SQA-8569 – Traffic Signal Supplementary Report

EVERY JOURNEY MATTERS

Contents

Purpose

To provide the template for the client / promoter scheme proposal and the Asset Management Directorate (AMD) audit of signal design and network impact. The template must be completed for all schemes planned for implementation on the Transport for London Road Network (TLRN) and Strategic Road Network (SRN) and where schemes on other roads impact the performance of the TLRN, SRN or bus operation. The audit and assessment completed by AMD will be undertaken on schemes that are accepted traffic signal schemes and this document will provide a summary of the findings with recommendations, with respect to safe signal design and road network impact. The Traffic Signal Supplementary Report (TSSR) will be initiated and submitted by the promoter (section 1). AMD Traffic Infrastructure (TI) Signals and Road Space Management (RSM) Network Performance (NP) will complete their assessment (Sections 2 and 3 respectively). It will then be returned to the promoter for them to submit to RSM's Planned Interventions (PI) and Forward Planning Team (FPT), along with other supporting information.	

Scheme Types

Minor works (usually not in carriageway) not effecting signal operation or capacity. Isolated crossings (Pelican, Toucan, Puffin). Crossing in a linked system (Pelican, Toucan, Puffin). Modifications to existing signals to improve facilities New junctions Modernisation Programme. Notes: Type 1: A TSSR is generally not required for this type of scheme, however a road network impact assessment (Section 3) may be required for non-traffic signal schemes that could affect road capacity. A network impact assessment will require operational traffic modelling and must follow the Model Audit Process (MAP) – SQA-0184. Type 5: Justification will need to be provided for new signal installations.	

Reference Documents

Document Number	Document Title
SQA-0064	Design Standards for Signal Schemes in London.
SQA-0184	Model Audit Process (MAP) Overview.
SQA-0448	Signal Design Review Sheet

Document Reference

Document Control for Scheme Submission

Issue	Date	Status/ Notes	Prepared by	Reviewed by	Approved by
0.1	26/10/16	Promoter submission for audit	[redacted]		
0.2		TI Signals assessment			
0.3		NP-NM assessment			
1.0		Promoter submission to FPT		[redacted]	

Scheme Reference

Scheme Type Number:	Number
FPT Reference Number:	Number
Sponsor:	Borough Projects and Programmes

Overview (Promoter to complete this section)

Bus Network		
Cycling		
Freight		
General Traffic		
Walking		

Scheme Sponsor		Signed
Sponsor (Client):	LB Enfield - Regeneration & Environment Department	
Promoter (Design Consultant):	Jacobs	

Traffic Infrastructure		Signed
TI Traffic Control Engineer:	[redacted]	
TI Principal Traffic Control Engineer:	[redacted]	

Outcomes Delivery		Signed
OM Traffic Control Engineer	[redacted]	
OM Area Performance Manager	[redacted]	

Planned Interventions		Signed
Network Impact Assessment Engineer		
Network Impact Assessment Manager		

Scheme Overview

Name:	Cycle Enfield – A105 Corridor Scheme		
Type of Scheme	TfL Cycling Programme -Mini-Holland Scheme		
Borough	Enfield	**Road Network (TLRN/SRN/Other):**	SRN
Location and Scope of works:	Significant modifications are proposed at the junctions listed in Section 5.2, with cycle facilities provided to improve safety for cycling. Where possible improvements have also been made to pedestrian facilities, whilst minimising the impact of general traffic and buses. 		

Scheme Details:

The proposed junctions have features including

- Separate cycle phases, either on-carriageway, or on footway, in one instance.
- Early-release
- 2-stage right turns
- Advanced stop lines

Cyclists are protected through timing/movement separation. Details of the proposed layouts and designs can be found in the reports and other information listed in the 'Information Supplied' section.

A two locations, signals have been introduced to replace a roundabout, to protect cyclists, predominantly left hooks at Edmonton Green Roundabout(Church Street/Fore Street/The Green (32/TBC) and Hertford Road/Bury Street (32/230). A cycle crossing has also been introduced south of Croyland Road (32/TBC). The Edmonton Green Roundabout junction will include multiple streams and include the signalising of the existing priority junction at Balham Road/The Green.

Scheme Overview (Continued)

Scheme Objective: (From Scheme Brief From)	This corridor forms part of TfL's Cycle Enfield Mini-Holland programme, which is looking to deliver transformational change for cycling across the borough. This includes segregated cycle facilities, in the form of light segregation, or tracks along the links and segregated cycle facilities at signalised junctions.
Scheme justification and benefits (From scheme Brief Form)	The proposed A1010 South scheme forms part of the wider Cycle Enfield scheme, which is one of Three Mini-Holland schemes being delivered as part of the TfL's Vision for Cycling. The scheme seeks to deliver transformational change to cycling, to promote and increase in the number of trips made by bike. The modelling shows that the proposed junctions can accommodate the existing traffic levels without over-saturating the junctions, whilst delivering the step change in cycle infrastructure required as part of the Mini-Holland programme, as well as improvements for pedestrians, where possible. This step change is to deliver segregated cycle facilities through physical separation in the form of light or full segregation and/or timing separation at the junctions, so cycle movements along the A1010 South corridor are not in conflict with general motor traffic.
Changes to scheme brief	NA

Site Works Breakdown

Existing or New Signals	Site No.	Address	Type	Controller / Stream	Scope of Works
Existing	32_078_079	A1010 Fore St by Park Rd Pedestrian Crossing	Pedestrian Crossing	Controller	Modification to existing signalised dual pelican staggered crossing (decommissioning) into zebra crossing with parallel priority crossing.
Existing	32_147_148	A1010 Fore St by Sebastopol Rd Pedestrian Crossing	Pedestrian Crossing	Controller	Modification to existing signalised dual pelican staggered crossing, into a straight Pelican crossing.
Existing	32_053	A1010 Fore St by Bridge Rd Pedestrian Crossing	Pedestrian Crossing	Controller	Modification to existing signalised Toucan crossing, at the northern and southern approaches to provide an improved layout for the cyclist movements.
Existing	32_194	A1010 The Broadway /Fore Street/Symthe Close	Junction	Controller	Modification to junction layout to ensure safe progression of the north-south cyclist movements, particularly in relation to left turn hooks.
New Signals	NEW 32/231	Edmonton Green Signalised Roundabout	Junction	Controller	Modification to existing roundabout to improve safety for cyclists, particularly in relation to left turn hooks
Existing	32_111_196	A1010 Hertford Road/ Edmonton Green Bus Station Exit/Balham Road	Junction	Controller	Modification to introduce cycle facilities
Existing	32_195	A1010 Hertford Road/ Edmonton Green Bus Station Northern Junction	Junction	Controller	Changes to the signal timing to adopt proposed cycle time for the UTC region A1208
Existing with a new Stream	32/018 & (Stream 2 -32_New)	A1010 Hertford Rd/Bounces Rd/Croyland Rd (Stream 1)& a cycle crossing located at south (Stream 2)	Junction	Controller with a Stream	Modification to junction layout to ensure safe progression of the north-south cyclist movements, particularly in relation to left turn hooks.
New Signals	New 32_230	A1010 Hertford Road/Bury Street	Junction	Controller	The scheme proposed to introduce a signalised junction, to replace the existing mini-roundabout. This is predominantly to mitigate the potential left turn hook conflicts between general traffic and ahead cyclists
Existing	32/021	A1010 Hertford Road/Galliard Road/Nightingale Road	Junction	Controller	Modification to junction layout to ensure safe progression of the north-south cyclist movements, particularly in relation to left turn hooks.

Information Supplied

Type	Title	Version No.	Date	Author	Organisation
32/078_079 A1010 Fore St by Park Rd Pedestrian Crossing					
Drawing	B240G001-SG-A1010S-009.dwg	R0	08/09/16	[redacted]	Jacobs
Report	32_078_079 TA Tech note_R0V0	R0	3110/16	[redacted]	Jacobs
Model	32_078_079 Fore St by Park Rd.lsg3x Proposed Zebra Crossing_rev00.j9 Proposed Zebra Crossing_rev00_LS.j9	R0	31/10/16	[redacted]	Jacobs
32/147_148 A1010 Fore St by Sebastopol Rd Pedestrian Crossing					
Drawing	B240G001-SG-A1010S-010.dwg	R0	08/09/16	[redacted]	Jacobs
Report	32_147_148 TA Tech note_R0V0	R0	28/10/16	[redacted]	Jacobs
Model	32_147_148 Fore St by Sebastopol Rd.lsg3x 32_147_148 Fore St by Sebastopol Rd_Proposed.lsg3x	R0	28/10/16	[redacted]	Jacobs
32/053 A1010 Fore St by Bridge Rd Pedestrian Crossing					
Drawing	B240G001-SG-A1010S-008.dwg	R0	08/09/16	[redacted]	Jacobs
Report	32_0XX A1010 Edmonton Green Network_LMAP5 Tech note_R3V0	R3	25/10/16	[redacted]	Jacobs
Model	Edmonton Gn Net_Prop AM_PM_WE_V0R8.lsg3x	R8	25/10/16	[redacted]	Jacobs
32/194 A1010 Fore St_Smythe Close					
Drawing	B240G001-SG-A1010S-004.dwg	R0	04/08/16	[redacted]	Jacobs
Report	32_0XX A1010 Edmonton Green Network_LMAP5 Tech note_R3V0	R3	25/10/16	[redacted]	Jacobs
Model	Edmonton Gn Net_Prop AM_PM_WE_V0R8.lsg3x	R8	25/10/16	[redacted]	Jacobs
32/111_196 A1010 Hertford Road_Balham Road_Bus Station Exit					
Drawing	B240G001-SG-A1010S-006.dwg	R0	04/08/16	[redacted]	Jacobs
Report	32_0XX A1010 Edmonton Green Network_LMAP5 Tech note_R3V0	R3	25/10/16	[redacted]	Jacobs
Model	Edmonton Gn Net_Prop AM_PM_WE_V0R8.lsg3x	R8	25/10/16	[redacted]	Jacobs
32/195 A1010 Hertford Road/ Bus Station Northern Junction					
Drawing	NA	-	-	-	-
Report	32_0XX A1010 Edmonton Green Network_LMAP5 Tech note_R3V0	R3	25/10/16	[redacted]	Jacobs
Model	Edmonton Gn Net_Prop AM_PM_WE_V0R8.lsg3x	R8	25/10/16	[redacted]	Jacobs

Information Supplied (Contd..)

Type	Title	Version No.	Date	Author	Organisation
NEW-32/0XX Edmonton Green Signalised Roundabout					
Drawing	B240G001-SG-A1010S-005.dwg	Rev B	15/09/16	[redacted]	Jacobs
Report	32_0XX A1010 Edmonton Green Network_LMAP5 Tech note_R3V0	R3	25/10/16	[redacted]	Jacobs
Model	Edmonton Gn Net_Prop AM_PM_WE_V0R8.lsg3x	R8	25/10/16	[redacted]	Jacobs
32/018 & New Stream (Stream 2) A1010 Hertford Rd/Bounces Rd/Croyland Rd & Cycling crossing					
Drawing	B240G001-SG-A1010S-001.dwg & B240G001-SG-A1010S-011.dwg	R0 R1	01/08/16 16/10/16	[redacted]	Jacobs
Report	32_018 LMAP 5 Tech note_R2V0	R2	24/10/16	[redacted]	Jacobs
Model	32_018_AM_PM_Proposed_V3R0.lsg3x	V3	24/10/16	[redacted]	Jacobs
New 32/230 A1010 Hertford Road/Bury Street					
Drawing	B240G001-SG-A1010S-002.dwg	R1	12/10/16	[redacted]	Jacobs
Report	32_230 Bury St_Hertford St_LMAP 5 Tech note_R2V0	R2	18/10/16	[redacted]	Jacobs
Model	Proposed Bury St_Hertford Rd Signalised Jn_R3V0.lsg3x	R3	18/10/16	[redacted]	Jacobs
32/021 A1010 Hertford Road/Galliard Road/Nightingale Road					
Drawing	B240G001-SG-A1010S-003.dwg	Rev B	15/09/16	[redacted]	Jacobs
Report	32_021 LMAP 5 Tech note_R3V0	R3	24/10/16	[redacted]	Jacobs
Model	32/021 A1010 Hertford Road/Galliard Road/Nightingale Road.lsg3x	R6	24/10/16	[redacted]	Jacobs
Corridor- Bus Journey Times					
Report	A1010 S Bus Journey Time Assessment_Rev3Assessment_Rev03	R3	31/10/16	[redacted]	Jacobs

Promotors Submission detail

The described scheme has been submitted for audit on behalf of the following:

Sponsor (Client):	LB Enfield - Regeneration & Environment Department
Promoter (Design consultant):	Jacobs

Contact Details:	
Name:	Enfield – [redacted] Jacobs – [redacted]
E Mail Address:	[redacted]
Telephone Number:	[redacted]

AMD Traffic Infrastructure

Changes required to junction layout	Yes

Safety checks complete	Stage One's only

SQA-448 Signed off	No

Signals safe to control as part of the scheme	Yes

Comments or additional supplementary information
The design of the A1010 corridor as part of Enfield's Mini Holland scheme will provide improved facilities for cyclists travelling along the corridor. This will be achieved using segregated cycle tracks, Toucan crossings, and providing priority for cyclists at signalised junction using Low Level Cycle Signals. All sites are to be upgraded to 21C UTC and have SCOOT added. For all sites the data provided was a Preliminary design drawing (1:200), accident statistics for the corridor, a proposed Linsig model and a Technical note. Traffic counts have been provided as part of the model audit process. 85th percentile speeds have also been provided. Accident statistics were supplied for the last 36 months up to 31th of December 2015 in a raw data format but due to the tight deadlines and no final accident report being submitted the true statistics as not total be assessed. As this Mini Holland scheme will be providing segregated facilities the likelihood of vehicle and cyclist collisions should be reduced. The A1010 South Mini Holland scheme consists of Seven signalised junctions, one new signalised Cycle crossing, one crossing removal and two signalised crossing modification. All schemes have been through a Stage one Signals Safety Check and the junctions have also had SQA-0448 forms audited to confirm safety timings are acceptable and comply with SQA-0645. Final Stage 2 Safety Checks are currently underway and should be completed once designs have been finalised. All drawings were also audited as part of this process and all the major safety concerns are being dealt with or have been mitigated effectively in the designs. Due to the tight deadline for the approval of the A1010 South we have completed as much design and safety check as reasonable practicable in the time we have had available.

AMD Traffic Infrastructure

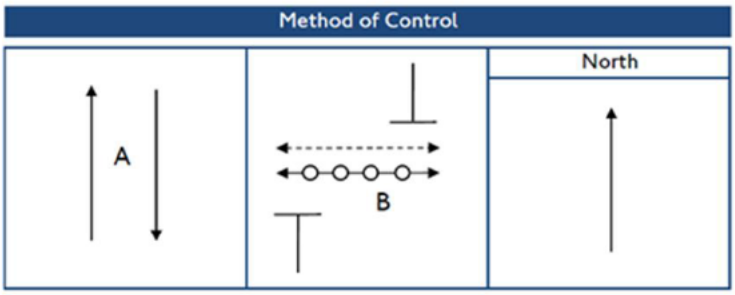
Comments or additional supplementary information continued

32/078_079 A1010 Fore St by Park Rd Pedestrian Crossing

The scheme proposes to remove the existing signalised dual pelican crossing (decommissioning), and converted it into a zebra crossing with parallel priority crossing for cyclists (as per latest LCDS guidelines).

32/147_148 A1010 Fore St by Sebastopol Rd Pedestrian Crossing

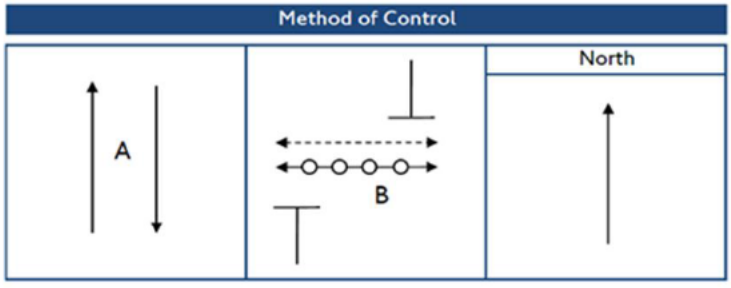
Proposed Method of Control



The scheme proposes to make changes to the existing signalised dual pelican crossing and converted it into a straight across Ped X crossing with PC@TS for the benefit of pedestrians.

32/053 A1010 Fore St by Bridge Rd Pedestrian Crossing

Proposed Method of Control



The scheme proposes to make changes to the existing signalised Toucan crossing which is to be retained with modifications at the northern and southern approaches of this junction to provide an improved layout for the cyclist movements.

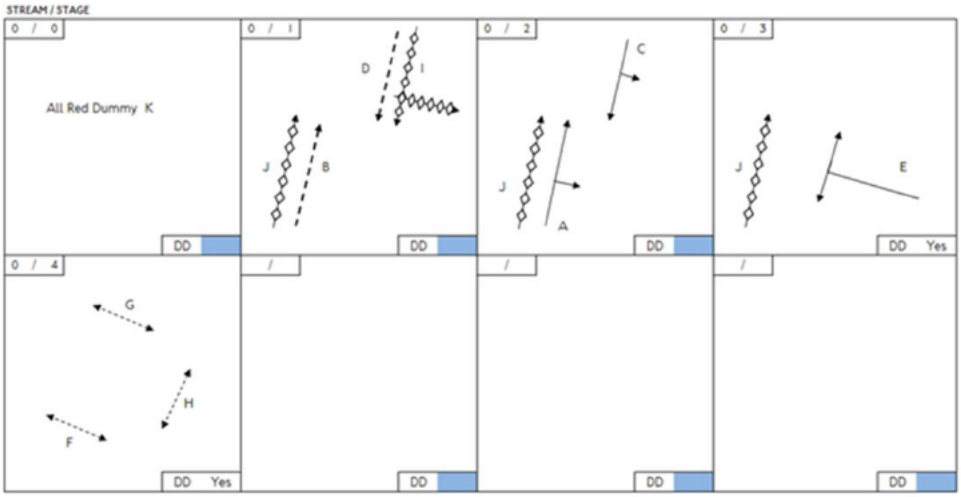
A cycle lane is to run through the crossing on the West side, this will have its own low level cycle signal and share the vehicle stop line. On the East side the cycle lane is to be off-carriageway and run through a shared area. The crossing is proposed to use PC@TS. There are to be pushbuttons on all four corners of the crossing.

AMD Traffic Infrastructure

Comments or additional supplementary information continued

32/194 The Broadway/Fore Street/Smythe Close

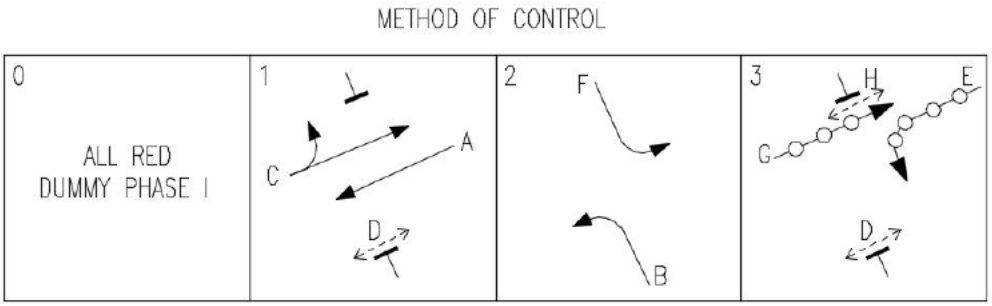
Proposed Method of Control



The scheme proposed is to majorly modify an existing T-junction to incorporate a new method of control and cycle facilities along the A1010 corridor. Segregated cycle lanes will be built and run both North and South controlled by their own dedicated cycle signals. This junction upgrade it to encourage cycling along the corridor and mitigate cycle/vehicle conflicts.

32/111- Hertford Road - Edmonton Green - Balham Road

Proposed Method of Control



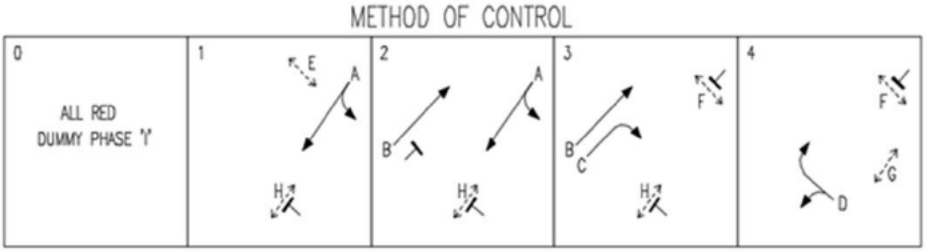
This junction is to be modernised and the layout will be changing. The main changes are the staggered crossing is to be removed and the crossing point moved toward the new roundabout. The crossing is becoming a straight across crossing in two parts with PC@Ts. Another change to the layout is the new lane for westbound cyclists, which crosses both carriageways. Balham road is now to be signalised, with pedestrian facilities and PC@Ts. There is SCOOT currently on site but will need to be adjusted to for the new layout, it is to be retained. There is also an eastbound segregated on carriageway cycle lane which leads to the bi-directional off carriageway cycle track. PC@Ts will also be provided for the crossing exiting the bus station.

AMD Traffic Infrastructure

Comments or additional supplementary information continued

32/195- A1010 Hertford Road - Edmonton Green Bus Station Northern Junction

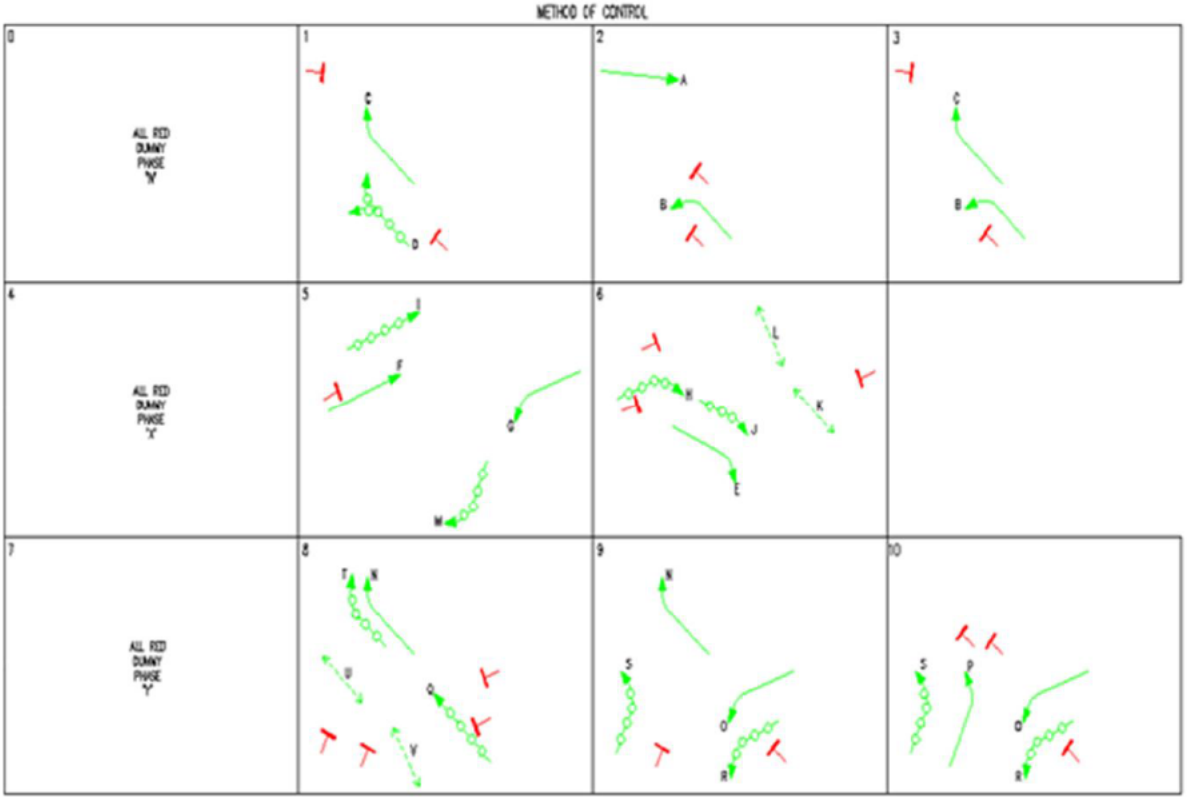
Method of Control



There are no changes to the junction in terms of signal works but there will be major changes to the layout as there will be an addition of a bi-directional cycle track on the northern footway. There will also be a removal of a northbound ASL and a non signalised stopline. Existing SCOOT is to be retained.

32/231 – Edmonton Green Roundabout – Church Street – The Green – The Broadway

Proposed Method of Control



Comments or additional supplementary information continued

32/231 – Edmonton Green Roundabout – Church Street – The Green – The Broadway continued

This is a new site which will significantly alter the roundabout's current layout. The introduction of multiple islands and cycle lanes will significantly reduce the roundabouts existing capacity, reducing it to a single circulatory lane. These islands will be used to provide segregated cycle facilities on all entries and exits from the gyratory. Cycle signals will also be provided on the circulatory at all potential conflict points with vehicular traffic. The roundabout is to have multiple cycle stop lines which will potentially hinder cyclist progression and may lead to non-compliance to the cycle signals causing them to exit segregation in order to progress. The roundabout proposal is to utilise signals on each of the three arms of the gyratory. These will run as separate streams.

The first stream is on the Church Street arm of the junction and includes vehicular and cycle movements. This is the only arm that provides no pedestrian facilities as there is a separate existing pedestrian crossing in close proximity to the roundabout, under the bridge. This crossing has a significant amount of bird excrement on it and has previously been raised as a health and safety concern to Enfield council. There will need to be some mitigation put in place as part of this project. There is also concern with left turning traffic exiting the roundabout on the first and third streams. Traffic can pass the left turn stopline in the right hand lane on the circulatory and then turn left exiting the roundabout past the stopline potentially without visibility of the signals and pass through cycle and pedestrian movements uncontrolled. Jacobs have stated that they intend to mitigate this issue with the use of wands to provide the necessary segregation and deter incorrect use of the exiting traffic.

The second stream on the roundabout is the northern intersection with The Green. This stream also has vehicular and cycle movements as well as a staggered pedestrian crossing. This is a straight over staggered pedestrian crossing which does not meet TI's current standards as there is a 5 metre internal clearance rather than the required 7 metres. This risk has been mitigated by the MOC being restricted so that both phases of the staggered crossing will start and terminate together, acting as one crossing. This will mean that the risk of see through is eliminated. Buses will exit the second stream and enter the bus terminus. This un-signalised left hook has a dedicated cycle stopline and signals to ensure there is no conflict with cyclists on the circulatory. The third stream is the southern junction with The Broadway. This arm is much the same as the second stream, with a sub standard straight over staggered crossing. All of the proposed crossing points are to have PC@T facilities provided. The site is to have a maintenance bay within the roundabout which will have immediate access to the junction controller and a secondary ESP. The site will operate under UTC SCOOT to allow for the optimisation of the signal timings.

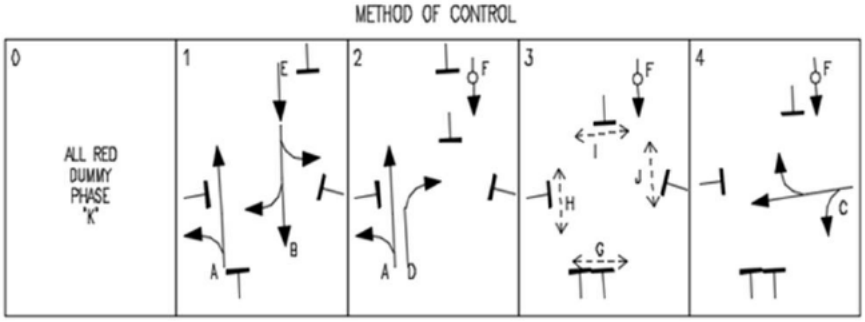
The site is in the middle of Edmonton Green tube station, bus terminus and shopping centre. Works on this site will cause significant disruption.

AMD Traffic Infrastructure

Comments or additional supplementary information continued

32/018 Hertford Road / Bounces Road / Croyland Road

Proposed Method of Control



The need for safety and priority for cyclists' progression through the junction of A1010 Hertford Road/Croyland Road/Bounces Road has resulted in the junction modification.
Croyland Road will be converted to one-way eastbound (EB) between the junction of Herford Road and Millbank Road. The restricted inbound movements from Croyland Road will be diverted via Bury Street to access the A1010 corridor

The SB approach to the junction is proposed to be converted from two lanes to single lane approach to accommodate the southbound cycle lane.

The SB right turning movements from the A1010 to Croyland Road is to be banned. This will provide additional capacity by not blocking the straight-ahead traffic movements. This change in the junction operation will also improve the safety of NB vehicles turning right at the junction, which will no longer be opposed to the SB right turn movement.

On the SB approach, there is a cycle gate with 18m storage, to be fed from a segregated nearside cycle lane.

On the NB approach, an advanced stop line (ASL) is provided with 7.5m storage fed by nearside mandatory cycle lane, this approach will have a 4 sec early release for cyclists.

Due to the presence of the ASL and storage on the NB approach of the junction, the exit-only gate of the petrol filling station located at the south-east corner of the junction is to be restricted to left turning movements only

The width of the pedestrian crossing facilities across Herford Road will be widened to 4.0m.

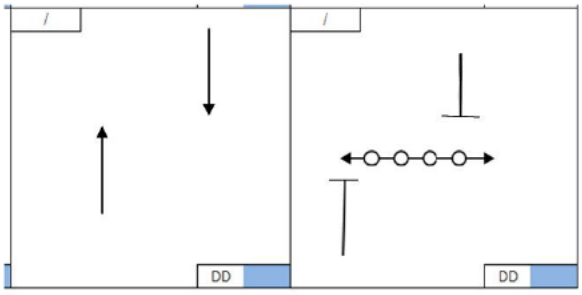
An advanced stop line (ASL) facility with 5m storage is provided at the Bounces Road.

AMD Traffic Infrastructure

Comments or additional supplementary information continued

32/018 Hertford Road / Bounces Road / Croyland Road continued (Separate stream)

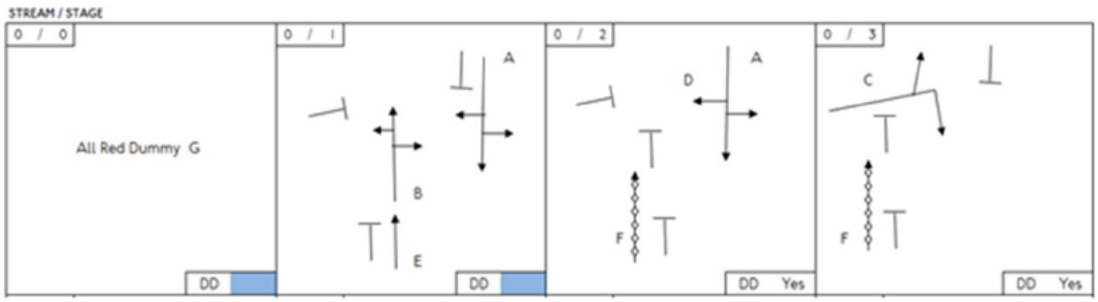
Proposed Method of Control



A signalised cycle crossing has been proposed 55m south of the junction of the A1010 Herford Road with Croyland Road and Bounces Road. This crossing is incorporated in the proposed base model of the node 32/000018, as a separate stream. We would suggest that this is a stand alone cycle crossing linked via UTC control.

32/230 Hereford Road/Bury Street/Rosemary Avenue

Proposed Method of Control



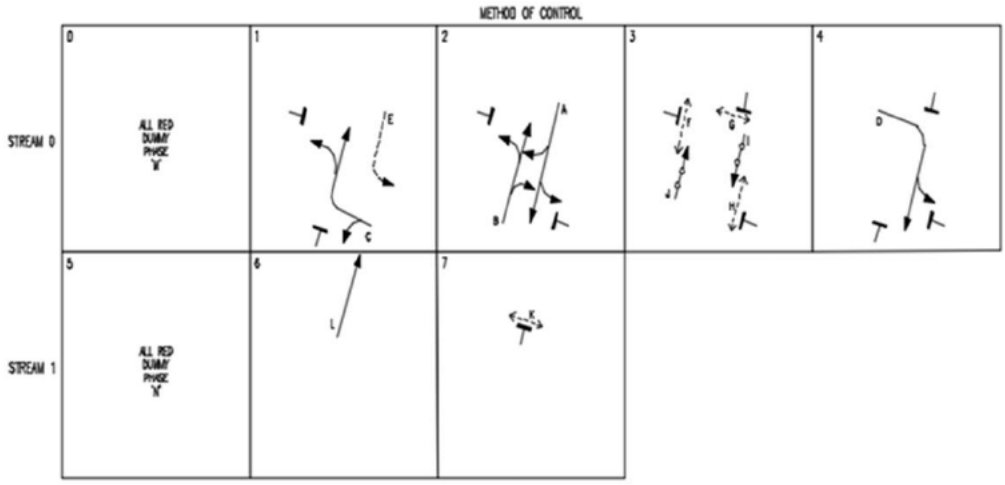
The scheme proposed to introduce a new signalised junction to replace the existing mini-roundabout. A segregated cycle lane will be built and run north controlled by its own dedicated cycle signal. Also, cycle holding areas will be created a signalised to allow cyclists to be ahead of general traffic at specific conflict points at the junction. This proposed design is too predominantly to mitigate the potential left turn hook conflicts between general traffic and ahead cyclists.

AMD Traffic Infrastructure

Comments or additional supplementary information continued

32/021 Hertford Road / Nightingale Road /Galliard Road

Proposed Method of Control



The scheme proposed is modify the junction layout for safety and priority for cyclists' progression through the junction of A1010 Hertford Road/Nightingale Road/Galliard Road.

These changes to the junction layout have been made to ensure safe progression of the north-south cyclist movements.

The existing pedestrian crossing at the south side of junction will be removed and the crossing on the north side of the junction will be converted from a straight over crossing to a staggered crossing.

The Southbound (SB) and Northbound (NB) cycle movements in stage 3 will have their own dedicated phase. However, these will operate as straight-ahead movements only to allow the pedestrian crossing across Nightingale Road to operate in this stage. The left turning cyclists from the northern arm of A1010 to Nightingale Road will share the north-east corner of the footway at this junction along with pedestrians. The NB left turning cyclist into Galliard Road will be using the NB vehicular stage.
The pedestrian crossing located at the NB exit arm of the junction is proposed to be moved 6m to north and will operate as an individual stream (Stream 2). It is proposed to run this stream at the same time as Stage 4 of the main junction, to minimise queueing.

Model Integrity -
Edmonton Green Network R1208 (New Edmonton Green Signalised Roundabout & 32/061, 32/194, 32/053, 32/111-196, 32/195)

Modelling in line with MAP standards			LMAP	Yes
			TMAP	N/A
			VMAP	N/A
Date of traffic flow data				January 2015
Traffic peak times modelled			AM	Yes
			Off	No
			PM	Yes
			Weekend	Yes
Strategic modelling undertaken	ONE	No	Other	No
Scenarios modelled			Base	Yes
			Future Base	No
			Do Something	Yes
			Sensitivity	No
Feasibility modelling undertaken in Linsig				No
Key modelling assumptions/exceptions · All new demand dependent stages called 100% of the time to assume worst case scenario. · All existing demand dependency data applied where stages have not changed. · Proposed model assumes no flow reduction as a result of a potential modal shift to cycling.				

General Traffic -
Edmonton Green Network R1208 (New Edmonton Green Signalised Roundabout & 32/061, 32/194, 32/053, 32/111-196, 32/195)

- All 3 entry/circulatory junctions making up the new signalised roundabout double cycle.
- Degree of Saturation (DoS) analysis vs Ratio of Flow to Capacity (RFC) predicts that DoS will remain below 80% for all approaches during all modelled periods at the proposed signalised roundabout.
- The greatest increase in DoS is on the northbound approach to the roundabout (The Green) however the highest DoS level is 76% during the PM peak demonstrating that reserve capacity would still exist.
- Signalisation of the existing give way roundabout results in delay to general traffic in both directions on the A1010 during all modelled time periods. The greatest increases in delay is on the northbound A1010 approach (The Green) during the PM (+25 seconds) and weekend peak periods (+22 seconds).

New Edmonton Green Signalised Roundabout & 32/061 (Church Street crossing)

AM Peak performance results table

Approach & Movement(s)	AM Base			AM Proposed			Change		
	RFC	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
The Green - NB	44.2%	2.3	1.7	64.1%	15.7	11.9	20%	13.4	10.2
Church Street	77.7%	13.9	9.2	72.0%	13.4	7.6	-6%	-0.5	-1.6
The Green - SB	59.5%	5.4	4.4	59.6%	14.5	4.6	0%	9.1	0.2
The Green - SB	47.8%	4.2	4.8	51.9%	12.1	5.1	4%	7.9	0.3
Church St (EB)- Ped Cros	65.4%	9.4	6	54.5%	6.1	5.6	-11%	-3.3	-0.4
Church St (WB)- Ped Cros	58.6%	8.2	7.9	48.8%	3	2.4	-10%	-5.2	-5.5

PM Peak performance results table

Approach & Movement(s)	PM Base			PM Proposed			Change		
	RFC	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
The Green - NB	45.7%	2.5	4.3	76.0%	27.5	12.3	30%	25.0	8.0
Church Street	81.6%	16.2	9.9	76.3%	16.4	7.4	-5%	0.2	-2.5
The Green - SB	53.2%	5.6	4.5	53.9%	15.4	4.4	1%	9.8	-0.1
The Green - SB	40.5%	4.8	4.3	44.3%	12.9	4.6	4%	8.1	0.3
Church St (EB)- Ped Cros	62.2%	8.2	5.4	52.7%	5.5	5.2	-10%	-2.7	-0.2
Church St (WB)- Ped Cros	52.3%	6.8	8.1	44.4%	3.1	3.3	-8%	-3.7	-4.8

Weekend performance results table

Approach & Movement(s)	Weekend Peak Base			Weekend Peak Proposed			Change		
	RFC	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
The Green - NB	47.1%	2.7	2.3	66.6%	24.5	9.3	19.5%	21.8	7
Church Street	76.4%	11.9	10.4	72.0%	15.5	9	-4.4%	3.6	-1.4
The Green - SB	56.8%	5.7	5.5	59.5%	12.1	6.6	2.7%	6.4	1.1
The Green - SB	42.8%	4.3	5	48.9%	11.3	6	6.1%	7	1
Church St (EB)- Ped Cros	56.1%	6.6	5.1	51.8%	5.4	5	-4%	-1.2	-0.1
Church St (WB)- Ped Cros	46.2%	4.5	3.2	42.7%	4.1	4.2	-4%	-0.4	1.0

General Traffic -
Edmonton Green Network R1208 (New Edmonton Green Signalised Roundabout & 32/061, 32/194, 32/053, 32/111-196, 32/195)

- Degree of Saturation (DoS) analysis predicts a broadly neutral impact for A1010 northbound and southbound travelling general traffic during the AM, PM and weekend peak periods.
- The highest DoS result in the AM proposed model is only 57% on A1010 Fore Street northbound.
- The highest DoS result in the PM proposed model is only 73% on Smythe Close right turn.
- The highest DoS result in the weekend proposed model is only 72% on A1010 Fore Street northbound.
- It has been necessary to increase the Region 1208 cycle time during all 3 time periods (from 80 to 120 seconds during the AM & PM peak and from 96 to 120 seconds during the weekend peak) to maximise capacity for best operation of the wider network. Because the majority of this extra time has been allocated to the A1010 signal stage this explains why both delay on Smythe Close has increased, and DoS on A1010 Fore Street southbound left turn has decreased as a result of this scheme.

32/194 - A1010 Fore Street / Smythe Close

AM Peak performance results table

Approach & Movement(s)	AM Base			AM Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
Fore St - Ahead & Right - NB	59.6%	11.9	10.9	57.1%	10.8	12.3	-3%	-1.1	1.4
Smythe Close Left	18.4%	41.2	0.9	27.6%	68.8	1.4	9%	27.6	0.5
Smythe Close- Right	10.1%	39.4	0.5	15.2%	64.9	0.8	5%	25.5	0.3
Fore Street - Left - SB	42.0%	10.1	5.4	10.9%	8.9	1.7	-31%	-1.2	-3.7
Fore Street - Ahead - SB	28.5%	12.7	5.5	54.3%	8.7	12	26%	-4.0	6.5

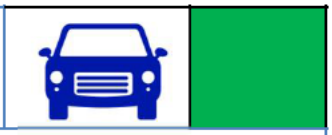
PM Peak performance results table

Approach & Movement(s)	PM Base			PM Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
Fore St - Ahead & Right - NB	76.8%	37.1	15.4	63.0%	20.2	14.5	-14%	-16.9	-0.9
Smythe Close Left	48.3%	42.9	3	67.6%	78.8	5	19%	35.9	2.0
Smythe Close- Right	52.4%	43.5	3.4	73.4%	83.2	5.9	21%	39.7	2.5
Fore Street - Left - SB	55.4%	23.6	7.8	22.8%	16.7	3	-33%	-6.9	-4.8
Fore Street - Ahead - SB	38.5%	21.1	4.6	52.3%	11.1	10.4	14%	-10.0	5.8

Weekend performance results table

Approach & Movement(s)	Weekend Peak Base			Weekend Peak Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
Fore St - Ahead & Right - NB	59.4%	25.9	12.4	71.5%	34.8	14.8	12%	8.9	2.4
Smythe Close Left	41.4%	41.5	3.4	51.7%	59	4.6	10%	17.5	1.2
Smythe Close- Right	55.5%	45	5.2	69.4%	67.2	7.1	14%	22.2	1.9
Fore Street - Left - SB	97.3%	104.7	17.9	31.7%	21.3	4.8	-66%	-83.4	-13.1
Fore Street - Ahead - SB	48.1%	24.6	8.5	56.1%	32.5	15.3	8%	7.9	6.8

General Traffic -
Edmonton Green Network R1208 (New Edmonton Green Signalised Roundabout & 32/061, 32/194, 32/053, 32/111-196, 32/195)



- Degree of Saturation (DoS) analysis predicts a positive impact for general traffic during all modelled time periods. This is because the increase in cycle time (from 80 to 120 seconds during the AM & PM peak and from 96 to 120 seconds during the weekend peak) necessary to best operate effectively the rest of the region results in a greater proportion of road green at this crossing.

32/053 - A1010 Fore Street by Bridge Road

AM Peak performance results table

Approach & Movement(s)	AM Base			AM Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
A1010 Fore St - Ahead - NB	75.5%	16.8	7.5	53.7%	8.8	6.5	-22%	-8.0	-1.0
A1010 Fore St - Ahead - SB	80.6%	25	12.7	57.3%	5.1	8.2	-23%	-19.9	-4.5

PM Peak performance results table

Approach & Movement(s)	PM Base			PM Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
A1010 Fore St - Ahead - NB	59.9%	9.7	5.2	46.8%	6.1	4.9	-13%	-3.6	-0.3
A1010 Fore St - Ahead - SB	62.6%	15.6	10.6	48.9%	5.1	2.4	-14%	-10.5	-8.2

Weekend performance results table

Approach & Movement(s)	Weekend Base			Weekend Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
A1010 Fore St - Ahead - NB	51.3%	10	4.8	43.2%	7.7	4.7	-8%	-2.3	-0.1
A1010 Fore St - Ahead - SB	60.8%	10.3	6.5	51.3%	9	6.6	-10%	-1.3	0.1

General Traffic -
Edmonton Green Network R1208 (New Edmonton Green Signalised Roundabout & 32/061, 32/194, 32/053, 32/111-196, 32/195)

- Degree of Saturation (DoS) analysis predicts a slight impact on general traffic on A1010 (The Green) northbound and southbound during the AM, PM and weekend peak periods at this junction.
- Two existing streams have been combined into a single junction so that Balham Road is now signalised. Balham Road is experiencing increased delays of around 60 seconds during all modelled periods but flow is very low on this approach - the highest DoS on Balham Road is 30% during the weekend period.
- Delays from the Bus station exit have increased in the PM and weekend periods by around 40 seconds.

32/111-196 - A1010 The Green / Balham Road / Bus Station Exit

AM Peak performance results table

Approach & Movement(s)	AM Base			AM Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
The Green - Ahead and Left - NB	34.1%	3.3	2.9	48.4%	5.6	1.6	14%	2.3	-1.3
The Green - Ahead - NB	11.8%	3.1	1.1	16.8%	2.9	0.3	5%	-0.2	-0.8
The Green - Ahead - SB	61.3%	3.6	2.2	72.8%	8.6	13.9	12%	5.0	11.7
Bus Station Exit	18.0%	41.3	0.9	22.5%	62.8	1.4	5%	21.5	0.5
Balham Road - Left	6.5%	3.3	0.1	21.3%	60.8	1.3	15%	57.5	1.2

PM Peak performance results table

Approach & Movement(s)	PM Base			PM Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
The Green - Ahead and Left - NB	46.9%	4.2	3.6	59.4%	4.6	5	13%	0.4	1.4
The Green - Ahead - NB	10.7%	2.2	0.6	14.0%	2.7	0.2	3%	0.5	-0.4
The Green - Ahead - SB	59.5%	9.1	6.7	64.9%	8.4	4.3	5%	-0.7	-2.4
Bus Station Exit	9.0%	17.3	0.4	17.4%	58.3	1.2	8%	41.0	0.8
Balham Road - Left	7.4%	3.4	0	20.6%	57.4	1.4	13%	54.0	1.4

Weekend performance results table

Approach & Movement(s)	Weekend Peak Base			Weekend Peak Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
The Green - Ahead and Left - NB	41.3%	4.3	4.3	54.5%	11.1	4.6	13%	6.8	0.3
The Green - Ahead - NB	8.5%	2.1	0.3	11.1%	5.7	0.6	3%	3.6	0.3
The Green - Ahead - SB	65.7%	9.6	9.9	67.3%	7.4	5.9	2%	-2.2	-4.0
Bus Station Exit	12.0%	22.4	0.5	24.6%	65.3	1.4	13%	42.9	0.9
Balham Road - Left	8.6%	3.4	0	30.1%	64.8	1.7	22%	61.4	1.7

General Traffic -
Edmonton Green Network R1208 (New Edmonton Green Signalised Roundabout & 32/061, 32/194, 32/053, 32/111-196, 32/195)

- Degree of Saturation (DoS) analysis predicts a broadly neutral or positive impact for general traffic on all approaches at this junction apart from the A1010 The Green northbound right turn into the Bus Station.
- Although DoS levels on the A1010 northbound right turn increase, they remain low at a maximum of 41.8% during the AM peak period. However proposed delay increases on this approach by 51 seconds during the AM peak, 37 seconds in the PM peak and 28 seconds during the PM peak period.
- On the Bus Station Exit arm DoS and proposed delay decrease during all modelled time periods.

32/195 - A1010 The Green / Bus Station Access

AM Peak performance results table

Approach & Movement(s)	AM Base			AM Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
The Green - Ahead - NB	55.8%	12.8	8.5	55.8%	17.5	9.2	0%	4.7	0.7
The Green - Right - NB	19.9%	54.2	0.6	41.8%	104.8	1.2	22%	50.6	0.6
Bus Station Exit	74.6%	56.9	5.7	55.9%	53.1	6.6	-19%	-3.8	0.9
Hertford Road - Ahead and Left - SB	82.6%	24.2	17.6	74.4%	21.9	21.1	-8%	-2.3	3.5

PM Peak performance results table

Approach & Movement(s)	PM Base			PM Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
The Green - Ahead - NB	63.2%	15.5	12.3	61.1%	21.2	13.2	-2%	5.7	0.9
The Green - Right - NB	17.6%	45.1	0.9	31.7%	81.9	1.5	14%	36.8	0.6
Bus Station Exit	69.7%	48.9	5.6	56.0%	51	7	-14%	2.1	1.4
Hertford Road - Ahead and Left - SB	86.8%	34.7	17.5	71.9%	25.8	19.1	-15%	-8.9	1.6

Weekend performance results table

Approach & Movement(s)	Weekend Peak Base			Weekend Peak Proposed			Change		
	DoS	Average Delay (sec/veh)	Queue (veh)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
The Green - Ahead - NB	56.3%	9.4	8.3	57.5%	16.5	8.9	1%	7.1	0.6
The Green - Right - NB	24.2%	59.4	0.9	34.6%	87.8	1.2	10%	28.4	0.3
Bus Station Exit	86.4%	86.6	8.2	65.7%	60.9	7.4	-21%	-25.7	-0.8
Hertford Road - Ahead and Left - SB	75.4%	21.7	17.3	72.3%	22.3	19.7	-3%	0.6	2.4

Cycling

- Cyclist safety will improve from the proposed changes. This is due to the introduction of segregated cycling facilities through the Edmonton Green signalised roundabout.
- Because the existing roundabout is give-way controlled, currently cyclists do not experience any delay once they have entered the roundabout. Under the proposals however this will not be the case as cycling phases will receive green alongside traffic phases meaning that cyclists may have to wait on the roundabout before being able to complete their journey.

Freight

- Freight and general traffic will be identically affected as a result of this scheme in terms of performance.

Walking

- Pedestrian levels are high in this area due to demand for the Overground station, Bus station and the shopping centre.
- Pedestrian wait times will increase in many areas as a result of this proposal as detailed below, due to the required increase to cycle time.
- New pedestrian facilities on the north and south side of the proposed signalised roundabout provide improved linking between the Bus station/shopping centre and the Overground station on the other side of the A1010 carriageway by allowing for an entire crossing within one signal stage.

Location	Cycle Time (s)					
	AM Peak		PM Peak		Weekend	
	Base	Proposed	Base	Proposed	Base	Proposed
Edmonton Green Network R1208	80	120	80	120	96	120

Average Max Wait Time (Seconds)	Average pedestrian maximum wait times					
	AM Peak		PM Peak		Weekend	
	Base	Proposed	Base	Proposed	Base	Proposed
New Edmonton Green Signalised Roundabout north side	34	54	34	54	42	54
New Edmonton Green Signalised Roundabout south side (Existing Zebra crossing)	0	54	0	54	0	54
32/061 Church Street crossing	34	54	34	54	42	54
32/194 - A1010 Fore Street / Smythe Close	74	114	74	114	90	114
32/053 - A1010 Fore Street by Bridge Road	34	54	34	54	34	54
32/111-196 - A1010 The Green / Balham Road / Bus Station Exit (Across Bus Station Exit)	34	26	34	28	42	25
32/111-196 - A1010 The Green / Balham Road / Bus Station Exit (Across Balham Road)	N/A	114	N/A	114	N/A	114
32/195 - A1010 The Green / Bus Station Access	74	114	74	114	90	114

Model Integrity -
32/018 (A1010 Hertford Road / Bounces Road / Croyland Road) + New Toucan Crossing

Modelling in line with MAP standards			LMAP	Yes
			TMAP	N/A
			VMAP	N/A
Date of traffic flow data				January 2015
Traffic peak times modelled			AM	Yes
			Off	No
			PM	Yes
			Weekend	No
Strategic modelling undertaken	ONE	No	Other	No
Scenarios modelled			Base	Yes
			Future Base	No
			Do Something	Yes
			Sensitivity	No
Feasibility modelling undertaken in Linsig				No
Key modelling assumptions/exceptions · All new demand dependent stages called 100% of the time to assume worst case scenario · All existing demand dependency data applied where stages have not changed. · Proposed model assumes no flow reduction as a result of a potential modal shift to cycling.				

General Traffic -
32/018 (A1010 Hertford Road / Bounces Road / Croyland Road) + New Toucan Crossing

- Croyland Road will become one-way as a result of this scheme and the assumption has been made that vehicles currently using Croyland Road to access the A1010 will approach via Bury Street instead.
- As a result the method of control at this junction has slimmed down from four stages to three unlocking the potential for increased capacity at this junction.
- On the A1010 Hertford Road northbound DoS reduces from over 90% during both peaks down from 94% to 67% DoS during the AM peak and from 97% to 89% during the PM peak as a result of fewer stages and higher cycle times.
- The A1010 Hertford Road southbound approach is reduced down from two lanes to one. This approach experiences an increase in DoS during both modelled time periods, up to 94% during the AM peak and 86% in the PM removing network resilience from this approach.
- Degree of Saturation (DoS) analysis at the proposed toucan crossing predicts that DoS levels will be low enough not to cause traffic congestion issues.

AM Peak performance results table

Approach & Movement(s)	AM Base			AM Proposed			Change		
	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
Stream 1- Junction of Herford Road/Bounces Road/Croyland Road									
Hertford Rd (SB) - Nearside	85%	44.1	12.8	94%	45.3	28.5	9%	1	9
Hertford Rd (SB) - Offside	56%	29.9	6.3						
Bounces Rd (WB) + Flare	79%	56.5	6.0	92%	87.5	9	13%	31	3
Hertford Rd (NB) + Flare	94%	62.2	18.2	67%	27.2	12.4	-27%	-35	-6
Croyland Rd (EB)	81%	88.7	4.7	-	-	-	-	-	-
Stream 2- Proposed Crossing south of the Junction of Herford Road/Bounces Road/Croyland Road									
Hertford Rd (SB)	-			56%	2.7	0.7	-		
Hertford Rd (NB)				40%	3.9	4.3			

PM Peak performance results table

Approach & Movement(s)	PM Base			PM Proposed			Change		
	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay (sec/PCU)	MMQ (PCU)
Stream 1- Junction of Herford Road/Bounces Road/Croyland Road									
Hertford Rd (SB) - Nearside	73%	38.4	11.1	86%	37.5	19.7	13%	-1	4
Hertford Rd (SB) - Offside	39%	29.8	4.9						
Bounces Rd (WB) + Flare	100%	132.6	19.2	87%	60.4	10.9	-13%	-72	-8
Hertford Rd (NB) + Flare	97%	100.0	31.9	89%	43.6	20.1	-9%	-56	-12
Croyland Rd (EB)	35%	50.6	2.1	-	-	-	-	-	-
Stream 2- Proposed Crossing south of the Junction of Herford Road/Bounces Road/Croyland Road									
Hertford Rd (SB)	-			47%	2.2	0.5	-		
Hertford Rd (NB)				45%	4.2	5.3			

Cycling

- Cyclists will see safety benefits from the proposed changes due to the introduction of segregated cycling facilities on the A1010 through this junction and at the toucan crossing to the south of the existing junction which connects to a segregated two-way cycling track off carriageway.
- Southbound travelling cyclists will see a safety benefit from the protection that will be provided by the proposed cycle gate and the early release facility, however southbound cyclists will be held up at their separately signalled stop line when the main road green is running which will increase average journey times for cyclists travelling southbound through the junction.
- Advanced stop lines (ASLs) have been introduced on all approaches at this junction.

Freight

- Freight and general traffic will be identically affected as a result of this scheme in terms of performance.

Walking

- Pedestrian wait times will increase during the AM peak period as a result of this proposal as detailed below, due to the required increase to cycle time.
- The existing all-round pedestrian crossing has been retained.

Location	Cycle Time (s)			
	AM Peak		PM Peak	
	Base	Proposed	Base	Proposed
32/018 (A1010 Hertford Road / Bounces Road / Croyland Road) + New Toucan Crossing	80	96	96	96

Average Max Wait Time (Seconds)	Average pedestrian maximum wait times			
	AM Peak		PM Peak	
	Base	Proposed	Base	Proposed
32/018 (A1010 Hertford Road / Bounces Road / Croyland Road) + New Toucan Crossing	74	90	74	90

Model Integrity -
New junction 32/230 (A1010 Hertford Road/Bury Street)

<table>
<tr><td colspan="3" rowspan="3">Modelling in line with MAP standards</td><td>LMAP</td><td>Yes</td></tr>
<tr><td>TMAP</td><td>N/A</td></tr>
<tr><td>VMAP</td><td>N/A</td></tr>
<tr><td colspan="3">Date of traffic flow data</td><td>January 2015</td></tr>
<tr><td colspan="3" rowspan="3">Traffic peak times modelled</td><td>AM</td><td>Yes</td></tr>
<tr><td>Off</td><td>No</td></tr>
<tr><td>PM</td><td>Yes</td></tr>
<tr><td colspan="3"></td><td>Weekend</td><td>No</td></tr>
<tr><td>Strategic modelling undertaken</td><td>ONE</td><td>No</td><td>Other</td><td>No</td></tr>
<tr><td colspan="3" rowspan="4">Scenarios modelled</td><td>Base</td><td>Yes</td></tr>
<tr><td>Future Base</td><td>No</td></tr>
<tr><td>Do Something</td><td>Yes</td></tr>
<tr><td>Sensitivity</td><td>No</td></tr>
<tr><td colspan="4">Feasibility modelling undertaken in Linsig</td><td>No</td></tr>
<tr><td colspan="4">Key modelling assumptions/exceptions
· All demand dependent stages called 100% of the time to assume worst case scenario (this is a new junction replacing a give-way roundabout so no existing demand dependent data is available).
· Base modelling carried out in Arcady.
· Proposed model assumes no flow reduction as a result of a potential modal shift to cycling.</td><td></td></tr>
</table>

General Traffic -
New junction 32/230 (A1010 Hertford Road/Bury Street)

- Degree of Saturation (DoS) vs Ratio of Flow to Capacity (RFC) analysis predicts a broadly neutral impact for general traffic on the A1010 Hertford Road in both directions during the AM and PM peak periods
- Queuing on the A1010 Hertford Road in both directions is likely to increase by at least 10 PCU during both the AM and PM peak periods. This will be because the junction is being converted from give way control, so queues will build while vehicles wait for the opposing Bury Road signal stage to finish before the A1010 receives green again.
- Currently queues are practically non-existent on Bury Street however queuing will increase during both modelled time periods by at least 10 PCU in part because vehicles currently using Croyland Road to access the A1010 will now route via Bury Street instead.
- Bury Street DoS will increase up from 65% to 93% during the AM peak and 49% to 81% in the PM peak.

AM Peak performance results table

Approach & Movement(s)	AM Base			AM Proposed			Change		
	RFC	Av. Delay (sec/veh)	Queue (veh)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay	MMQ
A1010 Hertford Road - All Movements - SB	97%	69.5	15.3	92.2%	48.4	24.5	-5%	-21.1	9.2
A1010 Hertford Road - All Movements -NB	71%	12.4	2.4	79.7%	31.9	17.0	9%	19.5	14.6
Bury Street - All Movements	65%	17.4	1.8	93.1%	64.2	19.4	28%	46.8	17.6

PM Peak performance results table

Approach & Movement(s)	PM Base			PM Proposed			Change		
	RFC	Av. Delay (sec/veh)	Queue (veh)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Average Delay	MMQ
A1010 Hertford Road - All Movements - SB	78%	18.6	3.5	79.9%	30	13.1	2%	11.4	9.6
A1010 Hertford Road - All Movements -NB	86%	24.0	5.5	83.2%	28.3	20.5	-3%	4.4	15.0
Bury Street - All Movements	49%	12.4	1.0	80.9%	51.9	11.2	32%	39.5	10.2

Cycling

- Cyclists will see safety benefits from the proposed changes due to the introduction of segregated cycling facilities on the A1010 through this junction.
- Northbound travelling cyclists will see a safety benefit from the protection that will be provided by the proposed cycle gate and the early release facility, however northbound cyclists will be held up at their separately signalled stop line when the main road green is running which will increase average journey times for cyclists travelling northbound through the junction.
- Southbound travelling cyclists will benefit from the introduction of an early release facility.
- Advanced stop lines (ASLs) have been introduced on the A1010 Hertford Road southbound and Bury Street approaches this junction.

Freight

- Heavy freight vehicles will likely find it easier to navigate around the proposed junction layout in comparison to the existing mini-roundabout layout.
- Otherwise freight and general traffic will be identically affected as a result of this scheme in terms of performance.

Walking

- No existing formal pedestrian facilities removed or introduced as part of this scheme

Location	Cycle Time (s)			
	AM Peak		PM Peak	
	Base	Proposed	Base	Proposed
32/230 (A1010 Hertford Road/Bury Street)	N/A	96	N/A	96

Model Integrity -
32/021 (A1010 Hertford Road/Galliard Road/Nightingale Road)

Modelling in line with MAP standards			LMAP	Yes
			TMAP	N/A
			VMAP	N/A
Date of traffic flow data				January 2015
Traffic peak times modelled			AM	Yes
			Off	No
			PM	Yes
			Weekend	No
Strategic modelling undertaken	ONE	No	Other	No
Scenarios modelled			Base	Yes
			Future Base	No
			Do Something	Yes
			Sensitivity	No
Feasibility modelling undertaken in Linsig				No
Key modelling assumptions/exceptions · New cycling phases added to all-round pedestrian crossing so given the lack of cycling demand information the assumption is that this demand dependent stage is called 100% of the time to assume worst case scenario. · All existing demand dependency data applied where stages have not changed. · Proposed model assumes no flow reduction as a result of a potential modal shift to cycling.				

General Traffic -
32/021 (A1010 Hertford Road/Galliard Road/Nightingale Road)

- During the AM peak period DoS on all approaches increase. All approaches which used to operate with a DoS under 90% will run with a DoS above 90% in the proposed scenario (A1010 Hertford Road southbound right turn & ahead movement up from 89% to 94%, A1010 Hertford Road northbound up from 81% to 95%, Galliard Road increases from 80% to 96%)
- The A1010 Hertford Road northbound approach is losing a flare in the proposed scenario which in the AM peak in particular results in an increased delay of around 40 seconds
- Due to the increase in cycle time, delay and DoS have greatly increased on the A1010 Hertford Road southbound offside lane, particularly during the PM peak where delay increases by 66 seconds and DoS increases up from 51% to 92%.
- Delay has also increased on Galliard Road during both the AM (+72 seconds) and PM peak (+80 seconds).
- Cycle time has been increased to 112 seconds during both peak periods so that proposed DoS values stay below 100%, however this has been necessary because of the assumption that the cycle phase will be demanded every cycle. If in reality this cycle phase is only demanded during stages when a pedestrian phase is already demanded, either DoS values will be lower than reported here or it will be possible to run the junction at a lower cycle time which could help reduce the large increases in delay.

AM Peak performance results table

Approach & Movement(s)	AM Base			AM Proposed			Change		
	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)
Hertford Rd (SB) – Nearside with Flare (LT+ Ahead)	96%	60.5	23.6	98%	73.2	29.8	1%	12.7	6.2
Hertford Rd (SB) – Offside (RT + Ahead)	89%	69.3	11.2	94%	96.1	16.3	5%	26.8	5.1
Nightingale Rd (WB) +Flare	96%	84.9	16.9	98%	105.0	22.2	2%	20.1	5.3
Hertford Rd (NB) +Flare*	81%	42.7	9.3	95%	84.4	20.8	14%	41.7	11.5
Galliard Rd (EB)	80%	67.8	6.9	96%	139.8	12.0	16%	72.0	5.1

PM Peak performance results table

Approach & Movement(s)	PM Base			PM Proposed			Change		
	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)
Hertford Rd (SB) – Nearside with Flare (LT+ Ahead)	76%	25.5	7.2	83%	38.3	12.6	8%	12.8	5.4
Hertford Rd (SB) – Offside (RT + Ahead)	51%	32.3	4.2	92%	98.1	11.4	41%	65.8	7.2
Nightingale Rd (WB) +Flare	94%	71.4	14.4	93%	78.8	18.3	-1%	7.4	3.9
Hertford Rd (NB) +Flare*	95%	78.5	13.2	96%	92.9	20.9	1%	14.4	7.7
Galliard Rd (EB)	79%	74.6	4.8	95%	155.0	9.0	15%	80.4	4.2

*Note: * Hertford Road (NB) will have no flare in the proposed layout*

Cycling

- Cyclists will benefit in terms of safety from the proposed changes due to the introduction of segregated cycling facilities on the A1010 through this junction.
- However, because the green phases to cyclists only run when the pedestrian crossings are demanded this means that average cyclist journey times through the junction will increase compared to the existing scenario where cyclists run alongside A1010 traffic in a signal stage which receives the bulk of green time at this junction.
- Advanced stop lines (ASLs) have been introduced on A1010 Hertford Road northbound, Nightingale Road and Galliard Road.

Freight

- Freight and general traffic will be identically affected as a result of this scheme in terms of performance.

Walking

- Pedestrian wait times will increase during both the AM and PM peak period as a result of this proposal as detailed below, due to the required increase to cycle time.
- The existing all-round pedestrian crossing has been altered. The crossing across the south arm of the junction has been removed and the straight-across crossing across the north arm of the junction has been changed to a staggered facility which runs in two separate stages increasing pedestrian wait times.

Location	Cycle Time (s)			
	AM Peak		PM Peak	
	Base	Proposed	Base	Proposed
32/021 (A1010 Hertford Road/Galliard Road/Nightingale Road)	87	112	75	112

Average Max Wait Time (Seconds)	Average pedestrian maximum wait times			
	AM Peak		PM Peak	
	Base	Proposed	Base	Proposed
32/021 (A1010 Hertford Road/Galliard Road/Nightingale Road) – Across Galliard Road or Nightingale Road	81	106	69	106
32/021 (A1010 Hertford Road/Galliard Road/Nightingale Road) – Across A1010 Hertford Road (north side – east to west)	81	227	69	227
32/021 (A1010 Hertford Road/Galliard Road/Nightingale Road) – Across A1010 Hertford Road (north side – west to east)	81	204	69	204

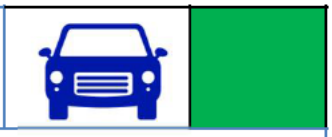
Model Integrity -
Pedestrian Crossing 32/078-079 - A1010 Fore Street by Park Road
(conversion to Zebra crossing)
Pedestrian Crossing 32/147-148 - A1010 Fore Street by Sebastopol Road

Modelling in line with MAP standards			LMAP	Partial
			TMAP	N/A
			VMAP	N/A
Date of traffic flow data				January 2015
Traffic peak times modelled			AM	Yes
			Off	No
			PM	Yes
			Weekend	No
Strategic modelling undertaken	ONE	No	Other	No
Scenarios modelled			Base	Yes
			Future Base	No
			Do Something	Yes
			Sensitivity	No
Feasibility modelling undertaken in Linsig				Yes

Key modelling assumptions/exceptions

- LMAP checks fully carried out save for DoS validation of base modelling (although modelling is still suitable for a straight comparison of before and after delay for use in the Bus Journey Time Impact Assessment report).
- Proposed modelling for 32/078-079 conversion to Zebra crossing carried out in Picardy.
- All existing demand dependency data applied.
- Proposed model assumes no flow reduction as a result of a potential modal shift to cycling.

General Traffic -
Pedestrian Crossing 32/078-079 - A1010 Fore Street by Park Road (conversion to Zebra crossing)



- As the pedestrian flow at this crossing is low, the conversion to a zebra crossing results in a slight improvement to traffic performance.

AM Peak performance results table

Approach & Movement(s)	AM Base			AM Proposed			Change		
	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)
Fore Street (NB)-Ahead	50%	4.7	3.2	40%	3.4	0.7	-10%	-1	-3
Fore Street (SB)-Ahead	62%	5.9	4.9	52%	4.4	0.9	-10%	-1	-4
Fore Street (SB) Bus Lane	8%	2.9	0.3						

PM Peak performance results table

Approach & Movement(s)	PM Base			PM Proposed			Change		
	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)
Fore Street (NB)-Ahead	47%	2.7	2.1	43%	3.6	0.8	-4%	1	-1
Fore Street (SB)-Ahead	51%	3.3	2.6	47%	4.0	0.9	-4%	1	-2
Fore Street (SB) Bus Lane	7%	1.8	0.2						

Cycling

- Cyclists will benefit from the proposed changes due to the introduction of segregated cycling facilities on the A1010 through this crossing.

Freight

- Freight and general traffic will be identically affected as a result of this scheme in terms of performance.

Walking

- The conversion to a Zebra crossing will provide an improved service to pedestrians who currently have to demand two crossings separately to cross the entire road.
- Because the existing crossings run local control (not SCOOT) provided that the road has been on green for at least 20 seconds the road will turn to red as soon as the pedestrian push button has been pressed. In this instance there is no advantage to the conversion to a Zebra crossing. However in the scenario that the signals have been green to traffic for less than 20 seconds the zebra crossing would reduce pedestrian wait times.

Location	Cycle Time (s)			
	AM Peak		PM Peak	
	Base	Proposed	Base	Proposed
Pedestrian Crossing 32/078-079 - A1010 Fore Street by Park Road (conversion to Zebra crossing)	41	N/A	41	N/A

Average Max Wait Time (Seconds)	Average pedestrian maximum wait times			
	AM Peak		PM Peak	
	Base	Proposed	Base	Proposed
Pedestrian Crossing 32/078-079 - A1010 Fore Street by Park Road (conversion to Zebra crossing)	35	0	35	0

General Traffic -
Pedestrian Crossing 32/147-148 - A1010 Fore Street by Sebastopol Road

- The existing dual crossing is being converted to a straight-across crossing which will result in an increase in the length of the non-road green period for every cycle that the pedestrian crossing stage is called.
- However as the existing pedestrian crossings are only demanded a low percentage of the time the increase in lost time per cycle has only a slight negative impact on general traffic performance.

AM Peak performance results table

Approach & Movement(s)	AM Base			AM Proposed			Change		
	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)
Fore Street (NB)-Ahead	42%	2.1	1.1	44%	2.3	1.5	1%	0	0
Fore Street (SB)-Ahead	49%	2.4	1.6	51%	2.7	2.1	1%	0	1
Fore Street (SB) Bus Lane	7%	1.4	0.1	7%	1.5	0.2	0%	0	0

PM Peak performance results table

Approach & Movement(s)	PM Base			PM Proposed			Change		
	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)	DoS	Av. Delay (sec/PCU)	MMQ (PCU)
Fore Street (NB)-Ahead	45%	2.4	1.6	47%	2.7	2	1%	0	0
Fore Street (SB)-Ahead	43%	2.3	1.5	44%	2.6	1.9	1%	0	0
Fore Street (SB) Bus Lane	7%	1.5	0.2	7%	1.7	0.2	0%	0	0

Cycling

- Cyclists will benefit from the proposed changes due to the introduction of segregated cycling facilities on the A1010 through this crossing.

Freight

- Freight and general traffic will be identically affected as a result of this scheme in terms of performance.

Walking

- Because the existing crossings run local control and the proposed crossing will run SCOOT control pedestrian wait times will increase. This is because the green man will now only be offered once a cycle as opposed to as soon as the push button is pressed (when the signals have been green to traffic for at least 20 seconds).
- However if the crossing is consistently demanded multiple cycles in a row the pedestrian wait time effectively doesn't change (hence the Average pedestrian maximum wait time values below).
- The existing dual crossing is being converted to a straight across crossing which will result in an improved service to pedestrians who will be able to cross the road in one go.

Location	Cycle Time (s)			
	AM Peak		PM Peak	
	Base	Proposed	Base	Proposed
Pedestrian Crossing 32/147-148 - A1010 Fore Street by Sebastopol Road	40	40	40	40

Average Max Wait Time (Seconds)	Average pedestrian maximum wait times			
	AM Peak		PM Peak	
	Base	Proposed	Base	Proposed
Pedestrian Crossing 32/147-148 - A1010 Fore Street by Sebastopol Road	35	34	35	34

Network Impact Assessment

Bus Network

The A105 Bus Journey Time Assessment report will be submitted alongside this TSSR.

In the absence of VISSIM modelling OM have agreed that contained within this report is an appropriate methodology to assess bus journey time impacts, however:

- There is an increased margin of error in the delay results calculated by LinSig at junctions where DoS is above 90%. This is applicable in the proposed scenario at the following junctions: 32/018, 32/230, 32/021
- The absolute change in delay value as represented in the results table cannot be guaranteed to a high degree of accuracy.
- Results are not as accurate as if VISSIM modelling had been carried out (however a VISSIM model of this network would have been very difficult to validate given the large distances between signalised junctions).

Note: Additional ARCADY modelling of the existing Zebra crossings on the south side of the Edmonton Green roundabout was carried out to accurately measure the existing northbound and southbound delay experienced on approach and exit to the roundabout due to pedestrian demand at these crossings. These ARCADY results have been used in calculating base bus delay through these Zebra crossings.

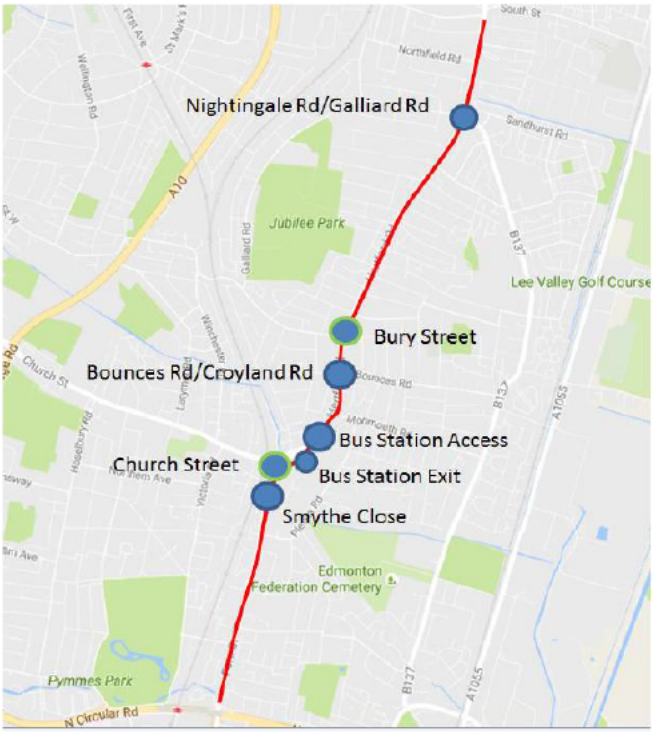


Figure 1: A1010 South Corridor

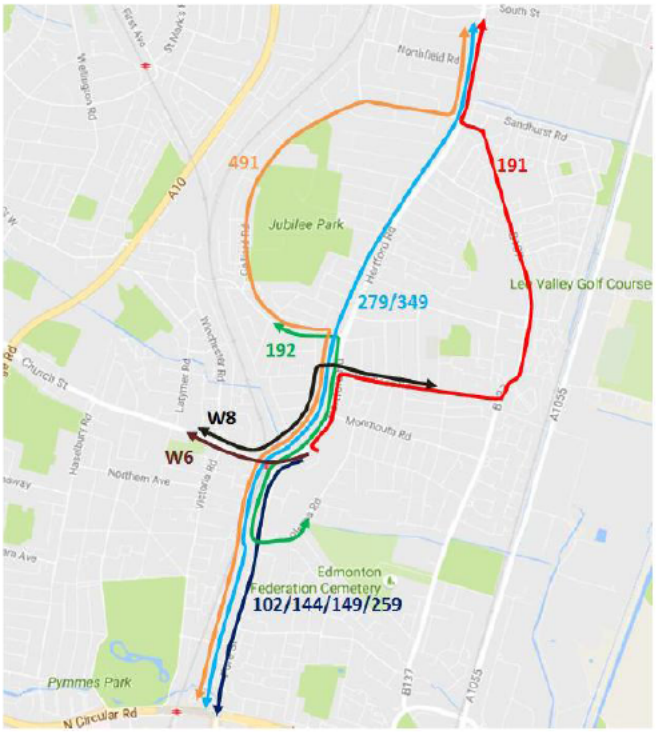


Figure 2: A1010 South Bus Routes

Network Impact Assessment

Bus Network

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

Table 1: Average change in delay per bus by route

Routes 279/349

- These routes are identical within the scope of the A1010 S scheme area.
- These routes travel through every junction which has been modelled and so are the most suitable routes to use when considering the full impact of this scheme on the entire stretch of the A1010 south.
- The stretch of the A1010 covered by these routes within the scheme area is almost three km.
- These routes will likely experience around 60 seconds additional delay in the northbound direction during the AM peak. This is largely due to the increase in delay experienced on the A1010 Hertford Road northbound approach to 32/021 where flare capacity has been removed in the proposed design.
- Journey times on these routes may remain stable in the northbound direction during the PM peak, mainly due to the improvement in journey times northbound through 32/018. As Croyland Road is converted to one way access only this allows for simpler staging at this junction. Therefore junction capacity increases.
- Journey times on these routes are predicted to remain stable in the southbound direction during both AM and PM peak periods.

Routes 102/144/149/259

- These routes are identical within the scope of the A1010 S scheme area.
- These routes travel from the Edmonton Green Bus Station south towards the junction of A1010 / A406 (and vice versa in the opposite direction).
- The stretch of the A1010 covered by these routes within the scheme area is approximately one km
- These routes will likely experience at least 30 seconds additional delay in the northbound direction during both the AM and PM peak periods. This is largely due to the increase in delay experienced whilst turning right into the bus station at 32/195.
- These routes are predicted to experience a slight improvement in journey times in the southbound direction. This is largely due to the journey time improvements experienced travelling southbound through 32/194 and 32/053.

Network Impact Assessment

Bus Network

Route 191

- Route 191 travels from the Edmonton Green Bus Station north towards the junction of A1010 / A110 (and vice versa in the opposite direction).
- Route 191 enters or leaves the A1010 at Bounces Road and Nightingale Road respectively dependent on the direction of travel.
- Route 191 does not travel much distance on the A1010 however the delay increase or journey time improvement is measured on an approximate 2.5 km stretch of the route.
- Route 191 will likely experience at least 30 seconds additional delay in the southbound direction during the AM peak period. This is largely due to the increase in delay experienced whilst exiting from Bounces Road back onto the A1010.
- Route 191 is predicted to experience an improvement in journey times in the southbound direction during the PM peak. This is largely because A1010 Hertford Road southbound at 32/018 is less congested during the PM vs AM peak (after losing a lane compared to existing) so it is possible to allocate more green time to Bounces Road which reduces delay on this approach.
- The result for Route 191 in the northbound direction which shows a journey time improvement is not accurate because there is no reliable LinSig output for the delay which will be experienced by vehicles travelling northbound on A1010 Hertford Road which turn right into Bounces Road.

Route 192

- Route 192 enters or leaves the A1010 at Bury Street and Plevna Road respectively dependent on the direction of travel.
- The stretch of the A1010 covered by Route 192 within the scheme area is approximately one km.
- Route 192 will likely experience around 60 seconds additional delay in the southbound direction during both the AM and PM peak periods. This is largely due to the increase in delay experienced whilst exiting from Bury Street as a result of the signalisation of the existing give way roundabout.
- Route 192 may experience around 30 seconds additional delay in the northbound direction during the AM peak. This is largely due to the increased delay experienced on the A1010 Hertford Road travelling northbound into the new signalised junction 32/230.
- In the PM peak Route 192 may experience a slight improvement in northbound journey times. This is largely due to the PM journey time improvements experienced northbound through 32/194 and 32/053.

Route 491

- Route 491 travels through all modelled signalised junctions within the A1010 S scheme scope but enters or leaves the A1010 at Bury Street and Galliard Road respectively dependent on the direction of travel.
- Route 491 travels for an approximate 1.5 km along the A1010 within the scheme area however the delay increase or journey time improvement is measured on a stretch of the route almost four km in length.
- Route 491 will likely experience over 60 seconds additional delay in the southbound direction during both the AM and PM peak periods. This is largely due to the increase in delay experienced whilst exiting from Bury Street as a result of the signalisation of the existing give way roundabout.
- Also in the northbound direction Route 491 will likely experience over 60 seconds additional delay. The cause of this is largely the increase in delay experienced whilst exiting from Galliard Road at 32/021.

Network Impact Assessment

Bus Network

Route W8

- Route W8 enters or leaves the A1010 at Bounces Road and Church Street respectively dependent on the direction of travel.
- The stretch of the A1010 covered by Route W8 within the scheme area is only about 500 m.
- Route W8 will likely experience over 60 seconds additional delay in the south-westbound direction during the AM peak. This is largely due to the increase in delay experienced while exiting from Bounces Road.
- During the PM peak bus journey times may remain stable in the south-westbound direction, mainly due to the improvement in delay out of Bounces Road at 32/018. This only occurs during the PM peak when A1010 Hertford Road southbound at 32/018 is less congested vs the AM peak (after losing a lane compared to existing) so more green time can be allocated to Bounces Road reducing delay.
- Route W8 is predicted to experience a slight improvement in journey times in the north-eastbound direction during both the AM and PM peak periods.

Route W6

- Route W6 travels from the Edmonton Green Bus Station west along Church Street (and vice versa in the opposite direction), travelling through the proposed Edmonton Green signalised roundabout.
- Route W6 will likely experience about 30 seconds additional delay in the eastbound direction during both the AM and PM peak periods. This is largely due to the increase in delay experienced whilst turning right into the bus station at 32/195.
- In the westbound direction bus journey times will likely increase by more than 30 seconds during the AM peak and by more than 60 seconds in the PM peak period. This is largely due to the increase in delay experienced whilst exiting the bus station and travelling around the Edmonton Green proposed signalised roundabout towards Church Street.

Summary

This proposed scheme has the following impacts:

Buses

The scheme will have a noticeable negative impact on many bus routes' journey times as outlined in the Bus Network section of the TSSR. In order to enable the effective operation of the A1010 it has been essential to allocate the majority of spare capacity to the A1010 north and southbound movements. Therefore this bus delay is even more pronounced on routes which enter the A1010 from feeder roads.

General traffic

Overall the scheme has a negative effect on general traffic, and delay will on the whole increase, but most approaches will still operate with some reserve capacity.

Cyclists

The scheme drastically improves cycling infrastructure and would have a very positive effect on cyclists.

Pedestrians

Overall the scheme will have a broadly neutral impact on pedestrians. Whilst most pedestrian wait times increase and some existing pedestrian facilities are lost, in other locations new crossings are added or relocated to provide a more direct route which accommodates existing prevalent desire lines.