Cycle Enfield

London Borough of Enfield

A1010 South Bus Impact Assessment

| R3

31/10/2016

Document history and status

Revision	Date	Description	By	Review	Approved
0	27/09/2016	Draft –Awaiting model approval from TfL	[redacted]	[redacted]	[redacted]
1	24/10/2016	Draft –Awaiting model approval from TfL	[redacted]	[redacted]	[redacted]
2	25/10/2016	Draft –Awaiting model approval from TfL	[redacted]	[redacted]	[redacted]
3	31/10/2016	First Issue- following the modelling approval	[redacted]	[redacted]	[redacted]

Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments
01	[redacted]	24/10/2016		
02	[redacted]	25/10/2016		
03	[redacted]	31/10/2016	[redacted]	

Cycle Enfield

Project No:	B240G001
Document Title:	A1010 South Bus Impact Assessment
Document No.:	1
Revision:	
Date:	24 October 2016
Client Name:	London Borough of Enfield
Client No:	
Project Manager:	[redacted]
Author:	[redacted]
File Name:	\\uk-lon-fas02\Projects\UNIF\Projects\NCC Traffic Team Project Library\Enfield Mini Holland\Route A1010 South\Deliverables\Reports\A1010 Bus Journey Time Assessment\Draft A1010 S Bus Journey Time Assessment_Rev3.docx

Jacobs U.K. Limited

New City Court
20 St Thomas Street
London SE1 9RS
United Kingdom
T +44 (0)20 7939 6100
F +44 (0)20 7939 6103
www.jacobs.com

Contents

1. Introduction

This note summarises the impact on bus journey times as a result of the A1010 South Cycle Enfield scheme.

1.1 Corridor Extent

The corridor extends from Ponders End (Junction with Lincoln Road) in the north to the approach to the A406 North Circular Road in the south. The junction with the A406 North Circular Road forms part of a separate scheme and will be implemented following the implementation of the A1010 South corridor.

There are currently 5 signalised junctions along the corridor, with a further two (at Edmonton Green Roundabout and Bury Street) proposed to be signalised as part of the scheme.

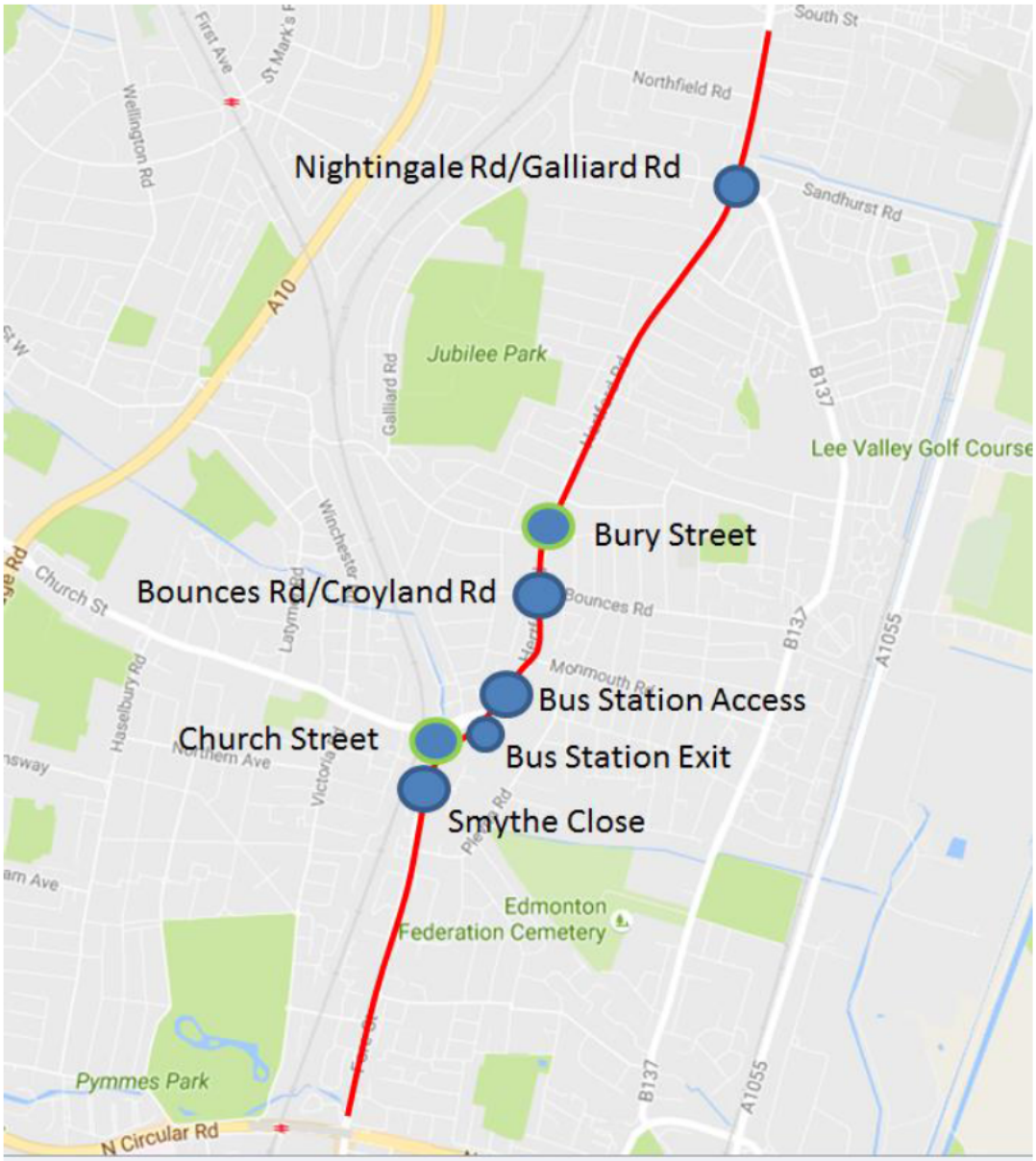

Figure 1: A1010 South Corridor

1.2 Modelling

Modelling has been carried out using LINSIGv3 for the signalised junctions, which is currently being audited by TfL's Outcomes Delivery Team and ARCADY has been used to model the Bury Street roundabout base situation. As the modelling is still being audited the results may be subject to change.

1.3 Existing Bus Situation

The existing bus routing is shown in the figure below.

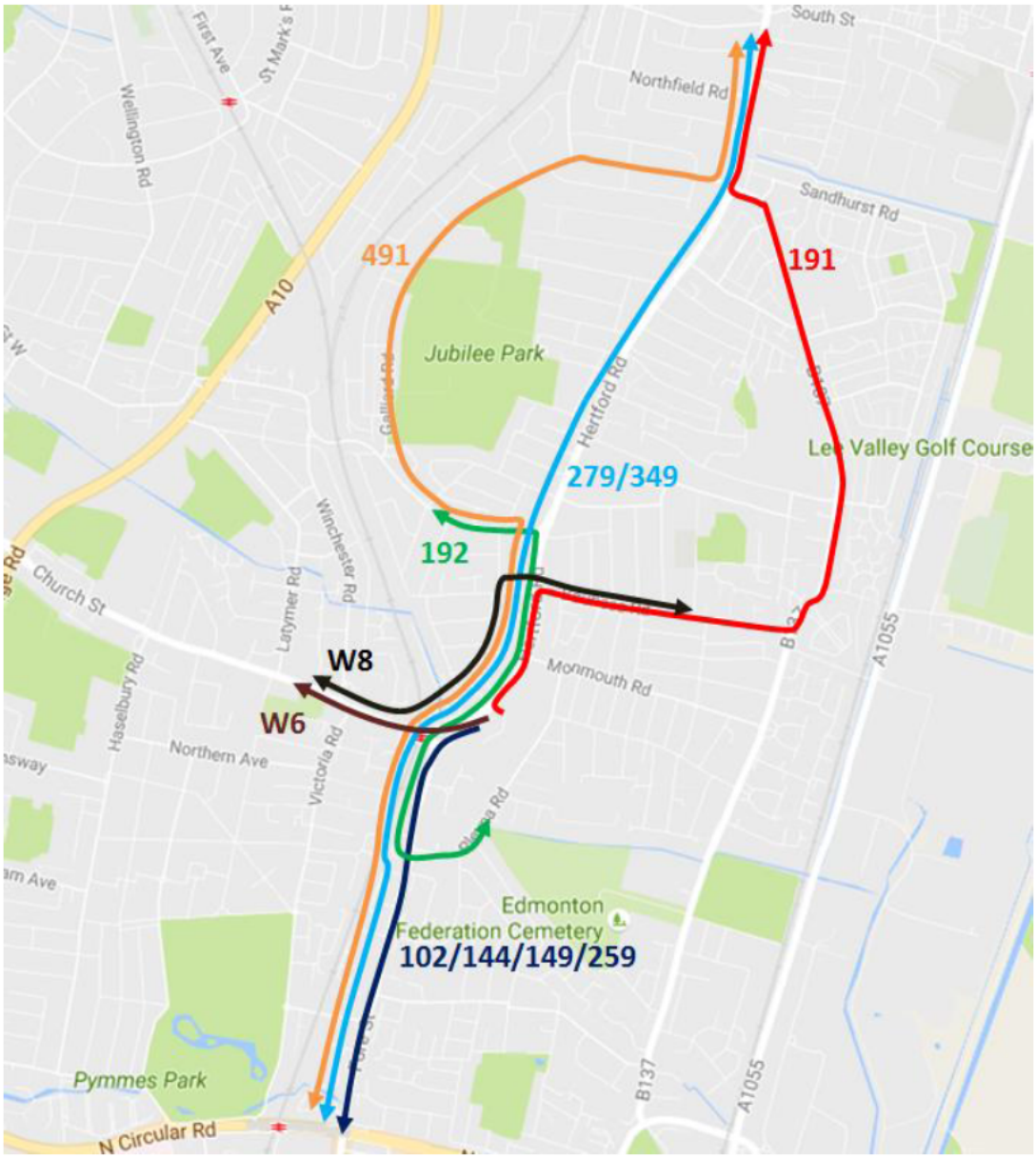

Figure 2: A1010 South Bus Routes

The figure shows that bus routes are concentrated on the southern section of the corridor with the majority of routes starting/terminating at the Edmonton Green bus station.

There are a number of other schemes being implemented in Enfield over the next few years, as part of Cycle Enfield, as well as the Ponders End scheme. The schemes affecting the routes on this A1010 South corridor are shown in the table below.

Table 1: Routes Affected by Other Scheme

Bus Route	Other Major Scheme Affecting Routes
102	A406 Junction
144	A406 Junction
149	A1010 South- Extension
191	Ponders End/Southbury Road Enfield Town/A1010 North
192	Enfield Town
259	A1010 South- Extension
279	A1010 South- Extension/Ponders End/A1010 North
349	Ponders End
491	A406 Junction/Ponders End/Southbury Road/A1010 North
W8	A105/Enfield Town
W6	A105

The tables below show the bus frequencies at each stop along the route and also where bus stops have been relocated into the carriageway, as part of the proposed scheme.

Table 2: Southbound Bus Stops on A1010 South

Southbound		Frequency		Bus Routes	Overtaking Space	
Stop	Name	AM	PM		Existing	Proposed
LZ	Orchard Road	20	20	3	Y	N
LA	Nightingale Road	12	12	2	Y	Y
LB	Nightingale Road	16	16	2	Y	Y
LC	Cuckoo Hall Lane	18	18	2	Y	N
LD	Tramway Avenue	18	18	2	Y	Y
LE	Forest Road/Jubilee Park	18	18	2	Y	N
LF	Bounces Road	28	28	4	Y	Y
LH	Monmouth Road	32.5	32.5	5	Y	Y
G	Edmonton Green Bus Station	63	69.5	8	Y	Y
A-F	Edmonton Green Bus Station	20.5	20.5	3	N/A	N/A
J	Edmonton Green Police Station	63	63	8	Y	Y
K	Shrubbery Road	57	57	7	Y	Y
G	Brettenham Road	49	49	6	Y	Y
D	Angel Corner	12	12	2	Y	Y
E	Angel Corner	37	37	4	Y	Y

Table 3: Northbound Bus Stops on A1010 South

Northbound		Frequency		Bus Routes	Overtaking Space	
Stop	Name	AM	PM		Existing	Proposed
H	Angel Corner	49	49	6	Y	Y
L	Shrubbery Road	57	57	7	Y	Y
M	Edmonton Green Police Station	63	63	8	Y	Y
N	Edmonton Green	63	63	8	Y	Y
A-F	Edmonton Green Bus Station	76	42.5	10	N/A	N/A
P	Monmouth Road	42	40.5	6	Y	Y
LJ	Bounces Road	14	12.5	2	Y	Y
LK	Bounces Road	28	28	4	Y	Y
LL	Bury Street Edmonton	18	18	2	Y	N
LM	Forest Road Jubilee Park	18	18	2	Y	Y
LN	Tramway Avenue	18	18	2	Y	Y
LP	Cuckoo Hall Lane	18	18	2	Y	Y
LR	Nightingale Road	28	28	4	Y	N
M	Orchard Road	28	28	4	N	N

As the tables show, the majority of bus stops still permit overtaking, once the scheme has been implemented. Where buses are located in-carriageway there is a maximum of two bus routes, with a maximum bus flow of 18 per hour, in the busiest periods, except at the Northbound Nightingale Road bus stop, where there are 4 routes and 28 buses per hour.

1.4 Assumptions

Given the number of routes and bus frequencies at each stop it is considered unlikely that buses will delay other buses along the route, when stopping in carriageway, except at the Northbound Nightingale Road bus stop.

Furthermore, an assessment carried out by TfL on the impacts of bus boarders *'TfL Accessible Bus Stop Design Guidance -Appendix B - Effects of introducing bus boarders'*, gave the following findings.

1. The percentage of buses stopping close to the kerb increased.
2. Significantly fewer passengers had to step into the road when boarding and alighting at boarder sites leading to improved access to buses, especially for mobility impaired passengers
3. There was a slight reduction in boarding and alighting times of 0.1 seconds
4. Fewer buses (between 5% and 18%) were hemmed in by general traffic at the full width boarder sites.
5. Those buses affected by traffic when pulling away from a stop were delayed by between 0.5 and 2.5 seconds less at the bus boarder than with the original kerbside stop.
6. For all buses, the time taken to leave the bus stop and re-enter the main flow of traffic was 0.6 to 0.8 seconds less after the introduction of a bus boarder.
7. Overall bus delays were reduced by 1.3 seconds per boarder on a road operating at 50% of capacity

It is therefore anticipated that the proposed scheme will see benefits to buses, when pulling away from bus stops, as a result of the proposed bus stop boarders.

It is also proposed to introduce SCOOT along the corridor at junctions r, which currently run VA and therefore it is anticipated that this will further benefit buses.

1.5 Methodology

To assess the impact on bus journey times as a result of the scheme it is therefore proposed to calculate the difference in journey time by taking the average delay/PCU (Passenger Car Unit) from the local junction modelling, for the existing and proposed scenarios.

Table 4 shows the routes that are affected by the key junctions on the A1010 South.

Where routes are not travelling north/south through the junction the arm which the route arrives from/departs to is shown in the table.

Table 4: Bus Routes through Junctions on the A1010 South

Key Junctions Impacts by A1010 Scheme											
Bus Route	Direction	Nightingale /Galliard Rd	Bury St	Bounces Rd/ Croyland Rd	Bus Station Access	Balham Road/ Bus Station Exit	Edmonton Green Sig Rbt (North Stream)	Edmonton Green Sig Rbt (South Stream)	Edmonton Green Sig Rbt (West Stream)	Smythe Close	Ped crossings Fore St
102	Northbound						Yes	Yes	Yes	Yes	Yes
	Southbound					Yes	Yes	Yes		Yes	Yes
144	Northbound						Yes	Yes	Yes	Yes	Yes
	Southbound					Yes	Yes	Yes		Yes	Yes
149	Northbound						Yes	Yes	Yes	Yes	Yes
	Southbound					Yes	Yes	Yes		Yes	Yes
191	Northbound	Yes (RT)		Yes (RT)	Yes (RT)						
	Southbound	Yes (LT)		Yes (LT)	Yes (LT)						
192	Northbound		Yes (LT)	Yes	Yes (RT)		Yes	Yes	Yes		
	Southbound		Yes (RT)	Yes	Yes (LT)	Yes (LT)	Yes	Yes			
259	Northbound						Yes	Yes	Yes	Yes	Yes
	Southbound					Yes	Yes	Yes		Yes	Yes
279	Northbound	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes
	Southbound	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
349	Northbound	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Southbound	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
491	Northbound	Yes (LT)	Yes (LT)	Yes	Yes (RT)		Yes	Yes	Yes	Yes	Yes
	Southbound	Yes (RT)	Yes (RT)	Yes	Yes	Yes	Yes	Yes		Yes	Yes
W8	Eastbound			Yes (RT)	Yes (RT)		Yes		Yes		
	Westbound			Yes (LT)	Yes (LT)	Yes (LT)	Yes	Yes	Yes		
W6	Eastbound						Yes		Yes		
	Westbound					Yes (LT)	Yes	Yes	Yes		

1.6 Results

The table below shows the impact on journey time per route, by direction and peak hour. The values provided are the total average delay taken from the modelled junctions, which the bus route passes through.

Table 5: Average Delay per Bus by Route (seconds)

Bus Route		Base		Proposed	
		AM	PM	AM	PM
102	Northbound	49.3	74.2	90.5	105.2
	Southbound	68.8	79.3	59.6	58.6
144	Northbound	49.3	74.2	90.5	105.2
	Southbound	68.8	79.3	59.6	58.6
149	Northbound	49.3	74.2	90.5	105.2
	Southbound	68.8	79.3	59.6	58.6
191	Northbound	204.0	220.3	189.2	177.6
	Southbound	141.2	192.8	185.3	126.7
192	Northbound	174.0	242.0	200.9	226.0
	Southbound	183.9	167.4	240.8	219.3
259	Northbound	49.3	74.2	90.5	105.2
	Southbound	68.8	79.3	59.6	58.6
279	Northbound	179.4	292.2	233.7	280.3
	Southbound	267.1	196.5	251.1	192.4
349	Northbound	179.4	292.2	233.7	280.3
	Southbound	267.1	196.5	251.1	192.4
491	Northbound	248.6	321.7	346.4	387.3
	Southbound	223.8	197.1	289.8	274.1
W8	Eastbound	142.4	173.3	135.5	149.7
	Westbound	134.4	196.2	207.9	189.2
W6	Eastbound	23.3	24.4	51.3	50.9
	Westbound	54.9	29.7	98.2	103.3

The table below shows the difference in journey time per route, by direction and peak hour.

Table 6: Average Change in Delay per Bus by Route (seconds)

Bus Route		Change with proposals	
		AM	PM
102	Northbound	41.2	31.0
	Southbound	-9.2	-20.7
144	Northbound	41.2	31.0
	Southbound	-9.2	-20.7
149	Northbound	41.2	31.0
	Southbound	-9.2	-20.7
191	Northbound	-14.8	-42.7
	Southbound	44.1	-66.1
192	Northbound	26.9	-16.0
	Southbound	56.9	51.9
259	Northbound	41.2	31.0
	Southbound	-9.2	-20.7
279	Northbound	54.3	-11.9
	Southbound	-16.0	-4.1
349	Northbound	54.3	-11.9
	Southbound	-16.0	-4.1
491	Northbound	97.8	65.6
	Southbound	66.0	77.0
W8	Eastbound	-6.9	-23.6
	Westbound	73.5	-7.0
W6	Eastbound	28.0	26.5
	Westbound	43.3	73.6

The table below summarises the two-way impact per bus service, in each peak period.

Table 7: Average Change in Delay per Bus 2-way by Route (seconds)

Bus Route		AM	PM	Two-way Bus Frequency	
				AM	PM
102	Two-Way	32.0	10.3	16	16
144	Two-Way	32.0	10.3	16	16
149	Two-Way	32.0	10.3	20	20
191	Two-Way	29.3	-108.8	12	12
192	Two-Way	83.8	35.9	12	12
259	Two-Way	32.0	10.3	18	18
279	Two-Way	38.3	-15.9	20	20
349	Two-Way	38.3	-15.9	16	16
491	Two-Way	163.8	142.6	8	8
W8	Two-Way	66.6	-30.6	13	13
W6	Two-Way	71.3	100.1	16	16
		Total Buses		**167**	**167**

The table below summarises the total delay experienced across all routes by peak, and the resulting average delay per bus across all routes

Table 8: Average Change in Delay per Bus across All Routes

	AM	PM
Total Delay	**8291.3**	**1616.0**
Average Delay	**49.6**	**9.7**
Average delay over both peaks	**29.7**	

Appendix A. : Corridor Modelling Results

32_018: Croyland Rd - Bounces Road												
	Existing						Proposed					
	AM			PM			AM			PM		
Approach	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)
Croyland Rd - All Movements	81.1%	88.7	4.7	35.1%	50.6	2.1	Exit Only					
Hertford Rd - Ahead and Left - SB	85.3%	44.1	12.8	73.1%	38.4	11.1	93.6%	45.3	28.5	85.6%	37.5	19.7
Hertford Rd - Ahead and Right - SB	55.7%	29.9	6.3	38.5%	29.8	4.9	Lane removed					
Bounces Rd - All Movements	83.2%	56.5	6	100.5%	132.6	19.2	92.1%	87.5	9	87.3%	60.4	10.9
Hertford Rd - All Movements - NB	94.0%	62.2	18.2	100.1%	100	31.9	67.2%	27.2	12.4	89.0%	43.6	20.1
SB Herford Road Cycle Crossing	N/A			N/A			55.8%	2.7	0.7	47.3%	2.2	0.5
NB Herford Road Cycle Crosing	N/A			N/A			39.7%	3.9	4.3	45.1%	4.2	5.3

32_021: Galliard Road - Nightingale Road												
	Existing						Proposed					
	AM			PM			AM			PM		
Approach	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)
Hertford Rd - Ahead and Left- SB	96.2%	60.5	23.6	75.5%	25.5	7.2	97.5%	73.2	29.8	83.1%	38.3	12.6
Hertford Rd - Ahead and Right - SB	88.8%	69.3	11.2	51.3%	32.3	4.2	93.8%	96.1	16.3	91.8%	98.1	11.4
Nightindale Rd - All Movements	96.4%	84.9	16.9	94.2%	71.4	14.4	98.1%	105	22.2	93.0%	78.8	18.3
Hertford Rd - All Movements - NB	80.5%	42.7	9.3	95.2%	78.5	13.2	94.5%	84.4	20.8	95.7%	92.9	20.9
Galliard Rd - Ahead and Right	80.3%	67.8	6.9	79.2%	74.6	4.8	95.9%	139.8	12	94.6%	155	9

32_230_A1010 Hertford Road/Bury Street/Rosemary Avenue (New Four Arm Signalised Junction)												
	Existing- (Mini- Roundabout)						Proposed					
	AM			PM			AM			PM		
Approach	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)
A1010 Hertford Road - All Movements - SB	97.0%	69.51	15.3	78.0%	18.57	3.5	92.2%	48.4	24.5	79.9%	30	13.1
A1010 Hertford Road - All Movements -NB	71.0%	12.42	2.4	86.0%	23.95	5.5	79.7%	31.9	17	83.2%	28.3	20.5
Bury Street - All Movements	65.0%	17.41	1.8	49.0%	12.41	1	93.1%	64.2	19.4	80.9%	51.9	11.2

New-Edmonton Green Network												
	Existing						Proposed					
	AM			PM			AM			PM		
Approach	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)	DoS (%)	Delay (Sec/PCU)	MMQ (PCU)
Edmonton Turbo Roundabout												
							Stream 3 (South Stream)					
The Broadway - NB	44.2%	2.3	1.7	45.7%	2.5	4.3	64.1%	15.7	11.9	76.0%	27.5	12.3
Circulating-WB A1010	N/A			N/A			68.5%	14.1	8.6	53.5%	22.1	7.6
Exit-SB A1010	N/A			N/A			75.0%	15.6	11.6	68.3%	12	10
	N/A			N/A			Stream 1 - West Stream					
Church Street	77.7%	13.9	9.2	81.6%	16.2	9.9	72.0%	13.4	7.6	76.3%	16.4	7.4
Circulating - NB A1010	N/A			N/A			72.7%	17.7	6.7	74.5%	16.1	7.2
Exit - WB Church St	N/A			N/A			48.1%	3.8	3.1	46.8%	4.4	2.4
	N/A			N/A			Stream 2 (North Stream)					
The Green - SB - Nearside	59.5%	5.4	4.4	53.2%	5.6	4.5	59.6%	14.5	4.6	53.9%	15.4	4.4
The Green - SB - Offside	47.8%	4.2	4.8	40.5%	4.8	4.3	51.9%	12.1	5.1	44.3%	12.9	4.6
Circulating - SB A1010	N/A			N/A			78.7%	31.8	9	75.0%	29	8.7
Exit - NB A1010	N/A			N/A			63.4%	10.1	7.4	69.1%	13.9	8.1
32_111/196 - The Green - Balham Rd												
The Green - Ahead and Left - NB	34.1%	3.3	2.9	46.9%	4.2	3.6	48.4%	5.6	1.6	59.4%	4.6	5
The Green - Ahead - NB	11.8%	3.1	1.1	10.7%	2.2	0.6	16.8%	2.9	0.3	14.0%	2.7	0.2
The Green - Ahead - SB	61.3%	3.6	2.2	59.5%	9.1	6.7	72.8%	8.6	13.9	64.9%	8.4	4.3
Bus Station Exit	18.0%	41.3	0.9	9.0%	17.3	0.4	22.5%	62.8	1.4	17.4%	58.3	1.2
Balham Road - Left	6.5%	3.3	0.1	7.4%	3.4	0	21.3%	60.8	1.3	20.6%	57.4	1.4
32_194/32_053 - Fore St - Smythe Close												
Fore Street - Ahead and Right - NB	59.60%	11.9	10.9	76.80%	37.1	15.4	57.1%	10.8	12.3	63.0%	20.2	14.5
Smythe Close Left	18.40%	41.2	0.9	48.30%	42.9	3	27.6%	68.8	1.4	67.6%	78.8	5
Smythe Close- Right	10.10%	39.4	0.5	52.40%	43.5	3.4	15.2%	64.9	0.8	73.4%	83.2	5.9
Fore Street - Left - SB	42.00%	10.1	5.4	55.40%	23.6	7.8	10.9%	8.9	1.7	22.8%	16.7	3
Fore Street - Ahead - SB	28.50%	12.7	5.5	38.50%	21.1	4.6	54.3%	8.7	12	52.3%	11.1	10.4
32_195 - Hertford Road - The Green - Bus Station												
The Green - Ahead - NB	55.8%	12.8	8.5	63.2%	15.5	12.3	55.8%	17.5	9.2	61.1%	21.2	13.2
The Green - Right - NB	19.9%	54.2	0.6	17.6%	45.1	0.6	41.8%	104.8	1.2	31.7%	81.9	1.5
Bus Station Exit	74.6%	56.9	5.7	69.7%	48.9	5.6	55.9%	53.1	6.6	56.0%	51	7
Hertford Road - Ahead and Left - SB	82.6%	24.2	17.6	86.8%	34.7	17.5	74.4%	21.9	21.1	71.9%	25.8	19.1

	Existing						Proposed					
32_053 - Ped Crossing By Bridge Road												
A1010 Fore St - Ahead - NB	75.5%	16.8	7.5	59.9%	9.7	5.2	53.7%	8.8	6.5	46.8%	6.1	4.9
A1010 Fore St - Ahead - SB	80.6%	25	12.7	62.6%	15.6	10.6	57.3%	5.1	8.2	48.9%	5.1	2.4
	Existing						Proposed					
32_061 - Church St Ped Crossing												
Church St EB	65.4%	9.4	6	62.2%	8.2	5.4	54.5%	6.1	5.6	52.7%	5.5	5.2
Church St WB	58.6%	8.2	7.9	52.3%	6.8	8.1	48.8%	3	2.4	44.4%	3.1	3.3
	Existing						Proposed					
32_148_148 - Ped Crossing By Sebastopol Road												
Fore Street (NB)-Ahead	42.0%	2.1	1.1	45.0%	2.4	1.6	44.0%	2.3	1.5	47.0%	2.7	2
Fore Street (SB)-Ahead	49.0%	2.4	1.6	43.0%	2.3	1.5	51.0%	2.7	2.1	44.0%	2.6	1.9
Fore Street (SB) Bus Lane	7.0%	1.4	0.1	7.0%	1.5	0.2	7.0%	1.5	0.2	7.0%	1.7	0.2
	Existing						Proposed					
32_078_079 - Ped Crossing by Park Road												
Fore Street (NB)-Ahead	50.0%	4.7	3.2	47.0%	2.7	2.1	40.0%	3.4	0.7	43.0%	3.6	0.8
Fore Street (SB)-Ahead	62.0%	5.9	4.9	51.0%	3.3	2.6	52.0%	4.4	0.9	47.0%	4	0.9
Fore Street (SB) Bus Lane	8.0%	2.9	0.3	7.0%	1.8	0.2						