	131	1026	259		1026	1098	96
		diff	*67*	*-526*	*1026*	*-105*	*-1022*	*4*	*-22*	*-74*
		%	*5.7%*	*-80.1%*	*-*	*-28.8%*	*-100.0%*	*0.4%*	*-2.0%*	*-43.5%*
	NB to MKE	Do Min	1797	1115		273	702	702	852	856
		Do Something	2044	377	1263	86	80	1343	1398	267
		diff	*247*	*-738*	*1263*	*-187*	*-622*	*641*	*546*	*-589*
		%	*13.7%*	*-66.2%*	*-*	*-68.5%*	*-88.6%*	*91.3%*	*64.1%*	*-68.8%*

**Immediately north of Carleton Gate in DM – north of Carleton Gate / South of M1 Bridge - DS*

8.3.25. In 2031, the development proposals are considered to result in the better balancing of traffic across the available and new crossing points. It is evident that the new M1 bridge crossing becomes an attractive route choice, which in turn reduces impact both on Willen Road and J14.

8.3.26. In addition to the crossing points over the M1, a review of traffic on Tongwell Street and Dansteed Way has also been completed. Along Tongwell Street, it is evident that the new MKE development utilises these sections as a result of the tie in with the new M1 bridge crossing. On Dansteed Way, the Do Something results generally show reductions in traffic compared to the Do Minimum results.

8.3.27. Table 8-2 below provides the same information for the 2048 period.

Table 8-2 - Trips (PCUs) on Key Links - 2048

Time	Dir	2031	Link							
			A422 (Bridge)	Willen Road	New MKE Bridge	J14 Through Traffic	Tongwell Street (Oneway Section in DS)	Tongwell Street (Immediately north of Carleton Gate*)	Tongwell Street (South of Carleton Gate)	Dansteed Way
AM	SB to CMK	Do Min	1996	1180		996	1334	1334	1419	490
		Do Something	2083	607	1648	795		1648	1563	677
		diff	*87*	*-573*	*1648*	*-201*	*-1334*	*314*	*144*	*187*
		%	*4.4%*	*-48.6%*	*-*	*-20.2%*	*-100.0%*	*23.5%*	*10.1%*	*38.2%*
	NB to MKE	Do Min	1562	784		281	1356	1356	1628	703
		Do Something	1647	220	664	799	984	1651	1628	111
		diff	*85*	*-564*	*664*	*518*	*-372*	*295*	*0*	*-592*
		%	*5.4%*	*-71.9%*	*-*	*184.3%*	*-27.4%*	*21.8%*	*0.0%*	*-84.2%*
PM	SB to CMK	Do Min	1715	961		471	1176	1176	1294	142
		Do Something	1706	247	1436	383		1436	1423	212
		diff	*-9*	*-714*	*1436*	*-88*	*-1176*	*260*	*129*	*70*
		%	*-0.5%*	*-74.3%*	*-*	*-18.7%*	*-100.0%*	*22.1%*	*10.0%*	*49.3%*
	NB to MKE	Do Min	2073	1475		310	1500	1500	1518	502
		Do Something	2218	421	1576	151	25	1600	1601	204
		diff	*145*	*-1054*	*1576*	*-159*	*-1475*	*100*	*83*	*-298*
		%	*7.0%*	*-71.5%*	*-*	*-51.3%*	*-98.3%*	*6.7%*	*5.5%*	*-59.4%*

8.3.28. Similar to 2031, the flows in 2048 suggest that the new infrastructure being delivered by MKE is fulfilling its objective of re-distributing traffic away from congested areas.

8.3.29. It should be noted that the Do Something scenario does not account for just development traffic alone and includes re-routeing and re-assignment of movements. As such, it is considered that on balance, the new infrastructure both accommodates the proposed development alongside background and existing traffic.

8.4. SUMMARY (CORE)

8.4.1. AECOM has updated the Milton Keynes Multi-Modal Model (MKMMM) to assess the impact of the MKE development on current and proposed infrastructure. The base year model has been calibrated according to TAG standards and converges to an acceptable level. The model is suitable for use in the forecasting of future year scenarios.

8.4.2. The Reference Case models include all committed developments and planning data within Milton Keynes and TEMPRO growth outside of Milton Keynes. Committed proposed infrastructure schemes are also included.

8.4.3. The 'with MKE development' Do-Something model includes the proposed MKE development infrastructure and trip assumptions.

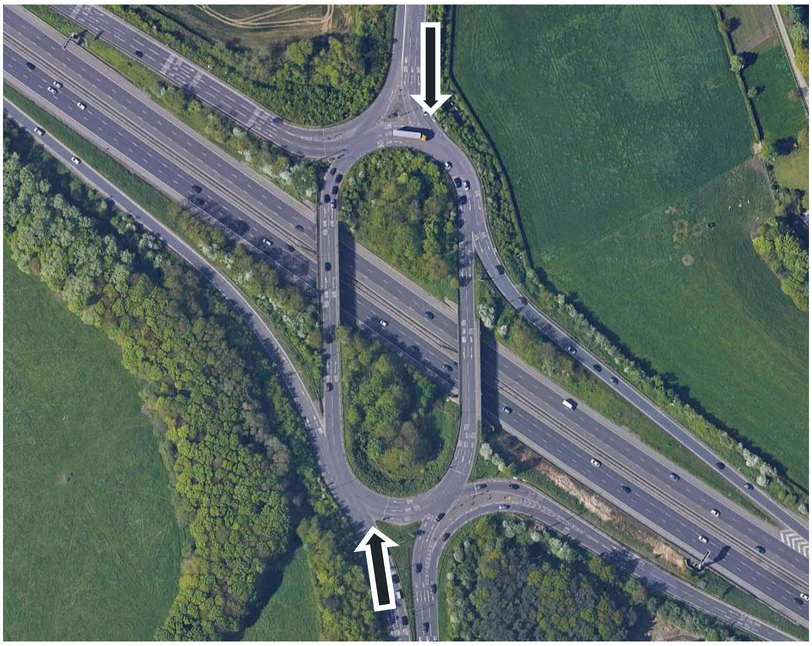
8.4.4. The MKE development and the associated changes to surrounding infrastructure result in a re-routing of Milton Keynes bound trips from the east of Milton Keynes.

8.4.5. There is a reduction in the number of trips using Willen Road to cross the M1 instead of using the new M1 crossing. The impact on M1 Junction 14 is minimal in terms of traffic flows and delays. This will be assessed further in Section 9 and 10 below.

8.5. MKMMM - SENSITIVITY TESTS

8.5.1. Upon review of the Core assessments within the Paramics model, compared against the MKMMM Saturn outputs, it was apparent that there was a difference in throughput and capacity, in particular at the A509 approaches to J14. Diagram 8-1 below outlines the approaches reviewed further.

Diagram 8-1 – A509 Sensitivity Review Locations



8.5.2. The Paramics model suggested that the level of vehicles able to access J14 was less than what was currently coded into the Saturn model. AECOM TN30, in Appendix K, also describes the sensitivity test process and provides some high-level strategic outputs.

8.5.3. Differences in capacity thresholds are not unusual because the level of capacity is often overstated within Saturn due to the lower granularity afforded to network coding. Any such differences will be implicit within the future year modelling unless a manual adjustment is made to compensate for the differences. It should also be noted that, in general, Saturn modelling may reflect a 'generally good' label of calibration within the study area, and there could still be differences of 10 or 20% on certain turning movements or approaches.

8.5.4. It should be noted that the MKMMM is a strategic model and, as such, has limitations in the level of detail that can be adopted when being used to assess such a wide area. Only through the iterative process was it possible to review this further and then suggest amendments. This does not question the validity of the MKMMM model but follows a standard iterative process when using more detailed analysis tools (in this case, Paramics micro-simulation) to then feed back into the strategic model. This approach has been agreed with MKC.

8.5.5. Suppose the level of capacity constraint within the MKMMM were coded such that vehicles make certain movements more than observed in the Paramics. In that case, this could mean the area is likely to attract more traffic in the future, and any future forecasts may contain higher traffic flows as a result.

8.5.6. It is considered unlikely that vehicles would continue to utilise a route that experiences continued high delays and queues. In reality, users will likely seek alternative routes, particularly in conjunction with a strategic signage strategy directing motorists to use certain routes for certain destinations, which cannot be reflected in the strategic modelling. In the case of MKE, the infrastructure proposals include an alternative route via the new M1 Bridge, which would be attractive and result in a similar journey time with minimal adjustment to travellers' route.

8.5.7. Table 8-3 shows the review of the saturation flows, demand flow and actual flows between the two model types, focusing on the 2048 future year AM peak only, at just the A509 approaches.

Table 8-3 –2048 DM vs DS review of Saturn and Paramics capacity – A509 and J14

AM peak		2048 Do-Minimum			2048 Do-Something		
MKMMM outputs							
		SAT FLOW (PCUs)	DEMAND FLOW (PCUs)	ACTUAL FLOW (PCUs)	SAT FLOW (PCUs)	DEMAND FLOW (PCUs)	ACTUAL FLOW (PCUs)
2048 AM	A509 NB	3792	2163	1817	3792	2535	2040
	A509 SB	1252 (M1 SB On-slip) 2502 (Circulatory)	1397	1197	1252 (M1 SB On-slip) 2502 (Circulatory)	1857	1680
Paramics Outputs							
2048 AM	A509 NB	n/a	1650	1125	n/a	1734	1396
	A509 SB	n/a	1194	575	n/a	1544	542

8.5.8. The review indicates that the Paramics model represented approximately 50% of the vehicle throughput that the MKMMM suggests in the SB direction. In the NB direction, the difference is more significant percentage-wise. However, the flow profiles match more generally.

8.5.9. As such, it was agreed with MKC’s modelling team to run a sensitivity test. This was completed using a fixed demand (no VDM) SATURN assignment of the 2031 and 2048 AM peak, DM and DS models, with the following adjustments made;

- A509 SB approach SAT FLOWS reduced by 50%
- A509 NB approach SAT FLOWS reduced by 25%

8.5.10. As outlined above, it should be noted that these Sensitivity results only make adjustments to two approaches. As such, they are treated with caution and caveated as they have been completed to understand the re-routeing of traffic if one of the key approaches (the A509) were constrained to match the Paramics throughput.

8.5.11. The same adjustments have been applied in both the DM and DS models for both 2031 and 2048 future years

8.5.12. Due to the nature of the adjustments applied in the sensitivity test, these do not replace the Core outputs, which remain the definitive tests. However, these sensitivity tests represent a useful indication of re-routeing. WSP considers that this could occur on a network that experiences queues and delay and that the MKMMM represents the appropriate tool to test what would occur if vehicles were to seek alternative routes during busy periods. As such, the outputs are presented for information and consideration against the other scenarios presented above.

SENSITIVITY TEST OUTPUTS – MKMMM

8.5.13. The sensitivity tests have been used primarily within the Paramics platform, although, as noted above, commentary on the MKMMM outputs are also contained within AECOM TN 30.

8.5.14. The same modelling approach, as set out for the Core tests, has been applied for the sensitivity tests. The MKMMM has been used to generate strategic outputs and a cordon of the Paramics model extent created from those and fed into the Paramics future year models.

8.5.15. To provide context, it is useful to understand how the traffic patterns were altered with the sensitivity adjustments in place.

8.5.16. For ease of review – the 2048 DM and DS sensitivity outputs (in terms of throughput at the A509 approaches) are shown in Table 8-4 below.

Table 8-4 –2048 DM vs DS review of Saturn capacity following sensitivity adjustments

AM peak		2048 Do-Minimum (Sensitivity)			2048 Do-Something (Sensitivity)		
		SAT FLOW (PCUs)	DEMAND FLOW (PCUs)	ACTUAL FLOW (PCUs)	SAT FLOW (PCUs)	DEMAND FLOW (PCUs)	ACTUAL FLOW (PCUs)
2048 AM	A509 NB	2844	2272	1890	2844	2668	2122
	A509 SB	626 (M1 SB On-slip) 1251 (Circulatory)	919	775	626 (M1 SB On-slip) 1251 (Circulatory)	1044	976

8.5.17. As outlined above, there is a clear reduction in the southbound movements under the sensitivity scenario with the adjustments in place. The sensitivity results indicate a reduction of 422 PCUS in the DM scenario and a reduction of 708 PCUs in the DS scenario compared to the Core results. The northbound flows show a negligible change compared to the Core results.

8.5.18. Select link analysis was also provided, which identified that under the sensitivity conditions, the new infrastructure, mainly the eastern perimeter link road, is forecast to be utilised for access to and from the J14.

8.5.19. A small number of traffic routes to and from the Moulsoe area, but it is clear that in the northbound direction, J14 still attracts vehicles from central Milton Keynes and that a lot of through movements occur.

8.5.20. Equally, the sensitivity test demonstrates that the new M1 bridge link will experience significant volumes of traffic.

8.5.21. The sensitivity tests were conducted to understand the level of re-routeing within the strategic model should reduced capacity is applied to the A509 approaches at J14. These reductions were calculated after reviewing the differences in throughput between the Paramics and MKMMM outputs under the Core scenarios.

8.5.22. As shown above, and as one would expect, the sensitivity tests reduce through traffic at J14. Some of the development traffic is still forecast to utilise J14. It presents the most logical route choice for the southernmost areas of development within the masterplan, especially for employment trips. However, when reviewing the DS compared to the DM, the changes in queues, delays and overall operation suggest that the DS scenario does not present material or severe impact at the two junctions.

8.5.23. It is acknowledged that the sensitivity tests are a manual adjustment to alter route choice, which may not occur to the same degree in the day to day operation of the network. The adjustments are likely to slightly over-estimate the route transference away from J14, whereas the Core results are considered to over-estimate the attractiveness of J14. Therefore, it is considered that the results in any scenario would be somewhere between the Core and the Sensitivity.

8.6. MKMMM - KEY PLANNING TESTS

8.6.1. The Core scenarios provide the basis of the assessment of the development. As outlined above, further sensitivity tests have also been undertaken using the outputs from the Paramics models to feed back into the Saturn model as set out above.

8.6.2. The key planning test on the Strategic Road Network (i.e. that for which HE are responsible), in accordance with Circular 02/2013, is to assess the impact of committed development (the Reference Case) alongside the proposed development against a period 10-years after the date of the planning application or the end of the Local Plan period, whichever is the greater. For MKE, these dates coincide with 2031.

8.6.3. Strictly speaking, the circular test for the Reference Case should be based on permitted development only. However, it has been agreed with MKC and HE to undertake a test that compares a 2031 Do Minimum Reference Case (i.e. full Local Plan growth) with a 2031 Do Minimum plus development scenario (Do Something), including both the proposed MKE highway infrastructure plus the full proposed build-out at MKE.

8.6.4. It should also be noted that the circular states that where the overall forecast demand at the time of opening of the development (the date at which the development first becomes available for occupation) can be accommodated by the existing infrastructure, further capacity mitigation will not be sought. It should be noted that the opening date for the development is anticipated to be no later than 2025 (which is when the first house would be occupied). However, an opening year test has not been undertaken at this stage, but the findings of the assessment for the 2031 period should consider the context of this.

8.6.5. An MKMMM run has been completed that adds the full development onto the 2031 future year to create an alternative 2031 Do Something run, but with the full allocation included. In terms of strategic changes, the outputs of this test are also contained within AECOM note TN30.

8.6.6. The outputs of the Key Planning test run have been primarily used within the Paramics modelling. However, checks on the junction mitigation strategies have also been completed, as discussed further in Section 12.

9. LOCAL HIGHWAY NETWORK IMPACT

9.1. INTRODUCTION

9.1.1. This section sets out the impact of the proposed development on the local highway network. Key junctions and links on the local highway network were identified and analysed.

9.1.2. It should be noted that the whole allocation has been tested within the MKMMM modelling and associated outputs used in the junction assessments. As such, the development impact also includes development not under the control of Berkeley St James.

9.2. IDENTIFICATION OF JUNCTIONS FOR ASSESSMENT

9.2.1. The process of identifying junctions for assessment was set out in TN1. Furthermore, the information set out below was issued to MKC for their review and comment. The MKC Highways Team provided no disagreement on the junctions included in this TA.

9.2.2. As outlined in the TA Scoping Note, it was the intention that a review of the Volume over Capacity (VOC) would be undertaken to ascertain the junctions that should be included for further assessment. The review of the junction VOC will allow the likely impacts to be ascertained across the network.

9.2.3. The VOC changes were assessed for the 2048 Do Something (with development) and 2048 Do Minimum (without development but including all committed development) scenarios as a worst-case. This has used the Core results from the MKMMM outputs.

9.2.4. The Do Something results may not indicate that the development itself has impacts at the junction and could include traffic re-routeing. However, this methodology provides a good basis to understand the likely areas of focus. For clarity, whilst the 2048 results have been used to determine junctions to be reviewed, the same junctions for the 2031 assessment year have also been completed.

9.2.5. The core junctions and all nodes/junctions that are shown to have a VOC over 0.85 in the 2048 future year were reviewed. Where the Do Minimum scenario indicates junctions already experiencing high VOCs, the relative impact from the development scenario was then reviewed. Where the change, either increase or decrease, hasn’t been considered material, or if the junction is considered to be too far from the development to represent impacts generated from the site, then these have been discarded.

9.2.6. It should be noted that under the DS scenario, some junctions also experience significant improvements, e.g. reductions in VOC. However, these may continue to be included in the assessments due to the importance of the local road network. The spreadsheet outputs contained in Appendix P provide the compiled node VOC data.

9.2.7. The summary Table 9-1 below sets out the junctions assessed and included in the further assessments below:

Table 9-1 – Junctions to be assessed in detail in the TA

Junction Names	To be assessed in detail	Notes
Core Junctions		
M1 J14 and Northfields Roundabout	Yes - Paramics	The strategic modelling does not suggest that there will be a material impact. However, this will be completed within the Paramics microsimulation model.
Tongwell Street Roundabout	Yes	The VOC shows improvements in the DS scenario, however, will be assessed due to its importance in the local network
Willen Road Roundabout	Yes	The DS scenario shows minor changes at the junction, however, will be assessed due to proximity and local importance
Pagoda Roundabout	Yes	The DS scenario does not indicate any material effect at the junction. This will be confirmed within Junctions 9 modelling
Woolstone Roundabout	Yes	The DS scenario shows an improvement over the DM, however, will be confirmed in the TA
Blakelands Roundabout	Yes	The DS scenario shows an improvement over the DM, however, will be confirmed in the TA
Fox Milne	Yes	The DS scenario does not indicate any material effect at the junction. This will be confirmed within Junctions 9 modelling
Pineham Roundabout	Yes	The VOC analysis does not show a material change overall, but does show an increase in VOC. Due to the importance of the junction with the new infrastructure - this will be assessed in detail
Renny Lodge Roundabout	Yes	The VOC shows increases in the DS scenario and this will be assessed in the TA.
Tickford Roundabout	Yes	The DS scenario shows an improvement over the DM, however, will be confirmed in the TA
Marsh End Roundabout	Yes	The DS scenario shows an improvement over the DM, however, will be confirmed in the TA
Tongwell Street / Carleton Gate	Yes	The DS scenario, which proposes to upgrade this junction to a roundabout shows changes to the VOC. As such, this will be reviewed in detail in the TA.
M1 J13	Yes - Link flow check	The DS shows a minor change compared to the DM. As agreed in TTN1, the link flow changes have been reviewed in the TA.
Additional Junctions – following review		
Marshend Rd / Wolverton	Yes - Link flow check	The VOC analysis does not show a material change overall, however a link / turning flow check of the junction has been undertaken in the TA.
High Street / St. John Street	Yes - Link flow check	The VOC analysis does not show a material change overall, however a link / turning flow check of the junction has been undertaken in the TA.
A509 / A422 Newport Road - Chicheley Hill Roundabout	Yes	The VOC analysis shows an increase in the AM in 2048, so a more detailed review of the junction will be in the TA.
Development Junctions – DS Only		
New Signals 1 - Willen Road (Bloor / Segro Access)	Yes	The signals junction will be checked to ascertain that the outline designs remain appropriate
New Signals 2 - Willen Road (New Willen Link Road)	Yes	The signals junction will be checked to ascertain that the outline designs remain appropriate
Internal Jcts 1 to 9	Yes	The “internal” or new development roundabout and junctions will be assessed to ensure that the designs are appropriate. This includes the new junction arrangement with Tongwell Street south of the new bridge etc.

9.2.8. The assessment has indicated that an additional junction (compared to the Core list identified previously) A509/A422 Newport Road (Chicheley Hill Roundabout) should be included for a more in-depth review. This will be undertaken using Junctions9 software.

9.2.9. The other junctions in Newport Pagnell (Marsh End/Wolverton and High Street/St John Street) have been identified to experience minor changes and have been included as link/turning flow checks.

9.2.10. The future year junction assessment outputs (using the 2031 and 2048 Do Minimum and Do Something Core modelling results) are also contained in Appendix O.

9.3. EXISTING JUNCTIONS – FUTURE YEAR ASSESSMENT - CORE

E1 - BLAKELANDS ROUNDABOUT

9.3.1. Blakelands Roundabout was assessed for both the 2031 and 2048 Do Minimum and Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-2 below.

Table 9-2 – Blakelands Roundabout – AM / PM Peak Hour

Arm	2031: Do Minimum		2048: Do Minimum		2031: Do Something		2048: Do Something	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
AM Peak								
A - Brickhill St (N)	0.78	4	1.10	47	0.78	4	1.07	38
B - Monks Way (E)	0.86	6	1.02	43	0.91	10	1.01	41
C - Brickhill St (S)	0.89	7	1.05	19	1.00	14	1.32	41
D - Monks Way (W)	0.77	3	0.97	20	0.77	3	0.98	25
PM Peak								
A - Brickhill St (N)	0.79	4	1.46	90	0.87	6	1.30	54
B - Monks Way (E)	0.56	1	0.74	3	0.55	1	0.73	3
C - Brickhill St (S)	0.89	7	1.04	22	0.91	8	1.12	36
D - Monks Way (W)	0.90	8	1.00	35	0.93	12	1.05	78

Source: Junctions 9 results

9.3.2. From the assessment results outlined in Table 9-2 above, it is evident that Blakelands Roundabout is forecast to operate approaching capacity in 2031 and above its theoretical operational capacity in 2048 future year scenarios.

9.3.3. In the 2031 DM scenario, AM period, the worst performing arm, Brickhill Street (S), is operating with a 0.89 RFC and a small queue of approximately 7 vehicles. In the PM Peak, Monks Way (W) and Brickhill Street (S) are forecast to operate with RFCs of 0.90 and 0.89 respectively. In the 2031 DS scenario in the AM Peak, the most significant change is on Brickhill Street South, where the arm is forecasted to operate at an RFC of 1.00. In the 2031 DS PM peak, Brickhill Street (S) and Monks Way (W) are both forecast to operate with RFCs of over 0.90, suggesting that the junction is approaching its capacity limits.

9.3.4. In the 2048 DM scenario, all arms are forecast to operate over their theoretical operational capacity. In the 2048 DS scenario, all arms in the AM peak are forecast to operate close to or over their theoretical operational capacity. In the PM peak, all arms bar Arm B Monks Way (E) are forecast to operate over their theoretical operational capacity.

9.3.5. It is evident that in the Do Minimum scenarios, Blakelands Roundabout is forecast to operate either close to or above its operational limits, especially in the 2048 scenarios. With the introduction of the development, some arms improve slightly, while others experience a slight reduction in capacity. It is considered that the Do Something scenario creates higher delay and queues on Brickhill Street (S) predominantly and that mitigation options should be reviewed to see if improvements could be implemented. The mitigation measures considered are outlined and shown in Section 12.

E2 - WILLEN ROUNDABOUT

9.3.6. Willen Roundabout was assessed for both 2031 and 2048 Do Minimum and Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-3 below.

Table 9-3 – Willen Roundabout – AM / PM Peak Hour

Arm	2031: Do Minimum		2048: Do Minimum		2031: Do Something		2048: Do Something	
	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q
AM Peak								
A - Brickhill St (N)	0.73	3	1.03	30	0.61	2	0.82	5
B - Dansteed Way (E)	0.42	1	0.41	1	0.49	1	0.54	1
C - Brickhill St (S)	0.53	1	0.73	3	0.52	1	0.67	2
D - Dansteed Way (W)	0.52	1	0.98	19	0.51	1	0.93	11
PM Peak								
A - Brickhill St (N)	0.81	4	0.85	5	0.65	2	0.90	8
B - Dansteed Way (E)	0.30	0	0.59	2	0.38	1	0.65	2
C - Brickhill St (S)	0.48	1	0.62	2	0.52	1	0.72	3
D - Dansteed Way (W)	0.51	1	0.77	3	0.54	1	0.79	4

Source: Junctions 9 results

9.3.7. From the assessment results outlined in Table 9-3 above, it is evident that Willen Roundabout is forecast to operate within its theoretical operational capacity in both peak hours in 2031 in the Do Something scenario but begins to operate above its theoretical operational capacity in 2048 future year scenarios. In the AM Peak in the 2048 Do Minimum scenario, Brickhill Street (N) and Dansteed Way (W) are forecast to operate over or at their theoretical operational capacity, with RFCs just over or approaching 1.0.

9.3.8. When comparing the Do Something scenario results versus the Do Minimum, there is a benefit in overall junction performance in the AM. In the PM, there is a slight worsening in junction performance, however, this is not considered material. Upon review, it is considered that some mitigation could be of benefit to the junction, and as such, mitigation options available will be considered. The mitigation measures are outlined and shown in Section 12.

E3 - PAGODA ROUNDABOUT

9.3.9. Pagoda Roundabout was assessed for both 2031 and 2048 Do Minimum and Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-4 below.

Table 9-4 – Pagoda Roundabout – AM / PM Peak Hour

Arm	2031: Do Minimum		2048: Do Minimum		2031: Do Something		2048: Do Something	
	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q
AM Peak								
A - Brickhill St (N)	0.95	13	1.07	52	0.99	18	1.11	54
B - A509 Portway (E)	0.92	10	1.05	54	0.93	13	1.10	104
C - Brickhill St (S)	0.97	13	1.18	60	0.94	10	1.14	47
D - A509 Portway (W)	0.58	1	0.68	2	0.66	2	0.70	2
PM Peak								
A - Brickhill St (N)	0.95	11	1.51	117	1.09	29	1.44	114
B - A509 Portway (E)	0.68	2	0.79	4	0.71	3	0.83	5
C - Brickhill St (S)	0.78	4	0.93	10	0.76	3	0.95	11
D - A509 Portway (W)	0.95	11	1.00	29	0.95	15	1.00	29

Source: Junctions 9 results

9.3.10. It is evident from the modelling undertaken that Pagoda Roundabout is approaching its capacity threshold in the 2031 Do Minimum scenario in both the AM and PM peaks. When reviewing the 2031 Do Something changes, the AM peak shows a minor worsening on the northern arm, Brickhill Street. 2031 Do Something PM peak shows a greater change with Brickhill Street (N) forecast to experience RFC of >1 with increases in queues compared to the Do Minimum as a result.

9.3.11. In the 2048 Do Minimum scenario, the junction is forecast to operate above capacity in both AM and PM peaks. The AM peak indicates three of the four approaches will experience RFCs >1, corresponding to queues of 50+ vehicles. In the PM peak, Brickhill Street (N) experiences the highest queuing, and, as a result, it is over its theoretical capacity. In the 2048 Do Something scenario, some minor increases are observed in RFCs on the Brickhill Street (N) and A509 Portway (E and W) approaches. In the PM, the junction is modelled to have a small reduction in RFC on the Brickhill Street (N) arm, with the other approaches remaining similar to Do Minimum levels.

9.3.12. The junction results suggest that a mitigation scheme should be considered principally catering for changes in operation in the 2031 future year. The junction is operating close to its capacity without introducing the development, but mitigation measures should be reviewed to ascertain whether improved performance can be achieved. It should be noted that once RFCs of over 1 are reported, then queues become unstable. So, the large queue increases in the Do Something observed on Arm B in the 2048 scenario may be more linked with the modelling instability rather than development impact. Regardless, mitigation will be considered, and any appropriate schemes are shown in Section 12.

E4 - WOOLSTONE ROUNDABOUT

9.3.13. Woolstone Roundabout was assessed for both 2031 and 2048 Do Minimum and Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-5 below.

Table 9-5 – Woolstone Roundabout – AM / PM Peak Hour

Arm	2031: Do Minimum		2048: Do Minimum		2031: Do Something		2048: Do Something	
	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q
AM Peak								
A - Brickhill St (N)	0.69	2	0.80	4	0.88	7	0.68	2
B - Childs Way (E)	0.95	14	1.13	130	1.14	149	0.95	14
C - Brickhill St (S)	1.07	50	1.52	286	1.53	310	1.07	51
D - Childs Way (W)	0.42	1	0.62	2	0.60	2	0.44	1
PM Peak								
A - Brickhill St (N)	0.95	11	1.12	55	1.13	60	1.01	19
B - Childs Way (E)	0.73	3	0.96	16	0.96	16	0.71	2
C - Brickhill St (S)	0.92	10	1.19	95	1.17	89	0.97	16
D - Childs Way (W)	0.91	9	0.95	16	0.95	16	0.96	16

Source: Junctions 9 results

9.3.14. The modelling assessment outlined above identifies that Woolstone Roundabout is forecast to operate over its theoretical capacity in the 2031 Do Minimum AM peak. The worst approach, Brickhill Street (S), is shown to experience an RFC of 1.07, with queues of approximately 50 vehicles. In the PM peak, the junction approaches its operational capacity, with three of the four arms experiencing RFCs of over 0.90.

9.3.15. When reviewing the changes in the Do Something scenario in 2031, it is clear that the Childs Way (E) and Brickhill Street (S) in the AM peak experience the highest increase in queuing and RFCs. In the PM peak, all arms are forecast to operate with higher RFCs and higher queues compared to the Do Minimum scenario.

9.3.16. In the 2048 Do Minimum, the junction is forecast to operate over capacity in both AM and PM peaks. In the AM, Childs Way (E) and Brickhill St (S) are shown to experience the highest queues and delays. In the PM, whilst all arms are shown to be either approaching or over capacity, Brickhill Street (N and S) approaches are forecast to operate with the highest RFCs and queues. A comparison of the 2048 Do Something flows shows that junction performance improves in both AM and PM peaks. It is likely that in the Do Something scenario, the traffic flows have balanced as part of the redistribution of traffic and, as such, allow for a more efficient operation of the junction as a whole.

9.3.17. Whilst the 2048 results suggest that mitigation is not required as the development scenario improves performance, the 2031 scenario identifies that Woolstone Roundabout should be reviewed in terms of mitigation to address the arms that exhibit the highest increases in RFCs and queuing. The measures considered are discussed further in Section 12.

E5 - MARSH END ROUNDABOUT

9.3.18. Marsh End Roundabout was assessed for both 2031 and 2048 Do Minimum and Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-6 below.

Table 9-6 – Marsh End Roundabout – AM / PM Peak Hour

Arm	2031: Do Minimum		2048: Do Minimum		2031: Do Something		2048: Do Something	
	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q
AM Peak								
A - Willen Road (N)	1.38	227	1.52	290	1.01	28	1.65	425
B - A422	0.99	28	1.06	83	0.85	6	0.88	7
C - Willen Road (S)	0.82	4	1.22	86	0.36	1	0.92	9
D - Monks Way	0.57	1	0.77	3	0.52	1	0.75	3
PM Peak								
A - Willen Road (N)	0.75	3	1.15	81	0.85	5	1.31	186
B - A422	0.64	2	0.84	5	0.60	2	0.75	3
C - Willen Road (S)	1.32	156	2.01	638	0.59	2	0.90	7
D - Monks Way	1.06	71	1.12	139	1.04	61	1.14	157

Source: Junctions 9 results

9.3.19. From the assessment results outlined in Table 9-6 above, it is evident that the existing layout of the Marsh End Roundabout is forecast to operate over its theoretical capacity in 2031 Do Minimum in both AM and PM peaks. Noticeable in the AM, Willen Road (N) is the worst-performing arm, with an RFC of 1.38 and corresponding high queues. The PM is the inverse, with Willen Road (S) showing the highest RFC and queue values recorded.

9.3.20. Reviewing the changes in operation at the junction in the 2031 Do Something scenario, the junction is forecast to improve performance in both AM and PM peaks. However, in the AM peak hour, Willen Road (N) is still forecast to have an RFC >1, this is better than the Do Minimum, and the other approaches all see reduced queues. This is similar in the PM peak.

9.3.21. In 2048 Do Minimum scenario, all arms apart from Monks Way in the AM Peak are performing above theoretical operational capacity with RFCs >1. Willen Road (N) is shown to experience high queues. In the PM peak hour, only the A422 is performing within typical thresholds, with all other arms performing over their theoretical operational capacity.

9.3.22. Arguably, the Do Something scenario suggests that betterment in terms of performance at the junction would occur as a result of the proposed MKE development. However, considering the importance of the junction to the development, it would be prudent to review what schemes could be implemented to improve performance. This is especially prudent given that it is acknowledged that as part of the SEGRO planning application (now withdrawn), a review of Marsh End Roundabout was completed. This has been checked against the recent MKMMM flows and reviewed in more depth within Section 12.

E6 - TONGWELL ROUNDABOUT

9.3.23. Tongwell Roundabout was assessed for both 2031 and 2048 Do Minimum and Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-7 below.

Table 9-7 – Tongwell Roundabout – AM / PM Peak Hour

Arm	2031: Do Minimum		2048: Do Minimum		2031: Do Something		2048: Do Something	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
AM Peak								
A - Willen Rd	0.87	7	0.86	6	0.44	1	0.33	1
B - Tongwell St	0.71	3	0.83	5	0.51	1	0.62	2
C - Dansteed Way	0.33	1	0.76	3	0.07	0	0.09	0
D - Michigan Dr	0.10	0	0.23	0	0.04	0	0.07	0
PM Peak								
A - Willen Rd	0.44	1	0.63	2	0.07	0	0.14	0
B - Tongwell St	0.38	1	0.82	5	0.04	0	0.01	0
C - Dansteed Way	0.66	2	0.63	2	0.16	0	0.12	0
D - Michigan Dr	0.34	1	0.07	0	0.08	0	0.15	0

Source: Junctions 9 results

9.3.24. Under the 2031 Do Minimum scenario, the junction is forecast to perform within its capacity. In the AM, Willen Road is shown to experience the highest RFC of 0.87, but with relatively low queues.

9.3.25. Comparing the 2031 Do Something against the Do Minimum results, it is clear that the junction will perform with residual capacity. The introduction of the development combined with the re-routing of traffic and the alterations to the Tongwell Street corridor results in lower demand at the junction.

9.3.26. With regards to Tongwell Street, it is important to note that as part of the Do Something proposals, the Tongwell Street arm becomes one way (northbound only) as it was not feasible to provide a safe connection to the new M1 bridge crossing. TTN12 sets out the decision process behind this in more detail.

9.3.27. In the 2048 Do Minimum scenario, similar to the 2031 results, the junction is forecast to perform within capacity, albeit with certain arms, Willen Road and Tongwell Street recording the highest RFC and queues. In the 2048 Do Something scenario, junction performance improves considerably.

9.3.28. Due to the improvements in operation at the junction, it is considered that no further assessments of the Tongwell Roundabout are required.

E7 - TICKFORD ROUNDABOUT

9.3.29. Tickford Roundabout was assessed for both 2031 and 2048 Do Minimum and Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-8 below.

Table 9-8 – Tickford Roundabout – AM / PM Peak Hour

Arm	2031: Do Minimum		2048: Do Minimum		2031: Do Something		2048: Do Something	
	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q
AM Peak								
A - B256 London Rd	0.75	3	0.88	7	0.72	3	0.71	3
B - A509 (E)	0.75	3	0.95	14	0.65	2	0.7	2
C - A509 London Rd	0.59	2	1.13	35	0.48	1	0.66	2
D - A422	0.70	3	0.87	7	0.61	2	0.85	6
PM Peak								
A - B256 London Rd	0.71	2	0.73	3	0.53	1	0.66	2
B - A509 (E)	0.59	2	0.79	4	0.52	1	0.74	3
C - A509 London Rd	0.59	2	0.60	2	0.61	2	0.59	2
D - A422	1.00	32	1.01	41	0.83	5	0.89	8

Source: Junctions 9 results

9.3.30. From the assessment results outlined in Table 9-8 above, it is evident that Tickford Roundabout is forecast to operate within its theoretical operational capacity in the 2031 Do Minimum scenario in the AM Peak. However, in the PM peak hour, the A422 will operate over an RFC of 1, suggesting that the junction and that approach has reached a point where delays and queues will occur beyond acceptable limits. 2031 Do something results, however, outline that junction performance is improved compared to the Do Minimum.

9.3.31. The 2048 Do Minimum scenario shows that the junction operates at or over capacity in the AM, with the A509 (E) recording an RFC of 1.13 in the AM. In the PM, only the A422 approach operates beyond 1.0 RFC. Similar to the 2031 results, the 2048 Do Something scenario indicates that junction capacity is improved. Due to the improvements observed, no further assessment is required.

TICKFORD FIELDS

9.3.32. It is noted that Tickford Fields have put forward a scheme where a part signalisation scheme of Tickford Roundabout was suggested as mitigation against the impacts of that particular development. This differs from the above results, which indicate that part signalisation is not required, albeit it is noted that Tickford Fields may not have used the MKMMM or similar assumptions.

9.3.33. For consistency, the LinSig of the part signalised scheme has been recreated using the outputs from the Tickford Fields application. It should be noted that WSP has used those inputs as an informative test to understand the impacts of the MKMMM Do Minimum and Do Something model outputs and has not checked or verified the assumptions used in the Tickford Fields junction assessments.

9.3.34. Table 9-9 below provides a summary of the LinSig outputs undertaken at the junction.

Table 9-9 – Tickford Fields proposed Signal Scheme at Tickford Roundabout, using MKE flows – Summary results

Year / Scenario	Time	PRC %	Delay (PCU/HR)
2031 – Do Minimum	AM – 08:00 – 09:00	-25.5	71.9
	PM – 17:00 – 18:00	12.8	26.5
2031 – Do Something	AM – 08:00 – 09:00	6.4	28.2
	PM – 17:00 – 18:00	28.6	21.1
2048 – Do Minimum	AM – 08:00 – 09:00	-35.9	111.0
	PM – 17:00 – 18:00	13.9	30.6
2048 – Do Something	AM – 08:00 – 09:00	-15.1	75.4
	PM – 17:00 – 18:00	20.0	28.5

9.3.35. Whilst WSP have reservations on the LinSig outputs from the Tickford Fields models, using the MKMMM flows, the mitigation confirms that the part signalisation scheme would operate with more capacity under the Do Something scenario compared to the Do Minimum flows.

9.3.36. However, as noted above, it is considered that the current roundabout configuration performs adequately without the need for alteration. It is worth noting that if the roundabout was partially signalised, it might be possible to introduce at-grade pedestrian/cycle crossing facilities.

E8 - RENNY LODGE ROUNDABOUT

9.3.37. Renny Lodge Roundabout was assessed for both 2031 and 2048 Do Minimum and Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-10 below.

Table 9-10 – Renny Lodge Roundabout – AM / PM Peak Hour

Arm	2031: Do Minimum		2048: Do Minimum		2031: Do Something		2048: Do Something	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
AM Peak								
A - Renny Park Rd	0.08	0	0.11	0	0.09	0	0.32	1
B - A509 (E)	0.73	3	0.77	3	0.59	2	0.67	2
C - A509 (W)	0.33	1	0.24	0	0.28	0	0.24	0
PM Peak								
A - Renny Park Rd	0.47	1	0.56	1	0.40	1	0.56	1
B - A509 (E)	0.57	1	0.78	4	0.71	2	0.84	5
C - A509 (W)	0.64	2	0.62	2	0.81	4	0.67	2

Source: Junctions 9 results

9.3.38. From the assessment results outlined in Table 9-10 above, it is evident that Renny Lodge Roundabout is forecast to operate within its theoretical operational capacity in both the AM and PM peaks in the 2031 Do Minimum and 2031 Do Something scenarios. The Do Something Scenario impact can be accommodated with no alteration to the junction, and the queues recorded are considered insignificant. In 204, both Do Minimum and Do Something scenarios continue to forecast that the junction will operate within capacity

E9 - CARLETON GATE/TONGWELL STREET PRIORITY JUNCTION

9.3.39. The existing Carleton Gate/Tongwell priority-controlled T-junction was assessed for both 2031 and 2048 Do Minimum and Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-11 below.

Table 9-11 – Carleton Gate / Tongwell Roundabout – AM / PM Peak Hour

Arm	2031: Do Minimum		2048: Do Minimum		2031: Do Something		2048: Do Something	
	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q
AM Peak								
Carleton Gate to Tongwell St (N)	0	0	∞	27	15.81	11	∞	243
Carleton Gate to Tongwell St (S)	0.90	5	∞	72	15.30	62	∞	51
Tongwell Street (N)	0	0	0	0	0.25	0	0.59	2
PM Peak								
Carleton Gate to Tongwell St (N)	0	0	∞	165	∞	21	∞	172
Carleton Gate to Tongwell St (S)	0.55	1	∞	85	∞	60	∞	67
Tongwell Street (N)	0	0	0	0	0	0	0.33	0

Source: Junctions 9 results

∞ - Junctions 9 has indicated that the RFC calculation is not possible, indicating significant instability.

9.3.40. The modelling suggests that the existing priority junction operates close to its capacity threshold in the 2031 Do Minimum in the AM peak, with the PM peak able to operate satisfactorily. In the 2031 Do Something scenario, the junction is over capacity with high RFCs recorded in the AM peak, with corresponding high queues. In the PM peak, the RFCs become unstable, suggesting that the junction is beyond a calculable capacity at this point.

9.3.41. In the 2048 Do Minimum and Do Something results, the priority junction is unable to accommodate the future year demand with or without the introduction of the development.

9.3.42. It is worth remembering that this junction is being upgraded to a roundabout as part of the works associated with the new M1 bridge and Tongwell Street dualling section. It will be subject to further testing to demonstrate that the new configuration is suitable; this is summarised in Section 12.

E10 - PINEHAM ROUNDABOUT

9.3.43. Pineham Roundabout was assessed for both 2031 and 2048 Do Minimum and Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-12 below. Through discussions with MKC and Ringway, it was confirmed that the part-time signals at the junction were not operational and had not been operational for some time. As such, the junction was assessed using the standard roundabout software, Junctions9.

Table 9-12 – Pineham Roundabout – AM / PM Peak Hour

Arm	2031 Do Minimum		2048 Do Minimum		2031 Do Something		2048 Do Something	
	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q
AM Peak								
A – Tongwell St (N)	0.49	1	0.84	5	0.64	2	1.00	32
B - A509 Portway (E)	0.85	6	1.03	53	0.87	7	1.08	99
C - Tongwell St (S)	0.76	3	0.84	5	0.81	4	0.84	5
D – A509 Portway (W)	0.57	1	0.37	1	0.68	2	0.67	2
PM Peak								
A – Tongwell St (N)	0.83	5	1.02	34	0.90	8	1.01	32
B - A509 Portway (E)	0.50	1	0.57	1	0.55	1	0.60	2
C - Tongwell St (S)	0.77	3	1.02	39	0.92	10	1.09	82
D – A509 Portway (W)	0.79	4	0.98	20	1.06	69	0.96	16

Source: Junctions 9 results

9.3.44. Reviewing the 2031 Do Minimum outputs suggest that the junction is forecast to perform within acceptable thresholds. The A509 Portway (E) and Tongwell Street (N) show the highest recorded RFCs and queues in the AM and PM peaks respectively, but these are not considered material. With the 2031 Do Something scenario, the AM peak does not show a significant change in performance compared to the Do Minimum. The PM peak outlines that the A509 (W) approach will experience RFCs >1, with queues of approximately 70 vehicles.

9.3.45. In the 2048 Do Minimum scenario, the junction is modelled to experience queues and delays in both AM and PM peaks. In the AM, the A509 Portway (E) records an RFC of 1.03, with a queue of 53 vehicles. In the PM peak, the Tongwell Street (N and S) approaches both record RFCs of 1.02.

9.3.46. With the introduction of the 2048 Do Something scenario, the AM peak identifies that Tongwell Street (N) would see the most significant increase in queuing and RFC compared to the Do Minimum. The A509 Portway (E) is also forecast to worsen, with higher queues, despite a minor increase in RFC. In the PM, the junction is considered to perform similar to the Do Minimum levels.

9.3.47. Pineham Roundabout forms a key junction for the MKE site, as it is located at the southern end of the proposed upgrades to the Tongwell Street corridor and provides a link with the new M1 bridge. As such, the Do Something scenarios show a worsening of performance at the junction. The higher demand and assignment of vehicles would have a detrimental impact on users' journey times to and from MKE. Therefore, a mitigation scheme has been considered, which is outlined and shown in Section 12.

E11 - FOX MILNE ROUNDABOUT

9.3.48. Fox Milne Roundabout was assessed for both 2031 and 2048 Do Minimum and Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-13 below. As Fox Milne Roundabout is currently partially signalised, the assessments have been undertaken within the LinSig software platform.

Table 9-13 – Fox Milne Roundabout – AM / PM Peak Hour

Arm	2031: Do Minimum		2048: Do Minimum		2031: Do Something		2048: Do Something	
	DoS	MMQ	DoS	MMQ	DoS	MMQ	DoS	MMQ
AM Peak								
V11 Tongwell St (N) Left/Ahead	100.2%	25	123.9%	102	97.5%	20	135.1%	128
V11 Tongwell St (N) Ahead	13.8%	1	17.9%	2	22.7%	2	28.1%	2
H6 Childs Way (E) Left/Ahead	100.8%	36	127.5%	140	98.5%	19	133.9%	171
H6 Childs Way (E) Ahead	77.9%	6	117.4%	86	87.4%	9	101.1%	36
H6 Childs Way (E) Ahead	76.9%	6	117.2%	82	84.6%	8	101.3%	35
V11 Tongwell St (S) Left/Ahead	65.9%	8	114.6%	101	62.1%	7	124.6%	169
V11 Tongwell St (S) Ahead	80.4%	10	116.6%	108	77.3%	10	125.9%	150
H6 Childs Way (W) Left/Ahead	37.2%	2	59.2%	4	45.4%	3	56.2%	4
H6 Childs Way (W) Ahead	67.6%	6	124.7%	104	86.6%	10	133.5%	121
PM Peak								
V11 Tongwell St (N) Left/Ahead	84.3%	15	96.9%	22	100.1%	24	101.6%	28
V11 Tongwell St (N) Ahead	12.9%	1	23.4%	2	18.1%	2	27.4%	2
H6 Childs Way (E) Left/Ahead	74.5%	4	85.4%	9	72.6%	4	94.8%	12
H6 Childs Way (E) Ahead	54.3%	2	65.8%	3	48.0%	2	62.3%	3
H6 Childs Way (E) Ahead	49.8%	2	60.3%	3	45.0%	2	57.2%	2
V11 Tongwell St (S) Left/Ahead	79.7%	7	95.2%	16	99.6%	10	99.9%	17
V11 Tongwell St (S) Ahead	83.4%	9	99.1%	17	95.3%	15	96.2%	18
H6 Childs Way (W) Left Ahead	86.2%	10	78.1%	8	100.2%	53	77.9%	8
H6 Childs Way (W) Ahead	67.1%	5	100.0%	24	72.9%	6	101.7%	48

Source: LinSig results

9.3.49. From the 2031 modelling, it is evident that the Fox Milne junction is operating at or approaching its capacity thresholds, especially in the AM peak. Two approaches are recorded as experience DoS of over 100%, Tongwell Street (N) and H6 Child Ways, with corresponding queues of between 25 and 36 vehicles respectively. The lower demand at the junction results in each approach performing at satisfactory levels in the PM peak hour.

9.3.50. The 2031 Do Something scenario generally shows improvements in the AM peak when compared to the Do Minimum results. Tongwell Street (N) and H6 Childs Way are both forecast to experience reductions in queues and DoS. The other approaches and lanes show some variability, but on balance, suggest that the Do Something scenario does not materially affect the junction's operation in the AM. However, the PM peak indicates that several approaches or lanes will be at or over capacity in the Do Something scenario. Both Tongwell Street (N) and H6 Child Ways (W) show DoS of over 100%.

9.3.51. In the 2048 Do Minimum scenario, the AM peak is forecast to operate significantly over capacity across multiple approaches and lanes. The PM peak is shown to experience less queueing and delay, albeit with H6 Child Ways (W) recording a DoS of 100%.

9.3.52. The 2048 Do Something results mirror those of the Do Minimum, with the roundabout continuing to operate above satisfactory levels in the AM predominantly. When compared to the Do Minimum, the Do Something results suggest an increase in queues and additional pressure on the arms shown to be over-capacity. The PM peak shows less variability and change, and the Do Something results are not dissimilar to the Do Minimum runs.

9.3.53. Whilst the Do Something impacts are not considered to be significantly different to those in the Do Minimum scenario, it is evident that changes at the junction alter the performance on some of the key arms under the Do Something scenarios. As such, it was considered that a mitigation scheme should be reviewed to ascertain whether improvements could be implemented. These potential improvements are shown in Section 12.

E12 - CHICHELEY HILL ROUNDABOUT

9.3.54. Chicheley Hill Roundabout was assessed for both 2031 and 2048 Do Minimum and Do Something scenarios. This junction was identified as a new location to review potential changes in operation, with the results of the AM and PM peak hour assessments summarised in Table 9-14 below.

Table 9-14 – Chicheley Hill Roundabout – AM / PM Peak Hour

Arm	2031: Do Minimum		2048: Do Minimum		2031: Do Something		2048: Do Something	
	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q	RFC	MAX Q
AM Peak								
A – Chicheley Hill	0.12	0	0.24	0	0.15	0	0.37	1
B - A509 (N)	0.62	2	0.80	4	0.74	3	0.98	22
C – A422	0.46	1	0.80	4	0.50	1	0.48	1
D – A509 (S)	0.36	1	0.34	1	0.39	1	0.40	1
PM Peak								
A – Chicheley Hill	0.38	1	0.62	2	0.63	2	0.81	4
B - A509 (N)	0.61	2	0.89	7	0.67	2	0.95	12
C – A422	0.19	0	0.37	1	0.18	0	0.32	1
D – A509 (S)	0.61	2	0.64	2	0.84	5	0.76	3

Source: Junctions 9 results

9.3.55. The 2031 Do Minimum results indicate that the junction is forecast to operate at satisfactory levels with a minimal queuing forecast in both AM and PM peaks. The 2031 Do Something results show little overall change at the junction, which continues to operate with minimal queuing across both assessed time periods.

9.3.56. In 2048, the Do Minimum scenario adds further background growth, resulting in increases in RFC and queues compared to the 2031 year. The 2048 Do Something scenario indicates that the A509 (N) would be approaching its capacity level in both peaks.

9.3.57. Whilst the Do Something results suggest a change at the junction, a review of development specific impacts indicate that the development represents only 5% of the traffic in the AM and PM peaks on the A509 (N) arm. This indicates that it is not the development that is the primary trigger for the change in operation at the junction. As the junction is forecast to operate with RFCs under 1 in the 2048 future year scenarios, it is considered that the development can be accommodated with the current layout.

NEWPORT PAGNELL JUNCTIONS

9.3.58. As set out in Table 9-1 above, two junctions in Newport Pagnell were identified for review; High Street/St John Street and Marsh End/Wolverton Road/High Street.

9.3.59. The VOC analysis indicated either very little change or slight benefits in the operation of these junctions. However, given the proximity to the site and Newport Pagnell in general, a review of the turning movements and total junction flows was completed, with this set out below.

High Street / St. John Street

9.3.60. The High Street/St John Street junction is located at the north eastern end of Newport Pagnell and takes a small mini-roundabout. The junction is located within a high footfall area, with numerous shops and services nearby. The High Street also contains traffic calming in raised speed tables, and there is a zebra crossing on the St John Street arm.

9.3.61. Table 9-15 below provides a comparison of the total junction flows for both the 2031 and 2048 future years.

Table 9-15 - High Street / St. John Street – Total Junction Flow Comparison

Total Junction Flows		
High Street / St. John Street	**AM**	**PM**
2031 Do Minimum	1802	2002
2031 Do Something	1717	1747
Difference	*-85*	*-255*
2048 Do Minimum	2276	2358
2048 Do Something	2422	2367
Difference	*146*	*9*

Source: MKMMM Core Outputs

9.3.62. The comparison between the Do Minimum and Do Something flows in 2031 outline a reduction in traffic in both AM and PM peak periods. In 2048, the AM modelling period suggests a small increase in the Do Something scenario. This is equivalent to a 6% change in flows and is not considered to result in a material change at the junction. The PM peak shows a negligible change in traffic flows.

9.3.63. The model flows indicate that the junction would not experience significant changes due to the development, associated infrastructure, and any background traffic re-routing.

Marsh End / Wolverton Road / High Street

9.3.64. The junction of Marsh End / Wolverton Road and the High Street is a mini roundabout situated at the western end of Newport Pagnell High Street adjacent to the Fire Station. Similar to the junction above, the eastern arm, High Street, has traffic calming present in the form of raised speed tables.

9.3.65. Table 9-16 provides a comparison of the total junction flows for the 2031 and 2048 future year scenarios.

Table 9-16 - Marsh End / Wolverton Road / High Street – Total Junction Flow Comparison

Total Junction Flows		
Marsh End / Wolverton Rd	**AM**	**PM**
2031 Do Minimum	1800	1907
2031 Do Something	1639	1898
Difference	*-161*	*-9*
2048 Do Minimum	2078	2100
2048 Do Something	2126	2163
Difference	*48*	*63*

Source: MKMMM Core Outputs

9.3.66. The 2031 comparison indicates a reduction in traffic flows in both the AM and PM peaks with the introduction of the development. The 2048 future year flows shows a small increase, equivalent to approximately 3% in the AM and PM peaks.

9.3.67. The traffic flow changes in the Do Something scenario do not result in a material change at the junction.

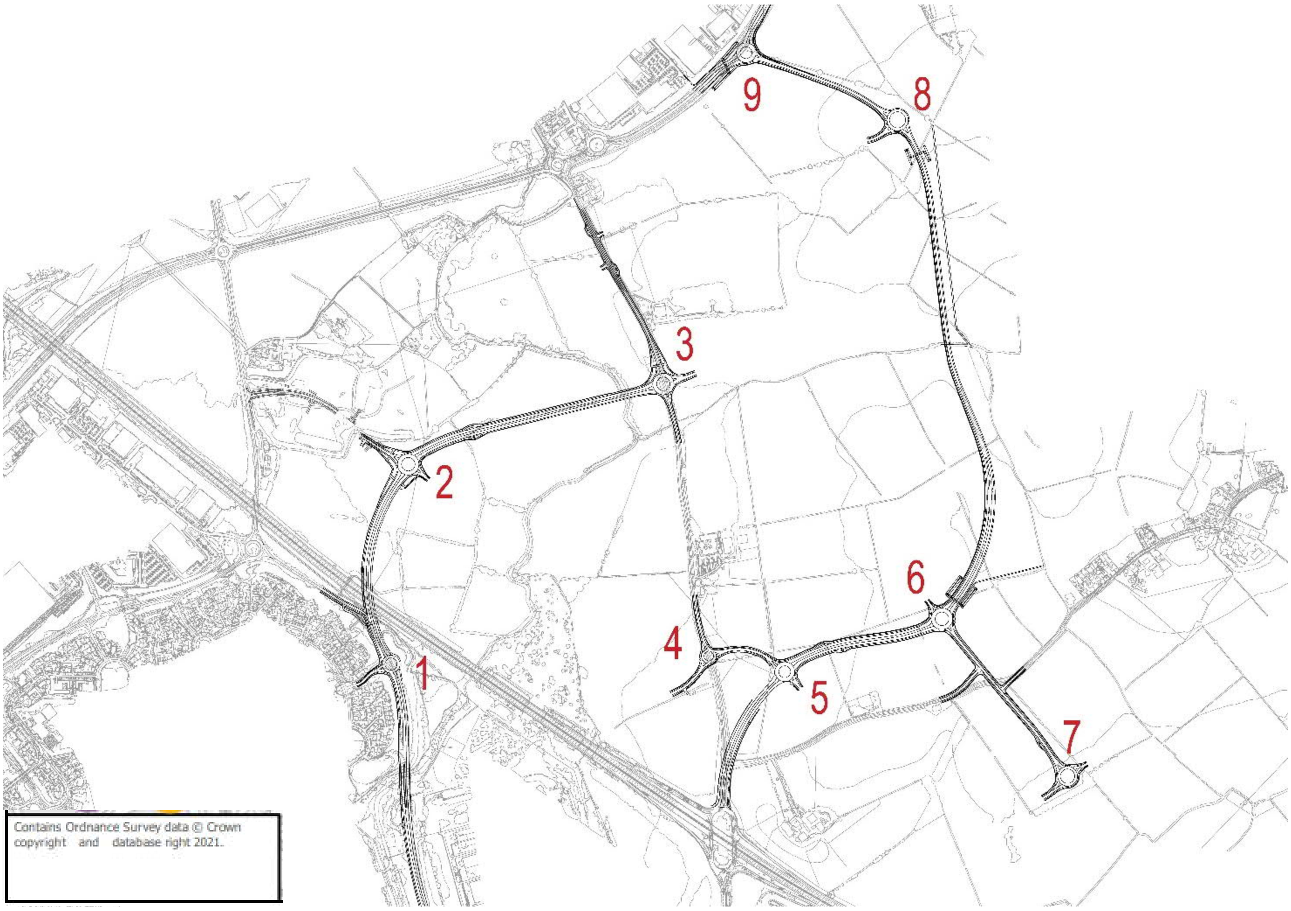
9.4. NEW DEVELOPMENT JUNCTIONS - CORE

9.4.1. As part of the assessment of the site, it is important to ensure that any new junction is suitably designed to accommodate forecast traffic flows. The proposed development includes numerous new junctions, ranging from internal-only connections to those that tie in with existing corridors and networks.

9.4.2. The design of any new junction should not over provide capacity and should be at a suitable level that can be utilised in the future without attracting vehicular use. Whilst it is acknowledged that car and vehicular travel will be prevalent for a considerable time, the danger of over-providing at junctions can result in unnecessary land take, coupled with links and junctions that encourage private vehicle use. Therefore, the development seeks to balance the provision for private vehicle use alongside providing sustainable travel connections throughout.

9.4.3. As the new infrastructure does not have street names, the new development junctions have been labelled as per the Diagram below.

Diagram 9-1 – New Development Junctions Assessed



9.4.4. Whilst it is acknowledged there are several smaller junctions included as part of the development proposals, the key new junctions have been identified for review and focus.

N1 - NEW JUNCTION 1 (TONGWELL STREET / CARLETON GATE)

9.4.5. New Junction 1 is at the existing junction of Tongwell Street and Carleton Gate but reflects the reconfiguration of Tongwell Street to a dual carriageway and the introduction of a roundabout at this junction. The new junction configuration has been assessed for both the 2031 and 2048 Do Something scenarios, with the AM and PM peak hour results shown in Table 9-17 below.

Table 9-17 – New Junction 1 – Tongwell Street / Carleton Gate Roundabout

Arm	2031: Do Something		2048: Do Something	
	RFC	Max Q	RFC	Max Q
AM Peak				
A - North Arm (Tongwell St)	0.52	1	0.74	3
B - South Arm (Tongwell St)	0.56	1	0.75	3
C - West Arm (Carleton Gate)	0.19	0	0.51	1
PM Peak				
A - North Arm (Tongwell St)	0.47	1	0.65	2
B - South Arm (Tongwell St)	0.62	2	0.72	3
C - West Arm (Carleton Gate)	0.23	0	0.42	1

Source: Junctions 9 results

9.4.6. The results outline that the new roundabout is forecast to operate within its theoretical operational capacity in both the AM and PM peaks in the 2031 and 2048 Do Something scenarios. The queues reported are considered insignificant. They present a significant betterment compared to the existing priority junction arrangement future year results shown above.

N2 - NEW JUNCTION 2 (WILLEN LINK ROUNDABOUT)

9.4.7. New Junction 2 forms the junction between the new M1 bridge link and the Willen Link road and is a new four-arm roundabout. This provides a connection to the development parcels as well as to Willen Road and the floodplain bridge towards the A509.

9.4.8. The proposed roundabout was assessed for both the 2031 and 2048 Do Something scenarios, with the results of the AM and PM peak hour assessments summarised in Table 9-18 below.

Table 9-18 – New Junction 2 – Willen Link Roundabout

Arm	2031: Do Something		2048: Do Something	
	RFC	Max Q	RFC	Max Q
AM Peak				
A - East Arm (Floodplain)	0.57	1	0.75	3
B - South East Arm (Development)	0.00	0	0.12	0
C - South West Arm (Bridge)	0.18	0	0.29	0
D - West Arm (Willen Link)	0.32	1	0.29	1
PM Peak				
A - East Arm (Floodplain)	0.36	1	0.53	1
B - South East Arm (Development)	0.00	0	0.03	0
C - South West Arm (Bridge)	0.53	1	0.66	2
D - West Arm (Willen Link)	0.78	4	0.81	4

Source: Junctions 9 results

9.4.9. The junction results demonstrate that the New Junction 2 is forecast to operate within its theoretical operational capacity in both 2031 and 2048 Do Something scenarios for the AM and PM peaks. The junction has been suitably designed and sized to ensure that any queues recorded are considered not to materially affect the operation of the junction.

N3 - NEW JUNCTION 3 (A509 / FLOODPLAIN LINK ROUNDABOUT)

9.4.10. New Junction 3 is a proposed roundabout at the junction of the existing A509 and the Floodplain Link, adjacent to the new community centre area. This roundabout was assessed for both the 2031 and 2048 Do Something scenarios, with the results of the AM and PM peak hour assessments summarised in Table 9-19 below.

Table 9-19 – New Junction 3 – A509 / Floodplain Link Roundabout

Arm	2031: Do Something		2048: Do Something	
	RFC	Max Q	RFC	Max Q
AM Peak				
A - North Arm (A509)	0.48	1	0.60	2
B - East Arm (Development)	0.40	1	0.99	21
C - South Arm (old A509)	0.39	1	0.74	3
D - West Arm (Floodplain)	0.21	0	0.17	0
PM Peak				
A - North Arm (A509)	0.42	1	0.68	2
B - East Arm (Development)	0.16	0	0.23	0
C - South Arm (old A509)	0.25	0	0.43	1
D - West Arm (Floodplain)	0.61	2	0.64	2

Source: Junctions 9 results

9.4.11. From the assessment results above, it is evident that New Junction 3 (A059 / Floodplain link Roundabout) is forecast to operate within satisfactory capacity levels in both the AM and PM peaks in the 2031 Do Something scenario.

9.4.12. In the 2048 Do Something scenario, the junction is shown to be operating at a 0.99 RFC on the eastern arm in the AM peak, which forms the approach from the development parcels adjacent to the new community centre. The PM peak shows residual capacity.

9.4.13. The AM results have been interrogated further. The development itself is not forecast to generate that level of traffic from that arm, and instead, it is suggested that re-routing from the strategic model has occurred. Upon reviewing the traffic flows from the MKMMM strategic modelling at this junction, it is evident that the model has routed vehicles through the centre of the site, past the community centre instead of continuing along the A509 through the Tickford Roundabout and via the floodplain bridge. As such, the model has overestimated the level of trips through the centre of the development, which results in the eastern arm experiencing greater levels of demand and congestion.

9.4.14. The junction has been run with a manual reassignment applied to the flows to reflect the fact that lower numbers of vehicles are likely to route through the central link of the community centre. This is discussed further in Section 12.

N4 - NEW JUNCTION 4

9.4.15. New Junction 4 provides connectivity between the existing but downgrade A509 and the new Eastern Perimeter Road and serves the employment parcels NW of M1 J14. This new roundabout was assessed for both the 2031 and 2048 Do Something scenarios, and the assessments are summarised in Table 9-20 below.

Table 9-20 – New Junction 4 – Downgraded A509 / Employment Parcel

Arm	2031: Do Something		2048: Do Something	
	RFC	Max Q	RFC	Max Q
AM Peak				
A - East Arm (Link to EPR)	0.40	1	0.51	1
B - South West Arm (Employment access)	0.06	0	0.14	0
C - North West Arm (Downgraded A509)	0.22	0	0.42	1
PM Peak				
A - East Arm (Link to EPR)	0.17	0	0.20	0
B - South West Arm (Employment access)	0.19	0	0.42	1
C - North West Arm (Downgraded A509)	0.31	1	0.33	1

Source: Junctions 9 results

9.4.16. From the assessment results outlined in Table 9-19 above, it is evident that New Junction 4 is forecast to operate within its theoretical operational capacity in both the AM and PM peaks in the 2031 and 2048 Do Something scenario. Queue lengths are deemed to be immaterial.

N5 - NEW JUNCTION 5 (NORTH OF J14 / EPR / DOWNGRADED A509)

9.4.17. New Junction 5 is the first roundabout north of M1 J14 on the new Eastern Perimeter Road. It serves as a connection back on to the existing downgraded A509 and will serve the employment parcels to the northeast of the M1 J14, and was assessed for both the 2031 and 2048 Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-21 below.

Table 9-21 – New Junction 4 – Downgraded A509 / Employment Parcel

Arm	2031: Do Something		2048: Do Something	
	RFC	Max Q	RFC	Max Q
AM Peak				
A - East Arm (EPR)	0.36	1	0.65	2
B - South East Arm (Employment access)	0.08	0	0.27	1
C - South West Arm (M1 link)	0.43	1	0.54	1
D - West Arm (downgrade A509)	0.29	1	0.60	2
PM Peak				
A - East Arm (EPR)	0.11	0	0.16	0
B - South East Arm (Employment access)	0.18	0	0.33	1
C - South West Arm (M1 link)	0.30	1	0.30	1
D - West Arm (downgrade A509)	0.53	1	0.62	2

Source: Junctions 9 results

9.4.18. From the assessment results outlined in Table 9-20 above, it is evident that New Junction 5 is forecast to operate within residual capacity in both the AM and PM peaks in the 2031 and 2048 Do Something scenario.

9.4.19. It should be noted that this junction is included within the Paramics Do Something modelling assessments. As such, the interactions between this junction and M1 Junction 14 are better presented in the Technical Note PTN1a.

N6 - NEW JUNCTION 6

9.4.20. New Junction 6 is the second roundabout north of M1 J14 on the new Eastern Perimeter Road and serves the Cranfield Link and connectivity back to Newport Road and Moulsoe Village as well as serving the central residential parcel of the development. It was assessed for both the 2031 and 2048 Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-22 below.

Table 9-22 – New Junction 6 – EPR / Cranfield Link Roundabout

Arm	2031: Do Something		2048: Do Something	
	RFC	Max Q	RFC	Max Q
AM Peak				
A - North Arm (EPR N)	0.29	0	0.50	1
B - South Arm (Cranfield Link)	0.39	1	0.90	8
C - South West Arm (EPR S)	0.12	0	0.21	0
D - North West Arm (Dev access)	0.09	0	0.21	0
PM Peak				
A - North Arm (EPR N)	0.08	0	0.14	0
B - South Arm (Cranfield Link)	0.35	1	0.42	1
C - South West Arm (EPR S)	0.22	0	0.24	0
D - North West Arm (Dev access)	0.23	0	0.39	1

Source: Junctions 9 results

9.4.21. From the assessment results outlined in Table 9-22 above, it is evident that New Junction 6 is forecast to operate within its theoretical operational capacity in both the AM and PM peaks in the 2031 Do Something scenario. In the 2048 Do Something scenario in the AM, the South Arm is forecast to operate slightly beyond the 0.85 RFC theoretical operational capacity threshold. All queues lengths are deemed to be immaterial.

N7 - NEW JUNCTION 7

9.4.22. New Junction 7 is a roundabout serving the residential and employment parcels on either side of the Cranfield Link included in both the 2031 and 2048 Do Something scenarios.

9.4.23. The way the strategic modelling was coded meant that only zone connectors were included in this location. Therefore, no turning outputs can be created from the MKMMM scenarios. Regardless, as the roundabout only serves development parcels (and does not have through traffic), there are no concerns about the roundabout's size and capacity.

N8 - NEW JUNCTION 8

9.4.24. New Junction 8 serves the MKC land to the east of the Eastern Perimeter Road. The new link road through the MKE development site connects the Eastern Perimeter Road with the A509 via the Community Hub and was assessed for both the 2031 and 2048 Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-23 below.

Table 9-23 – New Junction 8 – EPR / MKE Central Link Roundabout

Arm	2031: Do Something		2048: Do Something	
	RFC	Max Q	RFC	Max Q
AM Peak				
A - East Arm (Dev Access)	0.00	0	0.07	0
B - South Arm (EPR)	0.15	0	0.43	1
C - South West Arm (Dev access/central)	0.02	0	0.06	0
D - West Arm (EPR)	0.48	1	1.00	29
PM Peak				
A - East Arm (Dev Access)	0.00	0	0.04	0
B - South Arm (EPR)	0.42	1	0.45	1
C - South West Arm (Dev access/central)	0.18	0	0.24	0
D - West Arm (EPR)	0.13	0	0.21	0

Source: Junctions 9 results

9.4.25. From the assessment results outlined in Table 9-23 above, it is evident that New Junction 8 has been designed to operate with residual capacity in both the AM and PM peaks in the 2031 Do Something scenario.

9.4.26. In the 2048 Do Something scenario, the junction is forecast to operate well across most arms in the AM peak, apart from Arm D, which forms the western EPR arm. Similar to the new Junction 3 results, it is evident that the model has routed vehicles through the centre of the site, which would not realistically occur.

9.4.27. Vehicles travelling towards central Milton Keynes would seek to stay on the most logical and strategic routes where possible. These strategic routes, such as the A509 and the new dualled carriageway in the site, connecting to the new M1 bridge, would be quicker and less prone to delays compared to a smaller community centre and development access road. Therefore, it is considered that the model has misrepresented the attractiveness of the link past the community centre, and further analysis is required.

9.4.28. As this rerouting was observed in the Junction 3 analysis above, the analysis confirms that the vast majority of movements are from through traffic, not originating from the development parcels. As such, a manual re-assignment test has been completed, which is discussed in Section 12.

N9 - NEW JUNCTION 9

9.4.29. New Junction 9 forms the junction between the new Eastern Perimeter Road and the existing A509. It was assessed for both the 2031 and 2048 Do Something scenarios. The results of the AM and PM peak hour assessments are summarised in Table 9-25 below.

Table 9-24 – New Junction 9 – EPR / A509 Roundabout

Arm	2031: Do Something		2048: Do Something	
	RFC	MAX Q	RFC	MAX Q
AM Peak				
A - North Arm (A509)	0.78	4	1.12	158
B - East Arm (EPR)	0.17	0	0.45	1
C - West Arm (A509)	0.29	0	0.36	1
PM Peak				
A - North Arm (A509)	0.40	1	0.52	1
B - East Arm (EPR)	0.54	1	0.64	2
C - West Arm (A509)	0.74	3	0.62	2

Source: Junctions 9 results

9.4.30. From the results of the assessment outlined in Table 9-25 above, it is evident that the New Junction 9 roundabout has been designed to operate with residual capacity in both the AM and PM peaks in the 2031 Do Something scenario.

9.4.31. In the 2048 Do Something scenario, the Northern Arm, the A509, is forecast to operate with an RFC of 1.12. This is due to the considerable amount of vehicular demand both for the straight-ahead movement and the left turn onto the EPR.

9.4.32. As mentioned in the Junction 3 and Junction 8 analysis above, traffic re-routing has resulted in an imbalance in turning movements. In this case, the left turn from the northern arm is too high due to through traffic then routing via the link past the community centre. This combined with high levels of background growth, place significant demand in the AM peak towards central Milton Keynes. As part of the manual assignments undertaken in Section 12, Junction 9 will be reviewed.

WILLEN ROAD – NORTHERN SIGNAL ACCESS JUNCTION

9.4.33. The modelling assesses the wider allocation as a whole, including the proposals for a signalised access junction on Willen Road at the northern end of the link. This junction will provide access to the Bloor and Segro development parcels.

9.4.34. A skeleton LinSig junction model was created for input into the MKMMM modelling. The same LinSig has been used with the 2031 and 2048 core modelling outputs to ascertain that the current designs, taken from the Segro planning application, remain appropriate.

9.4.35. It was noted in the strategic modelling that whilst the northern access is considered the primary access point to the Bloor development, as a secondary connection was coded that fed onto the Willen Link Road and ultimately the southern signalised junction, that the Saturn model may balance flows between the two points.

9.4.36. The MKMMM outputs for the Do Something modelling runs have been included in the skeleton LinSigs, with the outputs summarised in Table 9-25 below.

Table 9-25 – Willen Road – Northern Signal Access – AM / PM Peak Hour

Arm	2031: Do Something		2048: Do Something	
	DoS	MMQ	DoS	MMQ
AM				
Willen Rd N (S/B) Left Ahead	68.5%	6	84.3%	13
Willen Rd N (S/B) Ahead Right	72.9%	7	49.9%	3
Bloor Access (Northern) Left Right Ahead	7.4 %	0	29.8%	2
Willen Rd S (N/B) Ahead Left	38.5%	3	32.5%	3
Willen Rd S (N/B) Right Ahead	28.3%	2	34.8%	4
SEGRO Ahead Right Left	33.1%	2	42.0%	2
PM				
Willen Rd N (S/B) Left Ahead	52.1%	4	58.6%	5
Willen Rd N (S/B) Ahead Right	57.0%	5	63.4%	5
Bloor Access (Northern) Left Right Ahead	10.4%	1	12.5%	1
Willen Rd S (N/B) Ahead Left	38.1%	3	38.5%	3
Willen Rd S (N/B) Right Ahead	41.0%	3	42.0%	3
SEGRO Ahead Right Left	72.7%	4	73.7%	4

Source: LinSig 9 results

9.4.37. From the modelling, the signal junction is shown to operate satisfactorily with the forecast flows in both 2031 and 2048. Signal cycle times were increased in the 2048 AM peak to accommodate the higher demand within this time period but still indicate that the junction can operate with residual capacity.

WILLEN ROAD – SOUTHERN SIGNAL ACCESS JUNCTION

9.4.38. Similar to the northern junction on Willen Road, a skeleton LinSig junction model for the southern junction, which is in the form of a signal three-arm junction with Willen Road and the Willen Link, was created for input into the MKMMM modelling. That LinSig has been used with the 2031 and 2048 core modelling outputs to ascertain that the current designs are suitable in principle. It is envisaged that the junction designs will be picked up by the respective landowners in that area but that the results below can be used to demonstrate that feasible access can be accommodated.

9.4.39. The MKMMM outputs for the Do Something modelling runs have been included in the skeleton LinSigs, with the outputs summarised in Table 9-26 below.

Table 9-26 – Willen Road – Southern Signal Access – AM / PM Peak Hour

Arm	2031: Do Something		2048: Do Something	
	DoS	MMQ	DoS	MMQ
AM				
Willen Rd N (S/B) Left Ahead	67.5%	5	69.2%	5
Willen Rd N (S/B) Ahead	69.7%	6	71.8%	6
Bloor Access (Southern) Left Right	73.1%	6	77.9%	7
Willen Rd S (N/B) Ahead	21.1%	2	11.3%	1
Willen Rd S (N/B) Right Ahead	16.7%	1	38.0%	2
PM				
Willen Rd N (S/B) Left Ahead	81.6%	9	73.5%	7
Willen Rd N (S/B) Ahead	7.8%	1	27.5%	2
Bloor Access (Southern) Left Right	51.8%	3	71.3%	5
Willen Rd S (N/B) Ahead	18.5%	1	16.7%	1
Willen Rd S (N/B) Right Ahead	50.0%	2	76.7%	4

Source: LinSig 9 results

9.4.40. As with the Northern junction, the Southern signal junction is shown to operate satisfactorily with the forecast flows in both 2031 and 2048 Do Something scenarios. The junction is operating with a low cycle time to minimise delay for users across.

9.4.41. The analysis demonstrates that signals at this location are feasible and appropriate. Further design work will be undertaken by the respective landowners in the area.

10. STRATEGIC ROAD NETWORK IMPACT

10.1. INTRODUCTION

10.1.1. This Section presents the assessments undertaken to ascertain the potential impacts on the Strategic Road Network (SRN).

10.1.2. With regard to impacts at the M1 J14, Highways England are responsible for the mainline M1 and the slip roads up to the circulatory carriageway, which, along with the A509 approaches, are the responsibility of MKC. MKC are also the highway authority for Northfields Roundabout.

10.1.3. This Section covers:

- A summary of the Paramics micro-simulation modelling undertaken at J14 and Northfields;
- Further merge and diverge analysis at Junction 14;
- Link flow impact review at J13; and
- Detailed review of Northfields Roundabout in isolation.

10.2. PARAMICS TESTING AT J14 AND NORTHFIELDS ROUNDABOUT

10.2.1. In agreement with MKC and Highways England, the two key tools used in this assessment are MKC's Multi Modal Model (MKMMM), based on the Saturn software, and a micro-simulation Paramics model of J14 and Northfields roundabout. Further tests of Northfields Roundabout in isolation have been undertaken, and are discussed in Section 10.5.

10.2.2. The Paramics Technical Note 1 (PTN1a) discusses the findings from assessing the impacts of development across both the HE and MKC components of M1 J14 and Northfields Roundabout. This note is contained within Appendix M.

10.2.3. A previous version of the PTN1 note was presented initially to MKC and Highways England as a summary of the analysis at that point in time. Following further discussions with Highways England and their modelling consultants, AECOM, adjustments and updates to the baseline validation models, in both time periods, have been completed leading to the current version of that note included in Appendix M.

10.2.4. Therefore, the final outputs in PTN1a use the updated baseline models, the changes of which have been included in all future year models, and presents updated results accordingly. The Paramics modelling has also included running the Key Planning Test (2031 future year plus full development) through the MKMMM, which now supersedes other manual tests.

CORE SCENARIOS

10.2.5. The models have also been run using the MKMMM Core Do Minimum (without development) and Do Something (with development and infrastructure) outputs from the MKMMM strategic model.

10.2.6. It is evident that the new infrastructure added as part of the Do Something network has resulted in a significant re-routeing and changing in route choice for vehicles, especially those coming from the northeast towards central Milton Keynes and J14, both in 2031 and 2048 future years. The new M1 bridge is shown to experience considerable use by vehicles in both the AM and PM peaks. It suggests that the new bridge over the M1 is fulfilling its brief and is being utilised by large traffic volumes. In turn, this typically reduces pressure on the other crossing points of the M1.

10.2.7. The 2031 and 2048 Do Minimum scenarios both show queuing occurs at the junction, which in turns begins to influence how vehicles approach the slips. This is evident when watching the simulations run with shockwave propagating downstream, with pulsing occurring as vehicles try to weave to the correct lane, slowing down and creating breaks in the flow.

10.2.8. It is important to note the Do Something scenarios not only include the development but also include vehicle re-routeing, creating more demand for J14 and Northfields Roundabout. As shown in both 2031 (partial build-out) and 2048 (full build-out) Do Something scenarios, it is evident that the new MKE infrastructure, including the new M1 bridge crossing, experiences significant volumes of traffic utilising it. This has the benefit of providing alternative routes, balancing away from existing constraints, such as J14. Without this infrastructure, it is clear that the junctions, both J14 and Northfields Roundabout, would operate under considerable further pressure, with higher delays and congestion.

10.2.9. Reviewing J14 itself, it is evident from the queue analysis that maximum queues do not extend back onto the mainline in either direction (northbound off slip or southbound off slip) in either the AM or PM periods movements directly impacted by the development. The northbound off slip – left turn exhibits rolling queues. However, this is evident in the 2031 Do Minimum scenario and the Do Something scenario improves the performance of this movement in the AM peak.

10.2.10. It is noted that the modelling shows the influence of weaving as vehicles approach the diverge points at the junction. The weaving section between J14 and Northfields Roundabout is equally seen as a key area where a significant demand and level of interaction occurs.

10.2.11. The 2031 and 2048 Do Minimum results at Northfields Roundabout indicate that queues on the approaches occur and are expected to worsen as more background traffic gets loaded onto the network. With the introduction of the development under the Do Something scenarios, the maximum and average queues at Northfields do not materially change compared to the Do Minimum in either AM or PM peaks.

10.2.12. It should be noted that the 2048 flows are shown in PTN1a for information and are considered to present a useful interpretation of potential growth on the network.

SENSITIVITY TESTS

10.2.13. The Core results using the MKMMM outputs have been run and reviewed to give an understanding of impacts at the junction. In that review process, it became apparent that the strategic modelling flows at J14 were different from those achieved within the Paramics. As such, further tests to fully understand where the impacts occur at the junction, including adopting a sensitivity test.

10.2.14. The sensitivity tests were conducted to understand the re-routeing level within the strategic model should the reduced capacity be applied to the A509 approaches at J14. These reductions were calculated after reviewing the differences in throughput between the Paramics and MKMMM outputs under the Core scenarios.

10.2.15. As shown in PTN1, the sensitivity tests reduce through traffic at J14. Some of the development traffic is still forecast to utilise J14, as it presents the most logical route choice for the southernmost areas of development within the masterplan, especially for the employment trips. However, when reviewing the Do Something vs the Do Minimum (2048), the changes in queues, delays and overall operation suggest that the Do Something scenario does not present material or severe impact at the two junctions.

10.2.16. It is acknowledged that the sensitivity tests are a manual adjustment to alter route choice, which may not occur to the same degree in the day to day operation of the network. The adjustments are likely to slightly over-estimate the route transference away from J14, whereas the Core results are considered to over-estimate the attractiveness of J14. Therefore, the results in any scenario would be somewhere between the Core and the Sensitivity.

KEY PLANNING TEST

10.2.17. Utilising the outputs of the 2031 key planning test run through the MKMMMM, the Paramics modelling was re-run to ensure a consistent approach between the various scenarios considered. The key planning test presented is based on the 2031 Do Something test (including Full Build Out) undertaken within the MKMMM. As such, it includes any potential re-routeing of 2031 Do Minimum traffic resulting from the introduction of the new infrastructure is fully accounted for.

10.2.18. As set out in PTN1a, a review of the maximum queues on the northbound and southbound slip roads of M1 J14 was undertaken against the physical space available on those slip roads. This demonstrated that those affected by the development can be accommodated within the length of the slip road without extending back to the mainline. The modelling has identified where existing demand, such as those exiting the M1 and turning left towards Milton Keynes, is the predominant cause for observed queues.

10.2.19. With the introduction of the development, there is an increase in the right turn queue from the northbound off-slip towards MKE, resulting from traffic being attracted predominantly to the employment land uses on the site. However, even when considering the maximum queue of 44m in the AM Peak, which would extend to a length of eight vehicles from the stop line (based on 5.75m per PCU), it can be seen that this would not interfere with the left-turn towards Central MK or with the mainline M1.

10.2.20. It is acknowledged that the Northbound off slip left turn is shown as experiencing maximum queues beyond the limits of the slip road in the 2031 and 2048 Do Minimum scenarios. However, when reviewing the modelling visuals, this appears to be a rolling queue that has been picked up within the Paramics queue parameters. With the Key Planning Tests, however, it is noted that the maximum queues on the left turn lane reduce significantly (compared to the 2031 Do Minimum) with the introduction of the development and that average queues are contained within the slip extent. The PM results show that both the 2031 Do Minimum and 2031 Key planning test maximum queues can be accommodated within the slip extent.

10.2.21. The maximum queue on the southbound off-slip is circa 30 PCUs (173m) and occurs during the AM Peak. This queue relates to the right turn into Central MK. Again, this maximum queue can be accommodated within the length of the slip road without impacting the mainline, and as shown in the tables above, the introduction of the development and associated infrastructure has no material impact on this slip.

10.2.22. While it can be seen that in the Key Planning Test, the maximum queues can largely be accommodated within the length of the slip roads, it should also be recognised that the queues will be much shorter for much of the peak hour the queues will be much shorter and consequently, not extend back to the extents shown above. It should also be noted that these queues incorporate full Local Plan growth and a period of 2031, i.e. at least six years into the build-out of the development.

10.2.23. Furthermore, the change in queues resulting from the introduction of full build-out will be attributable not only to traffic generated by the development itself but also as a result of background traffic redistributing as a result of the new infrastructure being introduced.

10.2.24. Similar to the core results, the queuing at Northfields Roundabout under the key planning test appears to show little change on the majority of the approaches when reviewed against the 2031 Do Minimum. Queues and delay are shown to increase on the A4146 Southern arm. The development does not add a significant amount of traffic to this approach and so it is likely that the primary cause is a result of the right turning traffic from the north heading towards central Milton Keynes.

10.2.25. In conclusion, it is therefore considered that the introduction of the new infrastructure and full build-out of MKE has no material impact on the operation of M1 J14 when compared with how the junction will perform in the 2031 Do Minimum scenario.

10.3. JUNCTION 14 – MERGE / DIVERGE ANALYSIS

10.3.1. A merge/diverge assessment of the M1 Junction 14 has been undertaken to identify whether the form of the (on/off) slip roads is appropriate and capable to accommodate forecast traffic volumes.

10.3.2. The assessment has been undertaken in line with the guidance set out in the DMRB CD 122 Geometric design of Grade Separated Junctions. Appropriate merge and diverge layouts are determined based on the forecast merge/diverge traffic flows in conjunction with mainline flows, using merging/diverging diagrams also provided in CD 122. These layouts are set out in CD122 for motorways as follows:

- Merge Layouts:
  A Option 1 – Taper merge;
  A Option 2 – 2 lane taper merge
  B – Parallel merge;
  C – Ghost island merge;
  D – Lane gain;
  E Option 1 – Lane gain with ghost island offside merge;
  E Option 2 – Lane gain with ghost island nearside merge; and
  F – 2 Lane gain with ghost island
- Diverge Layouts:
  A Option 1 – Taper diverge;
  A Option 2 – Single lane auxillary diverge;
  B Option1 – Ghost island diverge;
  B Option 2 – 2 lane auxillary diverge;
  C – Lane drop;
  D Option1 – Ghost island lane drop;
  D Option 2 – Auxillary lane drop; and
  E – 2 Lane Drop.

10.3.3. As outlined earlier in this TA, the section of the M1 between Junctions 13 and 16 is currently being upgraded to an All-Lane Running (ALR) smart motorway to support economic growth and ease congestion in the area. The works are currently estimated to be completed in 2022-23.

10.3.4. Amey/Arup Joint Venture as a designer for the scheme on behalf of Highways England reviewed, inter alia, the merge/diverge layouts in the corridor, including Junction 14. The justification and rationale behind the design are provided in Amey/Arup's Technical Note 09 (TN09) submitted to the Project Safety Control Review Group (PSCRG) for endorsement in January 2017 (i.e. prior to commencement of works). The TN09 is included in Appendix Q.

10.3.5. It should be noted that where Relaxation or Departure from Standards was required, these were endorsed by PSCRG. For the M1 Junction 14, Amey/Arup proposed the following layouts:

- Southbound Merge – based on the traffic volumes, Layout E should be provided. However, a Through Junction Running (TJR) is being delivered at this location, making Layout E inappropriate. As such, Layout C is to be delivered.
- Northbound Merge – based on the traffic volumes, Layout F should be provided. However, a TJR is being delivered at this location, making the Layout F inappropriate. Layout C would be the preferred alternative. However, due to the existing constraints, it could not be provided, and Layout B is to be delivered.
- Northbound Diverge – based on the traffic volumes, Layout D should be provided. However, a TJR is being delivered at this location, making Layout D inappropriate. As such, Layout B is to be delivered.
- Southbound Diverge – based on the traffic volumes Layout D, should be provided. However, a TJR is being delivered at this location, making Layout D inappropriate. Layout C would be the preferred alternative. However, due to the existing constraints, it could not be provided, and Layout A is to be delivered.

10.3.6. The merge/diverge layouts identified by Amey/Arup are based on the traffic volumes derived from the AECOM M1 J13-16 Smart Motorway Programme Traffic Model for the design year of 2036, which assumes the ALR to the north of Junction 13 of the M1.

10.3.7. It should be emphasised that the Smart Motorway Programme, including its features, has been included in the MKMMM assumptions.

10.3.8. A merge/diverge assessment, similar to that carried out by Amey/Arup, has been undertaken based on the traffic volumes forecast by MKMMM for the future years of 2031 and 2048 (with and without the proposed development) utilising the Core model outputs. The assessment results are summarised in Table 10-1 and Table 10-2 for merges and diverges respectively, with the full calculations provided in Appendix R.

Table 10-1 – M1 Junction 14 Merge Assessment

Scenario	Southbound Merge			Northbound Merge		
	Main Line Flow (vph)	Merge Flow (vph)	CD 122 Layout	Main Line Flow (vph)	Merge Flow (vph)	CD 122 Layout
2031 DM (AM)	4,079	999	B	3,333	896	D
2031 DM (PM)	4,100	1,632	E	3,614	1,916	E
2031 DS (AM)	4,112	1,034	B	3,340	928	D
2031 DS (PM)	4,122	1,712	E	3,644	1,980	E
2048 DM (AM)	4,079	999	B	3,333	896	D
2048 DM (PM)	4,100	1,632	E	3,614	1,916	E
2048 DS (AM)	4,112	1,034	B	3,340	928	D
2048 DS (PM)	4,122	1,712	E	3,644	1,980	E

Table 10-2 - M1 Junction 14 Diverge Assessment

Scenario	Northbound Diverge			Southbound Diverge		
	Main Line Flow (vph)	Merge Flow (vph)	CD 122 Layout	Main Line Flow (vph)	Merge Flow (vph)	CD 122 Layout
2031 DM (AM)	3,333	2,379	D	4,079	1,934	D
2031 DM (PM)	3,614	1,678	D	4,100	1,853	D
2031 DS (AM)	3,340	2,379	D	4,112	1,934	D
2031 DS (PM)	3,644	1,649	D	4,122	1,810	D
2048 DM (AM)	3,300	2,374	E	4,763	1,934	D
2048 DM (PM)	4,119	2,084	D	4,871	1,934	D
2048 DS (AM)	3,273	2,367	E	4,597	1,934	D
2048 DS (PM)	4,097	2,053	D	4,897	1,934	D

10.3.9. As set out in Table 10-1 and Table 10-2 above, the layouts identified as a result of the merge/diverge assessment vary between the peak hours and assessment years. As such, the worst-case result is considered for each of the merge/diverge. The resulting layouts compared to the layouts identified by Amey/Arup are provided in Table 10-3 below.

Table 10-3 – Merge/Diverge Layouts

Merge/Diverge	WSP Identified Layout (DM)	WSP Identified Layout (DS)	Amey/Arup Identified Layout	Layout to be Delivered*
Southbound Merge (2031)	E	E	E	**C**
Southbound Merge (2048)	E	E		
Northbound Merge (2031)	E	E	F	**B**
Northbound Merge (2048)	E	E		
Northbound Diverge (2031)	D	D	D	**B**
Northbound Diverge (2048)	E	E		
Southbound Diverge (2031)	D	D	D	**A**
Southbound Diverge (2048)	D	D		

** see the justification above and in Amey/Arup's Technical Note 09 in Appendix Q*

10.3.10. The comparison provided in Table 10-3 above suggests that the layout requirements remain unchanged after introducing the additional traffic associated with the proposed development, except for the northbound diverge in 2048.

10.3.11. For the Southbound Merge, Amey/Arup identified Layout E as that providing sufficient capacity. This is also the case for both 2031 and 2048 scenarios assessed as part of this TA. However, as noted above, the layout to be delivered is Layout C. The justification for the change of the layout was accepted by PSCRG. As such, it is also considered acceptable for the proposed development.

10.3.12. The assessment identified Layout E to be appropriate for the Northbound Merge in both assessed future years. Amey/Arup identified Layout F as that providing sufficient capacity. However, as noted above, the layout to be delivered is Layout B, which PSCRG also accepted. Given that Layout B is acceptable for the merge that would otherwise require Layout F, it also deemed acceptable to accommodate the traffic associated with the proposed development.

10.3.13. The Northbound Diverge is the only slip road where the changes in traffic volumes result in two distinct layouts (i.e. Layout D in 2031 and Layout E in 2048). Amey/Arup identified Layout D as providing sufficient capacity, identical to that determined for the 2031 scenario. However, as noted above, the layout to be delivered is Layout B, which was accepted by PSCRG. Given that Layout B is acceptable for the merge that would otherwise require Layout D, it also deemed acceptable to accommodate the traffic associated with the proposed development in 2031. The Amey/Arup note sets out that agreement on layouts two to three steps below suggested was acceptable. As the analysis for the MKE mirrors this, the same methodology and application is considered appropriate based on the constraints.

10.3.14. The assessment results suggest that Layout E would be appropriate for the slip road. However, as explained by Amey/Arup in their Technical Note 09, existing constraints prevent the delivery of any other layout than Layout B. Given that PSCRG accepted Amey/Arup justification, it is considered that Layout B would also be acceptable to accommodate the traffic associated with the proposed development in 2048.

10.3.15. As evidenced in the Paramics modelling, the existing and forecast left turn demand at the diverge, from vehicles exiting the M1 and heading towards Northfields Roundabout and central Milton Keynes is the predominant flow, especially in the AM peak. The proposed development is not forecast to add many if any, vehicles onto this movement. As such, the main driver for diverge layout change is existing and background traffic growth.

10.3.16. It should also be highlighted that the assessment presented in this TA is based on a robust forecast trip generation associated with the proposed development. The highway network is expected to operate with significant differences in the future (especially in 2048), resulting from the introduction of autonomous vehicles and a shift towards sustainable modes.

10.3.17. Finally, the assessment identified Layout D to be appropriate for the Southbound Diverge in both assessed future years, which coincide with the layout identified by Amey/Arup. However, as noted above, the layout to be delivered is Layout A. The justification for the change of the layout was accepted by PSCRG. As such, it is also considered acceptable for the proposed development.

10.4. JUNCTION 13 – LINK FLOW ANALYSIS

10.4.1. As agreed with Highways England during the modelling assessment approach, and as set out in TTN1, a review of the link flows at Junction 13 was undertaken using the MKMMM Core outputs to ascertain whether there were any significant changes in forecast flows at the junction.

10.4.2. The diagram below sets out the merges and diverges reviewed explicitly as part of the link flow analysis.

Diagram 10-1 – Junction 13 – Merge and Diverges reviewed

10.4.3. Table 10-4 below presents the 2031 and 2048 Do Minimum and Do Something flows, for both AM and PM periods for the Southbound elements of the junction using the outputs from the MKMMM model runs.

Table 10-4 - Southbound Diverge and Merge link review

Scenario	Southbound Diverge		Southbound Merge	
	AM	PM	AM	PM
2031 DM	1160	1095	1200	1189
2031 DS	1118	1091	1175	1206
Diff	-42	-4	-25	17
2048 DM	1294	1141	888	1270
2048 DS	1213	1133	937	1271
Diff	-81	-9	49	1

Source: MKMMM Core Outputs

10.4.4. Comparing the Do Something flows against the Do Minimum, the southbound diverge is forecast to experience small reductions in flow in both the AM and PM peaks. This is forecast in both the 2031 and 2048 future years. The Southbound merge in 2031 is forecast to experience reductions in flow in the AM and have a small increase in the PM period. In 2048, the AM and PM periods show small increases compared to the Do Minimum.

10.4.5. The small increases observed do not result in any material change to the operation of the merge and are likely to be imperceptible to those using the junction and well within daily flow variations. The development is unlikely to utilise the merge, so it is considered more likely that the changes result from background traffic re-routeing around the network.

10.4.6. Table 10-5 below presents the 2031 and 2048 Do Minimum and Do Something flows for both AM and PM periods for the Northbound elements of the junction.

Table 10-5 – Northbound Diverge and Merge link review

Scenario	Northbound Diverge		Northbound Merge	
	AM	PM	AM	PM
2031 DM	1666	1980	838	793
2031 DS	1652	1984	802	783
Diff	-14	4	-36	-10
2048 DM	1771	2285	920	763
2048 DS	1670	2270	860	748
Diff	-101	-16	-59	-15

Source: MKMMM Core Outputs

10.4.7. The 2031 modelling scenarios show little difference between the Do Something and Do Minimum flows, with predominantly small reductions in traffic flows. In 2048, the Do Something scenario shows reductions in traffic flows for both the diverge and merge across the AM and PM time periods.

10.4.8. Table 10-6 below presents the 2031 and 2048 Do Minimum and Do Something flows for both AM and PM periods for the mainline flows at the junction.

Table 10-6 – J13 Mainline link review

Scenario	Mainline - Southbound		Mainline - Northbound	
	AM	PM	AM	PM
2031 DM	3918	4637	4911	4500
2031 DS	4028	4743	4981	4511
Diff	*111*	*106*	*70*	*11*
2048 DM	4530	5407	4971	5440
2048 DS	4504	5465	5076	5402
Diff	*-25*	*57*	*105*	*-39*

Source: MKMMM Core Outputs

10.4.9. The 2031 mainline flows show some increase in traffic with the introduction of the Do Something modelling. The change in flows are not considered material and represent a change of between 0.2% to 2.8%. In 2048 the percentage change between scenarios is less than 2031, with some reductions observed on the Southbound in the AM and on the Northbound in the PM.

J13 SUMMARY

10.4.10. The link flow review of J13, comparing the Do Something versus the Do Minimum scenarios, indicates little change on the merge and diverges in either direction. The Do Something results indicate either small reductions or small increases. The mainline flows also show little difference.

10.4.11. As a result of the flow comparison, it is evident that the proposed development does not have a material impact at J13. The changes exhibited through the modelling exercise are likely due to background traffic rerouting more than specific development traffic flows utilising the junction. The different flow profiles would not result in any material change in the operation of the junction or mainline. As such, it is not considered that further analysis is required. These changes are all deemed to be well within daily variations in traffic flow movements.

10.5. NORTHFIELDS ROUNDABOUT

10.5.1. Whilst the Northfields Roundabout is a junction on the network under the review of MKC, it forms an integral link with J14 and the SRN.

10.5.2. The Paramics modelling includes Northfields Roundabout within the model extent, including the changes in queues and delays at the junction under the various scenarios run.

10.5.3. Considering the importance of the junction to the MKE site and the local area and following discussions with MKC, further analysis of Northfields was undertaken to ascertain the development impact.

10.5.4. As such, a separate LinSig model was created of Northfields Roundabout, the outputs of which is included within Appendix S. The MKMMM cordon flows used in the Paramics modelling were interrogated to extract the specific Northfields Roundabout turning movements and used within the LinSig models.

10.5.5. The use of a LinSig model was to provide greater flexibility in assessing what options could be implemented at the junction quickly without needing to re-run the full micro-simulation model. The Paramics modelling includes the interaction between J14 and Northfields, including the weaving section on the A509. As such, the outputs of those tests contained in PTN1a are considered to be representative of traffic conditions in future years.

10.5.6. Therefore, LinSig information provides a useful tool in identifying which time periods and scenarios exhibit the most significant impact on the operation of the roundabout. Table 10-7 below summarises the various modelling scenarios for the total junction PRC and Delay.

Table 10-7 – Northfields Roundabout – LinSig Summary Results

Year / Scenario	Time	Junction PRC %	Delay (PCU/HR)
Core Outputs			
2016 Base	AM – 08:00 – 09:00	-15.2	110.66
	PM – 17:00 – 18:00	-72.0	596.17
2031 – Do Minimum	AM – 08:00 – 09:00	-22.3	239.55
	PM – 17:00 – 18:00	-65.1	780.15
2031 – Do Something	AM – 08:00 – 09:00	-19.3	193.85
	PM – 17:00 – 18:00	-61.8	680.97
2048 – Do Minimum	AM – 08:00 – 09:00	-55.0	724.29
	PM – 17:00 – 18:00	-75.9	793.06
2048 – Do Something	AM – 08:00 – 09:00	-63.5	777.06
	PM – 17:00 – 18:00	-63.0	697.71
Key Planning Tests			
2031 – Do Something (KPT)	AM – 08:00 – 09:00	-21.5	184.68
	PM – 17:00 – 18:00	-69.3	758.39
2031 – Do Something (KPT) – Sensitivity	AM – 08:00 – 09:00	-21.0	172.80
	PM – 17:00 – 18:00	-70.6	744.51

Source: LinSig outputs

10.5.7. The LinSig results in Table 10-7 above, indicate that the Northfields Roundabout is operating above capacity in all scenarios.

10.5.8. Focusing on the 2031 Do Minimum core modelling runs, the Northfields Roundabout is shown to operate with a negative PRC of -22% and -65% in the AM and PM peaks respectively. This indicates that the junction performs well above its theoretical operational capacity and that significant queues and delays occur. With the introduction of the development in the 2031 Do Something runs, the junction is still forecast to operate over capacity, but with minor improvements compared to the Do Minimum results. It is considered that the new MKE infrastructure, including the M1 bridge crossing, is likely to be diverting traffic away from the Northfields Roundabout and J14. This indicates that in isolation, the partial build-out of the MKE site can be accommodated at Northfields Roundabout without a worsening of overall junction performance.

10.5.9. In the 2048 Do Minimum scenario, the AM and PM peak modelling continues to demonstrate that the junction is constrained, with negative PRC's of -55% and -75.9% respectively. This outlines that the considerable growth included in the 2048 scenario negatively impacts the operation of the junction. Delays and substantial queueing are then reported on all the approaches. Reviewing the development impacts in the 2048 Do Something scenario, the junction is shown to worsen slightly in the AM but see a small benefit in the PM, resulting in negative PRC values of -64% and -63% respectively.

10.5.10. The roundabout has also been run using the key planning tests scenarios. As shown in Table 10-7 above, the results outline that in the AM, the 2031 Do Something (KPT) is marginally better than the 2031 Do Minimum scenario. In the PM, the 2031 KPT test indicates a slight worsening compared to the 2031 Do Minimum.

10.5.11. The focused future year modelling identifies that the junction will be further constrained and suffering from delay and congestion with or without the development. Therefore, further discussions with MKC will be required to consider the opportunities for a wider strategic improvement scheme at this location. This is discussed further in Section 12.

11. SUSTAINABLE TRANSPORT STRATEGY

11.1. INTRODUCTION

11.1.1. This section sets out the proposed transportation strategy for MKE, particularly focused on active travel, public transport and micro-mobility modes. The above strategies complement the proposed development mobility in conjunction with the road strategy as detailed in the previous chapters of this TA.

11.2. WALKING AND CYCLING STRATEGY

11.2.1. The Walking and Cycling Strategy is detailed in the accompanying TTN9. In contrast, WSP's separate WCHAR has concluded that the MKE development and associated infrastructure will have a negligible impact on Highways England active travel network.

11.2.2. The Walking and Cycling Strategy for the proposed MKE development is based on existing connections and with the layout designed as a permeable masterplan aligned with the current context of the site. The masterplan has been designed with a focus on providing future users of the development with an interconnected network of active travel infrastructure to make walking, cycling, and the use of micro-mobility modes (such as e-scooters) the most attractive way of travelling to, from and across the site.

11.2.3. Internally, the starting point of the Walking and Cycling Strategy is to provide dedicated provision for both pedestrians and cyclists along routes that follow desire lines to minimise distances between key origins and destinations:

- An extension to the MK Redway network will be provided within the site. This will effectively include super Redways running directly alongside Grid Roads through the development. These are provided on both sides of the Grid Roads where there is adjacent development and on one-side only where there is a development adjacent to that side of the road. This approach has been discussed and agreed upon with MKC highway officers.
- Grid Roads, where there are other highway routes through the site, dedicated facilities for active travel users will be provided alongside the carriageway but physically separated (in the way of footways and cycleways) in accordance with the MKC Design Guide.
- Cyclist and pedestrian infrastructure will also be provided by traffic-free routes where demand makes this necessary to reduce the potential conflict that results from differing speeds and different users' requirements.
- Crossings for non-motorised users will be provided as a combination of new at grade, subway, and foot/cycle bridge crossings to link to existing infrastructure and new internal infrastructure.

11.2.4. There will be an extensive network of traffic-free routes throughout the development, fitting with the existing and amended/extended PRoW and Redway network. This is illustrated in the Access and Movement Parameter Plan. Regarding the design criteria, MKC's guidance on Redways will be followed.

11.2.5. By following the walking and cycling strategy, a permeable masterplan has been developed which connects to existing walking and cycling infrastructure and will implement a permeable network to satisfy pedestrians and cyclists and results in the below forecast walking and cycling accessibility illustrated in Diagram 11-1 and Diagram 11-2 respectively.

Diagram 11-1 – Forecast Pedestrian Accessibility

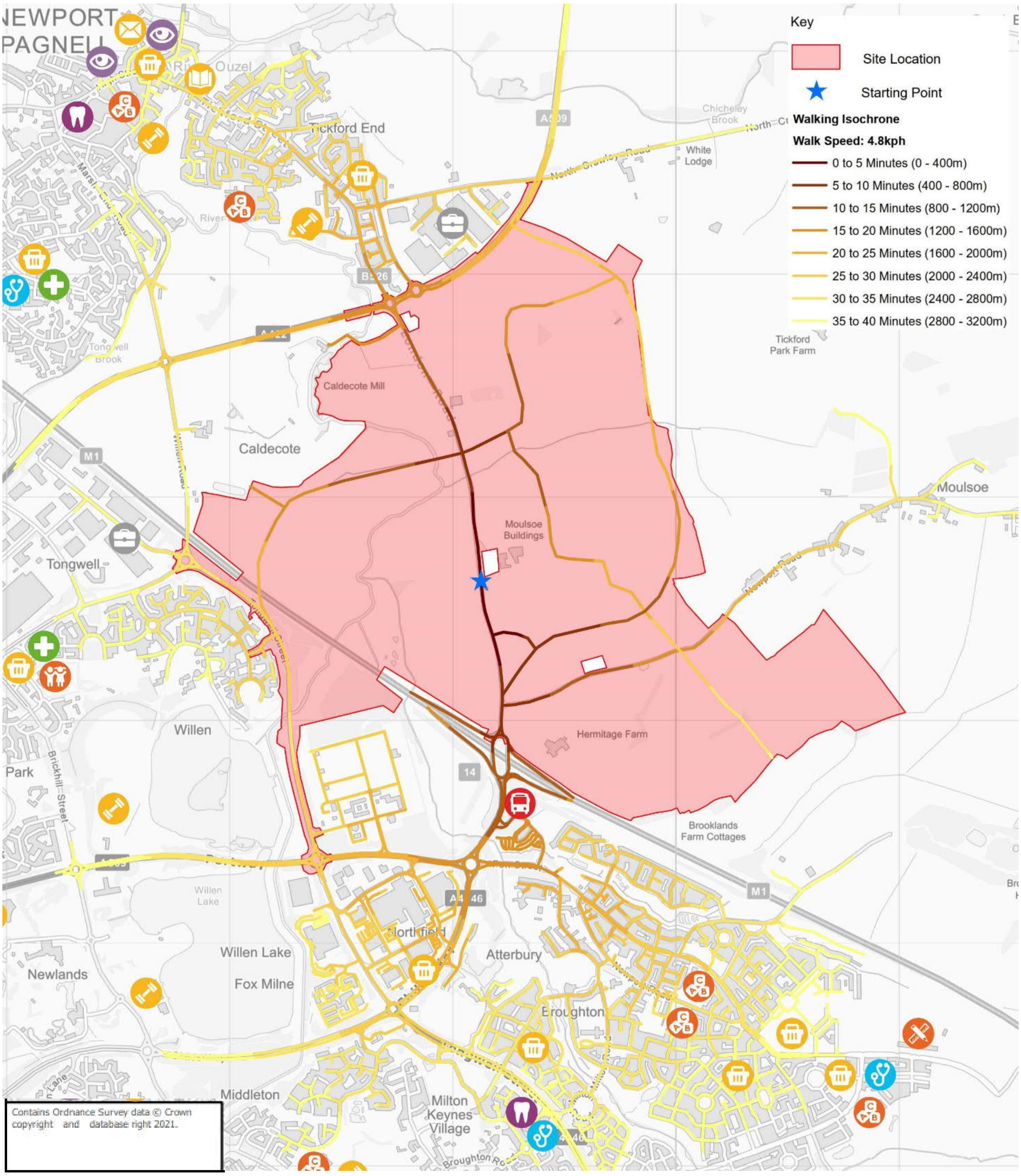
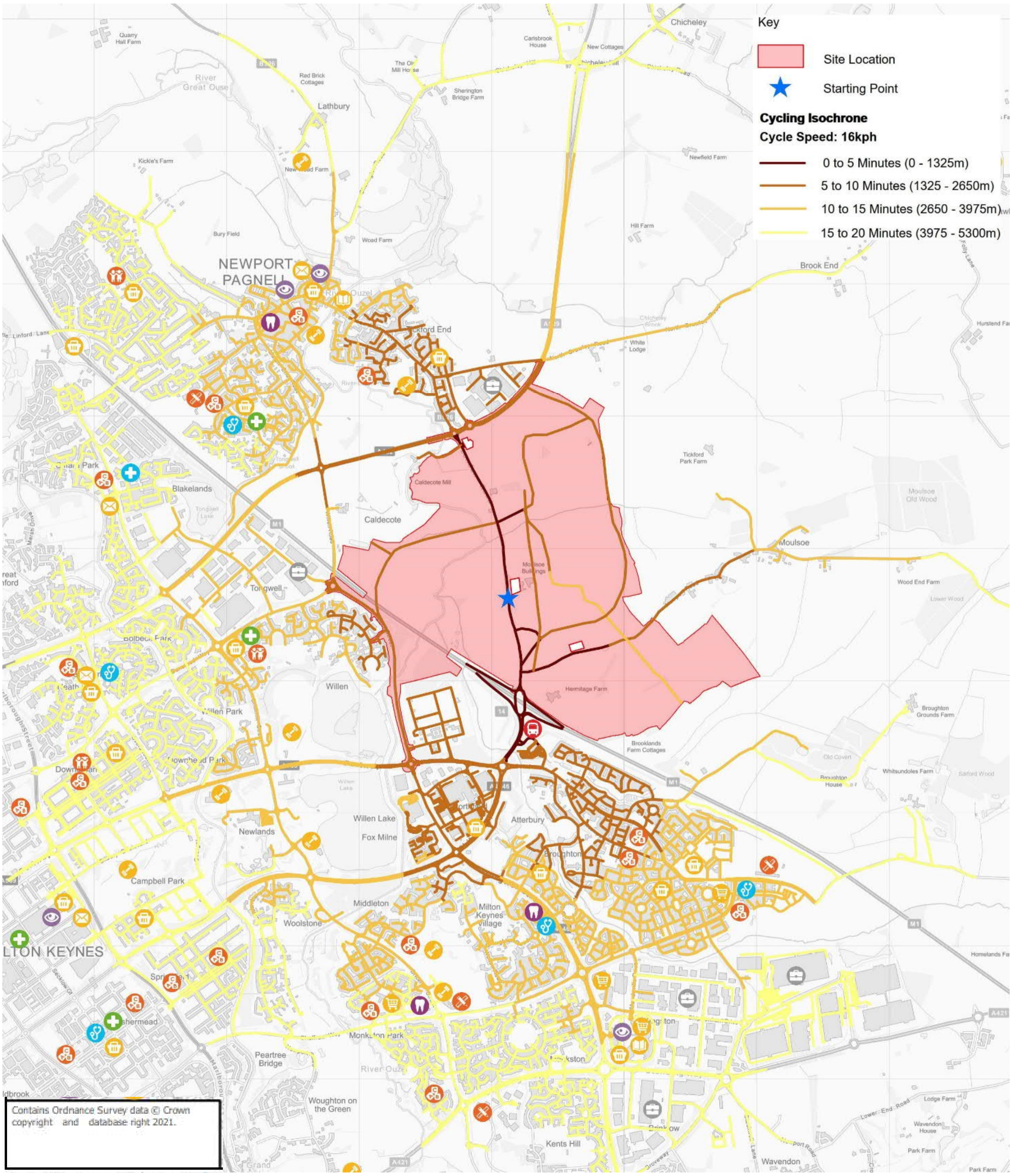


Diagram 11-2 – Forecast Cycling Accessibility



11.2.6. The diagrams demonstrate that the proposed main links and infrastructure will improve permeability to adjacent areas of the MKE site, thereby improving existing walking and cycling connectivity.

11.2.7. The forecast accessibility assessment only includes the key highway links and routes that will be available at the site. As shown in the masterplan, there will be an internal network of Redways, footpaths and PROWs through the development parcels, as well as a linear park that will provide further connections. Therefore Diagrams 11-1 and 11-2 illustrate that at a minimum, the provision in the local area will be significantly better than existing, which will be further enhanced as the masterplan and connections get built out.

11.2.8. The accessibility figures also illustrate that the proposed MKE development has been designed to become a '15-minute neighbourhood' in which residents and users will be able to access all facilities and areas of the site within a 15-minute active travel trip. This demonstrates that MKE aligns with the latest urban planning trends and city models being developed worldwide, enabling self-sufficient communities based upon proximity, diversity, density, and ubiquity. Consequently, they do not strictly need a car to satisfy their daily requirements.

11.2.9. The MKE development will consider how cycle hire and hubs around the development can further promote cycling. These initiatives will be reviewed over time through the Travel Plan frameworks, which are discussed further below. Cycle hire measures, including for leisure use, could be included within the site, extending the existing MK cycle hire scheme into the development to provide a comprehensive network of cycling opportunities. The travel plans will also consider community cycle repair facility within the community hub, vouchers for residents with discounted vouchers for purchasing a bike as well.

11.2.10. The applicant and WSP have also recently discussed the scheme with the Milton Keynes Cycling Forum, where several items were raised for consideration as the site develops. It is envisaged that the Cycling forum, alongside other stakeholders, are invited to the Travel Plan steering group meetings to help inform future decisions on cycling. The travel plans are discussed further in Section 11.4.

11.2.11. As set out in the Development Framework, the MKE site includes safeguarded land for further strategic walking and cycling crossings, including potential crossing south-east of M1 J14. The land associated with this will be made available to MKC as they review connectivity.

11.2.12. Upgrades to existing Bridleways and PRoWs have been reviewed and will be discussed with MKC as the masterplan develops, with further information provided below. Any upgrades will need to fit into MKC's wider strategic vision and will need to be appropriately designed based on forecast demand. If delivered by the MKE site, it needs to be linked/justified to the development impacts.

11.2.13. It is envisaged that a series of MKE Design guides will be developed with MKC that will, amongst others, outline the detail of the sustainable design elements and how these will be integrated within the various character areas. These design guides will utilise the latest guidance and best practise where feasible to do so, such as LTN1/20 and MKCs Redway Design guide; to provide an overarching framework, provide consistent design, and maximise connections to new and existing routes. It is expected that these design guides will also set out how the parking strategy, indicatively shown in TTN8, will also cater for cycle parking based on the MKC standards.

11.3. GRID ROAD CROSSINGS

11.3.1. As set out in the DAS and the Movement and Access Parameter plan, the development proposals include a mixture of grade-separated (either bridge or subway) and at-grade crossing points across the network. A strategy for crossing points has been developed at grid roads to ensure all parcels can safely navigate and connect to wider linkages, ensuring permeability and negating the risk of severance. These crossing points tie into the wider Walking and Cycling strategy and provide an attractive and cohesive set of crossing points for all residents and workplaces to utilise.

11.3.2. Where new grid roads are proposed, crossing points will be provided at junctions to allow movement and connection between parcels. Depending on the location and levels available, these may be subway structures or may require bridge elements. This is set out in the parameter plans.

11.3.3. In addition, as the floodplain link through the site is elevated, a subway beneath the floodplain link will be integrated with the bridge; i.e. the "subway" effectively passes beneath the bridge to allow connections to the A509, through the linear park and beyond.

11.3.4. At the new M1 bridge crossing, the existing farm track accommodation bridge will be retained for pedestrian and cycle access, with connections between that and the new Redways and PROW through the development. This will also provide connectivity into a reconfigured subway on Tongwell Street.

11.3.5. Furthermore, as outlined above, the development is safeguarding land for future improvements to walking and cycling connections, such as crossing point south-east of J14, should MKC wish to pursue these at a later date.

11.4. CONNECTIONS TO NEWPORT PAGNELL

11.4.1. Further to the development-specific crossings, the DF SPD for MKE identifies three crossing points across the A422/A509. These locations are across the A422 east of Marsh End Roundabout, across the A422/A509 in the vicinity of Tickford Roundabout and the A509 in the vicinity of Howard Way or Jenna Way.

11.4.2. The crossing of the A422 east of Marsh End Roundabout is to be delivered by Bloor as part of their development, as their land forms part of the wider MKE allocation.

11.4.3. A grade-separated crossing of the A509 in the form of a bridge can be delivered in the vicinity of Howard Way or Jenna Way. It would come forwards with one of the Reserved Matters Applications for the adjacent residential parcels and relies on the Eastern Perimeter Road (which runs around the eastern edge of the MKE allocation and connects the A509 with the M1 J14) having been delivered first. A link would be provided on the northern side of the A509 connecting that bridge with the existing PROW.

11.4.4. The provision of a crossing of the A422/A509 to the west of Tickford Roundabout is the most challenging crossing to deliver. Therefore, several options have been considered for this, and these are set out in TTN14 (Appendix A.14). The study has concluded, in the context of the third crossing in the vicinity of Tickford Roundabout, that either:

- A signal-controlled crossing is currently deliverable across the A509 between the Tickford and Renny Lodge Roundabouts to provide the Non-Motorised User connection between MKE and Tickford/Newport Pagnell; or

- A financial contribution is provided towards the future delivery of a subway beneath the A509 once land becomes available on the northern side of the A509 to enable it to be delivered.

11.4.5. The final configuration of the crossings towards Newport Pagnell will be discussed during each RMA stage. However, the principles are considered deliverable and of benefit to not only new MKE residents but also existing Newport Pagnell resident and workforce populations.

11.5. PROW STRATEGY

11.5.1. Alongside the Movement and Access Parameter Plan and the DAS, TTN10 sets out the site's PROW strategy (Appendix A.10). This includes how each of the PRoWs, currently traversing the MKE development site, is either retained or diverted and incorporated with the proposals and the existing provision. It should be noted that these matters will be dealt with separately with MKC as Local Planning Authority (LPA), which is responsible for Public Path Orders (PPOs) under Section 257 of the Town and Country Planning Act 1990 (‘the Act’).

11.6. BRIDLEWAY STRATEGY

11.6.1. There is an existing bridleway that traverses the eastern edge of the site running from a point south of Newport Road to North Crawley Road and beyond. The new Eastern Perimeter Road bisects this bridleway, and so it is to be diverted from a point within the vicinity of the Moulsoe stream to the point where the existing bridleway diverges into two separate bridleways leading to North Crawley Road. The bridleway will run parallel to the Eastern Perimeter Road at the far eastern edge of the site boundary with a new hedge to be provided along the application boundary, and a 4m wide bridleway then provided adjacent to the hedge, with a 1m gap provided between the hedge and the edge of the bridleway. This has been discussed with the MKC PROW officer.

11.6.2. There is also an aspiration to facilitate access into the linear park for horses with the new Eastern Perimeter Road bridge over the Moulsoe Stream providing sufficient headroom beneath to enable riders to pass through on horseback and on to a link running along the southern side of the Moulsoe Stream through the site and into the linear park.

11.6.3. It should also be noted that the Broughton Grounds Lane bridge over the M1 has a bridleway connection off it which runs into our site. Therefore, the MKE development will look at how improvements can be implemented to increase the connectivity between the Broughton area of MK and the MKE development.

11.7. PUBLIC TRANSPORT STRATEGY

11.7.1. The Public Transport Strategy is detailed in the accompanying standalone PTS. However, a summary is provided below and in TTN11 (Appendix A.11).

11.7.2. The existing bus services prior to the COVID 19 temporary changes were assessed on the assumption that these will eventually be re-instated. It is envisaged that conventional bus services will remain at the heart of the public transport strategy, complemented by on-demand services, to make it a real possibility to live and work at MKE without owning a car.

11.7.3. During the early years of development, the introduction of a demand-responsive ride-sharing service is proposed to cater for journeys.

11.7.4. By the time an on-demand service has been introduced, it is assumed that MaaS technologies will have developed so that users can make a single payment for multi-modal (i.e. bus/rail) journeys involving different bus and rail operators. Failing this, the availability of e-ticketing products will be critical to achieving seamless journeys and, in turn, the long-term viability of an on-demand service. The feasibility of operating the service using autonomous vehicles will also be investigated.

11.7.5. The strategy is predicated around a phased hierarchical approach as follows:

- The provision of a centrally located Multi-Modal Interchange Hub;
- A Principal Bus Route (PBR) between Milton Keynes East (MKE) and Milton Keynes Central and Rail Station operating electric vehicles (to be replaced at an unspecified date by the Mass Rapid Transit (MRT) system promoted by Milton Keynes Council);
- The diversion and extension of a limited number of existing bus services (route 1 and C1, C11, CX);
- The provision of Demand Responsive Transport (DRT) services feeding into the Interchange Hub; and,
- The potential conversion of the DRT services into semi-fixed or fixed-route services should demand justify.

MRT AND P&R

11.7.6. The MKE development has included routes for a 'mass rapid transit' scheme (likely bus-led) that have been safeguarded as a parameter. This ensures that a corridor is provided through the site within which any public transport prioritisation could occur.

11.7.7. The current strategy is that if the MRT were to come forwards, then the proposed dual carriageway over the floodplain, the M1 link and Tongwell Street could be converted into a single carriageway for general traffic with one lane in either direction then reallocated to the MRT once it is delivered. It is considered that this would provide an attractive and realistic alternative to using the private car by switching carriageway space in this way.

11.7.8. The MKE allocation includes the consideration of a Park and Ride (P&R) element, which at this stage would be located in the north eastern corner of the site – interlinking with the forthcoming MRT.

11.7.9. The proposed development seeks to safeguard the land for the P&R should MKC deem it appropriate for such a facility to be delivered in that location at a suitable date. The public transport and accessibility proposals put forward by the site do not rely on the P&R or MRT being in operation, albeit it is acknowledged that these would bring benefits for both the site and wider MK traffic.

11.8. TRAVEL PLANS

11.8.1. A Residential Travel Plan and Workplace Travel Plan have been produced in conjunction with this TA.

11.8.2. The Residential Travel Plan (RTP) outlines a long-term management strategy to ensure that all residents of the MKE development adopt sustainable travel behaviour where possible and practical. The targets and measures aim to minimise the number of single-occupancy vehicle journeys made to and from MKE and increase travel by sustainable modes, including walking, cycling, public transport and ridesharing/ride-hailing.

11.8.3. The RTP will be managed by a Travel Plan Steering Group (TPSG), which will act as an advisory body to review and guide the development of the RTP over time. The group will be chaired by the Travel Plan Manager and is anticipated to include representation from Berkeley St James and other key stakeholders, including MKC.

11.8.4. The RTP sets out a multi-modal package of measures to encourage all MKE residents to adopt sustainable travel. The measures are presented over four specific areas. These include:

- Enhancing Access to Public Transport and Shared Mobility Services
- Travel Information and Targeted Communications
- Managing Car Based Mobility
- Promoting Active Travel

11.8.5. The RTP also categorises these measures into those that can be implemented from development completion and measures that could be considered in the future. The RTP details that future measures can be devised through funding made available from the MKC tariff contributions applied to the site. This will allow for annual expenditure on related infrastructure, services or promotional initiatives that support the objectives and target outcomes. This will allow the Travel Plan Manager and associated stakeholders to consider new technologies and respond to changing social norms and travel demands as they materialise over time. Overall, the measures have been prepared in order to offer the best opportunity for residential development at MKE to attain the mode share targets.

11.8.6. Progress against targets will be reviewed using monitoring which is proposed to take place regularly for five years following the full occupation of the development or a date to be otherwise agreed with the TPSG. The RTP will be monitored and reviewed using various approaches to provide a robust understanding of the travel plan's effectiveness over time and how travel patterns at MKE are positively supported. The RTP will be monitored annually through Modeshift STARS – the Centre of Excellence for the Delivery of Effective Travel Plans. The monitoring and accreditation element of Modeshift STARS Community will help evaluate the effectiveness of the RTP and will prove best practice implementation. It is expected that the MKE residential development receives a 'bronze' status within the monitoring period of 5 years.

11.8.7. The Workplace Travel Plan (WTP) outlines a long-term management strategy to ensure all employees of MKE adopt sustainable travel behaviour to/from work where possible and practical. The measures aim to minimise the number of single-occupancy vehicle commuter journeys made to and from MKE and increase travel by sustainable modes, including walking, cycling, public transport and ridesharing/ride-hailing.

11.8.8. Similar to the RTP, the WTP will also be managed by a Travel Plan Steering Group (TPSG), which will act as an advisory body to review and guide the development of the WTP over time. The group will be chaired by the Travel Plan Manager and is anticipated to include representation from Berkeley St James and other key stakeholders such as MKC. The Travel Plan Manager will also work closely with Travel Plan Champions, responsible for implementing measures within their workplace organisation.

11.8.9. The WTP sets out a multi-modal package of measures to encourage all employees of MKE to adopt sustainable commuting behaviours that will facilitate positive health and wellbeing. The measures are presented over four specific areas. These include:

- Enhancing Access to Public Transport and Shared Mobility Services
- Travel Information and Targeted Communications
- Managing Car Based Mobility
- Promoting Active Travel

11.8.10. The WTP also categorises these measures into those that can be implemented from development completion and measures that could be considered in the future. The WTP details that future measures can be devised through funding from the MKC tariff contributions, which will allow for annual expenditure on related surveys, infrastructure, services or promotional initiatives that support the WTP objectives and target outcomes. This will allow the Travel Plan Manager, Travel Plan Champions and employers to consider new technologies and respond to changing social norms and travel demands as they materialise over time. Overall, the measures have been prepared in order to offer the best opportunity for employment development at MKE to attain the mode share targets.

11.8.11. Progress against targets will be reviewed using monitoring which is proposed to take place regularly for five years following occupation of the employment developments. The WTP will be monitored and reviewed using various approaches to provide a robust understanding of the travel plan's effectiveness over time and how travel patterns at MKE are positively supported. The WTP will be monitored annually through Modeshift STARS – the Centre of Excellence for the Delivery of Effective Travel Plans. The monitoring and accreditation element of Modeshift STARS for Business will help evaluate the effectiveness of the WTP and will prove best practice implementation. It is expected that employment development at MKE receives a 'bronze' status within the monitoring period of 5 years.

11.8.12. It is expected that further travel plans, such as School Travel Plans, are developed for those specific elements as each RMA comes forward. This will enable any future travel plan to build upon the framework set out in the RTP and WTP and ensure specific measures reflect current conditions.

12. TRANSPORT STRATEGY - HIGHWAYS

12.1. INTRODUCTION

12.1.1. Chapter 11 sets out the development proposals in terms of sustainable modes and non-motorised user provisions. It is acknowledged that vehicular based travel will continue to be prevalent, and as such, a strategy related to highways impacts is required.

12.1.2. The MKE development consists of several highway elements, including the delivery of major infrastructure and links. This is set out above and enables the MKE site to come forward. Further to this, it is acknowledged that a new development could have wider impacts on the local and strategic road networks.

12.1.3. This is especially true given the car dominance still observed in Milton Keynes. However, when wider initiatives in MK come forward, such as the MRT proposals and a move towards Demand Rapid Transit (DRT) bus models, a step change towards more sustainable based travel is achievable.

12.1.4. It is worth re-iterating that the planning application is for the Berkeley elements of the MKE allocation only. For the purposes of the modelling, however, the full allocation has been tested within the model. As such, any mitigation schemes developed will need to be reviewed in due course in terms of proportionality and impacts relating to specific development parcels.

12.1.5. Furthermore, any offset junction mitigation review has utilised the Core modelling results to determine when measures may be required. Where relevant, individual junctions have also utilised the key planning test outputs to ascertain if the MKE site is acting as the primary trigger for works.

12.2. DEVELOPMENT IMPACT – ALLOCATION VS BERKELEY ST JAMES SITE

12.2.1. As mentioned above, the wider MKE allocation has been assessed. As such, it is important to note that this includes the development land/parcels from Bloor, SEGRO and MKC alongside the Berkeley St James elements. Whilst it is acknowledged that the Berkeley elements form the majority of the allocation, certain junctions will experience changes in demand relative to the parcels near to them. For example, Marsh End Roundabout is located near the Bloor and SEGRO development parcels. So, it is likely to be utilised by more traffic from those elements than junctions on the new eastern perimeter road.

12.2.2. It is also noted that the allocation has had a residential quantum uplift applied within its modelling. This provides the allocation flexibility should each parcel vary in terms of housing units etc., but also means that the impacts are likely to be over-estimated.

12.2.3. As such, mitigation has been developed for the whole allocation impacts but will be reviewed during post submission discussions. Further analysis will be completed on the specific development impacts at each junction so that a proportional cost can be calculated. This is due to the assessments confirming that the MKE allocation is not solely responsible for future year growth in the area. As such, background growth, through committed developments as well as aspirational demand, especially in the case of the 2048 future year, has a significant impact on junction performance.

12.2.4. It is therefore expected that any offsite mitigation measures will be funded through proportionate developer contributions via the MK tariff applied to the site.

12.2.5. Chapter 9 of the TA assesses the various off-site junctions and makes recommendations where the further review should be undertaken. The mitigation strategies identified have been primarily focused on traffic-related schemes. However, through further discussions with MKC the junctions may benefit from alternative schemes coming forward in later years. This could change the focus from capacity related improvements to public transport priority, walking and cycling improvements or a combination of all.

12.2.6. The mitigation schemes have sought to balance improvements against available land, complexity, deliverability, and benefits over current provision. As such, in certain locations, further discussions with MKC will be required to understand the over-arching plan and vision for junction management over the build-out of the site and the next local plan periods.

12.3. EXISTING JUNCTIONS – MITIGATION SUMMARY

12.3.1. While the strategic infrastructure discussed above is required to enable the proposed MKE development to come forward, several other transport interventions ensuring that the impacts of the scheme are adequately mitigated are required. In addition to on-site measures and connections to off-site infrastructure to encourage travel by non-car modes (e.g. through the Redway network, bus services, etc.), several off-site measures would need to be implemented, such as highway junction improvements.

12.3.2. The outputs of the junction modelling work undertaken, set out in Section 9 of this TA, have been reviewed to understand which areas of the off-site highway network may require mitigation to accommodate the demand arising from the proposed development or as a consequence of introducing the new infrastructure. Table 12-1 below outlines the extent and nature of mitigation that could be required, with the corresponding assessment results provided below for each of the junctions (where applicable). The junction assessment outputs are provided in full within Appendix T. It should be noted that where mitigation has been identified as being required, this is not entirely attributable to the impacts of the development and results from wider growth associated with Plan:MK and anticipated growth beyond that to 2048.

Table 12-1 – Proposed Mitigation Summary

Junction Name	Indicative Mitigation Strategy	When required
Blakelands Roundabout	Physical adjustment to southern arm (extended flare to three-lane approach) and an extension of the flare on the western arm	Required in 2031 to reach nil-detriment. Beyond 2031 , further discussions with MKC will be required over wider strategic vision at this location
Willen Roundabout	Minor physical changes (flare lengths and entry widths adjustments) kerb line work on the northern and western arm	The results suggest that the mitigation would be required at some point between 2031 and 2048.
Pagoda Roundabout	Conversion into to a partially-signalised roundabout (southern arm remains priority-controlled) Adjustments to northern and southern exits to increase widths (kerb line and splitter island amendments)	The impacts in 2031 are not as noticeable as 2048, suggesting part-time signalisation could be an option in the 2031 period. Results suggest that a further signal scheme between 2031 and 2048 would be of benefit although this would not be directly related to the MKE development.

Junction Name	Indicative Mitigation Strategy	When required
Woolstone Roundabout	Conversion into a partially-signalised roundabout (northern arm remains e priority-controlled) Adjustments to northern and southern exits to increase widths (kerb line and splitter island amendments)	Results suggest that a part-time signal scheme in 2031 would be of benefit in the AM peak. In 2048, a signal scheme benefits the major arms but disbenefits the minor arms – therefore a wider discussions and decision by MKC will be required at a later date.
Marsh End Roundabout	Summary results confirm the mitigation set out by SEGRO (full signalisation) is largely sufficient.	The 2031 results indicate the mitigation is appropriate. The 2048 results shows that the signal junction is approaching capacity, although this is indicative of a wider background growth issue.
Carleton Gate/Tongwell	Development proposals already improve this junction to a roundabout, no further mitigation required after that.	Pre 2031 - To be delivered as part of early development works.
Fox Milne Roundabout	Conversion to full signals (currently, only north-south movements are controlled by part-time signals) No layout changes; Upgrades will likely be required for changes to signal controllers.	Results suggest that full signals wouldn't be needed until after 2031 (at some period between 2031 to 2048)
Pineham Roundabout	Conversion into a partially-signalised roundabout (southern arm remains priority-controlled) Adjustments required to internal circulatory (kerb and road marking adjustments) Adjustments (three-lane exit) required on eastern arm – mirror the western arm (kerb line, central res and splitter island amendments)	The signals compared to the current roundabout in 2031 show betterment on the western arm but slight worsening on others (DS vs DM). This suggests that the signal option would be needed between 2031 and 2048. However, given the importance of this junction, it is likely that improvements would be considered early on if appropriate.
Northfields Roundabout	Queues are shown in DM (without dev) scenarios. However, the DS (with dev) shows increases in queues.	Further discussions with MKC over wider strategic delivery of improvements at this location.
M1 J14	No improvements are suggested at this time (other than the amendments of the A509 northern arm into the junction for the development).	n/a

12.3.3. The junction mitigation assessments have been assessed using the Core modelling results. To ensure acceptability, the key planning test outputs have also been run through the various modelling platforms. To avoid replication of tables, these runs are not shown below, but some summary text is set out, and the results are included in the junction outputs within Appendix T.

E1 - BLAKELANDS ROUNDABOUT

12.3.4. The junction assessment results in Section 9 of this TA indicate that the existing priority-controlled roundabout is forecast to experience capacity issues on all arms of the junction even without the introduction of the proposed MKE development.

12.3.5. Consideration has been given to measures improving the capacity. It should be noted that the existing constraints in the form of bridge structures significantly reduce the scope for improvement on Brickhill Street (N) and H3 Monks Way (E) arms of the junction.

12.3.6. Consideration has been given to partial or full signalisation. However, the junction's size, in combination with the physical constraints, would not allow for an appropriate signalised-controlled layout to be delivered. Instead, it is proposed to widen the existing two-lane entry at Brickhill Street (S) to a 9m wide three-lane entry with the flare extended to approx. 15m. A flare extension to approx. 30m is also proposed on H3 Monks Way (W) arm.

12.3.7. The proposed mitigation strategy is shown on WSP Drawing 70057521-SK-001-A with Table 12-2 below summarising the forecast operation of the junction post-mitigation (Do Something scenarios only).

Table 12-2 - Blakelands Roundabout (mitigation in Do Something scenario only)

Arm	2031 Do Minimum		2048 Do Minimum		2031 Do Something		2048 Do Something	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
AM Peak								
A - Brickhill St (N)	0.79	4	1.10	47	0.78	4	1.11	47
B - Monks Way (E)	0.86	6	1.02	43	0.91	10	1.01	38
C - Brickhill St (S)	0.89	7	1.05	19	0.86	5	1.06	16
D - Monks Way (W)	0.77	3	0.97	20	0.74	3	0.96	18
PM Peak								
A - Brickhill St (N)	0.79	4	1.46	90	0.87	6	1.46	72
B - Monks Way (E)	0.56	1	0.74	3	0.55	1	0.73	3
C - Brickhill St (S)	0.89	7	1.04	22	0.81	4	0.95	11
D - Monks Way (W)	0.90	8	1.00	35	0.90	9	1.02	53

Source: Junctions 9 outputs

12.3.8. The results in Table 12-2 above indicate that the proposed layout changes at Brickhill Street (S) result in an increased capacity and/or reduction of queues in both AM and PM peak hours in both future-year scenarios.

12.3.9. This is also the case for H3 Monks Way (W) arm in the AM peak hour. However, in the PM peak hour, the proposed mitigation results in nil detriment in 2031 and increased RFC/queue in the 2048 scenario. Therefore, the mitigation ensures that the junction performs at a similar level to Do Minimum (e.g. should MKE not come forwards).

12.3.10. Notwithstanding the above, the proposed mitigation strategy would provide overall betterment in 2031, while in 2048, it would benefit all arms of the junction except Monks Way (W) in the PM peak. However, it should be emphasised that there is significant uncertainty about the traffic conditions in such a distant future, and additional mitigation may be considered as part of the wider MKC's strategies forming the future Local Plans.

12.3.11. The MKE development is unlikely to be the driving change in junction performance at this location in the 2048 future year, and it is considered that background growth is predominantly the reason behind increased delays and impacts observed. The proposed mitigation is therefore considered appropriate to absolve the impacts from the MKE site, including background traffic re-distribution, but it is acknowledged that MKC will likely seek to review this junction as part of any forthcoming Local Plans, which may result in more significant intervention to help accommodate longer-term growth across wider MK.

12.3.12. Table 12-2 shows the results for the Core modelling tests. The mitigated junction has also been run with the Key Panning test. As shown in those results in Appendix T, the roundabout is shown to be operating with RFCs <1.0 under the 2031 Key Planning test. This suggests that the mitigation suggested at the roundabout can accommodate the full development build-out and that any further capacity constraints are the likely result of background growth.

12.3.13. As discussed in Section 12.2, the applicant will seek to provide contributions proportional to its impact at the junction. As the site progresses, and should MKC seek to develop further strategies at Blakelands Roundabout in the future as part of its next Local Plan, the MKE development will likely review its impact as each RMA stage comes forward.

E2 - WILLEN ROUNDABOUT

12.3.14. As set out in Section 9 of this TA, the existing priority-controlled roundabout is forecast to experience capacity issues in the future year of 2048 in the Do-Minimum scenario on Brickhill Street (N) and Dansteed Way (W) in the AM peak hour.

12.3.15. Although the redistribution of the traffic resulting from the proposed MKE development (i.e. in the 2048 Do-Something scenario) would lead to an improvement at Brickhill Street (N) in the AM peak hour, the RFC would exceed the threshold value of 0.85 in the PM peak hour.

12.3.16. Given the above, it is considered appropriate to increase the capacity of both Brickhill Street (N) and Dansteed Way (W). To achieve this, it is proposed to extend the existing flare on Brickhill Street (N) to approx. 18m and on Dansteed Way (W) to approx. 25m. The proposed mitigation strategy is shown on WSP Drawing 70057521-SK-002-A with Table 12-3 below summarising the forecast operation of the junction post-mitigation (Do Something scenarios only).

Table 12-3 – Willen Roundabout (mitigation in Do Something scenario only)

Arm	2031 Do Minimum		2048 Do Minimum		2031 Do Something		2048 Do Something	
	RFC	Max Q	RFC	Max Q	RFC	Max Q	RFC	Max Q
AM Peak								
A - Brickhill St (N)	0.73	3	1.03	30	0.55	1	0.74	3
B - Dansteed Way (E)	0.42	1	0.41	1	0.49	1	0.54	1
C - Brickhill St (S)	0.53	1	0.73	3	0.52	1	0.67	2
D - Dansteed Way (W)	0.52	1	0.98	19	0.43	1	0.79	4
PM Peak								
A - Brickhill St (N)	0.81	4	0.85	5	0.59	2	0.81	4
B - Dansteed Way (E)	0.30	0	0.59	2	0.38	1	0.65	2
C - Brickhill St (S)	0.48	1	0.62	2	0.52	1	0.72	3
D - Dansteed Way (W)	0.51	1	0.77	3	0.46	1	0.68	2

Source: Junctions 9 outputs

12.3.17. The results in Table 12-3 above indicate that the proposed layout changes at Brickhill Street (N) and Dansteed Way (W) result in increased capacity and/or reduction of queues in both AM and PM peak hours in both future-year scenarios. Therefore, it is considered that the mitigation is appropriate for the MKE allocation and will also benefit in accommodating future growth in MK beyond 2031. Consequently, the full impacts at this junction which are being mitigated, are not solely down to MKE.

12.3.18. The proposed mitigation has also been tested under the key planning test scenario for information purposes. This is also shown in Appendix T. The results confirm that the mitigation is suitable to mitigate the full allocation under the key planning test theoretical scenario.

E3 – PAGODA ROUNDABOUT

12.3.19. The junction assessment results in Section 9 of this TA indicate that the existing priority-controlled roundabout is forecast to experience capacity issues on all arms in both future years of 2031 and 2048. The results suggest that the junction would experience capacity issues regardless of the delivery of the proposed MKE development.

12.3.20. Given the existing physical constraints in the form of bridge structures to the north and west of the junction and, therefore, limited scope for improvement, a signal-controlled arrangement has been considered. It is considered that the Brickhill Street (N), A509 Portway (E) and A509 Portway (W) approaches to the junction could be signal-controlled with the Brickhill Street (S) remain priority-controlled.

12.3.21. The proposed signal-controlled arrangement requires physical changes to the Brickhill Street (S) exit, which is to be widened to two lanes tapering down to a single lane further downstream. Similarly, the exit side of the Brickhill Street (N) splitter island is to be reduced to provide a two-lane exit for a longer distance.

12.3.22. The proposed mitigation strategy is shown on WSP Drawing 70057521-SK-003-A with Table 12-2 below summarising the forecast operation of the junction post-mitigation (Do Something scenarios only).

12.3.23. It should be noted that the Do Minimum results are not provided in Table 12-4 below, as these (i.e. RFC per arm as calculated by Junctions 9) are not directly comparable to the results from the assessment of traffic signals using LinSig software (i.e. DoS per lane). Instead, the queues calculated by each assessment method are used to illustrate changes in maximum queues resulting from the proposed mitigation compared to the layout prior to mitigation (i.e. Max Q vs MMQ). The Do Minimum (Junctions 9) results can be seen in Table 9-4 in Section 9 of this TA.

Table 12-4 - Pagoda Roundabout (mitigation in Do Something scenario only)

Arm	2031 Do Minimum	2048 Do Minimum	2031 Do Something		2048 Do Something	
	Max Q	Max Q	DoS	MMQ	DoS	MMQ
AM Peak						
Brickhill Street (N) Left/Ahead	13	52	90.9%	15	99.9%	27
A509 Portway (E) Left/Ahead	10	54	86.3%	15	101.9%	38
A509 Portway (E) Ahead			87.8%	16	101.8%	37
Brickhill Street (S) Left/Ahead	13	60	74.2%	6	86.2%	9
A509 Portway (W) Left/Ahead	1	2	72.2%	10	75.3%	11
A509 Portway (W) Ahead			70.4%	10	65.8%	9
PM Peak						
Brickhill Street (N) Left/Ahead	11	117	87.1%	9	98.5%	20
A509 Portway (E) Left/Ahead	2	4	68.2%	9	84.9%	15
A509 Portway (E) Ahead			70.5%	10	81.3%	14
Brickhill Street (S) Left/Ahead	4	10	64.9%	5	59.4%	4
A509 Portway (W) Left/Ahead	7	29	87.8%	17	0.0%	19
A509 Portway (W) Ahead			88.0%	17	93.2%	19

Source: Junctions 9/LinSig outputs

12.3.24. The results in Table 12-4 above indicate that the proposed (partial) signalisation of the roundabout would result in the junction operating with spare capacity (i.e. DoS of 90% or less) in 2031 on all arms, except for Brickhill Street (N) where the DoS is forecast to slightly exceeding 90% (90.9%), but still well within the junction's theoretical capacity (i.e. DoS of 100%).

12.3.25. In terms of queues, it has been calculated that there may be a modest increase in queues in 2031 on all arms, except for Brickhill Street (S) in the AM peak hour and Brickhill Street (N) in the PM peak hour, where the queues are forecast to decrease as a result of the proposed mitigation measures. However, as stated above, the junction is forecast to operate with spare and/or within its capacity in 2031.

12.3.26. The introduction of signals at the junction will create internal circulatory stop lines. Where possible, any queues associated with the internal carriageway have been balanced to be accommodated within the available space. Where internal queues are forecast to be close or slightly extend available stacking space, this will be mitigated through design and implementation of a yellow box or keep clear markings if appropriate.

12.3.27. The results of the assessment of the priority-controlled layout suggest a relatively dramatic change in 2048, with the junction forecast to operate over its theoretical capacity (i.e. RFC of 1 and above) and substantial queuing on all arms (either in the AM or PM peak, or both) in the Do Minimum scenario.

12.3.28. It is acknowledged that the proposed mitigation strategy would not fully resolve the capacity issues in 2048. However, as illustrated in Table 12-4 above, the partial signalisation of the roundabout would result in the junction operating within its theoretical capacity (i.e. with DoS <100%), except for the A509 Portway (E) arm, where the DoS would slightly exceed the value of 100%.

12.3.29. Despite the above, the mitigation scheme would significantly reduce queueing on all arms compared to the 2048 Do Minimum scenario. As such, the proposed mitigation is considered to mitigate the impact of the proposed MKE development and improve the junction operation in general.

12.3.30. The proposed mitigation has also been tested under the key planning test scenario for information purposes. This is shown in Appendix T. The results confirm that the signalisation mitigation is suitable to mitigate the full allocation to levels that are comparable with the 2031 Do Minimum scenario.

E4 – WOOLSTONE ROUNDABOUT

12.3.31. The junction assessment results in Section 9 of this TA indicate that the existing priority-controlled roundabout is forecast to experience capacity issues in both 2031 and 2048 future years regardless of the proposed MKE development.

12.3.32. Given that the existing roundabout sits on structures elevated above ground level, the scope for improvement is limited to the introduction of traffic signals. It is proposed that the junction is converted to a partially signalised roundabout with signals controlling the eastern (H6 Childs Way), southern (Brickhill Street) and western (H6 Childs Way) arms. Brickhill Street (N), forming the junction's northern arm, is to remain priority controlled. In addition to the signals situated on the approaches to the junction and its circulatory carriageway, the southern arm (Brickhill Street) exit is proposed to be widened to two lanes tapering down to a single lane further downstream. Similar widening is also proposed to the Brickhill Street (N) exit.

12.3.33. The proposed mitigation strategy is shown on WSP Drawing 70057521-SK-004-A with Table 12-5 below summarising the forecast operation of the junction post-mitigation (Do Something scenarios only).

12.3.34. It should be noted that the Do Minimum results are not provided in Table 12-5 below, as these (i.e. RFC per arm as calculated by Junctions 9) are not directly comparable to the results from the assessment of traffic signals using LinSig software (i.e. DoS per lane). Instead, the queues calculated by each assessment method are used to illustrate changes in maximum queues resulting from the proposed mitigation compared to the layout prior to mitigation (i.e. Max Q vs MMQ). The Do Minimum (Junctions 9) results can be seen in Table 9-5 in Section 9 of this TA.

Table 12-5 - Woolstone Roundabout (mitigation in Do Something scenario only)

Arm	2031 Do Minimum	2048 Do Minimum	2031 Do Something		2048 Do Something	
	Max Q	Max Q	DoS	MMQ	DoS	MMQ
AM Peak						
Brickhill Street (N) Left/Ahead	2	4	79.8%	8	109.3%	77
H6 Childs Way (E) Left/Ahead	14	130	83.6%	15	93.7%	21
H6 Childs Way (E) Ahead			82.4%	14	93.7%	21
Brickhill Street (S) Left	50	286	88.9%	12	106.5%	30
Brickhill Street (S) Ahead			77.7%	7	91.1%	11
H6 Childs Way (W) Left/Ahead	1	2	44.2%	5	87.8%	13
H6 Childs Way (W) Ahead			44.1%	5	87.7%	13
PM Peak						
Brickhill Street (N) Left/Ahead	11	55	106.1%	48	124.4%	109
H6 Childs Way (E) Left/Ahead	3	16	68.5%	9	81.8%	13
H6 Childs Way (E) Ahead			68.4%	9	81.8%	13
Brickhill Street (S) Left	10	95	93.4%	12	96.8%	17
Brickhill Street (S) Ahead			104.4%	30	65.0%	5
H6 Childs Way (W) Left/Ahead	9	16	104.0%	41	122.3%	110
H6 Childs Way (W) Ahead			104.0%	41	122.1%	109

Source: Junctions 9/LinSig outputs

12.3.35. The results in Table 12-5 above indicate that the proposed (partial) signalisation of the roundabout would result in the junction operating with spare capacity (i.e. DoS of 90% or less) on all arms in the 2031 AM peak hour. From the queue results, it is evident that the partial signalisation of the roundabout would significantly reduce the queuing at the southern arm while remaining unchanged or only slightly higher on the other arms. These increases do not represent an issue as all the arms are forecast to operate with spare capacity.

12.3.36. In the 2031 PM peak hour, however, the DoS is forecast to exceed the value of 100% on Brickhill Street (N), Brickhill Street (S) and H6 Childs Way (W), with associated increases in queues. As such, it is proposed that the traffic signals are to be operational in the AM peak only.

12.3.37. It is acknowledged that the proposed mitigation would not resolve the capacity issues in 2048, with only limited improvement for some of the arms, whilst having a knock-on effect on the operation of the others. Therefore, it is also acknowledged that given the significant uncertainty about the traffic conditions in such a distant future, additional mitigation may be considered as part of the wider MKC's strategies forming the future Local Plans.

12.3.38. As shown in Table 9-5, when reviewing the 2048 Do Something against the 2048 Do Minimum results under the priority-controlled roundabout, the Do Something flows indicate that the junction performs better with lower queues and RFCs in both AM and PM peaks across nearly all approaches. As such, the mitigation proposed is not considered necessary for the 2048 future year.

12.3.39. Therefore, the suggested mitigation provides MKC with the flexibility to adapt the focus at Woolstone Roundabout over the next local plan period and beyond. It is considered that the proposals adequately mitigate the MKE allocation at this junction and that further performance issues are caused primarily by background growth in the area. The signals have been run using the key planning test modelling scenario, which confirms that with the full development, the signals will operate similar to the 2031 Do Minimum levels. This outlines that background growth is the key trigger for causing capacity constraints at the junction.

E4 – MARSH END ROUNDABOUT

12.3.40. Part of the wider MKE allocation includes land to the west of Willen Road, promoted by SEGRO for employment development. Whilst their application has not yet been determined, it is understood that the Applicant agreed with MKC that since the developer has control over the land to the south of the junction, which could be used to assist in the delivery of a substantive improvement, works to mitigate the wider impact of the proposed development should be focused at the Marsh End Roundabout in lieu of a series of minor improvement schemes at other study area junctions.

12.3.41. Therefore, a comprehensive improvement scheme has been designed to provide a better than nil detriment improvement in junction performance. The mitigation proposals include the following:

- significant enlargement of the junction to the south;
- the introduction of traffic signal control on all four arms;
- widening on the A442 eastbound and westbound approaches to increase the length of the three-lane sections;
- provision of a toucan crossing on the A442 arm to the east of the junction as part of the proposed new Redway;
- significant widening on the Willen Road (N) arm, including the provision of the new Redway on the eastern side; and
- significant widening of the Willen Road (S) arm to provide two full lanes northbound and southbound between the Marsh End Roundabout and the proposed site access junction, along with the provision of the new Redway route.

12.3.42. The proposed improvement scheme is shown on PBA Drawing 38748-100-008 Rev A provided in Appendix U. The junction would operate a MOVA (Microprocessor Optimised Vehicle Actuation) control system.

12.3.43. The arrangement, as proposed by PBA, has been assessed with the traffic flows as extracted from the MKMMM to ensure that the new layout provides sufficient capacity and can accommodate the traffic associated with the proposed MKE development.

12.3.44. The forecast operation of the junction, with and without the proposed development, is summarised in Table 12-6 below.

Table 12-6 – Marsh End Roundabout (PBA layout)

Arm	2031 Do Minimum		2048 Do Minimum		2031 Do Something		2048 Do Something	
	DoS	MMQ	DoS	MMQ	DoS	MMQ	DoS	MMQ
AM Peak								
Willen Road (N) Left/Ahead	70.1%	7	74.7%	8	46.1%	4	63.7%	8
Willen Road (N) Ahead	46.0%	5	77.0%	10	58.2%	7	92.8%	19
A422 (E) Left/Ahead	63.8%	9	72.4%	11	68.9%	10	82.8%	11
A422 (E) Ahead	62.4%	8	70.7%	10	67.8%	9	81.5%	11
Willen Road (S) Left/Ahead	63.7%	6	88.9%	12	56.5%	3	93.7%	13
Willen Road (S) Ahead	32.1%	2	30.1%	3	14.0%	1	10.4%	1
A422 (W) Left/Ahead	44.5%	5	53.5%	6	36.6%	3	52.9%	5
A422 (W) Ahead	44.2%	5	48.6%	6	32.6%	3	45.8%	5
PM Peak								
Willen Road (N) Left/Ahead	70.9%	5	84.9%	7	45.5%	4	49.5%	4
Willen Road (N) Ahead	76.7%	6	91.0%	10	53.6%	4	80.8%	10
A422 (E) Left/Ahead	44.5%	5	58.8%	7	47.4%	6	64.2%	8
A422 (E) Ahead	42.0%	5	57.8%	7	46.8%	6	63.2%	8
Willen Road (S) Left/Ahead	71.1%	8	90.7%	17	48.7%	4	77.3%	7
Willen Road (S) Ahead	53.1%	5	40.8%	4	22.5%	2	28.3%	2
A422 (W) Left/Ahead	78.2%	12	82.3%	13	81.6%	13	84.1%	13
A422 (W) Ahead	70.0%	10	72.2%	11	58.8%	8	54.0%	7

Source: LinSig outputs

12.3.45. The results in Table 12-6 above indicate that the improved junction layout, as proposed by SEGRO, would operate with spare capacity (i.e. DoS of 90% or less) on all arms in the 2031 Do Something scenario. Notably, some of the arms/lanes are forecast to operate with even more capacity than in 2031 Do Minimum scenario due to the redistribution of the background traffic.

12.3.46. The introduction of the full MKE development in 2048 would result in the junction operating with spare capacity (i.e. DoS of 90% or less) on all arms in the PM peak hour, also as a result of the redistribution of the background traffic.

12.3.47. In the AM peak hour, some benefits of traffic redistribution would also be noticeable. However, the DoS on Willen Road (N) ahead lane and Willen Road (S) left/ahead lane would slightly exceed the threshold value of 90% (92.8% and 93.7% respectively), but still well within the junction's theoretical capacity (i.e. DoS of 100%). As such, the PBA improvements to the junction are considered capable of accommodating the traffic associated with the proposed MKE development.

12.3.48. As with the above assessments, the Marsh End mitigation has been run with the key planning test scenario for information purposes. This indicates that the signal scheme would operate with significant positive PRC in both AM and PM peaks, indicating residual capacity.

E10 – PINEHAM ROUNDABOUT

12.3.49. The junction assessment results in Section 9 of this TA indicate that the existing priority-controlled roundabout (the existing roundabout has part-time signals on the eastern approach/circulatory carriageway, which are not in operation) is forecast to experience capacity issues in the future year of 2048 regardless of the proposed MKE development. The capacity issues are also evident in both the 2031 and 2048 Do Something scenarios.

12.3.50. Given that the existing layout already comprises three-lane entries at all arms, with minimal opportunities to adjust the layout to increase the capacity, and there are constraints in the form of bridge structures to the south and west of the junction, it is deemed appropriate to re-introduce the existing signals and introduce new full-time traffic signals on the remaining arms/circulatory carriageway, except for the southern arm that would remain priority-controlled.

12.3.51. In association with introducing the signals, changes to circulatory carriageway lane markings and northern arm exist are also proposed. The existing two-lane eastern arm exit is proposed to be widened to three lanes tapering down to two lanes further downstream. The proposed mitigation strategy is shown on WSP Drawing 70057521-SK-005-A with Table 12-7 below summarising the forecast operation of the junction post-mitigation (Do Something scenarios only).

12.3.52. It should be noted that the Do Minimum results are not provided in Table 12-7 below, as these (i.e. RFC per arm as calculated by Junctions 9) are not directly comparable to the results from the assessment of traffic signals using LinSig software (i.e. DoS per lane). Instead, the queues calculated by each assessment method are used to illustrate changes in maximum queues resulting from the proposed mitigation compared to the layout prior to mitigation (i.e. Max Q vs MMQ). The 2031 and 2048 Do Minimum and Do Something scenarios (Junctions 9) results can be seen in Table 9-12 in Section 9 of this TA. Through discussions with MKC and Ringway, it was confirmed that the part-time signals at the junction were not operational and had not been operational for some time. As such, the junction was assessed using the standard roundabout software Junctions 9.

Table 12-7 - Pineham Roundabout (mitigation in Do Something scenario only)

Arm	2031 Do Minimum	2048 Do Minimum	2031 Do Something		2048 Do Something	
	Max Q	Max Q	DoS	MMQ	DoS	MMQ
AM Peak						
V11 Tongwell Street (S) Left	3	5	43.5%	2	73.2%	5
V11 Tongwell Street (S) Ahead			105.6%	48	104.4%	32
H5 A509 Portway (W) Left/Ahead	1	1	92.5%	17	90.6%	15
H5 A509 Portway (W) Ahead			0.0%	0	26.1%	2
V11 Tongwell Street (N) Left/Ahead	1	5	62.9%	7	86.1%	16
V11 Tongwell Street (N) Ahead			64.7%	7	76.4%	7
A509 Portway (E) Left/Ahead	6	53	92.5%	14	101.8%	34
A509 Portway (E) Ahead			100.6%	22	103.0%	44
PM Peak						
V11 Tongwell Street (S) Left	3	39	55.4%	3	95.9%	17
V11 Tongwell Street (S) Ahead			117.5%	110	106.3%	66
H5 A509 Portway (W) Left/Ahead	4	20	126.4%	208	85.0%	15
H5 A509 Portway (W) Ahead			0.0%	0.0	75.5%	11
V11 Tongwell Street (N) Left/Ahead	5	34	76.4%	10	106.0%	34
V11 Tongwell Street (N) Ahead			83.3%	11	106.8%	50
A509 Portway (E) Left/Ahead	1	1	67.3%	7	88.9%	9
A509 Portway (E) Ahead			68.1%	7	88.4%	31

Source: Junctions 9/LinSig outputs

12.3.53. The assessment results of the existing junction layout (priority-controlled roundabout) provided in Table 9-12 in Section 9 of this TA indicate that the junction is forecast to operate satisfactorily in the 2031 Do Minimum scenario. However, the effects of the proposed MKE development and the associated redistribution of the background traffic are forecast to result in capacity issues in the 2031 Do Something scenario.

12.3.54. This is particularly evident in the PM peak hour when Tongwell Street (N) and Tongwell Street (S) are forecast to approach their theoretical capacity (i.e. RFC values close to 1.00), and the A509 Portway (W) forecast to operate over its theoretical capacity (i.e. RFC >1.00). It is acknowledged that in the AM peak, the A509 Portway (E) is forecast to marginally exceed the operational threshold RFC value of 0.85 (RFC of 0.87) but still well within the junction's theoretical capacity (i.e. RFC of 1.00).

12.3.55. Notwithstanding the above, the results summarised in Table 12-7 suggest that the proposed measures would not fully mitigate the impacts of the proposed MKE development in 2031 and could increase queueing compared to the priority layout reducing the overall scheme benefits. Therefore, on balance it is considered appropriate to deliver the measures at some point after 2031.

12.3.56. The existing priority-controlled layout is forecast to experience capacity issues in 2048 Do Minimum regardless of the proposed MKE development. These issues are evident in the AM peak hour on the A509 Portway (E) and in the PM peak on all arms except the A509 Portway (E), all of which are forecast to operate at or over their theoretical capacity.

12.3.57. When reviewing the impacts of the priority-controlled roundabout, under the 2048 Do Something scenario, as shown in Table 9-12, the development impacts are considered negligible compared to the Do Minimum. This would indicate that improvements in 2048 are not necessarily required.

12.3.58. As outlined above, the scope for improvement at this junction is limited by its footprint and the existing physical constraints, with the proposed mitigation looking to mainly improve the operation of the A509 Portway (E) in the AM peak. In the PM peak hour, the scheme would benefit the junction more than in 2031 but still not provide enough capacity to reduce the queues. As such, the proposed mitigation could be considered to operate part-time in the AM peak only.

12.3.59. It should also be emphasised that there is significant uncertainty about the traffic conditions in such a distant future (i.e. in 2048). Additional mitigation may be considered as part of the wider MKC's strategies forming the future Local Plans.

12.3.60. It is therefore considered that the proposed mitigation provides MKC with the flexibility to adapt Pineham Roundabout over the next local plan period and beyond. It is considered that the proposals adequately mitigate the MKE allocation impacts at this junction, and that further performance issues are caused primarily by background growth in the area. This is further confirmed when running the mitigation through the key planning test scenario, which results in performance similar to 2031 Do Something levels, even though the full development is being loaded.

E11 - FOX MILNE ROUNDABOUT

12.3.61. The junction assessment results in Section 9 of this TA indicate that the existing partially signalised roundabout is forecast to experience capacity issues in both 2031 and 2048 future years regardless of the proposed MKE development.

12.3.62. The traffic approaching the junction from V11 Tongwell Street (N) and V11 Tongwell Street (S) is currently controlled by the traffic signals, including the associated traffic on the circulatory carriageway. It is proposed to signalise the remaining two arms (i.e.H6 Childs Way (E) and H6 Childs Way (W), including the circulatory carriageway, and create a fully signalised layout.

12.3.63. No physical changes, except for those associated with the installation of traffic signals and road markings, are proposed as part of the mitigation scheme. The proposed mitigation strategy is shown in WSP Drawing 70057521-SK-006-A with Table 12-8 below summarising the forecast operation of the junction post-mitigation (Do Something scenarios only).

Table 12-8 – Fox Milne Roundabout (mitigation in Do Something scenario only)

Arm	2031 Do Minimum		2048 Do Minimum		2031 Do Something		2048 Do Something	
	DoS	MMQ	DoS	MMQ	DoS	MMQ	DoS	MMQ
AM Peak								
V11 Tongwell St (N) Left/Ahead	100.2%	25	123.9%	102	41.8%	4	77.6%	8
V11 Tongwell Street (N) Ahead	13.8%	1	17.9%	2	43.9%	4	62.2%	5
H6 Childs Way (E) Left/Ahead	100.8%	36	127.5%	140	64.0%	10	84.3%	12
H6 Childs Way (E) Ahead	77.9%	6	117.4%	86	62.6%	8	57.2%	6
H6 Childs Way (E) Ahead	76.9%	6	117.2%	82	59.2%	7	58.2%	6
V11 Tongwell St (S) Left/Ahead	65.9%	8	114.6%	101	0.0%	0.0	31.8%	3
V11 Tongwell Street (S) Ahead	80.4%	10	116.6%	108	0.0%	0.0	55.5%	7
H6 Childs Way (W) Left/Ahead	37.2%	2	59.2%	4	0.0%	0.0	55.4%	7
H6 Childs Way (W) Ahead	67.6%	6	124.7%	104	0.0%	0.0	102.3%	43
PM Peak								
V11 Tongwell St (N) Left/Ahead	84.3%	15	96.9%	22	63.7%	5.7	56.4%	6
V11 Tongwell Street (N) Ahead	12.9%	1	23.4%	2	29.0%	2.2	73.9%	8
H6 Childs Way (E) Left/Ahead	74.5%	4	85.4%	9	48.8%	6.5	69.6%	8
H6 Childs Way (E) Ahead	54.3%	2	65.8%	3	42.2%	4.3	52.4%	5
H6 Childs Way (E) Ahead	49.8%	2	60.3%	3	34.6%	3.3	45.9%	4
V11 Tongwell St (S) Left/Ahead	79.7%	7	95.2%	16	0.0%	0.0	59.7%	7
V11 Tongwell Street (S) Ahead	83.4%	9	99.1%	17	0.0%	0.0	60.7%	7
H6 Childs Way (W) Left/Ahead	86.2%	10	78.1%	8	0.0%	0.0	60.5%	7
H6 Childs Way (W) Ahead	67.1%	5	100.0%	24	0.0%	0.0	63.2%	8

Source: LinSig outputs

12.3.64. The results in Table 12-8 above indicate that the proposed (full) signalisation of the roundabout would result in the junction operating with spare capacity (i.e. DoS of 90% or less) in 2031 on all arms in both peak hours.

12.3.65. This also the case for the PM peak of the 2048 Do Something scenario. In the AM peak hour, the proposed mitigation would result in all arms/lanes operating with spare capacity (i.e. DoS of 90% or less), except for H6 Childs Way (W) ahead lane that is forecast to operate slightly over its theoretical capacity with DoS of 102.3%. However, the proposals still result in a significant betterment over the 2048 Do Minimum scenario, delivering an increase in the capacity and reduction in queues.

12.3.66. To provide MKC further assurance that the mitigation is appropriate, the full signal scheme has also been run using the key planning test outputs. The results indicate that the mitigated junction would operate with positive PRC's in both AM and PM peaks.

12.4. J14 AND NORTHFIELDS ROUNDABOUT

12.4.1. The Paramics modelling, summarised in PTN1a, outlines the forecast impacts at Junction 14 and Northfields Roundabout. Furthermore, Section 10.6 reviews Northfields Roundabout in isolation to ascertain how that specific junction is operating throughout the various scenarios tested.

12.4.2. Through discussions with MKC, the current and future pressure at J14 and Northfields Roundabout is well acknowledged. However, the MKE development and allocation provides significant new infrastructure, including the new M1 bridge and improvements to Willen Road (through the proposed SEGRO scheme), which have demonstrated benefits to the wider network.

12.4.3. As the MKE development will provide early delivery of this key infrastructure, this would result in betterment in the short term as vehicles re-route away from J14 and Northfields Roundabout. This is observed in the LinSig outputs, where the Do Something scenarios in 2031 suggest slightly better performance overall compared to the Do Minimum.

12.4.4. Meetings with MKC officers have outlined that a strategic improvement package may be required at Northfields and possibly J14 in the future to account for future Local Plan growth beyond Plan:MK and in line with MKs 2050 Vision. However, it is premature to set out what appropriate intervention may be necessary prior to more detailed work being undertaken in support of the Local Plan review and 2050 vision which will provide greater granularity on where future growth is anticipated to be within MK and how that growth then impacts J14 and Northfields. This would need to be assessed and discussed with MKC and Highways England. As such, during the period of 2031 to 2040, it is likely that this area would be re-assessed as part of the next Local Plan.

NORTHFIELDS ROUNDABOUT

12.4.5. As set out above, it is evident that Northfields Roundabout will have to be reviewed at a strategic level to ensure that its interaction with J14 and the SRN is accounted for in being able to facilitate MKCs longer-term growth aspirations beyond Plan:MK.

12.4.6. As noted above, the 2031 Do Something results show a betterment over the 2031 Do Minimum, albeit the junction is still forecast to perform over capacity. However, this outlines that up to 2031, the introduction of the development and associated infrastructure would benefit Northfields Roundabout.

12.4.7. In the period post-2031, development plus, more notably, background traffic will ultimately begin to increase pressure and capacity issues at the junction. The development, therefore, is not the sole trigger for the junction's current performance issues.

12.4.8. Reviewing the development specific trips at Northfields Roundabout (taken from the PTN1a analysis), Table 12-9 below compares the MKE allocation trips versus the total junction movements under the 2031 Key Planning Test (2031 plus full development).

Table 12-9 – Northfields Roundabout – Development only impact

Time	2031 Key Planning Test	Development Only Trips	% change
AM	6928	613	8.8%
PM	6651	302	4.5%

Source: MKMMM KPT Outputs:

12.4.9. As shown in Table 12-9 above, the MKE allocation represents approximately 9% and 5% of the traffic using Northfields Roundabout in the AM and PM peaks respectively. The MKE allocation, therefore, only makes up a very small proportion of traffic that utilise this key junction. In 2048, with the introduction of further background growth, that proportion would be less than shown in the table above.

12.4.10. As part of the TA process, a review of potential options at Northfield has been undertaken, ranging from smaller schemes, such as signal controller adjustments, to larger proposals, such as segregated left-turn lanes, and initial discussions around these have been discussed with MKC.

12.4.11. However, it was agreed that it is not appropriate to suggest a change to the junction arrangement at this stage, given that the junction will likely be reviewed as part of the next Local Plan period.

12.4.12. It is, however, noted that the MKE site does have an impact at Northfields Roundabout. Therefore, the development will seek to provide a contribution proportional to the development's impacts at Northfields Roundabout and in proportion to a level of intervention that could mitigate the impacts associated with MKE alone. This can then be secured, e.g. through an S106 package or via the MK tariff applied to the site, ensuring that the contributions remain available for MKC at the appropriate time as a wider strategic improvement scheme is developed. It is envisaged that further discussions post submission will be held with MKC over this and the wider off-site mitigation strategy.

12.5. MKE DEVELOPMENT – RE-ASSIGNMENT TEST

12.5.1. As outlined in Section 9, several junctions were observed to have higher flows originating from/to minor arms that seemed disproportionate to the forecast development trips at those locations. These were primarily seen on the new internal junctions 3, 8 and 9.

12.5.2. From a further review of the MKMMM core outputs, it was observed that the Saturn model had routed vehicles through the centre of the site, using the A509 / Eastern perimeter road junction, before loading onto the flood plain link and ultimately the new M1 bridge crossing. This would not realistically occur as the central links past the Community Centre would not be promoted as a through route. Furthermore, the Saturn modelling had not coded in the appropriate "friction" that would be caused by multiple accesses and junctions, therefore over-estimating the free flow speeds in this location. This is not to say that the Community Centre would be congested, but more importantly, it would not act as a free flow link.

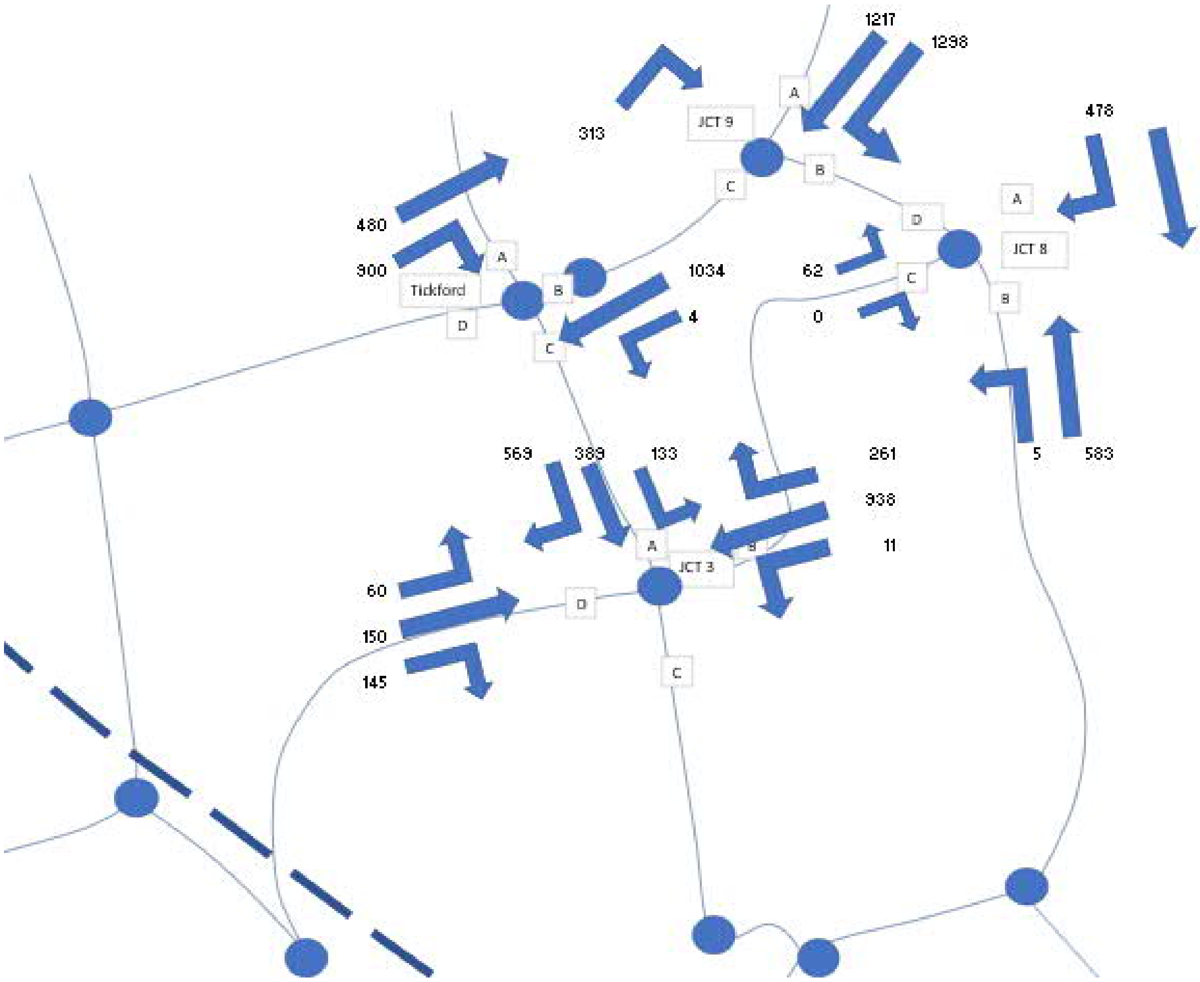
12.5.3. Vehicles travelling towards central Milton Keynes would seek to stay on the most logical and strategic routes where possible. These strategic routes, such as the A509 and the new dualled carriageway in the site, connecting to the new M1 bridge, would be quicker and less prone to delays compared to a smaller community centre and development access road. Therefore, it is considered that the model has misrepresented the attractiveness of the link past the community centre.

12.5.4. A review was undertaken, focusing on the 2048 AM peak under the Core modelling scenarios. This was discussed and agreed with MKC officers, and a manual re-assignment and test have been applied to confirm the suitability of the junctions in question. To avoid confusion, the review has focused on the following junctions;

- New Junction 9 – A509/EPR Roundabout;
- New Junction 8 – EPR/Community Centre link roundabout;
- New Junction 3 – Floodplain link/A509 roundabout (adjacent to the Community Centre);
- Existing junction Renny Lodge Roundabout; and
- Existing junction Tickford Roundabout

12.5.5. It is acknowledged that Renny Lodge Roundabout would also be subject to re-assignment, and whilst not shown in Diagram 12-1 below, assessments have also been undertaken at that junction to confirm the satisfactory operation.

Diagram 12-1 – 2048 AM – Core Modelling review, junctions subject to manual re-assignment



12.5.6. Diagram 12-1 above shows a selection of the forecast 2048 Core flows (without adjustment) in the AM peak. As shown at Junction 8, there is a high right turn flow (478 PCUs) towards the community centre link that is disproportionate to the flows seen exiting. This results in Junction 3 experiencing higher volumes of traffic exiting the eastern arm. It is considered that this would not occur, and instead, vehicles would utilise the A509 more, and this approach has been agreed with MKC.

12.5.7. Based on the above, the following manual adjustments have then been applied in the AM peak;

- Junction 9
  - Reduction of 400 PCU's from the A509 arm on the left turn (towards the EPR)
  - Re-assignment of that 400 PCU's onto the straight-ahead (Arm A to C) movement.
- Junction 8
  - Reduction of 400 PCU's from the EPR (Arm D) arm turning right towards the Community centre link.

- Tickford Roundabout
  - Increase of 400 PCU's from the eastern arm A509 (Arm B) turning left (to Arm C).
- Renny Lodge Roundabout
  - Increase of 400 PCU's from the eastern arm A509 onto the straight ahead.
- Junction 3
  - Increase of 400 PCU's on the northern arm (Arm A) onto the right turn (to Arm D).
  - Reduction of 400 PCU's from the eastern arm (Arm B) straight ahead movement (to Arm D)
  - Reduction of 150 PCU's from the northern (Arm A) straight ahead movement (to Arm C) with corresponding increase of 150 PCU's onto the right turn (to Arm D).

12.5.8. The PM peak is not observed to experience noticeable assignment issues, so the focus for these reviews has been on the AM period. The outputs of the junction re-assignment tests are shown in Appendix V.

N9 - NEW JUNCTION 9 REASSIGNMENT

12.5.9. The manual re-assignment tests for New Junction 9 are summarised in Table 12-10 below.

Table 12-10 – New Junction 9, A509 / EPR Roundabout, manual reassignment test

Arm	2048: Do Something	
	RFC	MAX Q
AM Peak		
A - North Arm (A509)	1.12	158
B - East Arm (EPR)	0.54	1
C - West Arm (A509)	0.36	1

Source: Junction 9 results

12.5.10. The manual reassignment test indicates that the northern arm (A509) would be over typical capacity thresholds, with an RFC of 1.12, and corresponding queues

12.5.11. Whilst the roundabout performs beyond its theoretical operational capacity in 2048, the key reason for this is considered to be down to background growth and not MKE. As mentioned previously, there is uncertainty around the potential level of growth that may occur. So, the junction may perform acceptably by 2048, particularly as MRT and other sustainable transport measures mature.

12.5.12. It is not considered appropriate to over-engineer the design of the A509/EPR roundabout to account for such future year forecast demand. This would undermine any non-vehicular focused strategies such as the MRT by promoting vehicular movements and creating capacity.

12.5.13. However, if further mitigation is required, consideration has been given to how this could be achieved. A segregated left-turn lane from the A509 (N) to the new Eastern Perimeter Road, indicatively shown in WSP Drawing 70057521-SK-007, has been developed. This effectively takes the left-turning traffic movement away from the roundabout, with the resultant impacts of this presented in Table 12-11 below.

Table 12-11 – New Junction 9, A059 / EPR Roundabout with segregated left turn (North Arm) - manual reassignment test

Arm	2048: Do Something	
	RFC	Max Q
AM Peak		
A - North Arm (A509)	0.82	5
B - East Arm (EPR)	0.60	2
C - West Arm (A509)	0.36	1

Source: Junction 9 results

12.5.14. The segregated left turn would result in the junction experiencing minimal queues on all approaches. It is envisaged that this would be reviewed as the development got built out at each RMA stage.

N8 - NEW JUNCTION 8 REASSIGNMENT

12.5.15. With the manual assignment, Junction 8 is forecast to reduce traffic movements. To check that the junction performs adequately, Table 12-12 provides the 2048 AM Do Something reassignment tests results.

Table 12-12 – New Junction 8, EPR / Central Link Roundabout manual reassignment test

Arm	2048: Do Something	
	RFC	Max Q
AM Peak		
A - East Arm (Dev Access)	0.05	0
B - South Arm (EPR)	0.37	1
C - South West Arm (Dev access/central)	0.06	0
D - West Arm (EPR)	0.75	3

Source: Junction 9 results

12.5.16. The analysis confirms that all approaches of the junction would operate satisfactorily, with minimal queuing under re-assignment conditions. No further adjustments would be required.

E7 – TICKFORD ROUNDABOUT REASSIGNMENT

12.5.17. Tickford Roundabout has been re-assessed with the higher left turn from the eastern arm. Table 12-13 sets out the revised 2048 AM peak results.

Table 12-13 – Tickford Roundabout manual reassignment test (2048 DS)

Arm	2048: Do Something	
	RFC	Max Q
AM Peak		
A – B256 London Road	0.71	3
B – A509 (E)	0.97	17
C – A509 London Road	0.65	2
D – A422	0.85	6

Source: Junction 9 results

12.5.18. The junction is forecast to operate under its theoretical capacity limit. It is noted that Arm B, A509 (E) would result in an RFC of 0.97. However, the junction as a whole still operates better than the 2048 Do Minimum results. As such, it is considered acceptable that the roundabout can accommodate re-assignment with minimal impacts to its operation.

E8 – RENNY LODGE ROUNDABOUT REASSIGNMENT

12.5.19. Renny Lodge Roundabout has been reassessed with the manual assignment, increasing the straight-ahead movement from the eastern arm. Table 12-14 sets out the revised 2048 AM peak results.

Table 12-14 – Renny Lodge Roundabout manual reassignment test (2048 DS)

Arm	2048: Do Something	
	RFC	Max Q
AM Peak		
A – Renny Park Road	0.32	1
B – A509 (E)	0.86	6
C – A509 (W)	0.24	0

Source: Junction 9 results

12.5.20. The junction is forecast to operate under its theoretical capacity limit. It is noted that Arm B, A509 (E) returns the highest RFC of 0.86, with low queues, however. As such, it is considered acceptable that the roundabout can accommodate re-assignment with minimal impacts to its operation.

N3 - NEW JUNCTION 3 REASSIGNMENT

12.5.21. Due to the re-assignment assumptions, new Junction 3 experiences the most significant shift in terms of alterations to turning movements. As such, Table 12-15 shows the results of the junction assessment in the 2048 AM peak.

Table 12-15 – New Junction 3 – A509 / Floodplain Link Roundabout – manual reassignment test

Arm	2048: Do Something	
	RFC	Max Q
AM Peak		
A - North Arm (A509)	0.82	4
B - East Arm (Development)	0.81	4
C - South Arm (old A509)	0.85	6
D - West Arm (Floodplain)	0.17	0

Source: Junction 9 results

12.5.22. The Junctions 9 results indicate that in 2048 the roundabout is forecast to operate within its theoretical operational limits. The South Arm returns the highest RFC of 0.85, but queues across all approaches are considered to be low. As such, no further adjustment to the design of Junction 3 would be required.

12.6. JUSTIFICATION FOR DUAL AND SINGLE CARRIAGEWAYS

12.6.1. TTN5 attached in Appendix A.5 sets out the approach to determining which links throughout the site needed to be dualled and which could remain single carriageway. This was based on the previous modelling undertaken in support of a bid made by MKC to Homes England for HIF funding for delivering the strategic infrastructure and gave comfort that links were designed appropriately.

12.6.2. The current proposals set out the following links as requiring dualling:

- Floodplain link over the River Ouzel;
- New M1 Bridge;
- Tongwell Street (Southern Section between new M1 bridge and Pineham Roundabout); and
- Southern section of the Eastern Perimeter Road (EPR) up to its connection to the Cranfield Link at the second roundabout north along the EPR from M1 J14.

12.6.3. A further review using the latest MKMMM outputs has been undertaken to confirm that the designs remain consistent with future capacity needs.

12.6.4. A review of the 2031 and 2048 flows has been undertaken. The 2031 Do Something flow (maximum recorded flows per direction in either AM or PM) is shown for selected key links in Table 12-16 below.

Table 12-16 - 2031 – Selected Link Flows and Capacity

Link	2031: Do Something	
	MAX ONE WAY FLOW	% CAPACITY (OF A UAP1)
New MKE Bridge	1263 (PM)	79.4%
Floodplain Link	1478 (PM)	92.9%
Tongwell (Immediately north of Carleton Gate)	1343 (PM)	84.5%
Tongwell (South of Carleton Gate)	1398 (PM)	87.9%
Northern section of existing A509 (South of Tickford Rbt)	914 (AM)	57.5%
Northern section of EPR (South of A509 Rbt)	914 (PM)	57.5%
Southern section of EPR (to connect to J14)	1072 (AM)	67.4%

Source: MKMMM Core outputs

12.6.5. Compared against the capacity thresholds set in DMRB TA 79-99, which still remains a relevant document for review, the links reviewed do not go over the capacity thresholds for a UAP1 single carriageway. However, as shown in Table 12-16, the calculated values get close to operational thresholds, such as the Floodplain Link and Tongwell Street.

12.6.6. The same review has been undertaken using the 2048 outputs. As shown in Table 12-17, dualling on most of those links would be required for the longer-term period up to 2048.

Table 12-17 – 2048 – Selected Link Flows and Capacity

Link	2031: Do Something	
	MAX ONE WAY FLOW	% CAPACITY (OF A UAP1)
New MKE Bridge	1648 (AM)	103.6%
Floodplain Link	1647 (AM)	103.6%
Tongwell (Immediately north of Carleton Gate)	1651 (AM)	103.8%
Tongwell (South of Carleton Gate)	1628 (AM)	102.4%
Northern section of existing A509 (South of Tickford Rbt)*	1474 (AM)	92.7%
Northern section of EPR (South of A509 Rbt)*	1211 (PM)	76.2%
Southern section of EPR (to connect to J14)1478 (P	1718 (AM)	108.0%

Source: MKMMM Core outputs

**with reassignment applied – +/-400 PCUs*

12.6.7. The development is committed to the early delivery of dual carriageway where required, which in turn would provide interim capacity beyond required based on the modelling flows.

12.6.8. The provision of dual carriageways also facilitates the early delivery of an MRT solution, as the MRT can utilise a lane of the carriageway, resulting in a traffic-free route, whilst still maintaining adequate facilities for traditional motor vehicles.

12.6.9. This promotes the use of a sustainable travel option over the traditionally focused car-based schemes.

12.6.10. As the development progresses, it is expected that the MRT and public transport provision begins to see more uptake, in turn reducing reliance on a private vehicle. As such, it is considered that in 2048 the level of forecast vehicular demand would be an overestimation, with higher volumes of bus, DRT and MRT use instead.

12.6.11. Therefore, the MKE development is providing, from the outset, infrastructure to enable non-vehicular modes to be at the forefront of the allocation. This aligns with the LTP4 and MK 2050 strategy.

12.7. SUMMARY

12.7.1. A review of junction performance in Section 9 identified several locations where mitigation strategies should be reviewed due to the changes in performance and operation under the Do Something scenarios compared to the Do Minimum runs.

12.7.2. The mitigation strategies set out above seek to balance improvements against development impacts. It should be noted that the modelling has tested the whole MKE allocation, and as such, further analysis will be required to ascertain each individual landholders impact, and therefore a proportional contribution to each junction upgrade.

12.7.3. Further assessments have also been undertaken, applying manual reassignment to reflect the use of strategic routes instead of community centre local roads.

12.7.4. Further assessments have also been undertaken, applying manual reassignment to reflect the use of strategic routes instead of community centre local roads.

12.7.5. The mitigation strategies are considered appropriate and commensurate with the comprehensive infrastructure packaged also being developed by the MKE development.

13. CONSTRUCTION TRAFFIC

13.1. INTRODUCTION

13.1.1. This chapter summarises potential impacts related to traffic associated with the construction phases of MKE. Whilst a Detailed Construction Logistics Plan (CLP) will be submitted to MKC for approval prior to the commencement of on-site works, with this to be secured by an appropriately worded condition. An Outline CLP has been produced for the purposes of the planning application. The Outline CLP is submitted as an independent report to this TA with the following primary aim:

- *'To provide MKC and Highways England with the initially planned logistics activity expected during the construction stage of MKE, which will be thereafter written within a Detailed CLP once the Principal Contractor is appointed'.*

13.1.2. In line with this primary aim, the objectives of the Outline CLP are to:

- Identify surrounding constraints and opportunities for the delivery and operation of freight associated with the construction phase of the Proposed Development;
- Identify potential opportunities for reducing, re-timing or combining deliveries;
- Forecast estimated trip generation and explore solutions to help to minimise congestion on the surrounding highway network and ease environmental pressures;
- Explore solutions to improve the reliability of deliveries to the Site; and
- Identify the needs and requirements of the future Detailed CLP, which will be prepared once a Principal Contractor is appointed.

13.1.3. The Detailed CLP / CLPs for the different phases will be prepared based on the above objectives to identify how traffic will be managed throughout the duration of the construction stage. The Detailed CLPs will also outline how pedestrian and cycle traffic will be safely and effectively managed, including those associated with the closure and/or diversions of footpaths, footways, or cycle routes due to remediation/construction works within or outside the public highway.

13.1.4. A summary of the construction programme and forecasted construction traffic and impact is provided herein.

13.1.5. As set out above, this will be refined with a Contractor then developing a detailed CLP to discharge an appropriately worded condition.

13.2. CONSTRUCTION PROGRAMME

13.2.1. The construction programme is detailed in Chapter 3 of the Outline CLP. In summary, it is anticipated that construction could continue for up to 26 years, commencing with the delivery of strategic highway and social infrastructure in 2022. Table 13-1 below provides an indicative schedule for the construction period for each phase, noting these are indicative and might be subject to change once a Principal Contractor is appointed and construction works are being progressed thereafter.

Table 13-1 – Construction Programme (Indicative)

Construction stage	Start year	End year	Residential Units	Commercial Area	Other	Independent Duration (years)
Enabling works / Infrastructure	2022	2024	-	-	HIF Funded Highway and Social Infrastructure	2
Phase 1	2025	2030	600	145,750sqm	1 primary school (2024) Community Hub Health Hub (2024) River linear park, sports pitches Grid road and primary streets for Phase 1	6
Phase 2	2031	2037	1,100	257,900sqm	1 secondary school (2032) 1 primary school (2038) Grid road and primary streets for Phase 2	7
Phase 3	2038	2048	2,900	-	1 primary school (2047)	11
					Total years from start to end = 26	

13.3. VEHICULAR ROUTEING

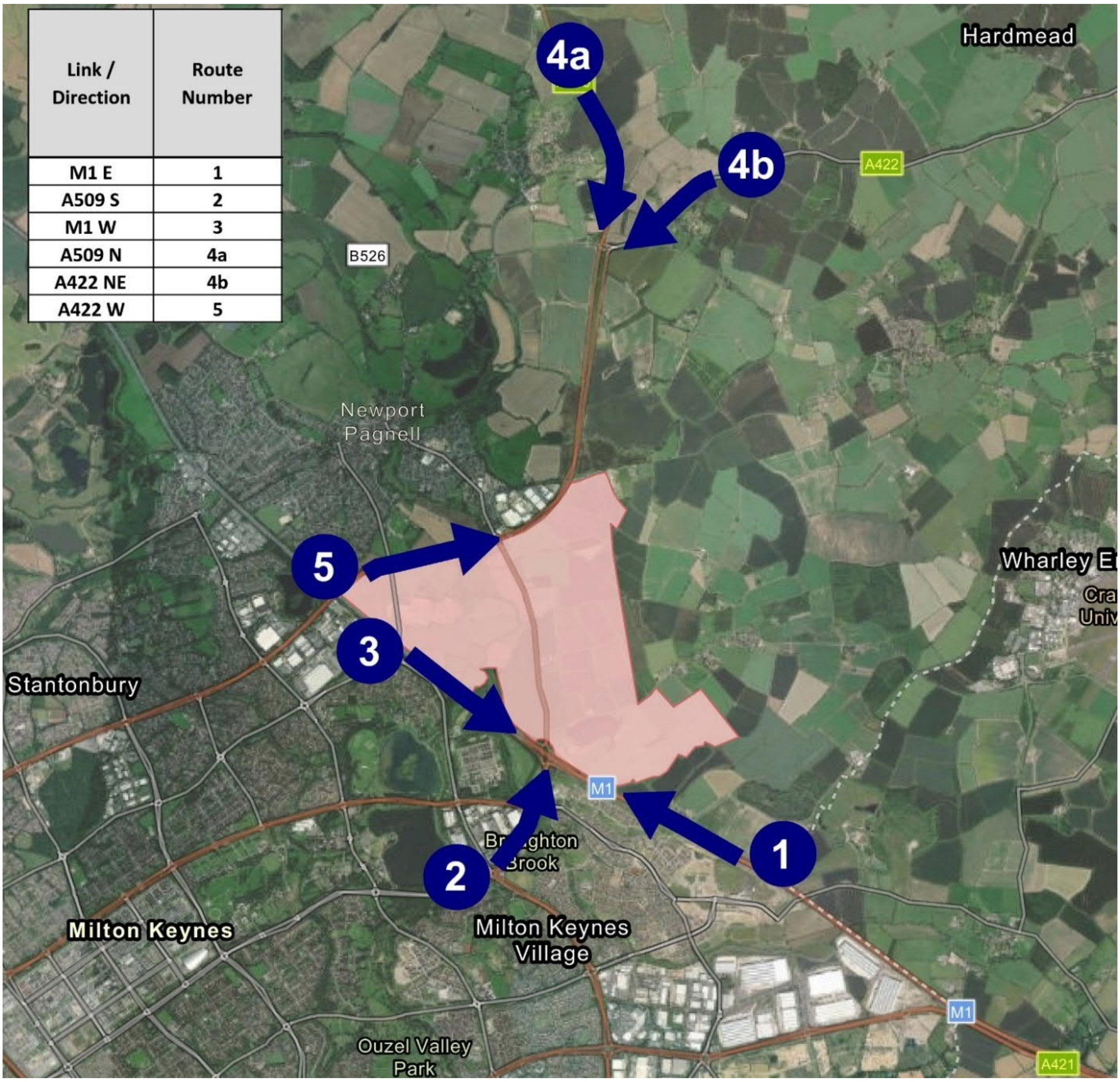
13.3.1. Four construction site access points are forecasted to be established:

- M1 junction 14 onto the A509;
- A422 (W) onto the A509;
- Tongwell Street (connecting to Willen Road); and
- A509 (S) to the site.

13.3.2. It is anticipated that access to the Site for construction vehicles will be via different routes. In principle, construction material deliveries will predominantly arrive at the site via the A509, principally via J14 of the M1. Limited local traffic would arrive at the site via the A422.

13.3.3. The different routes to be followed by construction vehicles can be seen in the strategic highway context of the Site within Diagram 13-1. These are set out following MKC's LRN until the final approach to the Site. These routes will be agreed upon with MKC and Highways England prior to commencement of construction work. However, preferred routeing of construction traffic will be identified and agreed with MKC in writing as part of the Detailed CLP for each phase or as required.

Diagram 13-1 – Construction Vehicles Routeing Plan



Source: ArcGIS Web AppBuilder, WSP, February 2021

13.3.4. It is assumed that no concrete batching plants will be installed on-site. Therefore, concrete deliveries would be required and are assumed to arrive from nearby facilities, including those at Bletchley (via the A509), at Breedon; and at Wolverton (via the A422).

13.4. FORECAST CONSTRUCTION TRAFFIC

13.4.1. Considering the scale of MKE's construction site and the different elements, which comprise the proposed development (i.e. different land uses such as commercial, educational and residential), the calculations to estimate forecast vehicular demand and traffic distribution have been based on a range of factors and assumptions which are detailed in Chapter 6 of the Outline CLP.

13.4.2. In summary, the average number of vehicular trips associated with site personnel and deliveries/construction works are summarised in Table 13-2. The forecasted distribution of vehicles along the different routes is provided in Table 13-3 below, considering traffic management to encourage using the M1 as the main route of construction vehicles.

Table 13-2 - Estimated Vehicular Demand (construction vehicles and site operatives)

Vehicular Demand	Yearly		Daily - AAWT		Daily - AADT	
	LGV	HGVs	LGV	HGVs	LGV	HGVs
No. Veh.	184,198	21,093	621	112	397	88

Table 13-3 - Estimated AADT Distribution (construction vehicles and site operatives)

Link / Direction	Route Number	% Distribution split (managed routes)		Daily - AADT	
		Total Vehicles	HGVs	LGV	HGVs
M1 E	1	30%	30%	119	26
A509 S	2	10%	10%	40	9
M1 W	3	30%	30%	119	26
A509 N	4a	10%	10%	40	9
A422 NE	4b	10%	10%	40	9
A422 W	5	10%	10%	40	9
			TOTAL	**397**	**88**

13.4.3. Chapter 6 of the Outline CLP concludes that the number of average daily trips forecasted to be introduced along the different highway routes is not significant in comparison with existing flows along the same routes. In accordance with this, it is concluded that MKE's traffic generation associated with the construction works will not be detrimental to the public highway surrounding the Site.

13.4.4. It should be noted that the earthworks strategy for the site is win material (e.g. take material and re-use from the cut and full profiles), thereby significantly reducing or possibly even negating the need for importing material; which will therefore have a significant benefit in reducing construction vehicle movements.

13.4.5. Liaison with MKC and other relevant bodies will be required to ensure that deliveries of materials to the site occur outside of highway peak hours, where practical, to minimise the impact to users of the local highway network during the construction period.

13.5. SUMMARY

13.5.1. An Outline Construction Logistics Plan (CLP) has been developed to limit any impacts of the construction period of the MKE site on the existing highway network within the vicinity of the proposed development. The Detailed CLP will be produced in due course, with input from a Principal Contractor once appointed. Alongside this, it is expected that a Logistics Manager will be appointed. As such, the CLP is a live document that will evolve and be updated as the development gets constructed.

14. SUMMARY AND CONCLUSIONS

14.1. SUMMARY

14.1.1. WSP has been appointed by Berkeley St James to provide transportation and highways advice in respect of the proposed MKE development of land located 3.5km to the northeast of Central Milton Keynes district, immediately adjacent to the northeast of J14 of the M1 motorway, which sets its southern boundary, the A422 and A509 delineating its western boundary, and open land of predominantly agricultural character that borders the site from the east. The location of the MKE site has been shown in Diagram 1-1 of Chapter 1 and has been widely illustrated in Figure 1 at the end of this TA.

14.1.2. The MKE site has been identified as an allocation for an SUE within Plan:MK, with MKC's aspirations for the allocation being set out in Policy SD12, which seeks to deliver a mixed-use development at MKE of circa 5,000 new homes, employment in the order of 105 hectares and supporting ancillary uses including primary and secondary schools, health care and community facilities. MKC's DF SPD for the MKE site also establishes the vision, disposition of land uses, core principles and infrastructure delivery.

14.1.3. Whilst the overall MKE site includes parcels that will be delivered by independent third parties (i.e. not Berkeley, and as presented in Diagram 1-2 of Chapter 1), this TA has been prepared solely to support the approach proposed by Berkeley as the majority landholder. The other MKE SUE allocation areas have nevertheless been included as part of the cumulative testing in the modelling for robustness purposes.

APPLICATION

14.1.4. This TA has therefore been produced in support only of the Berkeley St James development to address the feasibility of the proposed MKE development in terms of transportation impact, access, mobility and sustainability credentials, and which is indicatively described as follows:

"Hybrid planning application encompassing:

(i) outline element (with all matters reserved) for a large-scale mixed-use urban extension (creating a new community) comprising: residential development; employment including business, general industry and storage/distribution uses; a secondary school and primary schools; a community hub containing a range of commercial and community uses; a new linear park along the River Ouzel corridor; open space and linked amenities; new redways, access roads and associated highways improvements; associated infrastructure works; demolition of existing structures and

(ii) detailed element for strategic highway and multi-modal transport infrastructure, including: new road and redway extensions; a new bridge over the M1 motorway; a new bridge over the River Ouzel; works to the Tongwell Street corridor between Tongwell roundabout and Pineham roundabout including new bridge over the River Ouzel; alignment alterations to A509 and Newport Road; and associated utilities, earthworks and drainage works."

14.1.5. In support of the MKE development described above, this TA has been prepared in the context of a suite of transportation documents, in particular:

- Framework Workplace and Residential Travel Plans;
- Public Transport Strategy;

- Outline Construction Logistics Plan;
- Walking Cycling and Horse-riding Assessment and Review Lite;
- Transport Technical Notes 1 to 14 reviewing traffic generation and modelling assessments, public transport assessments (such as Mass Rapid Transit and Park and Ride allowances), PRoW, Walking and Cycling Strategies, and junction analysis; and
- Third party Transport Technical Notes, in particular AECOM's, which deal with strategic modelling matters such as MKMMM revalidation and calibration and future years impacts.

14.1.6. Along with this TA, the above documents had considered the comments received from different stakeholders, which commenced when WSP supported MKC during its successful HIF bid for the strategic highway infrastructure associated with the MKE site. In particular, these have been detailed in Section 1.5 of this TA and include conversations with MKC (Highways team, MK 2050 Vision team and urban designers) and Highways England (incl. the Smart Motorways team and the Planning, Highways and Bridges teams), who support the principles of a new bridge crossing over the M1 and recognise the benefits this would bring to J14 in freeing up capacity and extending its life in advance of any improvements coming forward sometime in the future.

POLICY CONTEXT

14.1.7. To consider additional requirements brought by national, regional and local policy, the policy and guidance documents presented in detail within Section 2 have been used to influence and underpin the assessment of MKE, thereby ensuring that the methodology and analysis are compliant with national, regional and local policy as it relates to transport and seek to adhere to additional guidance documents that impact the assessment and strategy.

EXISTING CONDITIONS AND ACCESSIBILITY

14.1.8. To understand the potential impact and baseline opportunities of the MKE development, the existing conditions of the overall site have been assessed in Section 3 of this TA, with careful consideration given to Berkeley St James land, and in particular regarding current means of access and baseline permeability and connectivity to adjacent areas. By reviewing current access and baseline permeability and connectivity conditions also detailed in Section 4 of the TA, the MKE allocated site has been determined to be:

- Immediately accessible to vehicular traffic via Willen Road to the west, the A509 through the centre of the site and Newport Road on the site's eastern boundary, in addition to several field access points at various locations around the site perimeter to serve farm vehicles;
- Connected to the SRN via J14 of the M1 to link into national urban centres such as Luton, Leicester and Sheffield; and to the PRN via the A509 road providing a connection between the A5 to the west of Milton Keynes and the A14 to the south of Kettering via Milton Keynes, Newport Pagnell and Wellingborough;
- Linked to the local road network via the A422 which runs from Tickford Roundabout through the centre of Milton Keynes and towards the A5; and Willen Road which runs towards the M1 and terminates at Tongwell Roundabout;
- Accessible to several PRoWs (footpaths and bridleways) and MKC's Redway Network which provides designated walking and cycle routes in and around Milton Keynes and make the MKE accessible by walking and cycling to key destination and facilities detailed in Section 4 (such as

employment areas, education facilities, recreational ground, and Newport Pagnell town centre with additional daily facilities);

- Connected to HE's walking, cycling and horse-riding network by an accommodation bridge over the M1 which provides a connection with Tongwell Street and currently serves for access to agricultural land; and
- Accessible to existing public transport services, these being:
  - bus services connecting to Milton Keynes Centre, Newport Pagnell and others such as Bedford or Cranfield University (C1/10/11, CX, 1, and 24/25);
  - Milton Keynes Central Railway Station which has cycle parking facilities to allow for modal exchange and provides direct connection to key wider destinations such as London Euston, Northampton or Birmingham; and
  - Woburn Sands Railway Station which also provides cycle parking facilities and connects to locations such as Bedford or Ridgmont.

PIA REVIEW

14.1.9. In addition to assessing existing accessibility and connectivity conditions, a detailed review of PIA data has been undertaken in order to understand potential highway safety issues within the vicinity of the MKE site, which could be impacted by the additional users generated by the development.

14.1.10. The analysis has covered a pre-defined study area for a period of five years from 01/06/2015 and 31/05/2020 as previously agreed with MKC and as illustrated in Section 3. The study highlights a total of 317 incidents, of which 17 involved pedestrians, 26 involved cyclists and 22 involved motorcyclists. 274 incidents resulted in slight severity, 36 in serious and 7 in fatal.

14.1.11. Apart from Blakelands Roundabout, where a further investigation into surfacing has been recommended to MKC, no recurrent patterns or collisions associated with highway design have been made evident from the analysis, which, instead, concludes there are no existing accident trends on the local highway network which the proposed development could exacerbate.

DEVELOPMENT PROPOSALS

14.1.12. Within the context summarised above and in alignment with the vision and aims defined with Policy SD12 of Plan:MK and MKC's DF SPD as explained in Section 5 of this TA, the MKE development is presented as a hybrid application. The hybrid application for the Berkeley St James areas of the MKE allocation includes both outline and detailed elements as detailed in Table 5-1 and Table 5-2 of this TA, which are forecasted to be implemented during three phases, and are summarised as follows:

- Outline element: 4,600 homes; 403,650sqm employment land use; one secondary and three primary schools; mixed uses within the Community Hub and local parades, Community Halls / library spaces, sport pitches; open space; grid road overbridges; and a temporary tree nursery;
- Detailed element: Eastern and Western grid roads; highways drainage; construction compound and materials working areas.

14.1.13. To accommodate the development quantum, the MKE masterplan has been designed based on access and movement strategies. These are illustrated in the Access and Movement Parameter Plan and demonstrate that the development has been designed to accommodate all transport modes and connect to principal routes around the development and key nearby origins and destinations. In particular:

- Six accesses into the site have been designed which connect to the M1 J14, the A509 and Tongwell Street via a new bridge over the M1, providing walking and cycling infrastructure, and form the basis of connections into the internal movement network;
- Four additional exclusive means of access for pedestrians and cyclists are provided along the eastern boundary of the site and two along the north-western boundary which connect with the existing PRoW network; and
- Internally, specific access provision is proposed to land uses with particular requirements such as the Employment Hub.

14.1.14. In relation to the above access strategy and to increase capacity across the M1 to enable the proposed MKE development to come forward, a new bridge over the M1 is to be provided as part of the MKE development as a consequence of the HIF fund previously mentioned. In addition to the bridge over the M1, the HIF highway infrastructure will be comprised of:

- Mixture of internal dual and single carriageways and associated road junctions;
- New bridges over the M1, River Ouzel (two) and Moulsoe Stream;
- Dualling of Tongwell Street between Pineham Roundabout and M1 Bridge;
- Introduction of a new roundabout at the junction of Tongwell Street with Carleton Gate;
- Reconfiguration of Tongwell Street north (between new M1 bridge and Tongwell Roundabout) to one-way northbound;
- Non-motorised user access and different type of active travel infrastructure to follow different forecasted desire lines and preferred routes including grade separated crossings;

14.1.15. To enable future users to have a wide range of travel choices as facilitated by the access and movement strategies and associated infrastructure, the MKE development proposals include a car and cycle parking strategy which is based on providing a balance between car parking provision for residents at a suitable level but without promoting car use, whilst at the same time offering real alternatives to private vehicle use through walking, cycling, micro-mobility modes and public transport options (incl. on-demand services).

14.1.16. The development of MKE is also closely aligned with the future provision of a fast MRT system linking the urban extension with MKC and which will be supported by a feeder network of other local mobility services to cater for first/last mile demand. As a result, there is safeguarded land within the development to allow for MRT. It is considered to have the possibility to link with a Park & Ride site initially expected to be located at the north-eastern corner of the MKE site (though implementation would ultimately rely on MKC).

14.1.17. All these proposals referring to walking, cycling and public transport connectivity and infrastructure set the basis of the Sustainable Transport Strategy for the MKE site explained in detail in Chapter 11 and graphically summarised in the Access and Movement Parameter Plan.

14.1.18. In addition to setting out the access and movement strategies for the MKE development, an important part of this TA has been based on demonstrating that the vehicular traffic envisaged to be generated by the MKE development will not have a detrimental impact on the highway network; both in the long term once the development is in operation, and temporarily during construction as detailed within Section 13. Where potential impacts have been determined, adequate mitigation measures have been determined.

MODELLING METHODOLOGY

14.1.19. The methodology that has been followed to determine the forecast traffic impact of the MKE development forms its basis on Milton Keynes Multi-Modal Model (so-called MKMMM in this TA), which, after being used to obtain the HIF funding, has been refined to reflect bespoke trip rates associated with the MKE development and, that way, represent an accurate forecast of the potential impacts. This strategic model has then fed into a detailed Paramics model associated only with M1 J14 and Northfields.

14.1.20. The traffic generation of the MKE development has been forecasted in consideration of Future Mobility trends, and these have been distributed and assigned within the internal and external network. Different modelling scenarios have been tested. These have been determined in agreement with MKC and HE and include 2016 as the base year, 2031 as the base future reference and 2031 with development, and 2048 as a further base future reference, and also with development.

MODELLING SCENARIOS AND OUTPUTS

14.1.21. For robustness purposes, three tests of each scenario have been run, namely: 'Core' as the MKMMM without any adjustments; 'Sensitivity' which includes adjustments to MKMMM at J14 and which has been only used in the Paramics modelling; and 'Key Planning Test' which adds the traffic generation forecasted for the full MKE development into the 2031 scenario in accordance with DfT Circular 02/2013.

14.1.22. The modelling exercises and tests incorporated in this TA have demonstrated that:

- During the 2016 scenario, some of the junctions which will be impacted by the traffic associated with the MKE development are already forecasted to operate close to, at, or over, theoretical capacity in the future as a result of planned Local Plan growth. In some instances, this may only be on one of it's the arms on a junction and during short periods of time (such as Woolstone Roundabout on its Childs Way arm only, Pineham Roundabout on its A509E arm or Fox Milne Roundabout on its H6 Childs Way East (left ahead) arm during the AM peak hour). Some other junctions have residual capacity to accommodate additional traffic (such as Willen Roundabout, Renny Lodge Roundabout and Carleton Gate/Tongwell Street priority junction, or Chicheley Hill Roundabout);
- For the 2031 and 2048 scenarios run under the Core test, i.e. the MKMMM with no adjustment, the MKE development and the associated changes to surrounding infrastructure are forecasted to result in a re-routeing of Milton Keynes bound trips from the east of Milton Keynes; there being a reduction in the number of trips using Willen Road to cross the M1 which instead prefer to use the new M1 crossing. At a strategic modelling level, it was concluded that the impact on M1 Junction 14 is forecasted to be minimal in this scenario in terms of traffic flows and delays;
- For the 2031 and 2048 scenarios run under the Sensitivity test i.e. the MKMMM with adjustments to reflect the Paramics, it is apparent that there was a difference in throughput and capacity, particularly at the A509 approaches to J14, where there is an apparent reduction in the southbound movements. Equally, the Sensitivity test continues to demonstrate that the new M1 bridge link will accommodate large volumes of traffic, attracting movements away from M1 J14;
- Since the adjustments made in the Sensitivity test are likely to slightly over-estimate the route transference away from J14, whereas the Core results are considered to over-estimate the attractiveness of J14, it is considered that the results in any scenario would be somewhere between the Core and the Sensitivity and the principles of this have been discussed with both MKC and HE;

- For the 2031 scenarios run under the Key Planning test, i.e. with full development added onto the 2031 base year, the Paramics results identify that the M1 Junction 14 infrastructure is considered to be able to accommodate the full build-out. The slips where the development has the greatest demand do not experience queues that would extend back to the M1 mainline. Where queues do occur, these are already observed under the Do Minimum scenarios, and the development does not have a material impact on these.

LOCAL JUNCTION AND MITIGATION STRATEGIES

14.1.23. By analysing the result of the different scenarios , various junctions were identified for assessment. The junctions required for assessment came from a thorough review of Volume Over Capacity changes in MKMMM affected junctions. In particular:

- M1 J14 and Northfields Roundabout
- Tongwell Street Roundabout
- Willen Road Roundabout
- Pagoda Roundabout
- Woolstone Roundabout
- Blakelands Roundabout
- Fox Milne
- Pineham Roundabout
- Renny Lodge Roundabout
- Tickford Roundabout
- Marsh End Roundabout
- Tongwell Street / Carleton Gate
- M1 J13
- Marshend Rd / Wolverton
- High Street / St. John Street
- A509 / A422 Newport Road - Chicheley Hill Roundabout
- Development Junctions – Do Something Only

14.1.24. Where impact has been determined, solutions have been reviewed and proposed. This is evidenced in Section 12 to mitigate any potential impacts of the MKE development satisfactorily. It should be noted that the mitigation has been based on the whole allocation impacts and in consideration of wider growth. As such, further discussions with MKC will be held over the proportional impact of MKE and the individual developments within it.

14.2. CONCLUSIONS

14.2.1. The MKE masterplan is compliant with national and regional policy and accords with the principles set out within the MKE Development Framework and Plan:MK, particularly policies CT2, CT3, CT5, CT6, CT8, CT10, SD1, SD9 and SD12. It is also forward thinking in its approach to flexibility in accommodating emerging technologies and embracing sustainable transport opportunities.

14.2.2. The MKE site will be an exemplar for sustainably led development, with accessibility at the forefront of its design. A community centre, encompassing an interchange hub, connected through a network of Redways, informal and formal leisure routes, and crossings will tie into an extensive Public Transport offering that will ensure non-car based travel is promoted from the outset - benefitting local residents as well as new homeowners and workers.

14.2.3. The development affords excellent access for people to travel around on foot and by cycle both within the site and to / from it in accordance with Policy CT3 of Plan:MK. Indeed, the development has been designed to fulfil the characteristics of a 15-minute neighbourhood; i.e. residents and employees of the site can access everything within a 15-minute walk or cycle; e.g. schools, health care facilities, shops, etc.

14.2.4. This is achieved through a network of Redways and PROWs (including bridleways) which provide connectivity with the existing off-site network which are then complemented by a highly permeable lattice of green corridors and routes within the development parcels themselves.

14.2.5. All pedestrian / cycle crossings of the Grid Road network will be grade separated in accordance with Policy CT8 of Plan:MK, including a bridge crossing of the A509 south of North Crawley Road and a further grade separated crossing of the A422 east of Marsh End Roundabout which would be deliverable by the developer of the adjacent MKE development parcel, Bloor. These provide enhanced connectivity for pedestrians and cyclists moving between Newport Pagnell, MKE and central MK.

14.2.6. There is also an aspiration to provide a further grade separated crossing within the vicinity of Tickford Roundabout and whist there are a number of technical challenges to delivering this, conversations will continue with MKC to ascertain whether this can be delivered. In the event that this is not possible then an at-grade crossing can be delivered in this location, which again is considered to be in accordance with Policy CT8 of Plan:MK.

14.2.7. A comprehensive public transport strategy has been identified in consultation with MKC public transport officers, which maximises the opportunities for existing bus services to be integrated within the masterplan, complemented by demand responsive travel services and future-proofed infrastructure which can facilitate the delivery of mass rapid transport services. These are integrated with the excellent walking and cycling links and associated cycle parking facilities to deliver a joined up sustainable transport strategy to maximise the opportunity for trips to be made by modes other than the private car. This strategy is considered to fulfil the criteria within Policy CT5 of Plan:MK.

14.2.8. A car parking and cycle parking strategy for the site has been developed that considers current MKC standards and applies a mechanism as to how the development can flex and re-evaluate these over time as public transport and other mobility choices become prevalent within the development and wider MK. A mix of parking standards that reflect the character areas of the Development Framework and MKE proposals are applied initially thereby adopting the most appropriate and current MKC parking standards.

14.2.9. The proposals at MKE, therefore, balance the need between parking provision for residents that is at a suitable level without promoting car use, whilst at the same time offering real alternatives to private vehicle use through walking, cycling and public transport options. This is considered to be compliant with the NPPF and in particular Paragraph 105.

14.2.10. Whilst traffic forecasts associated with the development proposals are cognisant of the excellent accessibility afforded to non-car modes they are still balanced with a recognition that many trips are still likely to be undertaken by the private car and without placing reliance on wider emerging MK strategies being delivered, such as the MRT, Park-and-Ride, etc. This therefore ensures that the historic predict and provide approach associated with overly robust traffic forecasts, which can lead to significant investment being directed towards car based infrastructure, is balanced with a more tangible outcome of how people may choose to travel given the options available to them and in ensuring that investment is then proportionally directed across the modes and in particular across sustainable modes of transport.

14.2.11. This TA has presented the impacts of the proposed MKE allocation on the local and strategic transport networks by assessing this forecast demand during the traditional AM and PM peaks fortwo key periods associated with its build-out. These are 2031, when the site is partially built out, aligning with the MK Local Plan period and 2048, when the MKE site is forecast to fully completed.

14.2.12. This has been undertaken in close consultation with both MKC and Highways England (HE) using a combination of the MKC strategic traffic model, MKMMM, feeding into a Paramics based model of M1 J14 and Northfields and other stand-alone models for other junctions around the transport network. This is compliant with industry accepted practice and the modelling approach was agreed with both MKC and HE.

14.2.13. At M1 J14 an assessment has been undertaken of the impacts associated with the full build out of the development at 2031. This has been discussed and agreed with both MKC and HE and represents the appropriate Planning Test in accordance with HEs circular 02/13.

14.2.14. The modelling undertaken at M1 J14 demonstrates that the development impacts do not materially affect the operation of the junction with no queuing back on to the mainline M1 and it is therefore considered that the impacts meet the test set out in circular 02/13. Furthermore, modelling demonstrates that the new M1 bridge does divert many motorists away from M1 J14 and other crossing points of the M1 thereby extending the life of M1 J14 and providing further resilience within the highway network.

14.2.15. Modelling across the wider highway network has demonstrated that there are some junctions at which intervention is required to mitigate future impacts and where appropriate schemes for this have been identified for discussion with MKC. In all instances the need for mitigation is not triggered solely by MKE but by wider growth across MK. Consequently, contributions towards any intervention measures will be in proportion with the level of impact associated with the MKE development.

14.2.16. It is therefore concluded that the vehicular impacts from the Proposed Development can be adequately accommodated either through the new highway infrastructure being delivered as part of the MKE development, through intervention at certain points within the highway network or as a result of sufficient spare capacity available within it.

14.2.17. To support the Transport Strategy, a Residential Travel Plan (RTP) and a Workplace Travel Plan (WTP) have been developed to outline measures to influence how and when people will travel to/from the MKE site. They also encompass strategies to monitor the site as it is built out to ensure that it is reactive to how travel patterns materialise over time and to any upcoming and emerging technology of travel trends such that funding collected from the MK Tariff for the site can then be directed appropriately. It can therefore be concluded that the development will remain flexible and able to respond to changes in travel trends and emerging technologies.

14.2.18. Overall it is considered that MKE will be highly accessible with the opportunities for many journeys to be made on foot, by cycle or public transport. Furthermore, all highway impacts associated with the new development can be mitigated accordingly through the introduction of new infrastructure, improvements to existing infrastructure (delivered through financial contributions via the MK Tariff) and management plans as appropriate.

14.2.19. In accordance with NNPF Paragraph 108 it is concluded that the development site affords appropriate opportunities for sustainable transport modes to be taken up, provides safe and suitable access to the site for all users; and that any significant impacts from the development on the transport network (in terms of capacity and congestion) can be cost effectively mitigated to an acceptable degree.

14.2.20. Finally, in accordance with NPPF paragraph 109, which states that "*Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe*", it is considered that the application for the MKE development this TA is supporting should not be refused on highways grounds.

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Basing View
Basingstoke, Hampshire
RG21 4HJ

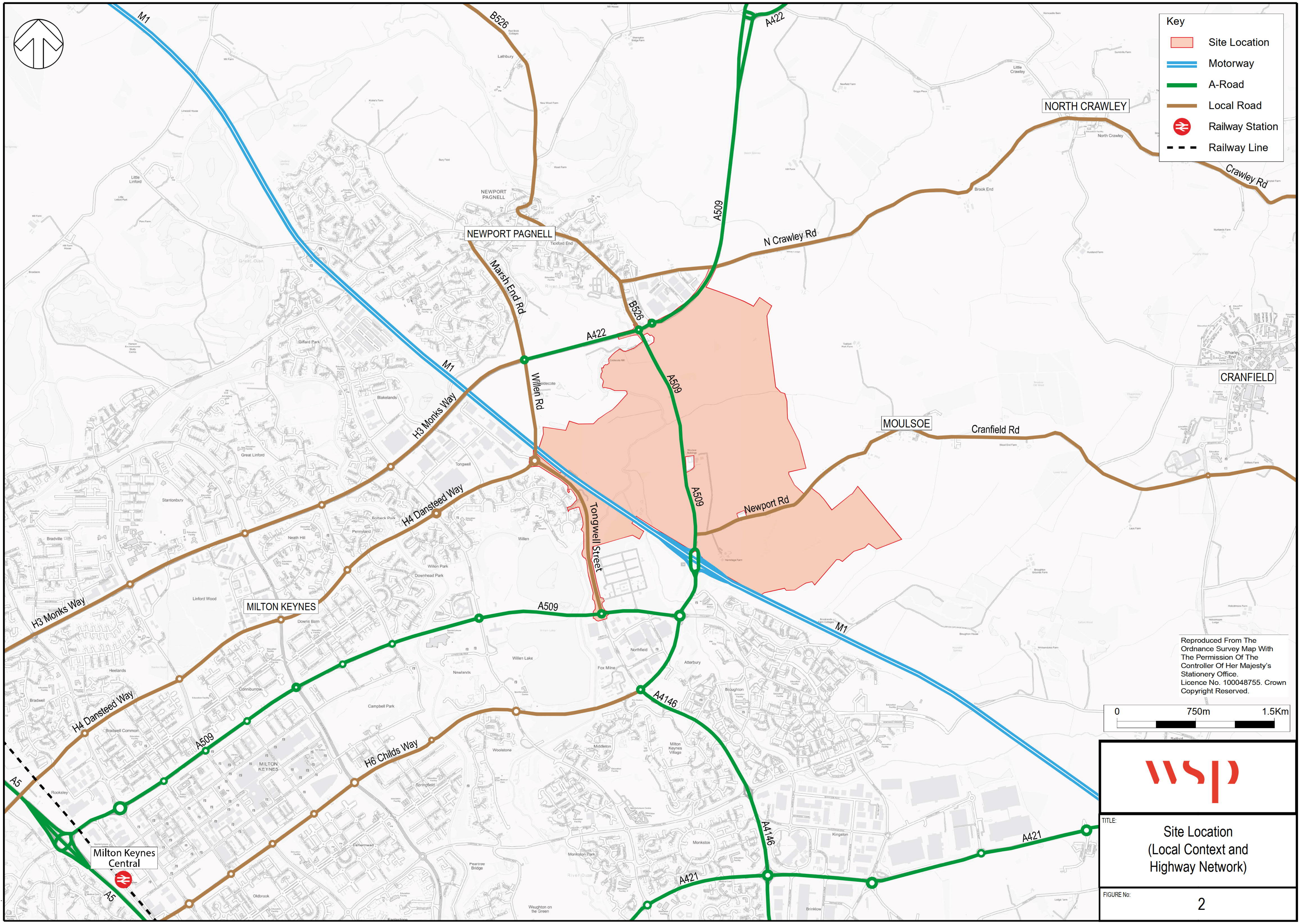
wsp.com

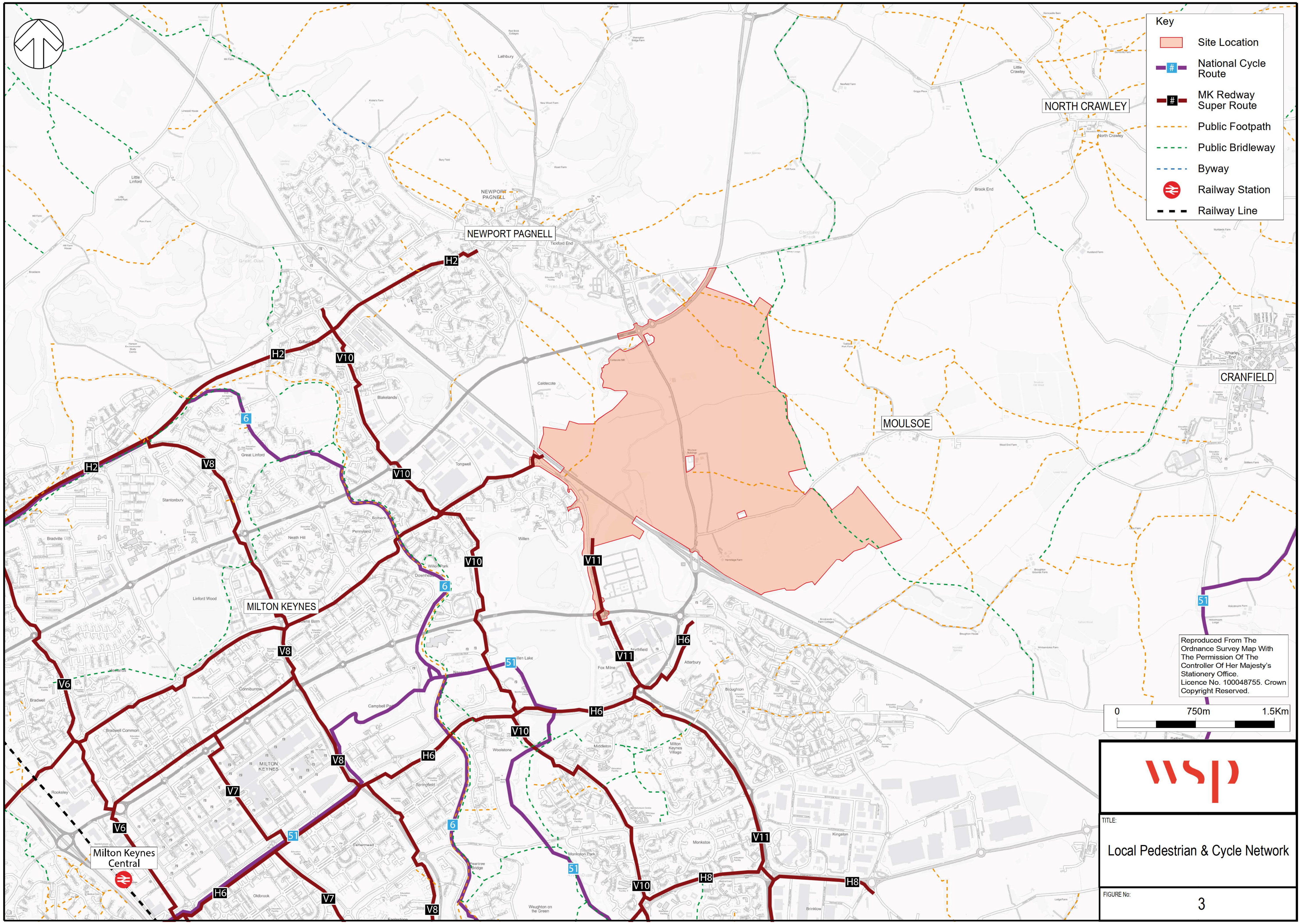
Figures & Drawings

TITLE:

Site Location (Regional Context)

FIGURE No: 1


Key
Site Location
Motorway
A-Road
Local Road
Railway Station
Railway Line
M1
B526
A422
A509
NORTH CRAWLEY
Crawley Rd
N Crawley Rd
NEWPORT PAGNELL
Marsh End Rd
A422
M1
Willen Rd
CRANFIELD
MOULSOE
Cranfield Rd
H3 Monks Way
H4 Dansteed Way
Tongwell Street
Newport Rd
MILTON KEYNES
A509
M1
A4146
H6 Childs Way
A5
Milton Keynes Central
A421
Reproduced From The Ordnance Survey Map With The Permission Of The Controller Of Her Majesty's Stationery Office. Licence No. 100048755. Crown Copyright Reserved.
0
750m
1.5Km
wsp
TITLE:
Site Location (Local Context and Highway Network)
FIGURE No:
2

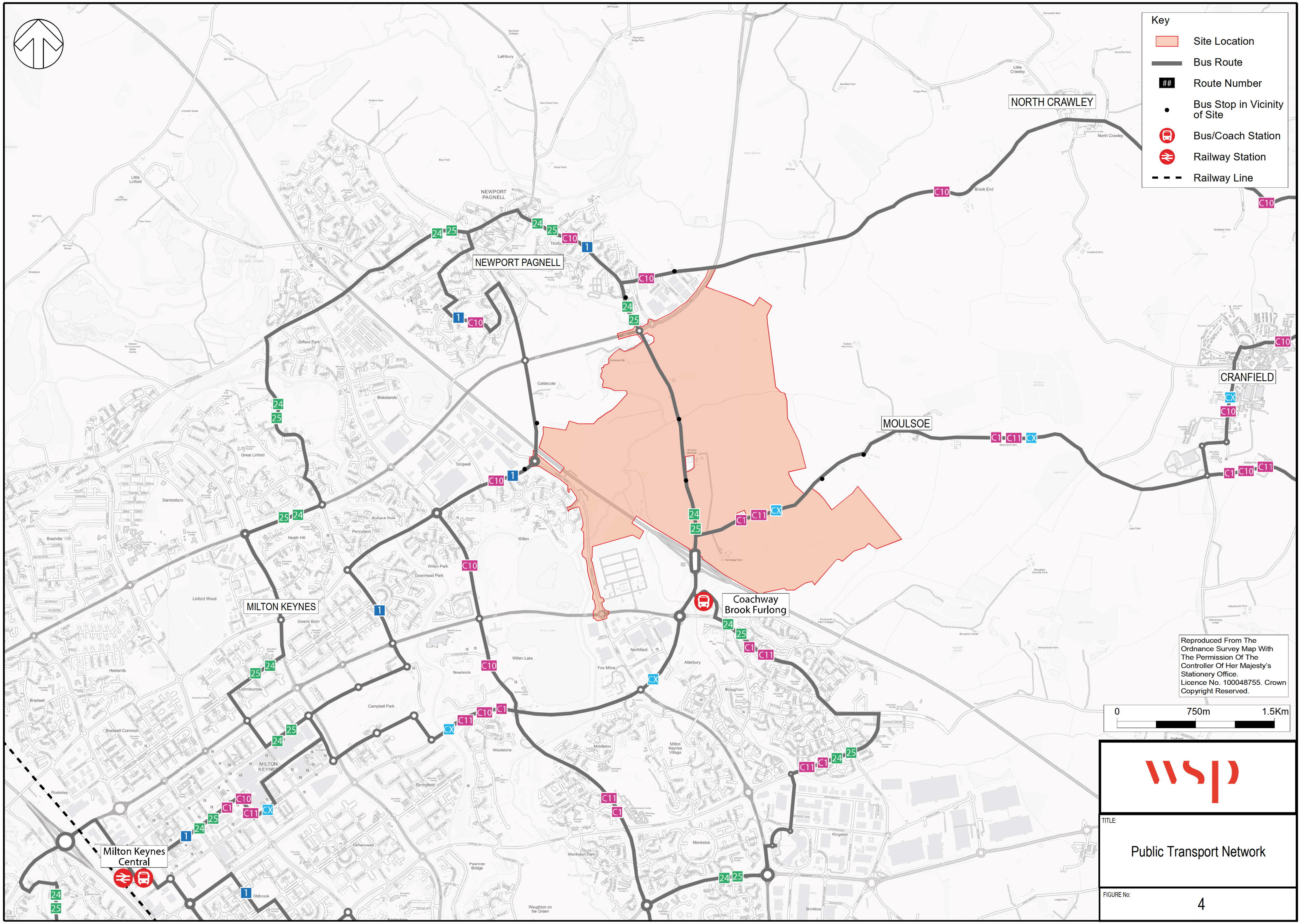


TITLE:

Local Pedestrian & Cycle Network

FIGURE No:

3



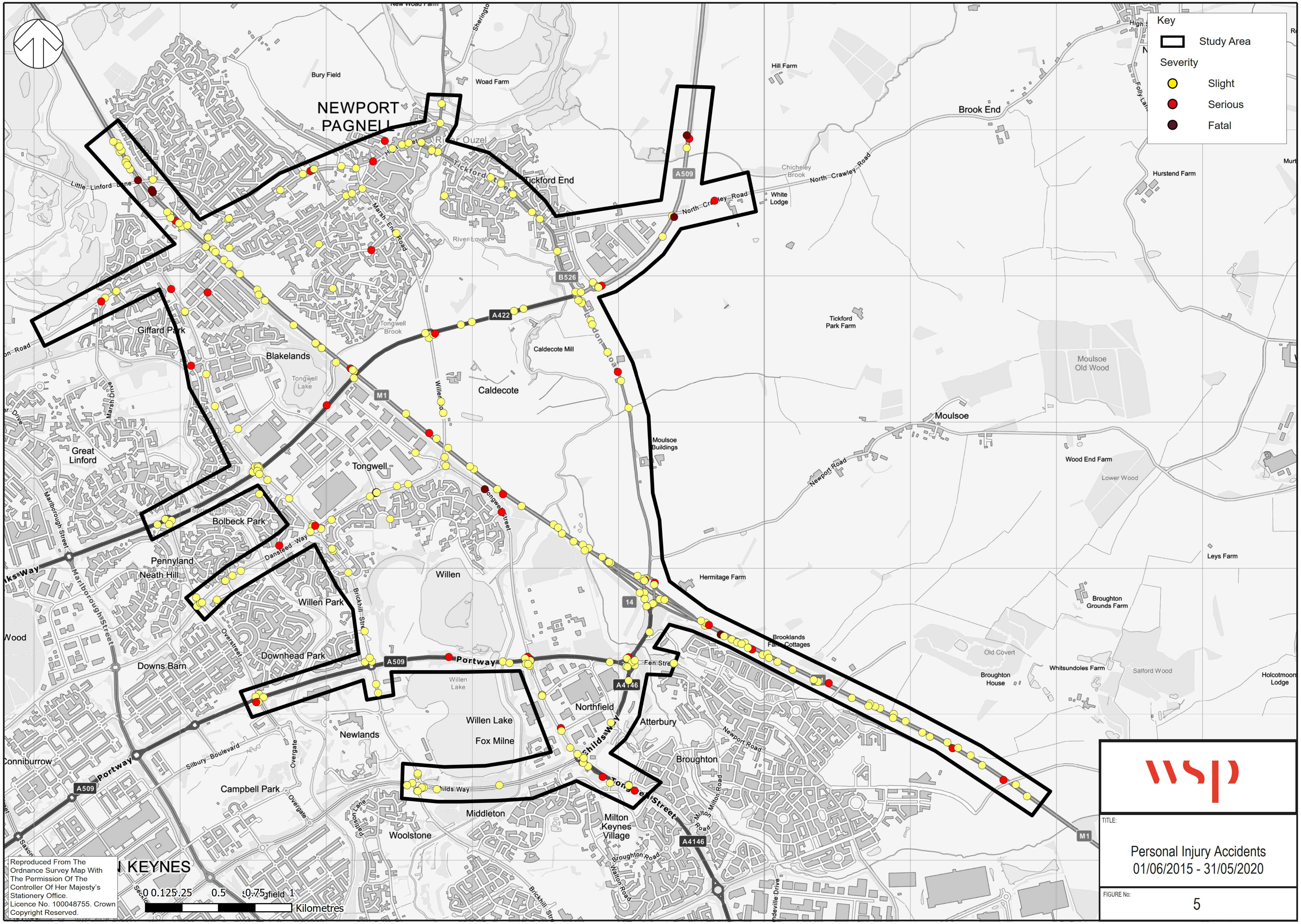
wsp

TITLE:

Public Transport Network

FIGURE No:

4


Key
Study Area
Severity
Slight
Serious
Fatal
NEWPORT PAGNELL
Bury Field
Woad Farm
Hill Farm
Brook End
Hurstend Farm
Tickford End
River Ouzel
Little Linford Lane
Marsh End Road
River Lovat
North Crawley Road
White Lodge
Chicheley Brook
A509
B526
A422
Tickford Park Farm
Giffard Park
Blakelands
Tongwell Lake
Tongwell Brook
Caldecote Mill
Caldecote
Moulsoe Old Wood
Moulsoe
Moulsoe Buildings
Wood End Farm
Lower Wood
Newport Road
M1
Great Linford
Tongwell
Tongwell Street
Bolbeck Park
Pennyland
Neath Hill
Dansteed Way
Willen
Willen Park
Leys Farm
Hermitage Farm
Broughton Grounds Farm
Brooklands Farm Cottages
Old Covert
Broughton House
Whitsundoles Farm
Salford Wood
Holcotmoors Lodge
Downs Barn
Downhead Park
Portway
Willen Lake
Northfield
A4146
Atterbury
Childs Way
Fox Milne
Newlands
Campbell Park
Broughton
Silbury Boulevard
Overgate
Conniburrow
Middleton
Woolstone
Milton Keynes Village
Broughton Road
Milton Road
Marlborough Street
KEYNES
0 0.125.25 0.5 0.75 1
Kilometres
Reproduced From The Ordnance Survey Map With The Permission Of The Controller Of Her Majesty's Stationery Office. Licence No. 100048755. Crown Copyright Reserved.
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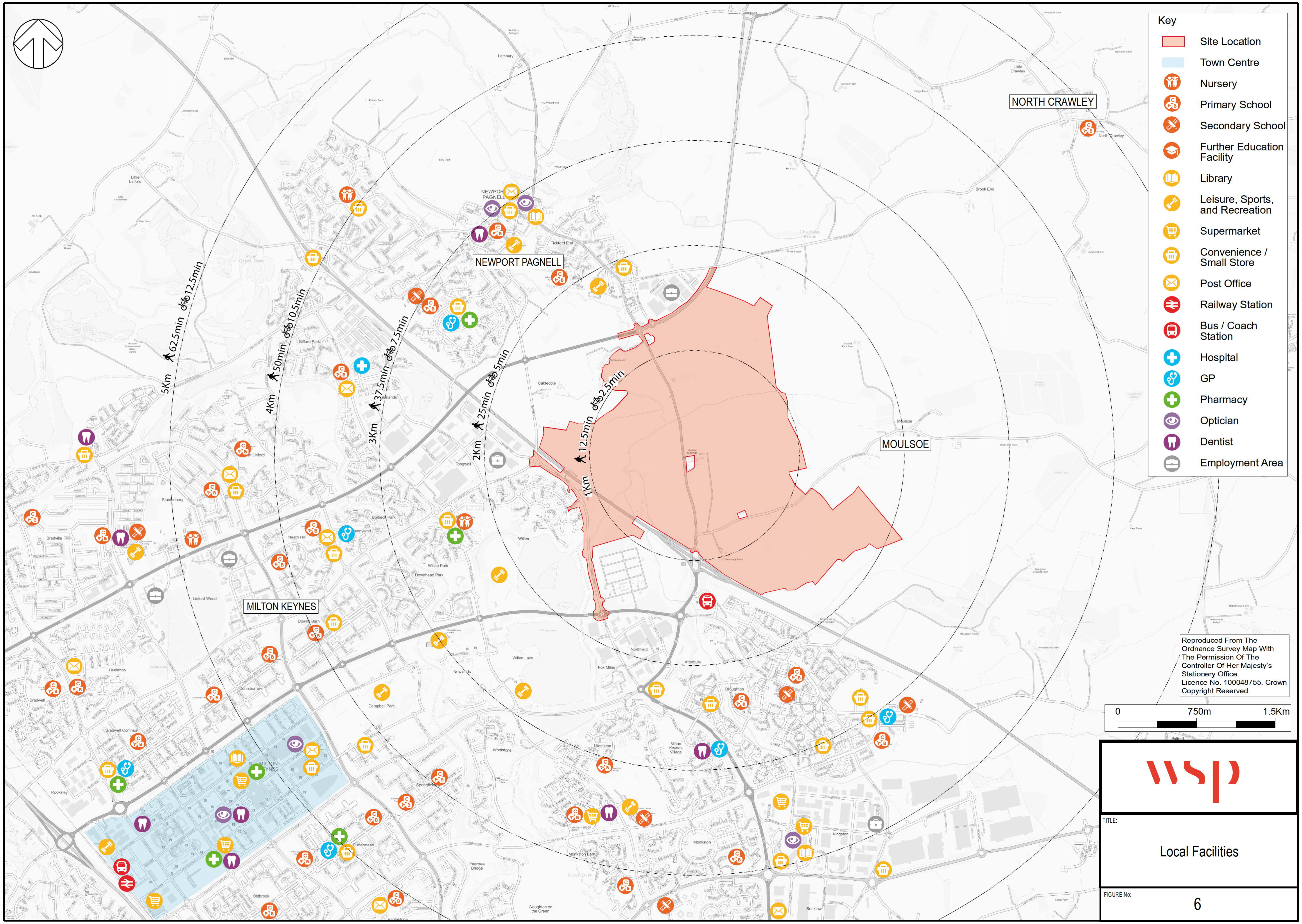
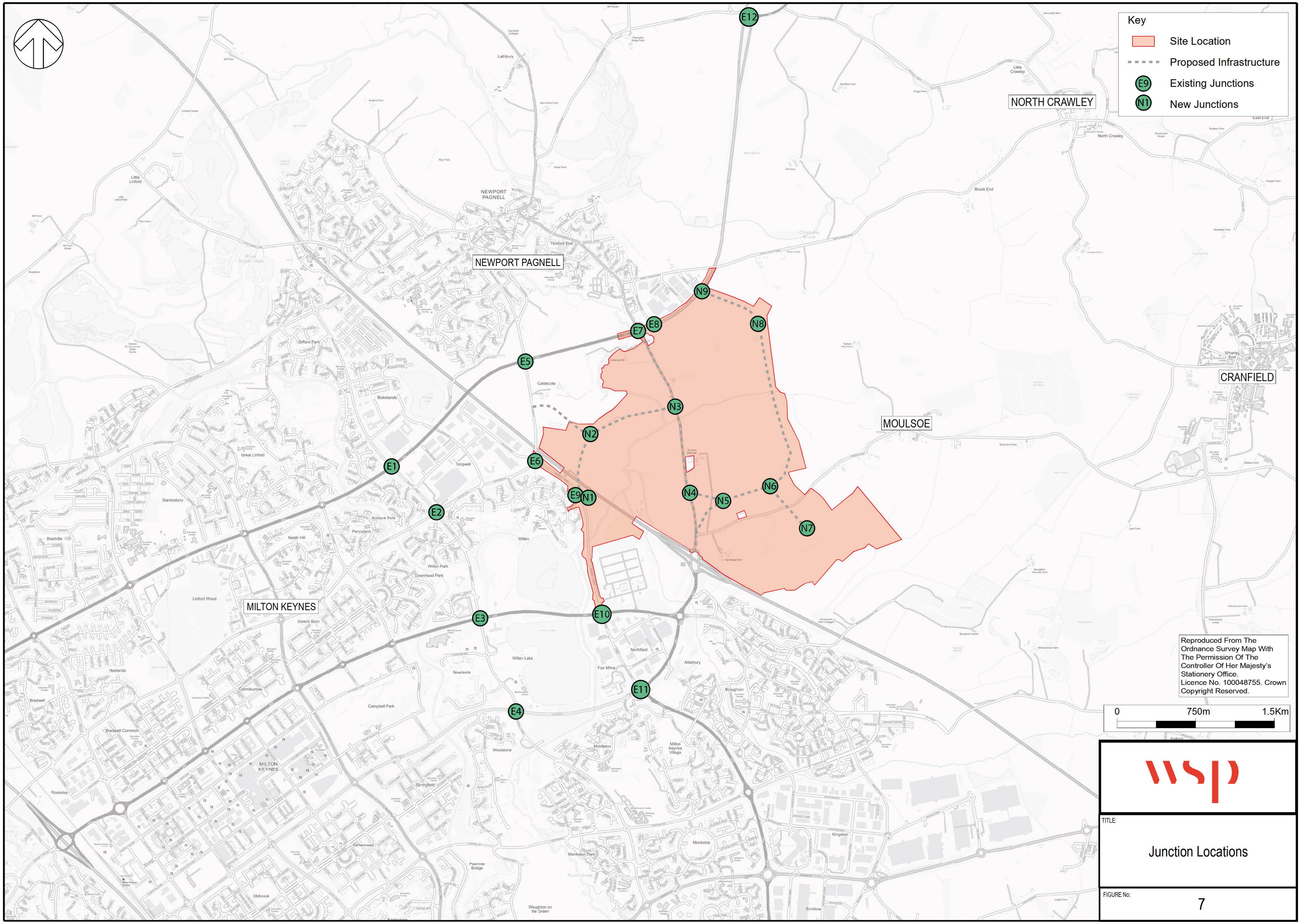
TITLE:
Personal Injury Accidents
01/06/2015 - 31/05/2020
FIGURE No:
5



TITLE:

Local Facilities

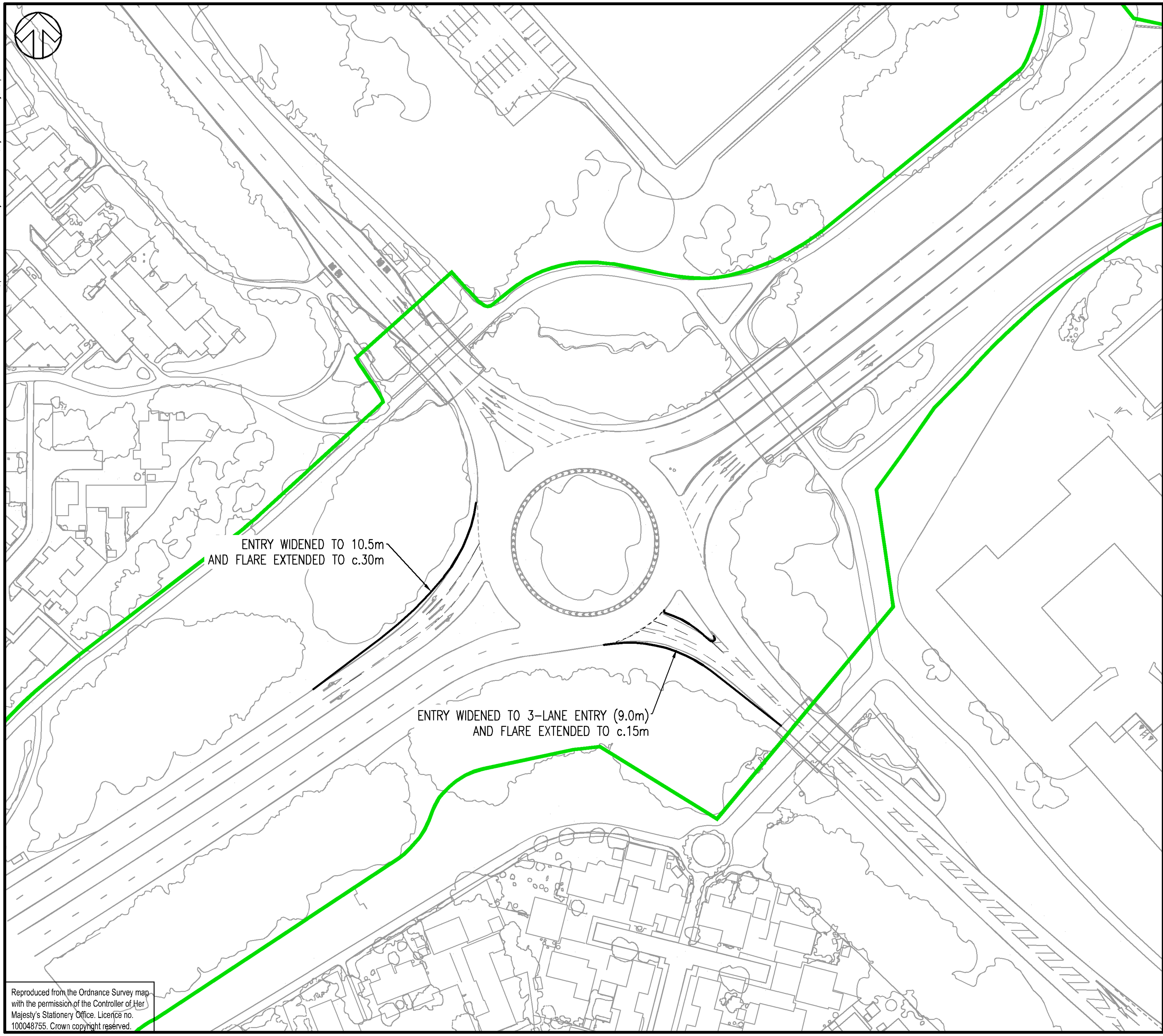
FIGURE No: 6



TITLE:

Junction Locations

FIGURE No: 7



DO NOT SCALE

KEY:

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A	25/02/2021	RJ	FIRST ISSUE	FI	AS

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CLIENT: BERKELEY ST JAMES

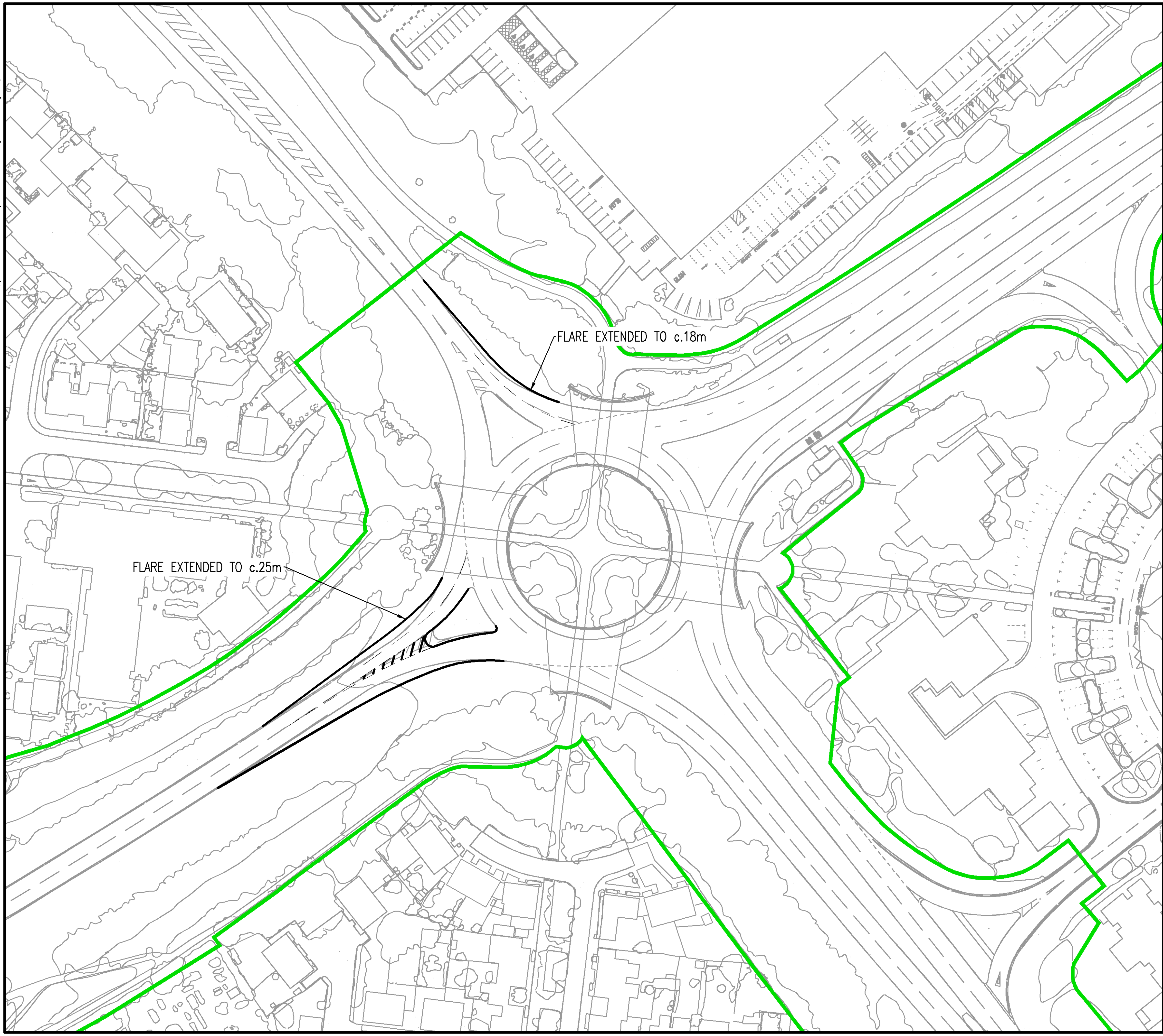
ARCHITECT: JTP / STEPHEN GEORGE AND PARTNERS

PROJECT: MILTON KEYNES EAST

TITLE: BLAKELANDS RBT PROPOSED MITIGATION STRATEGY

SCALE @ A3: 1:1000	CHECKED: FI		APPROVED: AS
PROJECT No: 70057521	DESIGNED: RJ	DRAWN: RJ	DATE: February 21
DRAWING No: 70057521-SK-001			REV: A

File name \\UK.WSPGROUP.COM\CENTRAL DATA\PROJECTS\700575XX\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP TRANSPORT PLANNING\02 DRAWING\AUTOCAD\SK\70057521-SK-002.DWG, printed on 26 February 2021 16:37:51, by Imramovsky, Filip



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ARCHITECT: JTP / STEPHEN GEORGE AND PARTNERS

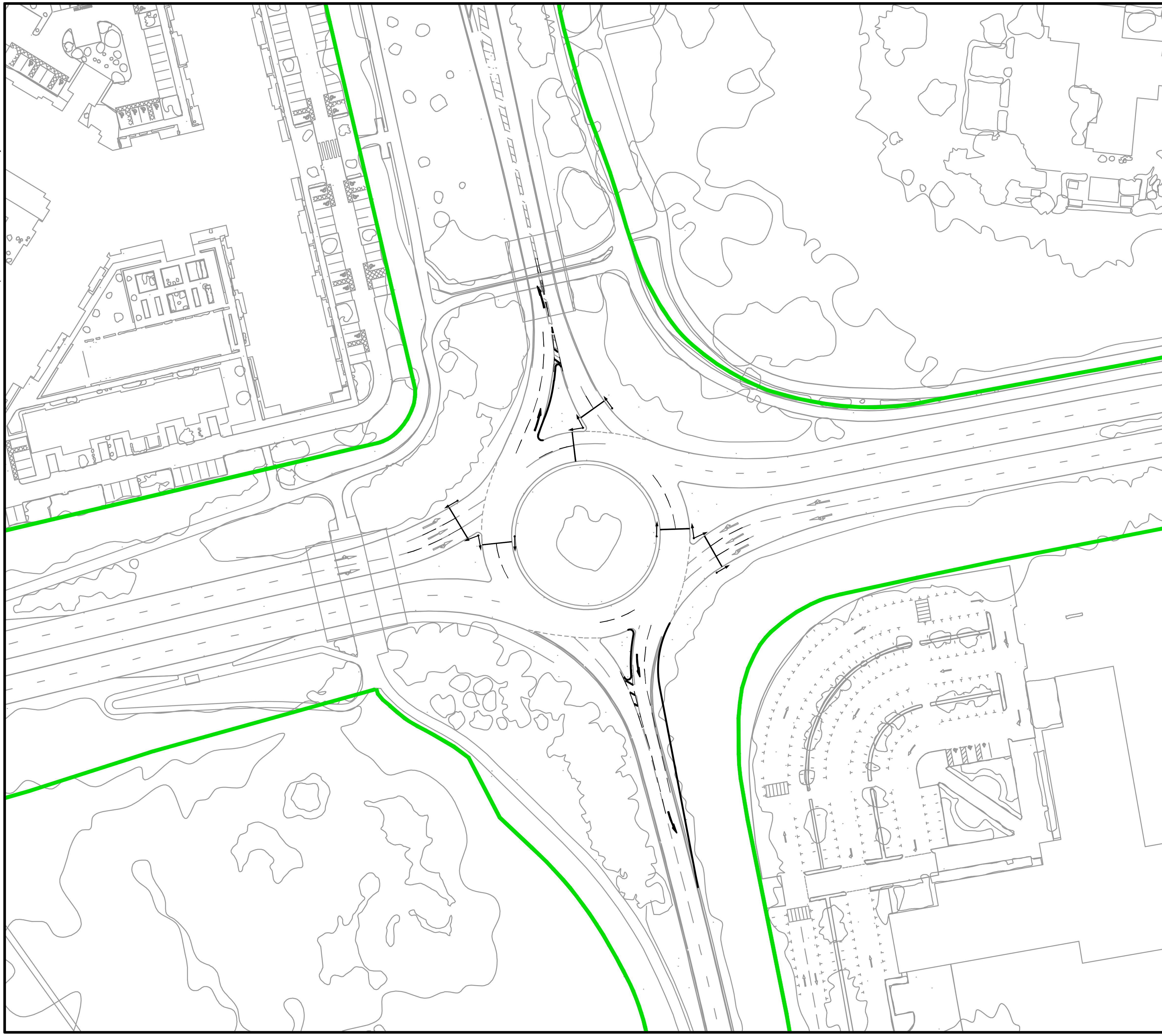
PROJECT: MILTON KEYNES EAST

TITLE: WILLEN RBT PROPOSED MITIGATION STRATEGY

SCALE @ A3:	CHECKED:		APPROVED:
1:1000	FI		AS
PROJECT No: 70057521	DESIGNED: RJ	DRAWN: RJ	DATE: February 21

DRAWING No: 70057521-SK-002 REV: A

File name \\UK.WSPGROUP.COM\CENTRAL DATA\PROJECTS\70057XXX\70057521 - MKE - PLANNING APPLICATION\03 WIP\TP TRANSPORT PLANNING\02 DRAWING\AUTOCAD\SK\70057521-SK-003.DWG, printed on 03 March 2021 12:23:17, by Jones, Roland



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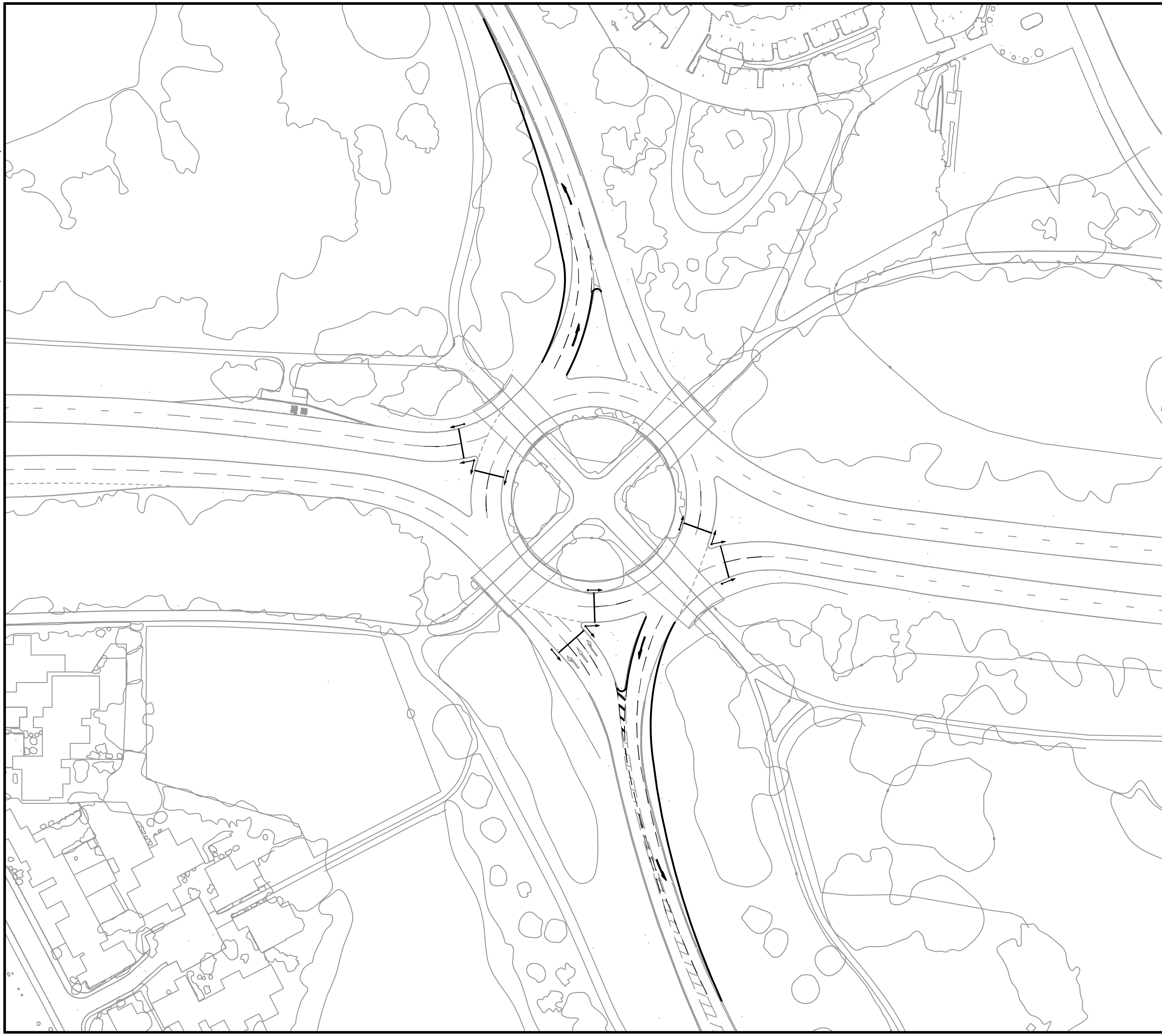
ARCHITECT: JTP / STEPHEN GEORGE AND PARTNERS

PROJECT: MILTON KEYNES EAST

TITLE: PAGODA RBT
PROPOSED MITIGATION STRATEGY

SCALE @ A3: 1:1000	CHECKED: FI		APPROVED: AS
PROJECT No: 70057521	DESIGNED: RJ	DRAWN: RJ	DATE: March 21

DRAWING No: 70057521-SK-003 — REV: A



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ARCHITECT: JTP / STEPHEN GEORGE AND PARTNERS

PROJECT: MILTON KEYNES EAST

TITLE: WOOLSTONE RBT
PROPOSED MITIGATION STRATEGY

SCALE @ A3: 1:1000	CHECKED: FI		APPROVED: AS
PROJECT No: 70057521	DESIGNED: RJ	DRAWN: RJ	DATE: March 21

DRAWING No: 70057521-SK-004 — REV: A

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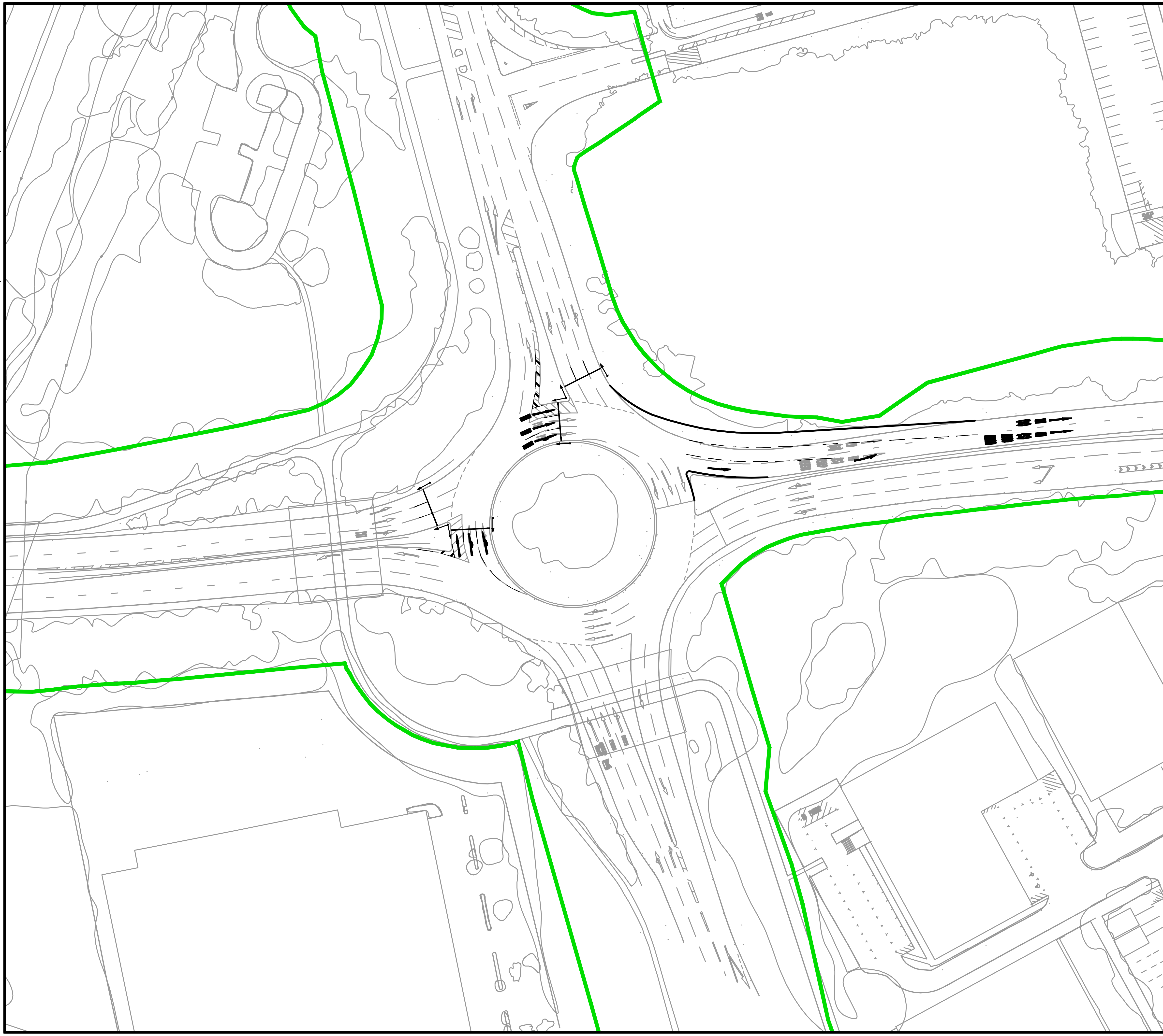

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KEY:

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CLIENT:

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ARCHITECT:

JTP / STEPHEN GEORGE AND PARTNERS

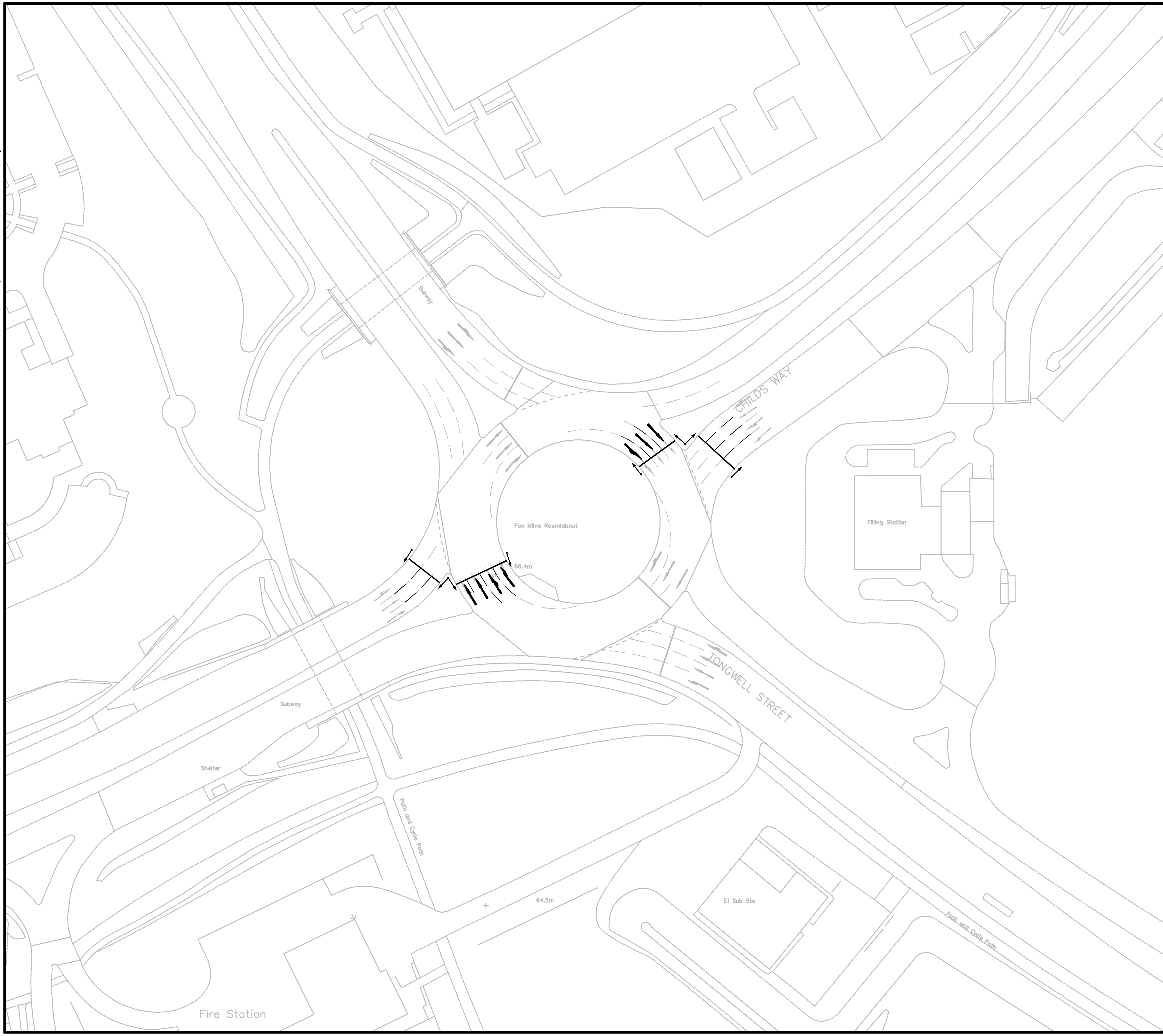
PROJECT:

MILTON KEYNES EAST

TITLE:

PINEHAM RBT
PROPOSED MITIGATION STRATEGY

SCALE @ A3: 1:1000	CHECKED: FI	APPROVED: AS
PROJECT No: 70057521	DESIGNED: RJ / DRAWN: RJ	DATE: March 21
DRAWING No: 70057521-SK-005		REV: A



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CLIENT: BERKELEY ST JAMES

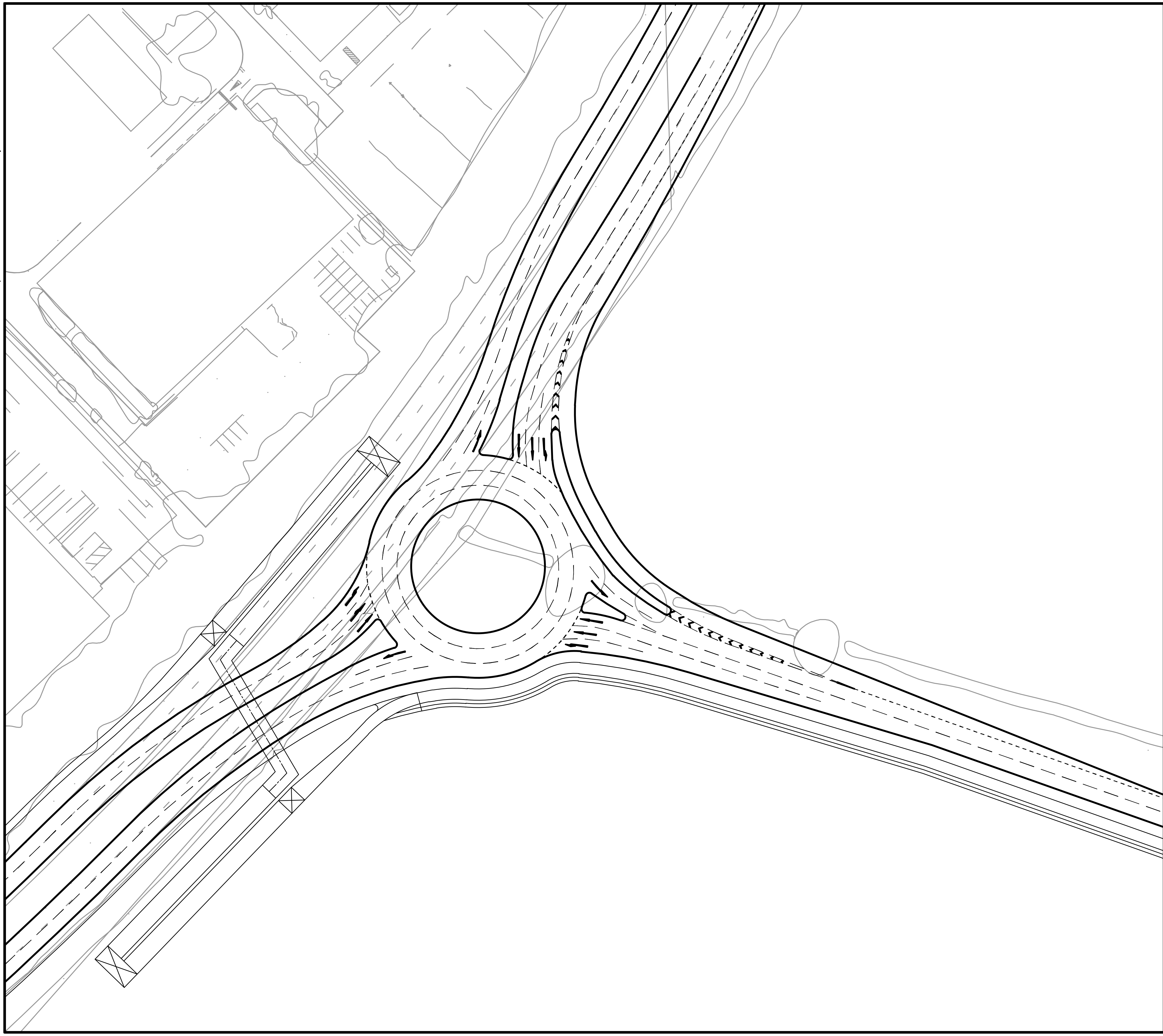
ARCHITECT: JTP / STEPHEN GEORGE AND PARTNERS

PROJECT: MILTON KEYNES EAST

TITLE: FOX MILNE RBT
PROPOSED MITIGATION STRATEGY

SCALE @ A3: 1:1000	CHECKED: FI		APPROVED: AS
PROJECT No: 70057521	DESIGNED: RJ	DRAWN: RJ	DATE: March 21

DRAWING No: 70057521-SK-006 | REV: A



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A	24/03/2021	RJ	FIRST ISSUE		A

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CLIENT:
BERKELEY ST JAMES

ARCHITECT:
JTP / STEPHEN GEORGE AND PARTNERS

PROJECT:
MILTON KEYNES EAST

TITLE:
PROPOSED A509/EPR ROUNDABOUT (INDICATIVE SEGREGATED LEFT TURN LANE)

SCALE @ A3:	CHECKED:		APPROVED:
1:1000	FI		AS
PROJECT No:	DESIGNED:	DRAWN:	DATE:
70057521	RJ	RJ	March 21

DRAWING No:	REV:
70057521-SK-007	A

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