Appendix L
Junction Design Report

Lucan to City Centre
Core Bus Corridor Scheme

Junction Design Report

August 2022

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Figures

Tables

1. Introduction

This report has been prepared to document the evolution of the design of key junctions along the Lucan to City Centre Scheme (hereafter referred the Proposed Scheme). In addition, the report presents the junction assessment results for the final scheme design which demonstrate the expected operation of the junction.

Finally, a theoretical assessment has been carried out to demonstrate the capacity of the junctions for all modes. The methodology adopted is elaborated upon in the following sections.

2. Methodology

2.1 Junction Design Evolution

The proposed scheme has been designed over the course of a number of years, and during this period the design principles have evolved to improve the movement of people through the junctions for all modes. The final design principles which guided the junction design are documented in the BusConnects Preliminary Design Guidance Booklet. This document sets out the four typical junction arrangements adopted on the project as follows:

- Junction Type 1 – Both bus lanes are dedicated lanes up to the junction stop line and general straight ahead and left-turning traffic is restricted to one lane;
- Junction Type 2 – As per Junction Type 1 but with left turning traffic crossing the bus lane into a dedicated left turn lane in advance of the stop line;
- Junction Type 3 – Bus lanes are terminated just short of the junction to allow left-turners to turn left from a short left-turn pocket in front of the bus lane. Buses can continue straight ahead from this pocket where a receiving bus lane is proposed; and
- Junction Type 4 – Similar to the CYCLOPS however signalised pedestrian crossings are proposed across the cycle tracks to allow pedestrians to cross from the footpath to the pedestrian crossing landing areas, thus avoiding any uncontrolled pedestrian – cyclist conflicts. Bus lanes are terminated just short of the junction to allow left turners to turn left from a short left-turn pocket in front of the bus lane. Buses can continue straight ahead from this pocket where a receiving bus lane is proposed.

In addition to the evolution of the design principles, the design has been positively influenced through engagement with the public at various points in the design process. The evolution of the design is documented in this report with a clear rationale provide for the changes at key points in the project as follows:

- Concept Design;
- Emerging Preferred Routes (EPR);
- Second Public Consultation (PC2);
- Third Public Consultation (PC3); and
- Final Proposed Scheme.

2.2 Transport Modelling

Transport modelling has been a key input to the scheme design throughout the project. Given the complexity of the scheme proposals and changes to existing traffic regimes, the design went through an iterative process which was incorporated in the multi-tiered transport modelling approach consisting of strategic, local, and microsimulation modelling. The overall modelling methodology and information flow is summarised in **Figure 2-1**.

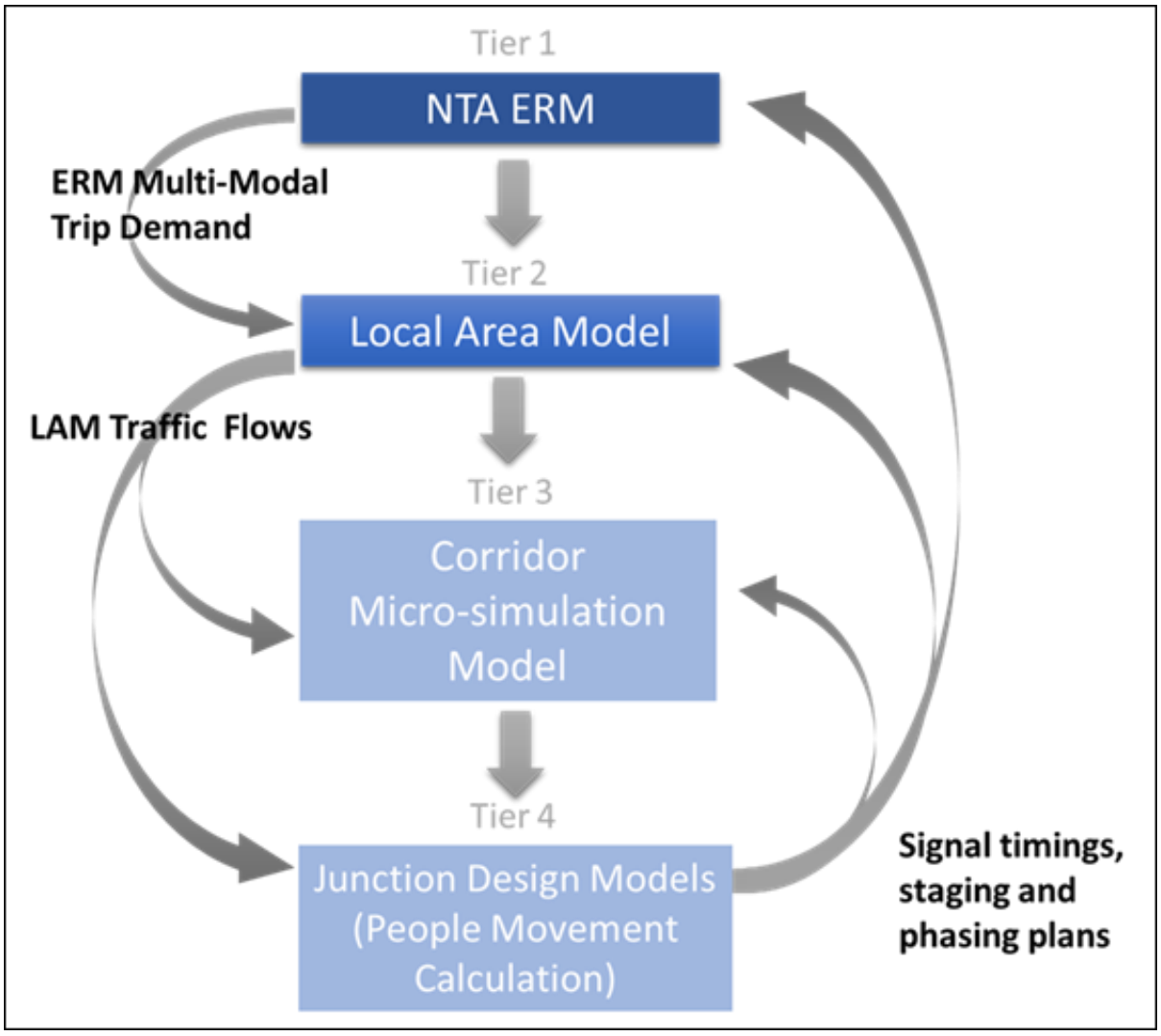


Figure 2-1: Transport Modelling Methodology and Information Flow

As shown above, there are four tiers in the transport modelling hierarchy that were used for the purposes of assessing the proposed scheme:

- East Regional Model (ERM): the primary tool that provides the strategic multi-modal demand outputs for the proposed forecast;
- Local Area Model (LAM): a more refined road network model used to provide consistent road-based outputs to inform the TIA, EIAR, microsimulation model, junction design models and traffic management plan testing;
- Microsimulation Model: represents the end-to-end corridor model of the proposed scheme to assist in the operational validation of proposed designs with the visualisation of the potential proposed scheme impacts and benefits; and
- Local Junction Models: each junction along the proposed CBC were modelled individually to support local junction design development.

For the purposes of the Junction Design and Modelling Report (JDR), results from the local junction models were extracted, which used LinSig, an industry-standard software that provides comprehensive assessment and design of a junction or a network of junctions. The local junction models were used to inform junction design considerations and 'proof of concept' demonstration of the preferred design for the CBC. The signal staging, timing and phasing from LinSig were incorporated into the three tiers of transport modelling hierarchy and it should be noted that this was an iterative approach throughout the design process of BusConnects. **Figure 2-2** presents an example of the local junction modelling results from LinSig presented in this report. A description of the images follows.

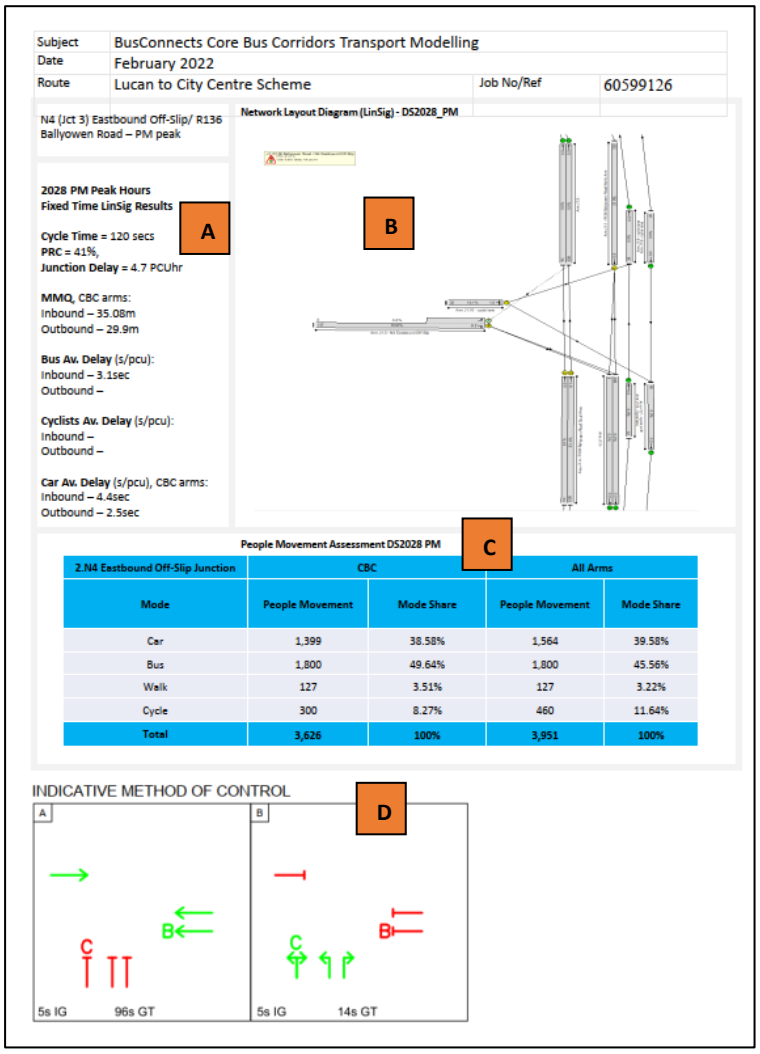


Figure 2-2: Example of a junction modelling results in the JDR

A shows the junction layout in LinSig and the results per lane, which are the following:

- **Number of PCUs arriving at the Stop Line** – this is the number located at the back of the lane in Figure 2-2 and reflects the traffic flows on its respective lane;
- **Degree of Saturation (%)** – this is the number located in the middle of the lane in Figure 2-2 and is the ratio of Flow to Capacity per lane. The theoretical capacity of a junction is 90% and anything less than this assumes that the junction is within theoretical capacity; and
- **Mean Max Queue (PCU)** – this is the number located at the front of the lane in Figure 2 and is maximum queue (per lane) within a typical cycle.

B shows the following Network Summary Results:

- **Cycle** (seconds) – Cycle time in seconds;

- **PRC** (%) – Practical Reserve Capacity, which is the available spare capacity at a junction (i.e. negative PRC = over-capacity; positive PRC = spare capacity);
- **MMQ** (meters) - maximum queue (CBC arms) within a typical cycle;
- **Junction Delay** (PCUhr) – the total aggregate delay on all lanes controlled by each Stage Stream;
- **Bus Av. Delay** (s/pcu) – the average bus delay per direction on the CBC per junction;
- **Cyclists Av. Delay** (s/pcu) - the average cyclist delay per direction on the CBC per junction; and
- **Car Av. Delay** (s/pcu) - the average car delay per direction on the CBC per junction.

C shows the tabulated information on the People Movement Assessment for the Do-Something 2028 scenario during the peak hours.

D illustrates the Indicative Method of Control at the junction including proposed staging, green time and intergreen time at the junction.

It should be noted that modelling bus priority signals is not possible in LinSig due to its dynamic nature. However, this was modelled in the microsimulation model and is reported in the Environmental Impact Assessment Report (EIAR).

2.3 People Movement

An assessment has been carried out to determine the people movement potential the proposed scheme will generate. This adopts a policy led approach to the design of junctions, which prioritises the movement of people as opposed to private modes and maximisation of sustainable modes i.e. walking, cycling and bus are considered in advance of management of general traffic movements at junctions. The outputs of the calculator provide an estimate of people movement per mode per junction and the respective percentage mode share. **Figure 2-3** illustrates the People Movement Formulae.

People Movement Formulae	
Cyclists	$\sum\left(\frac{Green\ Time}{headway}\right)\left(\frac{3600}{Cycle\ Time}\right)\left(\frac{CT\ Width}{1.5}\right)$
Buses	$\sum(No.of\ Buses)(Occupancy)(Direction)$
General Traffic	$\sum LinSig\ PCU\ Capacity\ Outputs$
Pedestrians	$\sum(Green\ Time)\left(\frac{Walking\ Speed}{Ped.Walking\ Buffer}\right)\left(\frac{Crossing\ Width}{2}\right)\left(\frac{3600}{Cycle\ Time}\right)(No.Crossing\ Points)$

Figure 2-3 People Movement Formulae

The emerging proposed designs were inputted to the People Movement Calculation tool including the junction geometry, junction type and the signal staging, which produced initial people movement outputs and indicative green times per mode. The results provided an initial starting point to facilitate a review of the junction designs, where necessary pedestrian, cyclist and bus infrastructure was optimised accordingly to facilitate additional capacity. The revised designs were then added into the LAM to facilitate traffic modelling.

The LAM outputs provided traffic flows for the opening year (2028) and opening year +15 (2043). The traffic flows were fed into the LinSig models to facilitate a detailed analysis of the proposed junction operation. The LinSig and DLAM analysis required traffic modelling iterations. The people movement results were also re-evaluated during the iteration process, the results were also used to inform the projected number of cyclists in the operational year in the Cycle Quantification assessment.

Below is a sample **Table 2-1** of People Movement results, which captures the People Movement Assessment for Do-Something 2028 scenario for all modes during the morning peak hours at the Ballyowen Road / N4 Eastbound off slip junction, which includes the new pedestrian and cycle bridge across the N4.

Table 2-1: People Movement Assessment

2.N4 Eastbound Off-Slip Junction	CBC		All Arms	
Mode	People Movement	Mode Share	People Movement	Mode Share
Car	1,625	44.34%	1,932	47.98%
Bus	1,500	40.93%	1,500	37.25%
Walk	130	3.54%	130	3.22%
Cycle	410	11.19%	465	11.55%
Total	**3,664**	**100%**	**4,027**	**100%**

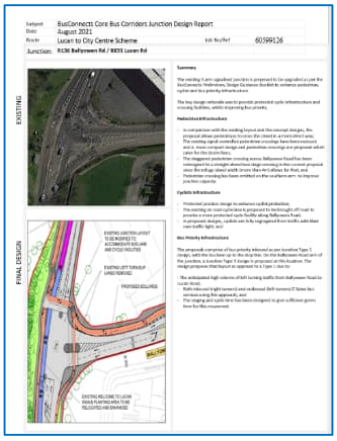
3. Junctions Assessed

A total number of 14 junctions in the Proposed Scheme are presented in this report which are as follows:

1. Ballyowen Road / Lucan Road
2. N4 Junction 3 Eastbound Off Slip / Ballyowen Road
3. N4 Junction 3 Westbound Off Slip / Ballyowen Road
4. Ballyowen Road / Hermitage Road
5. N4 Junction 2 (Hermitage Clinic)
6. Palmerstown Bypass / Kennelsfort Road Lower / Kennelsfort Road Upper
7. Palmerstown Bypass / The Oval
8. Chapelizod Bypass / Con Colbert Road
9. Con Colbert Road / Memorial Road
10. Con Colbert Road / South Circular Road / St Johns Road West
11. St Johns Road West / HSQ
12. St Johns Road West / Military Road
13. St Johns Road West / Heuston Station / Steevens Lane
14. St Johns Road West / Victoria Quay / Frank Sherwin Bridge

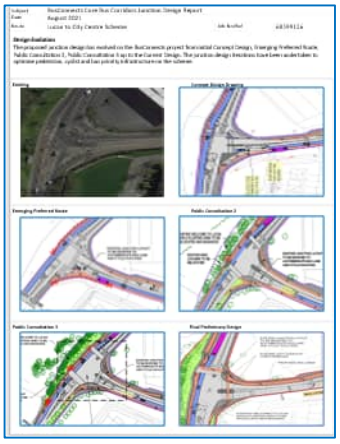
The junctions design, modelling commentary and results are presented in the same order as above in the next section.

Contents



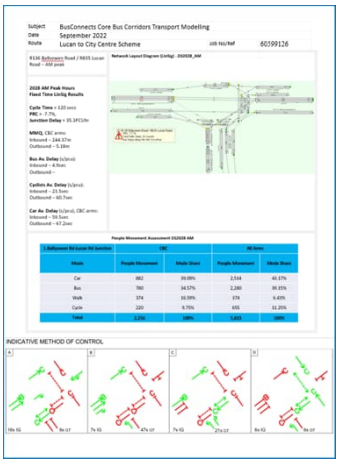
Proposal

- Proposed Design;
- Pedestrian Infrastructure;
- Cyclists Infrastructure;
- Bus Priority; and
- General Traffic.



Design Evolution

- Existing;
- Concept Design;
- Emerged Preferred Route;
- PC2;
- PC3; and
- Current Proposal.

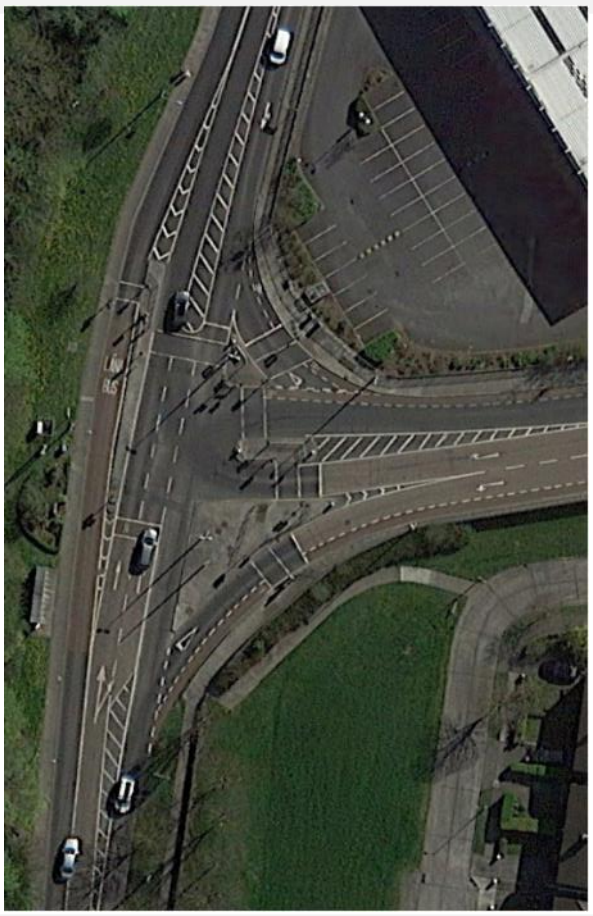


Transport Modelling

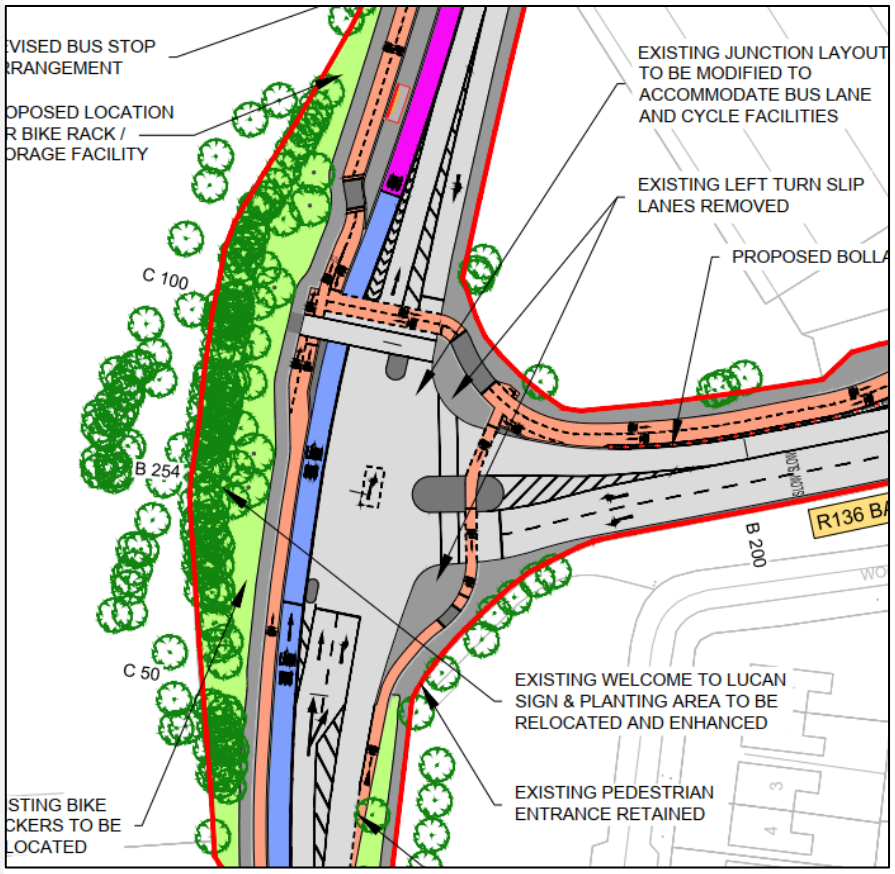
- LinSig Network outputs;
- Network Flow Diagrams; and
- People Movement.
- Indicative Method of Control

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**R136 Ballyowen Road / R835 Lucan Road**		

EXISTING



FINAL DESIGN



Summary

The existing 3 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure.

The key design rationale was to provide a more compact junction, to reduce pedestrian and cyclist crossing distances. The existing left turn slips are also proposed to be omitted to reduce the number of crossings at the junction.

Pedestrian Infrastructure

- In comparison with the existing layout and the concept designs, the proposal allows pedestrians to cross the street in a more direct way;
- The existing left turn slips are proposed to be removed to reduce the number of pedestrian crossings at the junction.
- The proposal includes a direct single stage toucan crossing on the Lucan Road.
- On Ballyowen Road, a two stage crossing is proposed for pedestrians and cyclists. The crossing is proposed to be straight in alignment with a 4m wide central medium as per the BusConnects guidelines to facilitate a two stage crossing. This crossing was modelled as a single stage crossing, however this resulted in increased capacity pressures along Ballyowen Road due to the high volume of left turning traffic, which had knock on traffic pressures at the N4 Junction 3 offslips.

Cyclists Infrastructure

- The existing on road cycle lane is proposed to be brought off road to provide a protected cycle track along Ballyowen Road and Lucan Road;
- It is proposed to introduce a two way cycle track along Ballyowen Road and Lucan Road. This two way facility will tie into the proposed two way cycle track proposed along the N4 and Ballyowen Road.

Bus Priority Infrastructure

The proposals comprise of bus priority inbound as per Junction Type 1 design, with the bus lane up to the stop line.

On the Ballyowen Road arm of the junction, a Junction Type 3 design is proposed at this location, whereby the bus lane is shared with left turning traffic. The design proposes this layout as opposed to a Junciton Type 1 due to:

- The projected high volume of left turning traffic from Ballyowen Road to Lucan Road from the traffic flow data. The Junction Type 1 layout was tested in the modelling, but the results indicated significant queuing and congestion issues, extending back onto the N4;
- Both inbound (right turning buses) and outbound (left turning buses) on the C Spine bus services will be travelling along Ballyowen Road onto Old Lucan Road. Therefore curtailing the bus lane will facilitate buses getting in either Lane 1 towards Lucan or Lane 2 towards inbound direction;
- The staging and cycle time has been designed to give sufficient green time for this movement

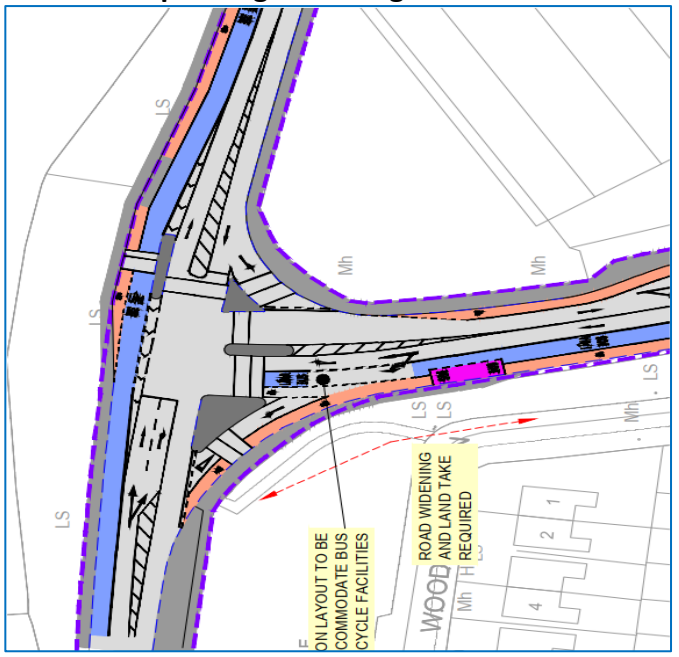
Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

Design Evolution

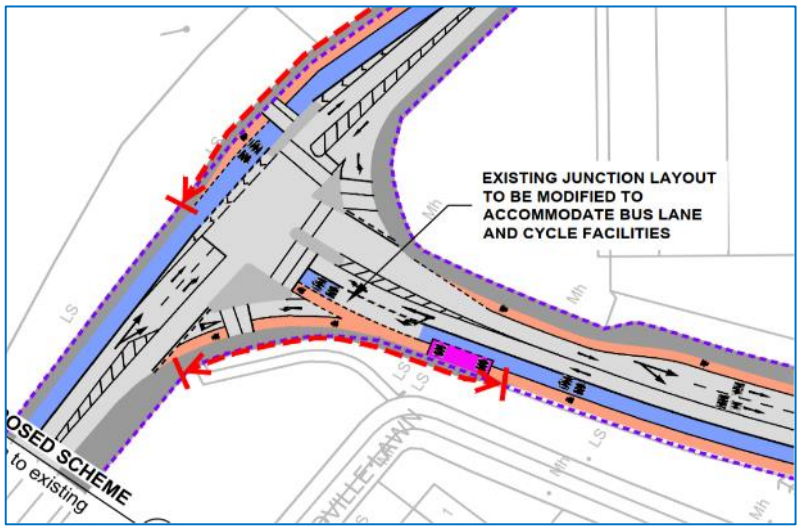
The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

Existing

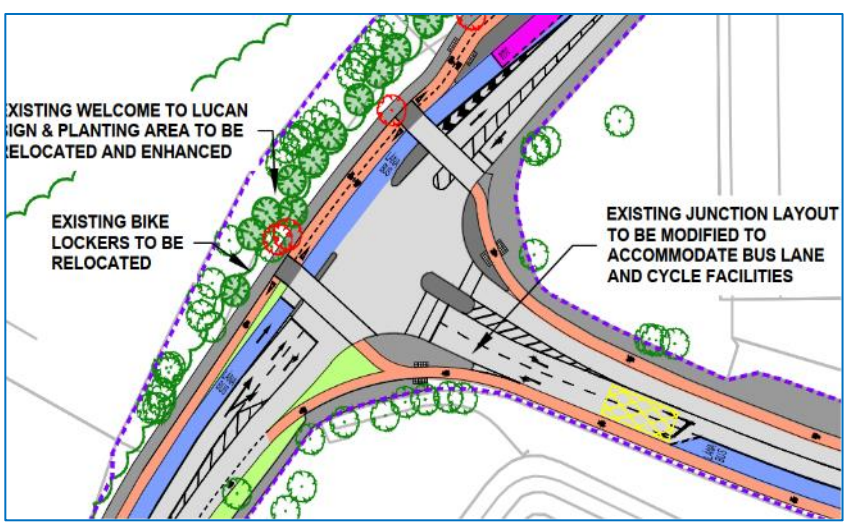
Concept Design Drawing



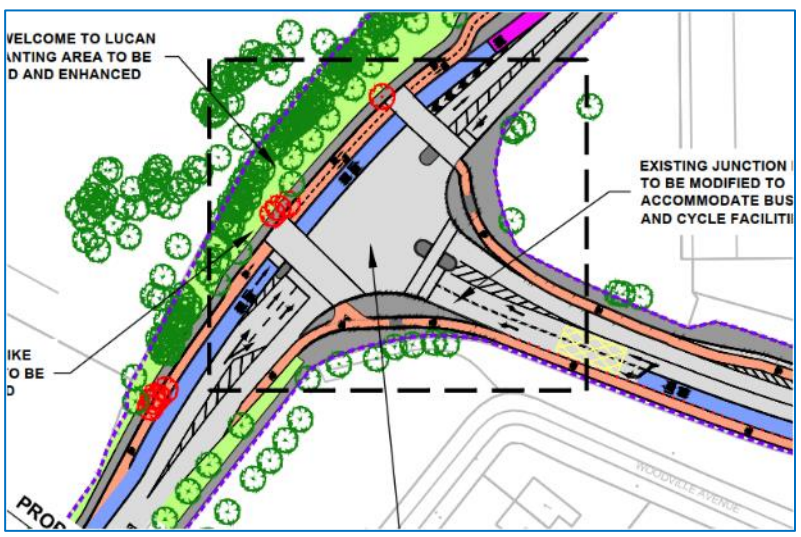
Emerging Preferred Route



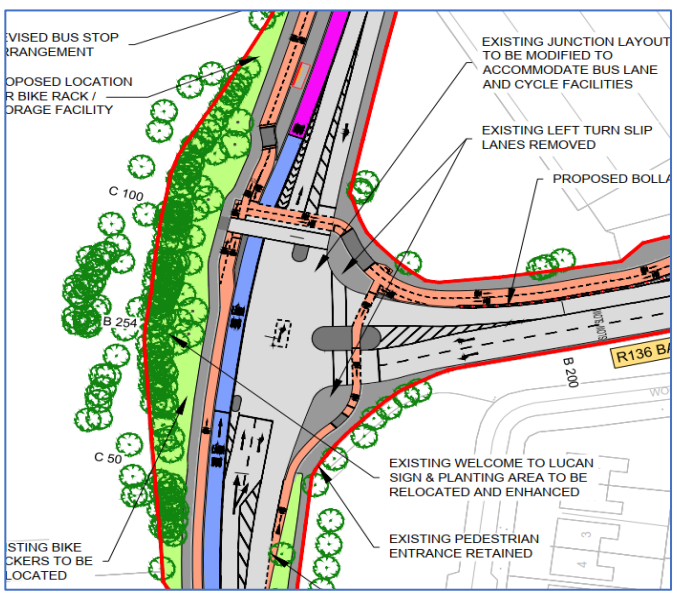
Public Consultation 2



Public Consultation 3



Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R136 Ballyowen Road / R835 Lucan Road – AM peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = -7.7%,
Junction Delay = 35.3PCUhr

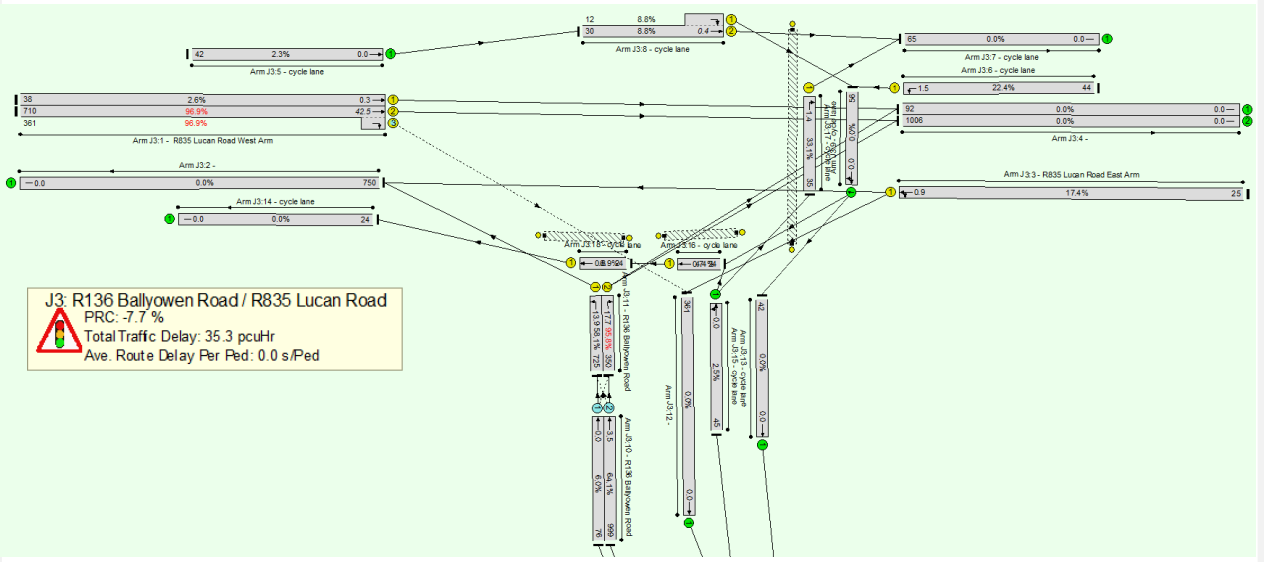
MMQ, CBC arms:
Inbound – 244.37m
Outbound – 5.18m

Bus Av. Delay (s/pcu):
Inbound – 4.9sec
Outbound –

Cyclists Av. Delay (s/pcu):
Inbound – 21.5sec
Outbound – 60.7sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 59.5sec
Outbound – 67.2sec

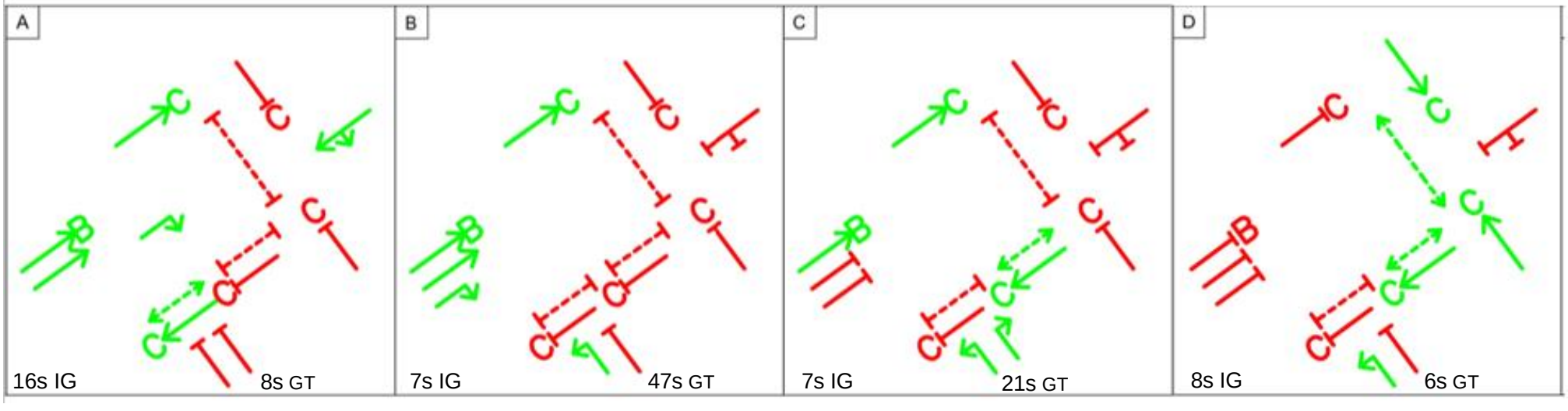
Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

1.Ballyowen Rd-Lucan Rd Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	882	39.09%	2,514	43.17%
Bus	780	34.57%	2,280	39.15%
Walk	374	16.59%	374	6.43%
Cycle	220	9.75%	655	11.25%
Total	**2,256**	**100%**	**5,823**	**100%**

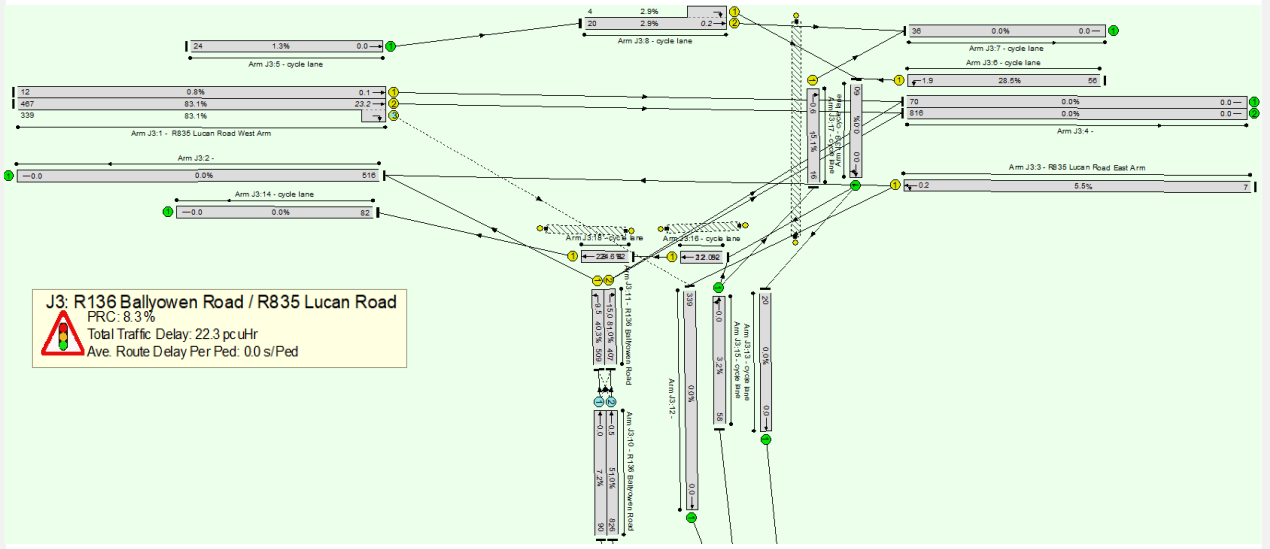
INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R136 Ballyowen Road / R835 Lucan Road – PM peak

Network Layout Diagram (LinSig) - DS2028_PM



2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 8.3%,
Junction Delay = 22.3 PCUhr

MMQ, CBC arms:
Inbound – 133.4m
Outbound – 1.15m

Bus Av. Delay (s/pcu):
Inbound – 4.9sec
Outbound –

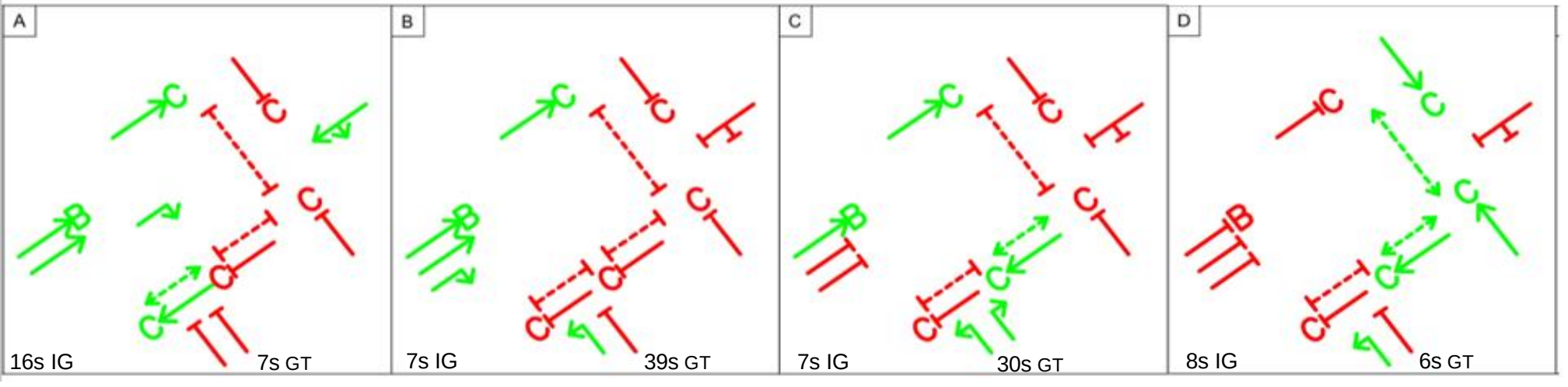
Cyclists Av. Delay (s/pcu):
Inbound – 13.9sec
Outbound – 62sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 37.7sec
Outbound – 67.6sec

People Movement Assessment DS2028 PM

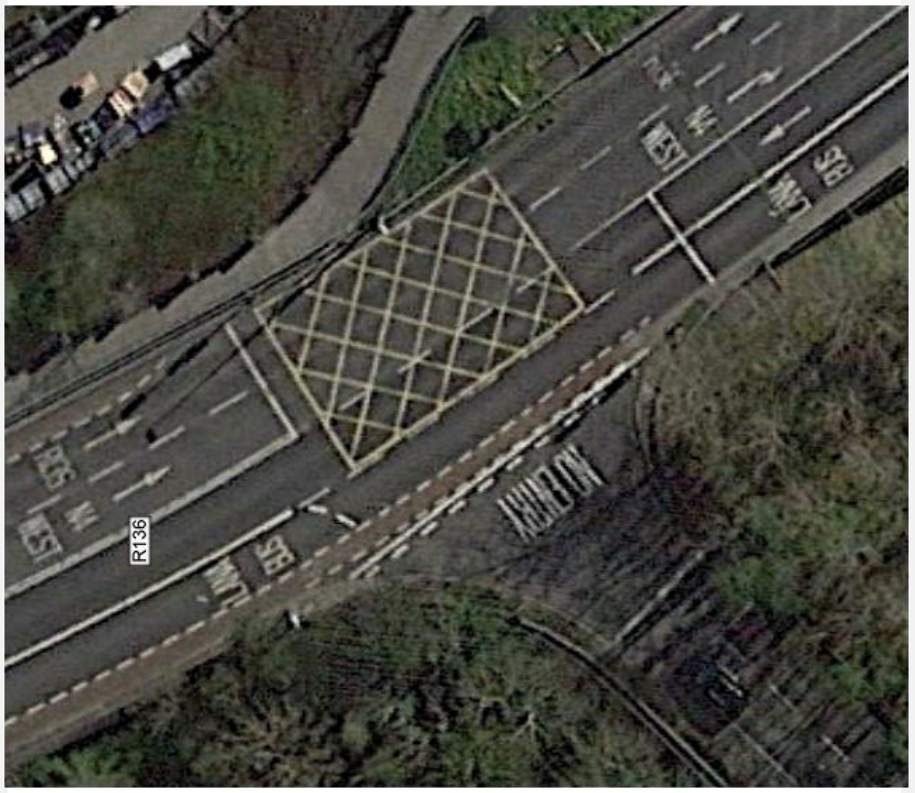
1.Ballyowen Rd-Lucan Rd Junction	CBC		All Arms	
Mode	People Movement	Mode Share	People Movement	Mode Share
Car	569	43.65%	1,967	40.29%
Bus	240	18.42%	2,040	41.79%
Walk	194	14.92%	194	3.98%
Cycle	300	23.02%	680	13.93%
Total	**1,303**	**100%**	**4,881**	**100%**

INDICATIVE METHOD OF CONTROL

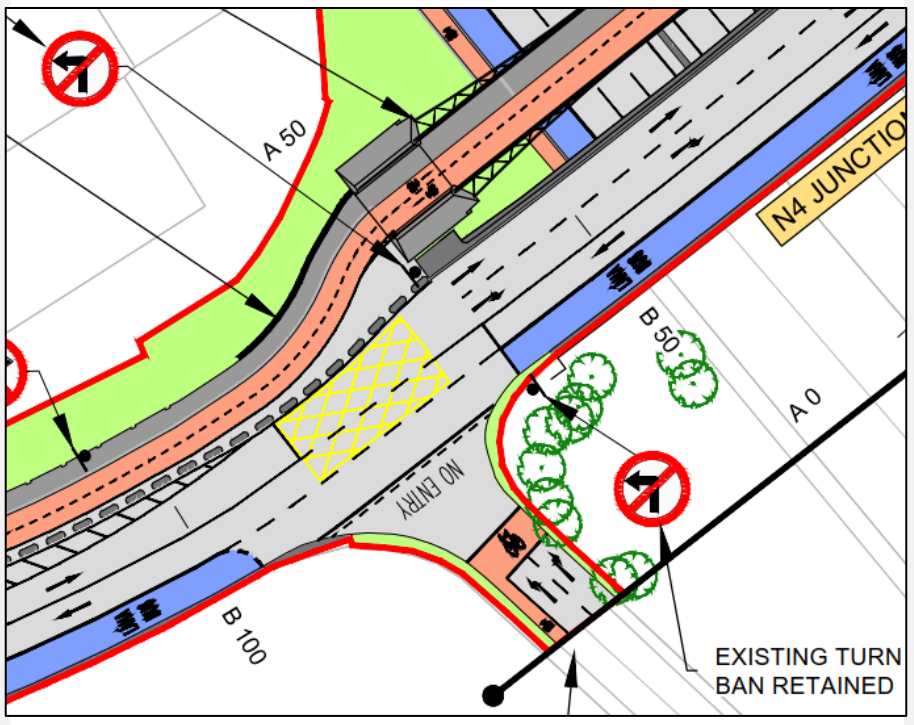


Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**N4 (Jct 3) Eastbound Off-Slip/ R136 Ballyowen Road**		

EXISTING



FINAL DESIGN



Summary

The existing 3 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet. The key design rationale was to provide protected cycle infrastructure through this junction.

Pedestrian Infrastructure

- The proposals will retain the existing footway that links to the pedestrian footbridge along the eastern side of Ballyowen Road. This facilitates access towards Lucan Road (to the north) and towards the nearby residential estates to the south via the existing N4 pedestrian bridge; and
- It is not necessary to introduce a pedestrian crossing on the Ballyowen Road / N4 Off slip junction, as there is no existing footpath facilities to tie into.

Cyclists Infrastructure

- The existing infrastructure comprises an existing cycle lane along Ballyowen Road towards Old Lucan Road.
- The proposal is to remove the existing cycle lane and introduce a two way protected cycle track on the eastern side of Ballyowen Road. This will remove cyclists from travelling on the carriageway, thus providing a safer environment for vulnerable road users.

Bus Priority Infrastructure

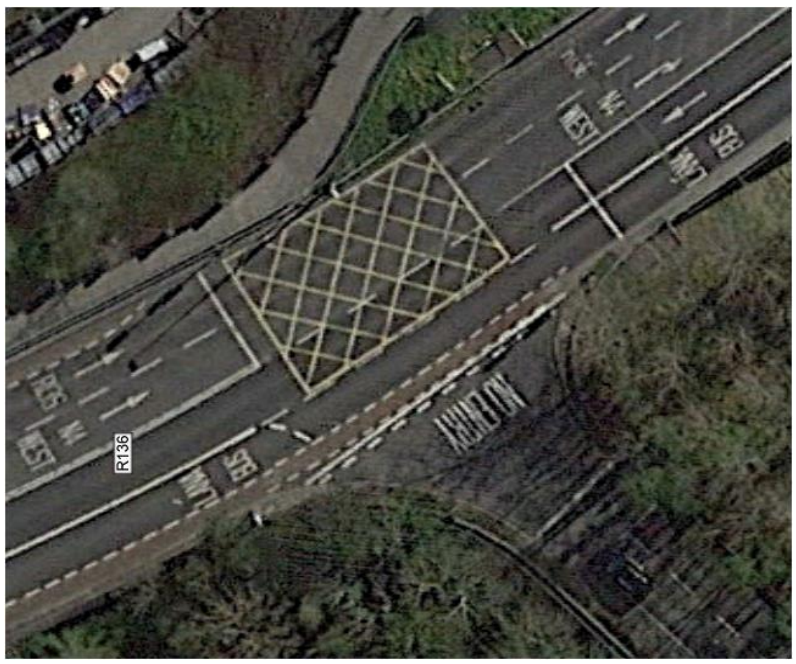
- Junction Type 1 proposed northbound, where bus lane extends up to the junction stop line. The northbound direction serves both inbound and outbound services; and
- There are no services running southbound along Ballyowen Road at this junction and therefore bus priority has not been included along Ballyowen Road southbound.

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

Design Evolution

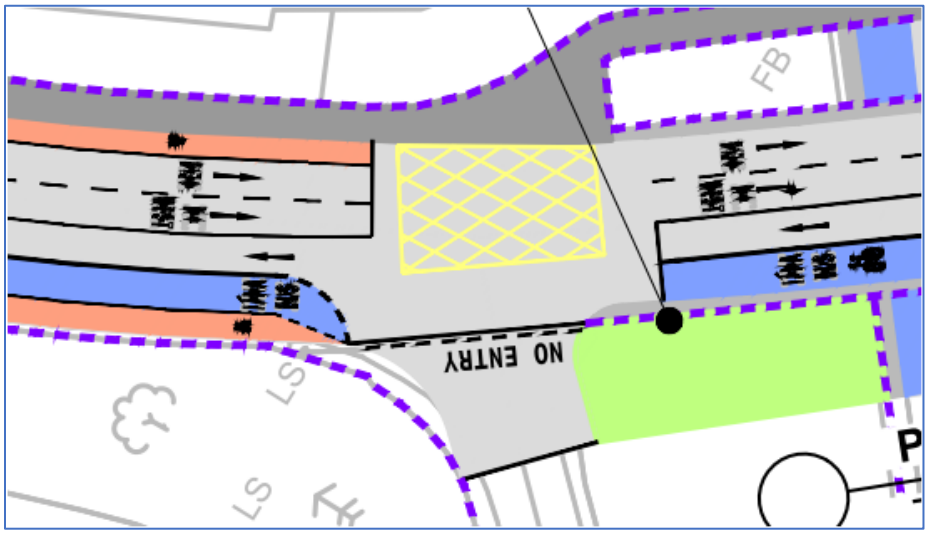
The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

Existing

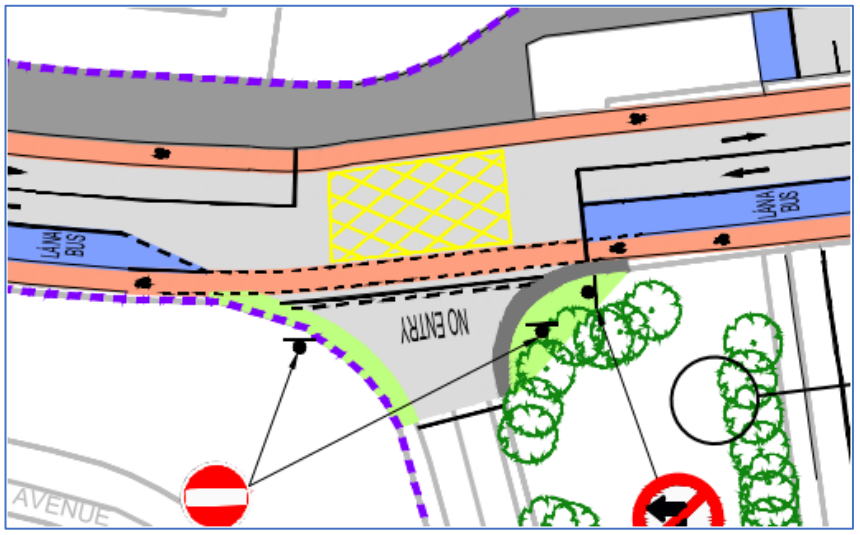


Concept Design Drawing

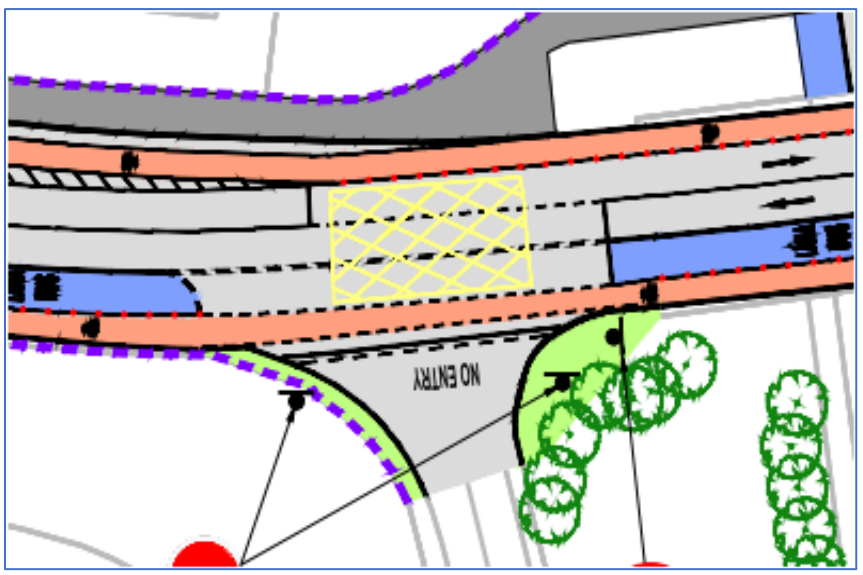
Emerging Preferred Route



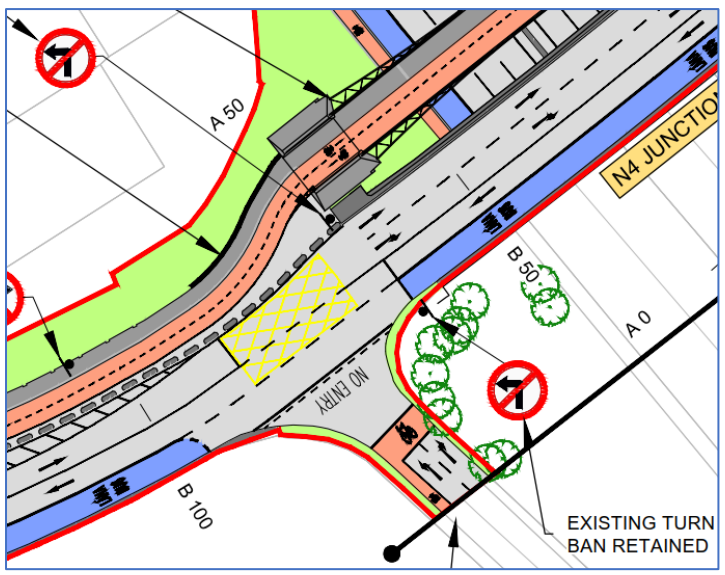
Public Consultation 2



Public Consultation 3



Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

N4 (Jct 3) Eastbound Off-Slip/ R136 Ballyowen Road – AM peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 3.9%,
Junction Delay = 9.0 PCUhr

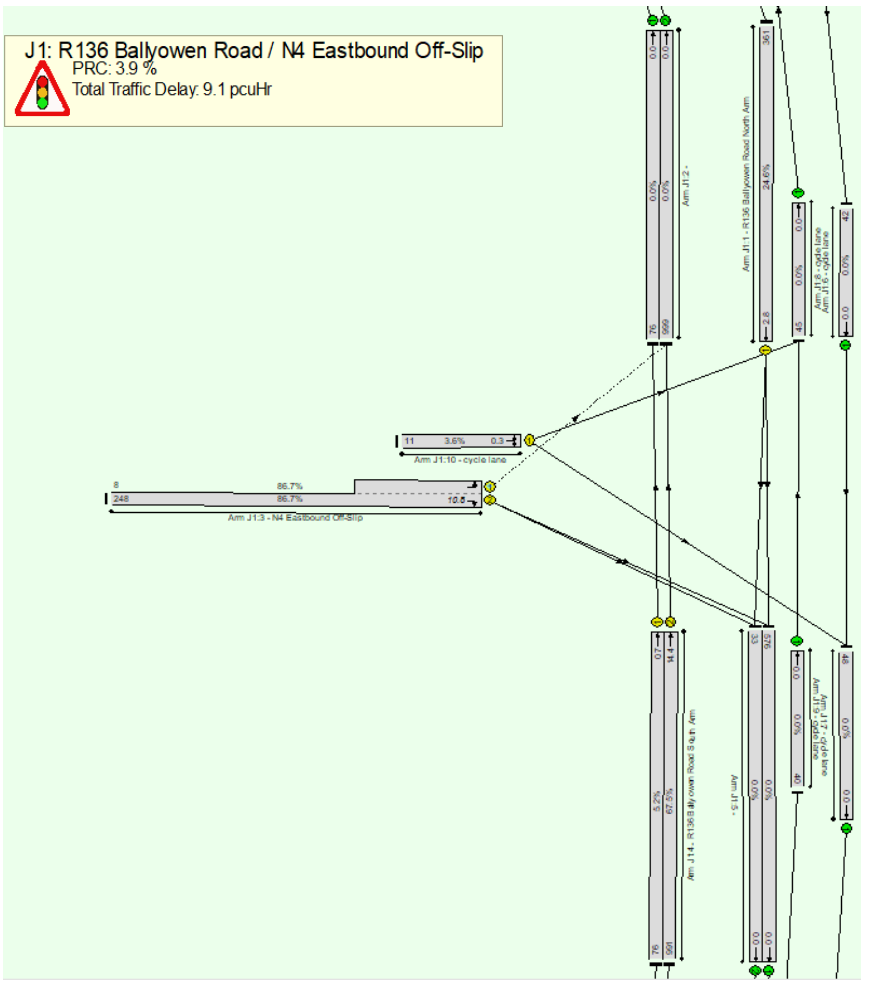
MMQ, CBC arms:
Inbound – 82.8m
Outbound – 62.1m

Bus Av. Delay (s/pcu):
Inbound –5.7sec
Outbound –

Cyclists Av. Delay (s/pcu):
Inbound –
Outbound –

Car Av. Delay (s/pcu), CBC arms:
Inbound – 7sec
Outbound – 5.5sec

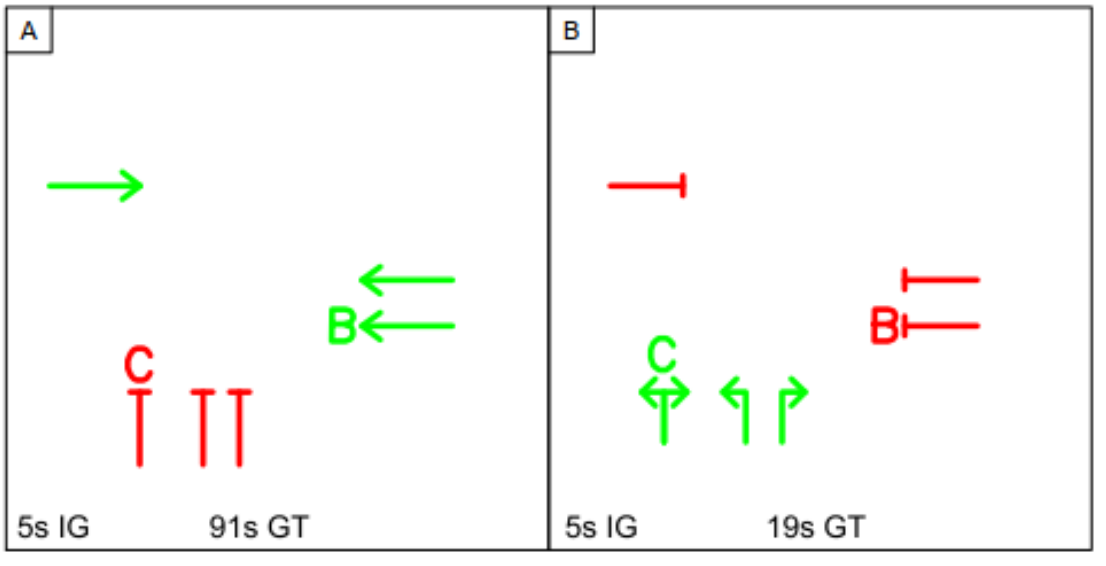
Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

2.N4 Eastbound Off-Slip Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	1,625	44.34%	1,932	47.98%
Bus	1,500	40.93%	1,500	37.25%
Walk	130	3.54%	130	3.22%
Cycle	410	11.19%	465	11.55%
Total	**3,664**	**100%**	**4,027**	**100%**

INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

N4 (Jct 3) Eastbound Off-Slip/ R136 Ballyowen Road – PM peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 41%,
Junction Delay = 4.7 PCUhr

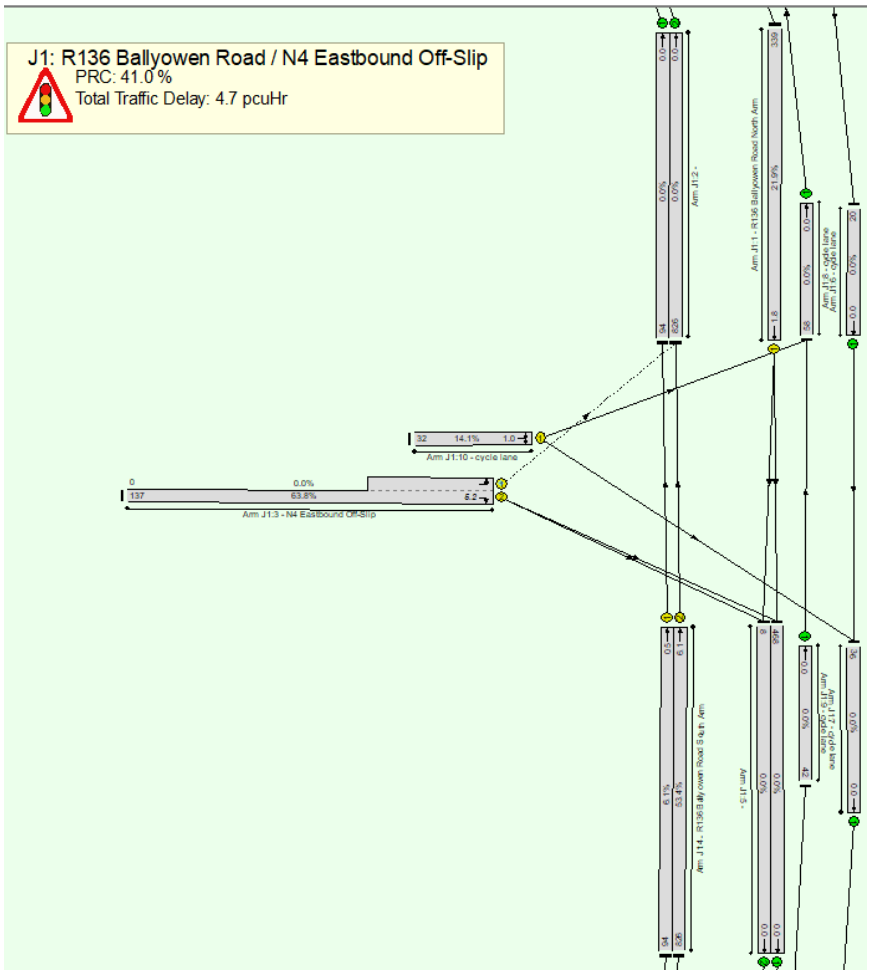
MMQ, CBC arms:
Inbound – 35.08m
Outbound – 29.9m

Bus Av. Delay (s/pcu):
Inbound – 3.1sec
Outbound –

Cyclists Av. Delay (s/pcu):
Inbound –
Outbound –

Car Av. Delay (s/pcu), CBC arms:
Inbound – 4.4sec
Outbound – 2.5sec

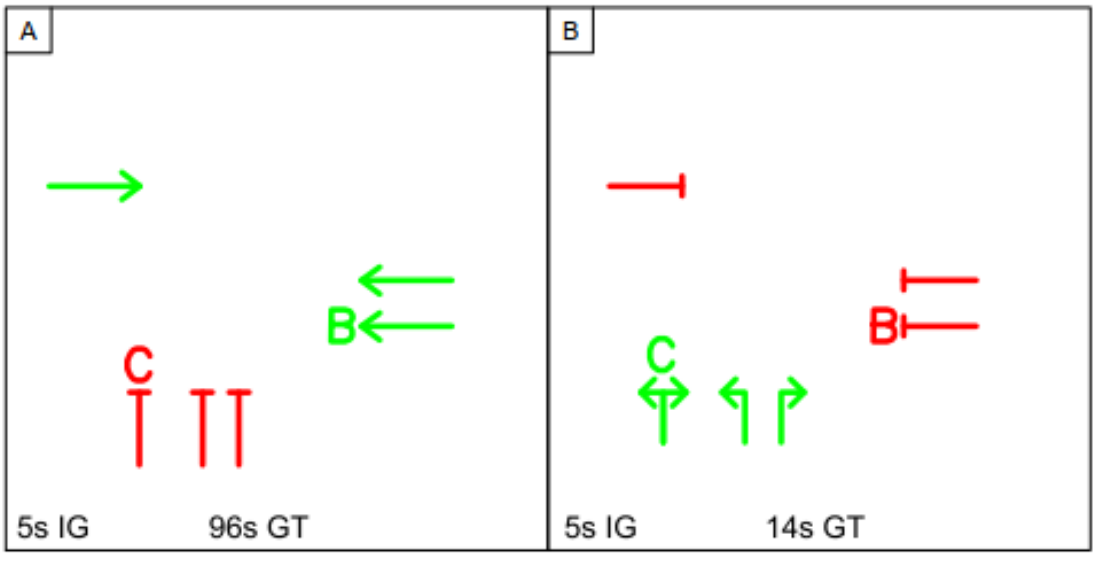
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

2.N4 Eastbound Off-Slip Junction	CBC		All Arms	
Mode	People Movement	Mode Share	People Movement	Mode Share
Car	1,399	38.58%	1,564	39.58%
Bus	1,800	49.64%	1,800	45.56%
Walk	127	3.51%	127	3.22%
Cycle	300	8.27%	460	11.64%
Total	**3,626**	**100%**	**3,951**	**100%**

INDICATIVE METHOD OF CONTROL

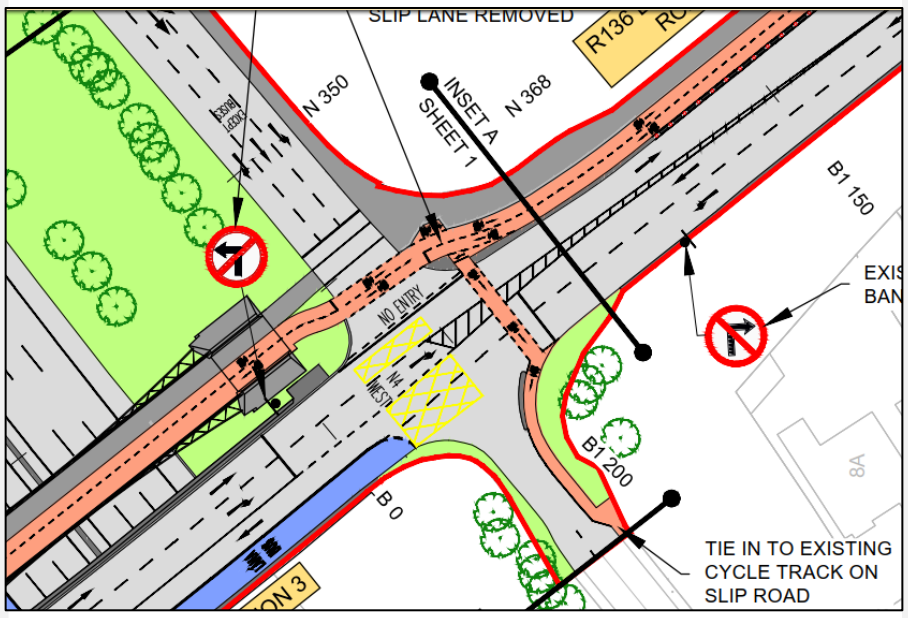


Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

Junction: **N4 (Jct 3) Westbound Off-Slip/ R136 Ballyowen Road**

EXISTING

FINAL DESIGN



Summary

The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure.

The key design rationale was to provide protected cycle infrastructure and crossing facilities, improving bus priority and to enhance pedestrian crossing infrastructure. The junction is proposed to be more compact in particular for pedestrians due to the proposed removal of the existing left turn slip lane from the N4 offslip onto Ballyowen Road

Pedestrian Infrastructure

- The controlled pedestrian crossing facility along the N4 Westbound off slip will be retained, but pedestrian crossing distance will be reduced following the removal of the left turn slip. Removal of the left turn slip ensures pedestrians are only required to cross once as opposed to the existing arrangement which requires pedestrians to cross two separate crossings; and
- No existing footpaths are located along the western side of Ballyowen Road, no existing crossing facilities are located on the remaining arms of the junction and there is no proposals to facilitate pedestrians crossing at this location.

Cyclists Infrastructure

- It is proposed to remove the existing cycle advanced stop markings located along Ballyowen Road and N4 Westbound off slip arms of the junction; and
- The proposed design will comprise of a two way cycle track along Ballyowen Road eastern side. This proposal will provide a safe and dedicate cyclist infrastructure to support sustainable travel through the junction. The two way cycle track will continue onto a new pedestrian and cyclist bridge crossing the N4.
- In addition, it is proposed to introduce a new cyclist crossing across Ballyowen Road the existing cycle track that joins onto the N4 westbound on slip. This will provide a safe crossing arrangement for cyclists.

Bus Priority Infrastructure

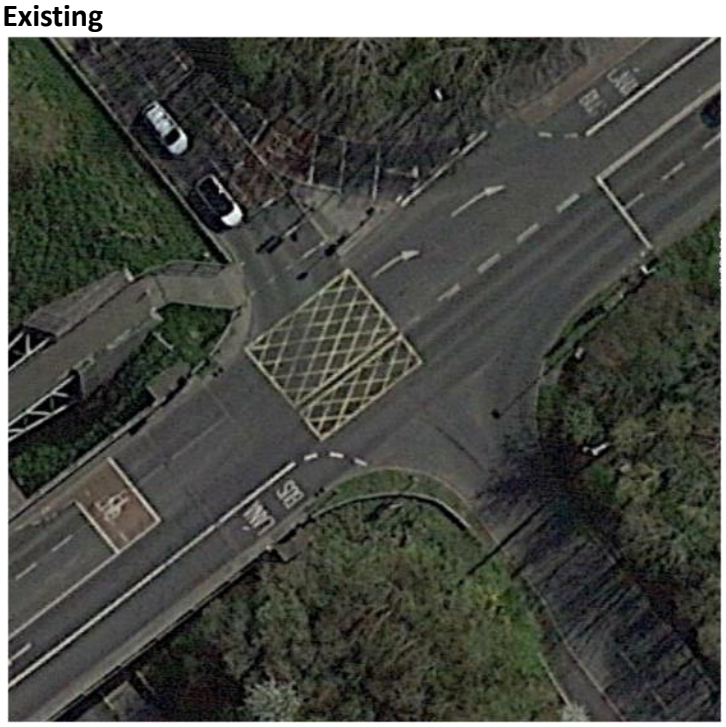
- The bus priority comprises a bus lane along the N4 Westbound off slip. On the approach to the junction, outbound services for Lucan Road merge into Lane 2 and will share the lane with general traffic travelling ahead, which is projected to be low from the traffic modelling data. Therefore any delay for buses will be minimal. Outbound bus services travelling towards the Hermitage Road residential areas to the south will share the lane with any general traffic turning left.; and
- The concept design drawings had indicated a Bus Lane only in Lane 2, with Lane 3 for Ahead and Right turn movements, this arrangement would not be suitable as it would lead to a conflict between right turning buses from Lane 2 and Ahead movements from Lane 3. It is noted that the Emerging Design and PC2 drawings had indicated Ahead and Right from Lane 3, the PC3 drawings show Lane 3 as Right Turn only as per the existing arrangement.

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

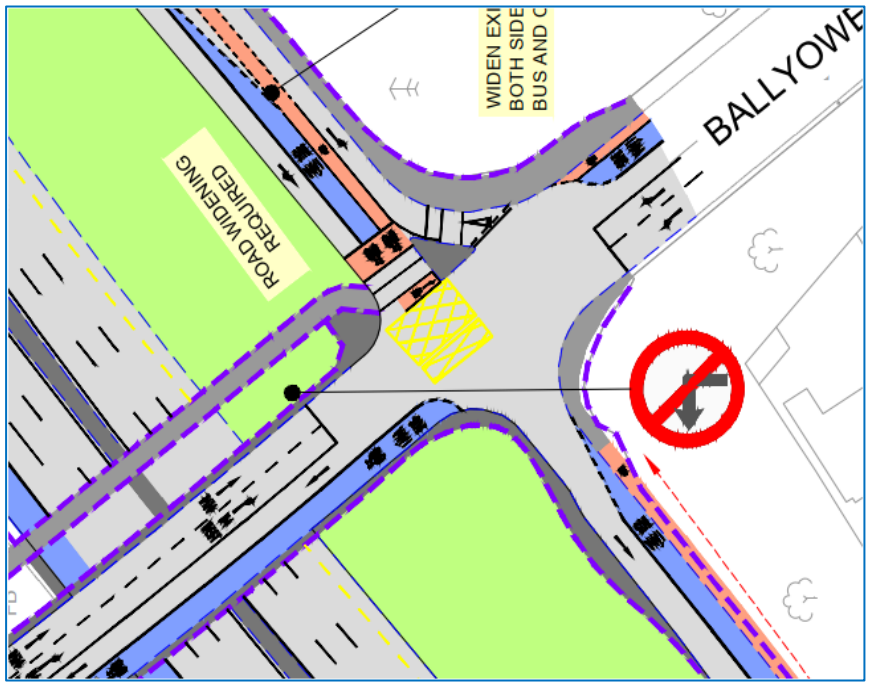
Design Evolution

The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

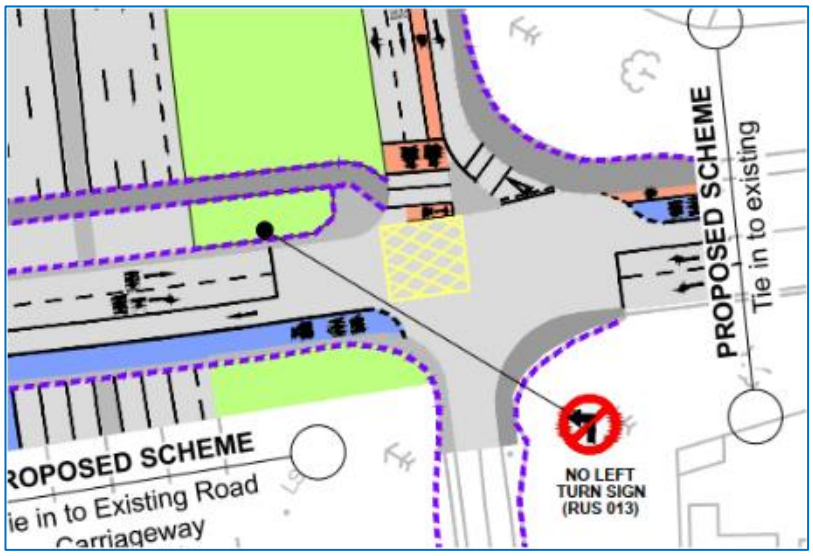
Existing



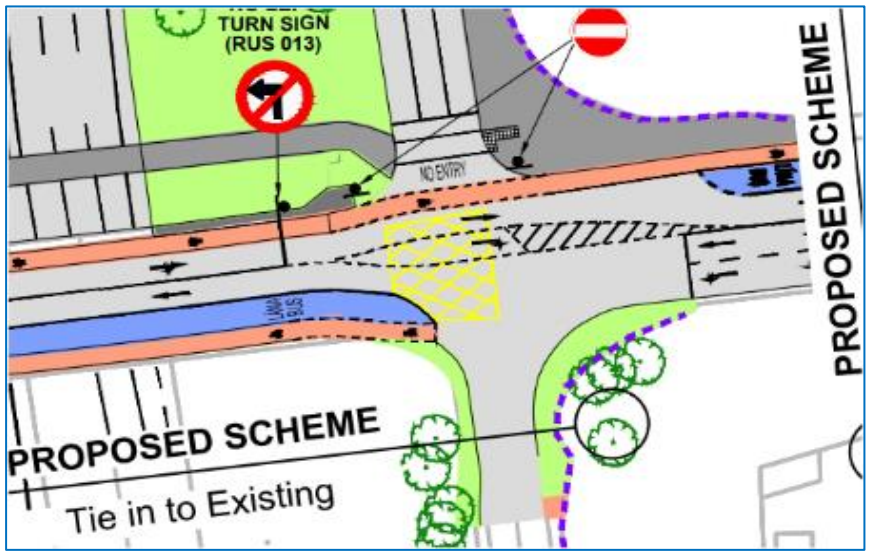
Concept Design Drawing



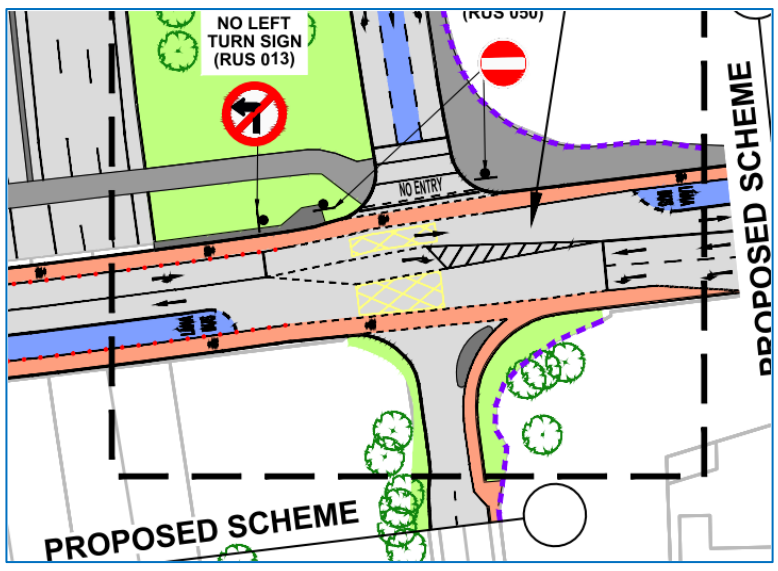
Emerging Preferred Route



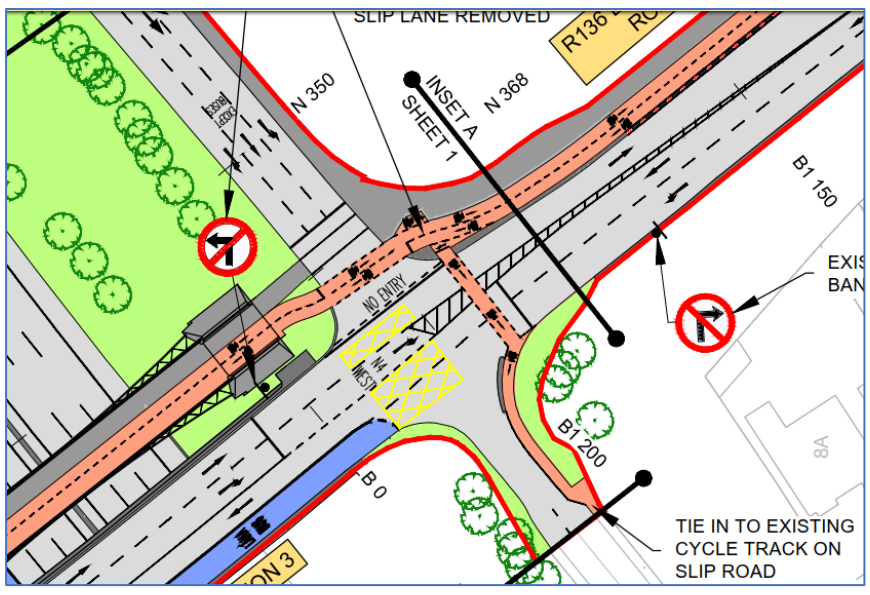
Public Consultation 2



Public Consultation 3



Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

N4 (Jct 3) Westbound Off-Slip/
R136 Ballyowen Road – AM peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 25.3%,
Junction Delay = 23.9 PCUhr

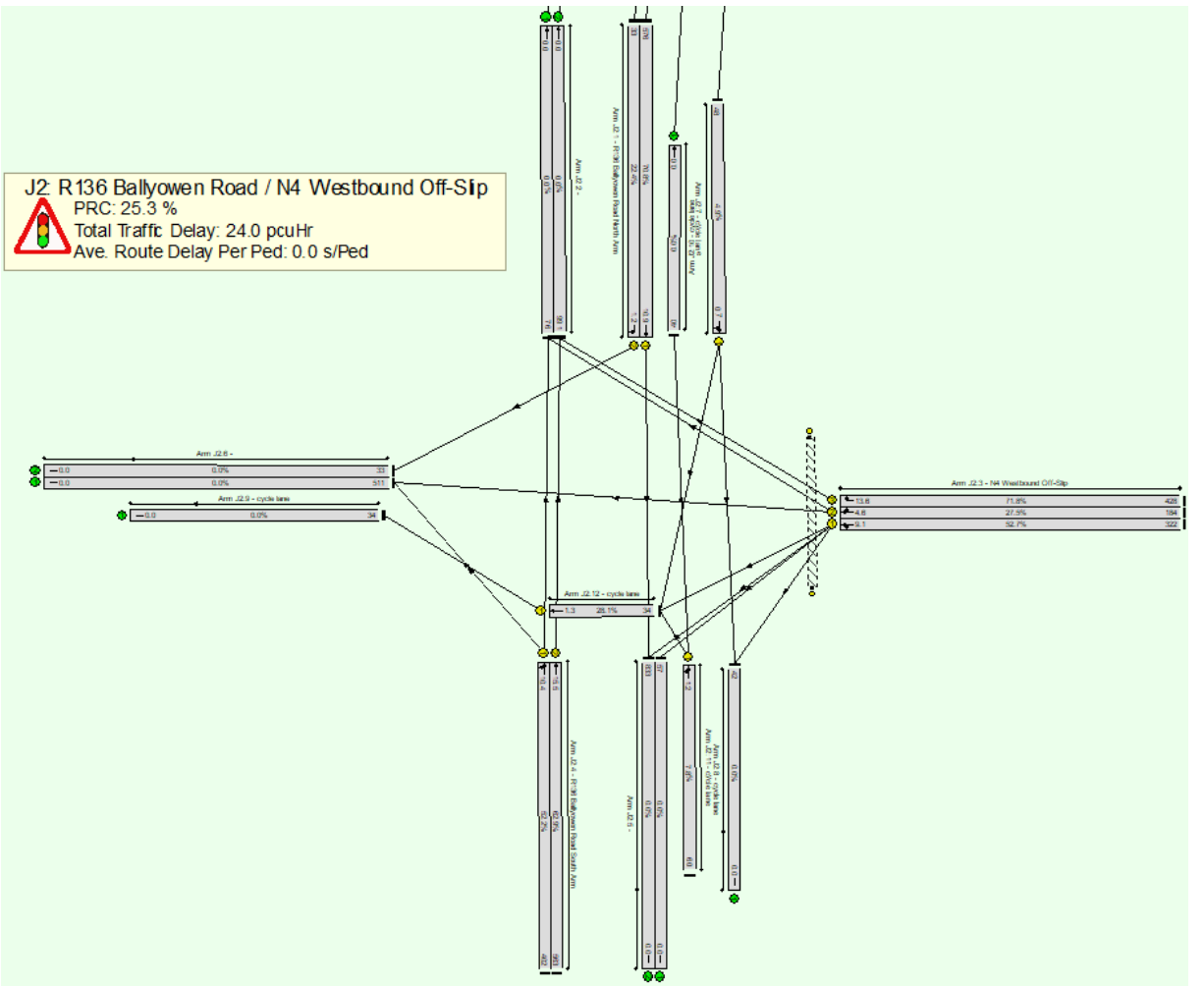
MMQ, CBC arms:
Inbound – 89.13m
Outbound – 78.2m

Bus Av. Delay (s/pcu):
Inbound – 30.4sec
Outbound –31.8sec

Cyclists Av. Delay (s/pcu):
Inbound – 23.1sec
Outbound –12.3sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 44.4sec
Outbound – 20.4sec

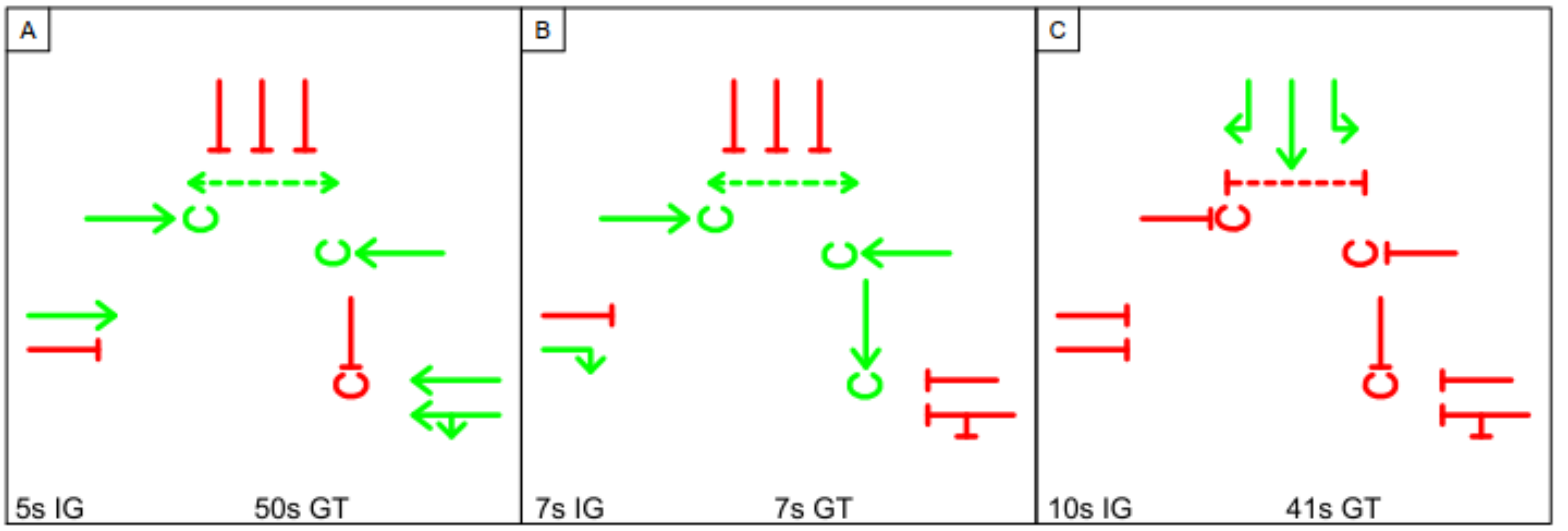
Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

3.N4 Westbound Off-Slip Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	1,447	43%	2,635	43%
Bus	1,320	39%	2,640	43%
Walk	215	6%	215	4%
Cycle	420	12%	620	10%
Total	**3,382**	**100%**	**6,070**	**100%**

INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

N4 (Jct 3) Westbound Off-Slip/
R136 Ballyowen Road – PM peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 27.8%,
Junction Delay = 19 PCUhr

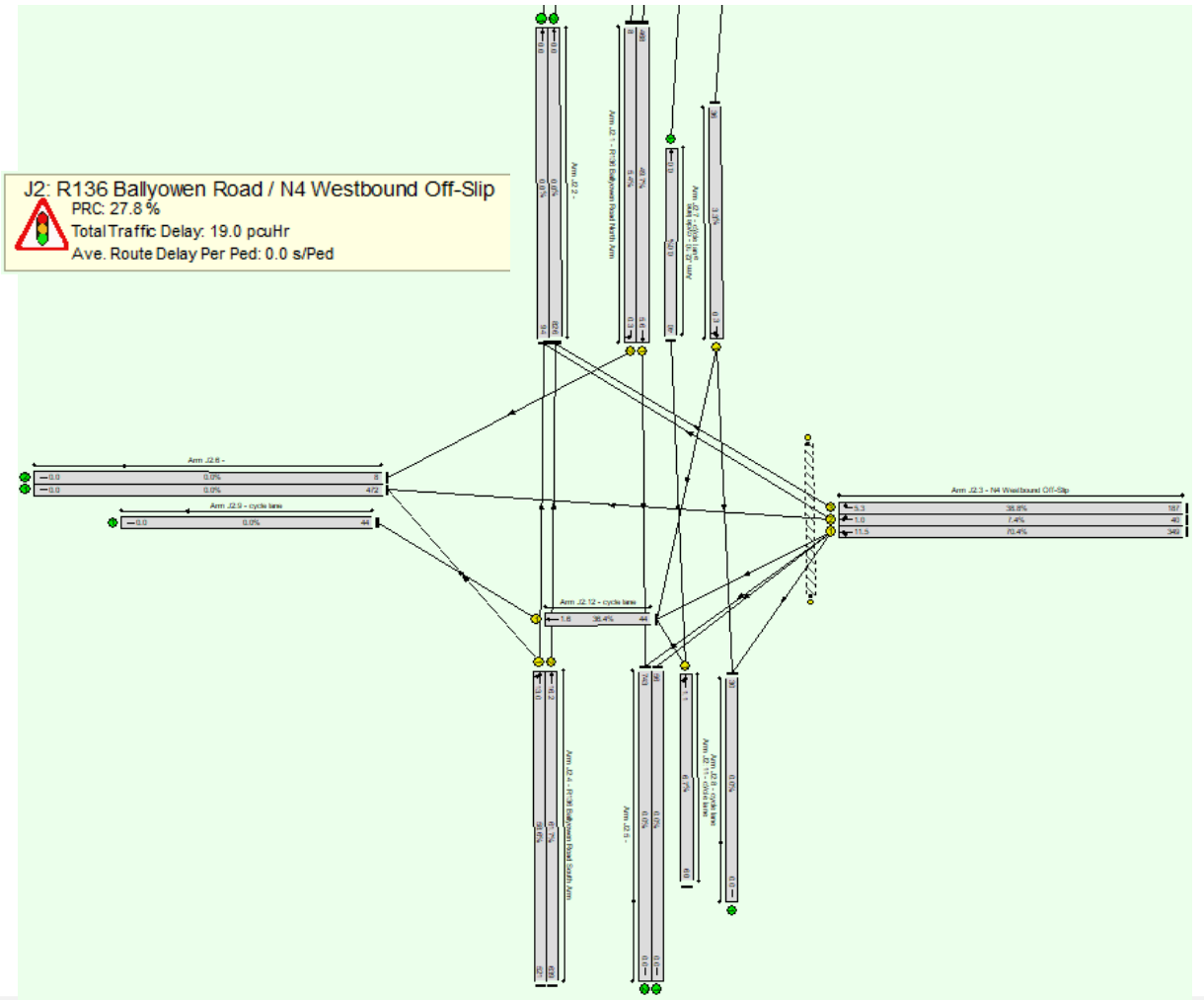
MMQ, CBC arms:
Inbound – 93.15m
Outbound – 32.2m

Bus Av. Delay (s/pcu):
Inbound – 26.7sec
Outbound –

Cyclists Av. Delay (s/pcu):
Inbound – 18.2sec
Outbound – 8.5sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 40.7sec
Outbound – 11.4sec

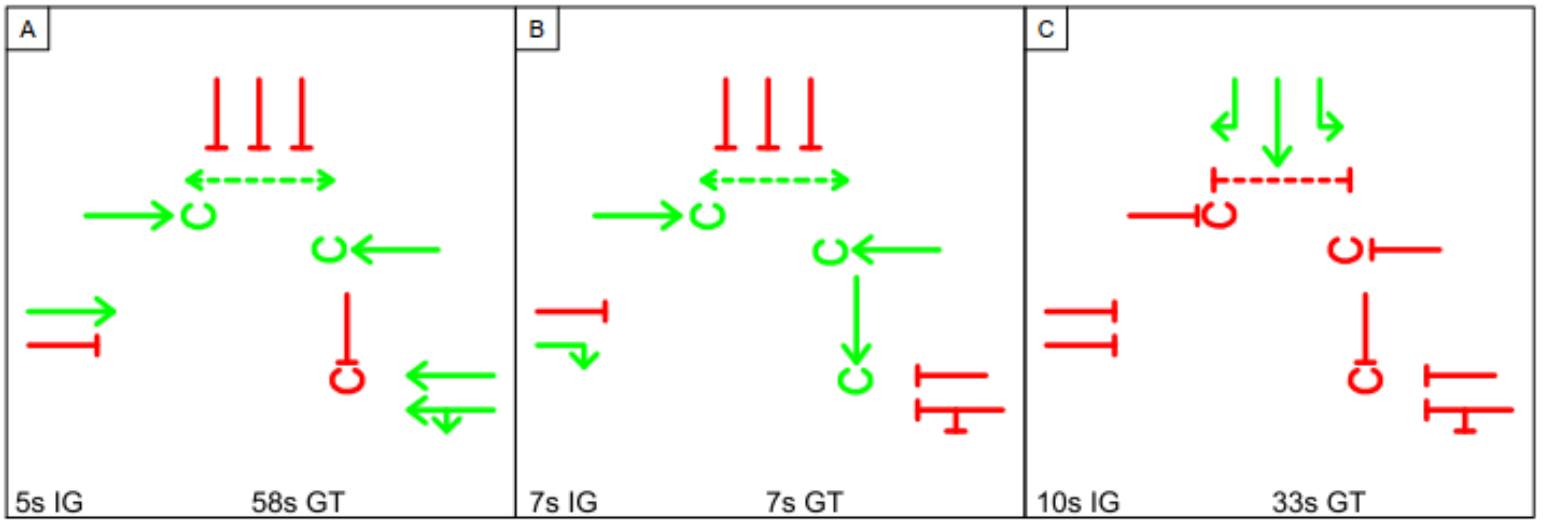
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

3.N4 Westbound Off-Slip Junction	CBC		All Arms	
Mode	People Movement	Mode Share	People Movement	Mode Share
Car	1,406	42%	2,440	39%
Bus	1,320	40%	2,940	47%
Walk	234	7%	234	4%
Cycle	380	11%	640	10%
Total	**3,300**	**100%**	**6,184**	**100%**

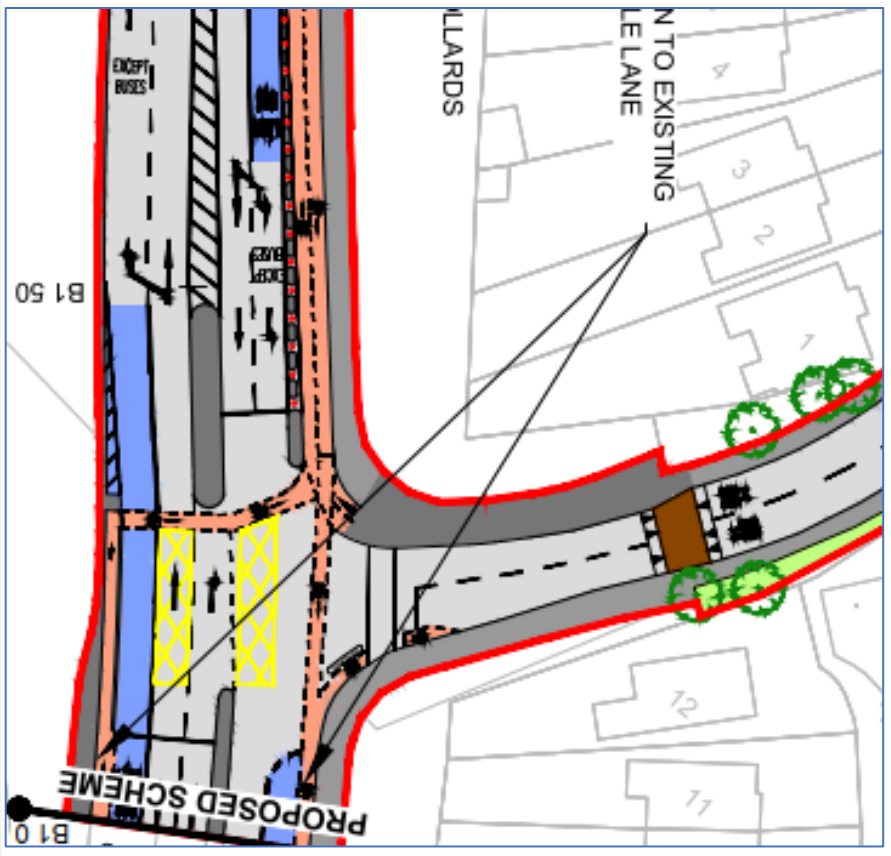
INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**R136 Ballyowen Road / Hermitage Road Junction**		

EXISTING

FINAL DESIGN



Summary
The existing 3 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure.

The key design rationale provide high quality pedestrian and cycle crossing infrastructure, to enhance access towards the new two way cycle track on the north eastern side of Ballyowen Road.

Pedestrian Infrastructure

- An existing footpath is located on the eastern side of Ballyowen Road. It is proposed to reduce the corner radius of Ballyowen Road and Hermitage Road, which will introduce a more compact junction thus reducing the crossing distance across Hermitage Road. The pedestrian crossing is designed to be a straight direct crossing in a single stage, as per the existing arrangement.

Cyclist Infrastructure

- The proposal will introduce a new two way cycle track on the eastern side of Ballyowen Road, which will connect Hermitage Road towards the N4 overpass and continue towards Lucan Road.
- To facilitate cyclist access onto the cycle track, a shared path is proposed on the northern side of Hermitage Road which will facilitate cyclist access to and from Hermitage Road towards the cycle track. An uncontrolled pedestrian and cyclist crossing is proposed on Hermitage Road, approximately 30m from the signalised junction, to enable cyclist access from Hermitage Road onto the cycle track.
- A new cyclist crossing is proposed to enable cyclists travelling along Ballyowen Road to cross onto the two way cycle track. The cyclist crossing will be signalised to enable a safe passage for cyclists across Ballyowen Road.

Bus Infrastructure

- Ballyowen Road northbound proposes a Junction Type 1, bus lane upto the stop line as per the existing conditions.
- On Ballyowen Road southbound, a Junction Type 3 is proposed, where the bus lane is curtailed to facilitate left turning traffic into Hermitage Road. This design will accommodate the projected low volume of residential associated left turners into Hermitage Road. It is envisaged that the left turning traffic will be low and therefore not have any noticeable delay to bus priority.

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

Design Evolution

The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

Existing

Concept Design Drawing

This Junction is not part of Concept Design

Emerging Preferred Route

This Junction is not part of Emerging Preferred Route

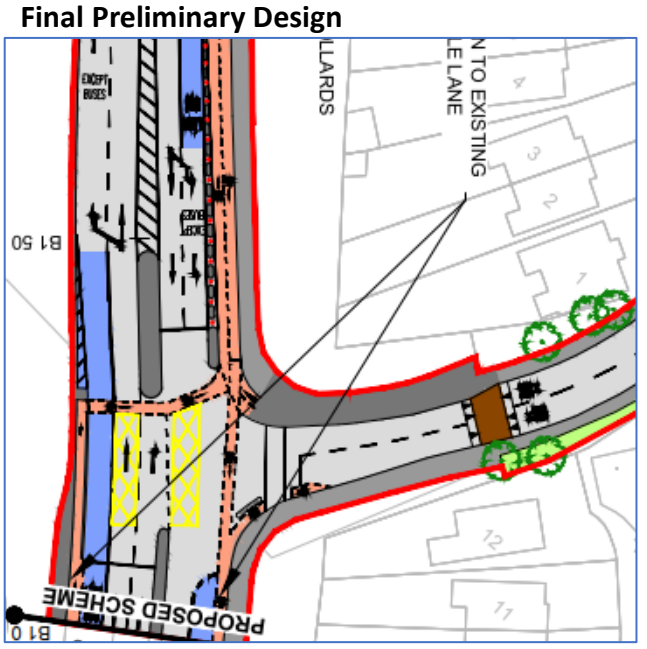
Public Consultation 2

This Junction is not part of Public Consultation 2

Public Consultation 3

This Junction is not part of Public Consultation 3

Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R136 Ballyowen Road / Hermitage Road Junction – AM peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 54.3%,
Junction Delay = 6.6 PCUhr

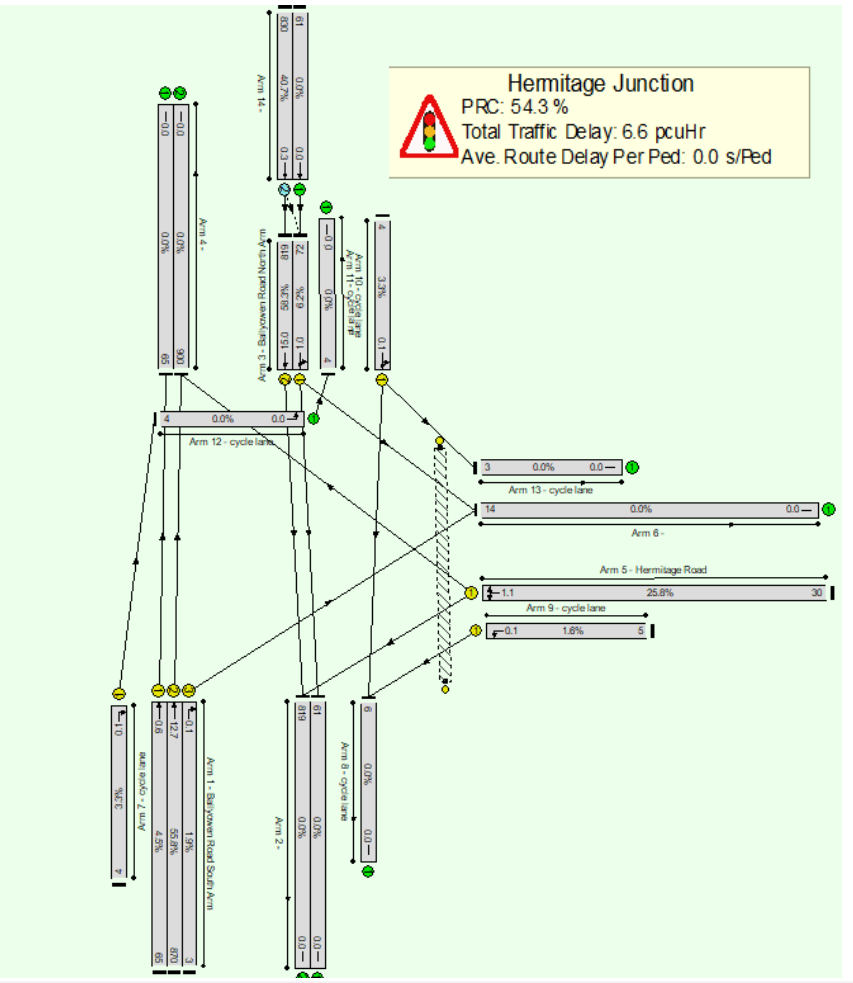
MMQ, CBC arms:
Inbound – 73.03m
Outbound – 86.25m

Bus Av. Delay (s/pcu):
Inbound – 4.9sec
Outbound – 10.4sec

Cyclists Av. Delay (s/pcu):
Inbound – 68.1sec
Outbound - 68.1sec

Car Av. Delay (s/pcu), CBC arms:
Inbound –74sec
Outbound – 13.1sec

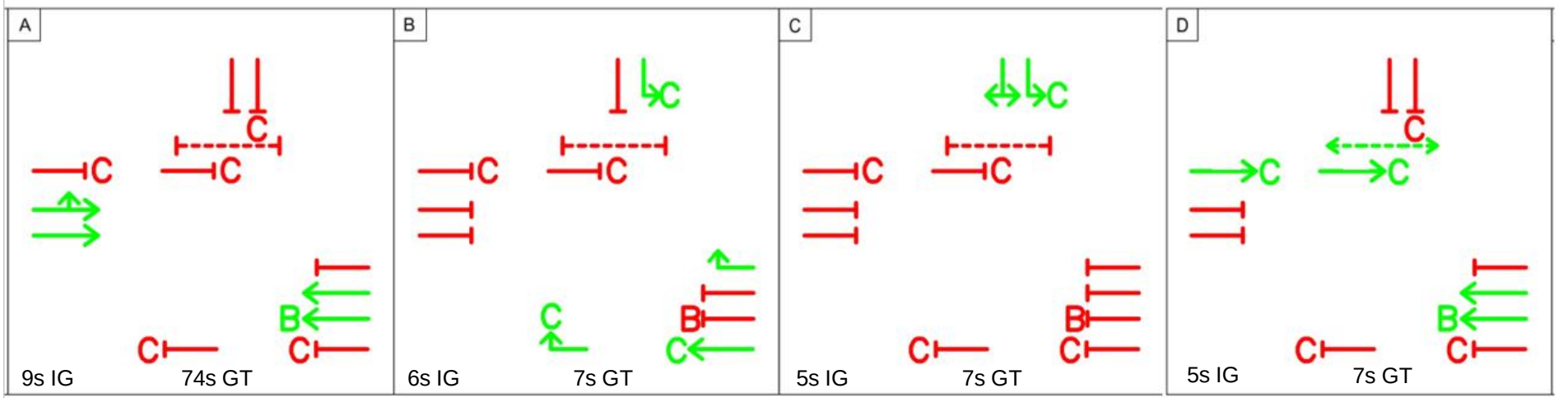
Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

4.Hermitage Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	2,027	39%	2,080	39%
Bus	2,520	49%	2,520	48%
Walk	120	2%	120	2%
Cycle	500	10%	560	11%
Total	**5,167**	**100%**	**5,280**	**100%**

INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R136 Ballyowen Road / Hermitage Road Junction – PM peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 30.6%,
Junction Delay = 7.0 PCUhr

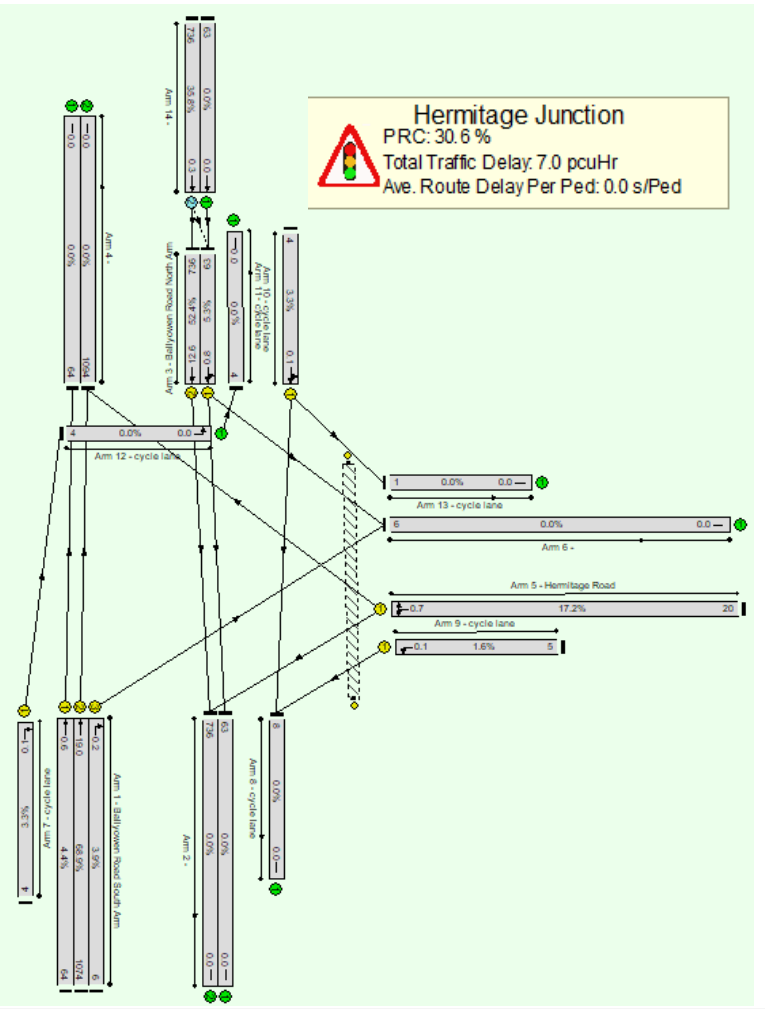
MMQ, CBC arms:
Inbound – 109.25m
Outbound – 72.45m

Bus Av. Delay (s/pcu):
Inbound – 4.9sec
Outbound – 10.3sec

Cyclists Av. Delay (s/pcu):
Inbound – 68.1sec
Outbound – 68.1sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 71.6sec
Outbound – 12.1sec

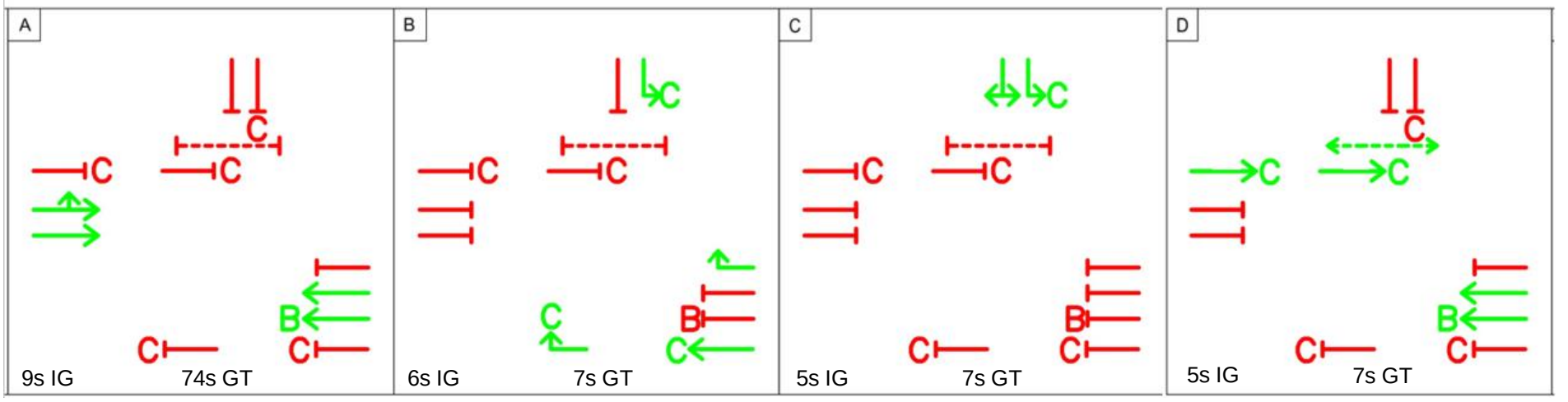
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

4.HermitageJunction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	2,172	41%	2,203	41%
Bus	2,520	48%	2,520	47%
Walk	120	2%	120	2%
Cycle	480	9%	550	10%
Total	**5,292**	**100%**	**5,393**	**100%**

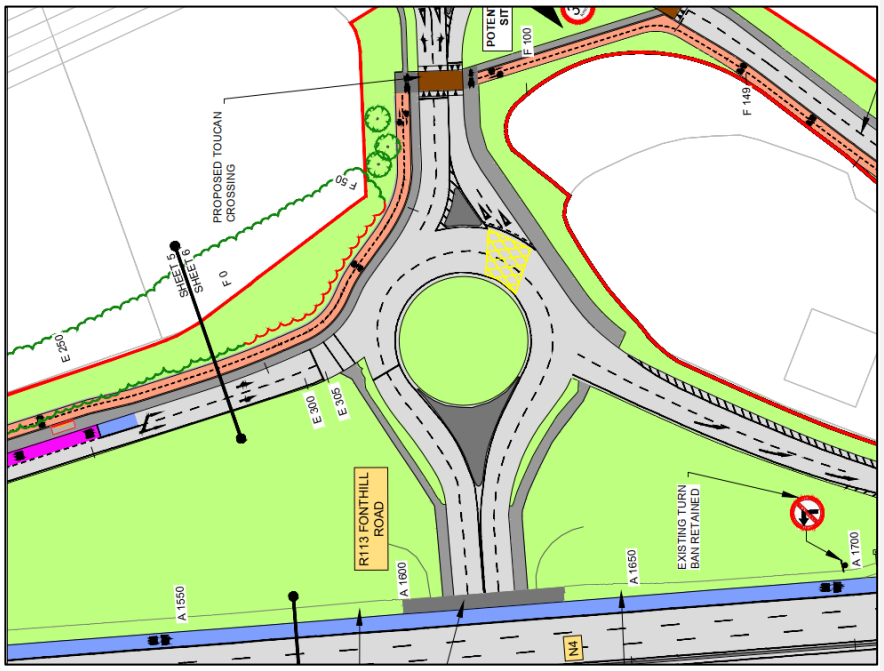
INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**N4 Junction 2**		

EXISTING

FINAL DESIGN



Summary

The existing 4 arm partially signalised roundabout junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure.

The key design rationale provide high quality cycle tracks through the junction, to enhance cyclist permeability, whilst enhancing bus priority.

Pedestrian Infrastructure

- The existing pedestrian crossing at the N4 (Jct 2) Eastbound offslip is proposed to be more compact providing a shorter crossing distance for pedestrians. This has been achieved by removing the existing on road cycle lane and introducing a segregated cycle track to the north of the footpath. This has reduced the pedestrian crossing distance by approximately 1.5m.
- A new toucan crossing is also proposed on the northern arm of the junction, offset from the existing roundabout. This crossing will assist to cater for sustainable modes wishing to travel along the new pedestrian and cycle route towards Palmerstown Village.

Cyclist Infrastructure

- The existing on road cycle along the N4 eastbound offslip is proposed to be removed and a new two way segregated cycle track is proposed. This will create a safer environment for cyclists.

Bus Infrastructure

- The majority of inbound bus services are anticipated to serve the Hermitage Clinic bus stop. An existing bus lane is proposed to be marginally extended to enhance bus priority.
- A Junction Type 1 was considered at this location for the inbound bus lane. However the results of the analysis indicated that the impact of an additional stage to accommodate the Junction Type 1 would result in significant additional queuing on the N4 eastbound offslip that would extend onto the N4 mainline. Therefore, it is proposed to retain Junction Type 3 as per existing arrangement, which optimises capacity at the junction for all modes.

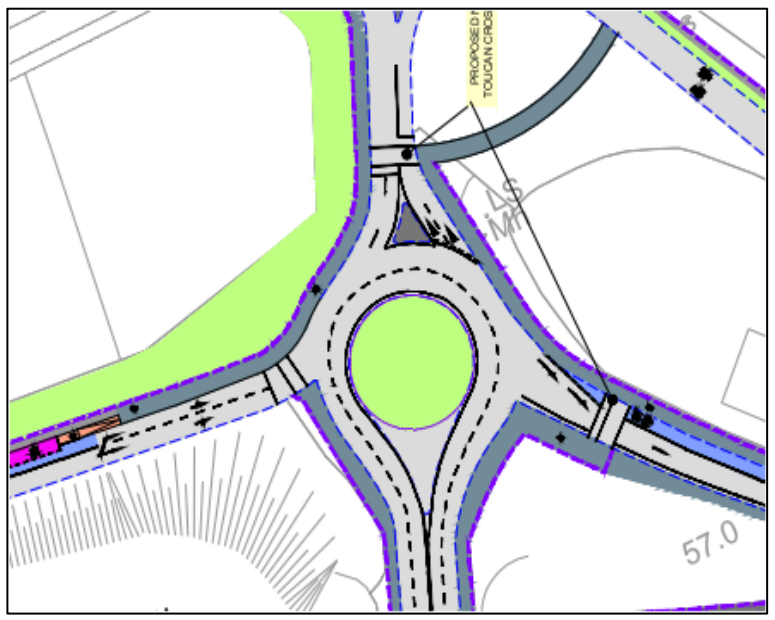
Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

Design Evolution

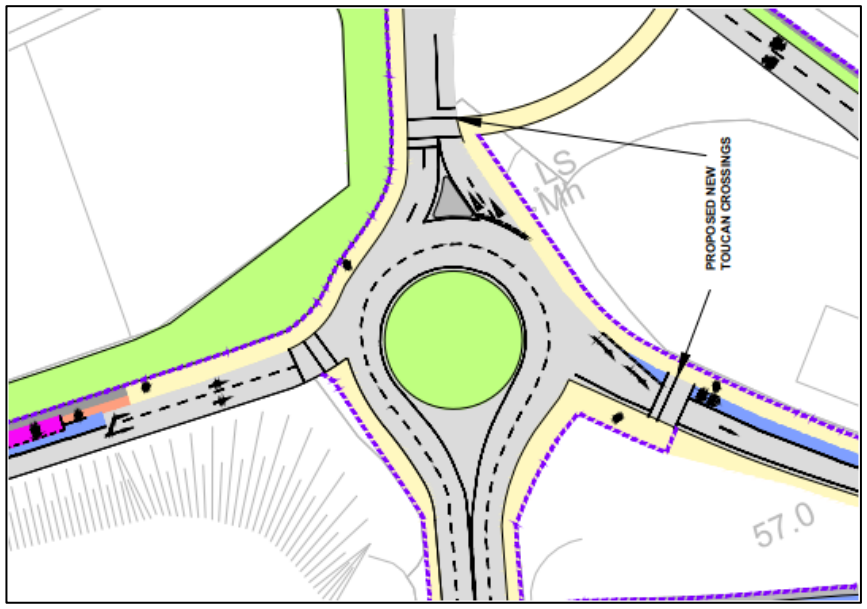
The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

Existing

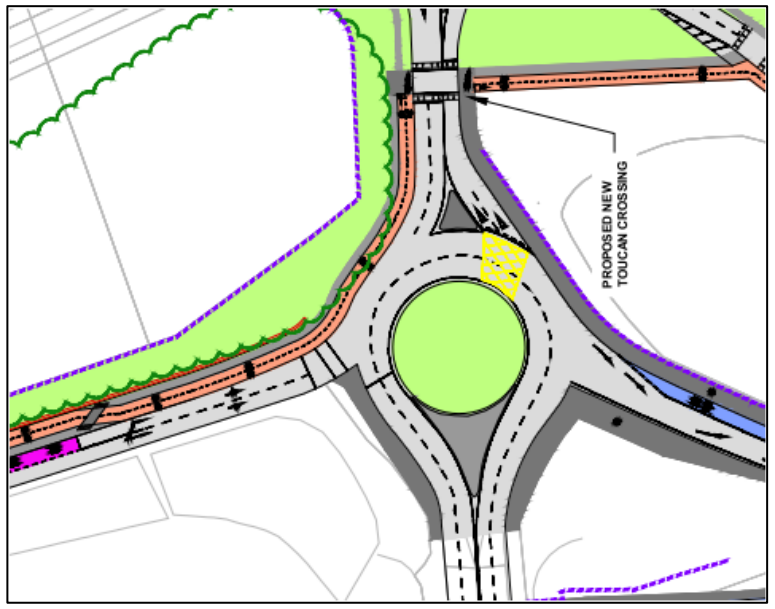
Concept Design Drawing



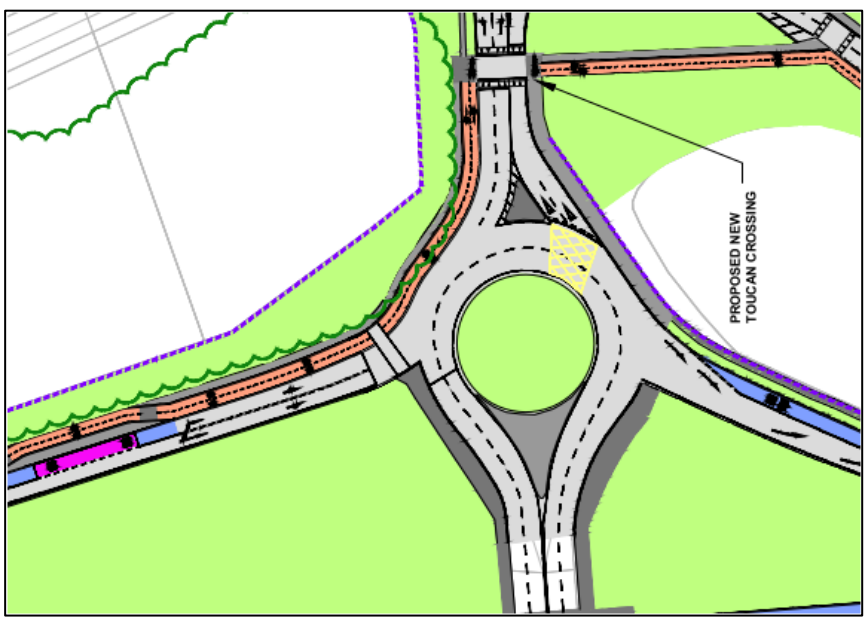
Emerging Preferred Route



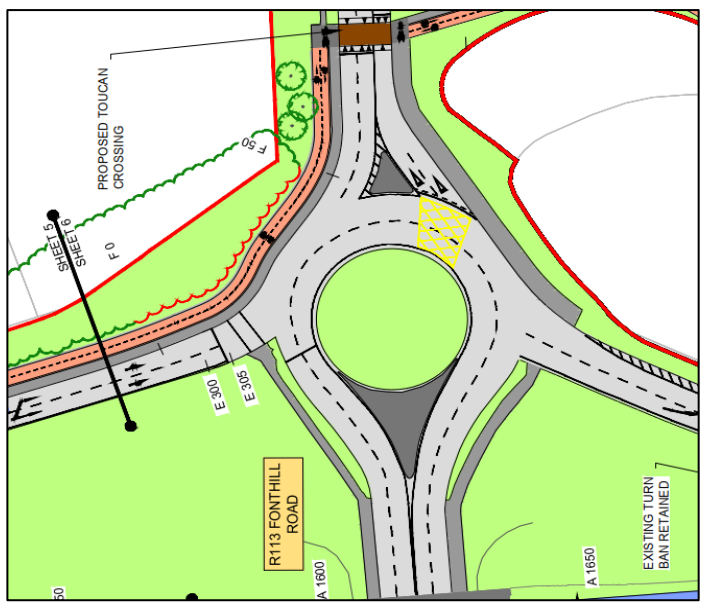
Public Consultation 2



Public Consultation 3



Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

N4 Junction 2 - AM peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = -8.5%
Junction Delay = 35.4PCUhr

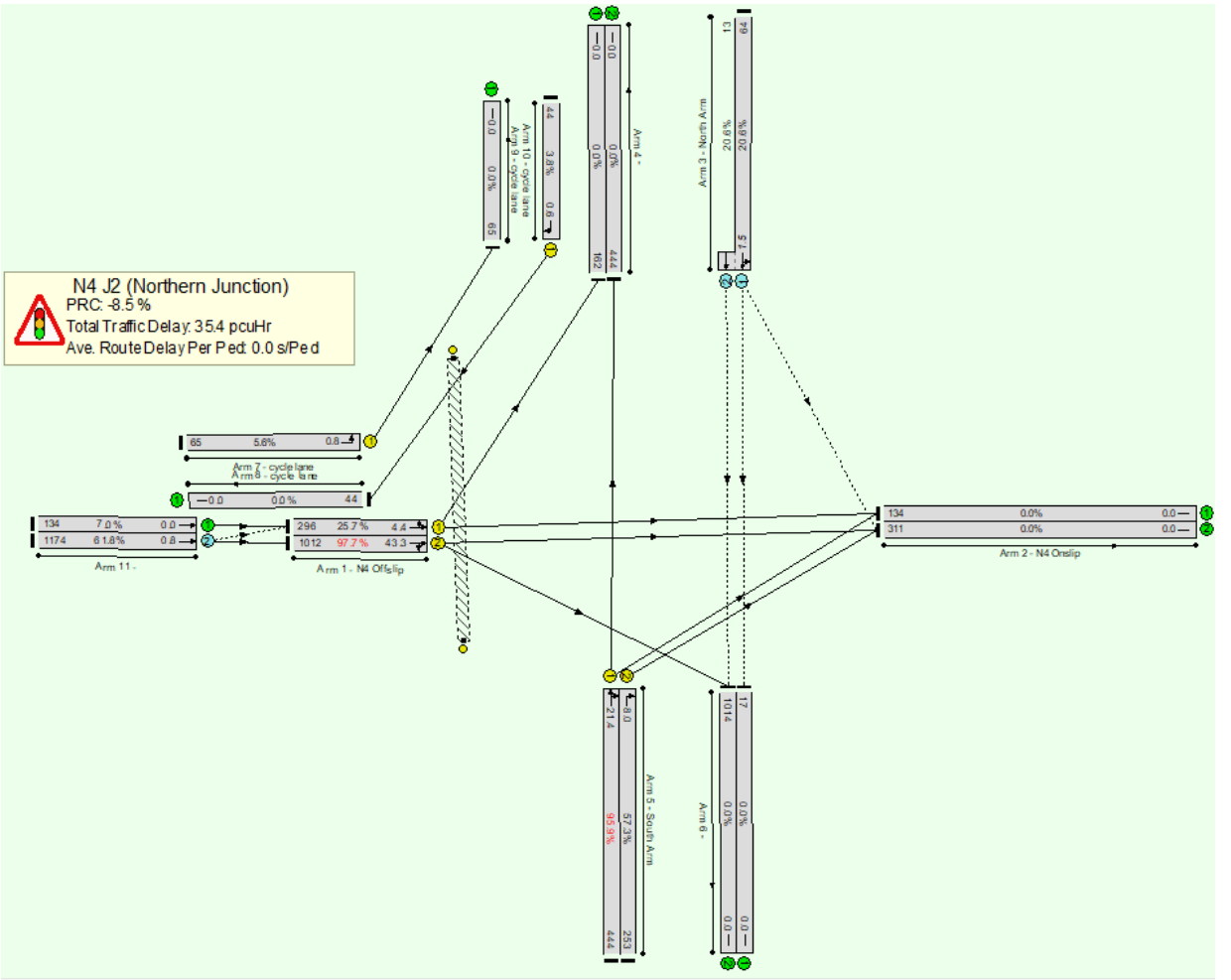
MMQ, CBC arms:
Inbound – 248.97m
Outbound –

Bus Av. Delay (s/pcu):
Inbound – 11.3sec
Outbound –

Cyclists Av. Delay (s/pcu):
Inbound –
Outbound – 9.5sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 59.6sec
Outbound –

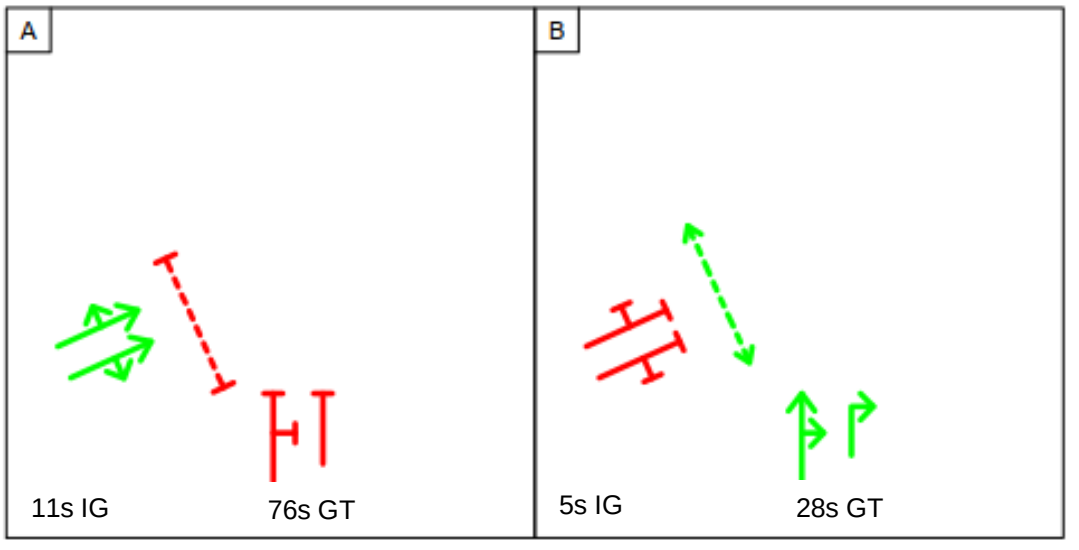
Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

5. N4J2 (Northern Junction)	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	13	1%	2,333	40%
Bus	2,700	78%	2,700	47%
Walk	184	5%	184	3%
Cycle	565	16%	585	10%
Total	**3,442**	**100%**	**5,781**	**100%**

INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

N4 Junction 2 - PM peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 26.9%,
Junction Delay = 15.54 PCUhr

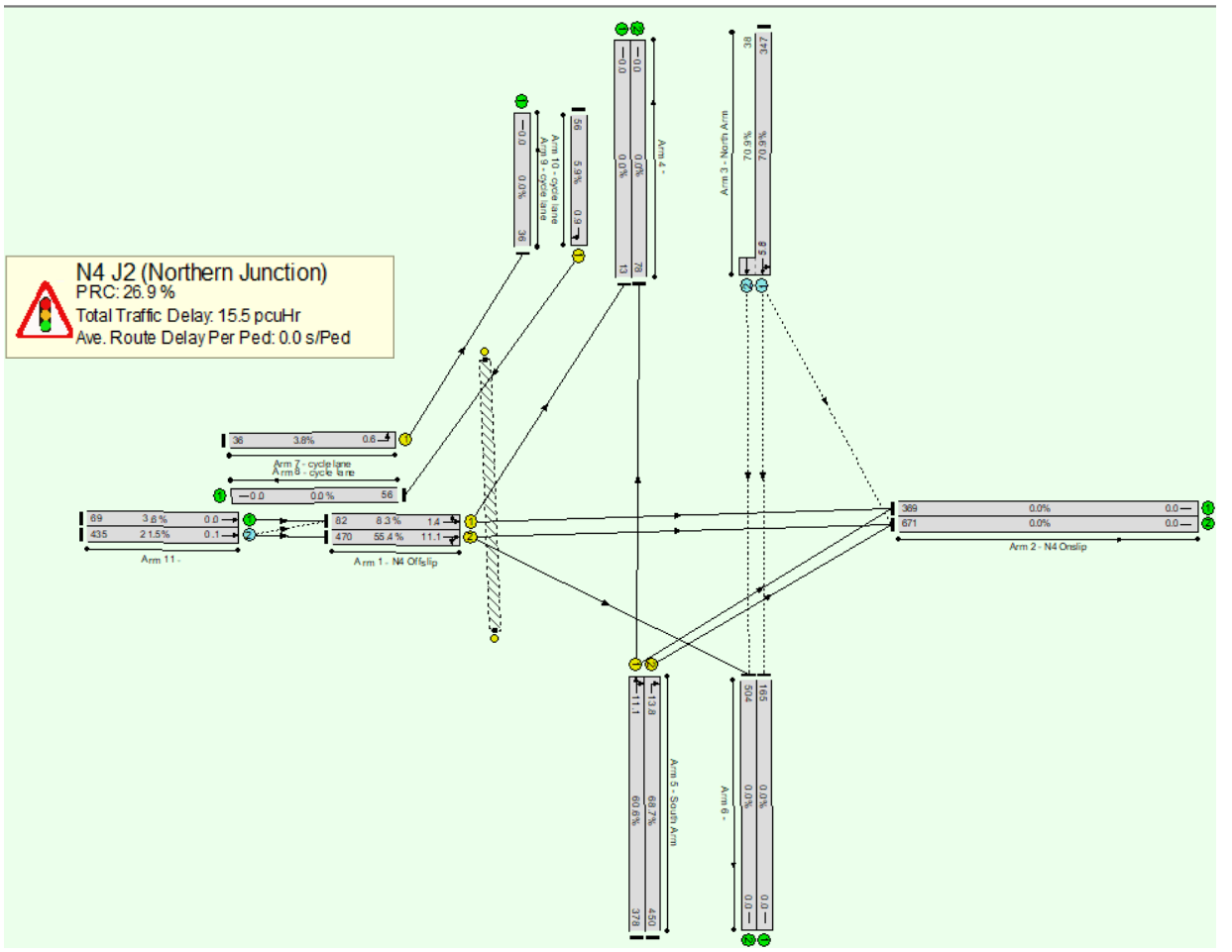
MMQ, CBC arms:
Inbound – 79.35m
Outbound –

Bus Av. Delay (s/pcu):
Inbound – 16.2sec
Outbound –

Cyclists Av. Delay (s/pcu):
Inbound –
Outbound – 16sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 23.8sec
Outbound –

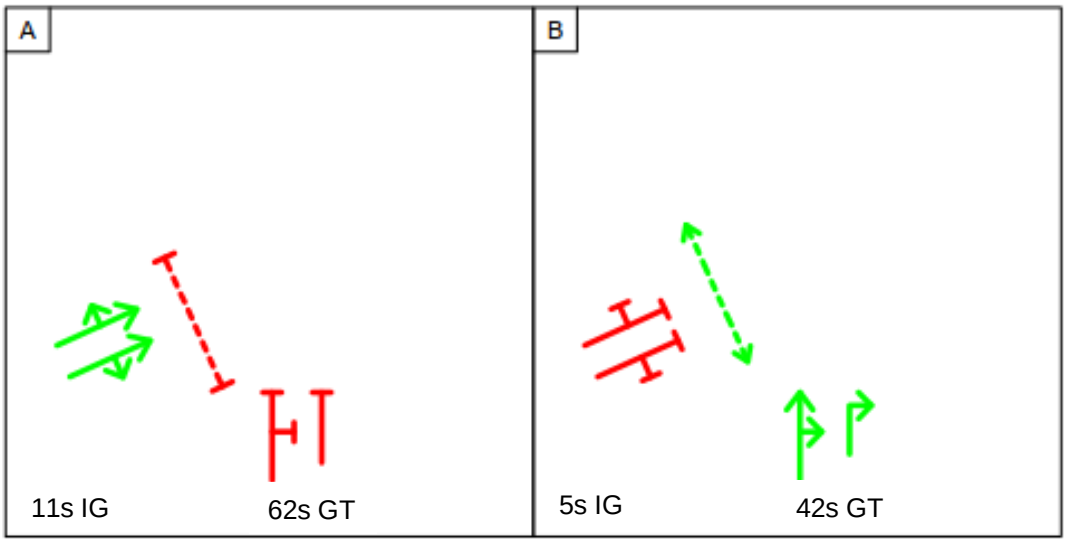
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

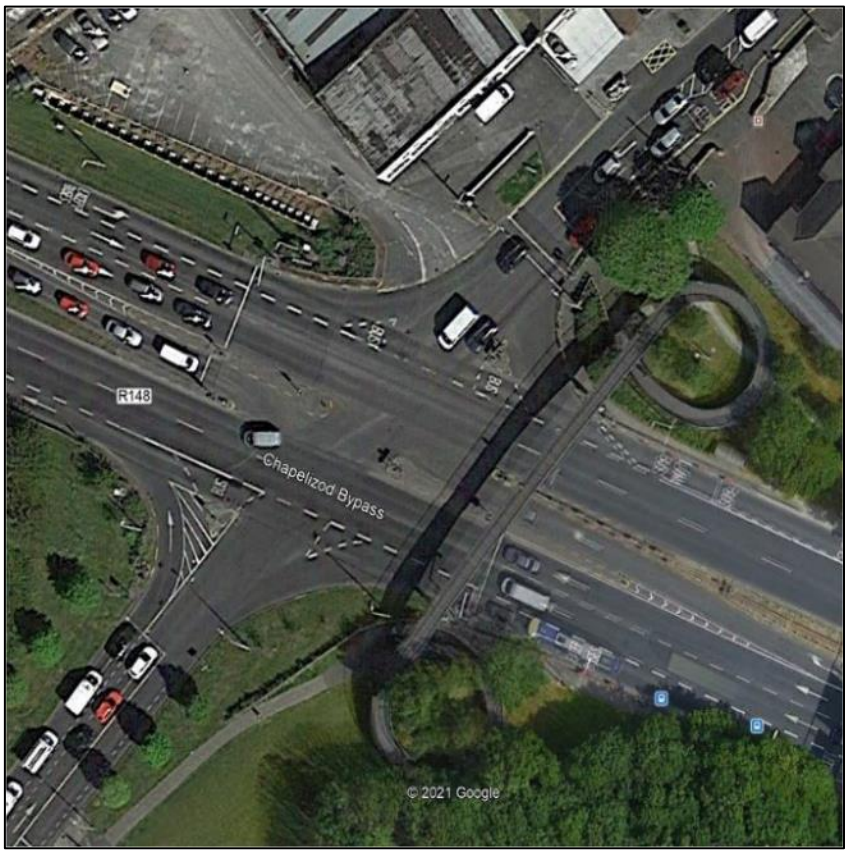
5. N4J2 (Northern Junction)	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	5	0%	2,070	52%
Bus	1,380	71%	1,380	34%
Walk	94	5%	94	2%
Cycle	460	24%	490	12%
Total	**1,938**	**100%**	**4,034**	**100%**

INDICATIVE METHOD OF CONTROL

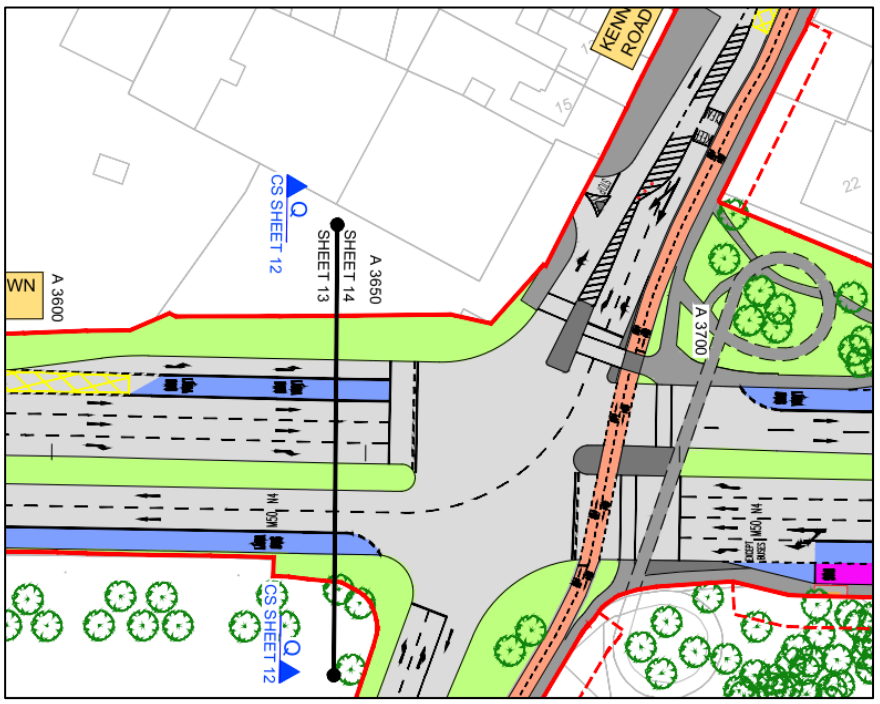


Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**R148 Palmerstown bypass/ Kennelsfort Road**		

EXISTING



FINAL DESIGN



Summary

The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure at the junction. The key design rationale was to enhance bus priority at the junction, whilst retaining and enhancing capacity for general traffic. The proposal will also introduce dedicated two way cycle crossing facility across Palmerstown Bypass to connect Kennelsfort Road Lower with Kennelsfort Road Upper.

Pedestrian Infrastructure

- On the eastern arm of the junction, currently a pedestrian bridge is available to cross Palmerstown Bypass.
- It is proposed to provide a new controlled pedestrian staggered crossing, to cater for pedestrians crossing Palmerstown Bypass. This will provide a more convenient and direct crossing facility particular vulnerable road users. A direct single stage crossing was examined at this location, but this was not achievable as the crossing length would be greater than the desired maximum crossing distance of 19m.
- A direct crossing with a 4m central refuge island was also examined, however this was not feasible at this location due to carriageway width constraints. Any widening of the carriageway would have required removing the existing pedestrian overbridge, whilst also causing carriageway realignment issues.
- On Kennelsfort Road Lower, is it proposed to introduce a staggered pedestrian crossing to enhance pedestrian permeability at the junction. The staggered pedestrian crossing is as per the recently permitted Palmerstown SHD. A direct single stage crossing was considered at this location, but this would have result in a significant intergreen (approx. 17s) and would have had a material impact on junction and people movement capacity. A straight crossing with a 4m island was also considered at this location, but is unachievable due to carriageway and alignment constraints.
- On Kennelsfort Road Upper a new direct toucan crossing is proposed, which will be offset from Palmerstown Bypass by approximately 40m.

Cyclists Infrastructure

- Cyclists travelling from Lucan towards the City Centre will be via the offline route which passes through Palmerstown Village. Cyclists travelling inbound and outbound and therefore not designed to travel along Chapelizod Bypass or through this junction.
- Cyclists will however be able to utilise the proposed two way cycle track located Kennelsfort Road Lower and Kennelsfort Road Upper. The design will connect Palmerstown Village to the north, with the large residential areas of Palmerstown to the south. The two way cycle track is proposed on the eastern side of Kennelsfort Road Lower and Kennelsfort Road Upper. A dedicated cyclist crossing will ensure the safe passage of cyclists through the junction.

Bus Priority Infrastructure

- Inbound, the design proposes Junction Type 2, with a left turning lane inside of the bus lane. This will provide additional capacity into the junction to cater for the projected high volume of left turning vehicles, whilst minimising any delay to bus priority.
- The outbound design proposes a Junction Type 3 where the bus lane is curtailed approximately 20m prior to the stop line to facilitate left turning traffic.
- A Junction Type 1 design has been tested in LinSig on both inbound and outbound directions. This would require an extra stage in the staging sequence, and the junction analysis results indicated the capacity of the junction would be materially compromised and with queuing exacerbated at the junction and impacting the M50 and N4; and
- It is also recognised that the Palmerstown Bypass is the key radial route in to the city centre from the M50 and there is a need to balance the competing demands of general traffic and bus priority at this location, particularly with the potential to impact on M50 traffic.

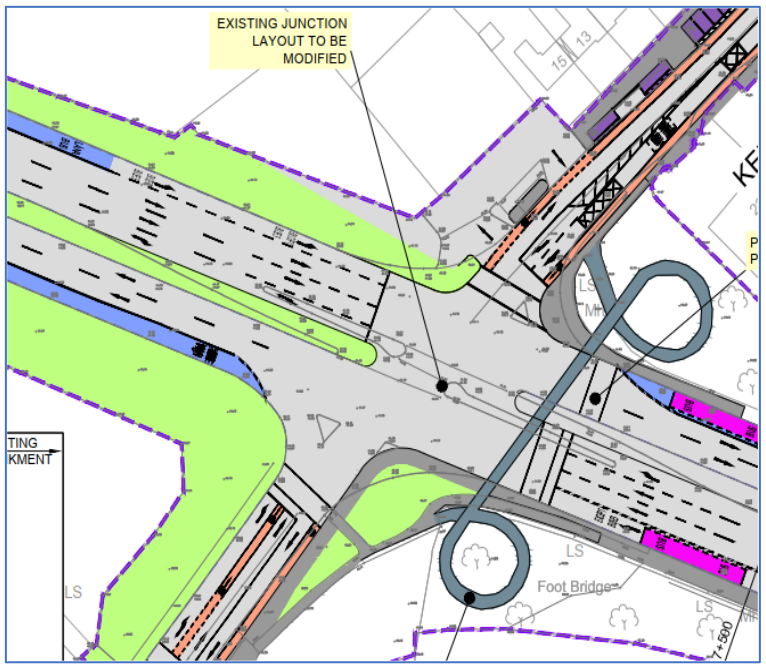
Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

Design Evolution

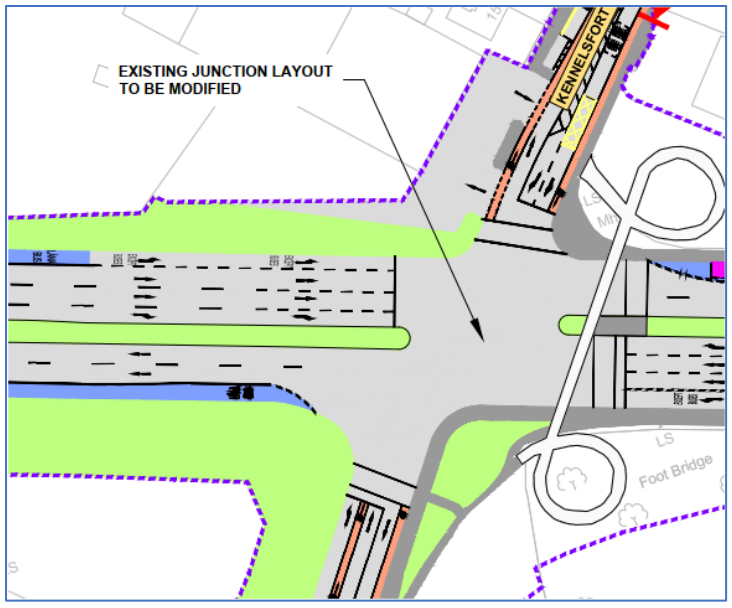
The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

Existing

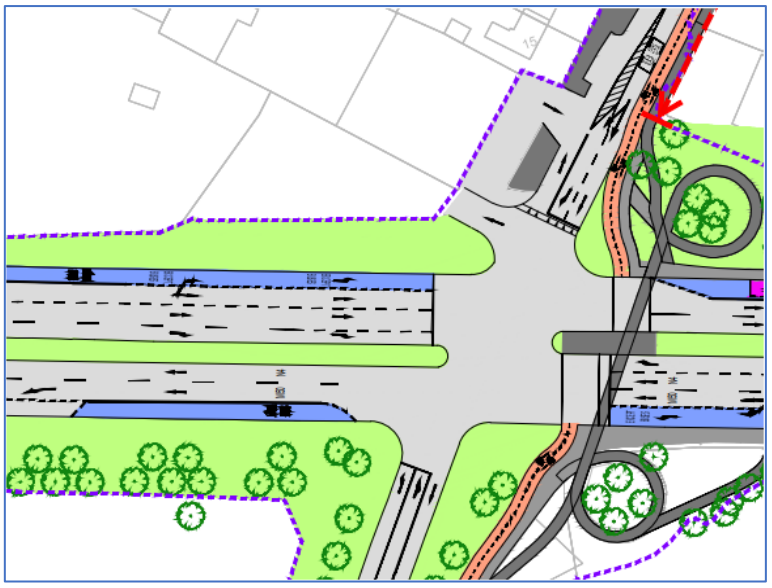
Concept Design Drawing



Emerging Preferred Route

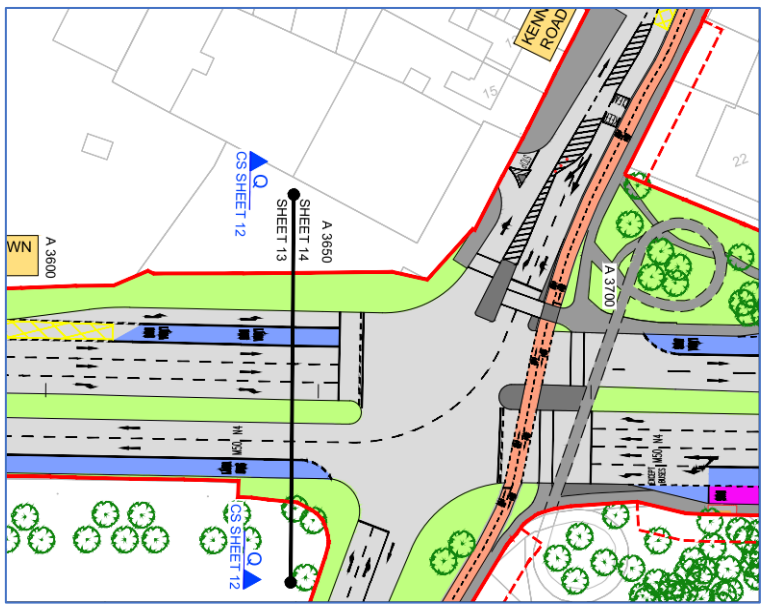


Public Consultation 2



Public Consultation 3

Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 Palmerstown bypass/
Kennelsfort Road – AM peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = -0.2%,
Junction Delay = 53.0 PCUhr

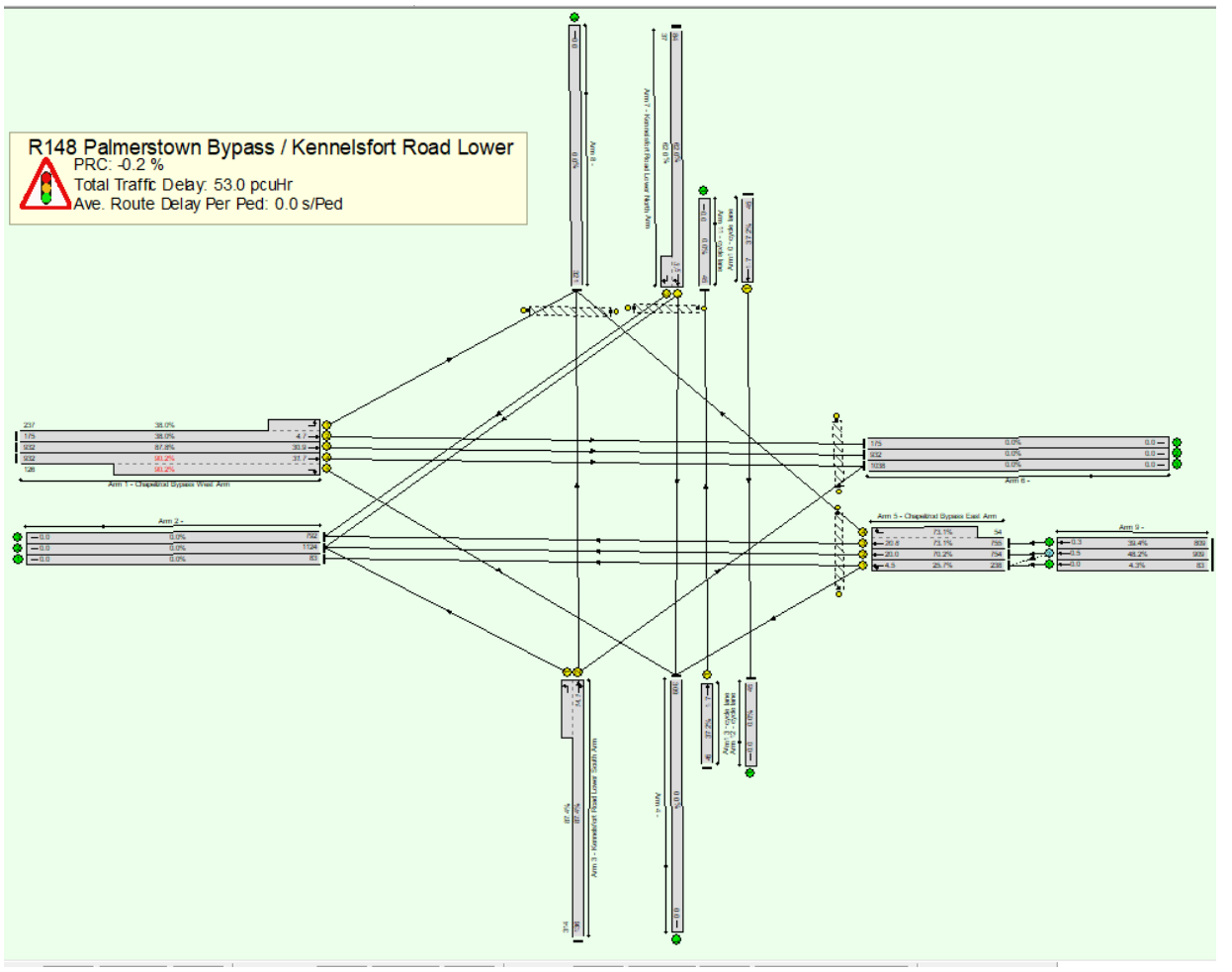
MMQ, CBC arms:
Inbound – 182.27m
Outbound – 119.6m

Bus Av. Delay (s/pcu):
Inbound – 18.3sec
Outbound – 18.8sec

Cyclists Av. Delay (s/pcu):
Northern Arm – 77.1sec
Southern Arm – 77.1sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 43.5sec
Outbound – 29.9sec

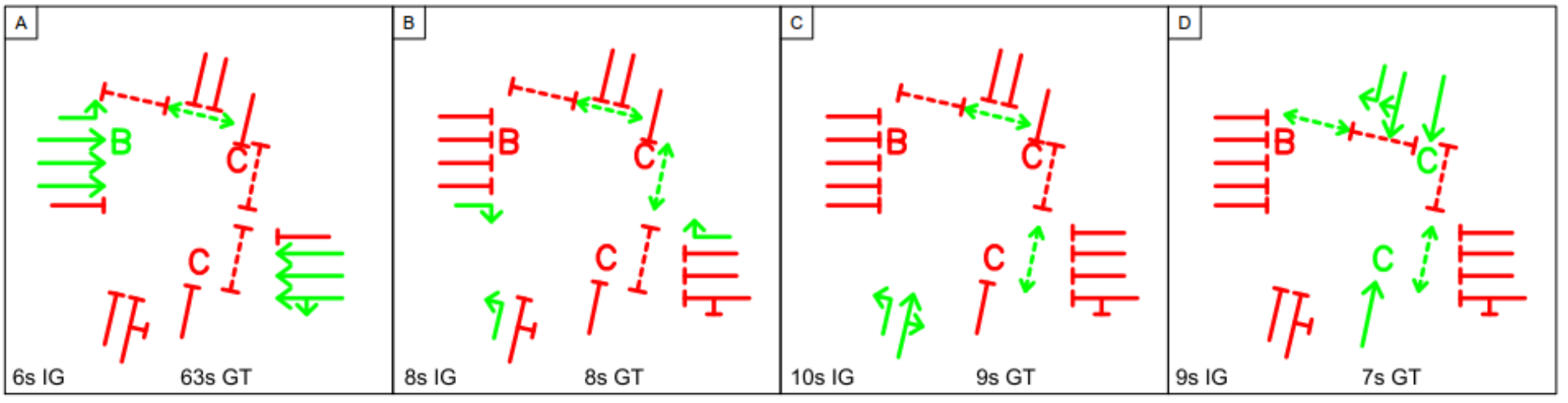
Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

6.Kennelsfort Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	4,048	43%	5,419	48%
Bus	5,160	55%	5,160	45%
Walk	234	2%	234	2%
Cycle	0	0%	580	5%
Total	**9,442**	**100%**	**11,263**	**100%**

INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 Palmerstown bypass/
Kennelsfort Road – PM peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = -1.2%,
Junction Delay = 46.4 PCUhr

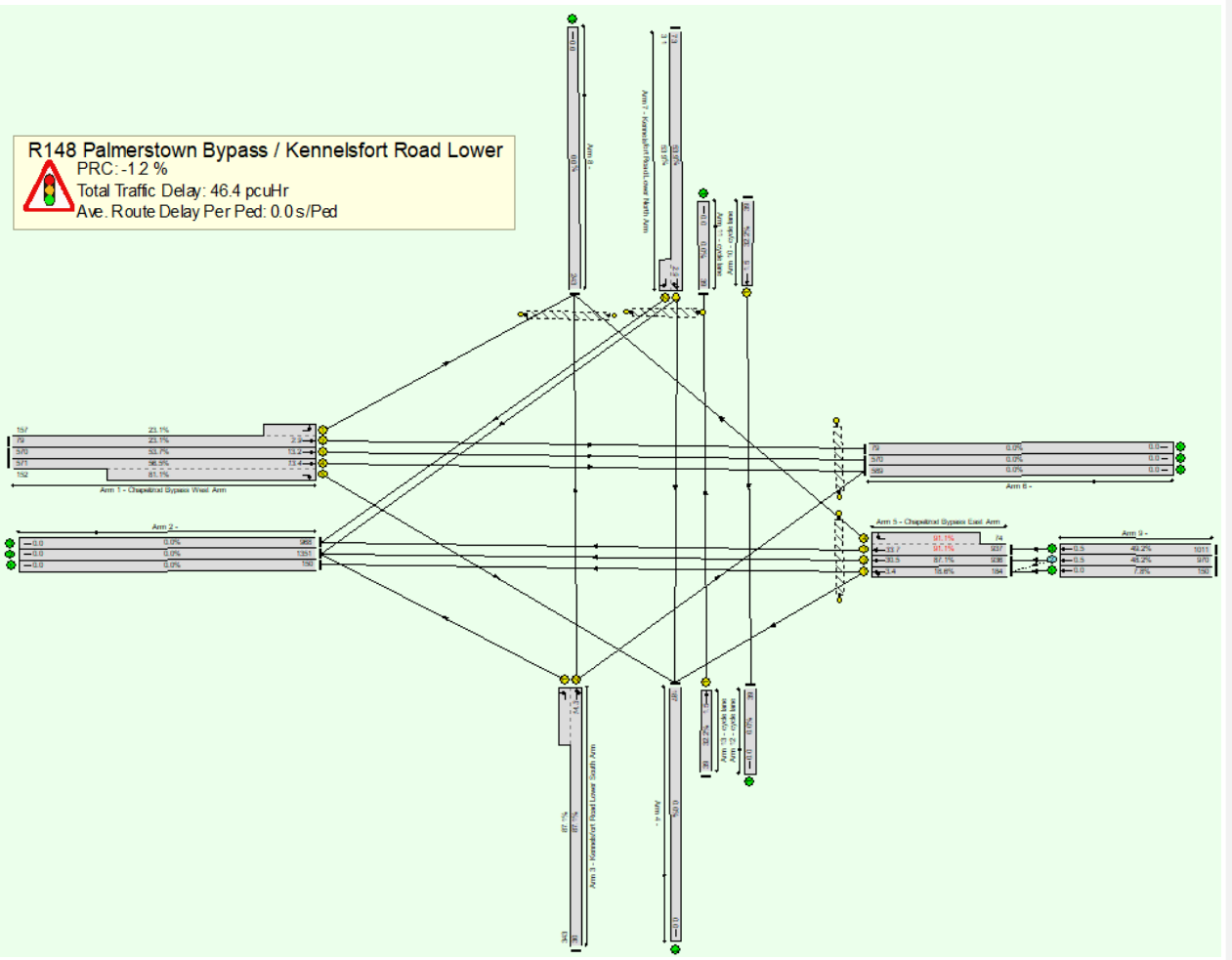
MMQ, CBC arms:
Inbound – 77.05m
Outbound – 193.77m

Bus Av. Delay (s/pcu):
Inbound – 17.1sec
Outbound – 17.8sec

Cyclists Av. Delay (s/pcu):
Northern Arm – 75.3sec
Southern Arm – 75.3sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 30.1sec
Outbound – 44.1sec

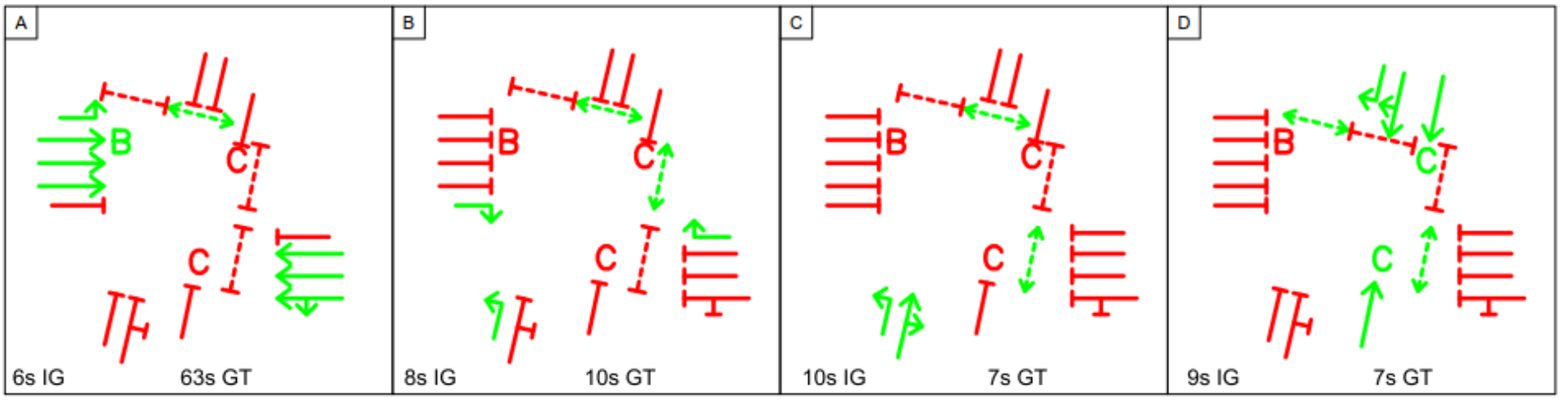
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

6.Kennelsfort Junction	CBC		All Arms	
Mode	People Movement	Mode Share	People Movement	Mode Share
Car	3,617	43%	4,691	48%
Bus	4,560	55%	4,560	47%
Walk	148	2%	148	1%
Cycle	0	0%	390	4%
Total	**8,324**	**100%**	**9,788**	**100%**

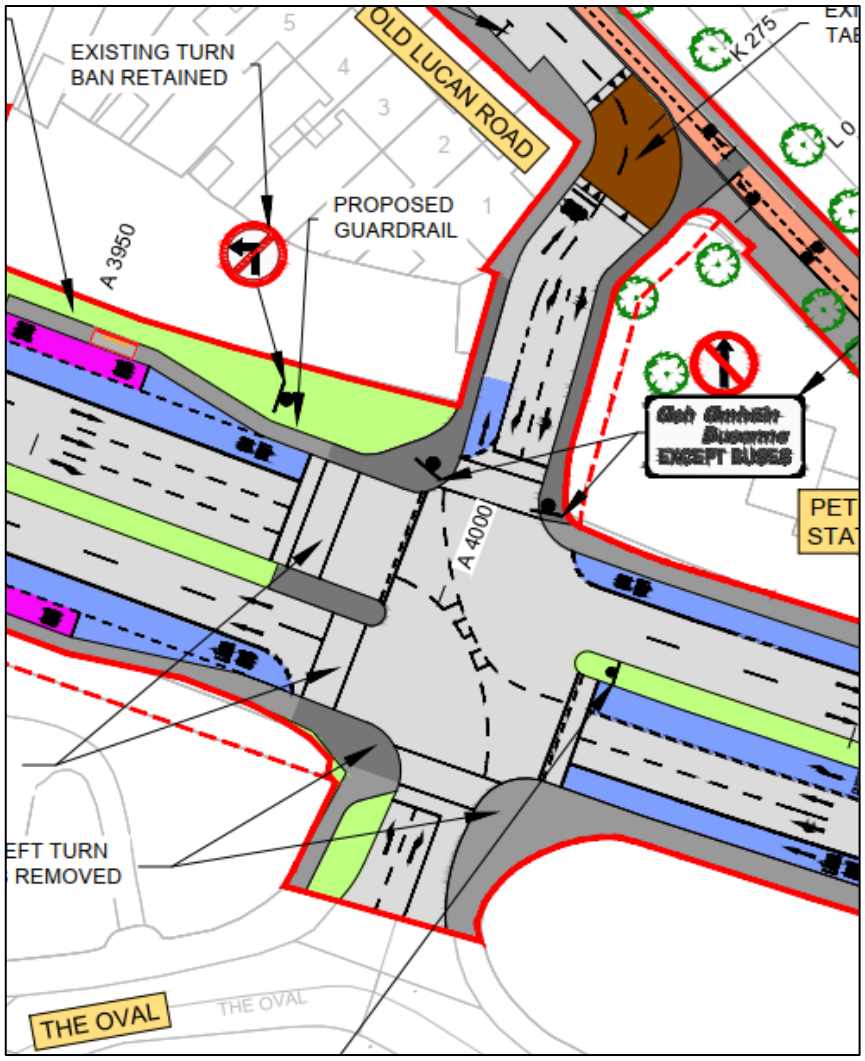
INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**R148 Palmerstown bypass/ The Oval**		

EXISTING

FINAL DESIGN



Summary

The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to provide protected cycle infrastructure and crossing facilities, whilst improving bus priority.

Pedestrian Infrastructure

- The existing pedestrian crossing is located on the eastern arm of the junction. In the Concept Design, Emerging Preferred Route and PC3 drawings it was proposed to retain this pedestrian crossing at its existing location. The current proposal is to relocate the existing crossing to the western side of the junction. The crossing will be upgraded to a toucan crossing. The new location will enhance accessibility to the proposed bus stop locations, which are proposed on the western side of the crossing.
- A direct single stage crossing was considered across Palmerstown Bypass however the crossing distance would be greater than 19m and therefore not appropriate for this location. A straight crossing with a 4m central island was considered however this is not proposed due to the impact on carriageway alignment.
- It is proposed to introduce direct single stage toucan crossings on both Lucan Old Road and The Oval arms of the junctions. The crossing distances at these proposed crossing points have been minimised by designing a compact junction. The compact junction at the Oval has been achieved by omitted the existing left turn slip from Palmerstown Bypass outbound into the Oval.

Cyclists Infrastructure

- No existing cycle facilities are located at this junction;
- The Proposed Scheme objective is for cyclists to utilise the offline two way cycle track along Palmerstown Village, which provide access from Lucan to the City Centre and vice versa.
- At the Oval Junction, a toucan crossing is proposed to facilitate access towards the two way cycle track.
- Alternatively cyclists can avail of the proposed cycle facilities at the Kennelsfort Junction which include a two-way cycle track.

Bus Priority Infrastructure

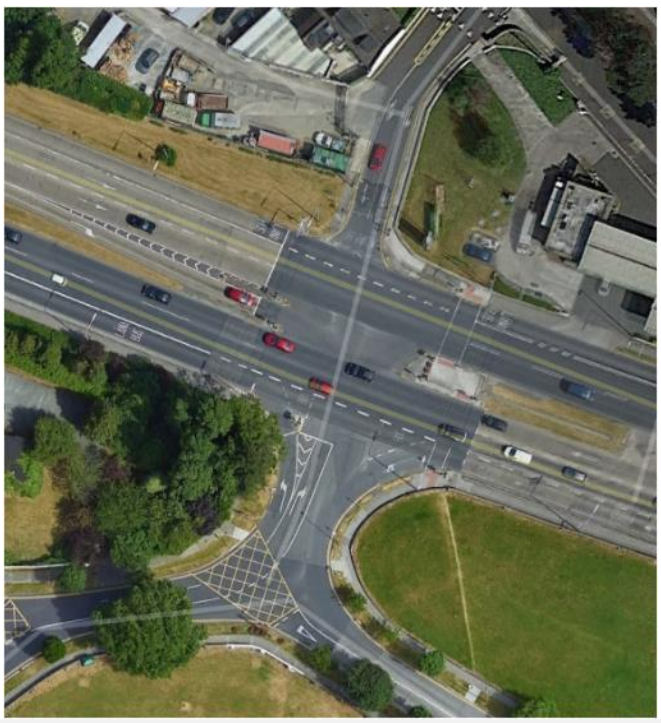
- Junction Type 1 is proposed on the CBC arms where both bus lanes are dedicated lanes up to the junction stop line;
- For the inbound direction general traffic is not permitted to turn left onto Old Lucan Road as per the existing arrangement, which assists in facilitating a Junction Type 1 inbound; and
- For outbound direction, a Junction Type 1 is proposed to enhance bus priority up to the junction stop line. General traffic turning left into the Oval will be required to turn left from Lane 2.

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

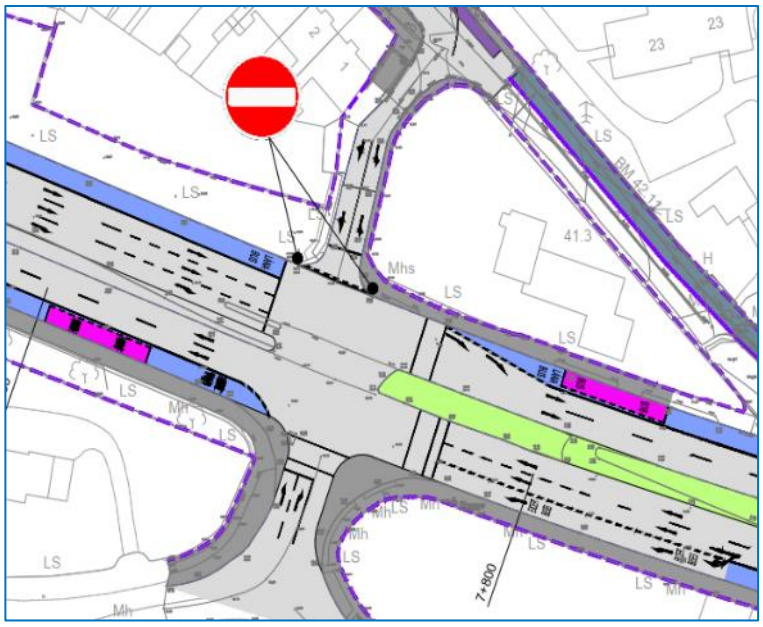
Design Evolution

The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

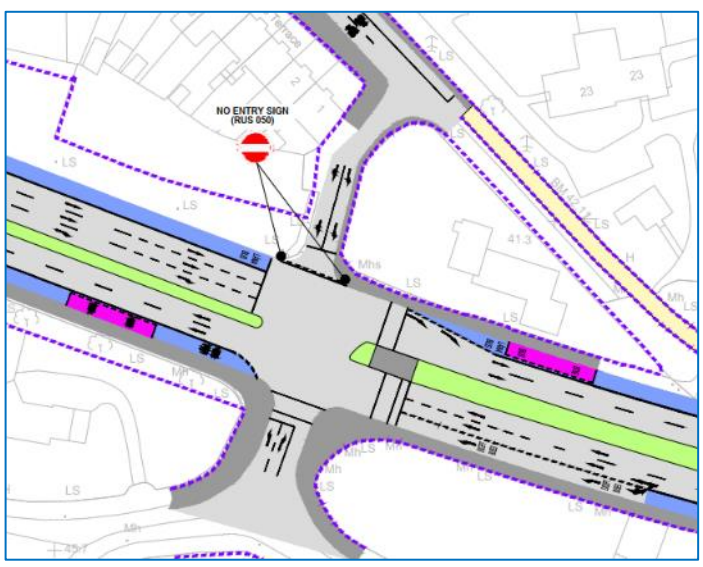
Existing



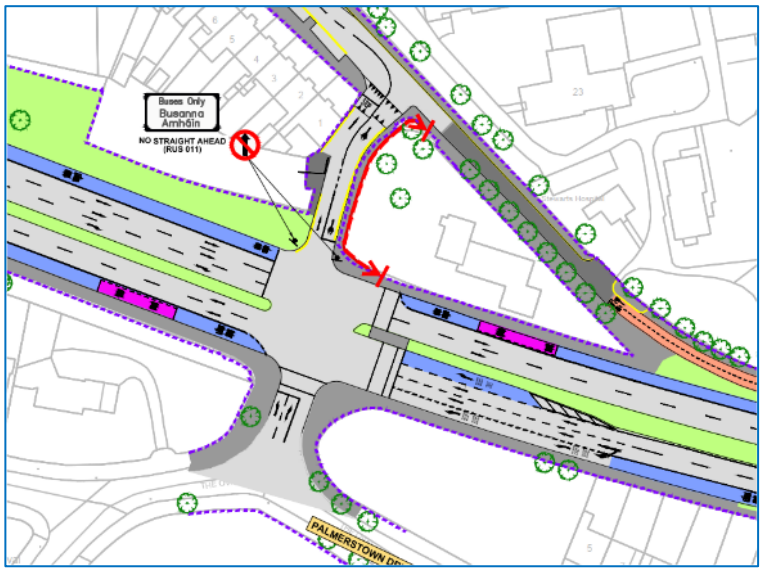
Concept Design Drawing



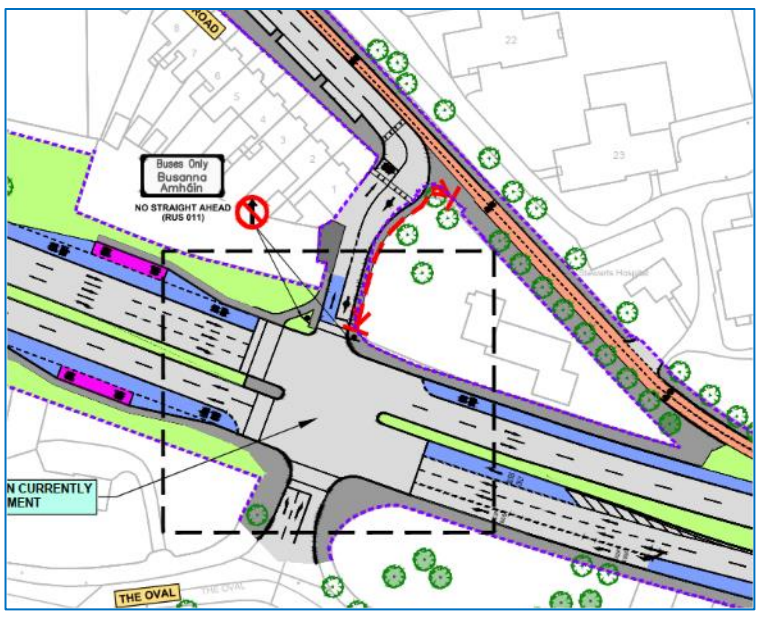
Emerging Preferred Route



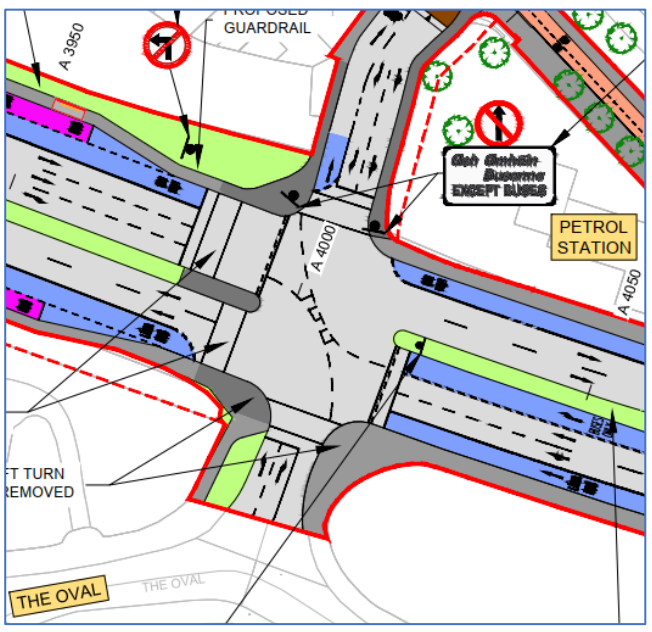
Public Consultation 2



Public Consultation 3



Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 Palmerstown bypass/
The Oval – AM Peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 7.4%,
Junction Delay = 28.10 PCUhr

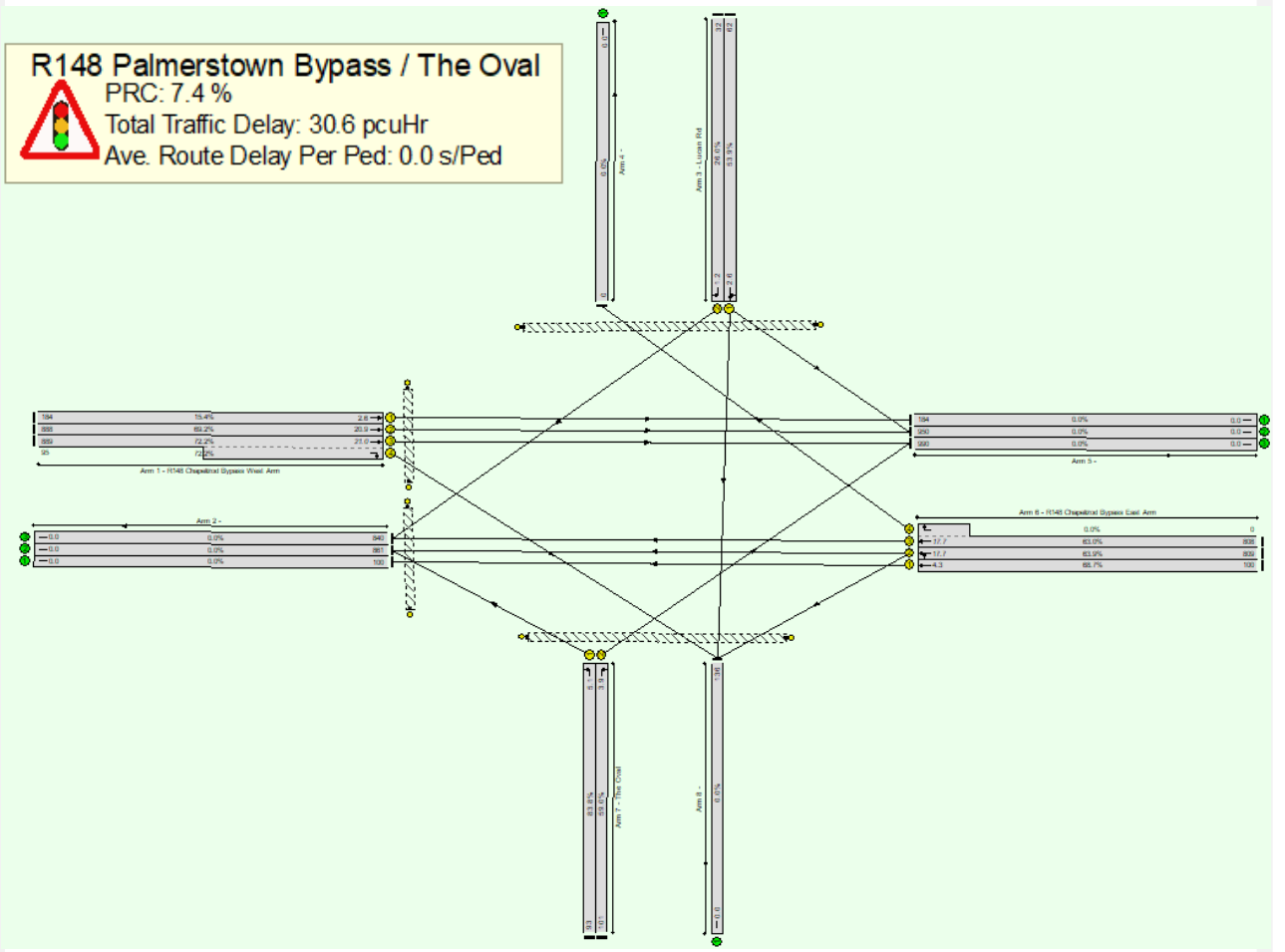
MMQ, CBC arms:
Inbound – 106.95m
Outbound – 104.65m

Bus Av. Delay (s/pcu):
Inbound – 9.4sec
Outbound – 61.6sec

Cyclists Av. Delay (s/pcu):
Inbound –
Outbound –

Car Av. Delay (s/pcu), CBC arms:
Inbound – 20.3sec
Outbound – 19.3sec

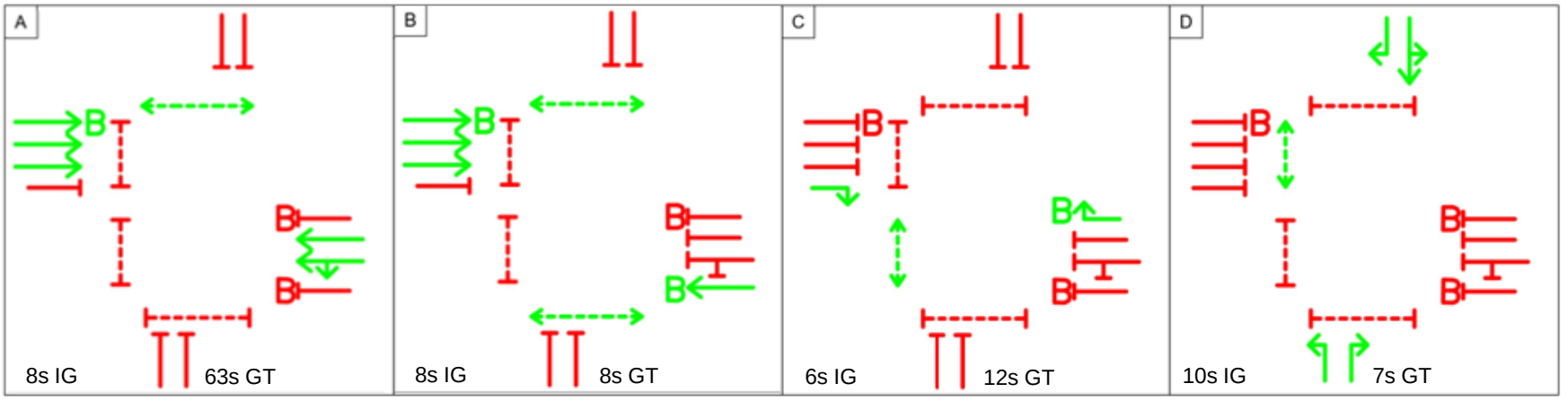
Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

7.The Oval Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	4,024	39%	4,532	41%
Bus	5,700	55%	5,700	51%
Walk	676	6%	676	6%
Cycle	0	0%	118	1%
Total	**10,399**	**100%**	**10,908**	**100%**

INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 Palmerstown bypass/
The Oval – PM Peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = -35.9%,
Junction Delay = 48.41 PCUhr

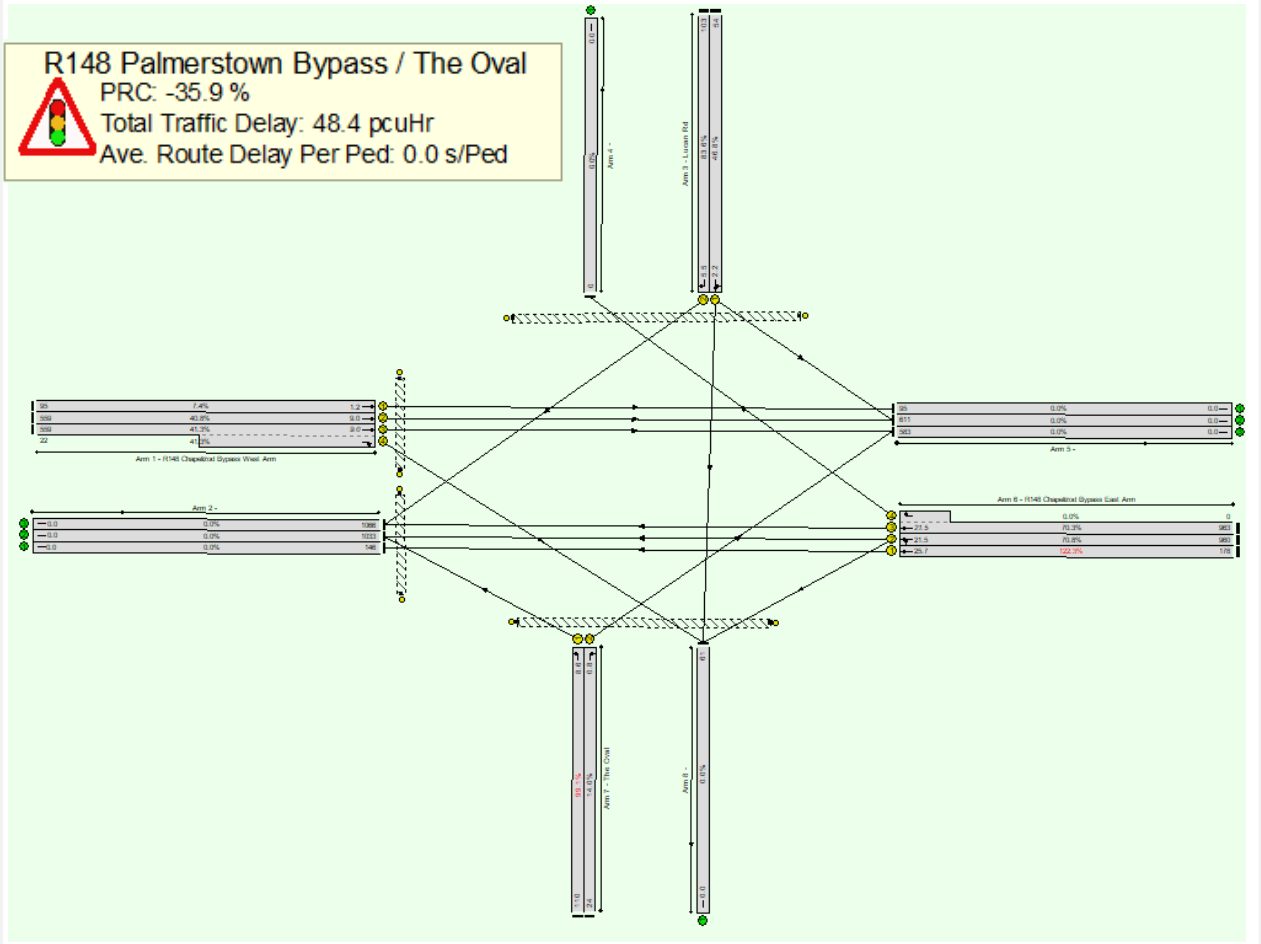
MMQ, CBC arms:
Inbound –51.75m
Outbound – 147.77m

Bus Av. Delay (s/pcu):
Inbound – 8.9sec
Outbound – 460.2sec

Cyclists Av. Delay (s/pcu):
Inbound –
Outbound –

Car Av. Delay (s/pcu), CBC arms:
Inbound – 13.4sec
Outbound – 17.6sec

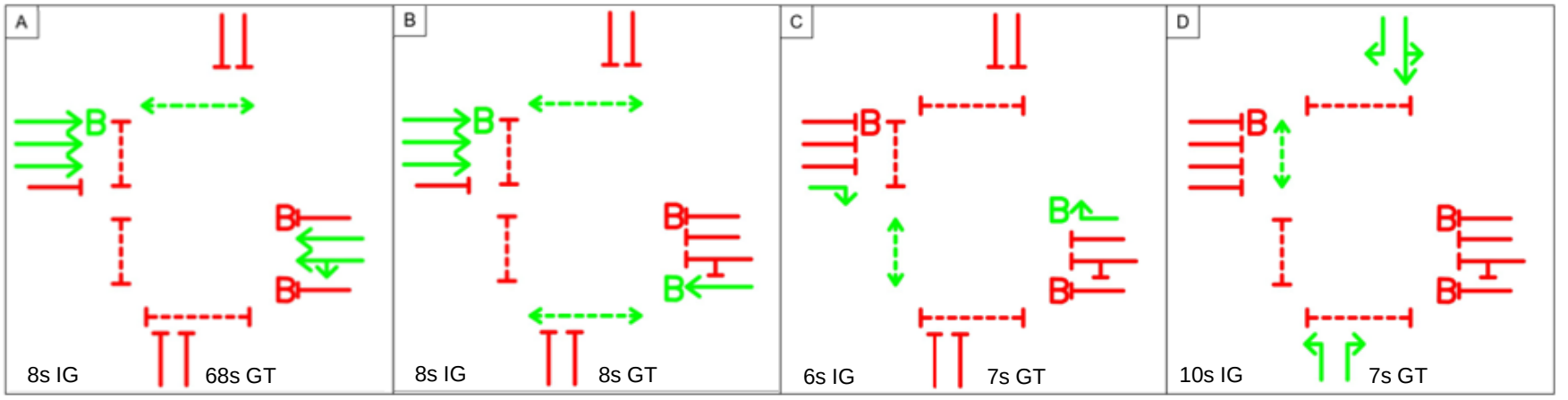
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

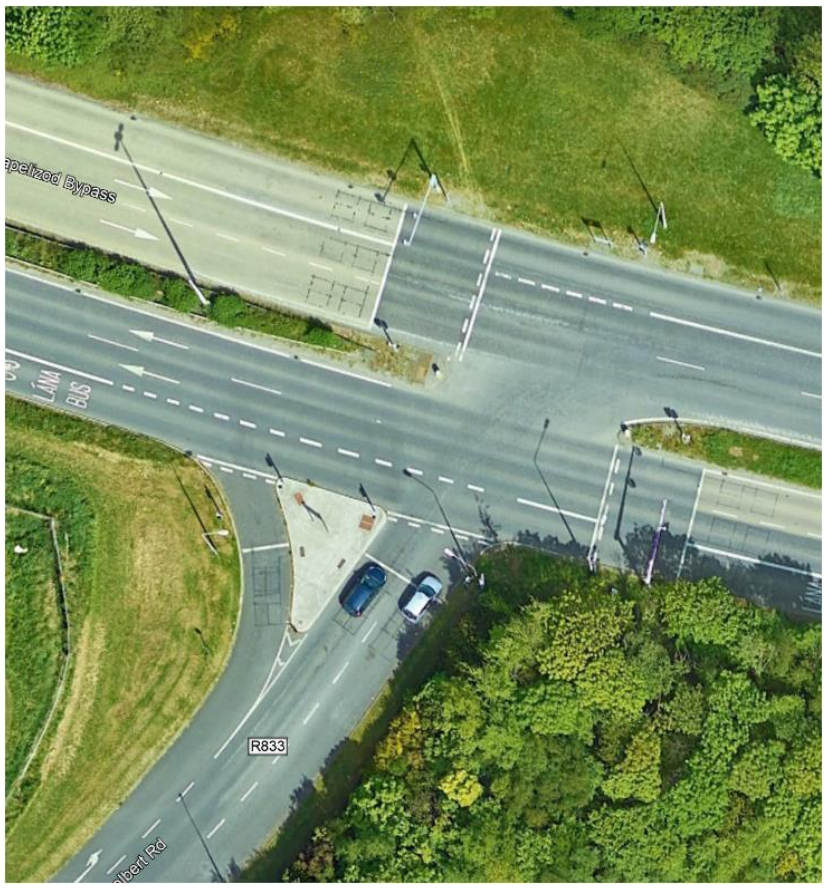
7.The Oval Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	3,605	39%	4,025	41%
Bus	5,460	58%	5,460	55%
Walk	252	3%	252	3%
Cycle	0	0%	107	1%
Total	**9,317**	**100%**	**9,737**	**100%**

INDICATIVE METHOD OF CONTROL

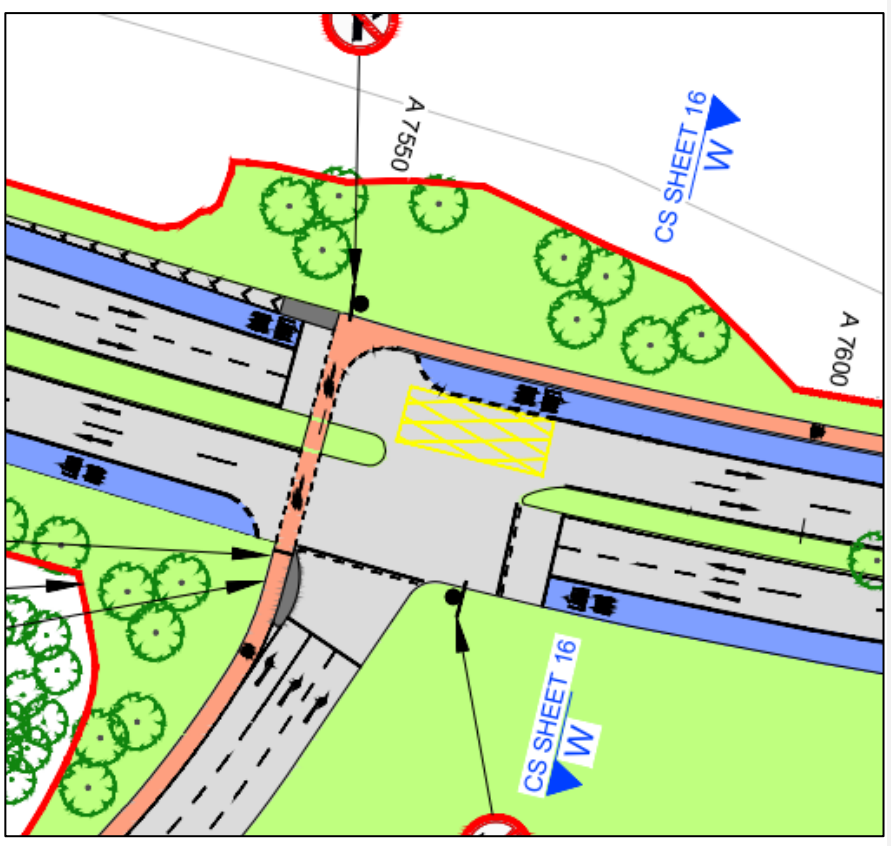


Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**R148 Chapelizod bypass/ R148 Con Colbert/ R833 Con Colbert Road**		

EXISTING



FINAL DESIGN



Summary

The existing three arm signalised junction is to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance cyclist and bus priority infrastructure. The key design rationale was to provide protected cycle infrastructure and crossing facilities, whilst improving bus priority.

Pedestrian Infrastructure

- No existing pedestrian infrastructure is located at this junction as this is not located on a pedestrian desire line. No existing footpath along Palmerstown Bypass.
- The proposal does not include for pedestrian infrastructure at this junction.

Cyclists Infrastructure

- No existing cycle infrastructure is located at this junction.
- It is proposed to introduce a new inbound cycle track and cycling crossing from Con Colbert Road onto Chapelizod Bypass. The cyclist crossing will connect onto a new inbound cycle track towards Dublin City Centre. The outbound cycle track does not pass through this junction, and is proposed on the Con Colbert Road offsip junction.
- The cyclist crossing has been incorporated by omitting the existing left turn slip from Con Colbert Road onto Chapelizod Bypass (outbound).

Bus Priority Infrastructure

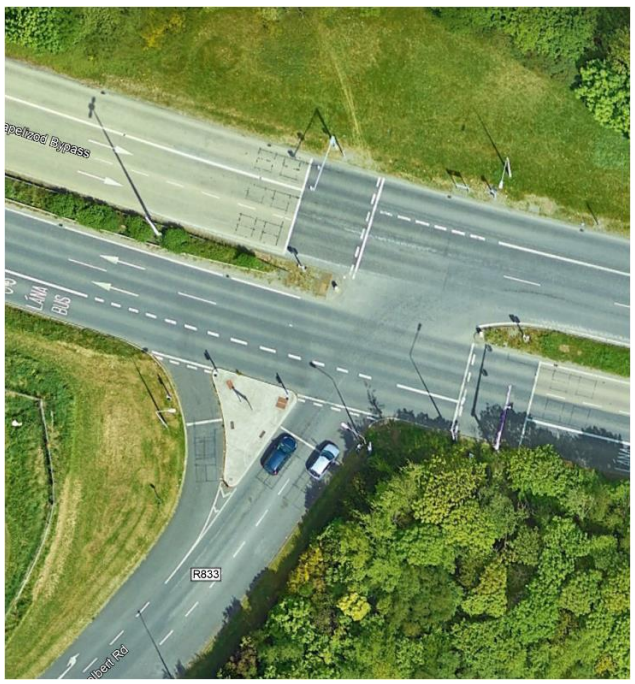
- Similar to the existing arrangement, bus priority is proposed in both the inbound and outbound directions along Chapelizod Bypass, with the bus lane proposed up to the junction in both instances as per Junction Type 1.

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

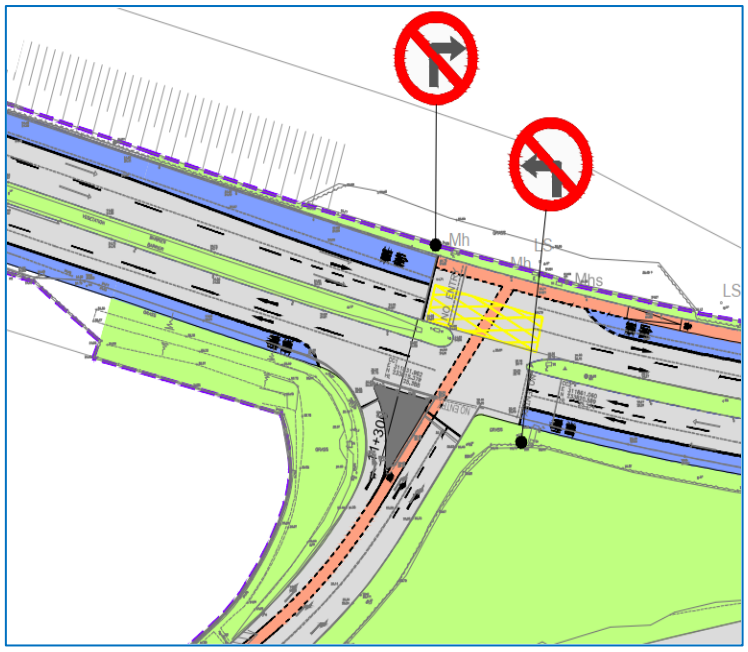
Design Evolution

The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

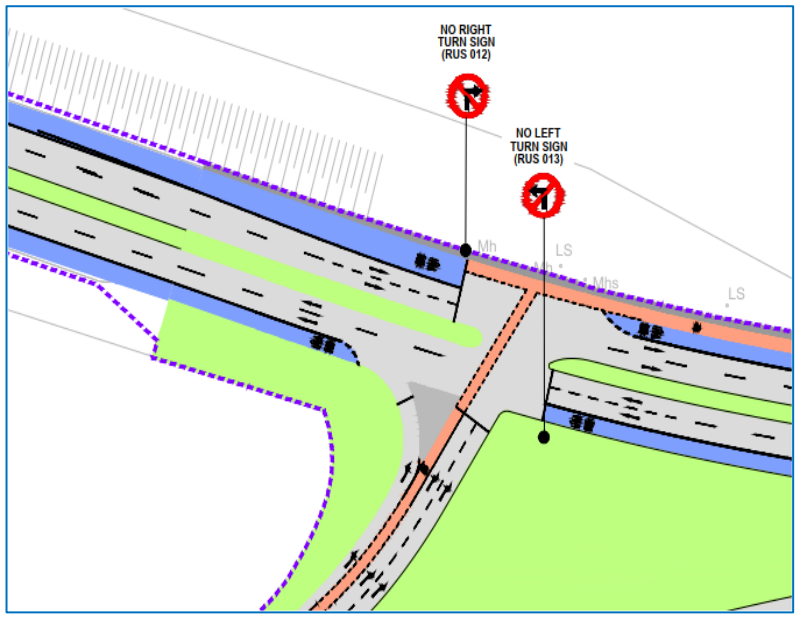
Existing



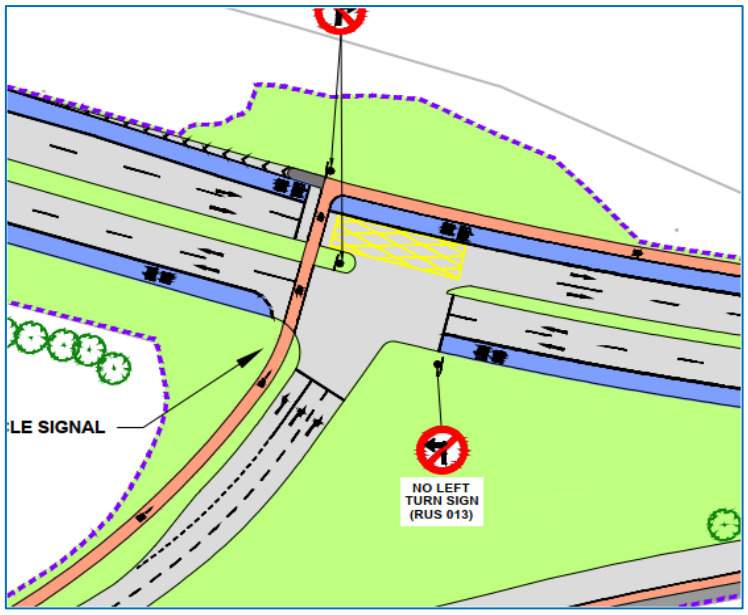
Concept Design Drawing



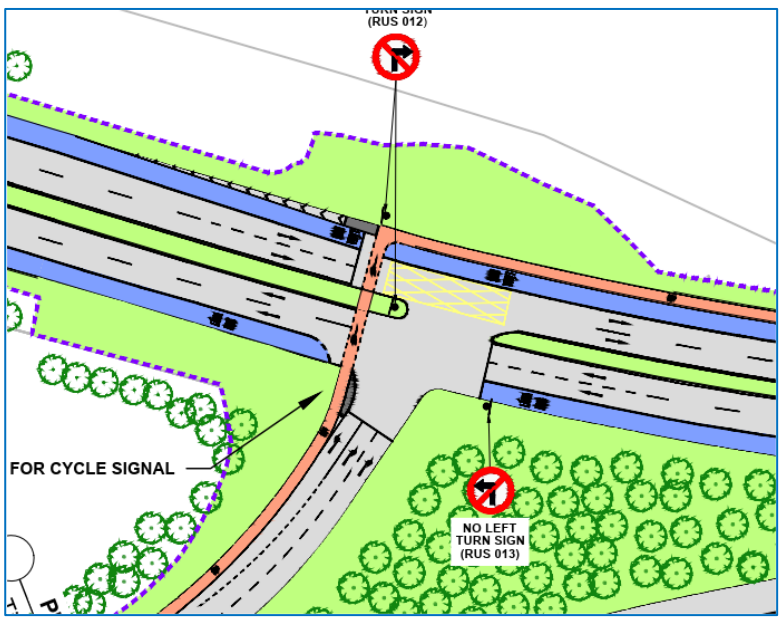
Emerging Preferred Route



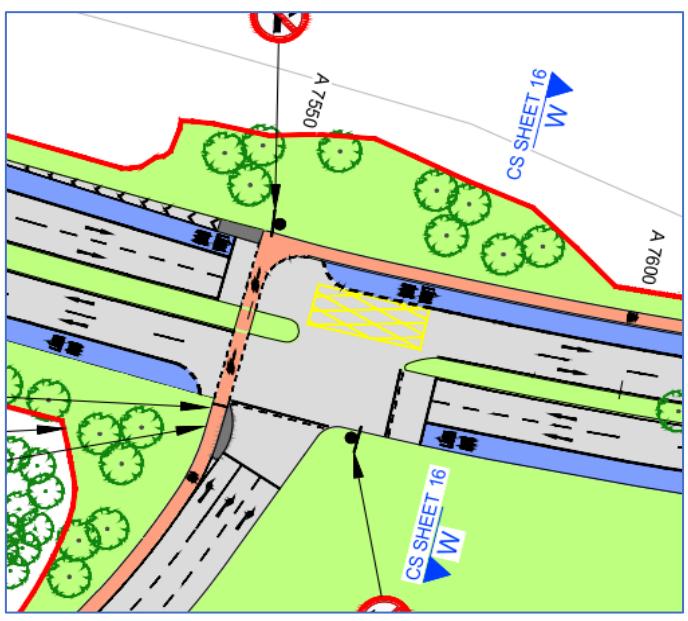
Public Consultation 2



Public Consultation 3



Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 Chapelizod bypass/ R148 Con Colbert/ R833 Con Colbert Road – AM Peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 90 secs
PRC = 80.3%,
Junction Delay = 9.5 PCUhr

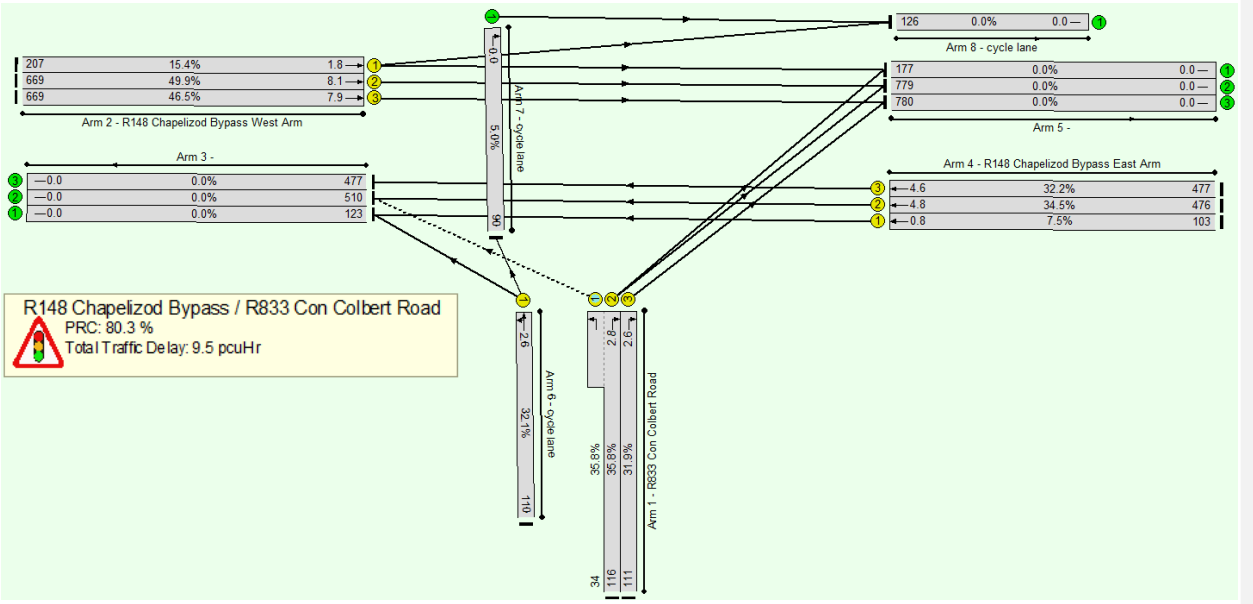
MMQ, CBC arms:
Inbound – 46.57m
Outbound – 27.6m

Bus Av. Delay (s/pcu):
Inbound – 6.1sec
Outbound – 5.4sec

Cyclists Av. Delay (s/pcu):
Inbound – 39.2sec
Outbound –

Car Av. Delay (s/pcu), CBC arms:
Inbound – 8.9sec
Outbound – 7.0sec

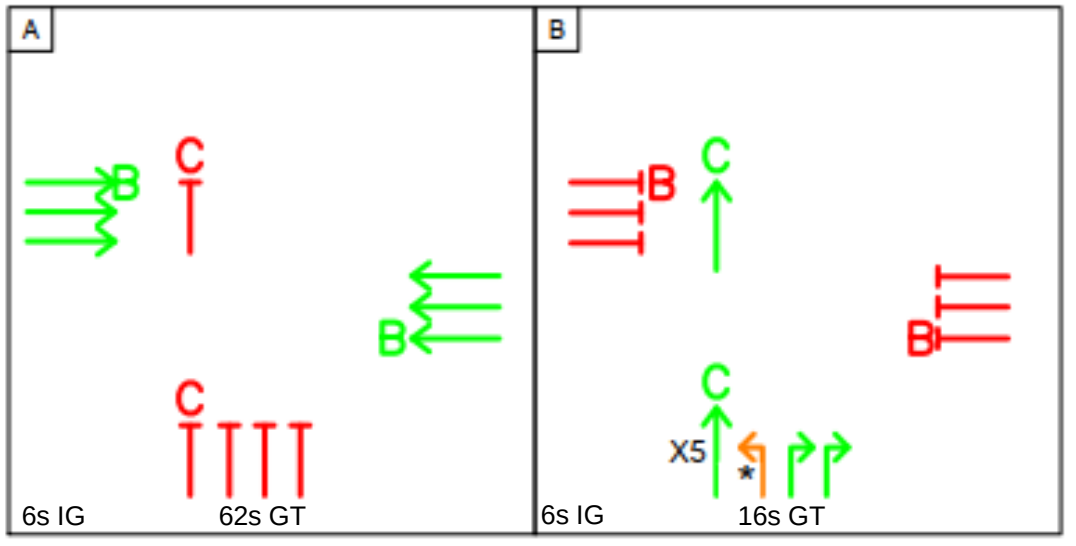
Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

8.Con Colbert Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	2,749	35%	3,062	34%
Bus	5,100	65%	5,100	56%
Walk	0	0%	0	0%
Cycle	0	0%	920	10%
Total	**7,849**	**100%**	**8,992**	**100%**

INDICATIVE METHOD OF CONTROL



X5 denotes 5 Seconds Early Start for Cyclists

Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 Chapelizod bypass/ R148 Con Colbert/ R833 Con Colbert Road – PM Peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 90 secs
PRC = 43.3%,
Junction Delay = 10.2 PCUhr

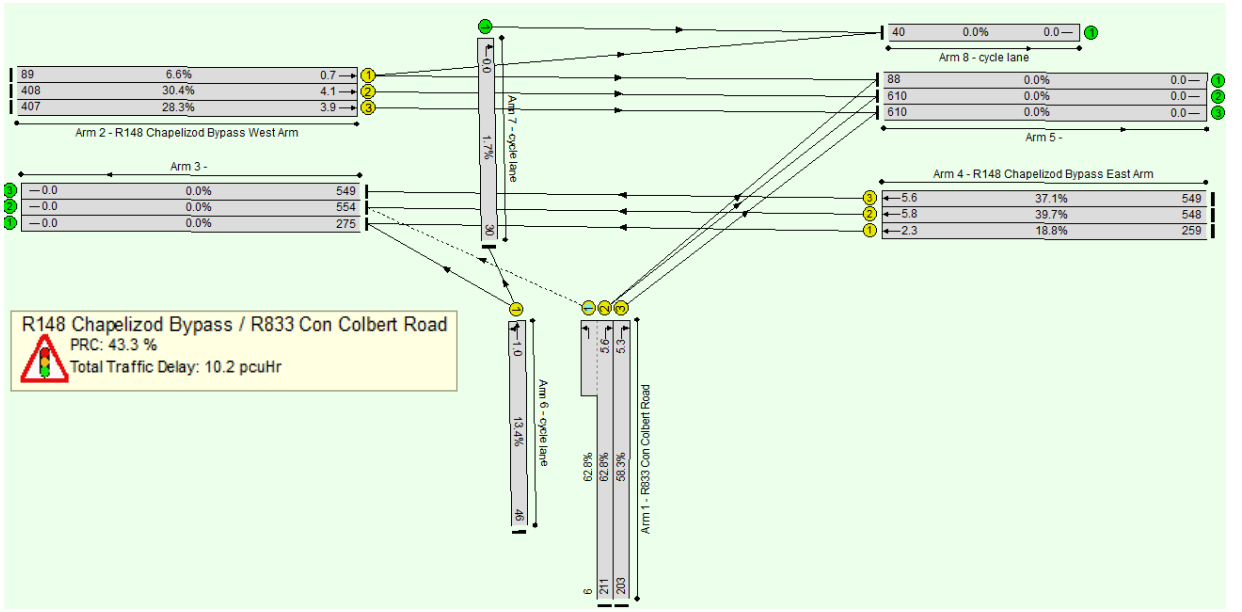
MMQ, CBC arms:
Inbound – 32.2m
Outbound – 33.35m

Bus Av. Delay (s/pcu):
Inbound – 5.7sec
Outbound – 5.9sec

Cyclists Av. Delay (s/pcu):
Inbound – 36.5sec
Outbound –

Car Av. Delay (s/pcu), CBC arms:
Inbound – 7.1sec
Outbound – 7.4sec

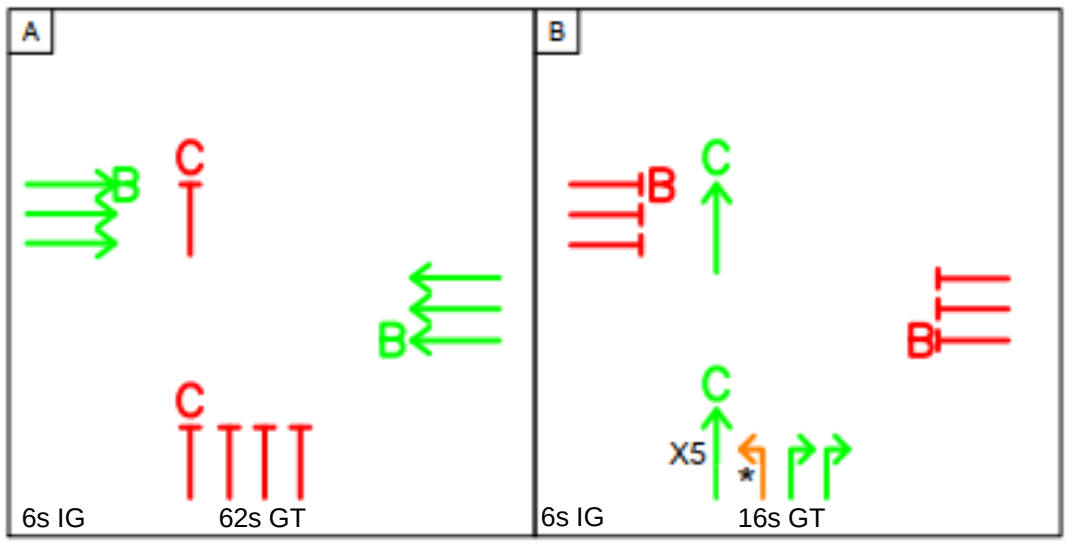
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

8.Con Colbert Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	2,294	33%	2,798	33%
Bus	4,740	67%	4,740	57%
Walk	0	0%	0	0%
Cycle	0	0%	850	10%
Total	**7,034**	**100%**	**8,318**	**100%**

INDICATIVE METHOD OF CONTROL

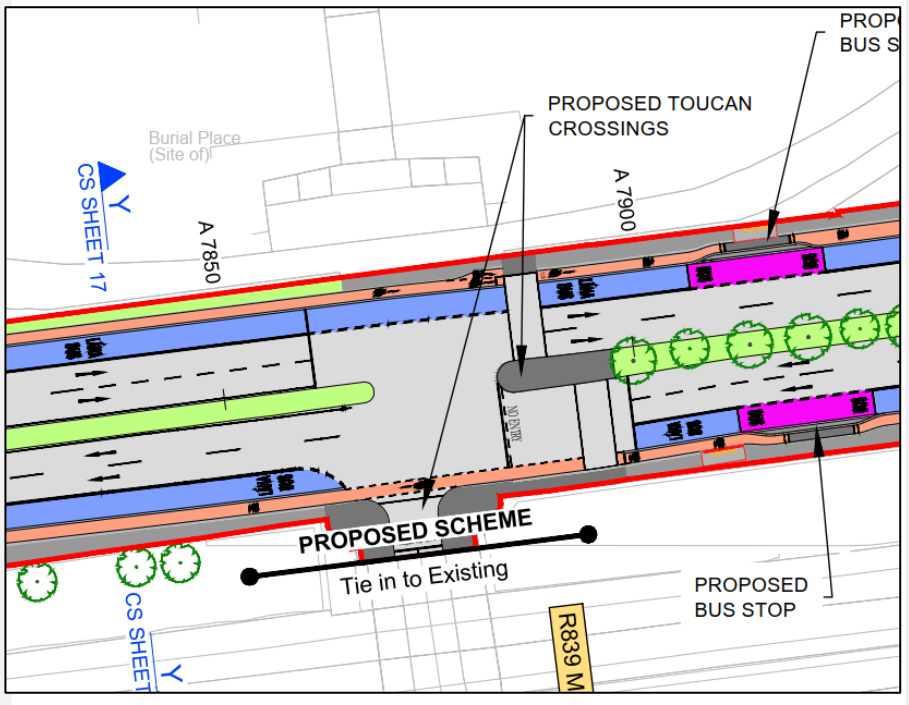


X5 denotes 5 Seconds Early Start for Cyclists

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**R148 Con Colbert Road/ R839 Memorial Road**		

EXISTING

FINAL DESIGN



Summary

The existing three arm signalised junction is to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure.

The key design rationale was to provide protected cycle infrastructure and crossing facilities, improving bus priority and pedestrian permeability through the junction.

Pedestrian Infrastructure

- The existing staggered pedestrian crossing on the western arm of the junction is to be relocated onto the eastern arm of the junction, and upgraded to a toucan crossing. This will facilitate improved pedestrian access to the proposed bus stops, which are both located to the eastern side of the junction.
- A direct pedestrian crossing was considered at this location but due to the crossing distance being greater than 19m, this option was discounted due to excessive crossing distance and excessive intergreen time this would place upon junction capacity. A straight crossing with a 4m island was also considered but due to carriageway alignment and width constraints, it was not feasible
- A Toucan crossing is also proposed on Memorial as per the existing arrangement

Cyclists Infrastructure

- Controlled toucan crossings are proposed on Chapelizod Bypass and Memorial Road
- Cycle lanes are also proposed through the corridor using dedicated cycle tracks.

Bus Priority Infrastructure

- Bus lanes are proposed upto the junction as per the existing arrangement. Buses will have dedicated priority at this junction.

General Traffic

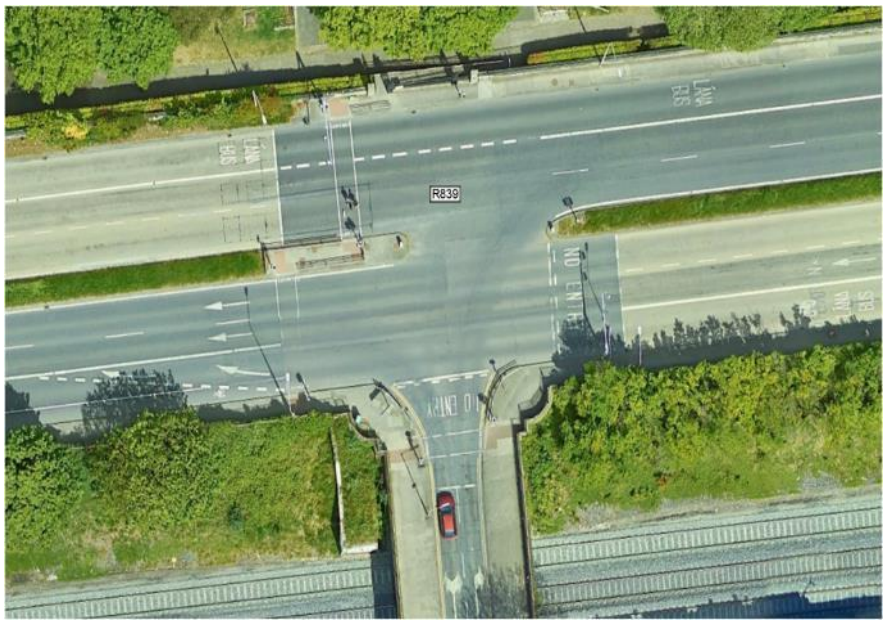
- The existing left turn ban on Chapelizod Bypass outbound is proposed to be retained

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

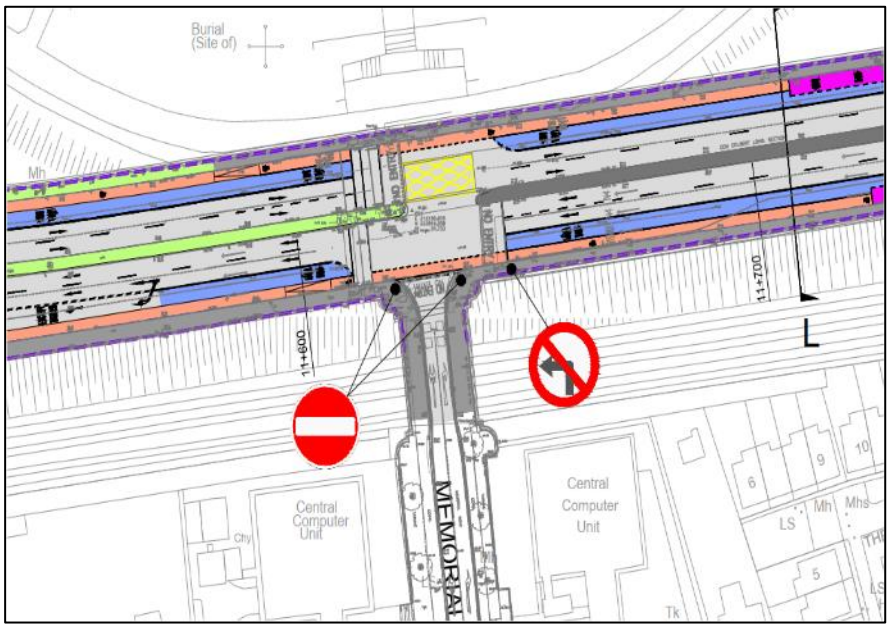
Design Evolution

The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

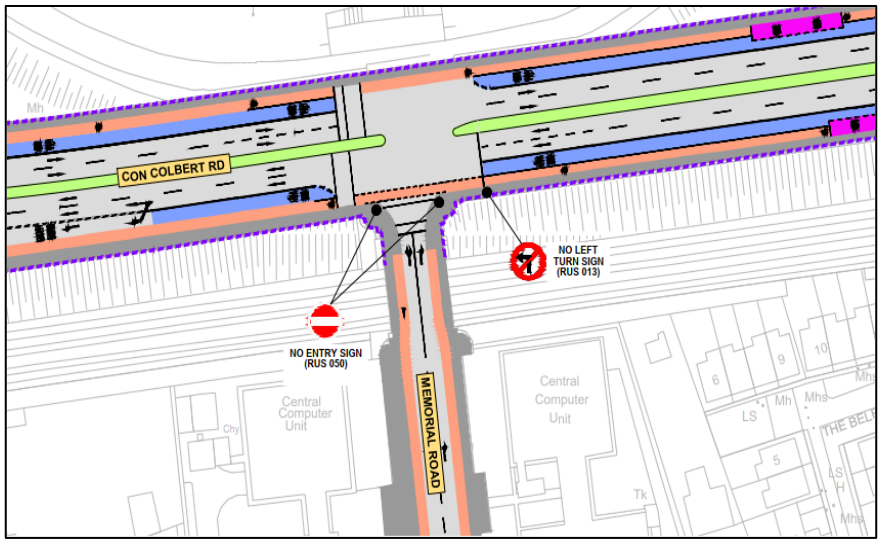
Existing



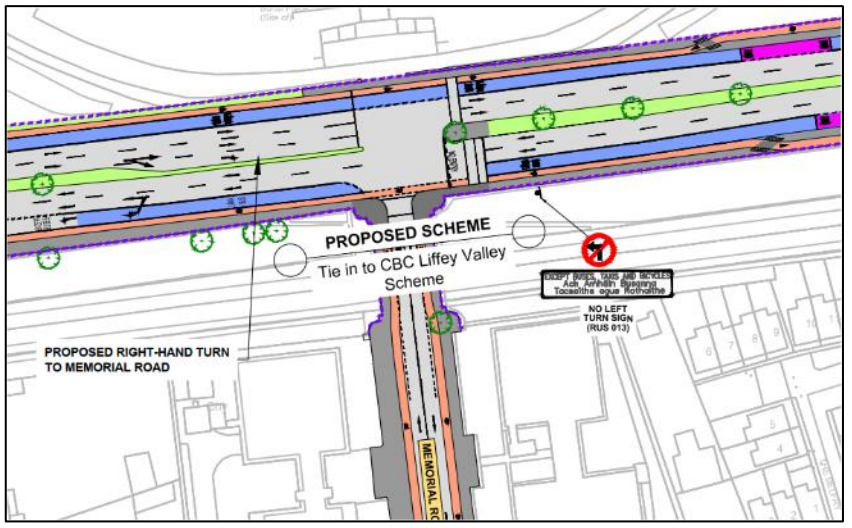
Concept Design Drawing



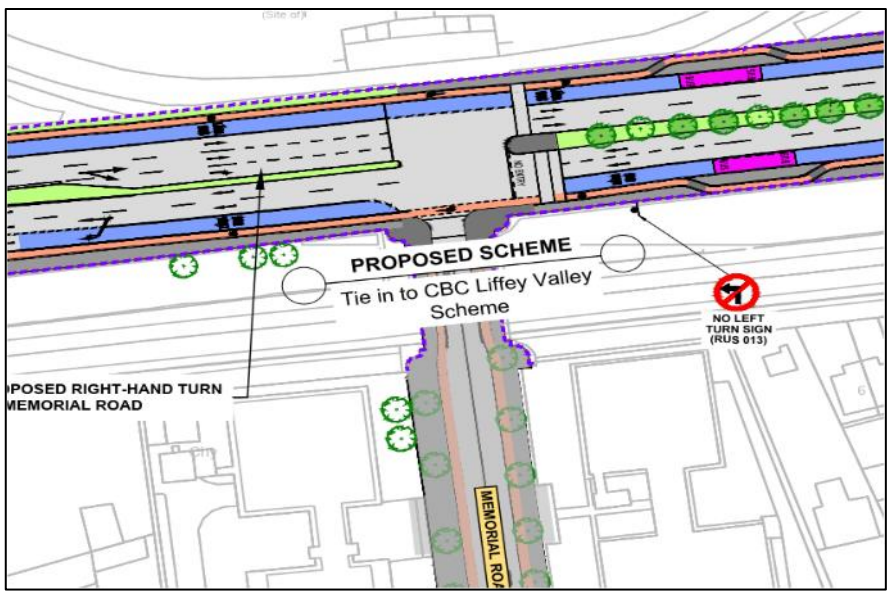
Emerging Preferred Route



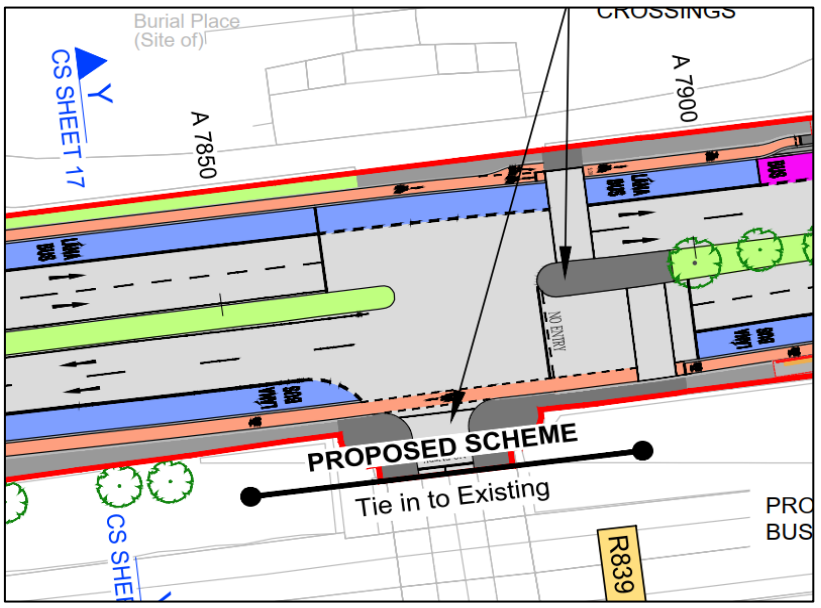
Public Consultation 2



Public Consultation 3



Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 Con Colbert Road/ R839 Memorial Road – AM Peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 110 secs
PRC = 3.9%,
Junction Delay = 36.3 PCUhr

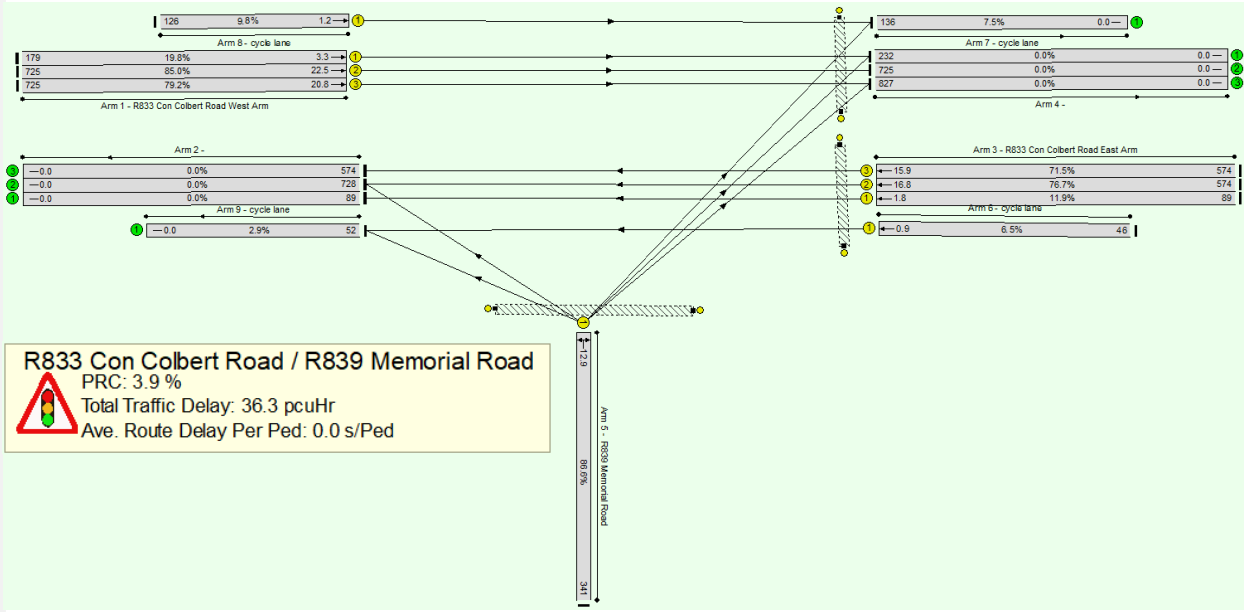
MMQ, CBC arms:
Inbound – 129.38m
Outbound – 96.6m

Bus Av. Delay (s/pcu):
Inbound – 19.3sec
Outbound – 24.1sec

Cyclists Av. Delay (s/pcu):
Inbound – 6.6sec
Outbound – 23.7sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 40.7sec
Outbound – 39.3sec

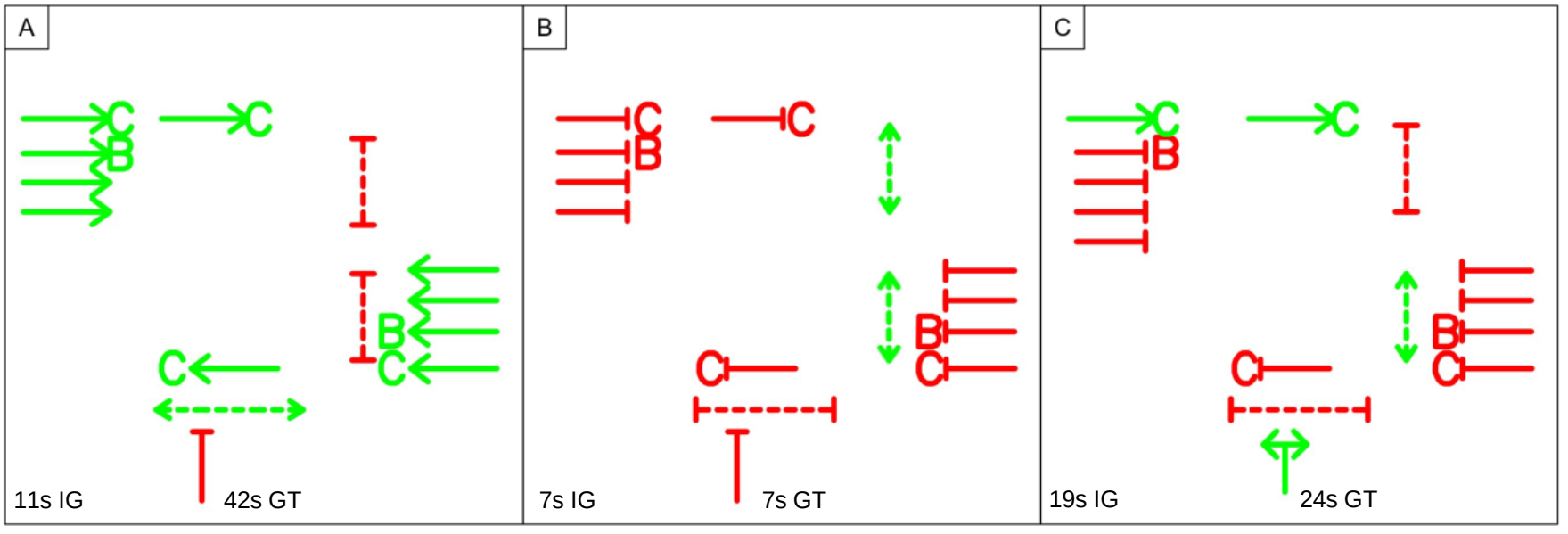
Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

9. Con Colbert-Memorial Rd Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	3,118	32%	3,619	31%
Bus	5,340	55%	6,420	55%
Walk	430	4%	430	4%
Cycle	820	9%	1170	10%
Total	**9,667**	**100%**	**11,539**	**100%**

INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 Con Colbert Road/ R839 Memorial Road – PM Peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 110 secs
PRC = 6.4%,
Junction Delay = 32.2 PCUhr

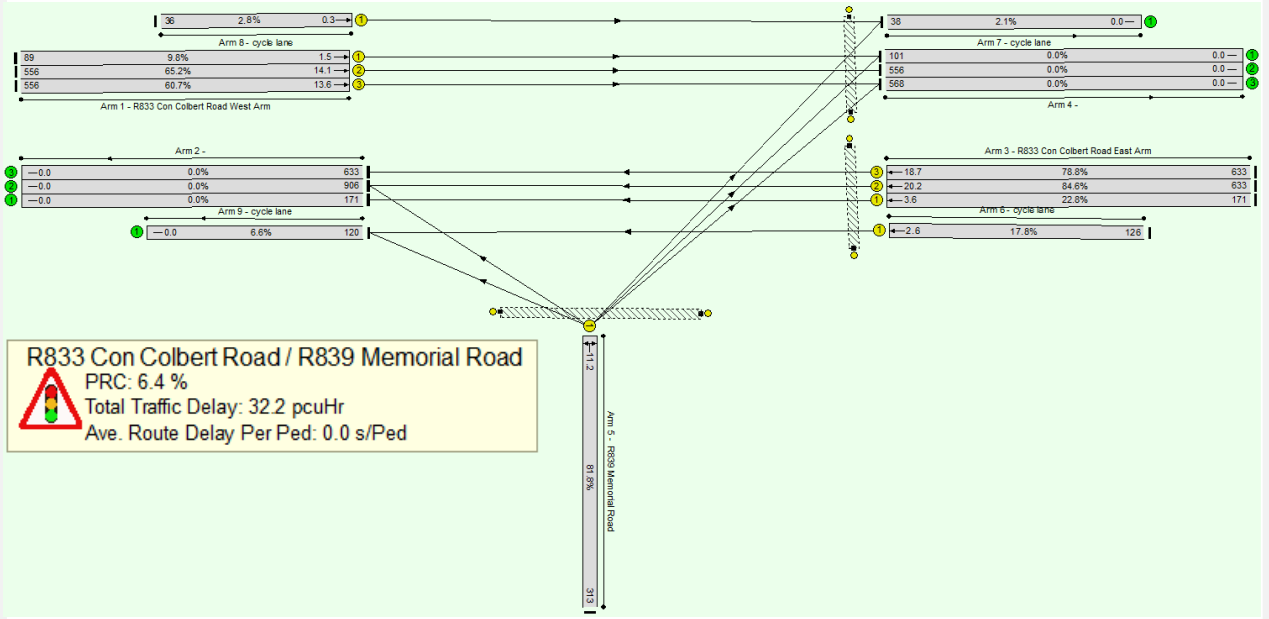
MMQ, CBC arms:
Inbound – 64.98m
Outbound – 94.3m

Bus Av. Delay (s/pcu):
Inbound – 18.3sec
Outbound – 25.5sec

Cyclists Av. Delay (s/pcu):
Inbound – 6.2sec
Outbound – 25sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 29.9sec
Outbound – 45.4sec

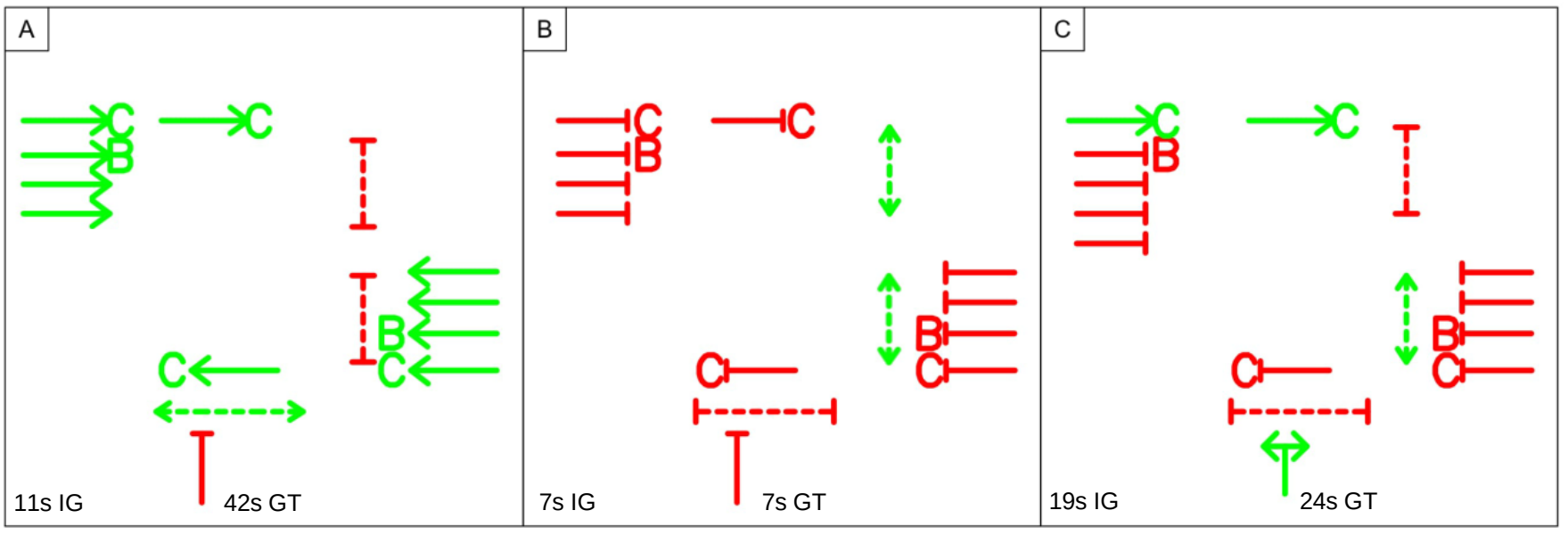
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

9. Con Colbert-Memorial Rd Junction	CBC		All Arms	
Mode	People Movement	Mode Share	People Movement	Mode Share
Car	2,854	31%	3,341	34%
Bus	5,220	58%	5,220	54%
Walk	179	2%	179	2%
Cycle	780	9%	980	10%
Total	**8,962**	**100%**	**9,650**	**100%**

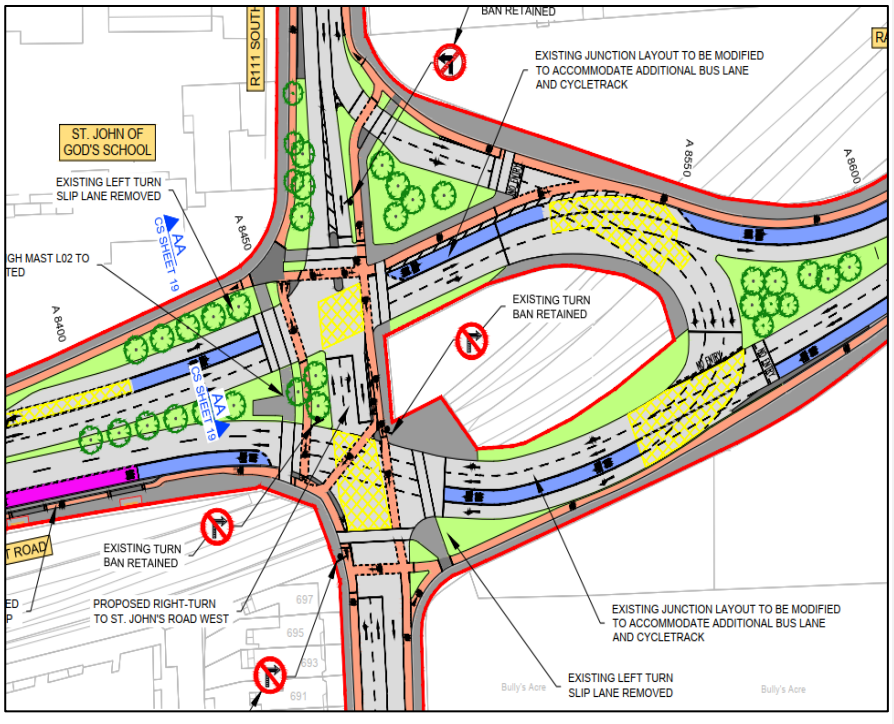
INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**R148 Con Colbert Road/ R111 South Circular Road/ R148 St John's Road West**		

EXISTING

FINAL DESIGN



Summary
The existing major junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to provide more compact pedestrian and cycle crossings, whilst also enhancing bus priority.

Pedestrian Infrastructure

- The existing junction comprises of controlled pedestrian crossings at the junction. However to cross Con Colbert Road arm requires pedestrians to use 3no. Separate crossings and to cross St Johns Road requires 4no. Separate crossings. This creates significant delay to pedestrians who are required to wait at each crossing for the crossing stage. This junction serves as a key desire line for pedestrians including pupils accessing the Gaelscoil Inse Chór to the north of the junction.
- The proposed crossing design will comprise a more compact junction, which has been achieved by omitting the left turning slips. This will reduce crossing distances for pedestrians and minimise delays for pedestrians. The proposed crossings are also better located in terms of desire lines.
- The existing footpaths have also been widened to 2m where feasible.

Cyclists Infrastructure

- The existing cycle infrastructure at the junction is limited, with an advisory cycle lane along Con Colbert Road (inbound).
- The proposal will introduce cycle tracks on all four of the junction to provide cyclists with a protected facility. Dedicated cycle crossings are also proposed on all arms of the junction to facilitate the safe passage of cyclists.

Bus Priority Infrastructure

- The existing conditions comprise of a bus lane along Con Colbert Road and St Johns Road, which extinguishes approx. 200m inbound and outbound prior to the junction;
- The proposal will comprise of a Junction Type 2, with a bus lane up to the junction stop line in both the inbound and outbound directions, with the exception of a break in the bus lane to facilitate left turning vehicles into a left turn lane as per Junction Type 2.
- A Junction Type 1 was considered at this location, however due to available space, Junction Type 2 can be accommodated, which also gives additional capacity at the junction for all modes of travel.

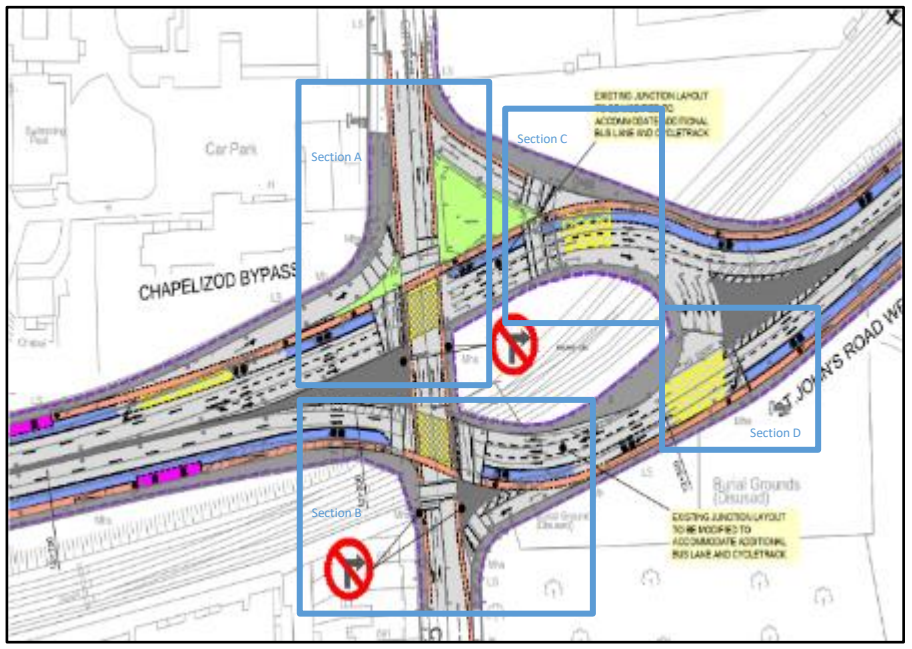
Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

Design Evolution

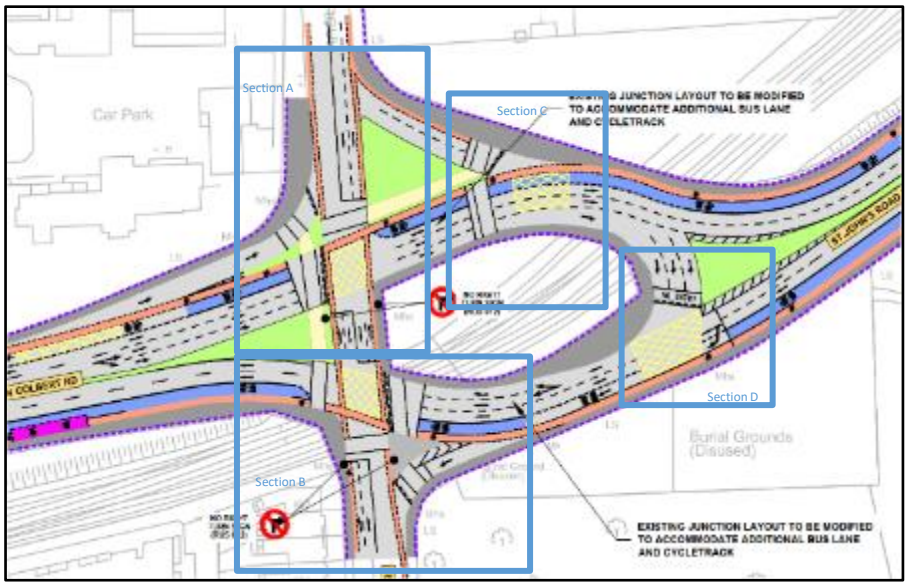
The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

Existing

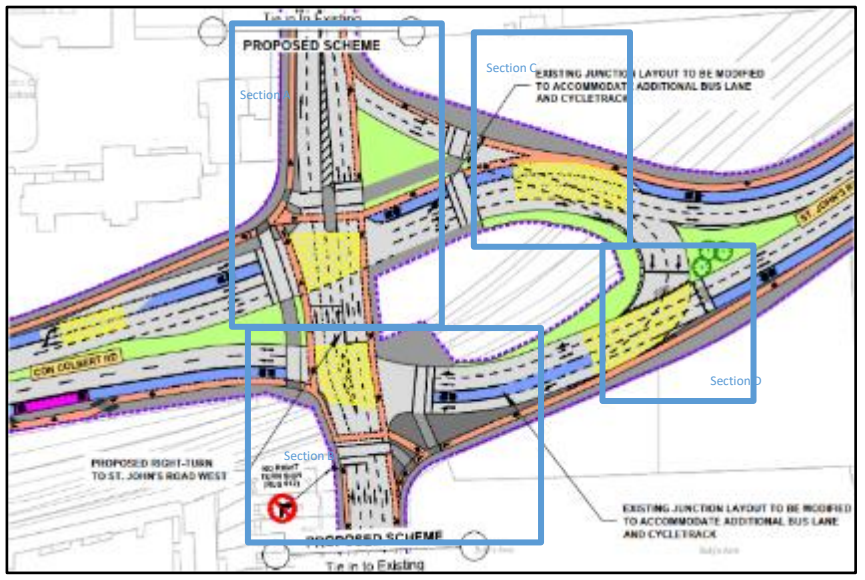
Concept Design Drawing



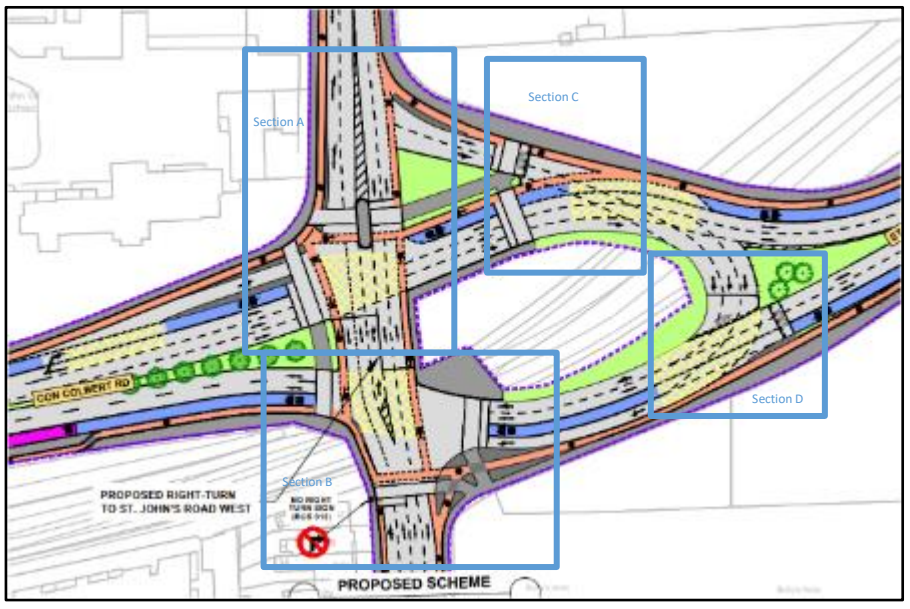
Emerging Preferred Route



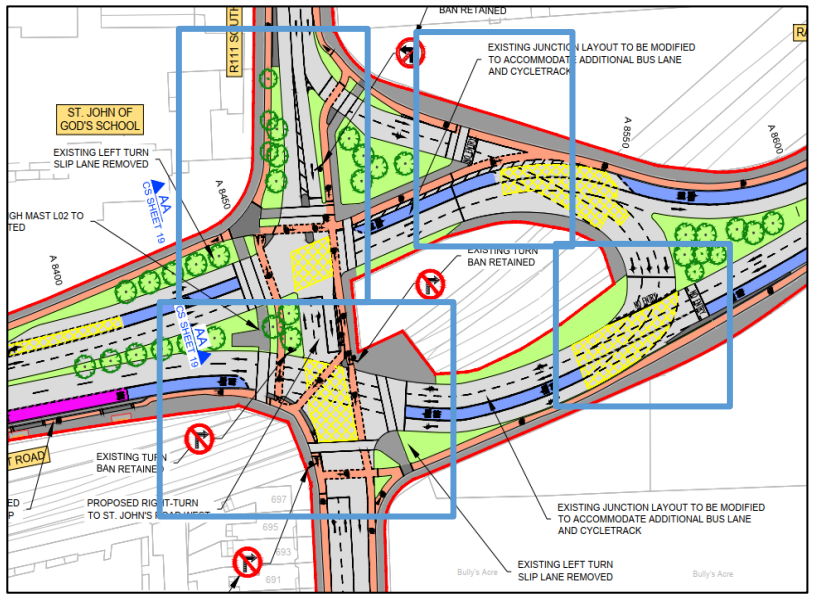
Public Consultation 2



Public Consultation 3



Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 Con Colbert Road/ R111 South Circular Road/ R148 St John's Road West– AM Peak

2028 AM Peak Hours
Fixed Time LinSig Results

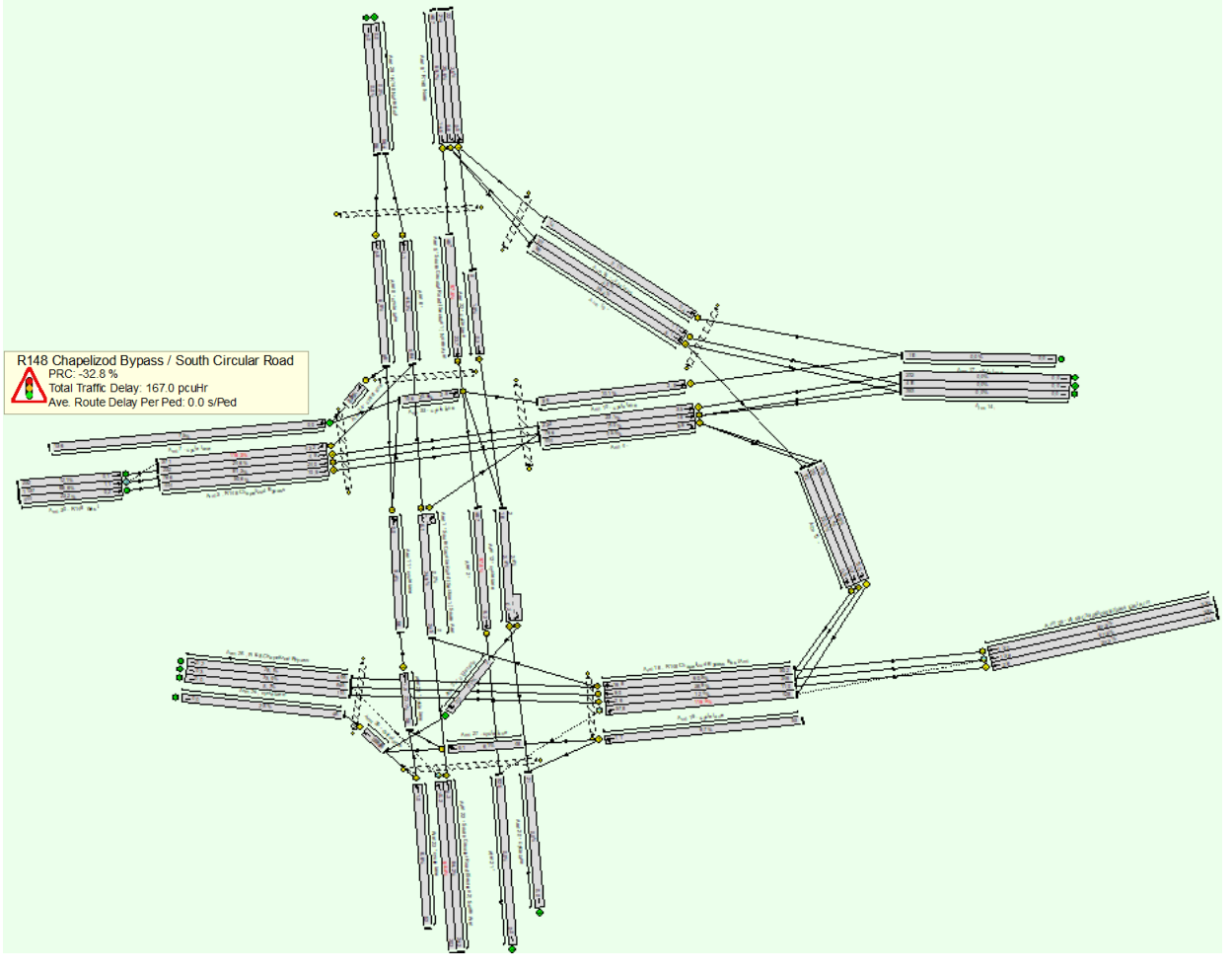
Cycle Time = 120 secs
PRC = -32.8%,
Junction Delay = 165.75 PCUhr

MMQ, CBC arms:
Inbound –248.4m
Outbound –332.35m

Bus Av. Delay (s/pcu):
Inbound –22.4sec
Outbound – 4.0sec

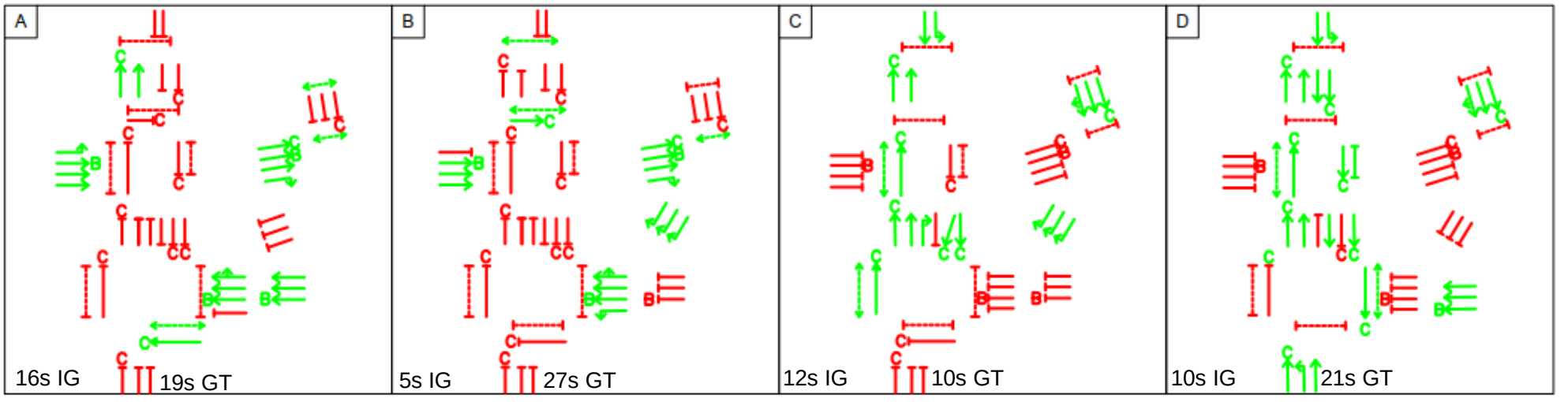
Cyclists Av. Delay (s/pcu):
Inbound – 19sec
Outbound – 22.3sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 38.1sec
Outbound – 29.2sec



10.SCR Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	1,985	19%	4,154	31%
Bus	6,840	66%	6,840	51%
Walk	949	9%	949	7%
Cycle	570	6%	1,395	11%
Total	**10,304**	**100%**	**13,259**	**100%**

INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 Con Colbert Road/ R111 South Circular Road/ R148 St John's Road West– PM Peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = -46.7%,
Junction Delay = 201.71 PCUhr

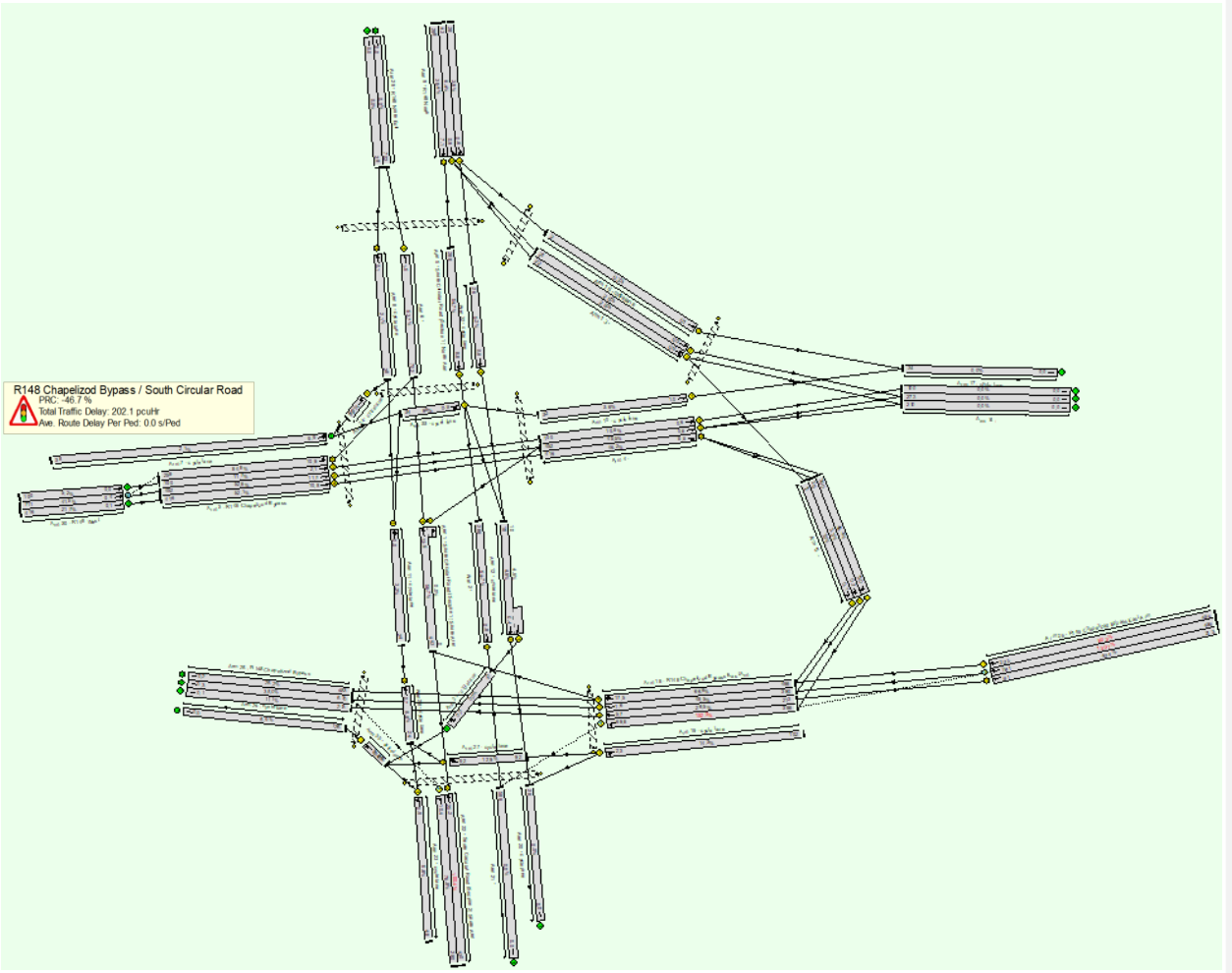
MMQ, CBC arms:
Inbound – 67.27m
Outbound – 401.35m

Bus Av. Delay (s/pcu):
Inbound – 23.9sec
Outbound – 4.6sec

Cyclists Av. Delay (s/pcu):
Inbound – 21.0sec
Outbound – 26.5sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 30.6sec
Outbound – 14.4sec

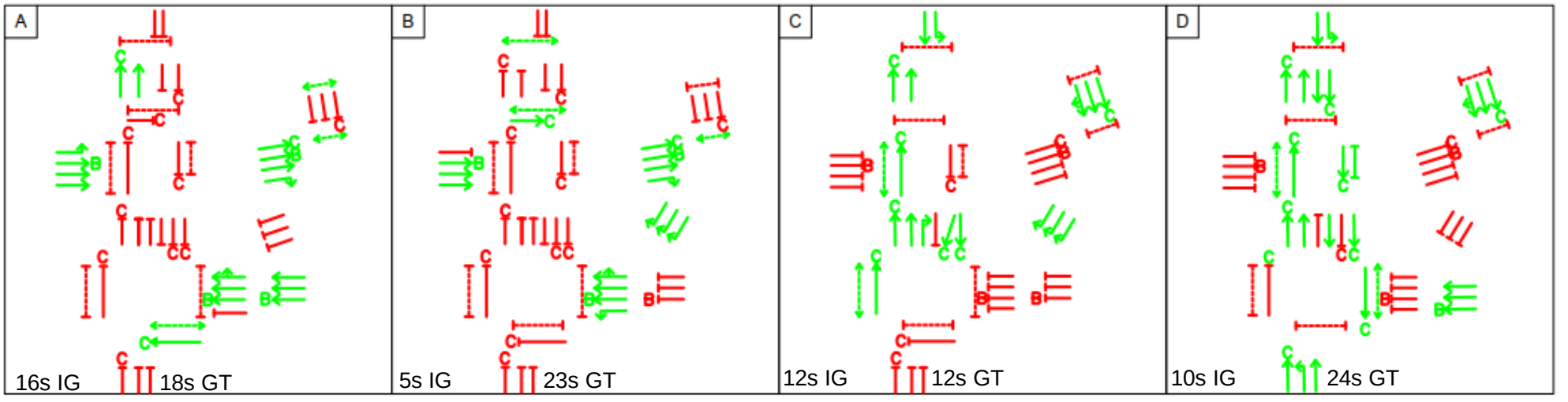
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

10.SCR Junction	CBC		All Arms	
Mode	People Movement	Mode Share	People Movement	Mode Share
Car	1,760	19%	3,763	32%
Bus	6,240	67%	6,240	52%
Walk	661	7%	661	6%
Cycle	670	7%	1,230	10%
Total	**9,262**	**100%**	**11,744**	**100%**

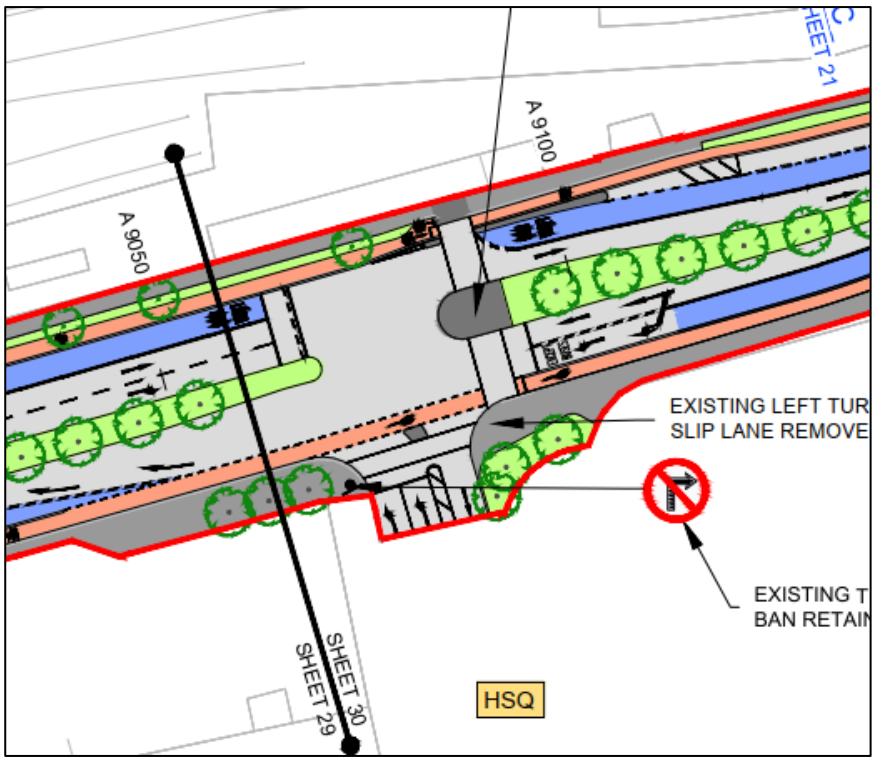
INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**R148 St Johns Road West/ HSQ**		

EXISTING

FINAL DESIGN



Summary
The existing 3 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to provide protected cycle infrastructure and crossing facilities, improving bus priority, removing the existing left turn slip to provide a more compact pedestrian crossing.

Pedestrian Infrastructure
- The existing junction comprises of staggered pedestrian crossings on the eastern and southern arm of the junction across St Johns Road and HSQ arm respectively. Pedestrians crossing St Johns Road are required to cross 3no. Separate crossings due to the existing left turn slip into the HSQ.
- The proposal design comprises a more compact junction with a direct crossing on the southern arm and a direct crossing on the eastern arm.

Cyclists Infrastructure
- The existing junction comprises of an outbound advisory cycle lane
- The proposal comprises of dedicated cycle tracks on both inbound and outbound directions;
- A Toucan crossing is proposed on St Johns Road to facilitate cyclist access into the HSQ.

Bus Priority Infrastructure
- Junction Type 1 proposed on the inbound direction, with bus priority upto the stop line
- Junction Type 3 is proposed for the outbound direction. A continuous bus lane upto the stop line was considered but due to the low volume of left turning vehicles into the HSQ, Junction Type 3 has therefore been proposed.

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

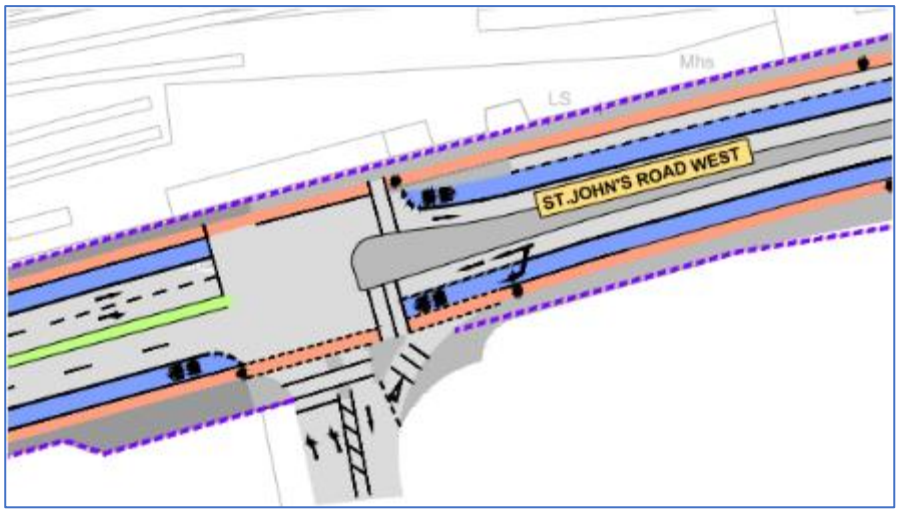
Design Evolution

The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

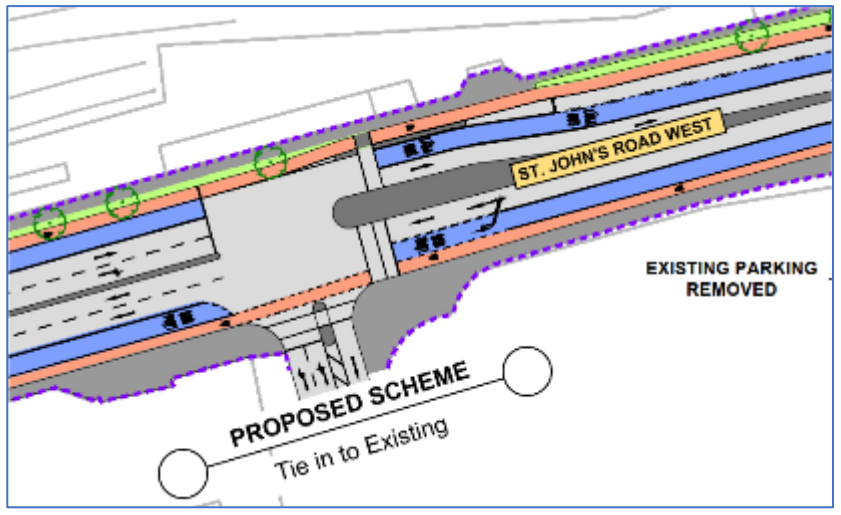
Existing

Concept Design Drawing

Emerging Preferred Route

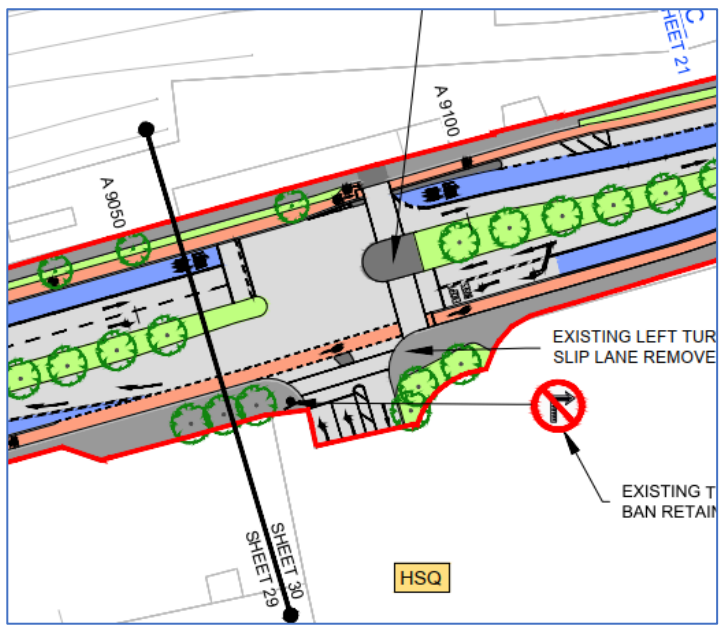


Public Consultation 2



Public Consultation 3

Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 St Johns Road West/
HSQ – AM Peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 100 secs
PRC = 61.5%,
Junction Delay = 7.46 PCUhr

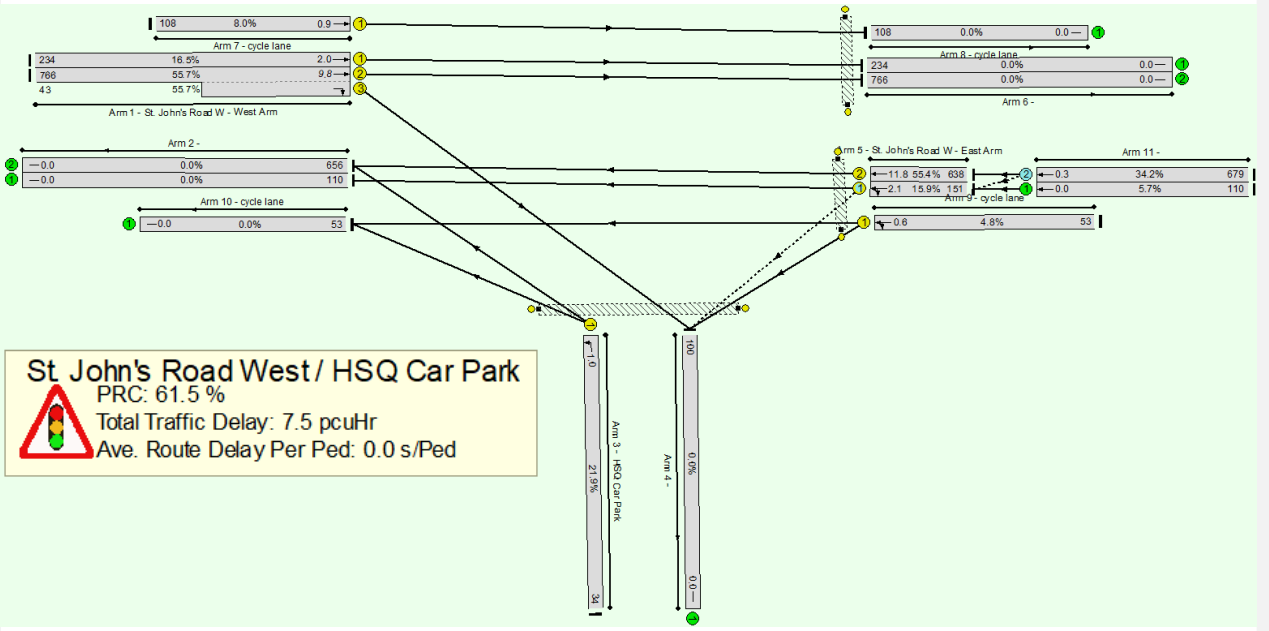
MMQ, CBC arms:
Inbound – 56.35m
Outbound – 67.85m

Bus Av. Delay (s/pcu):
Inbound – 5.4sec
Outbound – 12.9sec

Cyclists Av. Delay (s/pcu):
Inbound – 5.1sec
Outbound – 9.6sec

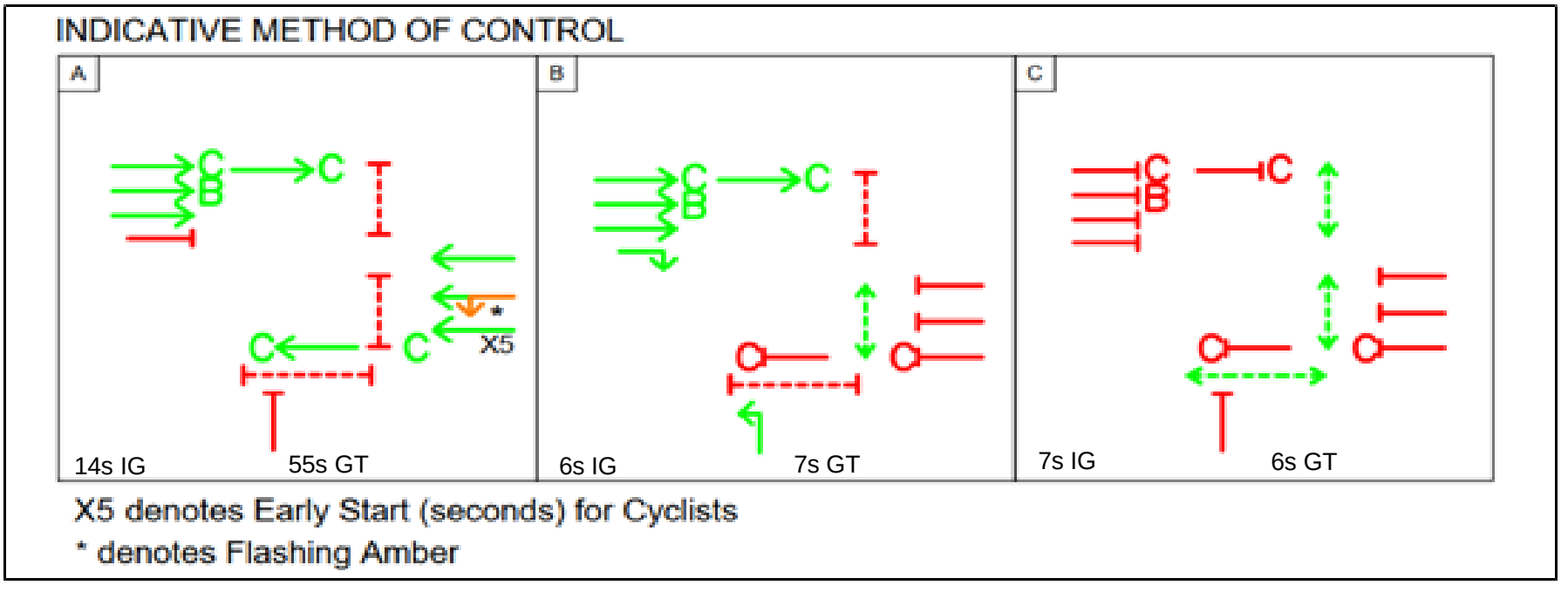
Car Av. Delay (s/pcu), CBC arms:
Inbound – 10.4sec
Outbound – 17.5sec

Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

11.St John Rd W-HSQ Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	1,685	18%	1,807	18%
Bus	6,900	72%	6,900	70%
Walk	212	2%	212	2%
Cycle	785	8%	995	10%
Total	**9,522**	**100%**	**9,815**	**100%**



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 St Johns Road West/
HSQ – PM Peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 100 secs
PRC = 14.7%,
Junction Delay = 10.49 PCUhr

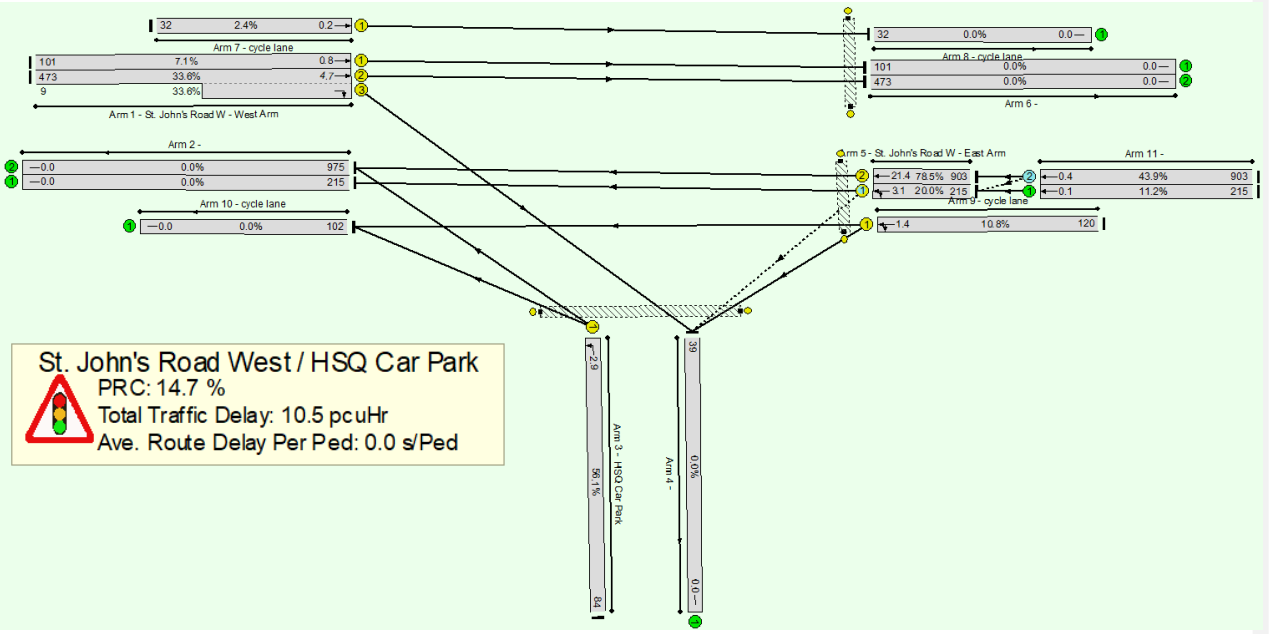
MMQ, CBC arms:
Inbound – 27.02m
Outbound – 123.05m

Bus Av. Delay (s/pcu):
Inbound – 5.0sec
Outbound – 13.0sec

Cyclists Av. Delay (s/pcu):
Inbound – 4.9sec
Outbound – 10.0sec

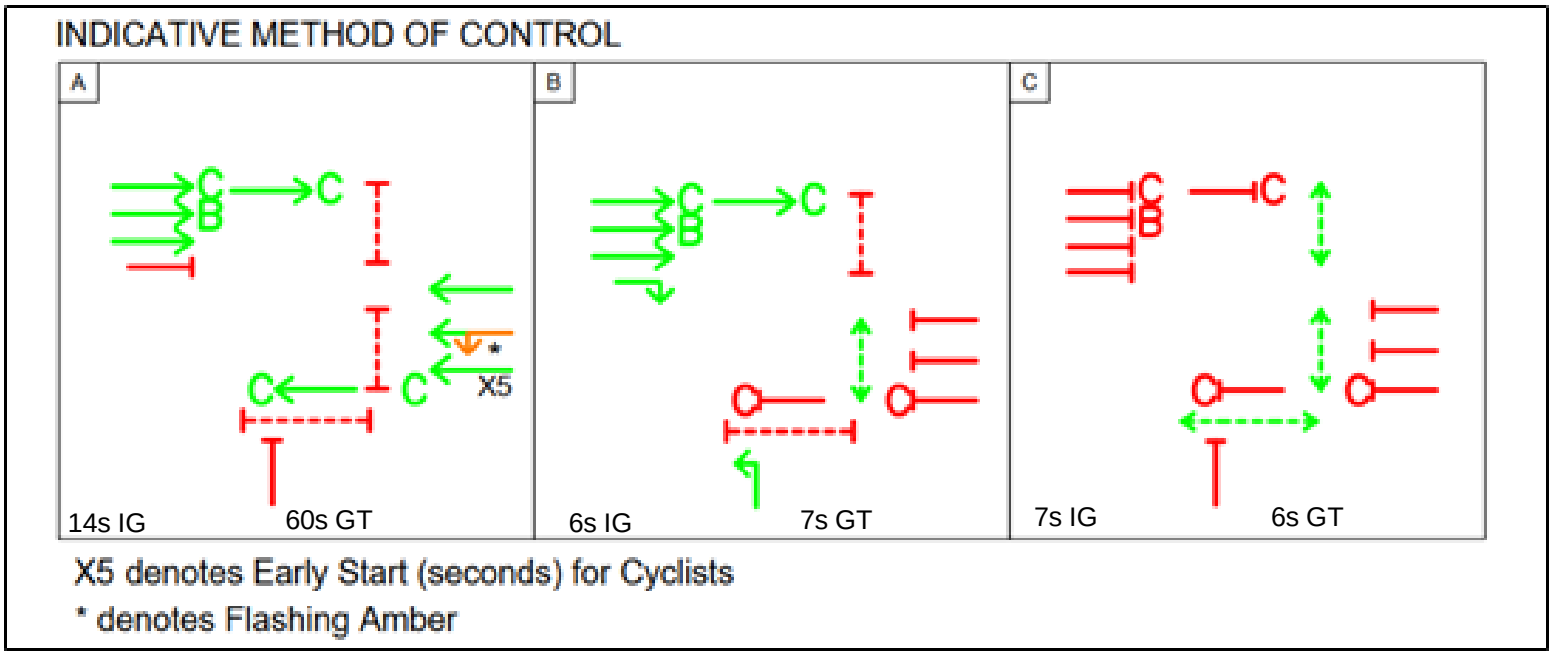
Car Av. Delay (s/pcu), CBC arms:
Inbound – 7.1sec
Outbound – 24.4sec

Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

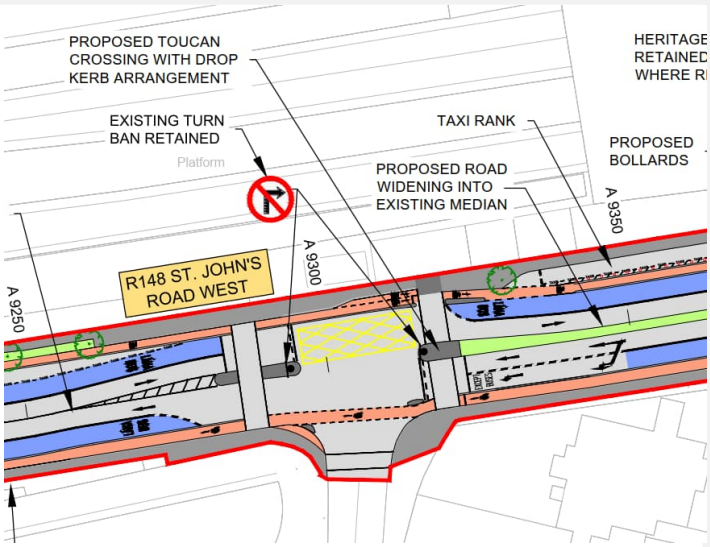
11.St John Rd W-HSQ Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	1,651	19%	1,748	19%
Bus	6,300	71%	6,300	69%
Walk	158	2%	158	2%
Cycle	680	8%	940	10%
Total	**8,720**	**100%**	**9,037**	**100%**



Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	R148 St Johns Road West/ Military Road		

EXISTING

FINAL DESIGN



Summary
The existing 3 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to provide protected cycle infrastructure and crossing facilities, whilst improving bus priority.

Pedestrian Infrastructure
- The existing pedestrian infrastructure comprises a staggered crossing across St Johns Road on the eastern arm and a direct crossing on the southern arm.
- The proposals will introduce a more compact and direct pedestrian crossing across Military Road. This has been achieved by amending the junction radius to reduce the crossing distance.
- The existing staggered crossing at St Johns Road is proposed to be upgraded into a direct single stage pedestrian crossing.
- In addition, a new direct, single stage crossing is proposed on the western arm of the junction across St Johns Road West, to further enhance pedestrian permeability at the junction.

Cyclists Infrastructure
- The existing cycle infrastructure comprises of an advisory cycle track onroad in both the inbound and outbound directions.
- The proposals comprise of an off road cycle track both inbound and outbound directions along St Johns Road.
- On Military Road, due to localised constraints it is not been feasible to introduce cycle tracks. However the crossings are proposed to be upgraded from pedestrians to toucans, to cater for cyclists crossing Military Road and St Johns Road West.

Bus Priority Infrastructure
- The proposals comprise of a Junction Type 1 inbound, and a Junction type 3 outbound. In the outbound direction. A Junction Type 3 is proposed outbound due to the volume of left turners during the peak hour is projected to be low (<100 PCUs), therefore Junction Type 3 will have minimal impact upon bus journey times.

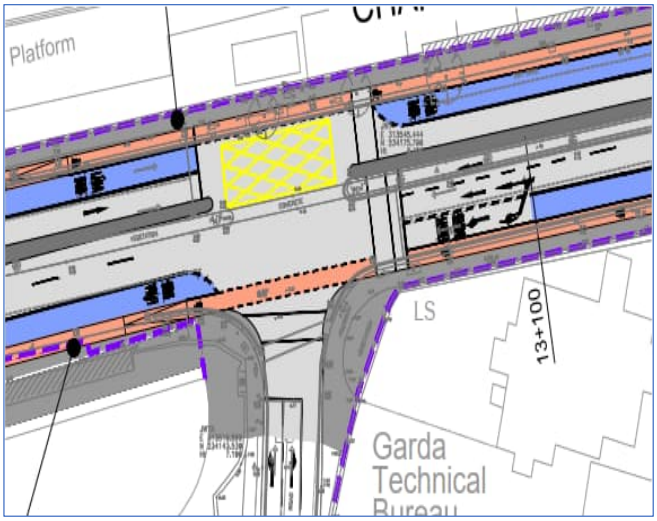
Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

Design Evolution

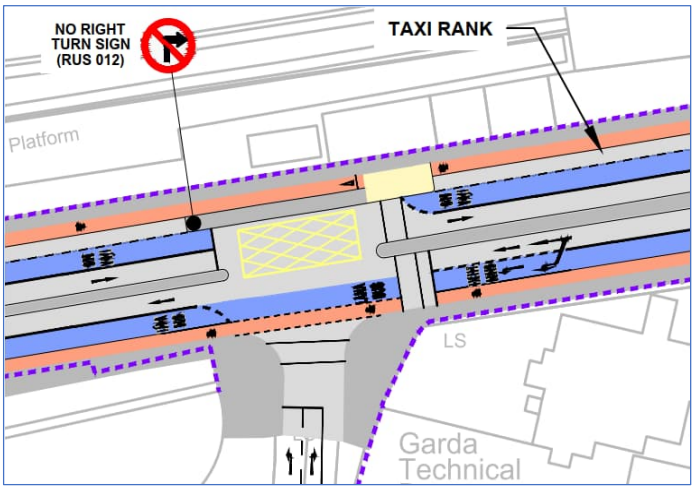
The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

Existing

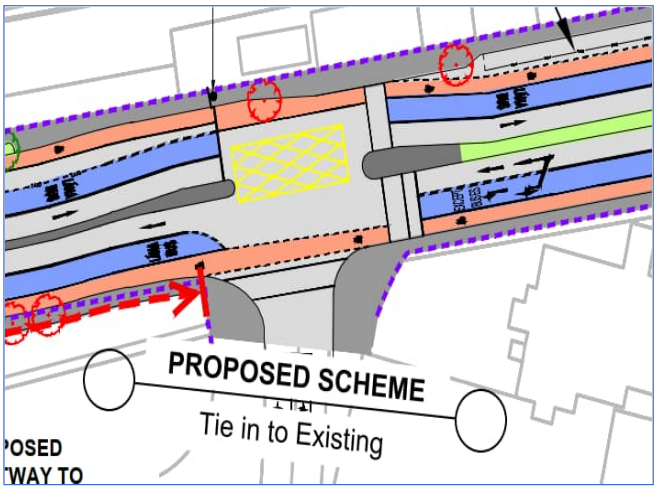
Concept Design Drawing



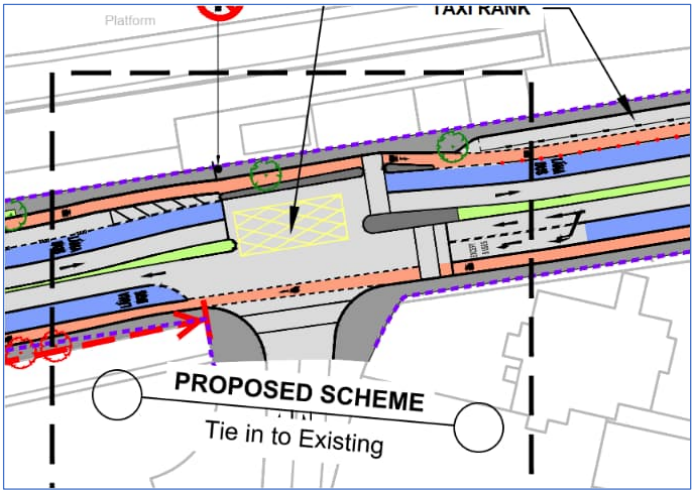
Emerging Preferred Route



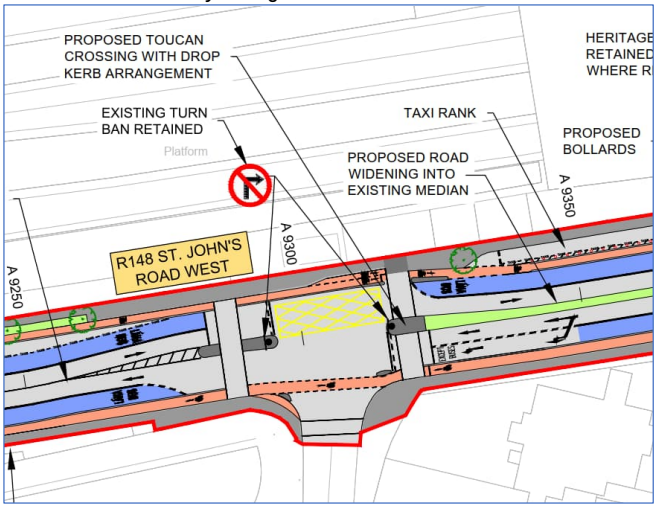
Public Consultation 2



Public Consultation 3



Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 St Johns Road West/
Military Road – AM Peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 100 secs
PRC = 35.6%,
Junction Delay = 13.0 PCUhr

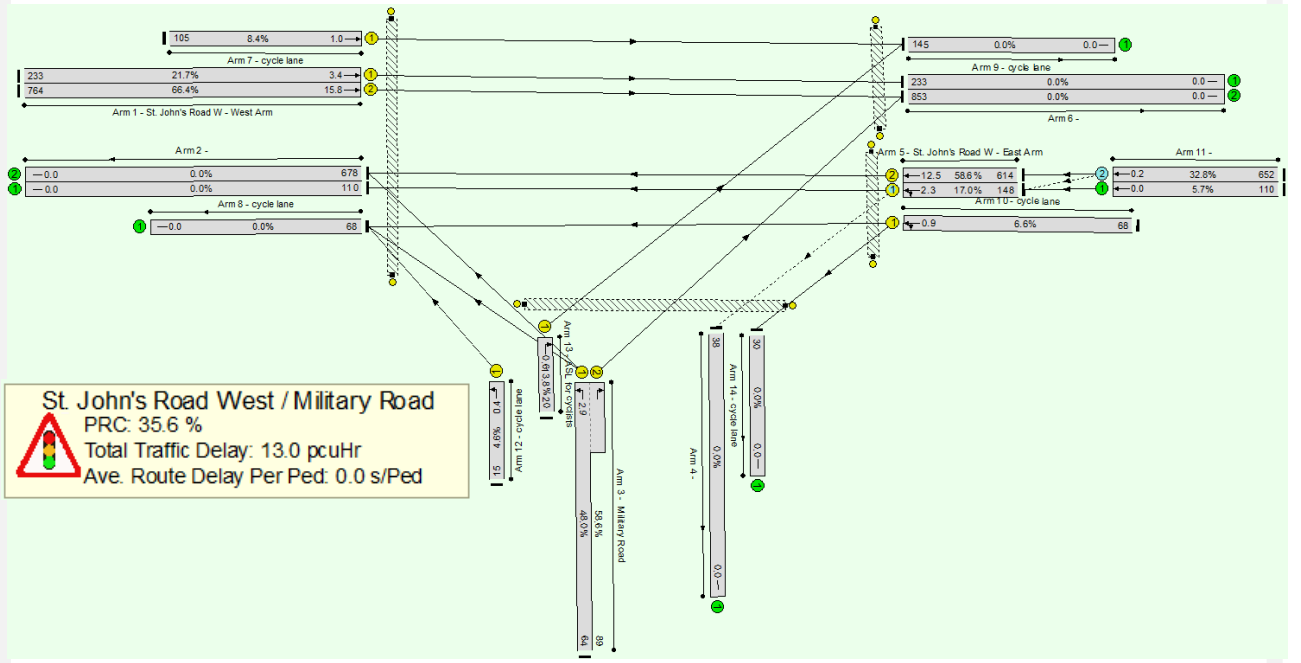
MMQ, CBC arms:
Inbound – 90.85m
Outbound – 71.88m

Bus Av. Delay (s/pcu):
Inbound – 13.2sec
Outbound – 15.6sec

Cyclists Av. Delay (s/pcu):
Inbound – 6.7sec
Outbound - 11.5sec

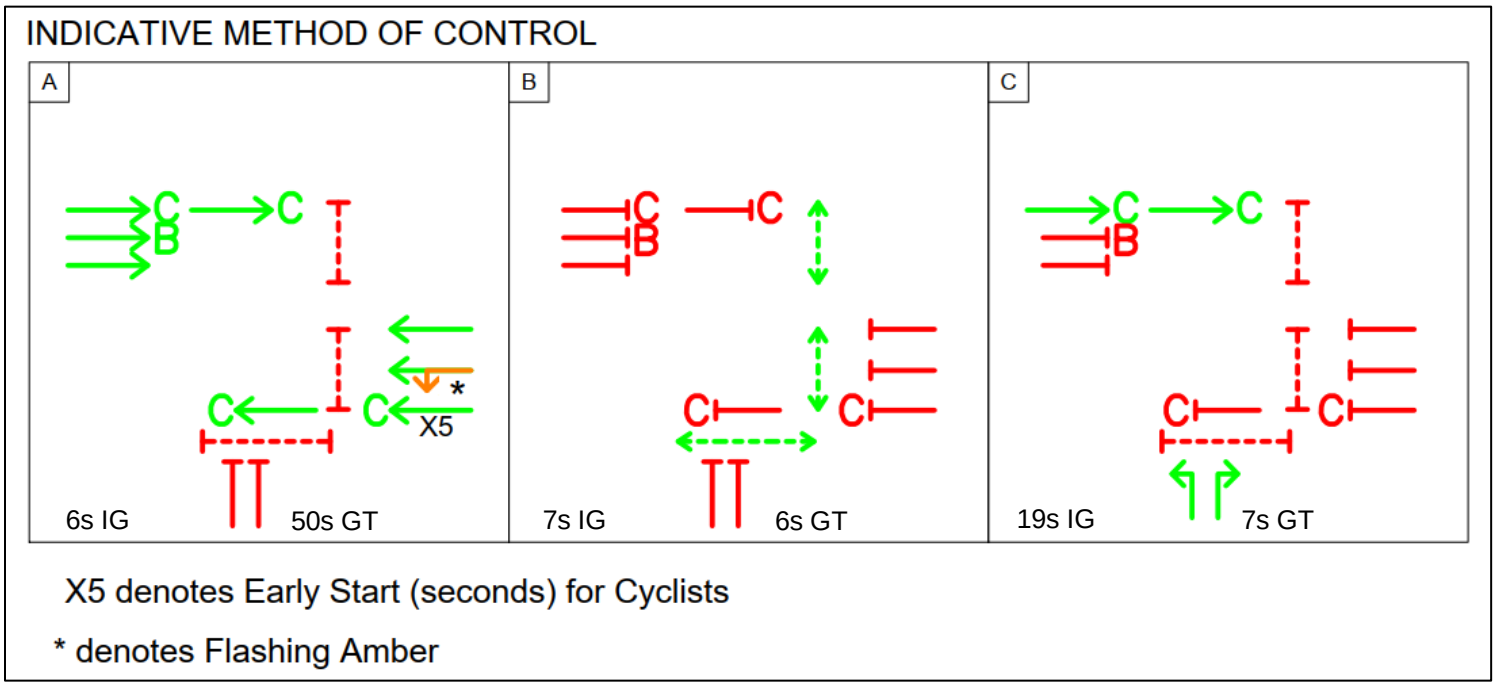
Car Av. Delay (s/pcu), CBC arms:
Inbound – 20sec
Outbound – 21.3sec

Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

12.St John-Military Rd Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	1,654	15%	1,883	16%
Bus	6,840	63%	6,840	59%
Walk	1,626	15%	1,626	14%
Cycle	795	7%	1,205	11%
Total	**10,835**	**100%**	**11,404**	**100%**



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 St Johns Road West/
Military Road – PM Peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 100 secs
PRC = 13.8%,
Junction Delay = 16.15 PCUhr

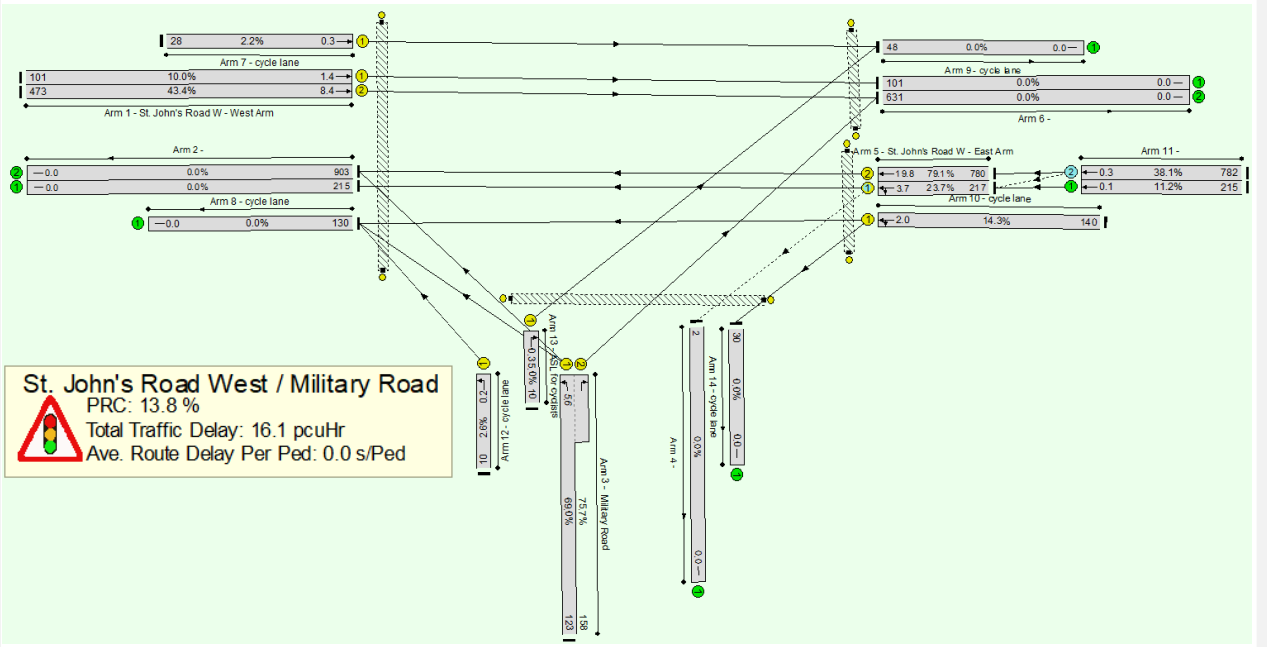
MMQ, CBC arms:
Inbound – 48.3m
Outbound – 113.85m

Bus Av. Delay (s/pcu):
Inbound – 13.7sec
Outbound – 17.8sec

Cyclists Av. Delay (s/pcu):
Inbound – 6.4sec
Outbound - 13.6sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 17.3sec
Outbound – 30.4sec

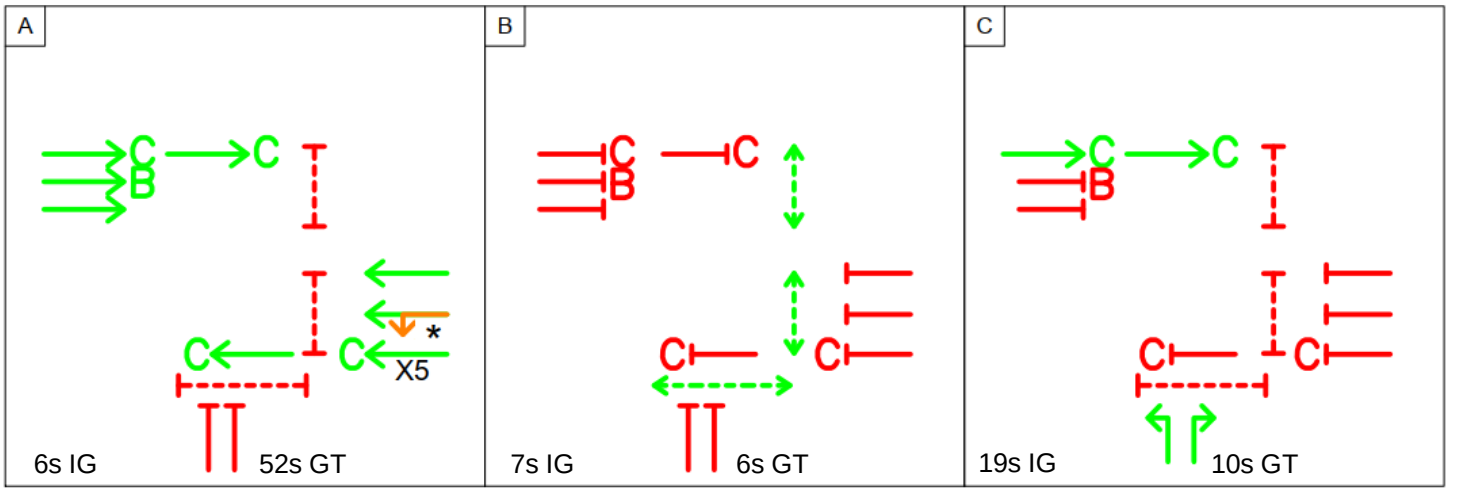
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

12.St John-Military Rd Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	1,504	15%	1,843	17%
Bus	6,300	64%	6,300	60%
Walk	1,320	13%	1,320	13%
Cycle	760	8%	1,060	10%
Total	**9,814**	**100%**	**10,423**	**100%**

INDICATIVE METHOD OF CONTROL

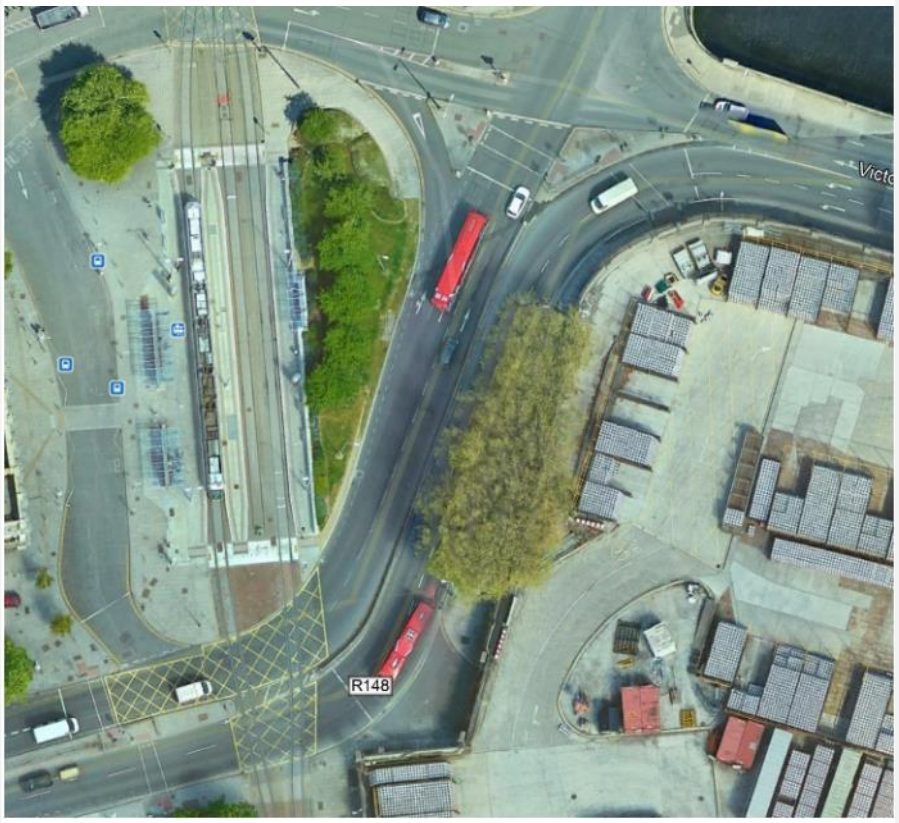


X5 denotes Early Start (seconds) for Cyclists

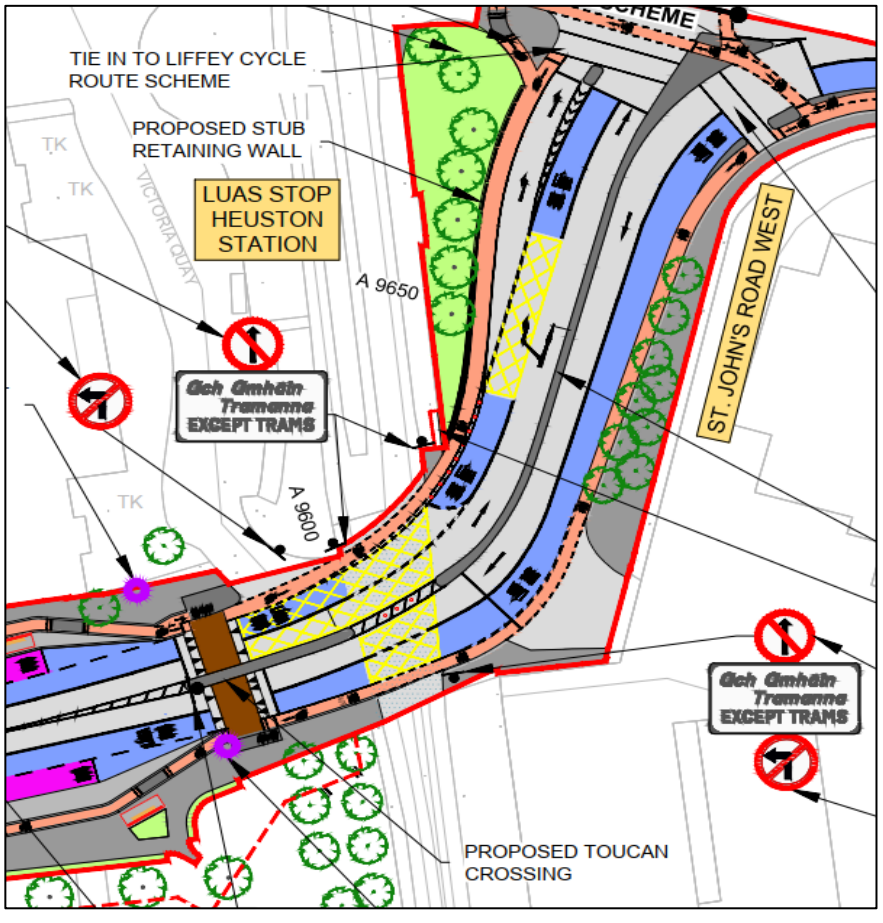
* denotes Flashing Amber

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	February 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**R148 St Johns Road West/ Heuston Station (Steeven's Lane)**		

EXISTING



FINAL DESIGN



Summary

The existing signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to provide protected cycle infrastructure and crossing facilities, whilst improving bus priority and introducing more direct pedestrian crossings.

Pedestrian Infrastructure

- The existing junction comprises a staggered pedestrian crossing across St Johns Road.
- The proposal is to upgrade the existing staggered pedestrian crossing on St Johns Road West, into a direct single stage pedestrian crossing. This will cater for the high volume of pedestrians at this location travelling to and from Heuston Station.

Cyclists Infrastructure

- An existing advisory cycle lane is located on St Johns Road (inbound).
- The proposal comprises of new dedicated cycle tracks for both inbound and outbound directions, with cyclist signals at the junction to enable cyclists to travel safely through the junction;
- Cyclists crossing St Johns Road can also avail of the new proposed toucan crossing.

Bus Priority Infrastructure

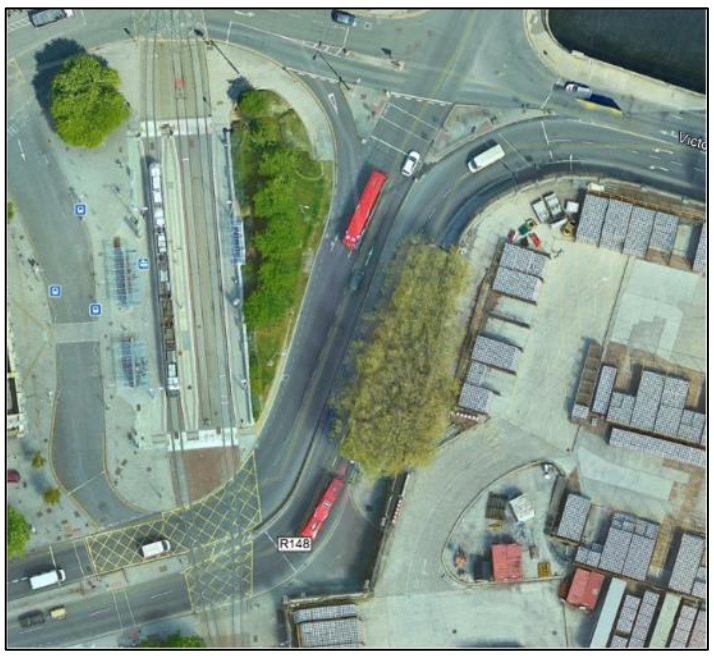
- The existing conditions does not provide bus priority in the outbound direction. The existing condition comprises of a bus lane inbound.
- The proposals comprise of a Junction Type 1 in both inbound and outbound directions, with the bus lane upto the stop line. This will assist to improve bus journey times and reliability at this location.

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	February 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

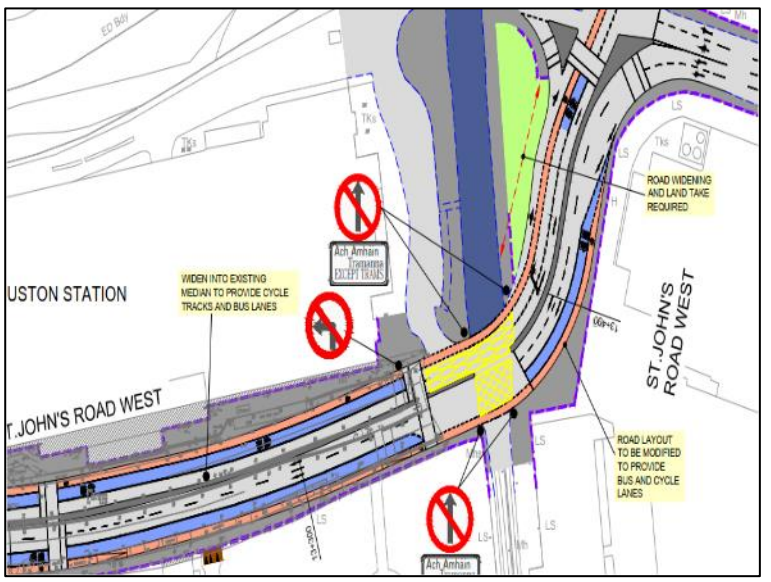
Design Evolution

The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

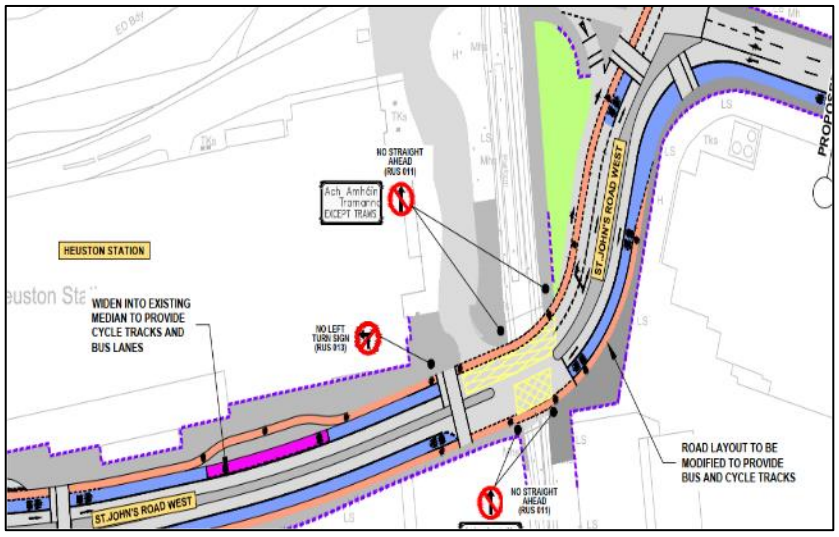
Existing



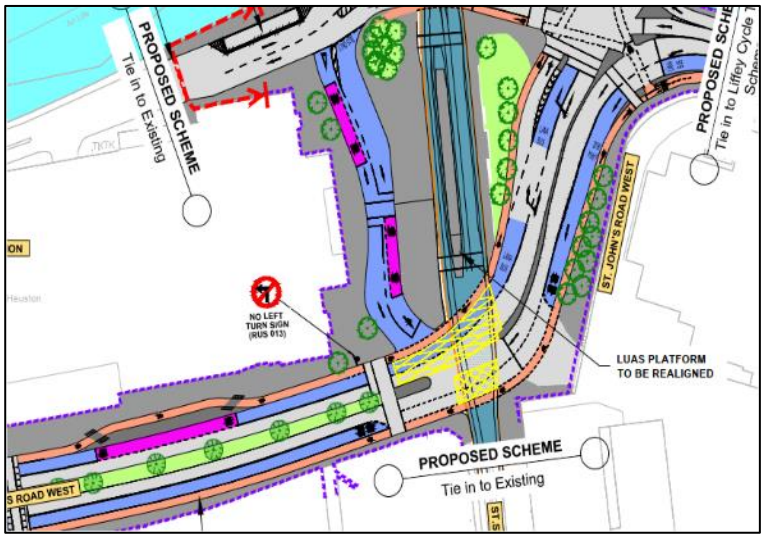
Concept Design Drawing



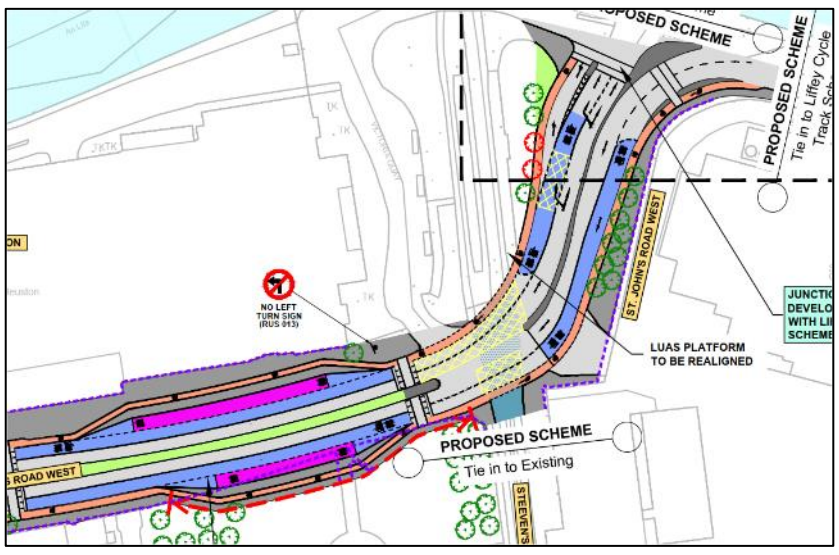
Emerging Preferred Route



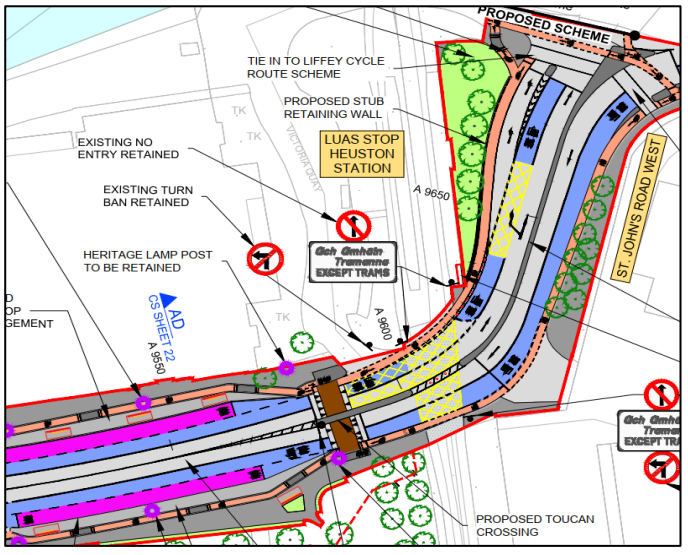
Public Consultation 2



Public Consultation 3



Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	February 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 St Johns Road West/ Heuston Station (Steeven's Lane) – AM Peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 25.7%,
Junction Delay = 15.7 PCUhr

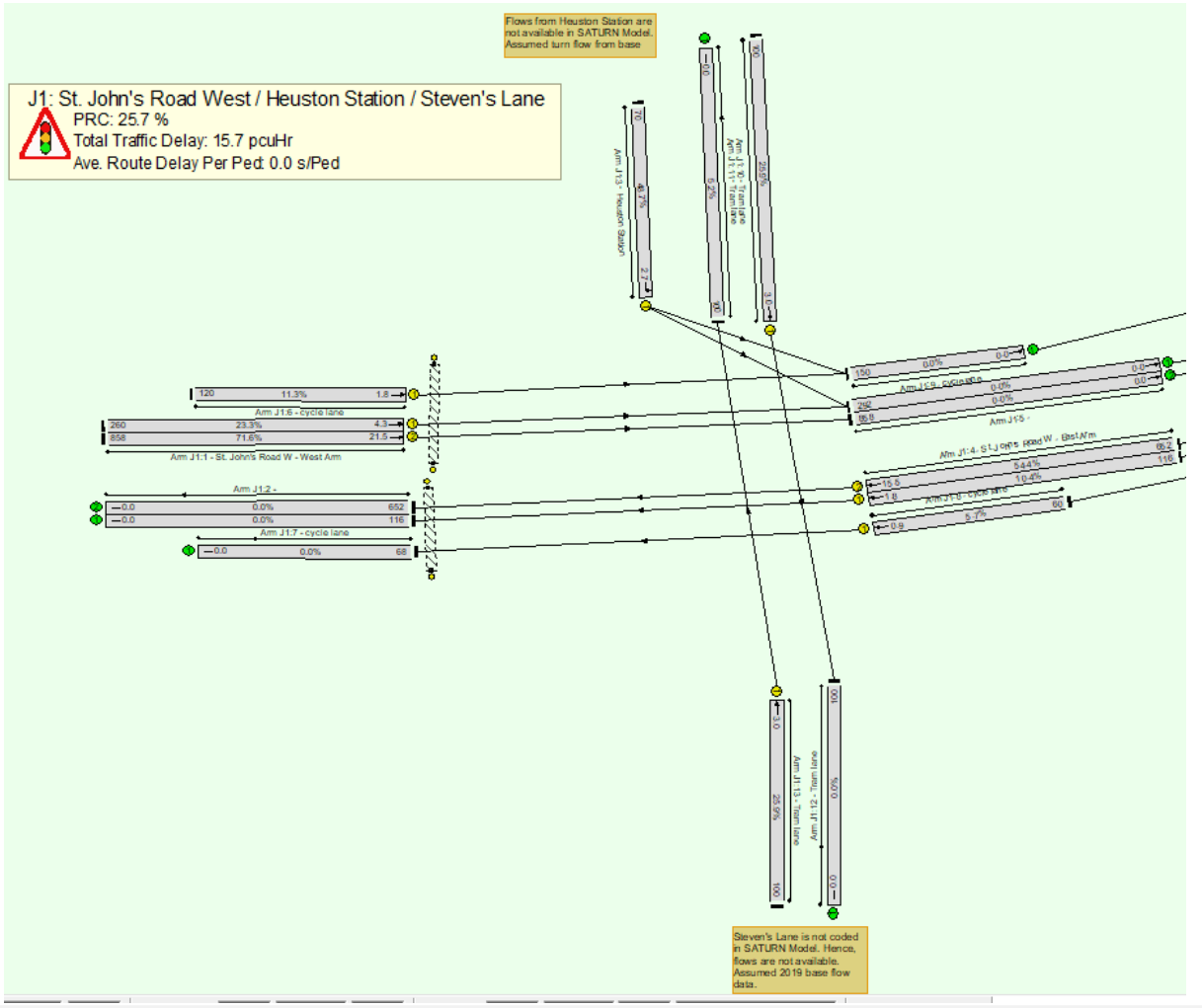
MMQ, CBC arms:
Inbound – 123.63m
Outbound – 89.13m

Bus Av. Delay (s/pcu):
Inbound – 14.2sec
Outbound – 11.2sec

Cyclists Av. Delay (s/pcu):
Inbound – 13.1sec
Outbound – 13sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 23.1sec
Outbound – 21.8sec

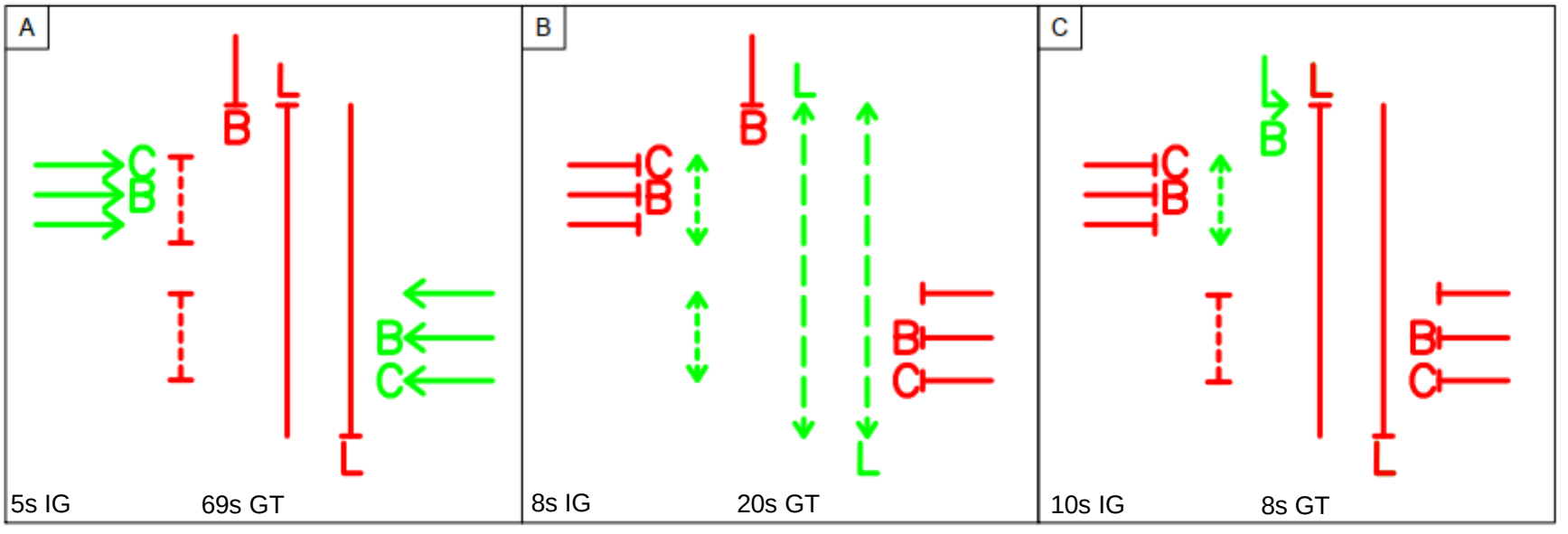
Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

13.St John-Heuston Station Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	1,806	14%	1,806	13%
Bus	7,500	57%	8,160	58%
Walk	2,696	21%	2,696	19%
Cycle	1,000	8%	1,415	10%
Total	**12,902**	**100%**	**13,937**	**100%**

INDICATIVE METHOD OF CONTROL



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	February 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 St Johns Road West/ Heuston Station (Steeven's Lane) – PM Peak

2028 PM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 38%,
Junction Delay = 14.7 PCUhr

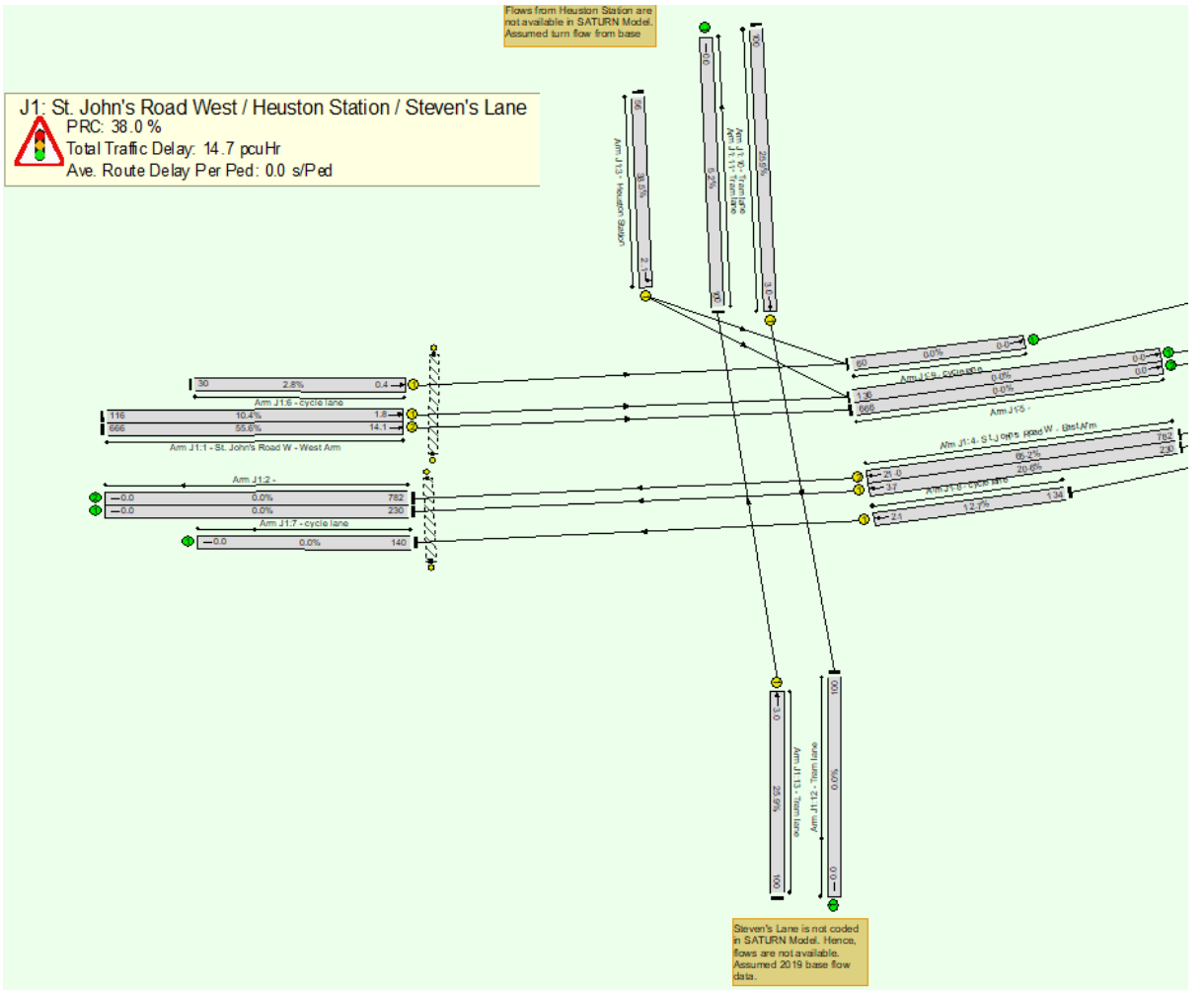
MMQ, CBC arms:
Inbound – 81.08m
Outbound – 120.75m

Bus Av. Delay (s/pcu):
Inbound – 12.9sec
Outbound – 12.1sec

Cyclists Av. Delay (s/pcu):
Inbound – 12.4sec
Outbound – 13.7sec

Car Av. Delay (s/pcu), CBC arms:
Inbound – 18.8sec
Outbound – 25.7sec

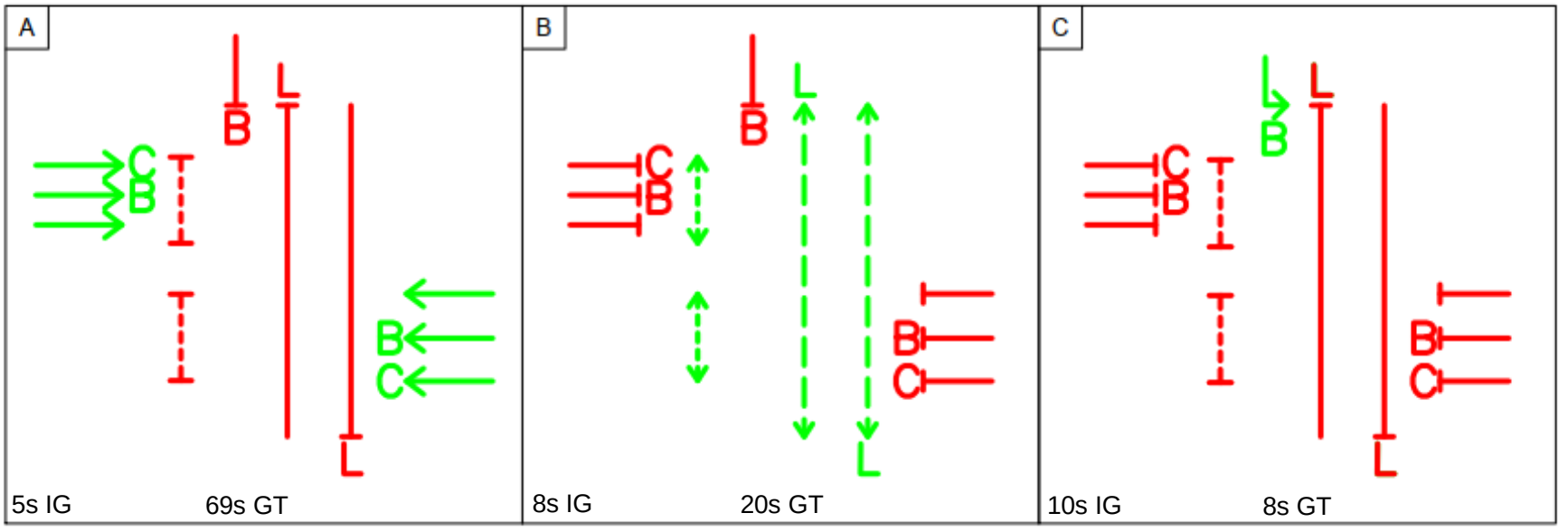
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

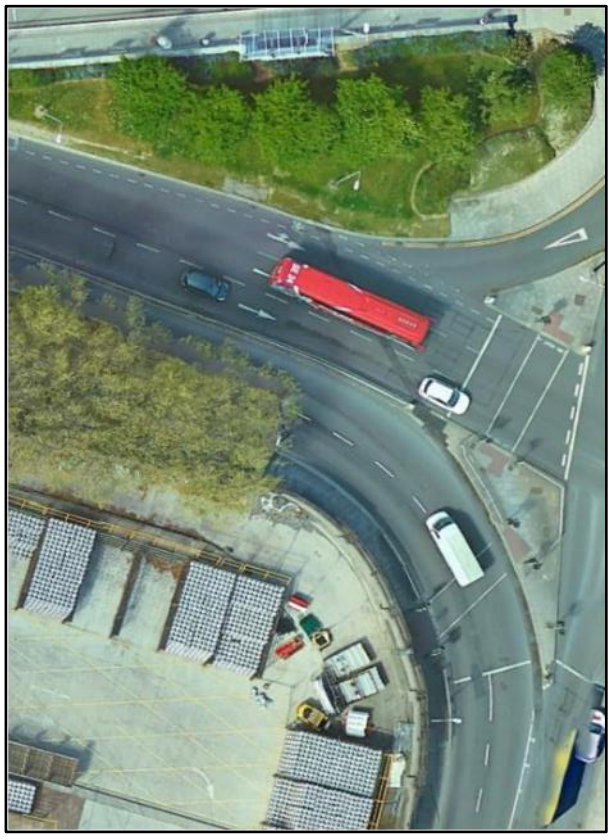
13.St John-Heuston Station Junction	CBC		All Arms	
Mode	People Movement	Mode Share	People Movement	Mode Share
Car	1,696	14%	1,696	13%
Bus	6,900	56%	7,320	56%
Walk	2748	23%	2,748	21%
Cycle	870	7%	1,310	10%
Total	**12,164**	**100%**	**12,944**	**100%**

INDICATIVE METHOD OF CONTROL

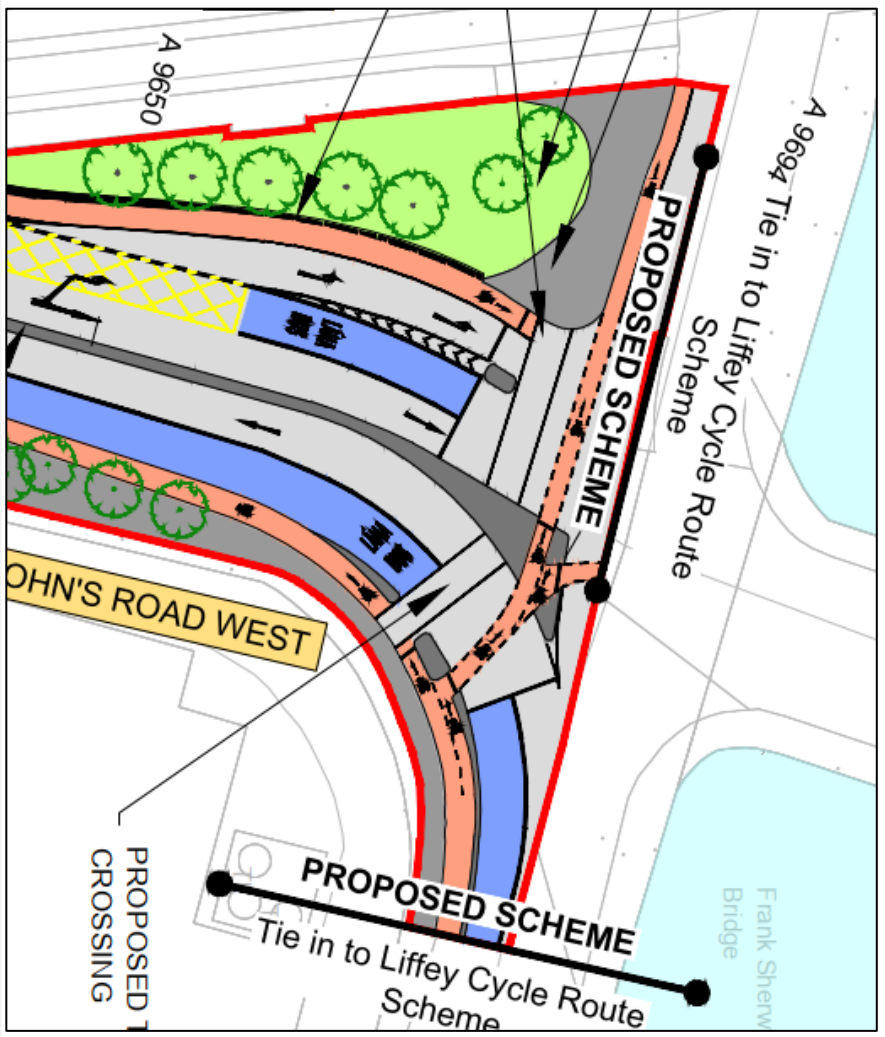


Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126
Junction:	**R148 St John's Road West/ Victoria Quay / Frank Sherwin Bridge**		

EXISTING



FINAL DESIGN



Summary
The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to provide protected cycle infrastructure and crossing facilities, improving bus priority and introduce more direct pedestrian crossings.

Pedestrian Infrastructure
- The existing junction comprises a three stage crossing for pedestrians crossing St Johns Road W arm.
- The proposal is to upgrade this crossing to a staggered toucan crossing. This has been achieved by removing the existing left turn slip lane from St Johns Road into Heuston, providing a more direct facility for pedestrians and reduced crossing distances.

Cyclists Infrastructure
- The existing infrastructure comprises an advisory cycle lane inbound, with no cycle infrastructure outbound.
- The proposal comprises of a dedicated cycle track in both inbound and outbound through the junction.
- A toucan crossing is also proposed across St Johns Road West which will provide a safe crossing facility for cyclists accessing Heuston Station.

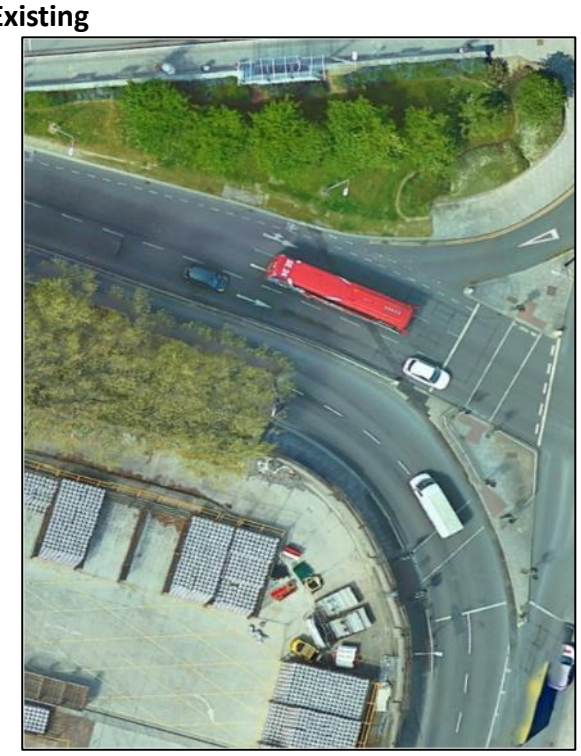
Bus Priority Infrastructure
- No existing bus priority is located at the junction.
- For the inbound direction, a Junction Type 2 is proposed where a gap is provided in the bus lane to facilitate left turning vehicles to access a new left turn lane inside the bus lane. A junction type 1 was considered at this location, but the modelling indicated this would result in capacity pressures at the junction. Therefore a Junction Type 2 is proposed in this instance.
- The outbound direction is proposed to introduce a bus lane up to the stop line as per Junction Type 1.

Subject	BusConnects Core Bus Corridors Junction Design Report		
Date	September 2022		
Route	Clongriffin to City Centre Scheme	Job No/Ref	60599126

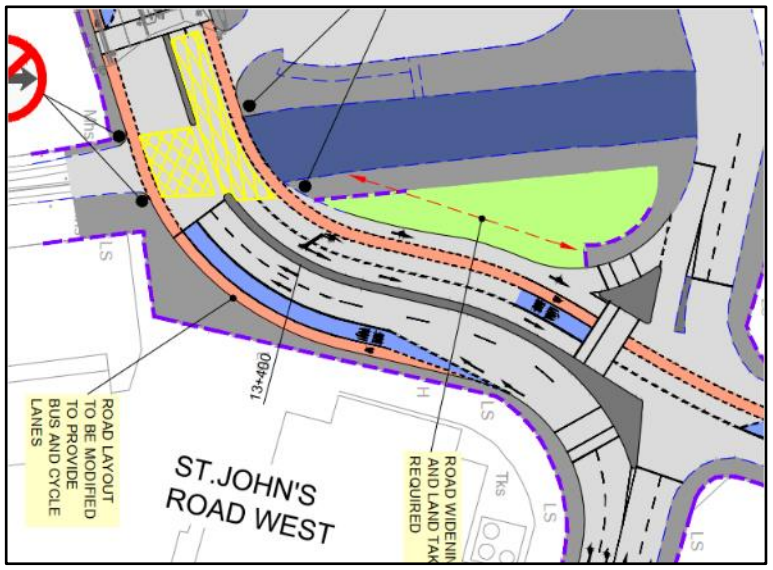
Design Evolution

The proposed junction design has evolved on the BusConnects project from initial Concept Design, Emerging Preferred Route, Public Consultation 2, Public Consultation 3 up to the Current Design. The junction design iterations have been undertaken to optimise pedestrian, cyclist and bus priority infrastructure on the scheme.

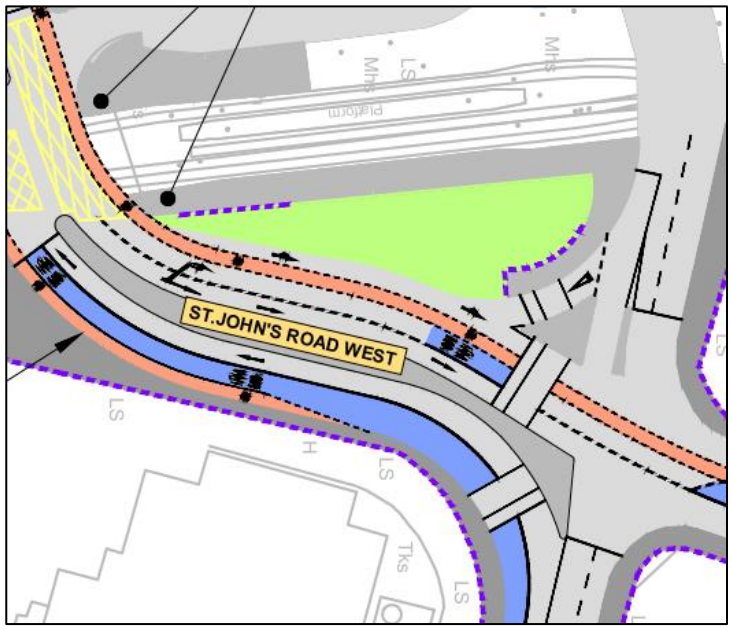
Existing



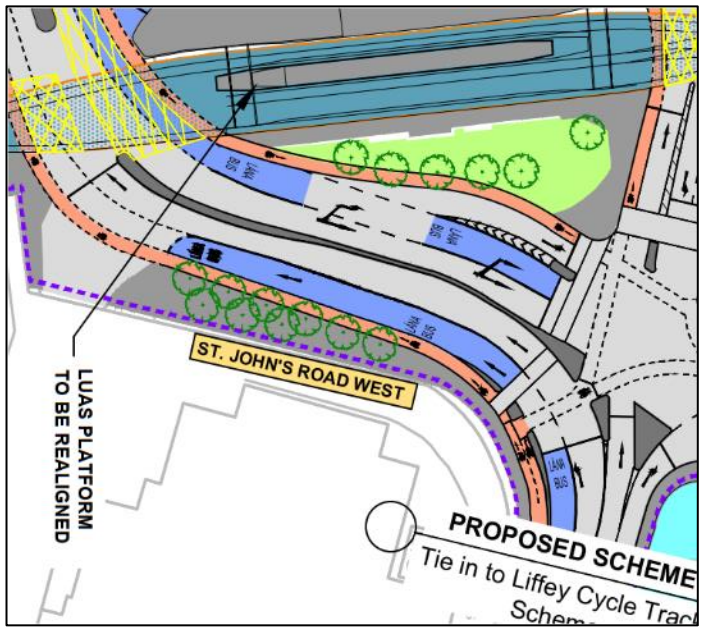
Concept Design Drawing



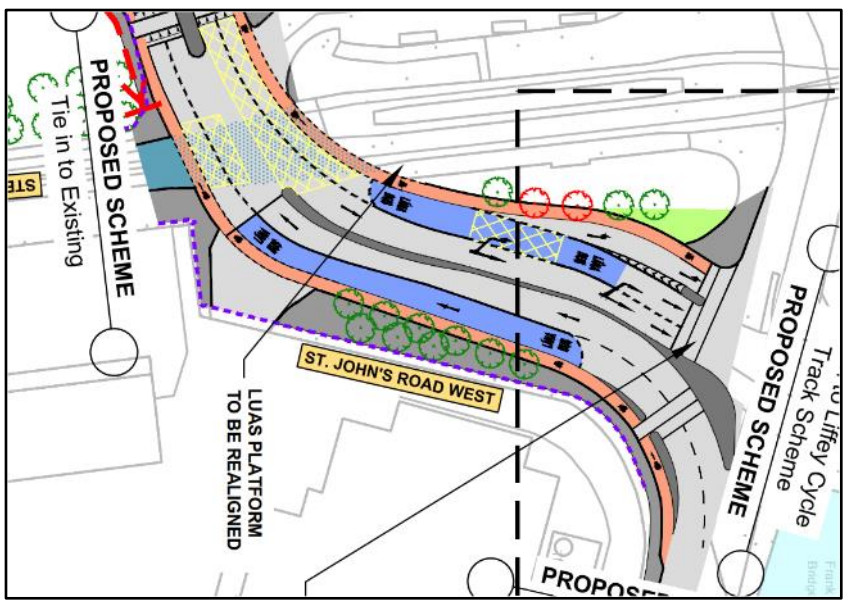
Emerging Preferred Route



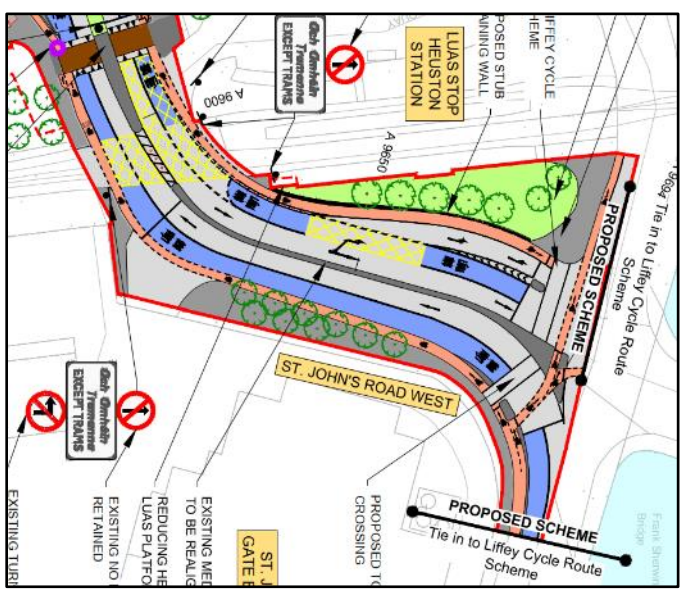
Public Consultation 2



Public Consultation 3



Final Preliminary Design



Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 St John's Road West/ Victoria Quay / Frank Sherwin Bridge – AM Peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = 4.4%,
Junction Delay = 29.3 PCUhr

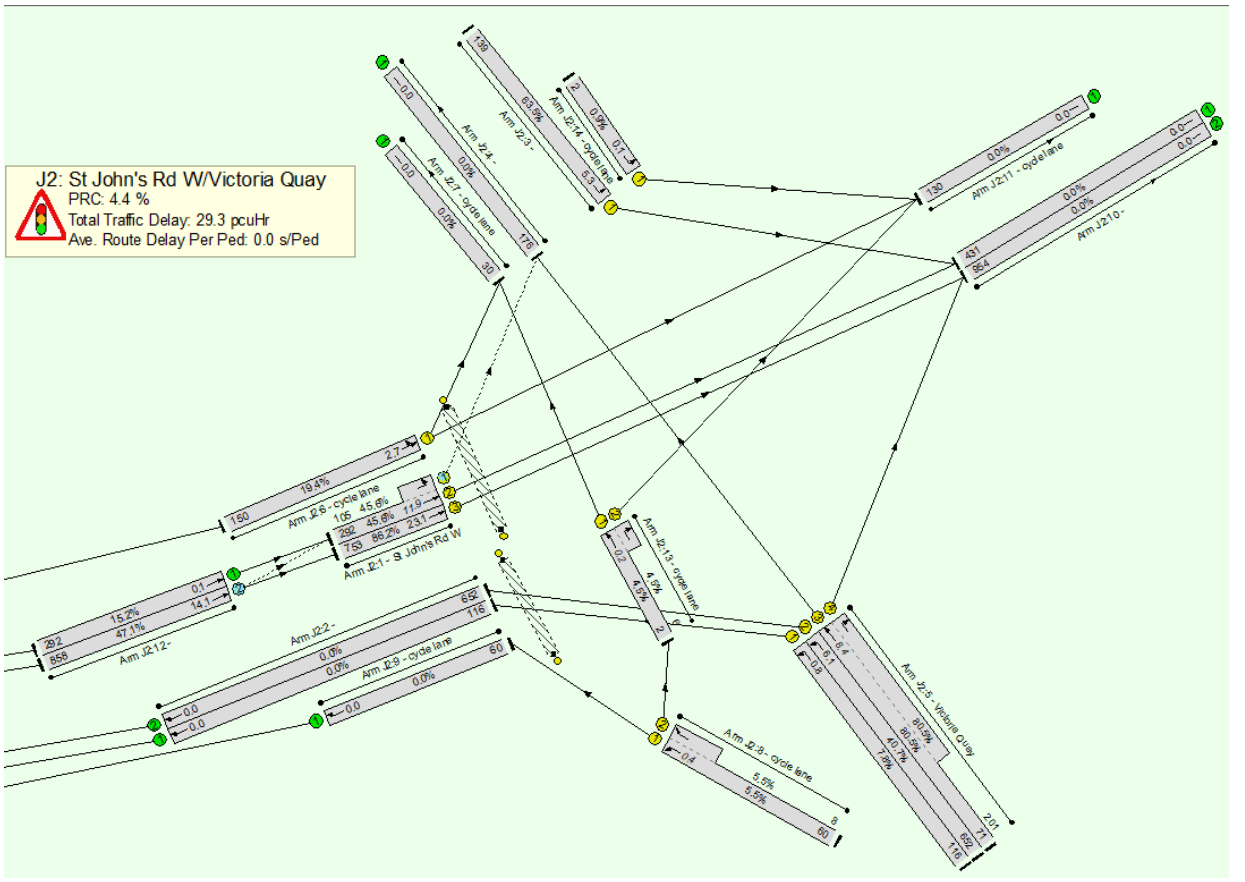
MMQ, CBC arms:
Inbound –132.82m
Outbound –35.07m

Bus Av. Delay (s/pcu):
Inbound –51.1sec
Outbound –3.5sec

Cyclists Av. Delay (s/pcu):
Inbound –24sec
Outbound –9.5sec

Car Av. Delay (s/pcu), CBC arms:
Inbound –59.5sec
Outbound –4.9sec

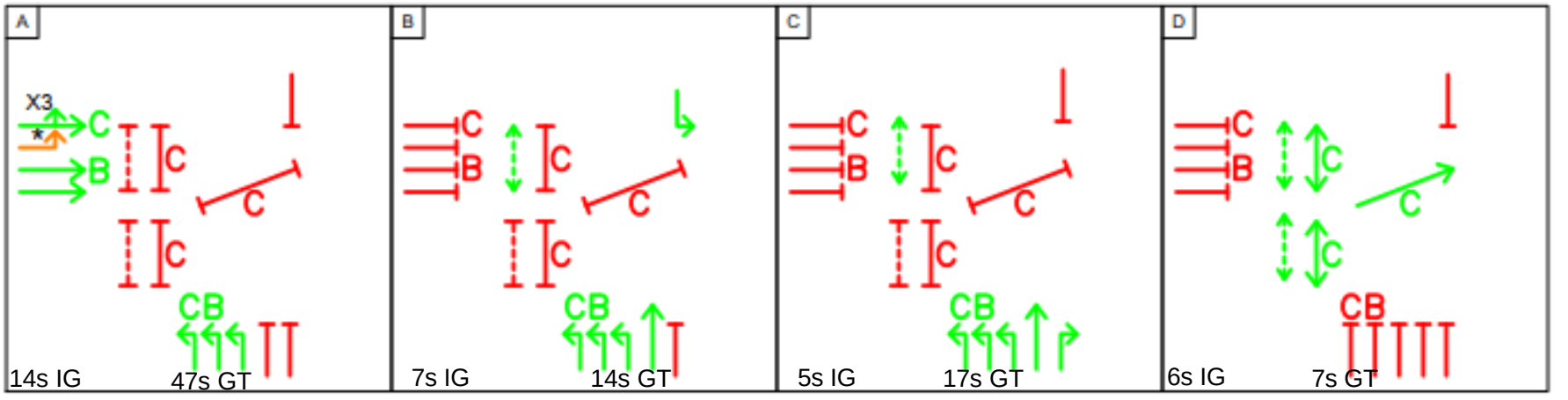
Network Layout Diagram (LinSig) - DS2028_AM



People Movement Assessment DS2028 AM

14.St John Rd -Victoria Quay Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	904	12%	2,280	19%
Bus	5,040	68%	7,800	63%
Walk	876	12%	876	7%
Cycle	620	8%	1,350	11%
Total	**7,430**	**100%**	**12,166**	**100%**

INDICATIVE METHOD OF CONTROL



X3 denotes 3 Seconds Early for Cyclists
* denotes Flashing Amber

Subject	BusConnects Core Bus Corridors Transport Modelling		
Date	September 2022		
Route	Lucan to City Centre Scheme	Job No/Ref	60599126

R148 St John's Road West/ Victoria Quay / Frank Sherwin Bridge – PM Peak

2028 AM Peak Hours
Fixed Time LinSig Results

Cycle Time = 120 secs
PRC = -40.9%,
Junction Delay = 221.8PCUhr

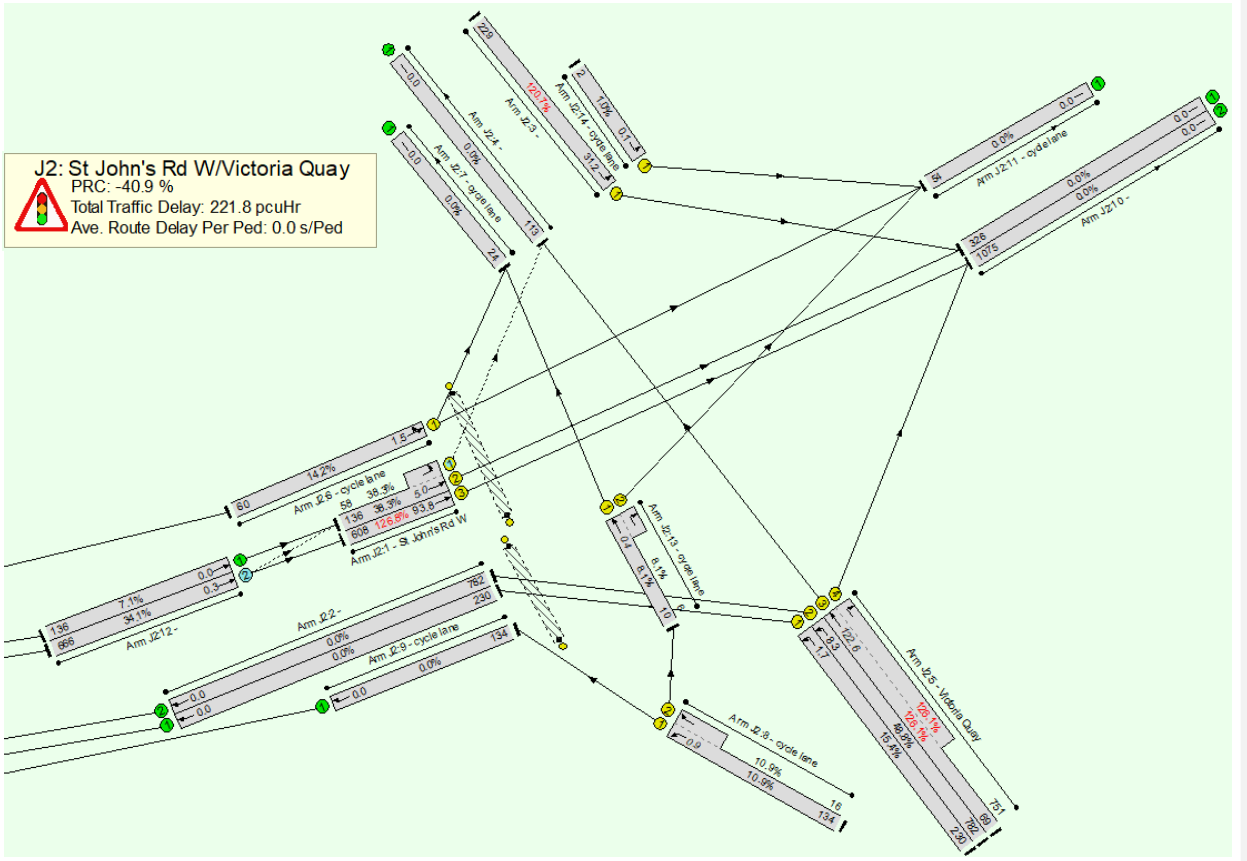
MMQ, CBC arms:
Inbound – 539.35m
Outbound –704.37m

Bus Av. Delay (s/pcu):
Inbound –56.7sec
Outbound –3.7sec

Cyclists Av. Delay (s/pcu):
Inbound –43.2sec
Outbound –8.9sec

Car Av. Delay (s/pcu), CBC arms:
Inbound –505sec
Outbound –5.5sec

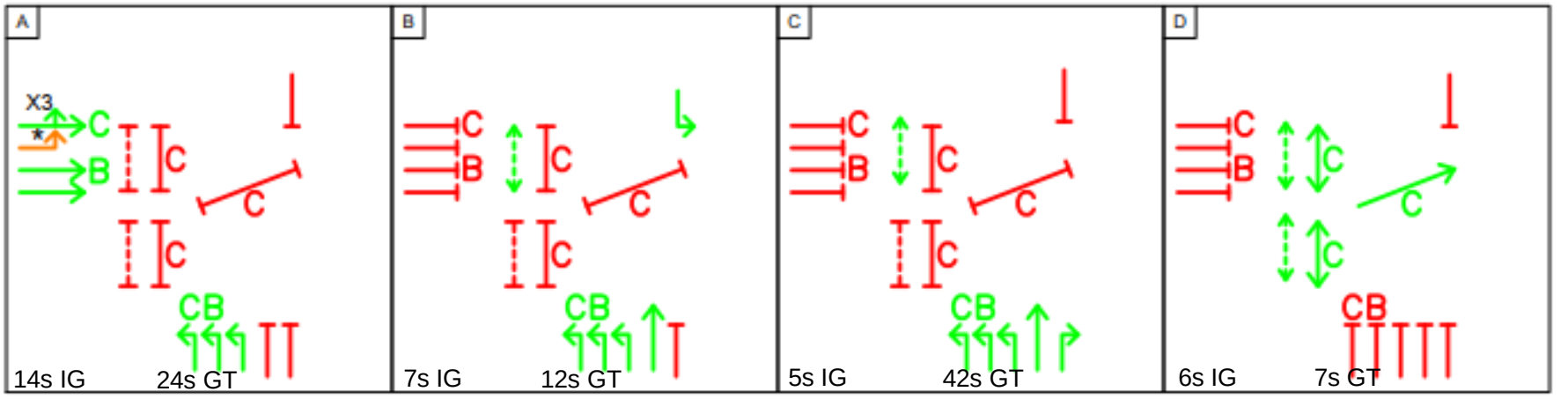
Network Layout Diagram (LinSig) - DS2028_PM



People Movement Assessment DS2028 PM

14.St John Rd -Victoria Quay Junction	CBC		All Arms	
Mode	**People Movement**	**Mode Share**	**People Movement**	**Mode Share**
Car	730	17%	2,971	24%
Bus	2,340	53%	7,320	58%
Walk	1,048	24%	1,048	8%
Cycle	280	6%	1,290	10%
Total	**4,347**	**100%**	**12,549**	**100%**

INDICATIVE METHOD OF CONTROL



X3 denotes 3 Seconds Early for Cyclists
* denotes Flashing Amber