

## Arup

**BusConnects Core Bus Corridors** 

 Templeogue to Terenure and Rathfarnham to City Centre

Stage 1 Road Safety Audit

### Arup

## BusConnects Core Bus Corridors -Templeogue to Terenure and Rathfarnham to City Centre

## Stage 1 Road Safety Audit

**Document Ref:** 

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4.0	AP	РЈМ	PJM	22 <sup>nd</sup> Jun. 2021	Revised Final
3.0	AP	РЈМ	РЈМ	18 <sup>th</sup> Jun. 2021	Revised Draft - Design Changes
2.0	AP	РЈМ	РЈМ	18 <sup>th</sup> Feb. 2021	Final Report
1.0	AP	PJM	PJM	8 <sup>th</sup> Jan. 2021	Draft Report





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#### 1 Introduction

#### 1.1 General

This report results from a Stage 1 Road Safety Audit on two of the proposed BusConnects Core Bus Corridors, from Templeogue to Terenure and from Rathfarnham to the City Centre, carried out at the request of Mr Denis Crowley of Arup.

The members of the Road Safety Audit Team are independent of the design team, and include: -

#### Mr. Peter Monahan

(BE MSc CEng FIEI RSACert) Road Safety Audit Team Leader

#### Mr. Antonios Papadakis

(MSc, MIEI)

Road Safety Audit Team Member

The Road Safety Audit took place between December 2020 & June 2021 and comprised an examination of the documents provided by the designers (see Appendix B). In addition to examining the documents supplied the Road Safety Audit Team visited the site of the proposed measures on the 9<sup>th</sup> December 2020. Weather conditions during the site visit were dry and the road surface was dry. Traffic volumes during the site visit were moderate, pedestrian and cyclist volumes were moderate and traffic speeds were considered to be generally within the posted speed limit.

Where problems are relevant to specific locations these are shown on drawing extracts within the main body of the report and their locations are shown in Appendix D. Where problems are general to the proposals sample drawing extracts are within the main body of the report where considered necessary.

This has been carried out in accordance with the requirements of GE-STY-01024 - Road Safety Audit (December 2017), contained on the Transport Infrastructure Ireland (TII) Publications website.

The scheme has been examined and this report compiled in respect of the consideration of those matters that have an adverse effect on road safety and considers the perspective of all road users. It has not been examined or verified for compliance with any other standards or criteria. The problems identified in this report are considered to require action in order to improve the safety of the scheme and minimise collision occurrence.

If any of the recommendations within this road safety audit report are not accepted, a written response is required, stating reasons for non-acceptance. Comments made within the report under the heading of Observations are intended to be for information only. Written responses to Observations are not required.

#### 1.2 Items Not Submitted for Auditing

Details of the following items were not submitted for audit; therefore no specific problems have been identified at this stage relating to these design elements, however where the absence of this information has given rise to a safety concern it has been commented upon in Section 3: -

- Vehicle swept paths; and
- Visibility splays.



#### 2 Project Description

#### 2.1 General

BusConnects is the National Transport Authority's (NTA) programme to improve bus and sustainable transport services. It is a key part of the Government's polices to improve public transport and address climate change in Dublin and other cities. The aim of BusConnects is to deliver an enhanced bus system that is better for the city, its people and the environment. BusConnects is included in the Programme for Government "Our Shared Future" 2020, as well as within the following Government strategies:

- The National Development Plan 2018 2027;
- Transport Strategy for the Greater Dublin Area 2016 2035; and
- The Climate Action Plan 2019.

Part of the overall BusConnects Programme is to create 16 radial core bus corridors (CBC). A CBC is an existing road with bus priority so that buses can operate efficiently, reliably and punctually. This generally means full length dedicated bus lanes on both sides of the road from start to finish of each corridor or other measures to ensure that buses are not delayed in general traffic congestion. The bus lanes will be alongside segregated cycle lanes/tracks where feasible and general traffic.

The Rathfarnham to City Centre Core Bus Corridor (CBC) commences on the R821 Grange Road at the junction with Nutgrove Avenue. The CBC is routed along the Grange Road, Rathfarnham Road, Terenure Road East, Rathgar Road, Rathmines Road Lower, Richmond Street South, Camden Street Upper and Lower, and Wexford Street to its junction with Kevin Street Lower and Cuffe Street where priority bus lanes end. From Cuffe Street to Dame Street along Redmond's Hill, Aungier Street and South Great George's Street, the route will involve a traffic lane and a cycle track in both directions where it will join the existing traffic management regime in the city centre.

The Tallaght to Terenure Core Bus Corridor (CBC) commences on the Tallaght Road, east of the M50 interchange. From here, the CBC is routed via the R137 along Tallaght Road and Templeogue Road, through Templeogue Village, to Terenure Cross, where it joins the Rathfarnham CBC. Priority for buses is provided along the entire route, consisting primarily of dedicated bus lanes in each direction, with alternative measures proposed at particularly constrained locations.

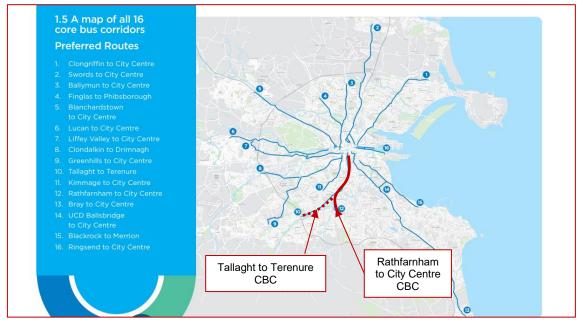


FIGURE 2-1: CORE BUS CORRIDORS PLAN



#### 2.2 Collision History

The Audit Team were provided with historical collision data for the period 2005 to 2016, detailed in the Collision Analysis Report for the proposed Templeogue to Terenure and Rathfarnham to City Centre Core Bus Corridor.

This data contains information on 370 collisions occurring on the road network in the vicinity of the proposed scheme, 1 of which resulted in a fatality and 28 of which resulted in serious injuries. 5.1% of the collisions involved pedestrians and 8.6% of the collisions involved cyclists.



#### 3 Main Report

#### 3.1 Problem

Location: General Problem - Throughout the Scheme

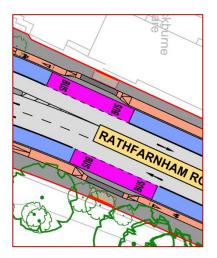
Summary: Potential for cyclist/pedestrian collisions where bus passengers are required to cross the cycle

track when accessing/leaving the floating/island bus stops.

The general arrangement at bus stops involves extending a shared surface from the footpath to the edge of the traffic lane (e.g. a 'Pedestrian Priority' area catering for pedestrians, passengers and cyclists) with the cycle track joining the shared area through the bus stop location.

At this early stage in the design process no tactile paving (either warning or guidance) has yet been indicated. Should insufficient guidance be provided on the entry/exit to/from the shared surfaces, this could result in an increased risk of collisions between cyclists and pedestrians where cyclists may be insufficiently aware of the shared area and of the need to moderate their speed, or even come to a halt.

An absence of Guidance Tactile Paving could result in increased difficulties for the visually impaired who may be unaware of how to access or leave the area for embarkation.



#### Recommendation

Guidance Tactile Paving should be provided to guide visually impaired pedestrians to/from the footpath & the bus stop.

Measures should be provided on the cycle track and footpath approaches/departures to/from these shared areas, for example Ladder & Tramline tactile paving & Yield road markings, so that cyclists and visually impaired pedestrians are aware that they are entering a Shared Area.

#### 3.2 Problem

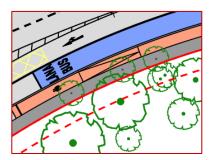
4

Location: General Problem - Throughout the Scheme

Summary: Trees indicated within the footpath may present obstacles to pedestrians and cyclists.

It is unclear from the drawings provided which trees are to be retained, and which are to be removed. A number of trees have been indicated positioned centrally within the proposed footpath in several locations such as along the eastern side of Grange Road.

If these are retained they would present an obstacle to mobility impaired road users, a hazard to the visually impaired or to cyclists on the adjacent cycle lane, resulting in pedestrians stepping into the cycle track, from the footpath, or cyclists entering the adjacent carriageway resulting in an increased risk of pedestrian/cyclist or vehicle/cyclist collisions.



#### Recommendation

Ensure retained/new trees or other items of roadside furniture do not present obstacles/hazards to pedestrians or cyclists.



#### 3.3 Problem

Location: General Problem - Throughout the Scheme

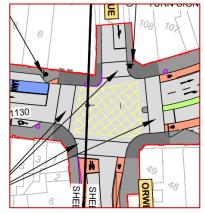
Summary: Insufficient space within proposed Pedestrian Priority areas to accommodate the likely/anticipated

volumes of pedestrians & cyclists safely.

Shared surfaces (Pedestrian Priority) have been indicated at a number of locations throughout the scheme, generally at existing or proposed signalised junctions.

In most instances the road layout indicates that cyclists are to leave the carriageway and join the footpath at these locations, where they will undertake crossings alongside pedestrians at proposed signalised Toucan Crossings within the junction.

It is not clear from the information provided if all of these areas have sufficient width to safely accommodate the likely/anticipated volumes of pedestrians & cyclists at these locations, in particular during peak times.



Insufficient space at these locations could lead to cyclist/pedestrian collisions and minor injuries, or to congestion within the path resulting in some road users entering the carriageway in order to pass waiting pedestrians/cyclists and crossing, with a resulting increased risk of being struck by a passing vehicle.

#### Recommendation

During the design development, review the proposed locations of Pedestrian Priority/Shared Surfaces to ensure that adequate space/width is provided to safely accommodated the anticipated volumes of pedestrians and cyclists.

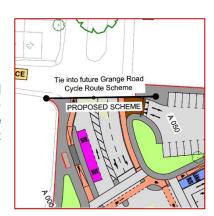
In addition, during the design development, appropriate tactile paving should be incorporated at these locations to adequately inform all road users that they are entering/leaving a shared area (Ref: Traffic Management Guidelines).

#### 3.4 Problem

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0001

Summary: Tie-in with the Grange Road Cycle Route scheme.

It is unclear if the Grange Road Cycle Route Scheme will be implemented in advance of this Scheme, or if there will be a period between the two schemes being constructed. The proposed tie-in arrangement onto the Grange Road North may be inappropriate in the absence of the adjacent scheme having been constructed.



#### Recommendation

During the design development, should it become apparent that the adjacent scheme will not be in place prior to the construction of this Scheme, then alternative tie-in arrangements will be required which provide a safe transition for all road users entering/exiting the proposed road layout.



#### 3.5 Problem

Location: A number of junctions Throughout the Scheme

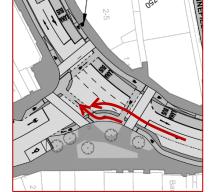
Summary: Left turning drivers may be insufficiently aware of cyclists proceeding straight at a number of the

protected intersections/junctions within the Scheme.

There is a risk that drivers turning left at some of the protected junctions within the scheme, when given a green signal, may not understand that there may be straight-through cyclists crossing their path. This could arise where a left-turning driver misinterprets the layout as a signalised/toucan crossing on a separate phase.

#### Recommendation

Reduce the lateral displacement of the straight through cycle lanes from the left-turning traffic lane(s) to improve driver's awareness of possible straight through cyclists and amend the left turn signals so that left turns are on a flashing amber.



Alternatively, straight ahead cyclist movements at junctions should occur on a separate signal phase to vehicles.

#### 3.6 Problem

6

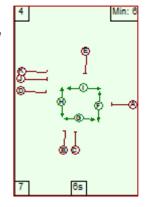
Location: General Problem - Throughout the Scheme

Summary: The timing proposed for pedestrian phases at a number of signalised

junctions within the Scheme may not be sufficient to allow pedestrians, and in particular the mobility impaired, to complete a crossing safely.

At a number of signalised junctions within the Scheme pedestrian phases have been indicated as being quite short (e.g. 6 seconds long). The Audit Team are concerned that this will not be sufficient time for non-motorised road-users, in particular the elderly & mobility impaired, to complete a crossing safely.

This could lead to pedestrians remaining within the carriageway when a subsequent green vehicular phase has been triggered increasing the risk of vehicle-pedestrian collisions.



#### Recommendation

Ensure pedestrian green phases are of a sufficient length such that all non-motorised road users can complete the crossing safely.



#### 3.7 Problem

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0004

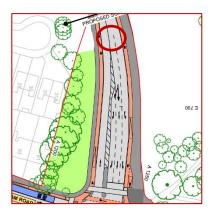
Summary: Eastbound drivers may enter the incorrect lane on the Dodder Park Road approaching the

junction with Rathfarnham Road.

Eastbound drivers on the Dodder Park Road approaching the junction with Rathfarnham Road may find themselves inadvertently in the left-turn lane resulting in an increased risk of late manoeuvres and side swipe collisions should drivers then attempt to re-enter the straight-ahead lane.

#### Recommendation

Eastbound drivers on the Dodder Park Road approaching the junction with Rathfarnham Road should be guided, by means of road markings, into the straight-ahead lane at the upcoming junction with drivers who wish to turn left at the junction having to consciously choose to enter the left-turn only lane.



#### 3.8 Problem

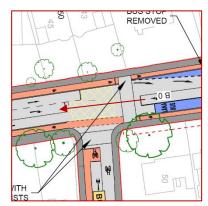
Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0005

Summary: Abrupt change in road layout at the junction of Rathfarnham

Road & Bushy Park Road may lead to vehicles entering the

opposing right-turn lane.

The indicated road layout at the junction of Rathfarnham Road & Bushy Park Road could result in southbound drivers misinterpreting the downstream lane position, and enter the opposing right-turn lane resulting in possible head-on collisions.



#### Recommendation

The road layout should be amended so that there is better alignment between the upstream & downstream southbound lanes through the junction, or additional guidance road markings or splitter islands provided to assist drivers in understanding the road layout.

#### 3.9 Problem

Location: BCIDC-ARP-GEO GA-1012 XX 01-DR-CR-0006

Summary: Visibility to the proposed regulatory signs may be insufficient.

The indicated position of the "No Right Turn" regulatory sign on the Rathfarnham Road approach to its junction with Terenure Road may be insufficiently visible to drivers approaching the junction, resulting in inappropriate & unsafe turning manoeuvres.

## TERENURE PLACE TERENURE PLACE NEW TOUCH OROPPED IN

#### Recommendation

Include the "No Right Turn" signs as 'Regulatory Illuminated Box Signs' within the signal aspects at this junction.

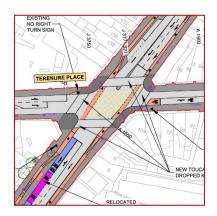


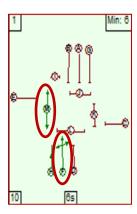
#### 3.10 **Problem**

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0006

Summary: Risk of pedestrians crossing Terenure place being struck by left-turning vehicles.

The proposed signal phasing for the Rathfarnham Road/Terenure Rd, North junction indicates that left turns from the Rathfarnham Road onto Terenure Place occur at the same time as the pedestrian crossing of Terenure Place, resulting in possible vehicular/pedestrian collisions.





#### Recommendation

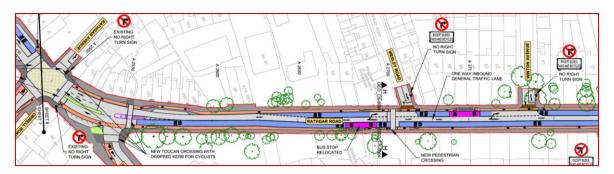
The pedestrian crossing of Terenure place should occur on a separate phase to left-turning vehicles from Rathfarnham Road.

#### 3.11 **Problem**

BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0008 Location:

Revisions to scheme layouts and permitted traffic movements at junctions within the Scheme may Summary: lead to capacity or safety issues at existing junctions outside the Scheme.

Proposed changes to the permitted direction of travel on Rathgar Road is likely to result in increased traffic volumes on the adjacent road network, for example Grosvenor Road & Rathmines Rd, Upper. It's unclear if the existing, adjacent, road network can safely accommodate the additional traffic safely, and whether additional measures are required along these routes as a result.



#### Recommendation

Ensure proposed amendments within the Scheme do not have a negative effect on traffic safety on the adjacent road network outside the Scheme extents. It may be necessary to consider additional measures, outside the Scheme extents, in order to ensure that the adjacent road network can safely accommodate displaced traffic.



#### 3.12 Problem

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0011

Summary: Absence of regulatory signage may lead inappropriate turning

manoeuvres.

No signage has been indicated on the exit from the existing petrol station at the Rathgar Road/Grosvenor Road junction advising drivers that they cannot turn right onto the Rathgar Road leading to unsafe exiting manoeuvres.

# RELOCATED BUS STOP

#### Recommendation

Provide a "No Right Turn" regulatory sign for drivers exiting from the petrol station.

#### 3.13 Problem

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0011

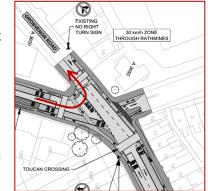
Summary: Unclear if the swept path of large vehicles can be accommodated safely at the Rathgar

Road/Grosvenor Road junction

It is unclear from the information provided whether the swept path of left turning large vehicles from Rathgar Road onto Grosvenor Road can be accommodated without encroaching into the opposing traffic lane at the stop line on Grosvenor Road.



During the design development ensure that the proposed road layout can accommodate the swept path of all vehicles undertaking all permitted manoeuvres.



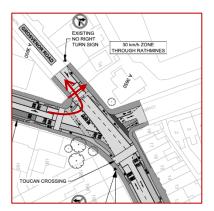
#### 3.14 Problem

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0011

Summary: Potential for conflicts between left-turning vehicles and northbound cyclists.

The proposed layout for cyclists wishing to proceed northbound at the junction of Rathgar Road and Grosvenor Road is such that left-turning drivers from Rathgar Road northbound onto Grosvenor Road may be unprepared for a cyclist proceeding across Rathgar Road at the same time as they are permitted to turn left, likely misinterpreting the layout as a toucan crossing of the side road, resulting in an increased risk of cyclists being struck by left turning vehicles at this location.

In addition, the route for northbound cyclists may be an attractive to cyclists, who may choose to cross the junction diagonally in line with the path of northbound vehicles.



#### Recommendation

Review the proposed signal phasing or the cycle lane layout to remove possible conflicts between cyclists and vehicles turning left onto Grosvenor Road, and to better reflect the likely cyclists desire lines through the junction. In addition, consider providing a flashing-amber left-turn signal for this manoeuvre.



#### 3.15 Problem

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0013

Summary: Visibility for drivers turning right from Rathmines Road onto

Richmond Hill might be impeded by stationary buses.

The proximity of the northbound bus stop to the junction of Rathmines Rd, Lower & Richmond Hill may make it difficult for drivers of following vehicles, who must turn right onto Richmond Hill, to see approaching vehicles where a bus is stationary at the bus stop in order to know if it is safe to turn right.

#### Recommendation

Ensure sufficient inter-visibility between drivers wishing to turn right and approaching southbound vehicles at this location.



#### 3.16 Problem

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0015

Summary: Discontinuous cycleway facilities.

The proposed layout of the cycle facilities at the junction of Camden Street Upper and Charlotte Way does not appear to cater for southbound cyclists wishing to proceed south at the junction.

A lack of cycle lane continuity at this location may lead to unsafe manoeuvres by cyclists and possible cyclist/vehicle collisions.



#### Recommendation

The road layout should be amended to include connectivity for southbound cyclists through the junction.

#### 3.17 Problem

10

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0016

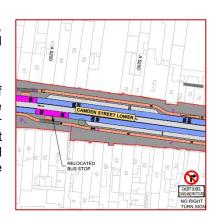
Summary: Vehicles using the proposed parallel parking on the western side of Camden St may have difficulty

in safely exiting the parking spaces due to insufficient visibility towards approaching southbound

vehicles in the general traffic lane.

Car parking has been indicated along the western side of Camden St, Lower, adjacent to the northbound bus lane. General traffic is only permitted southbound on Camden St, Lower & Wexford Street.

Consequently, the only vehicles who can park along the western side of Camden St, Lower will be southbound vehicles. Drivers exiting from these parking spaces will have to pull across the northbound bus lane and enter the southbound general traffic lane at an acute angle, which may be difficult to achieve safely with restricted visibility towards approaching southbound vehicles in the general traffic lane due to the driver's position within the vehicle.



#### Recommendation

Ensure the proposed car parking spaces can be safely used by drivers.



#### 3.18 Problem

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0019

Summary: Visibility for drivers turning left onto Yewlands Terrace might

be impeded by parked vehicles.

Vehicles parked in the loading area/parallel parking spaces on Terenure Rd, North, immediately north of the junction with Terenure Rd, East, may block visibility towards straight-ahead northbound cyclists on the cycle lane for drivers of vehicles turning left onto Yewlands Terrace, resulting in possible vehicular/cyclist collisions.

## icular/cyclist collisions. Recommendation

Ensure sufficient inter-visibility between drivers and cyclists at this location.

# TERENURE TO SERVICE TO

#### 3.19 Problem

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0031

Summary: Low tree canopies.

A number of trees have been indicated as overhanging the proposed cycle lanes, however at this early stage in the design process it is unclear whether these trees will provide sufficient vertical clearance to the cycle lane.

Trees with low canopies can present a hazard to cyclists who may be unaware of low branches which could lead to sudden avoidance manoeuvres leading to loss of control or collisions with vehicles in the adjacent lane.



#### Recommendation

Ensure adequate vertical clearance for tree canopies which overhang footpaths/cycle tracks.

#### 3.20 Problem

Location: BCIDC-ARP-GEO\_GA-1012\_XX\_01-DR-CR-0037

Summary: Northbound drivers may be insufficiently aware of the bus gate when on Templeogue Road resulting in unsafe u-turn manoeuvres at the junction between Templeogue Road and Olney

Grove.

An advance sign advising drivers of the upcoming bus gate has been indicated at the junctions of Templeogue Road with Cypress Grove Road and with Templeville Road. Similar signage has not been indicated at the junction with Fortfield Road or Rathdown Avenue.

The absence of signage in some locations in advance of the bus gate may result in some drivers incorrectly entering Templeogue Road and having to undertake possibly unsafe u-turn manoeuvres.

## NO LEFT TURN SIGN EXISTING NO RIGHT TURN SIGN EXISTING NO RIGHT TURN SIGN EXISTING NO RIGHT TURN SIGN NO RIGHT TURN SIGN RIGHT SIGN

#### Recommendation

Additional advance signage should be provided at the Fortfield Road & Rathdown Avenue junction is advising drivers of the bus gate & associated restrictions and providing directions for alternate routes for intended/likely destinations.



#### 4 Observations

4.1 At this early stage in the design development no information has been provided in relation to the proposed dropped kerb locations, tactile paving provisions & transitions for cycle tracks between on-road and off-road locations. Possible safety issues can arise at these locations, for example for visually impaired pedestrians may inadvertently enter a carriageway at a dropped kerb location should no tactile warning paving be provided (e.g. at uncontrolled crossing locations, or raised table crossing of side roads).

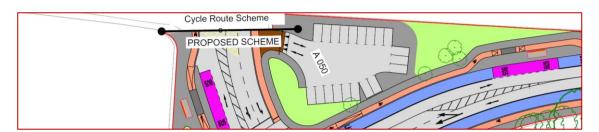
During the design development ensure that dropped kerbs are provided where necessary to facilitate mobility impaired road users, and that tactile paving is provided at these locations and where cycle tracks transition between on-carriageway and off-road locations, to advise visually impaired pedestrians of the carriageway hazard.

Where shared surfaces are provided, Ladder & Tramline tactile paving will be required in order to advise visually impaired pedestrians that they are entering a location shared with cyclists, and to prevent them from inadvertently exiting the shared space onto the cycle lane which could result in them entering the carriageway further downstream.

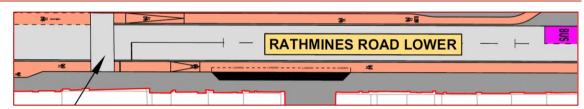
4.2 There is no existing cycle track along the southern side of Nutgrove Avenue, on the eastern arm of its junction with Grange Road/Rathfarnham Wood. An appropriate tie-in should be provided with the existing road layout at this location.



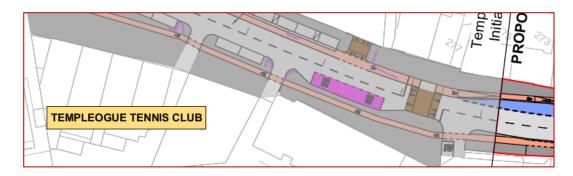
- 4.3 It is unclear if the existing recycling bins are to be retained within the amended car park layout at the junction between Grange Road & Nutgrove Avenue. During the design development ensure that the use and operation of these recycling bins is considered and amend the location or the access arrangements where necessary. In particular, allowances for HGV access during routine collection should be catered for.
- There is a potential for vehicles parking on some of the spaces within the amended car park layout at the junction between Grange Road & Nutgrove Avenue to overhang the adjacent footpath along Nutgrove Avenue. During the design development include measures to prevent/deter vehicles from overhanging the footpath.



4.5 On the eastern side of Rathmines Rd, Lower, at approximate Chainage A4050, an area of the cycle track and footpath has been shaded black. It is unclear what this area is intended for, and consequently whether any safety issues arise.



- 4.6 It is unclear how drivers who inadvertently proceed up to the proposed bus gates to be provided as part of the Scheme can safely perform U-turn manoeuvres where they are not permitted to proceed.
- 4.7 The partially indented bus stop in Templeogue Village could entice some drivers to attempt to pass a stationary bus where there may be insufficient room for this manoeuvre to be completed safely. It may be preferable for the bus cage to be positioned fully within the traffic lane width a continuous centreline between the opposing traffic lanes at this location, requiring following drivers to wait until the bus moves off.





#### 5 Road Safety Audit Team Statement

We certify that we have examined the drawings referred to in this report. The examination has been carried out with the sole purpose of identifying any features of the design that could be removed or modified in order to improve the safety of the scheme.

The problems identified have been noted in this report together with associated safety improvement suggestions, which we would recommend should be studied for implementation.

No one on the Road Safety Audit Team has been involved with the design of the scheme.

**ROAD SAFETY AUDIT TEAM LEADER** 

Peter Monahan Signed:

Dated: 22<sup>r/d</sup> June 2021

**ROAD SAFETY AUDIT TEAM MEMBER** 

Antonios Papadakis Signed: Archological Antonios Papadakis

Dated: <u>22<sup>nd</sup> June 2021</u>



Appendix A – Road Safety Audit Brief Checklist



Have the following been included in the audit brief?: (if 'No', reasons should be given below)

		Yes	No
1.	The Design Brief	$\checkmark$	
2.	Departures from Standard		$\checkmark$
3.	Scheme Drawings	$\checkmark$	
4.	Scheme Details such as signs schedules, traffic signal staging		$\checkmark$
5.	Collision data for existing roads affected by scheme		$\checkmark$
6.	Traffic surveys		$\checkmark$
7.	Previous Road Safety Audit Reports and		
	Designer's Responses/Feedback Form	$\checkmark$	
8.	Previous Exception Reports		$\checkmark$
9.	Start date for construction and expected opening date		$\checkmark$
10.	Any elements to be excluded from audit		$\checkmark$
	y other information? es', describe below)		$\checkmark$



Appendix B – Documents Submitted to the Road Safety Audit Team



DOCUMENT/DRAWING TITLE	DOCUMENT/DRAWING NO.	REVISION
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0001	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0002	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0003	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0004	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0005	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0006	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0007	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0008	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0009	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0010	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0011	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0012	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0013	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0014	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0015	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0016	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0017	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0018	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0019	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0020	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0021	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0022	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0023	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0024	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0025	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0026	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0027	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0028	L02.1



DOCUMENT/DRAWING TITLE	DOCUMENT/DRAWING NO.	REVISION
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0029	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0030	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0031	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0032	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0033	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0034	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0035	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0036	L02.1
CBC 1012 TEMPLEOGUE/RATHFARNHAM TO CITY CENTRE GENERAL ARRANGEMENT	BCIDC-ARP-GEO_GA- 1012_XX_01-DR-CR-0037	L02.1



Appendix C – Feedback Form



#### **Road Safety Audit Feedback Form**

Scheme: BusConnects Core Bus Corridors

Route No.: R114, R137

Audit Stage: Stage 1 Road Safety Audit Date Audit Completed: 17th Jun. 2021

		1		
	To Be Completed By Designer			To Be Completed By Audit Team Leader
Paragraph No. in Safety Audit Report	Problem Accepted (Yes/No)	Recommended Measure(s) Accepted (Yes/No)	Describe Alternative Measure(s). Give reasons for not accepting recommended measure	Alternative Measures or Reasons Accepted by Auditors (Yes/No)
3.1	Y	Y	Measures, including tactile paving, are proposed at in line bus stops to mitigate potential for conflicts by controlling these crossing points. These were not presented on drawings submitted for RSA. See Section 11.2 of Preliminary Design Guidance Booklet for details.	
3.2	Y	Y	Positioning of new trees and retention of existing trees is still under review. Cognisance will be given to pedestrian requirements and 1.2m clear footpath will be maintained at all locations in line with DMURS.	
3.3	Y	Y	Measures are proposed at pedestrian priority zones at junctions to mitigate potential for conflicts. These were not presented on drawings submitted for RSA. See Section 7.5 of Preliminary Design Guidance Booklet for details.	
3.4	Y	Y	Liaison with Grange Road design team is ongoing and tie ins will be coordinated as appropriate. If BusConnects is delivered first, it will be redesigned to tie into the existing Grange Road arrangement	
3.5	Y	Y	Managing the potential conflict between cyclists and left turning vehicles is still under review but the current proposal proposes use of a flashing amber signal to alert motorists to the potential conflict. Consideration will be given to phase separating these movements if the left turning vehicles is high (e.g. greater than 150vph). Further details are presented in Section 7 of the Preliminary Design Guidance Booklet	



#### **Road Safety Audit Feedback Form**

Scheme: BusConnects Core Bus Corridors

Route No.: R114, R137

Audit Stage: Stage 1 Road Safety Audit Date Audit Completed: 17th Jun. 2021

	To Be Completed By Designer			To Be Completed By Audit Team Leader
Paragraph No. in Safety Audit Report	Problem Accepted (Yes/No)	Recommended Measure(s) Accepted (Yes/No)	Describe Alternative Measure(s). Give reasons for not accepting recommended measure	Alternative Measures or Reasons Accepted by Auditors (Yes/No)
3.6	Y	Y	Green times assigned to pedestrians are still under review but all green times allow for sufficient intergreens for pedestrians, including mobility impaired pedestrians, to clear the road they are crossing.	
3.7	Y	Y	Road markings indicating lane arrangement to be located where one lane develops to 2.	
3.8	Y	Y	Additional guidance road markings to be provided at this junction.	
3.9	Y	Y	Drawings do not indicate positioning of signs but rather that there will be a turn ban at this junction. However, regulatory Illuminated box sign or multiple 'No Right Turn' signs to be considered at detailed design stage	
3.10	Y	Y	Proposed junction staging to be updated to remove this conflict	
3.11	Y	Y	Adjacent roads which will carry additional traffic have been assessed for suitability to carry additional traffic volumes	
3.12	Y	Y	'No Right Turn' sign to be provided at exit from petrol station	
3.13	Y	Y	Swept path analysis has shown that required movements cannot be undertaken without encroaching on adjacent lane. Layout amended to suit.	



#### **Road Safety Audit Feedback Form**

BusConnects Core Bus Corridors Scheme:

Route No.: R114, R137

Audit Stage: Stage 1 Road Safety Audit Date Audit Completed: 17th Jun. 2021

	To Be Completed By Designer			To Be Completed By Audit Team Leader
Paragraph No. in Safety Audit Report	Problem Accepted (Yes/No)	Recommended Measure(s) Accepted (Yes/No)	Describe Alternative Measure(s). Give reasons for not accepting recommended measure	Alternative Measures or Reasons Accepted by Auditors (Yes/No)
3.14	Y	Y	Managing the potential conflict between cyclists and left turning vehicles is still under review but the current proposal proposes use of a flashing amber signal to alert motorists to the potential conflict. Consideration will be given to phase separating these movements if the left turn vehicle is high (e.g. greater than 150vph).	
3.15	Y	Y	Location of Bus Stop to be reviewed to ensure sufficient visibility for right turners	
3.16	Y	N	Outbound cyclists are to be provided with a separate signal stage at this junction allowing them to safely continue south.	Yes
3.17	Y	Y	Car parking on Camden Street to be reviewed	
3.18	Y	Y	Visibility to cyclists to be improved - shorten parking bay bay 2-3m	
3.19	Y	Y	Vertical clearance to tree canopies to be reviewed at detailed design stage	
3.20	Y	Y	Advance signage to be provided advising motorists of the upcoming Bus Gate and directing them to other appropriate routes.	

David Callin Designer Date

Peter J. Mansher Audit Team Leader Date

colm griffin Employer Date 23rd June 2021

Signed: 22<sup>nd</sup> June 2021

14th April 2022 Signed:



**Appendix D – Problem Locations** 

