Appendix M
Road Safety Audits

REPORT

Clongriffin to City Centre CBC

City Centre to Kimmage CBC

Road Safety Audit Stage 1

Prepared for

CH2M Barry

Date: February 2018

3rd Floor,
St Johns House,
High Street,
Tallaght,
Dublin 24,
Ireland

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Appendices

Introduction

This report results from a Stage 1 Road Safety Audit of the proposed Clongriffin to City Centre CBC and City Centre to Kimmage CBC.

The audit has been prepared in accordance with TII Publication GE-STY-01024 (HD 19/15) Road Safety Audit.

The Audit Team has examined and reported on only the road safety implications of the scheme and has not examined or verified the compliance of the design to any other criteria.

The Audit Team was as follows:

G. Turley Team Leader	MEng, HDip PM, H Dip H'ways & Geo, CEng MIEI, Associate Director, Halcrow Group Ireland Ltd, A CH2M Company, 3rd Floor St Johns House, High Street, Tallaght, Dublin 24, Ireland
T. Meagher Team Member	BE Civil MEngSc C.IPA CEng MIEI, Director, Halcrow Group Ireland Ltd, A CH2M Company Classon House, Dundrum Business Park, Dundrum Road, Dublin 14.
P. Kelly Observer	BEng, MEng (Hons), MIEI Design Engineer, Halcrow Group Ireland Ltd, A CH2M Company 3rd Floor St Johns House, High Street, Tallaght, Dublin 24, Ireland

The audit was carried out on Friday 9th February to Tuesday 20th February 2018. The daytime site visit was carried out on Monday 12th February 2018.

Weather conditions during the daytime site visit was dry with periods of sun.

It is noted that some areas of the Clongriffin to City Centre CBC route could not be assessed on site as the areas were either not built or were under construction. These locations are on sheets 3, 4 and 5 of 28. It is assumed that these areas will be constructed to comply with all relevant standards such as National Cycle Manual(NCM) and Design Manual for Urban Roads and Street (DMURS).

The scheme drawings audited are listed in **Appendix B**.

Problems Identified

2.1 Problem

There is inconsistency in the provision of cycle facilities through the project. This could lead to confusion for cyclists putting them in conflict with vehicular traffic.

Recommendation

The design team shall review all locations and ensure there are adequate cycle facilities/ alternative routes provided along the full route of the CBC.

Figure 1 Example of Bus lane with no alternative cycle facilities

2.2 Problem

There are instances where an off-road cycle track merges with on road cycle lanes at or close to junction bell mouths. There is a risk that motorist turning left into these bell mouths could side swipe cyclists.

Figure 2 Example of cycle track merging onto road at junction bell mouth.

Recommendation

The design team shall review how the cycle track merges with the carriageway to ensure cyclists do not approach junctions from a motorist's blind spot.

2.3 Problem

There are inconsistencies with the beginning of bus lanes after junctions. This could lead to sudden maneuvers by motorist causing loss of control type collisions.

Recommendation

The design team shall review the beginning of all bus lanes to ensure there is an appropriate taper at the beginning of all bus lanes after all side road junctions.

Figure 3 Example of bus lane abruptly beginning

2.4 Problem

There are inconsistencies with how cyclists are treated for turning right at major junctions. Some junctions use box/jug turns while no facilities are shown in other locations. This could lead to confusion causing conflict between cyclists and vehicular traffic.

Recommendation

The design team shall review all junctions to ensure cycle facilities are provided in accordance with National Cycle Manual.

Figure 4 Example of lack of cycle facilities at a major junction

2.5 Problem

There are a number of refuge islands proposed to be used which appear to be small for the stacking of pedestrians. A number of these refuge islands also present the pedestrian with their back to approaching traffic. This could put pedestrians in conflict with vehicular traffic.

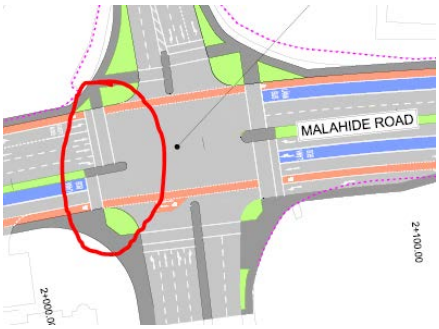


Figure 5 Example of incorrect stagger on pedestrian crossing.

Recommendation

The design team shall ensure all pedestrian refuges are large enough to allow pedestrians to safely wait for the correct signal phase to cross the road. The refuge shall be staggered to turn the pedestrian to face oncoming vehicular traffic.

2.6 Problem

There are a number of bus gates and Cul-De-Sac's proposed where local traffic will be required to perform a turn about. There are no provisions for turning heads to be provided in these locations. This could result in large vehicles such as refuse trucks having to reverse long distances and into other streets potentially putting all other road users at risk of collisions by such vehicles.

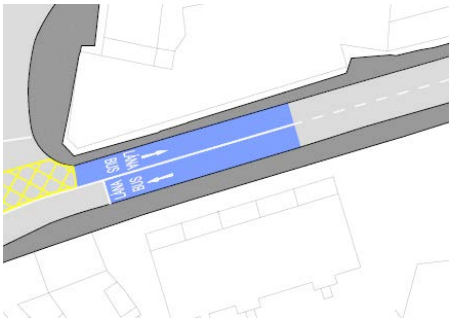


Figure 6 Example of bus gate with no turnabout facilities

Recommendation

The design team shall ensure there are sufficient turning head facilities provided at all bus gates.

2.7 Problem

There are a number of areas where existing parking facilities are to be removed in front of commercial and residential premises. If no alternative parking is available vehicles may park on the proposed cycle track forcing cyclists onto the road and into potential conflict with vehicular traffic.

Figure 7 Example location where parking is being removed

Recommendation

The design team shall ensure as a minimum there is alternative loading bays available for deliveries to all premises.

2.8 Problem

There are some junctions where advance stopping lines (ASLs) are used to allow cyclists to proceed ahead of traffic. At some of these junctions there are no feeder cycle lanes provided as required by the National Cycle Manual. This could potentially cause side swipe collisions between cyclists and vehicular traffic.

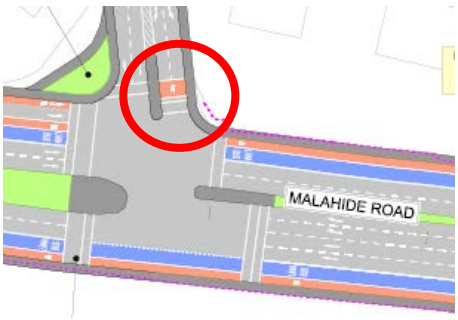


Figure 8 Example of ASL with no feeder cycle lane

Recommendation

The design team shall review all junctions and provide a consistent approach to the provision of ASLs at all junctions throughout the project.

2.9 Problem

At the junction of Malahide Road/Priorswood Road/Blunden Drive, there are provisions for "future extensions" of cycle tracks in an east – west direction. The lack of cycle facilities through the junction will put cyclists at risk of conflict with vehicular traffic through the junction.

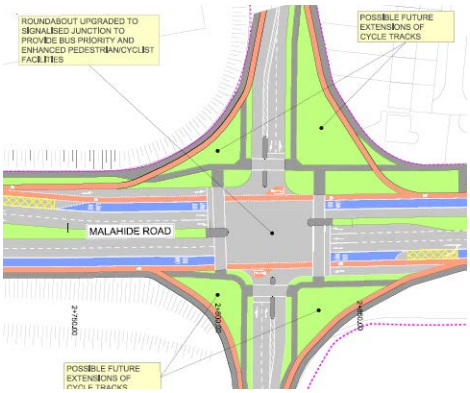


Figure 9 Malahide Road/Priorswood Road/Blunden Drive Junction

Recommendation

The design team shall provide cycle facilities on all arms of the junction as part of the project.

2.10 Problem

At Malahide Road, South of Mornington Grove (Sheet 14 of 28) there are existing parking spaces which are near perpendicular to the road and cycle track. There is a risk that vehicles reversing out of these spaces will not see an oncoming cyclist or other traffic approaching, and reversing into their path.

Figure 10 Perpendicular parking on Malahide Road

Recommendation

The design team should revise the parking layout. Ideally the parking should be angled parking to allow the vehicle drivers to see the road. In addition, the cycle track should be on the footway side of the parking to remove potential conflicts with vehicles using the parking spaces and cyclists.

2.11 Problem

There are inconsistencies with how bus lane/side street interfaces are treated. This could create driver confusion and sudden braking leading to either side swipe or shunt type collisions.

Figure 11 Example where bus lane continues past side street

Recommendation

The design team shall review these interfaces and ensure there is a consistent approach taken across the project

2.12 Problem

There are many areas where the cross section of the carriageway contains reduced lane widths of 3.00m. There is an increased risk of side swipe collisions especially with larger vehicles.

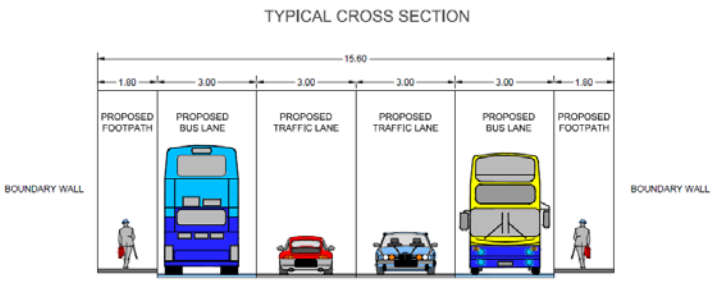


Figure 12 Example of cross section with reduced lane widths

Recommendation

The designers shall review all locations where reduced lane widths have been proposed. Lane widths should be in accordance with DMURS which specifies 3.25m as standard width with an increased width of 3.5m for streets with frequent access for larger vehicles.

2.13 Problem

There are areas where the proposed footway widths proposed is 1.8m. This could force pedestrians onto the carriageway when street furniture is encountered leading to a vehicular and vulnerable road user conflicts.

Figure 13 Example of Street furniture using footpath space

Recommendation

The designers shall review footway cross section to ensure there is adequate room provided for pedestrian demand and any street furniture such as street lighting and rubbish bins.

2.14 Problem

At the junction of Marino Mart and Malahide Road, cyclists travelling in a easterly direction have no cycle facilities through the junction. The cycle track along Marino Mart abruptly stops This could will cause conflicts between cyclists and pedestrians or cyclists and vehicular traffic.

Figure 14 Cycleway abruptly stopping on Marino Mart

Recommendation

The design team shall review the junction layout to ensure there are adequate cycle facilities are provided for cyclists through the junction.

2.15 Problem

There are a number of bus stops located on top of the segregated cycleway. There appears to be no provision for cyclists around these stops which could cyclists to take evasive action potentially putting them in conflict with vehicular traffic.

Figure 15 Example of bus stop in conflict with cycle track

Recommendation

The designers shall review all bus stops which are in conflict with a cycle track and ensure there are adequate facilities provided for cyclist around bus stops.

2.16 Problem

There are a number of areas where the cycle track is to run between parallel parking and the carriageway. It is unclear if there is a buffer zone is provided between the parking area and the cycle track. The lack of a buffer zone could cause side swipe collisions between cyclist and opening of car doors within the parking areas.

Figure 16 Example of cycle track between parking area and carriageway.

Recommendation

The design team shall ensure as a minimum there is a buffer zone between parked vehicles and cyclists. Ideally the cycle track should go between the footway and the parking area to reduce the potential conflict between vehicular traffic and cyclists.

2.17 Problem

There is an existing controlled crossing on Beresford Place. This is a busy street with demand for a control crossing. The proposed removal of the controlled crossing may put vulnerable road users in conflict with vehicular traffic.

Recommendation

The design team shall review this crossing and provide adequate crossing facilities for pedestrians.

Figure 17 Uncontrolled crossing on Beresford Place

2.18 Problem

The design proposes the removal of a splitter island on Memorial road junction with Custom House Quay. This creates a very wide crossing, crossing 4 number traffic lanes and 3 number cycle tracks. Mobility impaired may have issues completing this crossing placing them in conflict with vehicular traffic.

Recommendation

The design team shall ensure that within the signal design, there is sufficient time for mobility impaired pedestrian to complete the crossings.

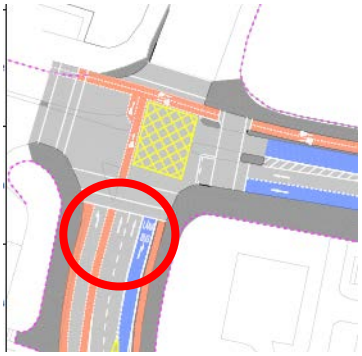


Figure 18 Extra wide crossing on Memorial Road

2.19 Problem

There are a number of locations where a left turn slip is being removed to allow for junction tightening. This can create an issue for the placement of the secondary signal head at junctions, potentially causing motorist reduced visual awareness of signal phases leading to sudden maneuvers such as braking causing shunt type collisions.

Recommendation

The design team shall ensure there are adequate signals placed in a conspicuous location at all junctions

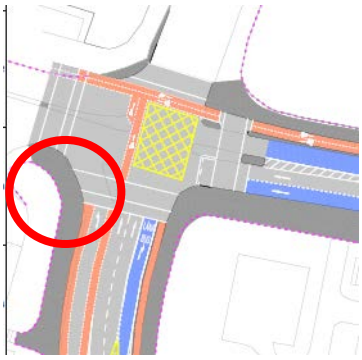


Figure 19 Example where left slip lane removed and consideration required for signal heads

2.20 Problem

It was noted during the site visit that there was inadequate drainage facilities at some crossings. This could lead to pedestrian slipping on surface water or meandering away from the designated crossing point to avoid puddles and leading to conflict with traffic.

Recommendation

The design team shall ensure there are adequate drainage facilities provided at all crossing locations. The design team shall ensure there are no low points or drainage gullies located within the crossing locations.

Figure 20 Example of existing drainage issues at existing crossing on Custom House Quay

2.21 Problem

There is a narrow cross section under the rail bridge on Beresford Place where currently there are 2 lanes of traffic. It is noted that the alignment at this location is curved and required wider lanes for swept paths of large vehicles such as buses and goods vehicles. It is proposed to have 3 lanes of traffic in this location which may require narrow lanes. This could lead to side swipe collisions between the lanes of traffic. There are also additional locations with similar problems on Memorial Road and Amiens Street

Figure 21 Narrow cross section on Beresford Place

Recommendation

The design team shall review the design at locations mentioned above to ensure there is sufficient cross section under the rail bridge to accommodate the proposed design and the swept paths of all vehicles.

2.22 Problem

It is proposed to provide a cantilevered extension over the Grand Canal Bridge (Sheet 3 of 19). The reduction in horizontal and vertical clearance of the proposed structure from the access road could result in an increased risk of collisions between vehicles enter the builders yard and the extended structure.

Figure 22 Pinch point between existing building and structure

Recommendation

The design team shall ensure there is sufficient space available for the safe passage of vehicle entering and exiting from the builder's yard.

2.23 Problem

There are currently steps on Clanbrassil Street Upper which will impact on the movements of mobility impaired. These could lead to an increased risk of falls by mobility impaired pedestrians.

Figure 23 Steps located on Clanbrassil Street

Recommendation

The design team shall review design at this location to remove these steps and provide a ramp with suitable gradients for the mobility impaired.

2.24 Problem

There are high walls where the proposed cycle track joins Mount Argus Road (Sheet 5 of 19). There is a risk that cyclist could suddenly join the road leading to sudden maneuvers by vehicular traffic causing side swipe, head on or shunt type collisions.

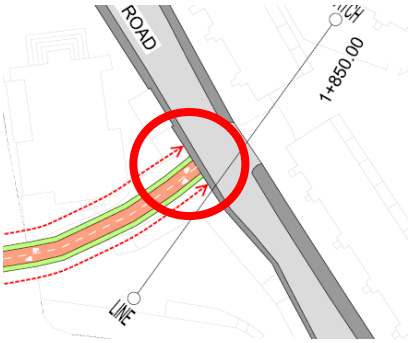


Figure 24 Lack of Visibility to cycle track

Recommendation

The design team shall review the location and ensure there is sufficient visibility between traffic on Mount Argus Road and cyclists using the proposed cycle track.

2.25 Problem

The existing footway on the northern side of Mount Argus Road is sub-standard in width. There is a risk that mobility impaired users could slip of the footway.

Figure 25 Narrow footway on Mount Argus Road

Recommendation

The design team should review the existing footpaths and increase widths to ensure they comply with minimum standard to facilitate pedestrian movements.

2.26 Problem

In numerous locations where it is proposed to have the cycle track as a shared surface separate to the mainline such as Mount Argus Road, Larkfield Grove and Derravargh Road, there are traffic calming ramps currently in existence on the carriageway. It is unclear from the drawings if these will be removed. These ramps may pose a hazard to cyclists and result in cyclists swerving to avoid them leading to loss of control type accidents.

Recommendation

The design team shall review all streets which are proposed to be used as shared surfaces and remove the ramps. If traffic calming measures are required the design team shall consider alternative options which are cycle friendly.

2.27 Problem

In numerous locations where it is proposed to have the cycle track as a shared surface separate to the mainline such as Mount Argus Road, Larkfield Grove and Derravargh Road. The street lighting poles appear to be positioned far apart. A lack of street lighting could mean vulnerable road users such as pedestrians and cyclists could feel unsafe in using these facilities.

Recommendation

The design team shall review all public lighting and ensure there is sufficient lighting provided throughout the project.

2.28 Problem

There are a number of areas which are decision points for cyclists to use alternative routes. There is a risk cyclists may not notice these alternative safer routes putting them in conflict with vehicular traffic further along the main routes

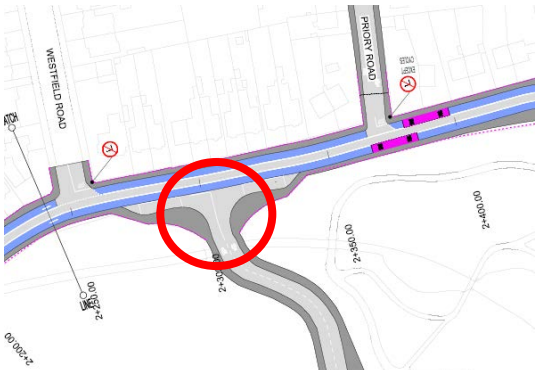


Figure 26 Example of decision point for a cyclist

Recommendation

The design team shall ensure all alternative cycle routes are appropriately signed and that the signs are suitably visible.

2.29 Problem

At the junction of Sundrive Road and Kimmage Road Lower there is a bus stop located in close proximity to the junction. There is no room to allow a second bus to stack behind the first vehicle without extending into the junction or blocking a pedestrian crossing.

Figure 27 Bus stop located very close to the junction

Recommendation

The design team shall review the bus stop location to ensure queueing does not obstruct the junction or pedestrian crossing.

2.30 Problem

There is a proposed Pedestrian/Cyclist bridge over the Grand Canal (Sheet 13 of 19). It is unclear from the drawings whether there is adequate clearance for barges on the canal to pass underneath the bridge. It is also unclear from the drawing what are the gradients of the approach ramps. Steep ramps could cause loss of control collisions with cyclists and impair the movement of the mobility impaired.

Recommendation

The design team shall ensure there is sufficient clearance between the canal and the structure. The approach ramps shall be in accordance with the NCM.

2.31 Problem

The current road closure at the end of Mount Tallant Avenue has a full height kerb. This impedes the safe movement of cyclists from Larkfield Grove to Mount Tallant Avenue and vice versa.

Figure 28 Lack of cycle facilities between 2 residential streets

Recommendation

The design team shall review the design and allow for the safe movement of cyclists between these two residential streets.

SECTION 3

Audit Team Statement

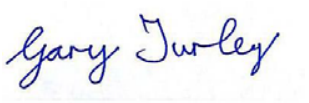
We certify that we have examined the drawings and documents listed in the appendices to this report.

The examination and subsequent report was made with the sole purpose of identifying any features of the scheme that could be removed or modified in order to improve the safety of the proposals.

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

No one on the Audit Team has been involved in any way with the scheme design.

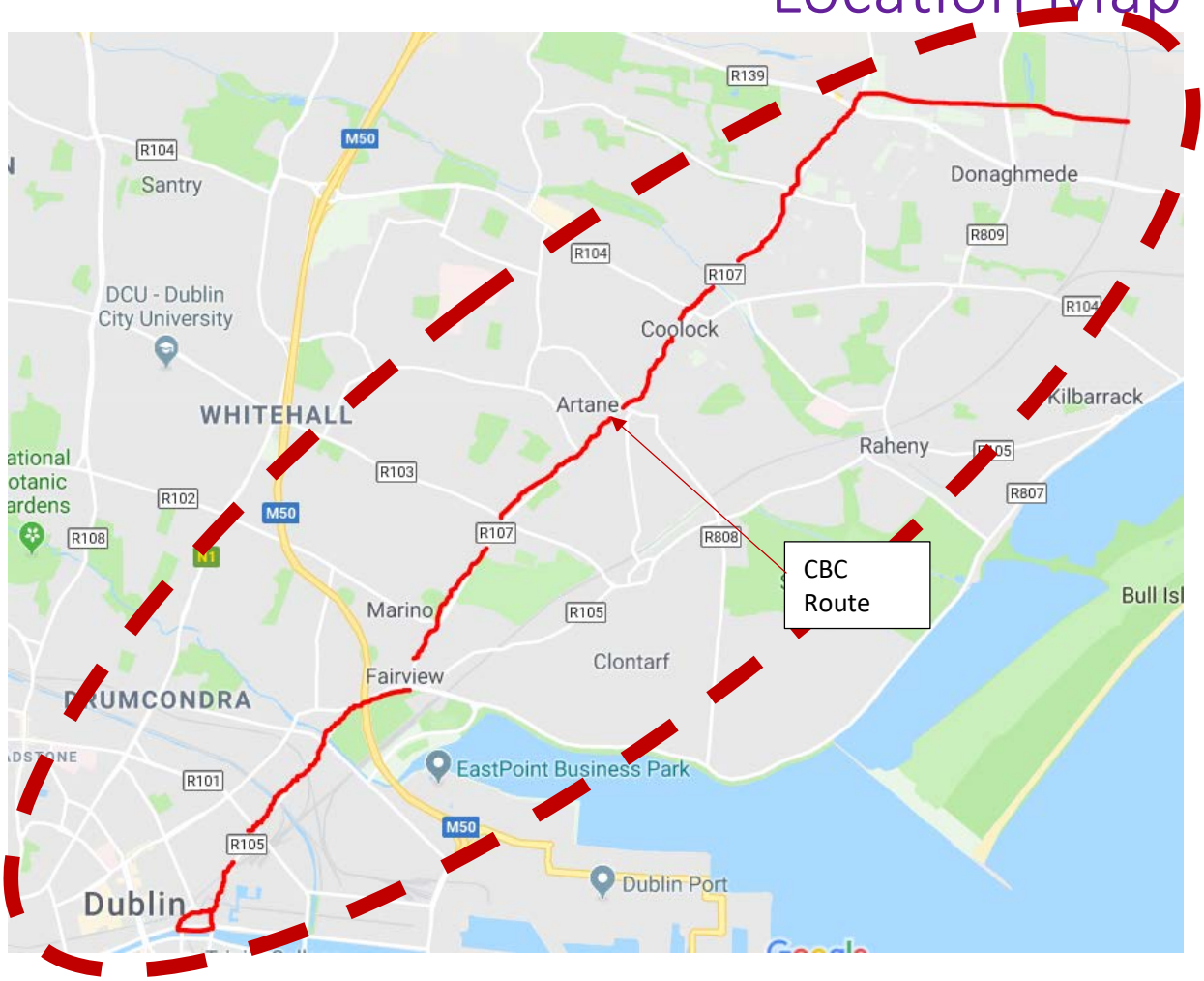
Audit Team Leader

Name:	G Turley MEng HDip H'ways & Geo, HDip PM, CEng MIEI	Signed: 
Position:	Associate Director	Dated: 20th February 2018
Organisation:	Halcrow Group Ireland Ltd	
Address:	3rd Floor, St. Johns House, High Street, Tallaght Dublin 24	

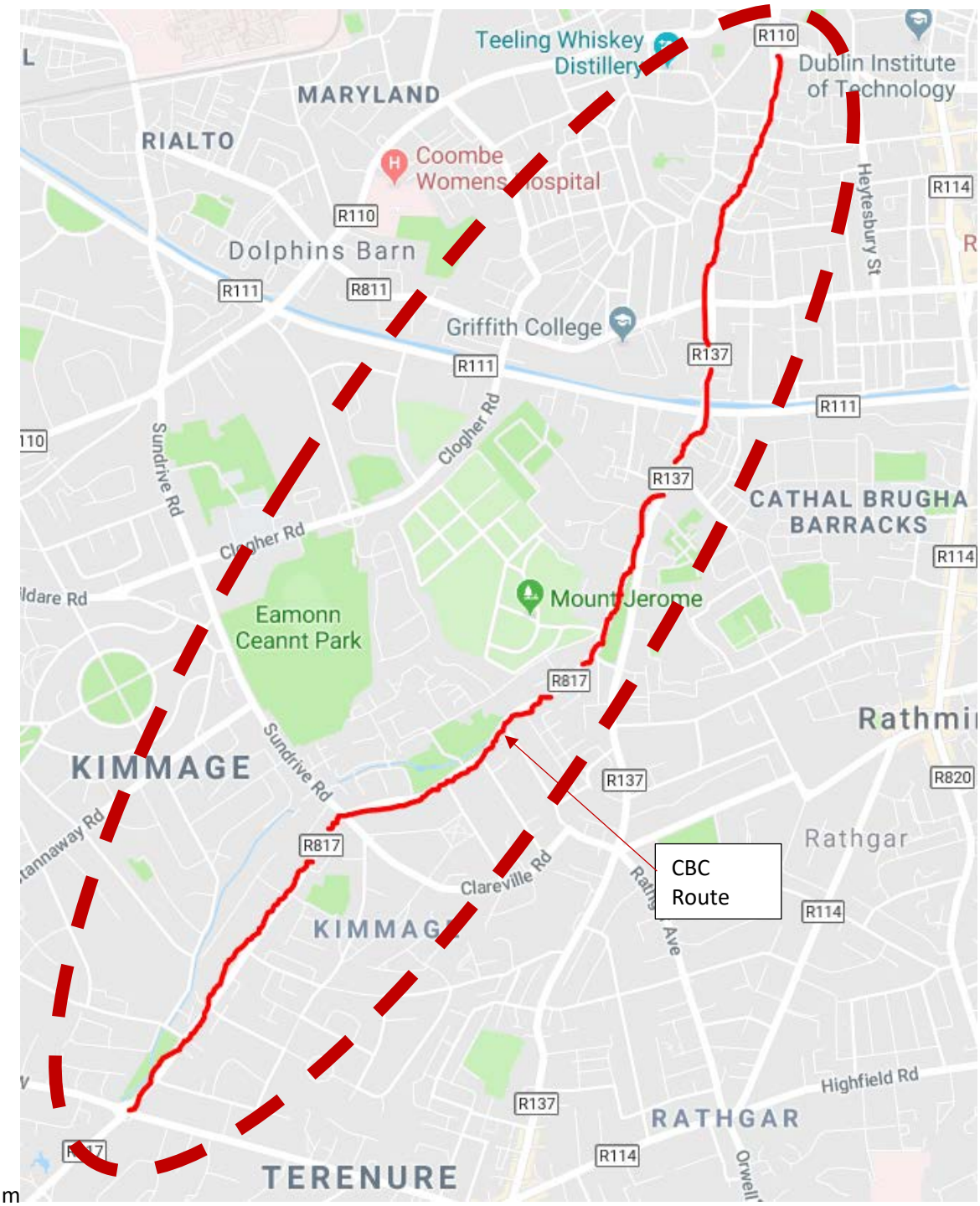
Audit Team Member

Name:	Tom Meagher BE Civil MEngSc, C.IPA, CEng MIEI	
		Signed:
Position:	Director	Dated: 20th February 2018
Organisation	Halcrow Group Ireland Ltd	
Address:	3rd Floor, St. Johns House, High Street, Tallaght Dublin 24	

Appendix A
Clongriffin to City Centre BRT
Location Map



Appendix B
City Centre to Kimmage CBC Location Map



Appendix B
List of drawings supplied with Audit Brief

Drawing Number	Title
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Drawing Number	Title
Sheet 5 of 19	City Centre to Kimmage CBC
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Appendix C
Road Safety Audit Feedback Form

ROAD SAFETY AUDIT FEEDBACK FORM

Scheme: Clongirffin to City Centre CBC

City Centre to Kimmage CBC

Audit Stage: Road Safety Audit Stage 1

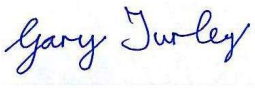
Date Audit Completed: 12th February 2018

Paragraph No. in Report	To Be Completed by the Design Team			To Be Completed by the Audit Team
	Problem accepted (yes/no)	Recommended measure accepted (yes/no)	Alternative measures (describe)	Alternative Measures accepted by Auditors (yes/no)
2.1	N	N	Cycle facilities have been provided along the preferred route as identified in the Greater Dublin Area Cycle Network Plan – for both secondary and primary cycle route. Main Street, as identified in this problem, is not defined within the GDA CNP and cycle facilities have been provided through the Hole in the Wall Road.	Yes
2.2	Y	Y		
2.3	Y	Y		
2.4	Y	Y		
2.5	Y	Y		
2.6	Y	Y		
2.7	N	N	Parking has been retained on the location identified in problem 2.7, a note will be added in the drawing. On other locations where parking has been removed, alternate parking arrangements have been identified.	Yes
2.8	Y	Y		
2.9	N	N	Cycle facilities have been provided along the preferred route as identified in the Greater Dublin	Yes

			Area Cycle Network Plan – for both secondary and primary cycle route. For the concept design the cycle facilities have been removed from the Priorswood Road/ Blunden Drive has been removed, to avoid any confusion for the cyclists as there are no cycle facilities along the two roads.	
2.10	Y	Y		
2.11	Y	Y		
2.12	N	N	Min cross-section have been provided at pinch point locations to avoid excessive land take. It should be noted that min cross-sections have been provided at low speed areas primarily in the City.	Yes, during Preliminary Design, Design Team to review the 85th percentile speed in areas where minimum cross sections are provided to ensure lower traffic speeds will apply
2.13	N	N	The location identified in the Audit is along Malahide Road at Donnecarley. This is a particular pinch point and footpath and cycle lane width has been reduced locally to avoid land take of front garden for the residential properties. Various options have been examined for this location and documented in a Technical Note with a risk assessment.	Yes, during Preliminary Design, Design Team to review during Preliminary Design Phase when topographical survey is available
2.14	Y	Y		
2.15	N	N	Where space allows island type bus stops have been used in accordance with the National Cycle Manual to eliminate the conflict between cyclists/buses and also between cyclists/passengers. In the cases where there is not enough space available for island type bus stops inline type bus stops have been used in accordance with the National Cycle Manual.	Yes

2.16	Y	Y		
2.17	Y	Y		
2.18	Y	Y		
2.19	Y	Y	Will be addressed during the preliminary design phase	
2.20	Y	Y	Will be addressed during the preliminary design phase	
2.21	Y	Y		
2.22	Y	Y	Will be addressed during the preliminary design phase	
2.23	Y	Y		
2.24	Y	Y	Amended in concept design. Footpath widened for visibility splays, yield sign added and note added on the drawing. Will be addressed further during the preliminary design phase.	
2.25	Y	Y	The footpath as shown on the Concept Design is as per existing. We propose to remove the narrower footpath on one side and retain wider footpath on other side, which will be most likely used. Will be addressed further during the preliminary design phase.	
2.26	Y	Y		
2.27	Y	Y	Will be addressed during the preliminary design phase	
2.28	Y	Y		
2.29	Y	Y		
2.30	Y	Y	The design is as per the Greater Dublin Area Cycle network plan and will be will be reviewed during the preliminary design stage.	
2.31	Y	Y		

Signed: ……..Designer Date…….

Signed:  Audit Team Leader Date 12/04/2018

Signed: ……..Client Date …….

AECOM Imagine it. Delivered.

Clongriffin to City Centre

Bus Connects Corridor
Stage 1 Road Safety Audit

National Transport Authority

April 2020

Prepared for:

National Transport Authority

Prepared by:

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1 Introduction

1.1 Overview

AECOM has been commissioned by the National Transport Authority (NTA) to undertake a Road Safety Audit of a proposed Core Bus Corridor (CBC) scheme running from Clongriffin to City Centre (CBC 1).

This Stage 1 Audit will assess the safety implications of the scheme for all road users.

The Safety Audit Report indicates each of the problems identified, provides outline recommendations for solving the problems, presents the Audit Team Statement, and describes a schedule of documents reviewed. The members of the Audit Team were:

Audit Team Leader:

Brian McMahon, BE MSc CEng MIEI

Associate Director, AECOM

Audit Team Member:

Zachary Cave, BEng MIEI

Transport Planner / Engineer, AECOM

Due to the ongoing Covid-19 restrictions the audit team were unable to undertake an on-site visit but utilised Google Streetview to carry out a virtual walkover of the sit. The audit comprises of an examination of the proposed scheme drawings. The Belmayne Avenue section of the scheme is subject to a separate design by Dublin City Council and has not been included within this audit, this section has been illustrated in Figure 2.1.

1.2 Road Safety Audit

This Safety Audit represents the response of an independent Audit Team to various aspects of the scheme. The recommendations contained therein are the opinions of the Audit Team and are intended as a guide to the designers on how the scheme as constructed can be improved to address issues of road safety.

The following documents were provided by the Design Team:

- Clongriffin to City Centre – General Arrangement – Index Plan – Sheet 01 of 01
- Clongriffin to City Centre – General Arrangement – Sheet 1 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 2 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 3 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 4 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 5 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 6 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 7 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 8 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 9 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 10 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 12 of 21

- Clongriffin to City Centre – General Arrangement – Sheet 13 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 14 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 15 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 16 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 17 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 18 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 19 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 20 of 21
- Clongriffin to City Centre – General Arrangement – Sheet 21 of 21

The general arrangement plan drawings, with cross sections were provided to the audit team. Other drawings such as road markings and sign plans, road junction signalling and staging, drainage, lighting, landscaping, etc. have not been provided and therefore have not been included in this Stage 1 Road Safety Audit. The level of existing and predicted traffic volumes has not been provided. Future forecasts of pedestrian, cyclists, frequency of the buses, Dublin Bus or otherwise have not been provided.

The terms of reference of the Audit are as described in TII guidelines GE-STY-01024 (HD 19/15). The team has examined and reported only on the road safety implications of the scheme as presented and they have not examined or verified the compliance of the design to any other criteria.

The Safety Audit guidelines do not provide a facility for the Audit Team to classify individual problems according to their severity, and hence the level of priority to be attached to each. It is instead the task of the design team and/or their representative to take a view on the validity of each of the recommendations and decide on an appropriate course of action.

The response of the Design Team to the Safety Audit should be prepared in the form of a Safety Audit Feedback Form, accepting the changes proposed by the Audit Team or providing an alternative solution to the problem. The Feedback Form is then returned to the Audit Team for review and verification. A template for a Safety Audit Feedback Form is included as Appendix B.

1.3 Background

The core bus corridor project proposes the provision of 230 kilometres of bus lanes on sixteen of the busiest bus corridors and 200 kilometres of cycle lanes and tracks.

The intention is to develop these bus corridors so that each will have continuous bus priority - in other words, a continuous bus lane in each direction as well as maintaining two general traffic lanes. In addition, it is proposed to provide safe cycling facilities, segregated where possible from other vehicular traffic. This will remove the delays currently experienced which will grow worse as congestion increases.

The Core Bus Corridor (CBC) commences at Clongriffin DART Station and is routed via Clongriffin Main Street which will be extended to join the Malahide Road at a new junction to the north of Clare Hall Junction. The CBC is then routed via Malahide Road to the junction with Marino Mart/Fairview. From here the CBC ties into a separate project, Clontarf to City Centre Cycle Scheme currently proposed by Dublin City Council.

The CBC is approximately 8km in length and will reduce bus journey times from 65 minutes down to 35 minutes. It is intended that CBC 1 will provide a high-quality transport system where priority for buses will be provided along the entire route, consisting primarily of dedicated bus lanes in both directions. Dedicated cycle facilities will also be provided alongside the proposed CBC route.

2 Site Location

2.1 Overview

The scheme comprises of a Core Bus Corridor system linking Clongriffin to the City and is 8km in length. The CBC commences at the Clongriffin DART Station and is routed via Clongriffin Main Street which will be extended to join the Malahide Road at a new junction to the north of Clare Hall Junction. The CBC is then routed via Malahide Road to the junction with Marino Mart/Fairview. From here the CBC ties into a separate project, Clontarf to City Centre Cycle Scheme currently proposed by Dublin City Council.

The scheme includes redistribution of road space, provision of new CBC facilities as well as pedestrian and cycle facility upgrades.

Table 2.1 provides a summary of the scheme location and context while the location of the CBC Route 1 is shown on **Figure 2.1.**

Table 2.1: Summary of Scheme Location

Location	Clongriffin to the City Centre
Classification	Regional & Local Roads
Speed Limit	50 to 60 km/h
Local Authority Area	Dublin City Council
Type of Roads	Single Carriageway Roads, Urban Environment

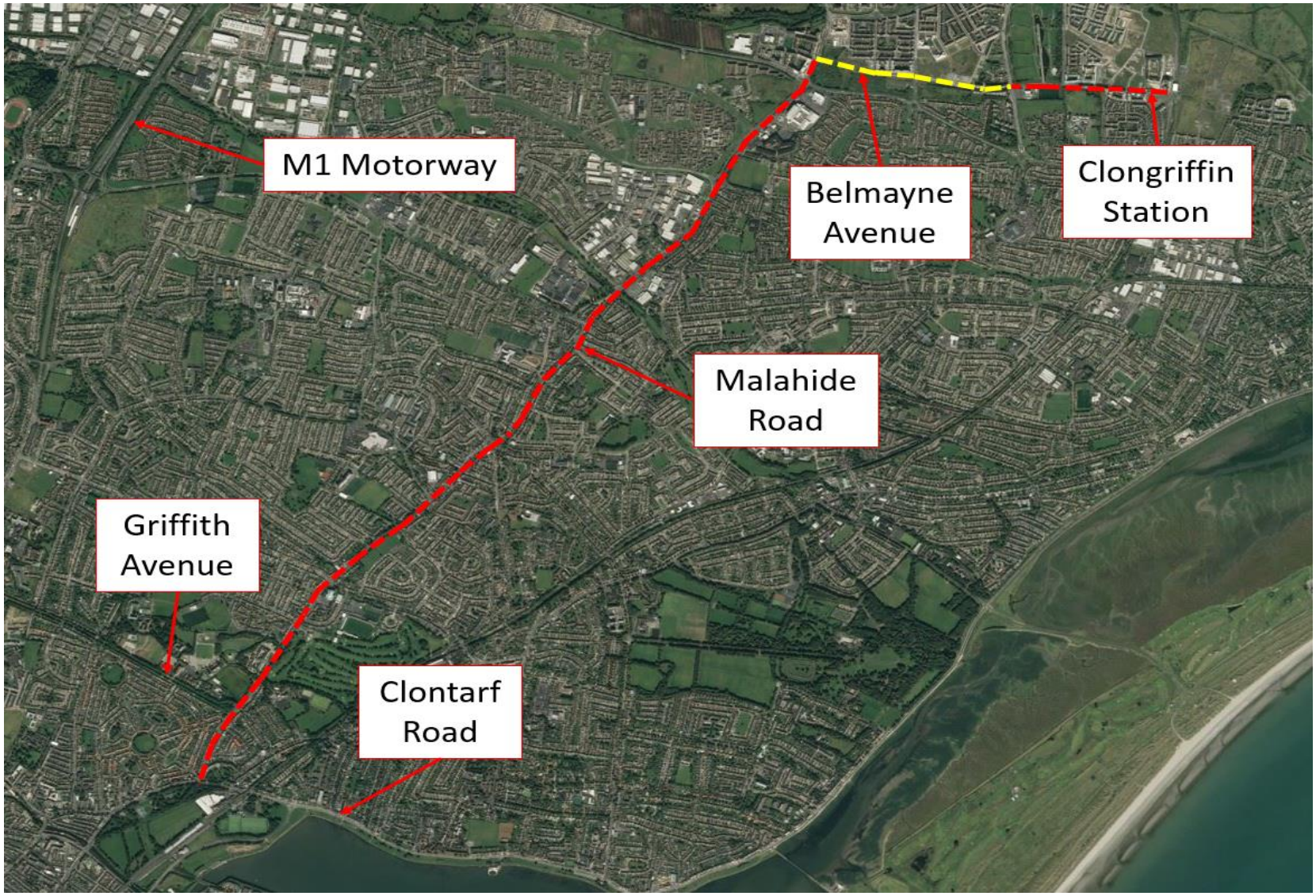


Figure 2.1: Site Location

2.2 Observations

A number of observations were noted through Google Streetview. These observations are discussed below under a number of key headings.

Road Geometry

- There is an array of road types and geometries along the 8km route. The route mainly consists of dual carriageway roads (inclusive of a dedicated bus lane) with the exception of the Belmayne Avenue scheme which has not been constructed as of this audit.
- There are bus lanes in both directions along much of the Malahide Road between the Clontarf Road junction and the tie in with the Belmayne Avenue Scheme. There are also bus lanes in both directions along the Main Street of Belmayne to Clongriffin Dart Station.
- There are bus lanes provided along sections of the northbound and southbound carriageways of the Malahide Road.

Vehicular Traffic

- No observations can be made on the vehicular traffic at present.

Pedestrians & Cyclists

- There are existing footpaths provided on both sides of the full route.
- There are a variety of existing cycle facilities along the route, from on-road, shared with bus, cycle tracks etc.
- There are a number of signal controlled pedestrian crossings along the route.

Street Lighting

- Public lighting is provided throughout the entire scheme extents.

2.3 Collision History

A review of the collision data between the years 2005 and 2016 has been undertaken for the length of the Clongriffin to City Centre CBC.

3 Departures from Standards

3.1 General

No departures from standards have been notified to the audit team.

4 Items Resulting from this Stage 1 Road Safety Audit

4.1 Overview

This Safety Audit has reported on issues relating to the proposed CBC Scheme (Route 1) Clongriffin to City Centre along the Clongriffin Main Street, and R107 Malahide Road. This is classified as a Stage 1 Road Safety Audit, as defined within the TII Road Safety Audit Guidelines.

The following information was not provided for Audit so therefore could not be commented upon:

- Signal Layout and Phasing;
- Signage Layout;
- Drainage and Services;
- Lighting;
- Landscaping;
- Autotrack analysis; and
- Belmayne Main Street and Belmayne Avenue Scheme.

The Belmayne Main Street and Belmayne Avenue section of the scheme (General Arrangement - Sheets 03 to 06) were omitted from this audit as they are subject to a separate scheme of which the detailed designs drawings were not provided.

The report has been divided into general issues that are common throughout the scheme in Section 4.2, with specific areas highlighted in Section 4.3.

4.2 General Issues

4.2.1 Road Geometry

4.2.1.1 Problem	
Location:	Throughout the Scheme
Summary:	Auto Tracking has not been provided
Description:	
Tracking for buses (and other large vehicles) has not been provided for any of the junctions throughout the scheme. If there is insufficient space within the carriageway for all vehicle types to safely complete a turning manoeuvre there is a risk of vehicles over-running, or striking, the kerb or entering the footpath/cycle lane where there is the potential for collisions with vulnerable road users.	
***Recommendation*:**	
The swept path of all vehicles should be accommodated within the extents of the traffic lanes at all junctions within the Scheme. Where larger vehicles (e.g. buses and HGVs) may over-run adjacent traffic lanes when turning ensure stop lines are sufficiently set back from the junction and that mirrored turning manoeuvres are on separate signal phases.	

4.2.1.2 Problem	
Location:	Throughout the Scheme
Summary:	Kerb height of cycle track
Description:	
No details have been provided regarding the level difference between the cycle track and adjacent carriageway. In accordance with the National Cycle Manual, the cycle tracks and carriageway should be physically separated by verge or height difference. Failure to provide adequate segregation between the cycle track and adjacent carriageway may result in collisions, with motorists more likely to encroach on the cycle track.	
***Recommendation*:**	
The cycle track should be constructed at a higher level (25 to 50mm) than the adjacent carriageway.	

4.2.1.3 Problem	
Location:	Throughout the Scheme
Summary:	Tie-ins to existing
Description:	
There are a number of locations through the scheme where proposed cycle tracks, footpaths and kerblines do not tie-in with the existing infrastructure. Failure to provide adequate tie-ins at these locations may result in confusion amongst all road users which, in turn, may lead to collisions.	
***Recommendation*:**	
Adequate tie-ins should be provided between the scheme and existing carriageway.	

4.2.2 Pedestrians & Cyclists

4.2.2.1 Problem

Location:	Throughout the Scheme
Summary:	Operation of protected intersections

Description:

The majority of the scheme's junctions have designated cycle lanes through the junction with raised concrete islands. While the islands provide a level of protection for cyclists, they will be required to take a slight detour in order to remain on the cycle lane. There is a risk that more confident cyclists will cycle back out onto the main carriageway thus increasing the risk of collisions with vehicles.

Other cyclists will remain in the cycle lane, but the horizontal separation will decrease driver's awareness of the presence of cyclists and reduce any eye contact between cyclists and drivers. To increase driver's awareness of cyclists to their left as they proceed through the junction, the cycle lane would have to be set back far enough (one car length) that a motorist in a left turning vehicle will cross the cycle lane at a large angle thus improving visibility, removing the left-turn blind spot and giving drivers more time to react and slow down. The larger the cycle crossing setback, the easier it is for drivers to see people in the cycle lane without checking mirrors or turning around.

Without signal staging information, it is unclear how cyclists will be controlled at the signalised junctions and whether a separate dedicated stage is provided for cyclists or if they will be included in a stage with traffic. If included in the same stage as traffic, some motorists may not be aware that cyclists will be proceeding through the junction at the same time. This could result in cyclists being struck by vehicles, particularly left turning traffic across cyclists who continue straight ahead.

The following are examples of locations where on-road cyclists are protected:

- Sheet 3 of 21: At the Hole in the Wall Road / Belmayne Main Street junction.
- Sheet 6 of 21: At the R139 / Malahide Road junction.
- Sheet 7 of 21: At the Tesco Access / Malahide Road junction.
- Sheet 8 of 21: At the Blunden Drive / Malahide Road junction.
- Sheet 10 of 21: At the Greencastle Road / Malahide Road junction.
- Sheet 11 of 21: At the Brookville Crescent / Malahide Road junction.
- Sheet 14 of 21: At the Gracefield Road / Malahide Road junction.
- Sheet 15 of 21: At the Kilmore Road / Malahide Road junction.
- Sheet 17 of 21: At the Collins Avenue / Malahide Road junction.
- Sheet 19 of 21: At the Griffith Avenue / Malahide Road junction.

***Recommendation*:**

Ensure cyclists are sufficiently catered for at protected intersections, such that the risk of conflicts with other road users is minimised. Provide a separate signal stage for cyclists or if cyclists are running during the same stage as left-turning vehicles then there should be a sufficient set back of the cycle lane from the corner. Cyclists should have an advanced green signal.

4.2.2.2 Problem

Location:	Throughout the Scheme
Summary:	No details provided on tactile paving to be provided

Description:

No detail has been provided in relation to the tactile paving to be provided at any of the crossing points / junctions throughout the scheme. Lack of appropriate tactile paving may result in confusion for vision impaired pedestrians. Failure to provide a footpath across the junctions/entrances would give motorists priority and therefore increase the risk of collisions with pedestrians.

Figure 4.2 & **4.3** below illustrates an example of this problem along Main Street and the Malahide Road, respectively.

Figure 4.1: Crossing Points along Main Street / The Hole in the Wall

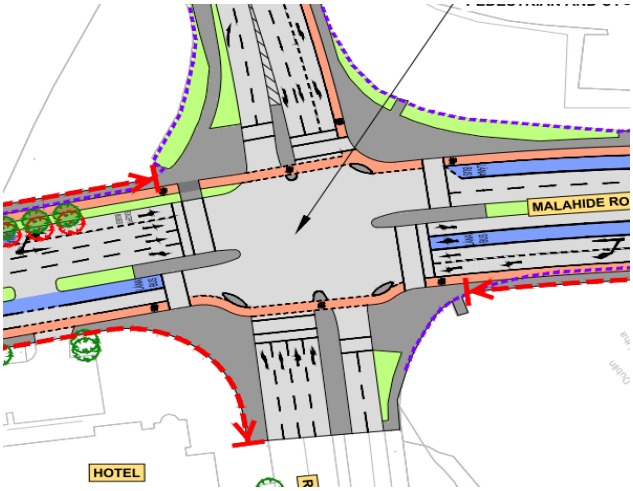


Figure 4.2: Crossing Points along Malahide Road / R139 Junction

***Recommendation*:**

Ensure adequate tactile paving is provided across the scheme at both controlled and uncontrolled crossing points.

4.2.2.3 Problem

Location:	Bus Stops
Summary:	Potential conflicts between cyclists and waiting passengers

Description:

The proposed cycle track along both sides of the Malahide Road pass a shared space between the bus stop and footpath. It is possible that conflicts will occur between cyclists using the cycle tracks and pedestrians waiting at the bus stops or passengers alighting from or entering the bus. Figure 4.3 below is an example of such a layout.

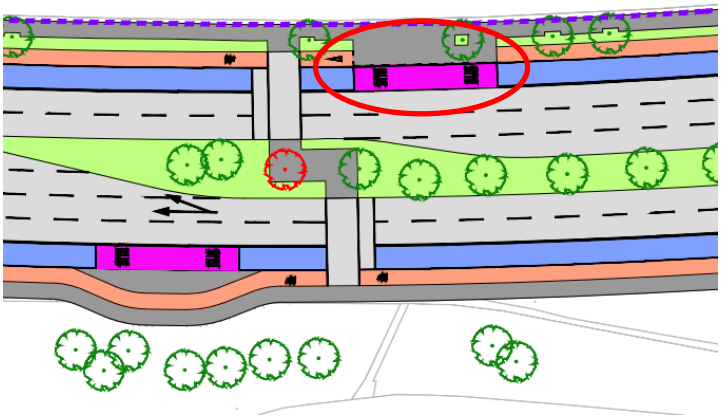


Figure 4.3: Bus Stop on Malahide Road

The following are examples of other locations where this layout is proposed:

- Sheet 7 of 21: Malahide Road (southbound carriageway)
- Sheet 12 of 21: Malahide Road (southbound carriageway)
- Sheet 16 of 21: Malahide Road (both carriageways)
- Sheet 19 of 21: Malahide Road (both carriageways)

***Recommendation*:**

Although this layout is accepted within the National Cycle Manual, the cycle track should be diverted around the back of the footpath where there is scope to do so (availability of land). Alternatively, yield markings should be installed on the cycle track in advance of the bus stop waiting area.

4.3 Specific Areas

4.3.1 Problem

Location:	Clongriffin Main Street / Dermot Street
Drawing:	Sheet 02 of 21
Summary:	Removal of Existing pedestrian crossing

Figure 4.4: Existing Pedestrian Crossing on Main Street

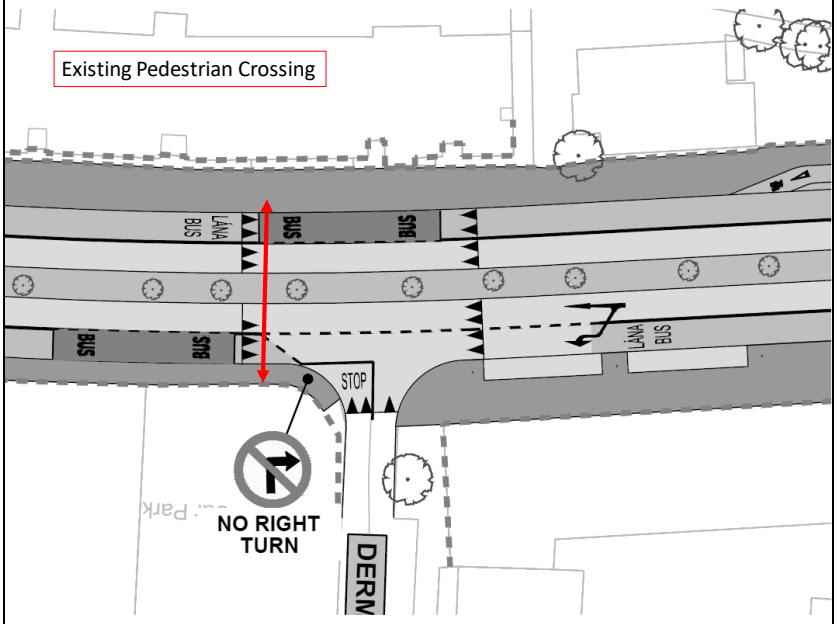


Figure 4.5: Pedestrian Crossing not indicated in the design

Description:

It is proposed to relocate the existing bus stop on Main Street to Dermot Street junction. This will create a pedestrian desire line across Main Street from Dermot Street. However, the existing uncontrolled pedestrian crossing has not been indicated on the scheme drawings. Without a pedestrian crossing, there will be no focused pedestrian crossing point, meaning that pedestrians may cross at a variety of locations resulting in a greater risk of collision with a vehicle. Pedestrians crossing at this location may also trip as they are crossing the central median.

Recommendation:

A pedestrian crossing should be provided at the Clongriffin Main Street / Dermot Street junction.

4.3.2 Problem

Location:	The Hole in the Wall / Main Street junction
Drawing:	Sheet 03 of 21
Summary:	Tie-in details

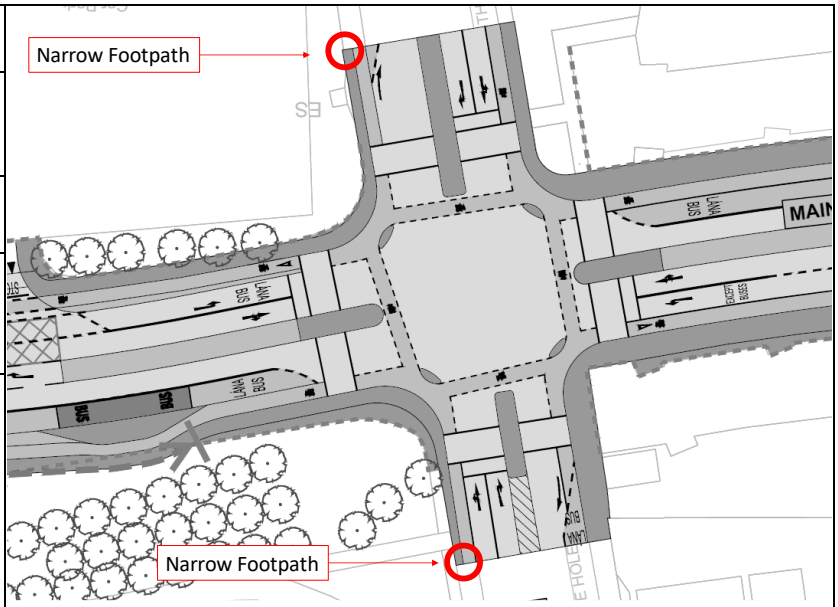


Figure 4.6: Eastbound cycle track intersects footpath at M50 overbridge

Description:

On the Hole in the Wall road, the footpaths do not tie-in with the existing infrastructure and appear narrow. Failure to provide adequate tie-ins at these locations may result in pedestrians stepping out on the road carriageway, resulting in a collision.

Recommendation:

The footpaths should be of adequate width, in accordance with DMURS.

4.3.3 Problem

Location:	Malahide Road / R139 junction
Drawing:	Sheet 06 of 21
Summary:	Southbound Cycle facilities

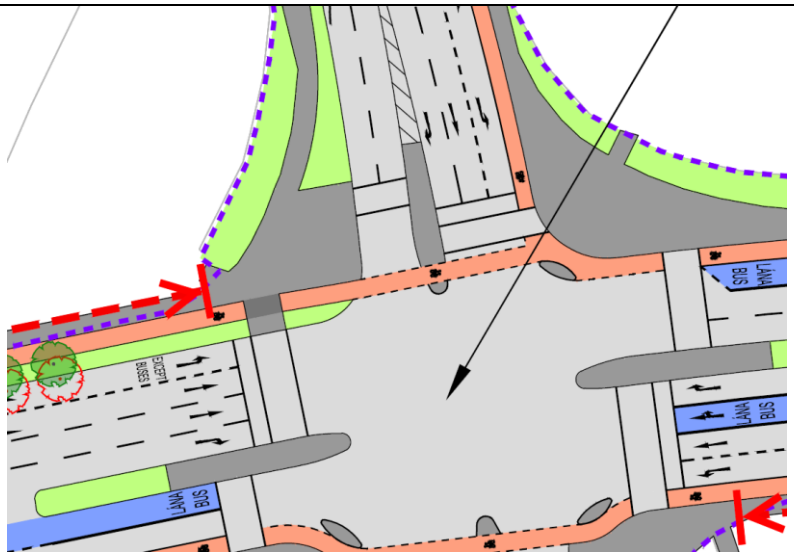


Figure 4.7: Malahide Road / R139 Junction

Description:

The southbound cycle facilities on the Malahide arm do not have the “protected island” as provided on all other arms. The cycle lane is set back from the road carriageway and is not re-established on road adjacent to the road carriageway well in advance of the junction (as outlined in the National Cycle Manual). The proposed layout may result in some motorists being unaware of cyclists or that they are to be re-established on the road carriageway on the side arm, and the cyclists pops out in front of vehicles resulting in a collision.

Furthermore, it appears that cyclists are directed through a small area of shared space. This share space is very small and would not be very noticeable to cyclists. Pedestrians would be vulnerable to cyclists travelling at excessive speeds at this location, which could result in collisions.

Recommendation:

The cycle track should be re-established on road in advance of the junction, with cyclists controlled at the junction at the stop line. The shared space should be removed.

4.3.4 Problem

Location:	Malahide Road / Tesco Clarehall Junction
Drawing:	Sheet 07 of 21
Summary:	Cycle Lane Staging

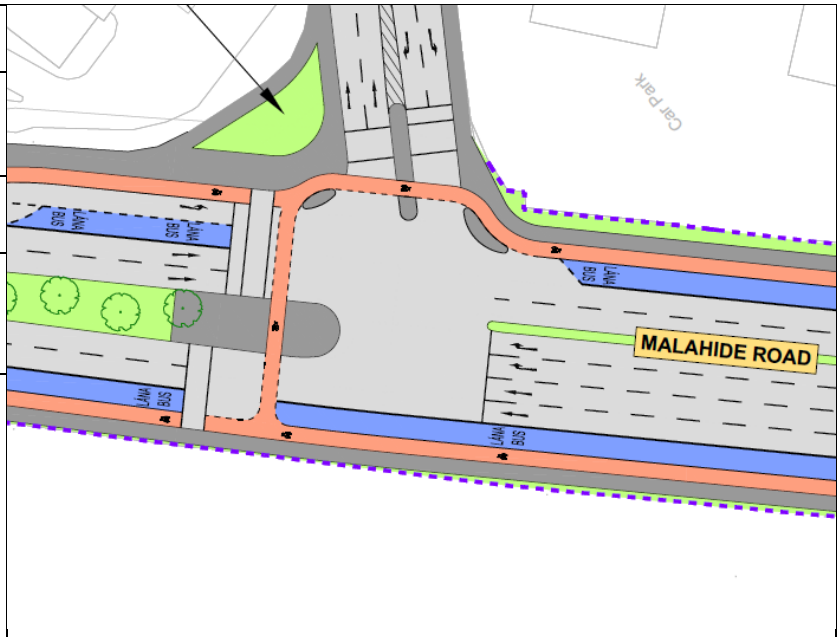


Figure 4.8: Malahide Road / Tesco Junction

Description:

No staging information has been provided, but the current layout would indicate that if cyclists are permitted to proceed at the same time as traffic on the northbound traffic lanes, it could result in collisions with vehicles as they attempt to turn right across the road carriageway.

Recommendation:

Controlled signal facilities should be provided for cyclists wishing to cross the road carriageway. The cycle staging should be separated from the traffic movements.

4.3.5 Problem

Location:	Blunden Drive / Malahide Road junction
Drawing:	Sheet 08 of 21
Summary:	Arms not aligned

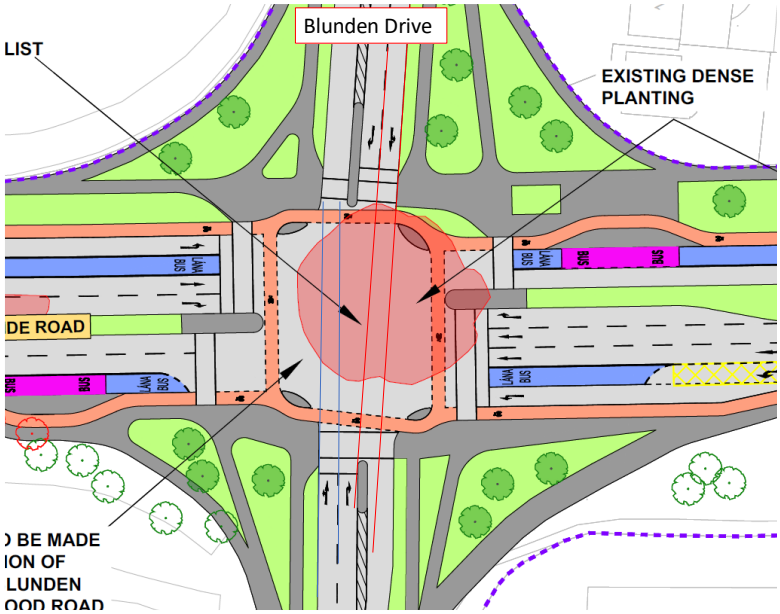


Figure 4.9: Bluden Drive / Malahide Road Junction

Description:

The lanes on the east and west arms of the junction are not aligned. The alignment of the westbound lanes on Blunden Drive which may result in vehicles encroaching on adjacent lanes and thereby side-swipe type collisions may occur as traffic travels through the junction.

Recommendation:

The alignment of the lanes should be altered to ensure that the lanes on both sides of the junction are aligned. Lane delineation road markings should be provided to guide traffic through the junction.

4.3.6 Problem

Location:	Newtown Road / Malahide Road Junction
Drawing:	Sheet 08 of 21
Summary:	Stop lines and road markings not shown

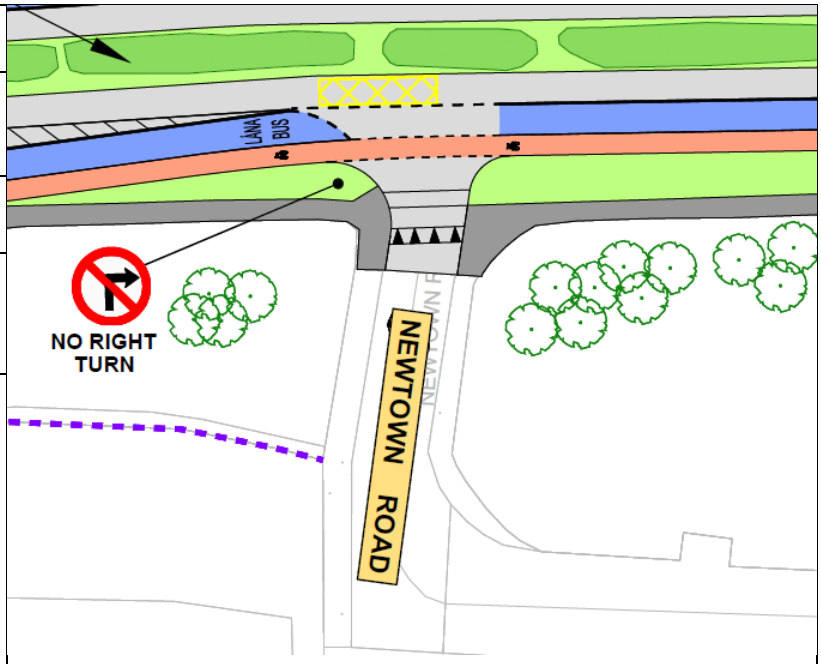


Figure 4.10: Proposed Access to Malahide Road

Figure 4.11: Existing Access to Malahide Road

Description:

The scheme drawings do not illustrate the existing signage arrangement of the Newtown Road / Malahide Road Priority junction. Drivers unfamiliar with the area may stop in the cycle lane, blocking cyclists along the route and in some instances forcing them to manoeuvre suddenly around vehicles potentially into the vehicle carriageway resulting in cyclist-vehicle collisions.

Recommendation:

Ensure all junctions have appropriate signage and line markings.

4.3.7 Problem

Location:	Ayrefield Drive Pedestrian Link
Drawing:	Sheet 9 of 21
Summary:	Straight Alignment of Cycle Lane

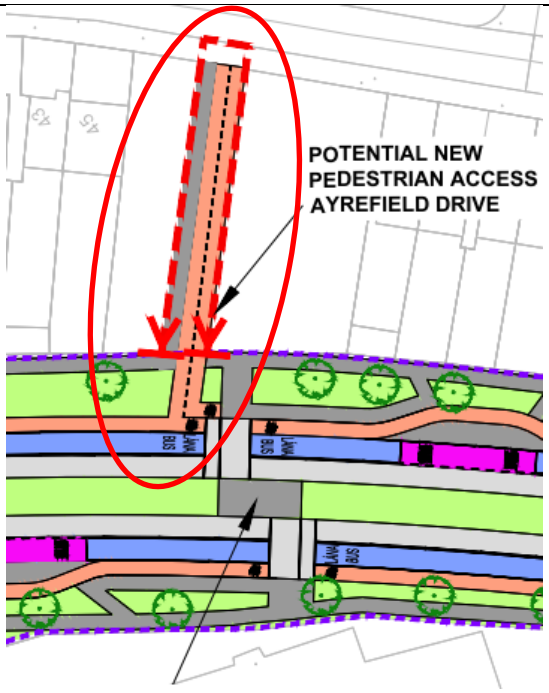


Figure 4.12: Proposed Pedestrian / Cyclist Link

Description:

The audit team are concerned that given the straight alignment of the new pedestrian avenue access to Ayrefield Drive, cyclists may not slow down. This could result in cyclists overshooting the cycle lane and travelling into the vehicle carriageway resulting in collisions with vehicles along the Malahide Road or striking a pedestrian crossing the cycle lane.

Recommendation:

Some form of preventative measure is to be provided which reduces cyclists speed.

4.3.8 Problem

Location:	Access to Crown Decorating Centre
Drawing:	Sheet 10 of 21
Summary:	Can a HGV undertake this right turning movement

Figure 4.13: Right Turn Pocket

Description:

The audit team are concerned that the right turn pocket provided for access into the Crown Decorating Centre along the Malahide Road is not situated in an adequate location for HGVs to turn into the site (red arrow). This could lead to HGV drivers underestimating the turning arc required and result in them mounting the kerb and striking a pedestrian or damaging street furniture.

Recommendation:

This access is to be reviewed to ensure that vehicles can safely enter.

4.3.9 Problem

Location:	Malahide Road (Northbound)
Drawing:	Sheet 11 of 21 & Sheet 12 of 21
Summary:	Car parking spaces are provided along bus lanes without a buffer

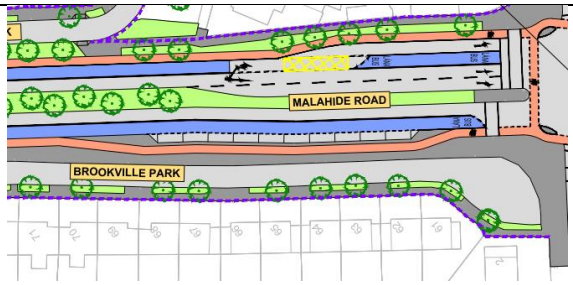


Figure 4.14: Proposed Parallel Car Parking Spaces

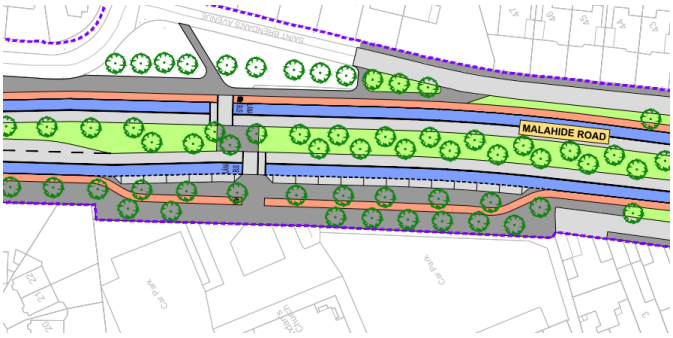


Figure 4.15: Proposed Parallel Car Parking Spaces

Description:

Parallel car parking spaces are to be provided on the Malahide Road (northbound) along the bus lanes without a buffer between the spaces and the vehicle carriageway. This could lead to instances where drivers do not check over their shoulder upon exiting their vehicles and results in them being struck by a bus, damage to their vehicle or buses swerving into the adjacent lane resulting in sideswipe and/or rear impact collisions.

Recommendation:

A buffer should be provided between the bus lane and the parallel car parking spaces.

4.3.10 Problem

Location:	Coolock Village (Brookville Park Road)
Drawing:	Sheet 12 of 21
Summary:	Lack of pedestrian crossing locations

Figure 4.16: Proposed Arrangement

Figure 4.17: Existing Arrangement

Description:

The audit team note that there are no provisions for pedestrians to cross from the Malahide Road onto the Brookville Park Road. Lack of appropriate crossing locations can present a hazard to pedestrians, particularly vision and mobility impaired.

Recommendation:

Appropriate crossing facilities are to be provided at this location.

4.3.11 Problem

Location:	Access to McHughs off-licence / Artane Auto Centre
Drawing:	Sheet 14 of 21
Summary:	Discontinuation of footpaths

Figure 4.18: Access to McHughs off-licence / Artane Auto Centre

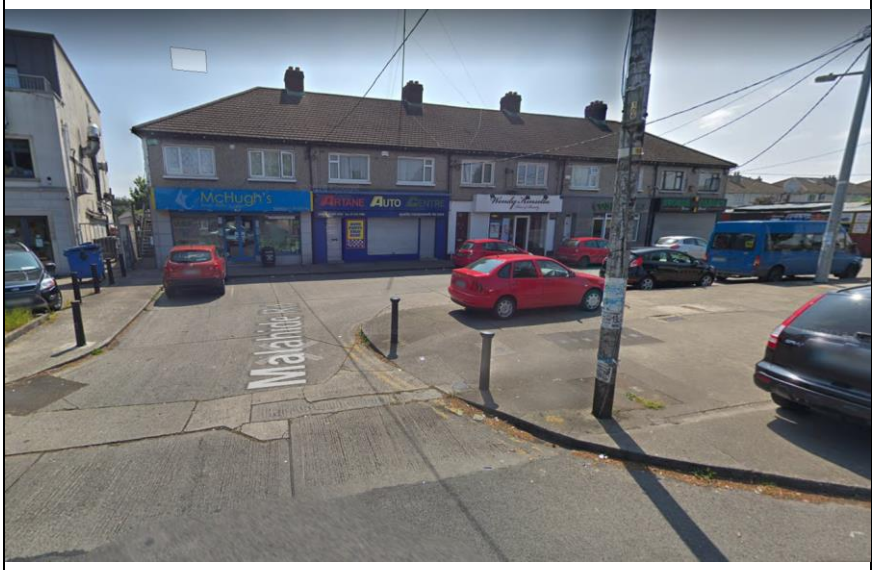


Figure 4.19: Existing Access Arrangement

Description:

No footpath is shown across the accesses to McHughs Off-licence and Artane Auto Centre have been omitted. This absence of a footpath at this location is likely to result in conflicts between vehicle accessing/departing these properties and pedestrians.

Recommendation:

The footpath should be continued across the accesses thus giving priority to pedestrians.

4.3.12 Problem

Location:	Malahide Road / Kilmore Road Junction
Drawing:	Sheet 15 of 21
Summary:	Cycle Lane Staging

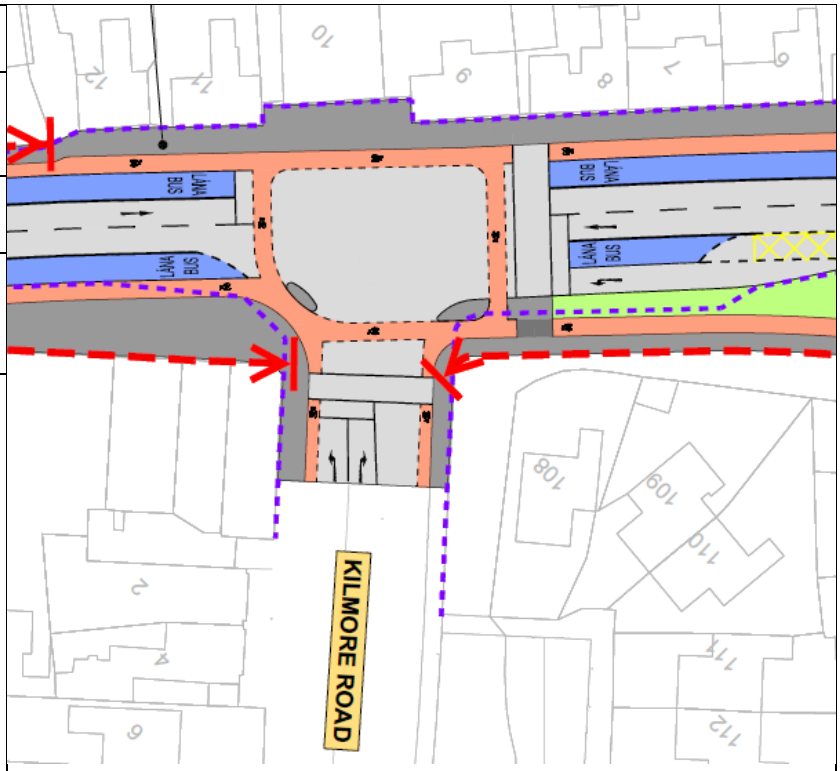


Figure 4.20: Malahide Road / Kilmore Road Junction

Description:

No staging information has been provided, but the current layout would indicate that if cyclists are permitted to proceed at the same time as traffic on the southbound traffic lanes, it could result in collisions with vehicles as they attempt to turn right across the road carriageway.

Recommendation:

Controlled signal facilities should be provided for cyclists wishing to cross the road carriageway. The cycle staging should be separated from the traffic movements.

4.3.13 Problem

Location:	Malahide Road / Kilmore Road Junction
Drawing:	Sheet 15 of 21
Summary:	Cycle Lane on Kilmore Road appears too narrow

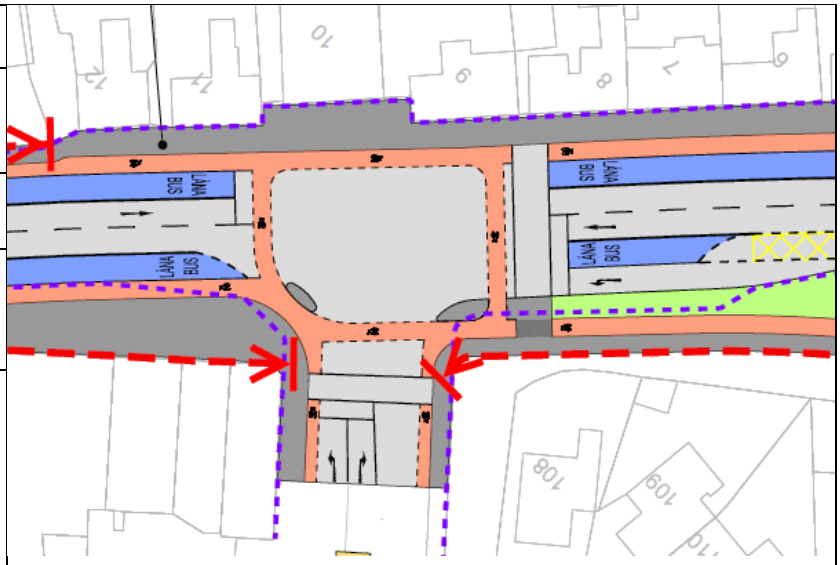


Figure 4.21: Malahide Road / Kilmore Road Junction

Description:

The cycle lanes provided along the Kilmore road on approach to / from this junction appear to be very narrow at this location on both sides of the carriageway. This could result in inadequate cycle lanes being provided which may lead to cyclist-vehicle collisions at this junction.

Recommendation:

Appropriately sized cycle lanes are to be provided at this location, in accordance with the National Cycle Manual.

4.3.14 Problem

Location:	Malahide Road / Copeland Avenue / Griffith Avenue Junction
Drawing:	Sheet 19 of 21
Summary:	Cycle Lane Staging

Figure 4.22: Malahide Road / Copeland Avenue / Griffith Avenue

Description:

No staging information has been provided, but the current layout would indicate that if cyclists are permitted to proceed at the same time as traffic on the southbound traffic lanes, it could result in collisions with vehicles as they attempt to turn right across the road carriageway.

Recommendation:

Controlled signal facilities should be provided for cyclists wishing to cross the road carriageway. The cycle staging should be separated from the traffic movements.

4.3.15 Problem

Location:	Malahide Road / Copeland Avenue / Griffith Avenue Junction
Drawing:	Sheet 19 of 21
Summary:	Cycle Lane on Griffith Avenue appears too narrow

Figure 4.23: Malahide Road / Tesco Junction

Description:

The cycle lanes provided along the Griffith Avenue on both sides of the carriageway appears to narrow on approach to this junction. This could result in inadequate cycle lanes being provided which may lead to cyclist-vehicle collisions at this junction.

Recommendation:

Appropriately sized cycle lanes are to be provided at this location, in accordance with the National Cycle Manual.

4.3.16 Problem

Location:	Malahide Road / Copeland Avenue / Griffith Avenue Junction
Drawing:	Sheet 19 of 21
Summary:	Provision of cycle lane through junction

Figure 4.24: Malahide Road / Copeland Avenue / Griffith Avenue Junction

Description:

No staging information has been provided, but the current layout would indicate that if cyclists are permitted to proceed at the same time as traffic on the southbound traffic lanes, it could result in collisions with vehicles as they attempt to turn left, right or southbound across the road carriageway.

Recommendation:

Controlled signal facilities should be provided for cyclists wishing to cross the road carriageway in a similar manner to the other junctions within the scheme i.e. cycle lanes are provided across all arms as opposed to through the centre of the junction. The cycle staging should be separated from the traffic movements.

4.3.17 Problem

Location:	Malahide Road / Marino Avenue Junction
Drawing:	Sheet 20 of 21
Summary:	Bus Stop to be provided across Junction

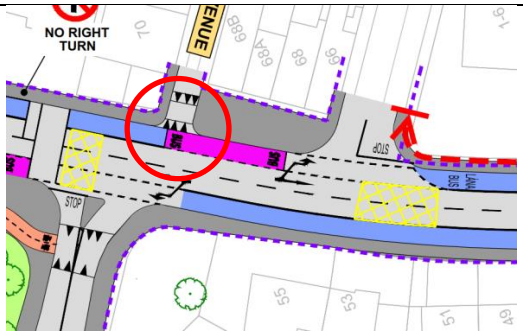


Figure 4.25: Proposed Bus Stop

Figure 4.26: Existing Arrangement at Proposed Bus Stop Location

Description:

It is proposed to provide a bus stop on the southbound carriageway of the Malahide Road between Marino Avenue and Claremont Road junction. If a bus is stopped at this location, vehicles will be prohibited from exiting from the Marino Avenue. This could lead to drivers mounting the kerb to manoeuvre around the bus which could result in pedestrian-vehicle collisions, collisions with the stopped bus or damage to street furniture.

Recommendation:

This bus stop should be relocated to a suitable location.

4.3.18 Problem

Location:	Malahide Road / Marino Avenue Junction
Drawing:	Sheet 20 of 21
Summary:	Pedestrian crossing to be removed

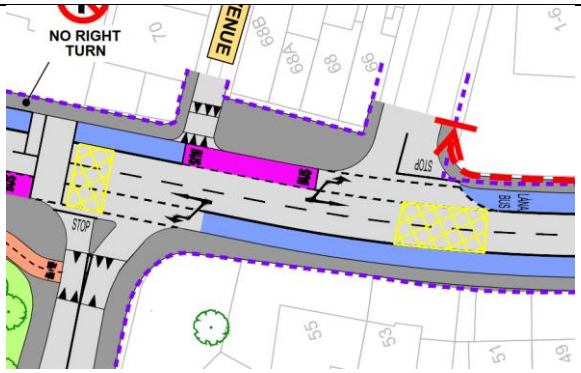


Figure 4.27: Proposed Arrangement

Figure 4.28: Existing Arrangement

Description:

It is proposed to provide a bus stop on the southbound carriageway of the Malahide Road between Marino Avenue and Claremont Road junction which removes the existing pedestrian crossing. This will create a pedestrian desire line across the Malahide Road. Without a pedestrian crossing, there will be no focused pedestrian crossing point, meaning that pedestrians may cross at a variety of locations resulting in a greater risk of collision with a vehicle.

Recommendation:

This bus stop should be located to a more adequate location with the controlled crossing to be retained or relocated to a suitable area.

4.3.19 Problem

Location:	Malahide Road
Drawing:	Sheet 21 of 21
Summary:	Angle of turning cars across the proposed cycle lane

Figure 4.29: Access to Marino Crescent

Description:

Due to the oblique angle of entry, drivers may approach this left turn in at speed and not anticipate a cyclist to cross at this location resulting in drivers having to stop suddenly which could lead to rear-end shunt type collisions with other vehicles or cyclist-vehicle collisions.

Recommendation:

Review the junction radii at this location.

5 Audit Team Statement

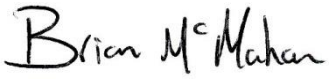
We certify that the site was visited and that this audit has been carried out in accordance with the Transport Infrastructure Ireland Road Safety Audit Guidelines GE-STY-01027-01 (HA 19/15) and Standard GE-STY-01024-07 (HD 19/17).

The Road Safety Audit 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.

No one on the audit team has been involved with the scheme design.

AUDIT TEAM LEADER: SENIOR ROAD SAFETY AUDITOR

Name: Brian McMahon BE MSc CEng MIEI

Position: Associate Director Signed: 

Organisation: AECOM Date 15.04.20

Address: Adelphi Plaza

George's Street Upper

Dun Laoghaire

AUDIT TEAM MEMBER: ROAD SAFETY AUDITOR

Name: Zachary Cave BEng MIEI

Position: Transport Planner / Engineer Signed: 

Organisation: AECOM Date 15.04.20

Address: Adelphi Plaza

George's Street Upper

Dun Laoghaire

Appendix A Documents Submitted to the Audit Team

The following documents were obtained from the Design Team.

Document No.	Rev.	Description	Date
BCID-0001-GEN_KP-01_XX_00-DR-CR-0001	A01	Clongriffin to City Centre General Arrangement Index Plan – Sheet 01 of 01	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0001	A01	Clongriffin to City Centre General Arrangement – Sheet 1 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0002	A01	Clongriffin to City Centre General Arrangement – Sheet 2 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0003	A01	Clongriffin to City Centre General Arrangement – Sheet 3 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0004	A01	Clongriffin to City Centre General Arrangement – Sheet 4 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0005	A01	Clongriffin to City Centre General Arrangement – Sheet 5 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0006	A01	Clongriffin to City Centre General Arrangement – Sheet 6 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0007	A01	Clongriffin to City Centre General Arrangement – Sheet 7 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0008	A01	Clongriffin to City Centre General Arrangement – Sheet 8 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0009	A01	Clongriffin to City Centre General Arrangement – Sheet 9 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0010	A01	Clongriffin to City Centre General Arrangement – Sheet 10 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0011	A01	Clongriffin to City Centre General Arrangement – Sheet 11 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0012	A01	Clongriffin to City Centre General Arrangement – Sheet 12 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0013	A01	Clongriffin to City Centre General Arrangement – Sheet 13 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0014	A01	Clongriffin to City Centre General Arrangement – Sheet 14 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0015	A01	Clongriffin to City Centre General Arrangement – Sheet 15 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0016	A01	Clongriffin to City Centre General Arrangement – Sheet 16 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0017	A01	Clongriffin to City Centre General Arrangement – Sheet 17 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0018	A01	Clongriffin to City Centre General Arrangement – Sheet 18 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0019	A01	Clongriffin to City Centre General Arrangement – Sheet 19 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0020	A01	Clongriffin to City Centre General Arrangement – Sheet 20 of 21	January 2020
BCID-0001-GEO_HV-01_XX_00-DR-CR-0021	A01	Clongriffin to City Centre General Arrangement – Sheet 21 of 21	January 2020

Appendix B Audit Feedback Form

Road Safety Audit Feedback Form

Scheme: Clongriffin to City Centre Core Bus Corridor

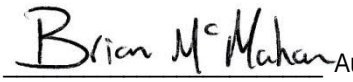
Audit Stage: Stage 1

Date Audit Completed: April 2020

Paragraph No.	To be Completed by Designer				To be completed by Audit Team Leader
	Problem Accepted (Y/N)	Recommended Measure Accepted (Y/N)	Describe alternative measure(s). Give reasons for not accepting recommended measure. Only complete if recommended measure is not accepted	Designer Comments	Alternative measures or reasons accepted by auditors (Y/N)
4.2.1.1	Yes	Yes		This will be undertaken during Preliminary Design Stage	Yes
4.2.1.2	Yes	Yes		This will be undertaken during Preliminary Design Stage	Yes
4.2.1.3	Yes	Yes		This will be undertaken during Preliminary Design Stage	Yes
4.2.2.1	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.2.2.2	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.2.2.3	Yes	Yes		This will be undertaken during Preliminary Design Stages	Yes
4.3.1	Yes	No	This will be reviewed during Preliminary Design Stages		No
4.3.2	Yes	Yes		Footpaths will be in accordance with DMURS.	Yes
4.3.3	Yes	Yes		This will be undertaken during Preliminary Design Stage	Yes
4.3.4	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.5	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.6	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.7	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.8	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages, current layout is as per existing layout	Yes
4.3.9	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages, current layout is as per existing layout	Yes
4.3.10	Yes	Yes	This will be reviewed during Preliminary and Detail Design Stages, current layout is as per existing layout		Yes

Paragraph No.	To be Completed by Designer				To be completed by Audit Team Leader
	Problem Accepted (Y/N)	Recommended Measure Accepted (Y/N)	Describe alternative measure(s). Give reasons for not accepting recommended measure. Only complete if recommended measure is not accepted	Designer Comments	Alternative measures or reasons accepted by auditors (Y/N)
4.3.11	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.12	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.13	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.14	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.15	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.16	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.17	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.18	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes
4.3.19	Yes	Yes		This will be undertaken during Preliminary and Detail Design Stages	Yes

Signed:  Designer John Hawe Date: 08-May 2020

Signed:  Audit Team Leader Brian McMahon Date: 11-May 2020

Signed:  Employer/ Employer(s) Representative Date: 11-May-2020

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Clongriffin to City Centre

BusConnects Corridor
Stage 1 Road Safety Audit

National Transport Authority

February 2022

Delivering a better world

Prepared for:

National Transport Authority

Prepared by:

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Tables

1. Introduction

1.1 Overview

AECOM has been commissioned by the National Transport Authority (NTA) to undertake a Stage 1 Road Safety Audit for a proposed Core Bus Corridor (CBC) scheme running from Clongriffin to City Centre (CBC 1).

This Stage 1 Audit will assess the safety implications of the scheme for all road users.

The Safety Audit Report indicates each of the problems identified, provides outline recommendations for solving the problems, presents the Audit Team Statement, and describes a schedule of documents reviewed. The members of the Audit Team were:

Audit Team Leader:

Brian McMahon, BE, MSc, CEng, MIEI

Associate Director, AECOM

Audit Team Member:

Zachary Cave, BEng (Hons), MIEI, MTPS

Senior Consultant, AECOM

The audit comprises of an examination of the scheme drawings and a site visit. The site visit took place on Tuesday the 18th of January 2022. On the day of the visit, the weather was cloudy with a dry road surface, the site visit was undertaken between 10:30 hrs and 14:30hrs (in daylight). During the time of the site visit, there did not appear to be any circumstances that would suggest a deviation from normal traffic conditions. The Clongriffin and Belmayne Avenue section of the scheme is subject to a separate design by Dublin City Council and has not been included within this audit.

1.2 Scheme Description

The core bus corridor project proposes the provision of 230 kilometres of bus lanes on sixteen of the busiest bus corridors and 200 kilometres of cycle lanes and tracks.

The intention is to develop these bus corridors so that each will have continuous bus priority - in other words, a continuous bus lane in each direction as well as maintaining two general traffic lanes. In addition, it is proposed to provide safe cycling facilities, segregated where possible from other vehicular traffic. This will remove the delays currently experienced which will grow worse as congestion increases.

The Core Bus Corridor (CBC) commences at Clongriffin DART Station and is routed via Clongriffin Main Street which will be extended to join the Malahide Road at a new junction to the north of Clare Hall Junction. The CBC is then routed via Malahide Road to the junction with Marino Mart/Fairview. From here the CBC ties into a separate project, Clontarf to City Centre Cycle Scheme currently proposed by Dublin City Council.

The CBC is approximately 8km in length and will reduce bus journey times from 65 minutes down to 35 minutes. It is intended that CBC 1 will provide a high-quality transport system where priority for buses will be provided along the entire route, consisting primarily of dedicated bus lanes in both directions. Dedicated cycle facilities will also be provided alongside the proposed CBC route.

This RSA considers the section of the scheme which runs along the Malahide Road only and not the Belmayne and Clongriffin sections, this accounts for approximately 5.7km of the CBC.

1.3 Road Safety Audit

This Safety Audit represents the response of an independent Audit Team to various aspects of the scheme. The recommendations contained therein are the opinions of the Audit Team and are intended as a guide to the designers on how the scheme as designed can be improved to address issues of road safety.

The following documents were provided by the Design Team:

- Clongriffin to City Centre – General Arrangement – Cover Sheet – Sheet 01 of 01
- Clongriffin to City Centre – General Arrangement – Key Plan – Sheet 01 of 01
- Clongriffin to City Centre – General Arrangement – Sheet 06 to 21
- Clongriffin to City Centre – Junction Systems Design – Cover Sheet
- Clongriffin to City Centre – Junction Systems Design – Key Plan
- Clongriffin to City Centre – Junction Systems Design – Mayne River Avenue
- Clongriffin to City Centre – Junction Systems Design – Hilton
- Clongriffin to City Centre – Junction Systems Design – Clarehall
- Clongriffin to City Centre – Junction Systems Design – Belcamp Lane Malahide Road
- Clongriffin to City Centre – Junction Systems Design – Blunden Drive
- Clongriffin to City Centre – Junction Systems Design – Woodys Malahide Road
- Clongriffin to City Centre – Junction Systems Design – Green Castle Road
- Clongriffin to City Centre – Junction Systems Design – Tongelee Road
- Clongriffin to City Centre – Junction Systems Design – St Brendans Church Malahide Road
- Clongriffin to City Centre – Junction Systems Design – Coolock Village Malahide Road
- Clongriffin to City Centre – Junction Systems Design – Mask Avenue Malahide Road
- Clongriffin to City Centre – Junction Systems Design – Ardlea Road
- Clongriffin to City Centre – Junction Systems Design – Danieli Road Malahide Road
- Clongriffin to City Centre – Junction Systems Design – Kilmore Road
- Clongriffin to City Centre – Junction Systems Design – Killester Avenue
- Clongriffin to City Centre – Junction Systems Design – Elm Mount Road
- Clongriffin to City Centre – Junction Systems Design – Collins Avenue
- Clongriffin to City Centre – Junction Systems Design – Elm Road Malahide Road
- Clongriffin to City Centre – Junction Systems Design – Donnycarney Road Malahide Road
- Clongriffin to City Centre – Junction Systems Design – Casino Park
- Clongriffin to City Centre – Junction Systems Design – North of Griffith Malahide Road
- Clongriffin to City Centre – Junction Systems Design – Griffith Avenue
- Clongriffin to City Centre – Junction Systems Design – Marino Avenue Brian Road Malahide Road
- Clongriffin to City Centre – Junction Systems Design – Clontarf Road

The general arrangement plan drawings and road junction signalling and staging were provided to the audit team, with the signal timings not being provided. Other drawings such as road markings and sign plans, drainage, lighting, landscaping, etc. have not been provided and therefore have not been included in this Stage 1 Road Safety Audit. The level of existing and predicted traffic volumes has not been provided. Future forecasts of pedestrian, cyclists, frequency of the buses, Dublin Bus or otherwise have not been provided.

The terms of reference of the Audit are as described in TII guidelines GE-STY-01024 (HD 19/15). The team has examined and reported only on the road safety implications of the scheme as presented and they have not examined or verified the compliance of the design to any other criteria.

The Safety Audit guidelines do not provide a facility for the Audit Team to classify individual problems according to their severity, and hence the level of priority to be attached to each. It is instead the task of the design team and/or their representative to take a view on the validity of each of the recommendations and decide on an appropriate course of action.

The response of the Design Team to the Safety Audit should be prepared in the form of a Safety Audit Feedback Form, accepting the changes proposed by the Audit Team or providing an alternative solution to the problem. The

Feedback Form is then returned to the Audit Team for review and verification. A template for a Safety Audit Feedback Form is included as Appendix B.

2. Site Description

2.1 Overview

The scheme comprises of a Core Bus Corridor system linking Clongriffin to the City and is 8km in length. The CBC commences at the Clongriffin DART Station and is routed via Clongriffin Main Street which will be extended to join the Malahide Road at a new junction to the north of Clare Hall Junction. The CBC is then routed via Malahide Road to the junction with Marino Mart/Fairview. From here the CBC ties into a separate project, Clontarf to City Centre Cycle Scheme currently proposed by Dublin City Council. As part of this RSA, the audit team examined from the Mayne River Avenue junction to the Clontarf Road junction, approximately 5.7km of the overall scheme.

The scheme includes redistribution of road space, provision of new CBC facilities as well as pedestrian and cycle facility upgrades.

The location of CBC Route 1 that is subject to this Stage 1 RSA is shown in Figure 2.1.

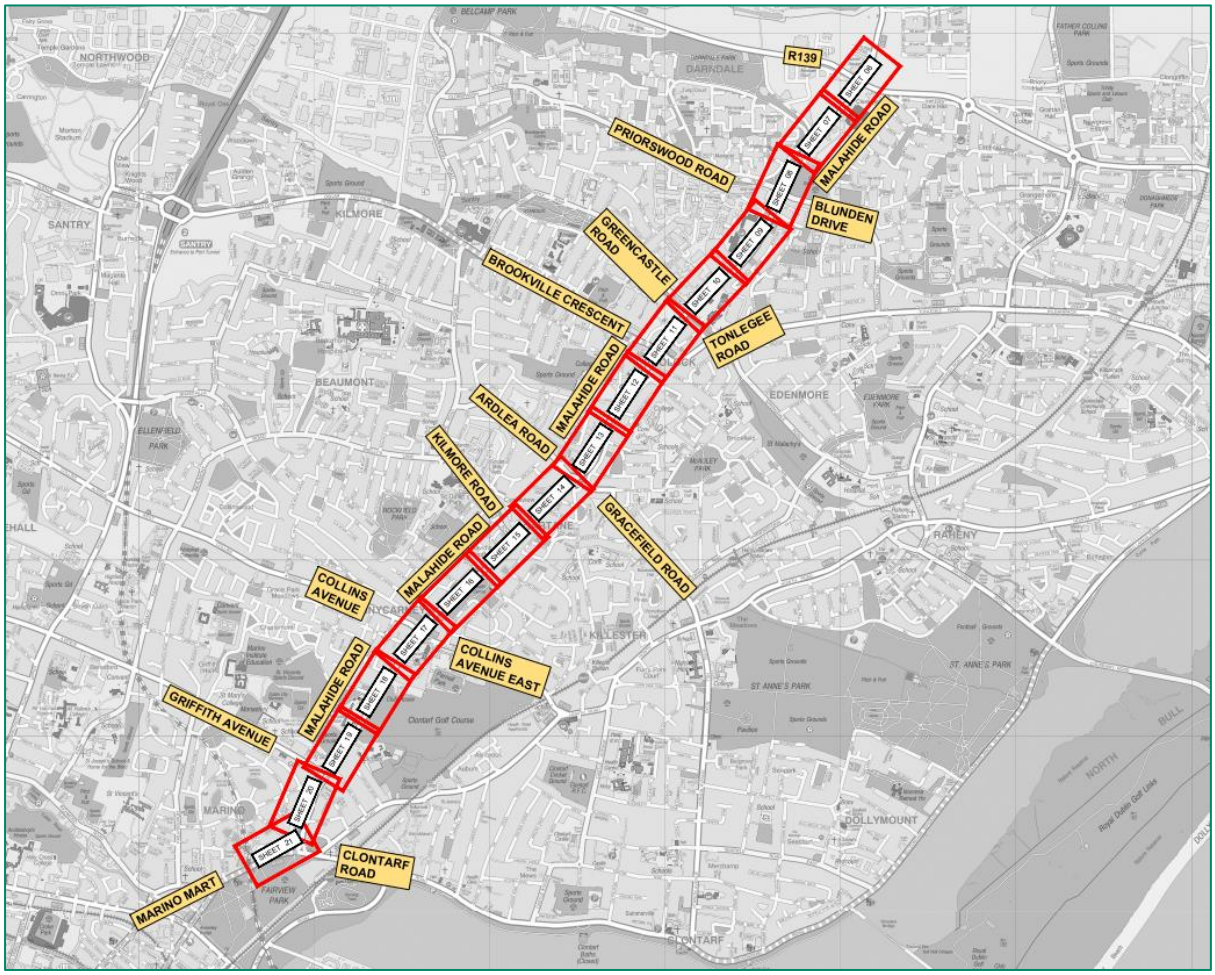


Figure 2.1 – Site Location (Source: General Arrangement - Key Plan, Drawing No. BCIDA-ACM-GEO_KP-0001_XX_00-DR-CE-0001)

Table 2.1 provides a summary of the scheme location and context.

Table 2.1 – Scheme Summary

Location	Clongriffin to the City Centre
Classification	Regional & Local Roads
Speed Limit	50km/hr and 60km/hr
Local Authority Area	Dublin City Council
Types of Roads	Single Carriageway Roads, Urban Environment

2.2 Site Observations

The site visit was undertaken during the daytime on Tuesday the 18th of January 2022. A number of observations were noted. These observations are discussed below under a number of key headings.

Road Geometry

- There is an array of road types and geometries along the 5.7km route. The route mainly consists of dual carriageway roads (inclusive of a dedicated bus lane).
- There are bus lanes in both directions along much of the Malahide Road between the Clontarf Road junction and the tie in with the Belmayne Avenue Scheme.
- There are bus lanes provided along sections of the northbound and southbound carriageways of the Malahide Road.

Vehicular Traffic

- Within the scheme extents the speed limit is 60km/hr and 50km/hr.

Pedestrians & Cyclists

- There are existing footpaths provided on both sides of the full route.
- There are a variety of existing cycle facilities along the route, from on-road, shared with bus, cycle tracks etc.
- There are a number of signal-controlled pedestrian crossings along the route.

Street Lighting

- Public lighting is provided throughout the entire scheme extents.
- The site visit was carried out during daylight hours; lighting levels at the site during darkness hours were therefore not observed.

2.3 Site Observations

A review of the collision data between the years 2005 and 2016 has been undertaken for the length of the Clongriffin to City Centre CBC.

3. Departures from Standards

3.1 General

No departures from standards have been notified to the audit team.

4. Items Resulting from this Stage 1 Road Safety Audit

4.1 Overview

This Safety Audit has reported on issues relating to the proposed CBC Scheme (Route 1) Clongriffin to City Centre along the R107 Malahide Road. This is classified as a Stage 1 Road Safety Audit, as defined within the TII Road Safety Audit Guidelines.

The following information was not provided for Audit so therefore could not be commented upon:

- Signal Timings;
- Signage Layout;
- Drainage and Services;
- Lighting;
- Landscaping;
- Autotrack analysis; and
- Clongriffin, Belmayne Main Street and Belmayne Avenue Scheme.

The Clongriffin, Belmayne Main Street and Belmayne Avenue section of the scheme (General Arrangement - Sheets 01 to 05) were omitted from this audit as they are subject to a separate scheme of which the detailed designs drawings were not provided.

The report has been divided into general issues that are common throughout the scheme in Section 4.2, with specific areas highlighted in Section 4.3.

4.2 General Issues

4.2.1 Road Geometry

4.2.1.1 Problem	
Location:	Throughout the Scheme
Summary:	Autotracking has not been provided
Description:	
Tracking for buses (and other large vehicles) has not been provided for any of the junctions throughout the scheme. If there is insufficient space within the carriageway for all vehicle types to safely complete a turning manoeuvre there is a risk of vehicles over-running, or striking, the kerb or entering the footpath/cycle lane where there is the potential for collisions with vulnerable road users.	
Recommendation:	
The swept path of all vehicles should be accommodated within the extents of the traffic lanes at all junctions within the Scheme. Where larger vehicles (e.g. buses and HGVs) may over-run adjacent traffic lanes when turning ensure stop lines are sufficiently set back from the junction and that mirrored turning manoeuvres are on separate signal phases.	

4.2.1.2 Problem	
Location:	Throughout the Scheme
Summary:	Kerb height of cycle track
Description:	
No details have been provided regarding the level difference between the cycle track and adjacent carriageway. In accordance with the National Cycle Manual, the cycle tracks and carriageway should be physically separated by verge or height difference. Failure to provide adequate segregation between the cycle track and adjacent carriageway may result in collisions, with motorists more likely to encroach on the cycle track.	
Recommendation:	
The cycle track should be constructed at a higher level (25 to 50mm) than the adjacent carriageway.	

4.2.1.3 Problem	
Location:	Throughout the Scheme
Summary:	Tie-ins to existing
Description:	
There are a number of locations throughout the scheme where proposed cycle tracks, footpaths and kerblines do not tie-in with the existing infrastructure. Failure to provide adequate tie-ins at these locations may result in confusion amongst all road users which, in turn, may lead to collisions. Furthermore, cycle lanes end suddenly on the side roads, with little transition before cyclists enter the main road carriageway.	
Recommendation:	
Adequate tie-ins should be provided between the scheme and existing carriageway. Road markings should be provided to highlight to motorists that cyclists are entering the main road carriageway.	

4.2.2 Pedestrians and Cyclists

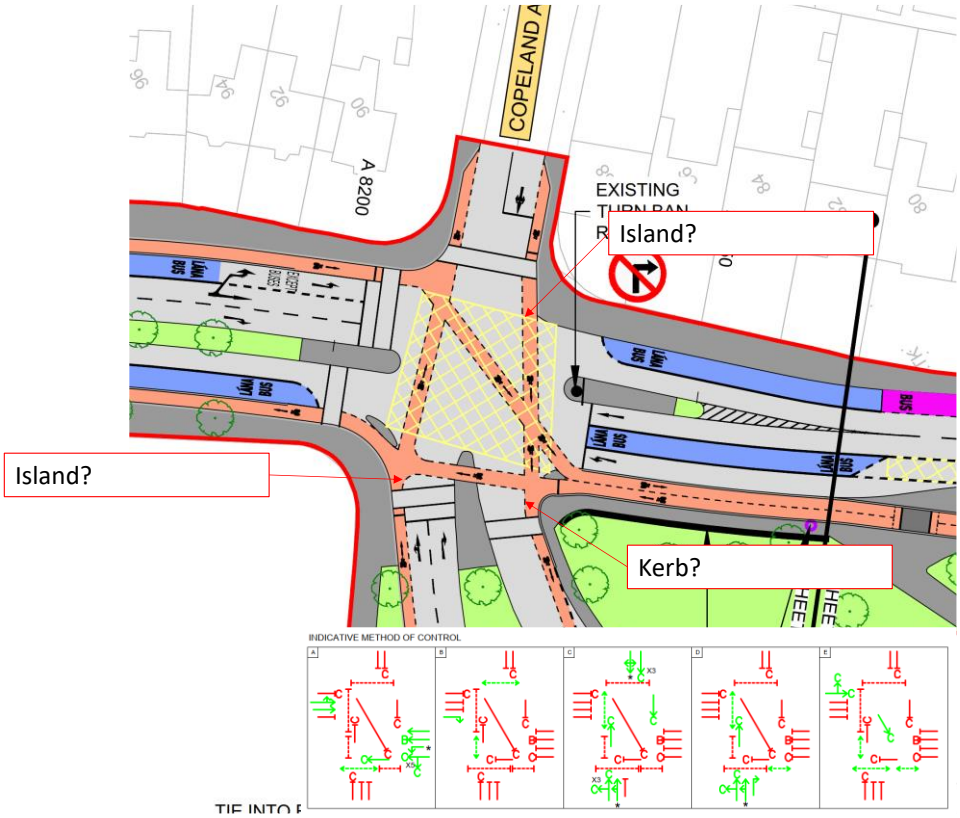
4.2.2.1 Problem	
Location:	Throughout the Scheme
Summary:	Operation of protected junctions
Description:	
The majority of the scheme's junctions have designated cycle lanes through the junction with raised concrete islands. While the islands provide a level of protection for cyclists, they will be required to take a slight detour in order to remain on the cycle lane. The horizontal separation may decrease driver's awareness of the presence of cyclists and reduce any eye contact between cyclists and drivers. It is proposed to provide a separate signal stage for cyclists at some junctions, but at other junctions, it is proposed to provide a flashing amber signal to left-turning traffic to warn of the interaction with cyclists. It is unclear if this will provide enough protection to cyclists at all locations.	
Recommendation:	
Ensure cyclists are sufficiently catered for at protected junctions, such that the risk of conflicts with other road users is minimised. If cyclists are running during the same stage as left-turning vehicles then it should be monitored for a period after opening for near misses and collisions. If it is decided that there is an unacceptable risk for cyclists, provide a separate signal stage for cyclists.	

4.2.2.2 Problem

Location:	Throughout the Scheme
Summary:	Protected junctions

Description:

Protected signal-controlled junction layouts provide a safe separate space for cyclists at junctions. They are typically designed with segregated tracks with kerbs on the approach and exit arms, and a protection island through the junction. However, on some arms of the proposed junctions, segregation is not provided, thus diminishing the value of the protected facilities.



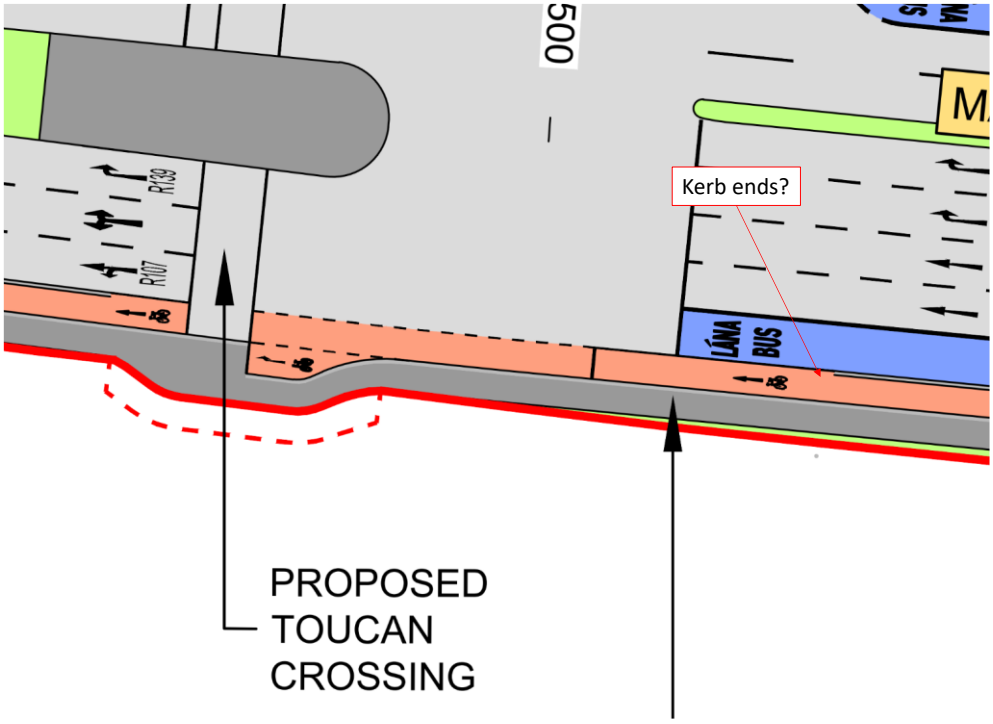
Recommendation:

Kerbs and islands should be provided on all arms of the junctions where there is going to be a conflict between cyclists travelling straight-ahead and left turning traffic.

4.2.2.3 Problem	
Location:	Throughout the Scheme
Summary:	Raised Kerb Buffer

Description:

The proposed raised kerb stops short of the stop line on the approaches to some junctions. Cyclists may be vulnerable to some motorised vehicles, cutting into the cycle lane, resulting in a collision.



Recommendation:

A raised kerb buffer should be provided between the bus lane and the cycle lane on approach to junctions up to the stop line.

4.2.2.4 Problem	
Location:	Throughout the Scheme
Summary:	Right Turning Cyclists at Protected Junctions

Description:

Right turning cyclists may have to stack behind the kerb build-outs. However, in some locations it appears that there is limited space for cyclists to wait. There is a risk of a potential collision between the stationary cyclists and the cyclist wishing to travel straight through.

Recommendation:

Ensure that appropriate waiting space has been provided for the anticipated number of right turning cyclists at each junction.

4.2.2.5 Problem

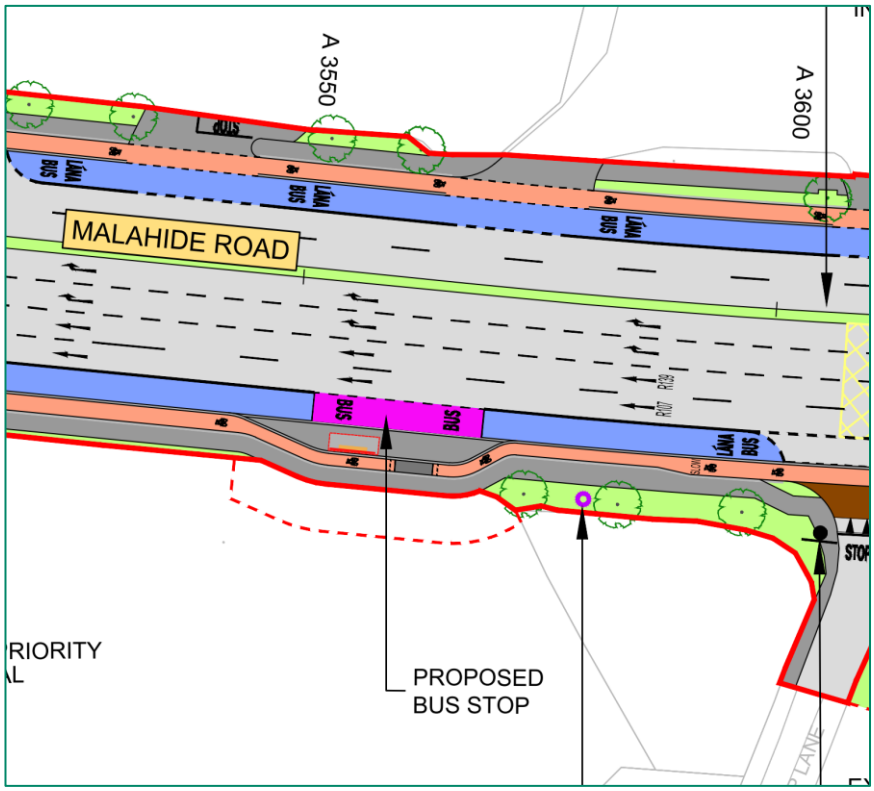
Location:	Throughout the Scheme
Summary:	Cyclists passing Bus Islands

Description:

Urban situations will invariably require cyclists to make a transition to the right or left, and are generally required in the vicinity of bus stops.

Transitions should be designed and constructed to provide continuity, comfort and safety to cyclists. The curve radius of a transition should permit cyclists to preserve momentum and maintain their balance.

The curve radius proposed in the current designs appear to be too tight and could result in cyclists losing control of their bikes.



Recommendation:

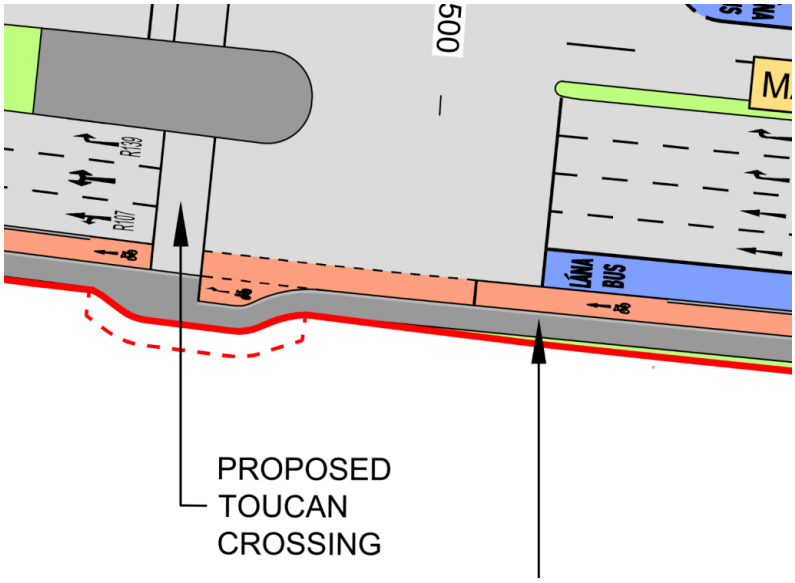
The proposed transition should be increased in length with a larger radius used.

4.2.2.6 Problem

Location:	Throughout the Scheme
Summary:	Cyclist Waiting Area at Toucan Crossing

Description:

It is unclear how cyclists are to access the toucan crossings from the jug-turns. No ramp details are provided on how cyclists are to access the crossing from the cycle lane. There is very little separation between the cycle turning area and the toucan crossing which may lead to collisions between cyclists and pedestrians.



Recommendation:

Appropriate facilities should be provided at the cyclists waiting area, with enough space for cyclists to pull into the ramp off the cycle lane. A ramp with ladder tactile paving should be provided. A shared space should be provided before the toucan crossing to ensure that there is adequate space for both cyclists and pedestrians to wait comfortably.

4.2.2.7 Problem

Location:	Throughout the Scheme
Summary:	No details provided on tactile paving to be provided

Description:

No detail has been provided in relation to the tactile paving to be provided at any of the crossing points / junctions throughout the scheme. Lack of appropriate tactile paving may result in confusion for vision impaired pedestrians. Failure to provide a footpath across the junctions/entrances would give motorists priority and therefore increase the risk of collisions with pedestrians.

Figure 4.1 and Figure 4.2 illustrates an example of this problem along the Malahide Road.

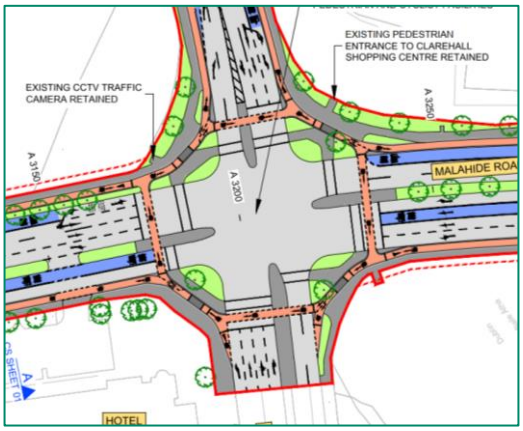


Figure 4.1 – Crossing Points along Malahide Road / R139 junction

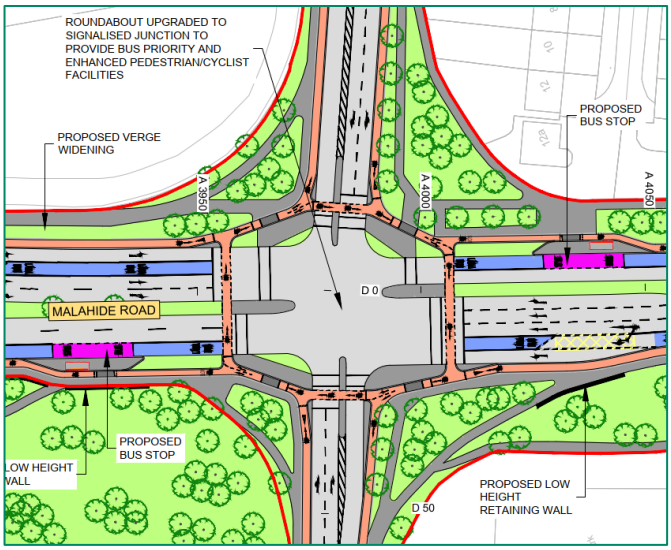


Figure 4.2 – Crossing Points along Malahide Road / Blunden Drive / Priorswood Road junction

Recommendation:

Ensure adequate tactile paving is provided across the scheme at both controlled and uncontrolled crossing points.

4.2.2.8 Problem

Location:	Throughout the Scheme
Summary:	Reinstatement of existing road markings

Description:

It is unclear from the scheme drawings if the existing road markings are to be re-instated and incorporated into the scheme proposals. Enhancing lane discipline adds to the safety of traffic, besides improving traffic flows. For example in the location shown below, the lack of the arrow road marking may result in someone who is unfamiliar with the area, hesitating, resulting in a rear end collision.

Figure 4.3 illustrates an example of this problem along the Malahide Road.

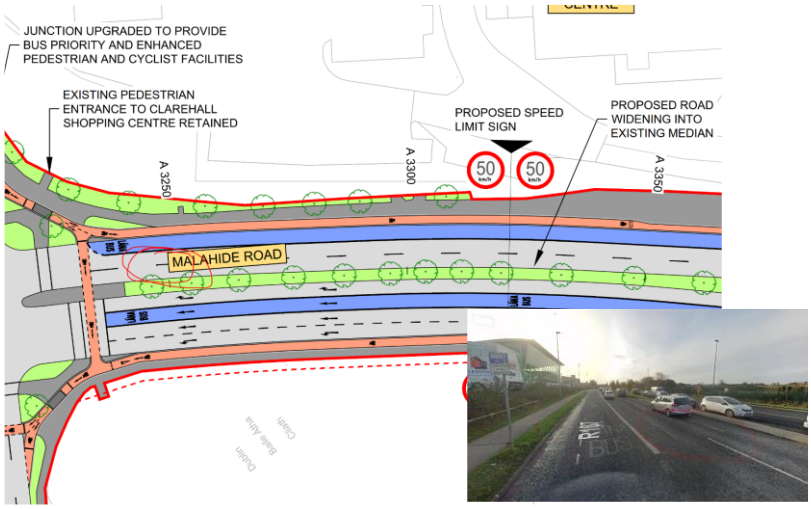


Figure 4.3 – Malahide Road Markings

Recommendation:

Ensure that all existing road markings are reviewed and replaced as necessary.

4.2.2.9 Problem

Location:	Throughout the Scheme
Summary:	Inconsistency on cycle track protection at minor road accesses

Description:

The scheme proposals show the cycle lane being protected by means of a kerb across some of the minor arm accesses but this is inconsistent across the scheme with respect to the minor roads / accesses.

Figure 4.4 illustrates an example of this problem along the Malahide Road where the raised table on the eastern side of the road features a raised kerb and the access on the western side features no protection.

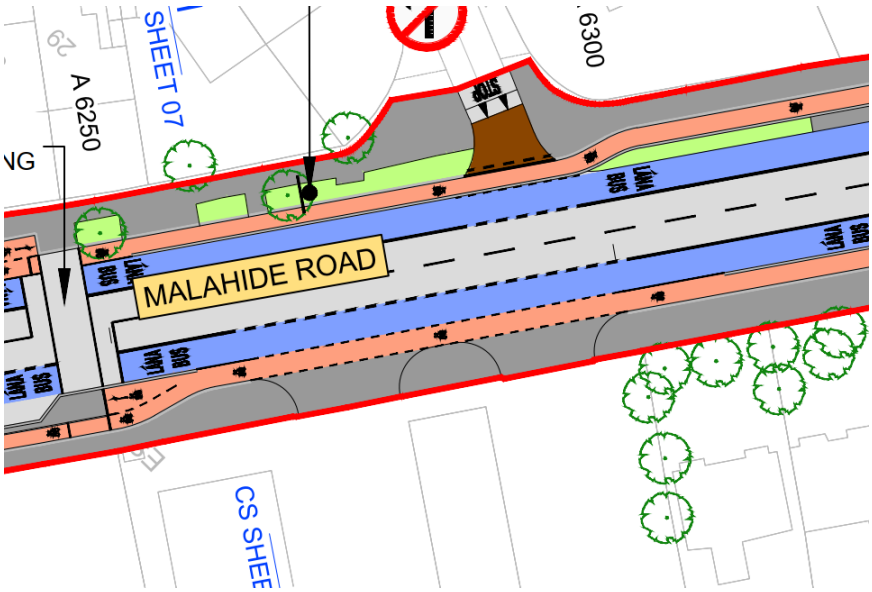


Figure 4.4 – Protected cycle lane across minor arm along Malahide Road

Recommendation:

A consistent approach to protection for cyclists should be adopted at minor arms along the length of the scheme.

4.3 Specific Areas

4.3.1 Problem	
Location:	Clarehall Avenue Junction
Drawing:	Sheet 06 of 21
Summary:	Tie-In Detail

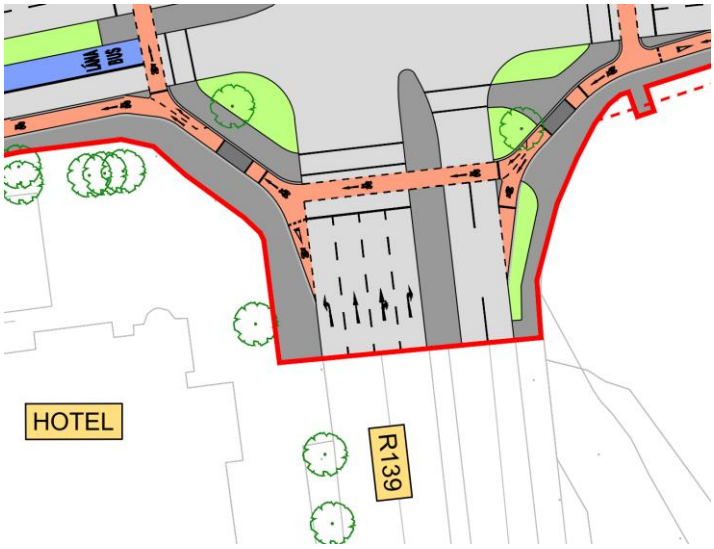


Figure 4.5 – Start of Cycle Lane on R139

Description:

A cycle lane starts close to the junction, with the kerb line diverging from the main road carriageway at the left turn arrow. Some motorists may confuse this for a left slip lane, resulting in a vehicle colliding with a cyclists or pedestrian.

Recommendation:

Concrete kerbs or islands should be provided, with all necessary signage, to warn and prevent motorists from driving into the cycle lane.

4.3.2 Problem	
Location:	Clarehall Avenue Junction
Drawing:	Sheet 06 of 21
Summary:	Cycle signal staging

Figure 4.6 – Exit of Cycle Lane on R139

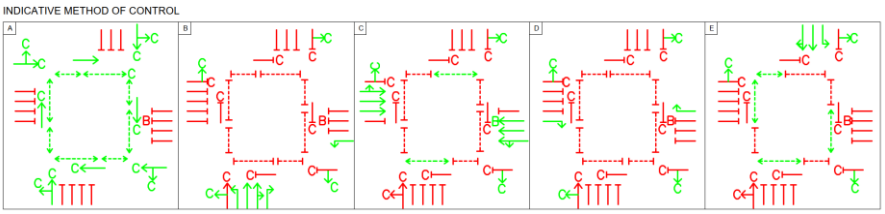


Figure 4.7 – R139 / Malahide Road Junction Staging

Description:

The cycle lane merges with the R139 with a short taper. A stop line and cycle signal are proposed. The cycle signal is proposed at each stage in the signal sequence, even during stages when there is a conflicting traffic stage. If the cyclists are given a green signal, they may believe that they have priority and not check for conflicting traffic movements, resulting in a collision.

Recommendation:

The cycle signal should be replaced with a STOP or yield road markings or signage. Or alternatively a flashing amber signal should be provided during stages when there are conflicting traffic movements.

4.3.3 Problem

Location:	Malahide Road
Drawing:	Sheet 06 of 21
Summary:	Length of Bus Stop

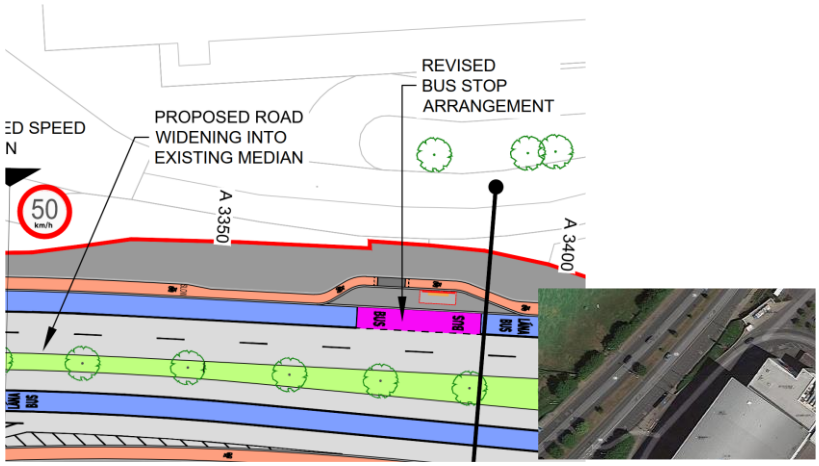


Figure 4.8 – Bus Stop on the Malahide Road

Description:

The existing bus stop is approximately 40m long with currently 5 different route services using it. However, the proposed bus stop appears to facilitate only 1 bus . There is a risk that with a queue of buses, that some passengers will have to access or exit the bus at the cycle track, resulting in a collision with a cyclist. The shorter set-down area also presents a trip and fall hazard to pedestrians with the cycle lane.

Recommendation:

Ensure that the proposed bus stop length has sufficient capacity to cater for the expected number of buses during peak traffic periods.

4.3.4 Problem

Location:	Priorswood Road
Drawing:	Sheet 08 of 21
Summary:	Operation of bus turn facility

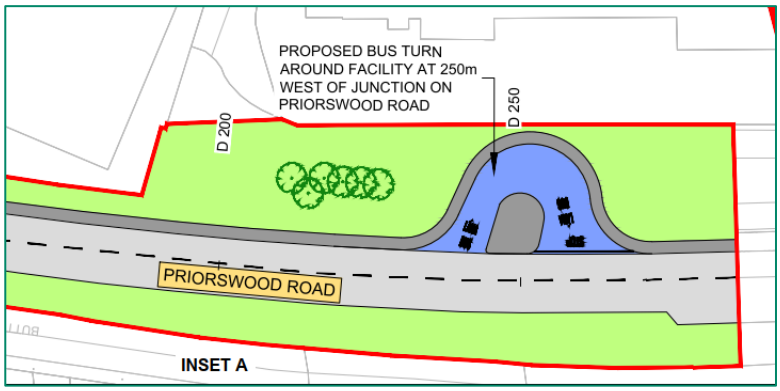


Figure 4.9 – Priorswood Road bus turn facility

Description:

It is proposed to provide a bus turn facility along Priorswood Road. It is unclear if this bus turn facility is adequate to cater for buses turning in this area, if inadequate facilities are provided this could result in a bus over tracking the footpath and striking a pedestrian.

Recommendation:

The bus turn facility should be tracked to ensure that buses can turn in this area without infringing on the footpaths. Pedestrian crossings with raised crossing should be provided at the entrance and exit of the facility.

4.3.5 Problem	
Location:	Malahide Road
Drawing:	Sheet 09 of 21
Summary:	Access to petrol station resulting in faster vehicle speeds

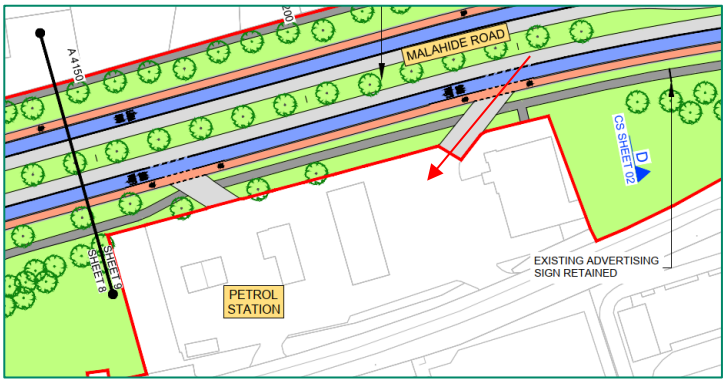


Figure 4.10 – Access to petrol station

Description:

Traffic accessing the petrol at this location (red arrow) were observed to cross the cycle and bus lane at speed given the oblique angle of entry. This could result in instances where a vehicle cuts across the bus and cycle lane at speed resulting in a collision with a cyclist or bus.

Recommendation:

The junction radii should be reduced to ensure that vehicle speeds remain slow on entry.

4.3.6 Problem	
Location:	Ayersfield Drive pedestrian and cyclist access
Drawing:	Sheet 09 of 21
Summary:	Unclear priority along cyclist link to Ayersfield Drive

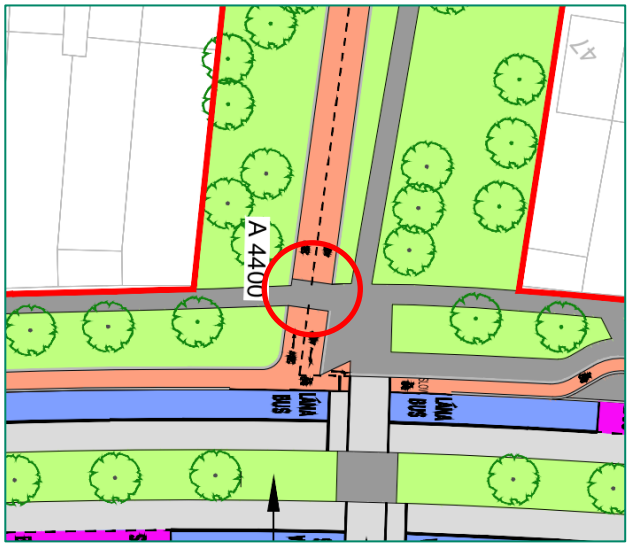


Figure 4.11 – Conflict point between footpath and cycle track

Description:

It is unclear whether pedestrians travelling along Malahide Road or cyclists using the Ayersfield Drive cyclist link have priority at the circled location. If priority is unclear this could result in a collision between a pedestrian and cyclist.

Recommendation:

It should be clear to users whether pedestrians or cyclists have priority at this location and the appropriate tactile paving should be provided to highlight to pedestrians.

4.3.7 Problem	
Location:	Ayrefield Drive pedestrian and cyclist access
Drawing:	Sheet 09 of 21
Summary:	Straight alignment of cycle lane

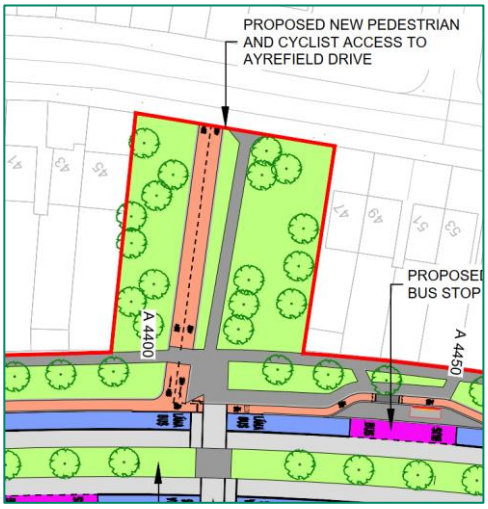


Figure 4.12 – Proposed pedestrian and cyclist link

Description:

The audit team are concerned that given the straight alignment of the new pedestrian avenue access to Ayrefield Drive, cyclists may not slow down. This could result in cyclists overshooting the cycle lane and travelling into the vehicle carriageway resulting in collisions with vehicles along the Malahide Road or striking a pedestrian crossing the cycle lane.

Recommendation:

Some form of preventative measure should be provided which reduces cyclists speed.

4.3.8 Problem	
Location:	Malahide Road
Drawing:	Sheet 09 of 21
Summary:	Insufficient stacking capacity for jug turn

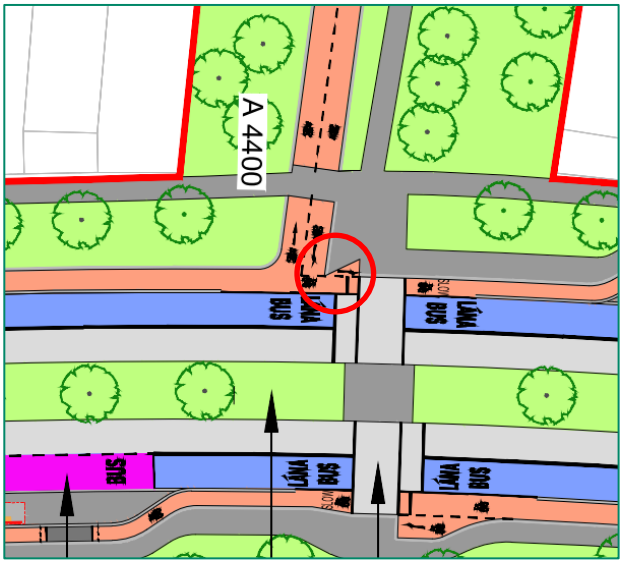


Figure 4.13 – Proposed Jug Turn for cyclists

Description:

It is proposed at the toucan crossings to provide a jug-turn for cyclists to access the crossing from the cycle lane. The jug-turn to be provided on the southbound approach along the Malahide Road at the Toucan Crossing is noted as having no apparent stacking capacity. This could result in cyclists using the jug turn forcing cyclists travelling southbound along Malahide Riad into the bus lane which could result in a collision.

Recommendation:

The jug-turn at this location should be consistent with the jug-turn on the northbound approach, and provide enough stacking space for cyclists.

4.3.9 Problem	
Location:	Access to Crown Decorating Centre
Drawing:	Sheet 10 of 21
Summary:	Large Junction Radii

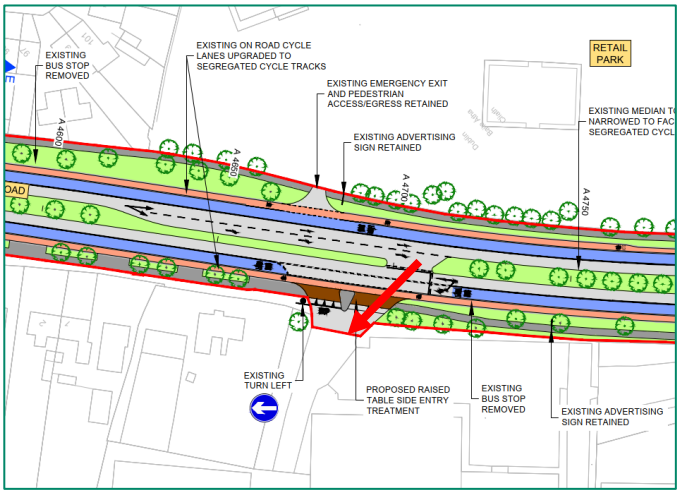


Figure 4.14 – Right turn pocket

Description:

Large junction radii are currently provided at the access. This could result in instances where a vehicle cuts across the bus and cycle lane at speed resulting in a collision with a cyclist or bus. The audit team are also concerned that the right turn pocket provided for access into the Crown Decorating Centre along the Malahide Road is not situated in an adequate location for HGVs to turn into the site (red arrow).

Recommendation:

The junction radii should be reduced to ensure that vehicle access speeds remain slow.

4.3.10 Problem	
Location:	Malahide Road (Northbound)
Drawing:	Sheet 12 of 21
Summary:	Car parking spaces provided along bus lanes without buffer

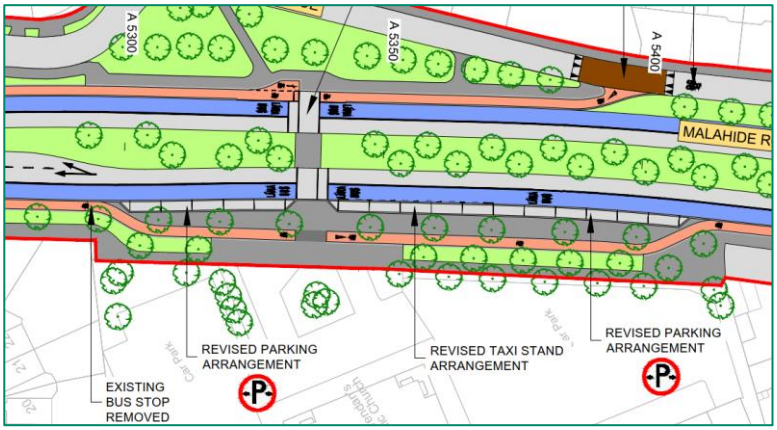


Figure 4.15 – Proposed Parallel Car Parking Spaces

Description:

Parallel car parking spaces are to be provided on the Malahide Road (northbound) along the bus lanes without a buffer between the spaces and the vehicle carriageway. This could lead to instances where drivers do not check over their shoulder upon exiting their vehicles and results in them being struck by a bus, damage to their vehicle or buses swerving into the adjacent lane resulting in sideswipe and/or rear impact collisions.

Recommendation:

A buffer should be provided between the bus lane and the parallel car parking spaces.

4.3.11 Problem

Location:	Coolock Village (Brookville Park Road)
Drawing:	Sheet 12 of 21
Summary:	Lack of pedestrian crossing locations

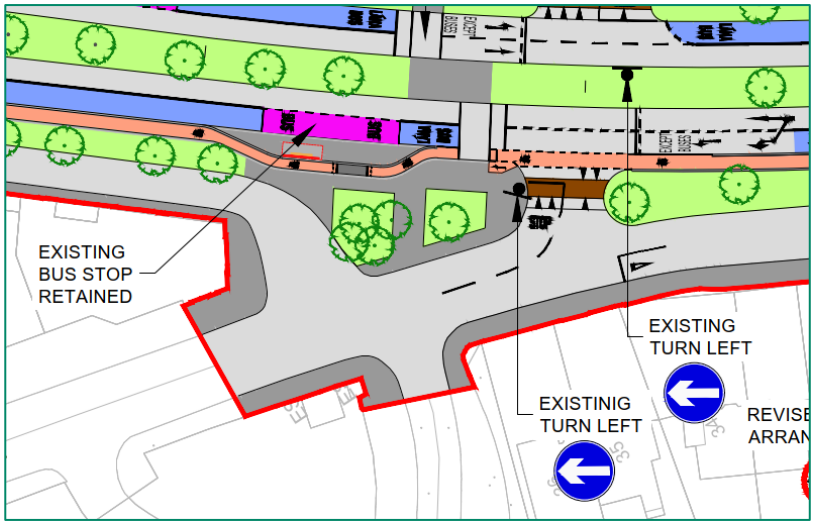


Figure 4.16 – Proposed Arrangement

Figure 4.17 – Existing Arrangement

Description:

The audit team note that there are no provisions for pedestrians to cross from the Malahide Road onto the Brookville Park Road. Lack of appropriate crossing locations can present a hazard to pedestrians, particularly vision and mobility impaired.

Recommendation:

Appropriate crossing facilities should be provided at this location.

4.3.12 Problem	
Location:	St Brendan's Avenue
Drawing:	Sheet 13 of 21
Summary:	Lack of raised tables at junctions

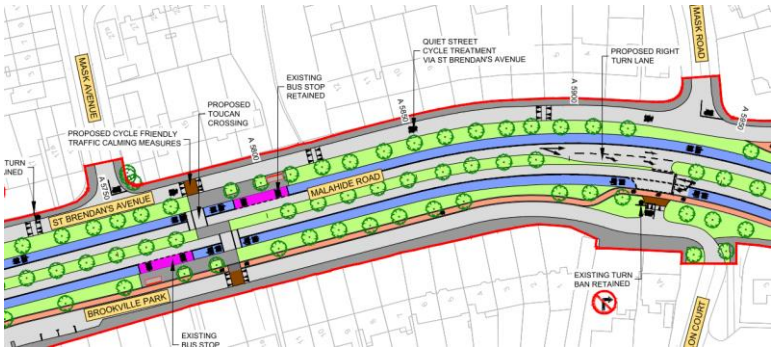


Figure 4.18 – Lack of Raised Tables

Description:

It is proposed that St Brendan's Avenue is to become a 'Quiet Street' for cyclists which includes cycle friendly ramps and raised tables along with on-road cycle symbols to enforce cyclist priority along St Brendan's Avenue. A raised table has been provided at the St Brendan's Drive / St Brendan's Avenue junction but no raised table has been provided at the Mask Avenue and Mask Road side roads. The lack of a raised table could result in higher vehicle speeds on approach to these junctions.

Recommendation:

Raised tables should be provided at the Mask Avenue / St Brendan's Avenue and Mask Road / St Brendan Avenue junctions.

4.3.13 Problem

Location:	Malahide Road / Gracefield Road / Adrlea Road junction
Drawing:	Sheet 14 of 21
Summary:	Unusual arrangement for right turn pocket

Figure 4.19 – Right turn cyclist pockets

Description:

It is proposed that the Malahide Road / Gracefield Road / Ardlea Road roundabout is to be upgraded to a signalised 4-arm junction with protected cycle facilities. At the corners of the junction, a right turn pocket with a stop line is provided for cyclists but the north-eastern corner (circled red) has a different arrangement which could result in a cyclist not entering the right turn pocket and siting at the concrete island (yellow arrow). Cyclists may not be aware of the intended arrangement which could result in cyclists attempting to cross during a traffic phase and being struck by a vehicle.

Recommendation:

The right turn cycle pocket at this location should be consistent with the other right turn cycle pockets at this junction.

4.3.14 Problem

Location:	Malahide Road (Between St David's Wood estate and Kilmore Road)
Drawing:	Sheet 15 of 21
Summary:	Narrow pedestrian footpath

Figure 4.20 – Section of Path

Description:

It is proposed that the footpath along the Malahide Road between St David's Wood and Kilmore Road is to be reconfigured to run along the boundary of the St David's Wood housing estate and remove the existing footway. From the scheme drawings a section of the path looks to remain and it is unclear if this is to remain in use. This could result in a collision between a pedestrian crossing and a cyclist at this location.

Recommendation:

The path should be removed from this location. Or if it is proposed to use this as a path, it should be widened with appropriate crossing facilities.

4.3.15 Problem	
Location:	Malahide Road / Kilmore Road junction
Drawing:	Sheet 15 of 21
Summary:	Cycle Lane on Kilmore Road appears too narrow

Figure 4.21 – Malahide Road / Kilmore Road Junction

Description:

The cycle lanes provided along the Kilmore road on approach to / from this junction appear to be very narrow at this location on both sides of the carriageway. This could result in inadequate cycle lanes being provided which may lead to cyclist-vehicle collisions at this junction.

Recommendation:

Appropriately sized cycle lanes are to be provided at this location, in accordance with the National Cycle Manual.

4.3.16 Problem	
Location:	Malahide Road / Copeland Avenue / Griffith Avenue Junction
Drawing:	Sheet 19 of 21
Summary:	Cycle Lane on Griffith Avenue appears too narrow

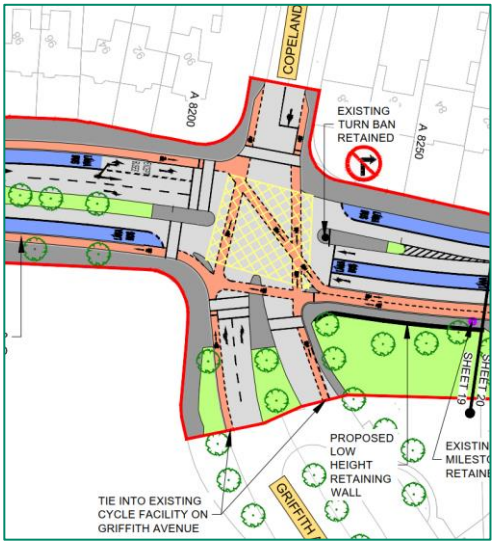


Figure 4.22 – Malahide Road / Griffith Avenue Junction

Description:

The cycle lanes provided along the Griffith Avenue on both sides of the carriageway appears to narrow on approach to this junction. This could result in inadequate cycle lanes being provided which may lead to cyclist-vehicle collisions at this junction.

Recommendation:

Appropriately sized cycle lanes are to be provided at this location, in accordance with the National Cycle Manual.

4.3.17 Problem	
Location:	Malahide Road / Copeland Avenue / Griffith Avenue Junction to Malahide Road / Clontarf Road junction
Drawing:	Sheet 19 of 21
Summary:	Junction to cater for cyclists travelling southbound
Description:	

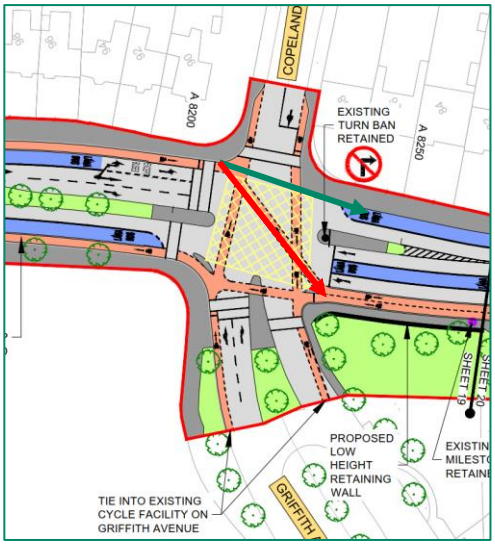


Figure 4.23 – Malahide Road / Griffith Avenue Junction

For cyclists travelling southbound along Malahide Road they are directed across the Malahide Road / Griffith Avenue junction onto the new two way cycle track on the western side of the Malahide Road (red arrow). For cyclists that are more confident and familiar with the existing arrangement they are more likely to stay on road and continue straight through the junction and enter into the bus lane (green line). The audit team are concerned that cyclists will continue to remain on road and not utilise the proposed cycle track on the western side of the Malahide Road particularly if they wish to access any of the side streets off Malahide Road on the eastern side (Marino Avenue, Charlemont Road, Crescent Place, Marino Crescent).

Recommendation:

The junction should accommodate cyclists continuing straight through the junction at this location and into the bus lane. Cycle symbols (M 116) should be provided in the bus lane.

4.3.18 Problem

Location:	Malahide Road / Brian Road junction
Drawing:	Sheet 20 of 21
Summary:	Unclear where vehicles are to stop when pedestrian crossing activated

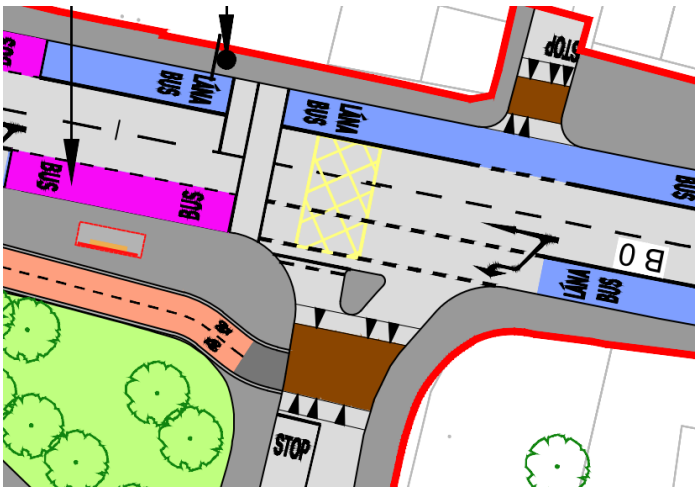


Figure 4.24 – Lack of Stop Line

Description:

It is proposed to move the pedestrian crossing from the southern side of Brian Road to the northern side. It is unclear where vehicles are to stop when the crossing is called for traffic travelling northbound. This could confuse drivers resulting in a rear end shunt collision.

Recommendation:

A 'STOP' line (RRM 017) should be provided at an appropriate location.

4.3.19 Problem

Location:	Haverty Road / St. Aidan's Park
Drawing:	Sheet 21 of 21
Summary:	Adequacy of turning head at Haverty Road

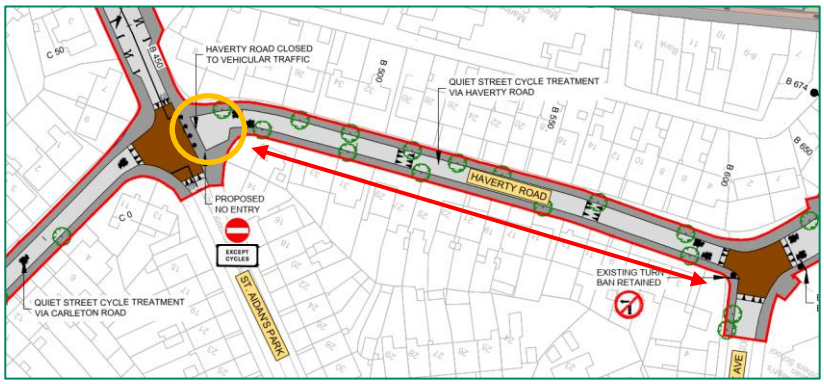


Figure 4.25 – Haverty Road turning head

Figure 4.26 – Haverty Road

Description:

It is proposed that the Haverty Road arm of the St. Aidan's Park / Haverty Road junction is to be restricted to pedestrian and cyclist movements only and a turning head provided at this location to accommodate vehicles turning on Haverty Road. Should the turning head at this location be inadequate, this could result in vehicles having to reverse approximately 160m to the Marino Park Avenue junction (indicated by red arrow) which could result in a collision with a cyclist travelling northbound along Haverty Road.

Recommendation:

Autotracking should be undertaken to demonstrate that the turning head at this location is adequate to cater for large vehicle movements.

4.3.20 Problem

Location:	Kilmore Road Junction
Drawing:	Sheet 15 of 21
Summary:	Signal Staging

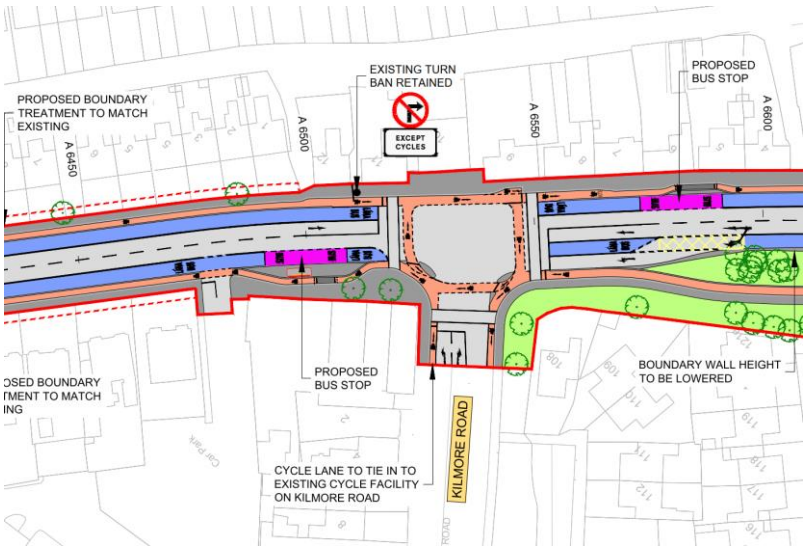


Figure 4.27 – Kilmore Road Junction

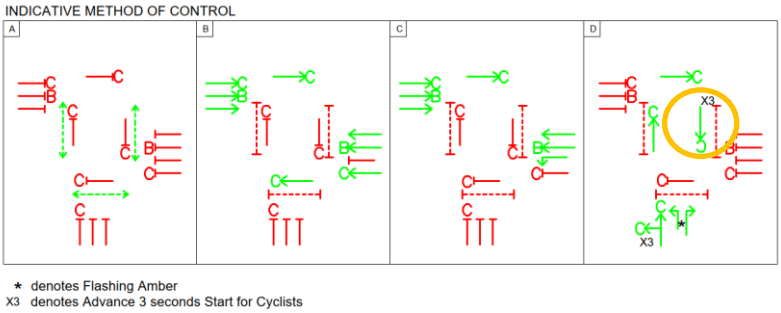


Figure 4.28 – Signal Staging

Description:

The right turning cyclists run at the same stage as the right turning vehicles during Stage D which could lead to a collision.

Recommendation:

The right turning cyclists should run in a separate stage.

5. Audit Team Statement

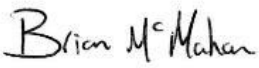
We certify that the site was visited and that this audit has been carried out in accordance with the Transport Infrastructure Ireland Road Safety Audit Guidelines GE-STY-01027-01 and Standard GE-STY-01024-07.

The Road Safety Audit 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.

No one on the audit team has been involved with the scheme design.

AUDIT TEAM LEADER: Senior Road Safety Auditor

Name: Brian McMahon

Position: Associate Director **Signed:** 

Organisation: AECOM **Date:** 27.01.2022

Address: Adelphi Plaza

Georges Street Upper

Dun Laoghaire

AUDIT TEAM MEMBER: Road Safety Auditor

Name: Zachary Cave

Position: Senior Consultant **Signed:** 

Organisation: AECOM **Date:** 27.01.2022

Address: Adelphi Plaza

Georges Street Upper

Dun Laoghaire

Appendix A Documents Submitted to the Audit Team

The following documents were submitted to the audit team:

Document No.	Rev	Description	Date
BCIDA-ACM-0001-GEN_IX-0001_XX_00-DR-CR-0001	M01	Clongriffin to City Centre General Arrangement Cover Sheet – Sheet 01 of 01	03.12.2021
BCIDA-ACM -0001-GEO_KP-0001_XX_00-DR-CR-0001	M01	Clongriffin to City Centre General Arrangement Key Plan – Sheet 01 of 01	03.12.2021
BCIDA-ACM 0001-GEO_GA-0001_XX_00-DR-CR-0006	M01	Clongriffin to City Centre General Arrangement – Sheet 06 of 21	03.12.2021
BCIDA-ACM 0001-GEO_GA-0001_XX_00-DR-CR-0007	M01	Clongriffin to City Centre General Arrangement – Sheet 07 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0008	M01	Clongriffin to City Centre General Arrangement – Sheet 08 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0009	M01	Clongriffin to City Centre General Arrangement – Sheet 09 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0010	M01	Clongriffin to City Centre General Arrangement – Sheet 10 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0011	M01	Clongriffin to City Centre General Arrangement – Sheet 11 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0012	M01	Clongriffin to City Centre General Arrangement – Sheet 12 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0013	M01	Clongriffin to City Centre General Arrangement – Sheet 13 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0014	M01	Clongriffin to City Centre General Arrangement – Sheet 14 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0015	M01	Clongriffin to City Centre General Arrangement – Sheet 15 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0016	M01	Clongriffin to City Centre General Arrangement – Sheet 16 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0017	M01	Clongriffin to City Centre General Arrangement – Sheet 17 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0018	M01	Clongriffin to City Centre General Arrangement – Sheet 18 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0019	M01	Clongriffin to City Centre General Arrangement – Sheet 19 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0020	M01	Clongriffin to City Centre General Arrangement – Sheet 20 of 21	03.12.2021
BCIDA-ACM-0001-GEO_GA-0001_XX_00-DR-CR-0021	M01	Clongriffin to City Centre General Arrangement – Sheet 21 of 21	03.12.2021
BCIDA-ACM-TSM_IX-0001_XX_00-DR-TR-0001	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Cover Sheet	05.12.2021
BCIDA-ACM-TSM_KP-0001_XX_00-DR-TR-0001	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Key Plan	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0001	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Mayne River Avenue (Sheet 01 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0002	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Hilton (Sheet 02 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0003	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Clarehall (Sheet 03 of 24)	05.12.2021

BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0004	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Belcamp Lane Malahide Road (Sheet 04 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0005	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Blunden Drive (Sheet 05 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0006	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Woodys Malahide Road (Sheet 06 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0007	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Green Castle Road (Sheet 07 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0008	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Tongelee Road (Sheet 08 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0009	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – St Brendans Church Malahide Road (Sheet 09 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0010	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Coolock Village Malahide Road (Sheet 10 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0011	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Mask Avenue Malahide Road (Sheet 11 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0012	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Ardlea Road (Sheet 12 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0013	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Danieli Road Malahide Road (Sheet 13 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0014	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Kilmore Road (Sheet 14 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0015	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Killester Avenue (Sheet 15 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0016	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Elm Mount Road (Sheet 16 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0017	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Collins Avenue (Sheet 17 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0018	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design –Elm Road Malahide Road (Sheet 18 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0019	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Donnycarney Road Malahide Road (Sheet 19 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0020	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Casino Park (Sheet 20 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0021	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – North of Griffith Malahide Road (Sheet 21 of 24)	05.12.2021

BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0022	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Griffith Avenue (Sheet 22 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0023	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Marino Avenue Brian Road Malahide Road (Sheet 23 of 24)	05.12.2021
BCIDA-ACM-TSM_SJ-0001_XX_00-DR-TR-0024	M01	Clongriffin to City Centre Core Bus Corridor Scheme – Junction Systems Design – Clontarf Road (Sheet 24 of 24)	05.12.2021

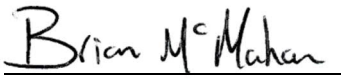
Appendix B Designer Feedback Form

Scheme: Clongriffin to City Centre CBC Audit Stage: Stage 1 Date Audit Completed: 10.12.2021					
	To be Completed by Designer				To be completed by Audit Team Leader
Paragraph No. in Stage 1 RSA	Problem Accepted (Yes/No)	Recommended Measure Accepted (Yes/No)	Describe Alternative Measure(s). Give reasons for not accepting recommended measure	Designer's Comments	Alternative Measure(s). Give reasons for not accepting recommended measure
General					
4.2.1.1	Yes	Yes	N/A	Appropriate swept paths have been checked for the designs. Swept paths will also be checked at final detailed design.	Yes
4.2.1.2	Yes	Yes	N/A	Cycle tracks and adjacent carriageway will be physically segregated.	Yes
4.2.1.3	Yes	Yes	N/A	Appropriate tie-ins have been provided and will be reviewed at detailed design stage.	Yes
4.2.2.1	Yes	Yes	N/A	Cyclist protection will be reviewed at detailed design stage.	Yes
4.2.2.2	Yes	Yes	N/A	Cyclist protection will be reviewed at detailed design stage.	Yes
4.2.2.3	Yes	Yes	N/A	Cyclist protection will be reviewed at detailed design stage.	Yes
4.2.2.4	Yes	Yes	N/A	Right turning cyclist stacking space will be reviewed at detailed design stage.	Yes
4.2.2.5	No	No	Design layout is in accordance with the BusConnects Design Manual		Yes
4.2.2.6	Yes	Yes	N/A	Right turning cyclist stacking space will be reviewed at detailed design stage.	Yes
4.2.2.7	Yes	Yes	N/A	Tactile paving provision will be considered at detailed design stage.	Yes
4.2.2.8	Yes	Yes	N/A	Final road markings will be considered at detailed design stage.	Yes
4.2.2.9	No	No	Raised tables are provided at road junctions but not at	Different approaches to public roads and private accesses are	Yes

			private accesses	considered appropriate.	
Specific					
4.3.1	Yes	Yes	N/A	Final layout will be considered at detailed design stage.	Yes
4.3.2	Yes	Yes	N/A	Final layout will be considered at detailed design stage.	Yes
4.3.3	Yes	Yes	N/A	Bus stop lengths have been designed to cater for the proposed number of future services.	Yes
4.3.4	Yes	Yes	N/A	Appropriate swept paths have been checked for the design. Swept paths will also be checked at final detailed design.	Yes
4.3.5	Yes	Yes	N/A	Final layout will be considered at detailed design stage.	Yes
4.3.6	Yes	Yes	N/A	Tactile paving provision will be considered at detailed design stage.	Yes
4.3.7	Yes	Yes	N/A	Tactile paving / warning sign provision will be considered at detailed design stage.	Yes
4.3.8	Yes	Yes	N/A	Right turning cyclist stacking space will be reviewed at detailed design stage.	Yes
4.3.9	Yes	Yes	N/A	Final layout of right turn lane and entry radius will be considered at detailed design stage.	Yes
4.3.10	Yes	Yes	N/A	Introduction of a buffer between the parking and the bus lane to be included at detailed design stage	Yes
4.3.11	Yes	Yes	N/A	Introduction of appropriate crossing facilites to be included at detailed design stage	Yes
4.3.12	No	No	Ramps are provided along the road at regular locations	It is considereed that the inclusion of regular ramps will ensure the 30km/h speed limit will be observed.	Yes
4.3.13	Yes	Yes	N/A	Final layout of right turn pockets will be consistent at detailed design stage.	Yes
4.3.14	No	No	No footpath is proposed immediately adjacent to the Malahide Road.	The grey shading represents an area of hard standing in front of a stub retaining wall	Yes

4.3.15	No	No	The scheme extents do not extend to Kilmore Road.	The proposed cycle lanes tie-in to the existing provision.	Yes
4.3.16	No	No	The scheme extents do not extend to Griffith Avenue.	The proposed cycle lanes tie-in to the existing provision.	Yes
4.3.17	No	No	The strategy is for cyclists to be directed to the new two-way facility	Cyclists will be directed away from the bus lane onto new two-way facility and then onto the Quite streets.	Yes
4.3.18	Yes	Yes	N/A	A STOP line will be provided at detailed design stage	Yes
4.3.19	Yes	Yes	N/A	Autotracking will be undertaken at detailed design stage to provide an appropriate turning head.	Yes
4.3.20	Yes	Yes	N/A	Signal staging to be updated.	Yes

Designer's Signature:  Date: 10/12/2021

Auditor's Signature:  Date: 10/12/2021

Employer's Signature  Date: 10/12/2021

NTA

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