

IDOM Engineering

DART+ West Project
Section B: M50 to Barberstown

Stage 1 Road Safety Audit

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1 Introduction

1.1 General

This report results from a Stage 1 Road Safety Audit on Section B (M50 to Barberstown) of the proposed DART+ West Project carried out at the request of Mr Gorka Corchete Zubiaurre of IDOM Engineering.

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

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Road Safety Audit Team Leader

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The Road Safety Audit took place during March & April 2022 and comprised an examination of the documents provided by the designers (see Appendix B). In addition to examining the documents supplied the Road Safety Audit Team visited the site of the proposed measures on the 10th March 2022. Weather conditions during the site visit were wet and the road surface was wet. An additional site visit to the Navan Road Bridge took place on the 22nd March 2022. Weather conditions during this site visit were dry and the road surface was dry. Traffic volumes during the site visits were moderate, pedestrian and cyclist volumes were high and traffic speeds were generally within the posted speed limit.

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

This Stage 1 Road Safety Audit has been carried out in accordance with the requirements of GE-STY-01024 - Road Safety Audit (December 2017), contained on the Transport Infrastructure Ireland (TII) Publication's website.

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

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

1.2 Items Not Submitted for Auditing

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

- Vehicle swept paths
- Visibility splays

2 Project Description

2.1 General

The DART+ Programme is the DART expansion project within the Greater Dublin Area (GDA). The project is expected to improve the existing rail network within Dublin, providing a sustainable, electrified, faster, reliable, and user-friendly rail system, which increases train frequencies and customer carrying capacity.

The overall DART+ Programme will be delivered in a number of separate projects to expand the heavy rail electrified commuter network in Dublin from the existing c. 50km to c.150km. The individual projects within the overall DART+ programme will consist of:

- DART+ West- c.40km from west of Maynooth to Connolly/Docklands in the City Centre. Including the M3 Parkway, connection to the Phoenix Park Tunnel and a new EMU Depot. It also includes upgrade and reconfiguration of existing railway infrastructure in the city centre.
- DART+ Kildare Line - c.20km from Hazelhatch into Heuston and the Phoenix Park Tunnel including 4-tracking from Parkwest to Heuston.
- DART+ Coastal Line comprising of:
 - DART+ Northern Line - c. 38km with electrification and related works from Malahide to Drogheda, including works from Connolly to Malahide & on the Howth Branch.
 - DART+ Southeast line - removal of level crossings and related works, construction of turn back facilities and increases to the capacity of the Bray-Greystones section.

The DART+ West project will introduce electrified high-capacity trains at increased frequency for all stations between Maynooth/M3 Parkway and Dublin City Centre at Connolly Station and Docklands Station (c. 40km in length).

The project will increase services from the current 7 trains per hour per direction to 15 trains per hour per direction by 2027 increasing passenger capacity from 4,500 to 13,750 subject to passenger demand.

This will be achieved through modifications to the track, removal/closure of level crossings and the purchase of a new fleet of trains.

The electrification of the rail line will predominantly follow the existing railway corridor. Interventions outside of Iarnród Éireann lands will be required at a number of locations for some of the scheme elements such as level crossing replacements, a proposed depot (including rail and road realignment), the proposed new Spencer Dock Station, construction of substations (to facilitate the provision of power to the line) and the use of land for temporary construction/storage compounds and all ancillary works required for the project.

The scheme has been divided into three sections as follows:

1. Section A: City Centre to M50
2. Section B: M50 to Barberstown
3. Section C: Barberstown to Maynooth Depot

The scope of this Road Safety Audit includes proposed changes to the road layout within Section B. A total of 9 sites are included in this section, with all sites located in the vicinity of Blanchardstown in West Co. Dublin. The following sites are included in Section B: -

- Castleknock Road junction upgrade
- Castleknock rail bridge
- Clonsilla level crossing pedestrian and cyclist bridge
- Clonsilla Road junction upgrade
- Coolmine level crossing pedestrian and cyclist bridge
- Diswellstown Road Junction upgrade
- Porterstown level crossing pedestrian and cyclist bridge
- Porterstown Road junction upgrade
- Navan Road bridge.

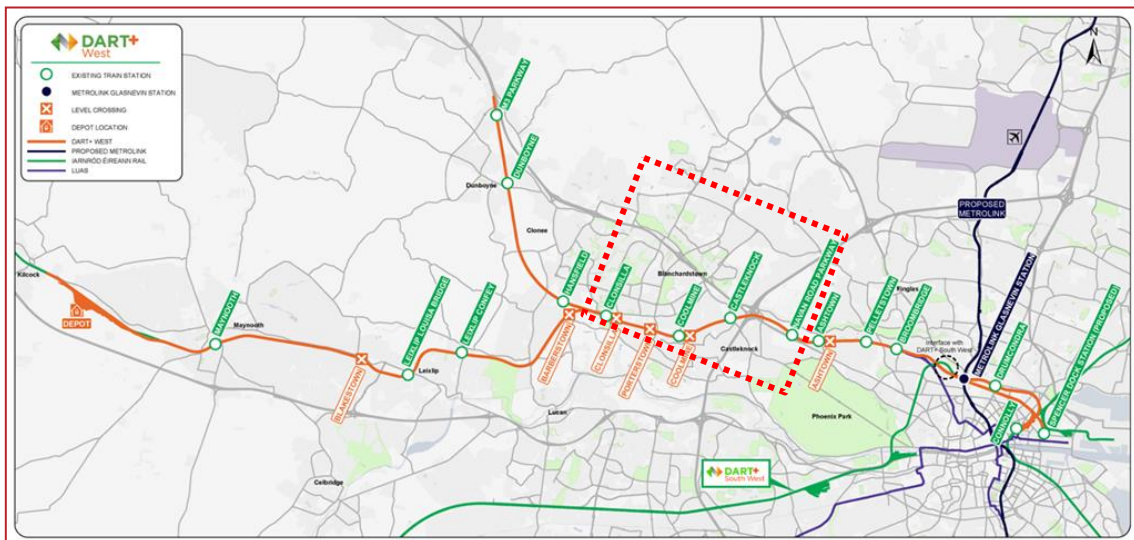


FIGURE 2-1: LOCATION PLAN

2.2 Collision History

The Road Safety Authority website (www.rsa.ie) was consulted to identify historical collisions in the vicinity of the proposed scheme. The website includes summary information on recorded collision occurrence for the period 2005 to 2016 (see Figure 2-2).

16No. collisions were recorded during this time period at the nine sites in Section B. These include one Fatal collision and 15No. Minor Injury collisions. A summary of the collisions is contained in Table 2-1.

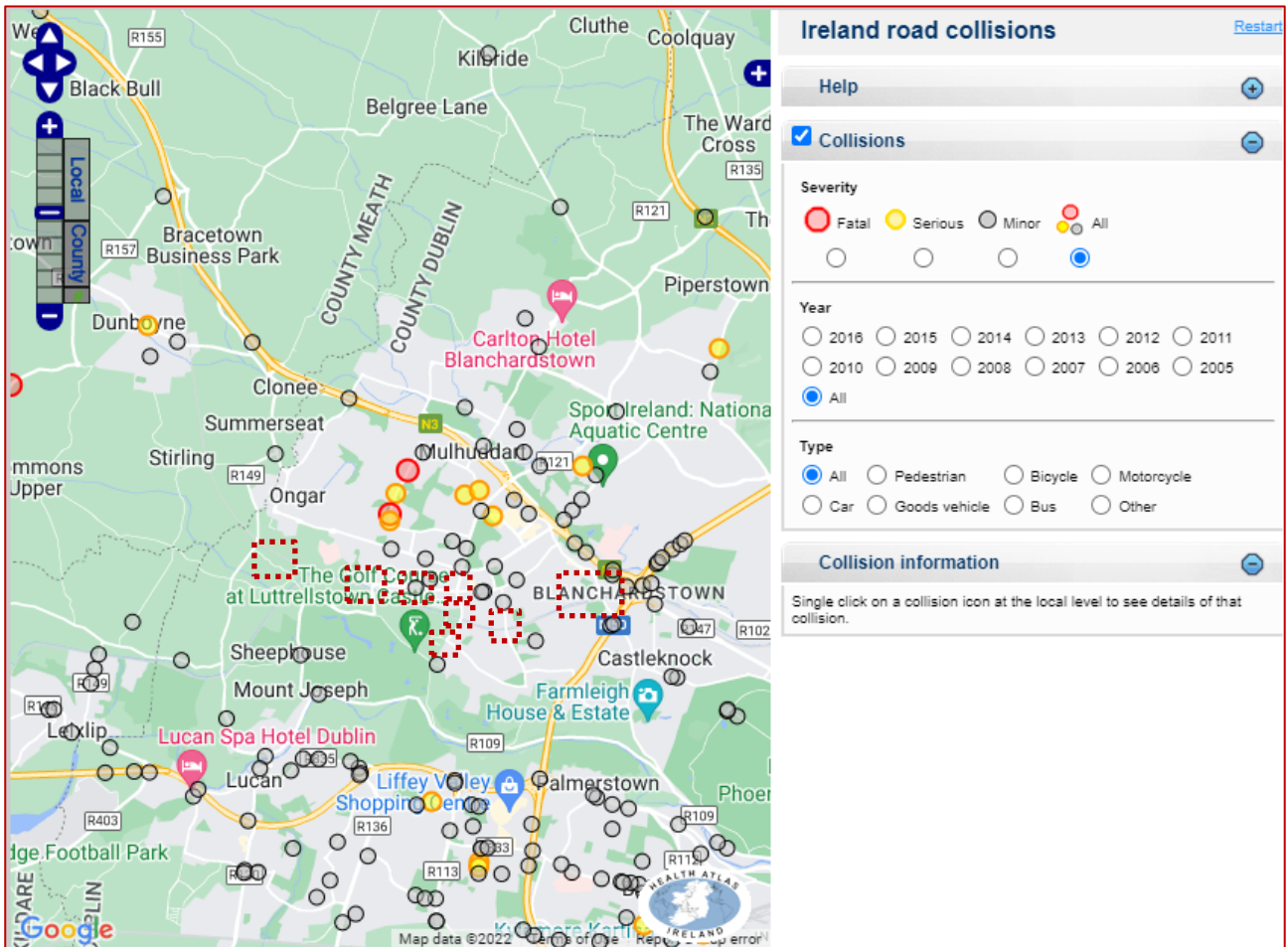


FIGURE 2-2: HISTORICAL COLLISIONS IN THE VICINITY OF THE SCHEME (SOURCE WWW.RSA.IE)

TABLE 2-1: DETAILS OF RECORDED COLLISIONS IN THE VICINITY OF THE SCHEME

Year	Vehicle	Circumstances	Day	Time	Speed Limit	Location	Severity
2005	Motorcycle	Pedestrian	Tuesday	07:00- 10:00	50kph	Coolmine Road/Kirkpatrick Drive junction	Fatal
2016	Car	Rear end, straight	Thursday	10:00- 16:00	50kph	Diswellstown Road junction	Minor
2014	Bicycle	Other	Wednesday	16:00- 19:00	60kph	Clonsilla/Blanchardstown Road South Junction	Minor
2014	Bicycle	Other	Sunday	10:00- 16:00	50kph	Clonsilla/Blanchardstown Road South Junction	Minor
2012	Car	Rear end, straight	Tuesday	10:00- 16:00	30kph	Diswellstown Road junction	Minor
2012	Motorcycle	Single vehicle Only	Friday	10:00- 16:00	50kph	Castleknock Road Junction	Minor
2012	Car	Other	Tuesday	16:00- 19:00	50kph	Castleknock Road Junction	Minor
2011	Car	Pedestrian	Tuesday	16:00- 19:00	50kph	Clonsilla Road (Clonsilla level crossing)	Minor
2011	Car	Single vehicle only	Sunday	16:00- 19:00	50kph	Clonsilla level crossing	Minor
2010	Car	Angle, right turn	Tuesday	23:00- 03:00	60kph	Porterstown Road/Luttrellstown Road junction	Minor
2008	Car	Head-on-conflict	Saturday	07:00- 10:00	50kph	Clonsilla Road (Clonsilla level crossing)	Minor
2007	Car	Head-on right turn	Friday	16:00- 19:00	50kph	Castleknock Road (North of Castleknock Bridge)	Minor
2006	Car	Pedestrian	Tuesday	19:00- 23:00	50kph	Castleknock Road Junction	Minor
2005	Car	Head-on right turn	Friday	16:00- 19:00	50kph	Coolmine Road	Minor
2005	Motorcycle	Other	Monday	07:00- 10:00	100kph	Porterstown Road	Minor
2005	Car	Rear end, straight	Tuesday	19:00- 23:00	50kph	Old Navan Road	Minor

2.3 Report Structure

The report is split into 10 sections, including:

- General Problems – These problems are common to each of the nine scheme locations.
- Nine Site Specific Sections – a separate section is provided for each of the nine scheme locations, allowing for site specific problems to be covered under each scheme.

3 Main Report

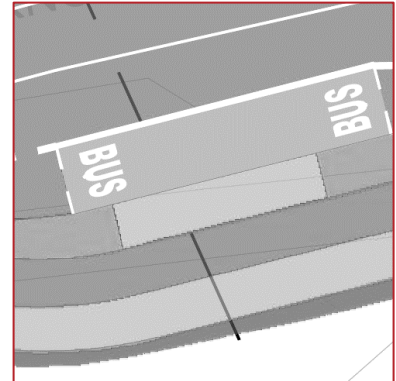
3.1 General Problems

3.1.1 Problem

*Location: Castleknock Road Junction
Clonsilla Level Crossing
Clonsilla Road Junction*

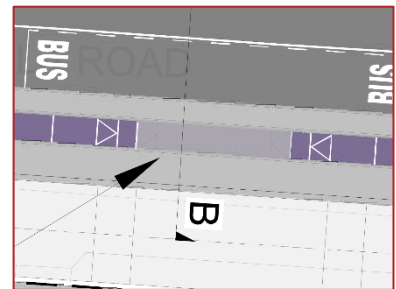
Summary: Potential for cyclist-pedestrian collisions and slips, trips, and falls where bus passengers are required to cross the cycle track when boarding or disembarking buses throughout the Scheme.

Bus stops have been indicated on some arms of the Castleknock Road and Clonsilla Road Junctions and at the Clonsilla Level Crossing. The road layout at the bus stops requires passengers boarding or disembarking the bus to cross the cycle track to access the bus stop/footpath. The segregated cycle track is indicated as being continuous through bus stop locations at both junctions while at the Clonsilla Level Crossing the cycle track is terminated either side of the bus stop to permit access to/from the bus.



Pedestrians, particularly the visually and mobility impaired, may be unable to safely access the bus stop resulting in an increased risk of being struck by a cyclist, or trips and falls at the vertical separation between the footway and cycle track.

Where a link between the footpath and bus stop has been indicated (Clonsilla Level Crossing), tactile paving has not been indicated at the cycle track terminations which may lead to visually impaired pedestrians inadvertently accessing the cycle track and being struck by a cyclist.



Recommendation

The segregated cycle track should transition to a shared use footpath upstream of bus stop locations. Ladder and tramline tactile paving, as well as relevant signage, should be provided at the transitions between the cycle track and shared use footpath.

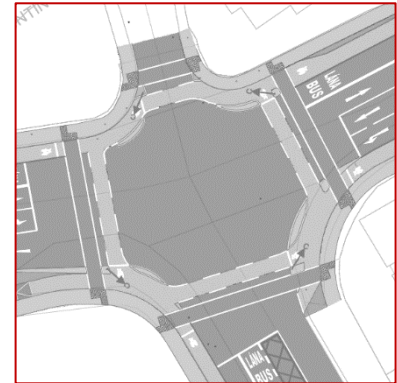
Note, the use of uncontrolled crossings between the footpath and island bus stop may not support visually impaired pedestrians, as they will be unable to locate the tactile paving when disembarking the bus.

3.1.2 Problem

*Locations: Castleknock Road Junction
 Clonsilla Road Junction
 Diswellstown Road Junction*

Summary: Swept paths at proposed signalised junctions have not been provided to the Audit Team and it is therefore unclear if all vehicles can safely complete turning manoeuvres within the extents of their traffic lane.

Information regarding swept path analysis has not been provided to the Audit Team. As the proposed junction upgrades include the introduction of physical islands within the junction layout, the width of the carriageway will be reduced in places. It is therefore unclear if HGVs and buses will be able to complete turning manoeuvres within the carriageway extents. If turning manoeuvres cannot be undertaken within the extents of the traffic lane there is a risk of kerb strikes, collisions with other road users or collisions with items of roadside furniture.



Recommendation

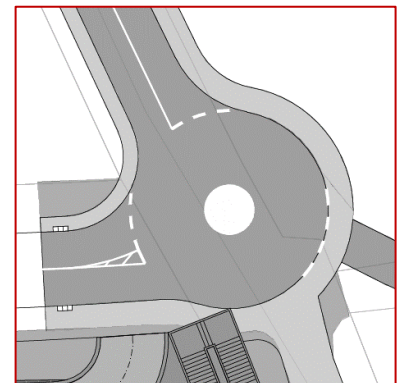
Ensure the swept path of all vehicles can be accommodated safely at all upgraded junctions.

3.1.3 Problem

*Locations: Clonsilla Level Crossing
 Coolmine Level Crossing
 Porterstown Level Crossing*

Summary: Unclear if the proposed roundabouts can safely accommodate the swept path of large vehicles.

It is proposed to terminate the road on both sides of the Clonsilla, Coolmine and Porterstown Level Crossings and to provide a roundabout on one side for U-turn manoeuvres. Information regarding the swept path of vehicles turning at these roundabouts has not been provided to the Audit Team and it is therefore unclear if these vehicles can undertake U-turn manoeuvres at these locations. If these roundabouts cannot accommodate the swept path of large vehicles (e.g. buses) there is a risk that they may overhang the footpath as they manoeuvre through the roundabout which may lead to a collision with a pedestrian or cyclist or collisions with items of roadside furniture.



Recommendation

A swept analysis should be undertaken to ensure all vehicles can be safely accommodated at the roundabouts.

3.1.4 Problem

*Locations: Castleknock Road Junction
 Clonsilla Road Junction
 Diswellstown Road Junction
 Porterstown Road Junction*

Summary: Traffic signal information has not been provided to the Audit Team.

Given the project's early design stage, traffic signal phasing details have not been provided for the proposed upgraded junctions, including the Castleknock Road Junction, Clonsilla Road Junction, Diswellstown Road Junction and Porterstown Road Junction. It is therefore unclear what movements will be permitted during each signal phase and whether cyclist movements will be segregated or occur during a phase with motorised vehicles where the risk of conflicts would be increased.

Also, the pedestrian crossings at the junctions are relatively long and it is also unclear if sufficient time will be provided during pedestrian phases to allow all pedestrians to complete a crossing during a single phase. Refuge islands have not been provided at crossings and should a pedestrian be unable to complete a crossing during a pedestrian phase there is an increased risk of them being struck by a vehicle.

Recommendation

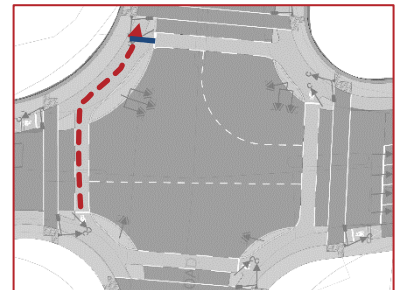
Ensure opposing manoeuvres do not occur during the same phase and that sufficient time is provided during pedestrian phases to allow all pedestrians, including mobility impaired pedestrians, to complete a crossing during the phase.

3.1.5 Problem

*Locations: Castleknock Road Junction
Clonsilla Road Junction
Diswellstown Road Junction*

Summary: Right-turning cyclists may block straight through cyclists at signalised junctions.

Protected cycle lanes are indicated at a number of signalised junctions within the Scheme. However, it is unclear from the drawing if there will be sufficient space at stop lines to allow cyclists to wait outside the path of an adjacent cyclist. Should there be insufficient space for a cyclist to pass a stationary cyclist, there is a risk of collisions between cyclists or to cyclists entering the carriageway, to pass a stationary cyclist, at locations where drivers may be less attentive to a cyclist entering the carriageway increasing the risk of collisions.



Recommendation

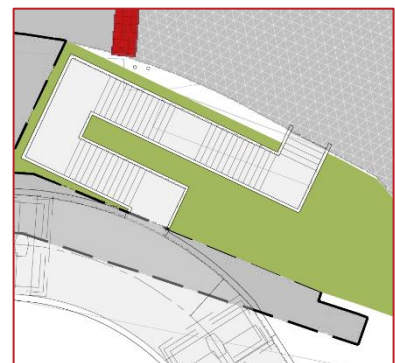
Ensure sufficient space is provided at cyclist stop lines for a stationary cyclist to wait out of the path of an oncoming cyclist.

3.1.6 Problem

*Locations: Clonsilla Level Crossing
Coolmine Level Crossing
Porterstown Level Crossing
Castleknock Road Rail Bridge*

Summary: Tactile paving has not been indicated at the top and bottom of steps at the pedestrian and cyclist bridges which may lead to visually impaired pedestrians being insufficiently aware of the height hazard.

Tactile paving has not been indicated at the top and bottom of the proposed steps to pedestrian/cyclist bridges at the upgraded level crossings and also at an existing set of steps within the footpath at the Castleknock Road Rail Bridge. This may lead to visually impaired pedestrians being insufficiently aware of the height hazard resulting in them continuing towards the steps and falling from a height, and suffering serious injuries, or tripping on the bottom step, and suffering personal injuries.



Recommendation

Corduroy hazard tactile paving should be provided at the top and bottom of steps within the scheme.

3.1.7 Problem

*Locations: Castleknock Road Junction
Clonsilla Road Junction
Diswellstown Road Junction
Porterstown Road Junction*

Summary: Impact of change in traffic flows within the scheme and on adjacent road network could give rise to safety issues.

The proposals to terminate the carriageway on both sides of level crossings within the scheme will result in drivers no longer being able to continue straight ahead on certain roads resulting in traffic being redistributed throughout the surrounding road network and likely through a number of junctions where works are proposed. No details have been provided to the Audit Team of an assessment of the likely impacts, in relation to capacity and junction performance, on the surrounding road network. Should capacity issues arise on the adjacent road network, and at junctions, there is the potential for driver frustration and unsafe manoeuvres resulting in collisions with other road users.

Recommendation

An assessment of the effects of the proposals on traffic on the adjacent road network should be undertaken. Where necessary measures should be incorporated to address any issues which may arise as a result of the proposals on the adjacent road network, including any safety measures which may be necessary.

3.1.8 Problem

Location: Scheme Tie-ins with existing road network

Summary: It is unclear in all instances if the proposed upgrade works sufficiently tie-into the existing road network.

At all sites within the Scheme, with the exception of the Castleknock Road Rail Bridge and Navan Road Bridge, amendments to the existing road layout, in particular at junctions, have been indicated. It is unclear if, in all instances, the amended traffic lanes tie-into the existing traffic lanes at the scheme extents at each site. The amended lanes are not indicated as aligning with the existing lanes at a number of locations on the background mapping, particularly where the number of lanes has been amended, although it is unclear how accurate this mapping is regarding the centre/edge of the carriageway. If the proposed upgrades do not sufficiently tie-into the existing road layout there is a risk that drivers will be directed into adjacent, or opposing, traffic lanes where there is an increased risk of side swipe or head-on collisions respectively.



Additionally, if safe transitions between the new cross section and the existing cross section are not fully considered at this early stage, there is a risk that locked-in land and road constraints may lead to unsafe road layouts being developed at the next design stage.

Recommendation

Ensure the amended sections of carriageway sufficiently align with the existing road layout at the scheme tie-ins ensuring a smooth transition between the upgraded sections of carriageway to the old sections of carriageway.

3.2 Clonsilla Level Crossing & Pedestrian and Cyclist Bridge

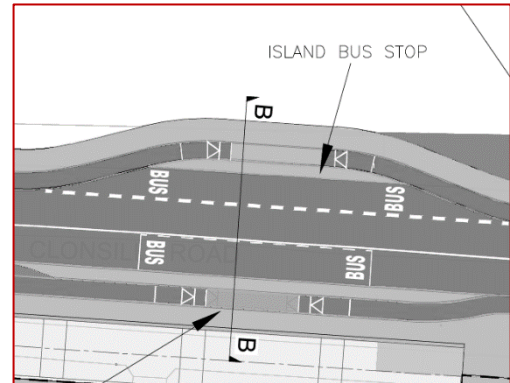
3.2.1 Problem

Location: Drawings no. MAY-MDC-HRW-LC04-DR-C-0101 (Rev. V01)

Summary: Insufficient effective width at island bus stop.

Island bus stops are indicated on both sides of the Clonsilla Road. It is unclear what the effective width of the footpath will be at the island bus stops, although they appear to be relatively narrow on the drawings provided. Should the islands be too narrow to accommodate waiting pedestrians there is a risk of pedestrians waiting for a bus within the path of cyclists where there is an increased risk of being struck by a cyclist.

This could be exacerbated during peak times when large volumes of pedestrians are likely to congregate while waiting for a bus.



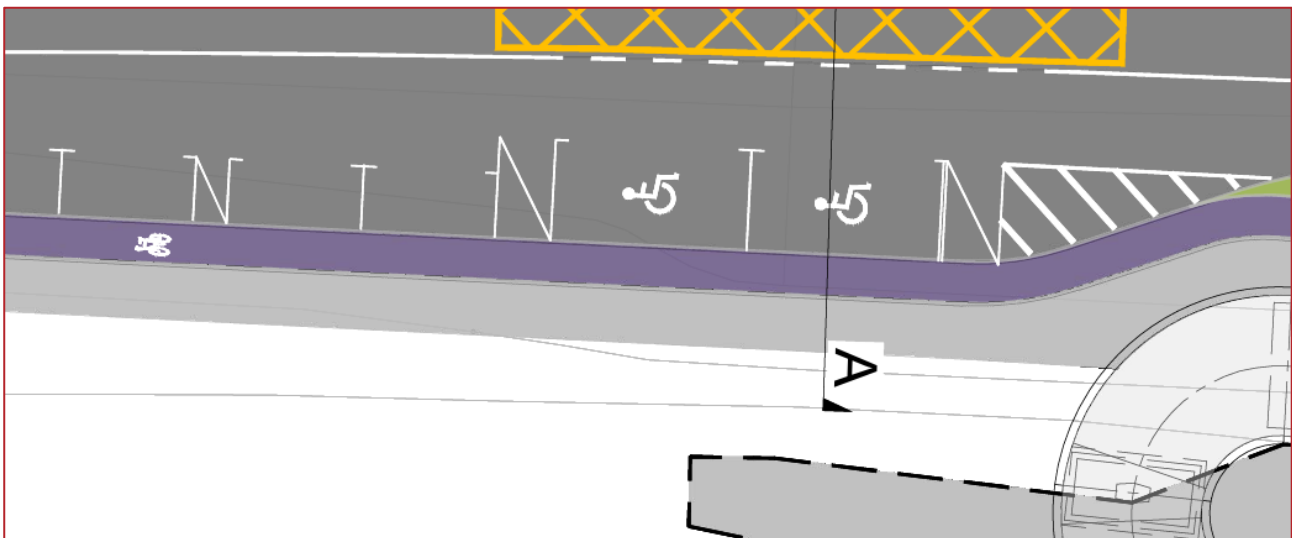
Recommendation

As per the Recommendation in Problem 3.1.1, a shared use footpath should be provided at bus stops within the Scheme. Also, ensure the shared use footpath at this bus stop is of a sufficient width to accommodate waiting pedestrians such that they will not encroach into the path of cyclists.

3.2.2 Problem

Location: Drawings no. MAY-MDC-HRW-LC04-DR-C-0101 (Rev. V01)

Summary: No safe access route to footpath from parking spaces.



Parking spaces have been indicated on the southern side of Clonsilla Road, including two mobility impaired parking spaces. To access the adjacent footpath, drivers/passengers would be required to cross the cycle track where no crossing has been indicated. A lack of a formal crossing may lead to an increased risk of pedestrians being struck by a cyclist when travelling between the parking spaces and footpath.

Also, it is assumed that there will be a kerb at the edge of the carriageway adjacent the parking spaces. A lack of a dropped kerb may present accessibility issues for mobility impaired pedestrians when accessing the footpath.

Recommendation

A safe pedestrian route from the parking spaces to the footpath should be provided.

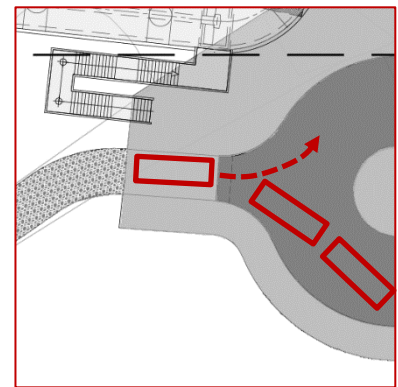
Additionally, a dropped kerb, and tactile paving, should be provided adjacent the mobility parking spaces to allow mobility impaired users access the footpath.

3.2.3 Problem

Location: Drawings no. MAY-MDC-HRW-LC04-DR-C-0102 (Rev. V01)

Summary: Junction control has not been indicated at the western arm of the roundabout leading to the Beech Park Allotments.

The western arm of the proposed roundabout to the south of the Clonsilla level crossing provides access to the Beech Park Allotments. Junction control and thus priority, has not been indicated at the entrance to the roundabout. The absence of clear priority on this arm, via signs and/or road markings, may lead to drivers being insufficiently aware of who has priority at the junction. This could lead to drivers approaching the junction on different arms believing that they have priority resulting in them entering the junction at the same time as an opposing vehicle and side-on collisions.



Additionally, the access is relatively narrow, and it is unclear if it will facilitate two-way traffic. If sufficient space is not available it may lead to a vehicle waiting within the roundabout circulating carriageway where there is an increased risk of collisions.

Recommendation

Junction control and priority should be provided on this arm of the roundabout.

Also, ensure the access is wide enough to facilitate two-way traffic.

3.3 Porterstown Road Junction Upgrade

3.3.1 Problem

Location: Drawing no. MAY-MDC-HRW-LC02-DR-C-0188 (Rev. V01)

Summary: Left-turning drivers may be insufficiently aware of straight-ahead cyclists on their nearside prior to entering the left turn lane approaching the Porterstown Road junction.

On the southbound approach to the Porterstown Road junction the cycleway is indicated between the straight-ahead and left-turn traffic lanes.

Left-turning drivers, approaching the junction in the through traffic lane may be insufficiently aware of a cyclist approaching on their nearside as the existing cycle facilities upstream are off-road. This may lead to drivers failing to take due care and consideration of cyclists approaching from the footway when changing lane, increasing the risk of vehicle-cyclist collisions.



Recommendation

If the expected traffic volumes do not require two lanes, the existing layout with only a single lane should be retained.

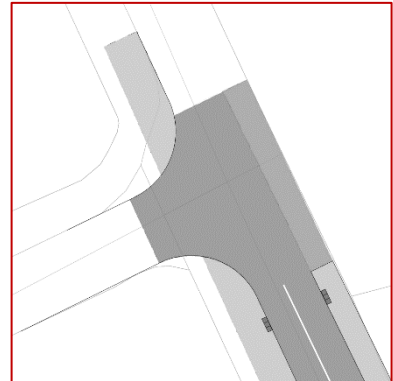
Alternatively, the off-road cycle track should transition to the carriageway in greater advance upstream of the left-turn lane development to increase a driver's awareness of cyclists on the carriageway. The weaving area

3.4.2 Problem

Location: Drawing no. MAY-MDC-HRW-LC03-DR-C-0100 (Rev. V01)

Summary: Absence of pedestrian crossing across ‘The Village’ side road.

A formal pedestrian crossing point has not been indicated, nor is one currently provided, across ‘The Village’ side road, at the northern extents of the scheme. A failure to provide a formal crossing point could lead to visually, and mobility, impaired pedestrians being unable to safely and independently cross to the opposite footpath. This could result in slips, trips, or falls as these pedestrians attempt to descend the kerb, or an increased risk in visually impaired pedestrians unintentionally entering the carriageway where they could be struck by a vehicle.



Recommendation

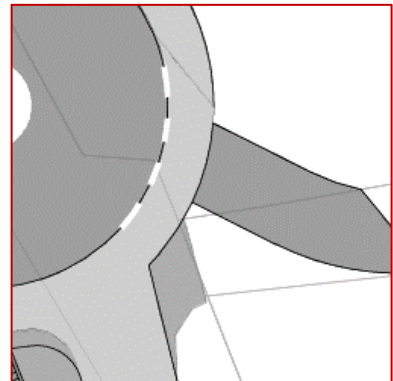
An uncontrolled pedestrian crossing, including dropped kerbs and tactile paving, should be provided across ‘The Village’ side road at its junction with Porterstown Road.

3.4.3 Problem

Location: Drawing no. MAY-MDC-HRW-LC03-DR-C-0100 (Rev. V01)

Summary: It is unclear if the access will be gated and, if so, if the gates will be sufficiently set back to permit a vehicle to fully exit the circulating carriageway when opening/closing the gates.

There is an existing gated access on the eastern side of Porterstown Road which is proposed to form the eastern arm of the upgraded roundabout. Gates have not been indicated on this arm and it is therefore unclear if the access will continue to be gated following construction and where these gates will be located if provided.



If the gates are not sufficiently set back from the carriageway, a driver may be unable to fully exit the roundabout circulating carriageway when opening/closing the gates, resulting in possible rear-end shunts or side-on collisions between oncoming traffic and a vehicle overhanging the carriageway.

Recommendation

The access gate, if provided, should be sufficiently set back from the carriageway to ensure a driver can completely exit the roundabout circulating carriageway when opening/closing the gates.

3.4.4 Problem

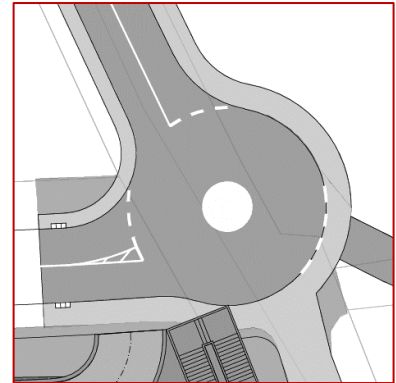
Location: Drawing no. MAY-MDC-HRW-LC02-DR-C-0188 (Rev. V01)

Summary: Insufficient lateral clearance between the footbridge and the roundabout circulating carriageway.

The corner of the footbridge indicated at the Porterstown level crossing is located in close proximity to the roundabout circulating carriageway where it is at risk of being struck by high-sided vehicles resulting in potential structural damage to the footbridge.

Recommendation

Ensure the steps of the footbridge are sufficiently offset from the circulating carriageway, such that high-sided vehicles, or errant drivers, are unable to conflict with the structure.



3.5 Coolmine Level Crossing/Pedestrian and Cyclist Bridge

3.5.1 Problem

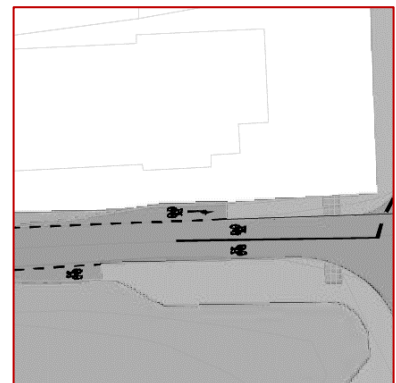
Location: Drawing no. MAY-MDC-HRW-LC02-DR-C-0100 (Rev. V01)

Summary: Effective width of shared surface may be insufficient to accommodate both pedestrians and cyclists.

Cyclists are directed off the Sheepmore Lane carriageway towards an uncontrolled pedestrian crossing to access the pedestrian and cycle bridge at the Coolmine level crossing. The short section of footpath between the cycle ramp and uncontrolled pedestrian crossing will effectively operate as a shared surface for pedestrians and cyclists. It is unclear if the width of this section of footpath is sufficient to accommodate both cyclists and pedestrians. Should the shared surface be incapable of accommodating pedestrians and cyclists, there is an increased risk of pedestrian-cyclist collisions.

Recommendation

The width of the shared surface should be sufficient to accommodate pedestrians and cyclists.

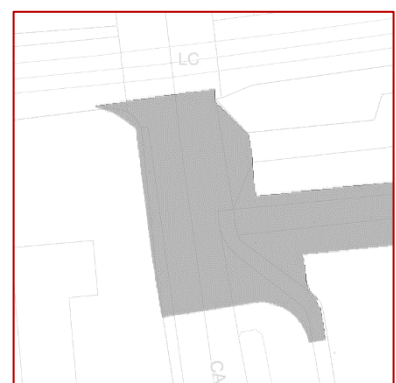


3.5.2 Problem

Location: Drawing no. MAY-MDC-HRW-LC02-DR-C-0100 (Rev. V01)

Summary: It is unclear how the carriageway will be terminated on the southern side of the Coolmine level crossing.

It is proposed to terminate Carpenterstown Road on both sides of the Coolmine level crossing. While a roundabout has been indicated on the northern side of the crossing it is unclear how the carriageway on the southern side will be terminated. If the end of the carriageway is not sufficiently defined drivers approaching the crossing may be insufficiently aware that there is no through route, particularly during the hours of darkness, resulting in an increased risk of overshoot type incidents and collisions with items of roadside furniture or the boundary/gates at the railway line.



Recommendation

The road layout on the southern side of the level crossing should be clearly defined such that drivers are aware of the carriageway termination.

3.6 Clonsilla Road Junction Upgrade

Issues relating to Clonsilla Road Junction have been discussed in Sections 3.1.2, 3.1.4, 3.1.5, 3.1.7 & 3.1.8.

3.7 Diswellstown Road Junction Upgrade

Issues relating to Diswellstown Road junction have been discussed in Sections, 3.1.2, 3.1.4, 3.1.5, 3.1.7 & 3.1.8.

3.8 Castleknock Road Junction Upgrade

Issues relating to Castleknock Road junction have been discussed in Sections, 3.1.1, 3.1.2, 3.1.4, 3.1.5, 3.1.7 & 3.1.8.

3.9 Castleknock Road Rail Bridge

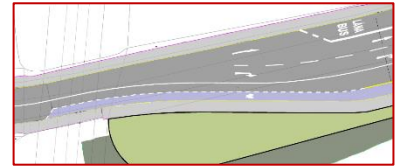
Issues relating to Castleknock rail bridge have been discussed in Section 3.1.6.

3.10 Navan Road Rail Bridge

No safety problems were identified at the Navan Road Rail Bridge.

4 Observations

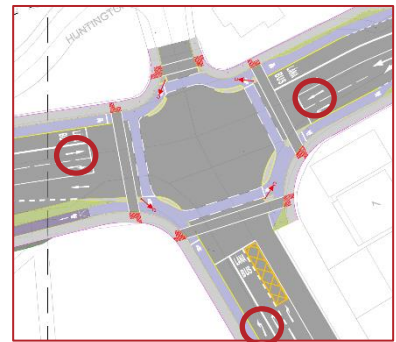
- 4.1 A short northbound on-road cycle lane has been indicated on the northern arm of the Castleknock Road Junction. It is assumed that this is an advisory cycle lane as the adjacent traffic lane significantly reduces in width at this location. However, if the cycle lane is mandatory the traffic lane should be widened such that vehicles will not encroach into the cycle lane.



Measures should also be provided to advise approaching drivers of the adjacent on-road cycle lane and the potential for cyclists merging onto the carriageway.

- 4.2 At this early stage in the design process, the location of the primary and secondary traffic signal heads has not been provided for the upgraded signalised junctions. As the signal design progresses, ensure the amended traffic signal heads are located such that they are sufficiently visible to the necessary drivers and that they are sufficiently setback from the carriageway.

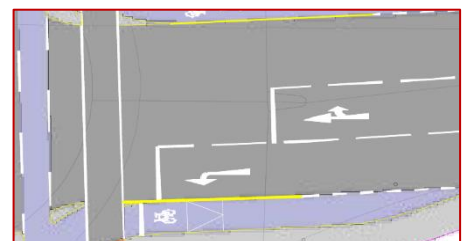
- 4.3 Arrow road markings for movements into Huntington Lodge have not been indicated within the traffic lanes on the approaches to the Castleknock Road Junction. Whilst it is likely that entry and exit manoeuvres into this small residential development will be infrequent these movements are not prohibited at the junction. The following measures should be provided: -



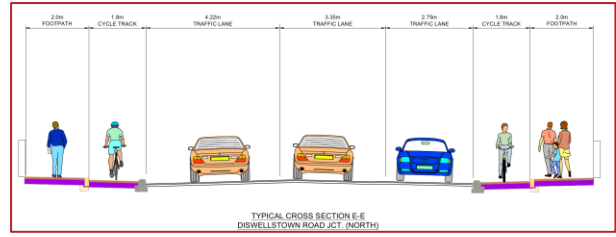
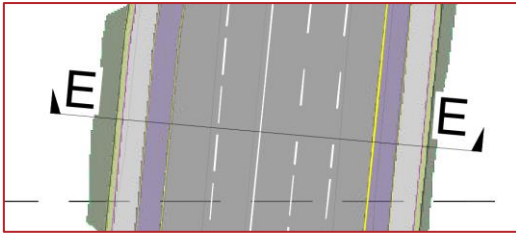
- Western arm: A straight-ahead and left-turn arrow in lieu of the straight-ahead only arrow indicated.
- Southern arm: A straight-ahead and left-turn arrow in lieu of the left-turn only arrow indicated.
- Eastern arm: A straight-ahead and right-turn arrow in lieu of the straight-ahead only arrow indicated.

Additionally, the signal phasing should be reviewed to ensure these movements do not lead to conflicts with other streams of traffic.

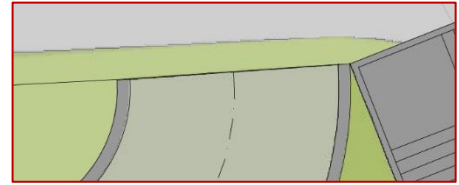
- 4.4 The stop line in the straight-ahead and right-turn lane on the eastern arm of the Clonsilla Road junction is set back presumably to allow for buses turning left into this arm. A Yellow box should be provided on the carriageway between the stop line and the crossing to ensure drivers do not mistakenly overshoot the stop line and obstruct the swept path of incoming large vehicles.



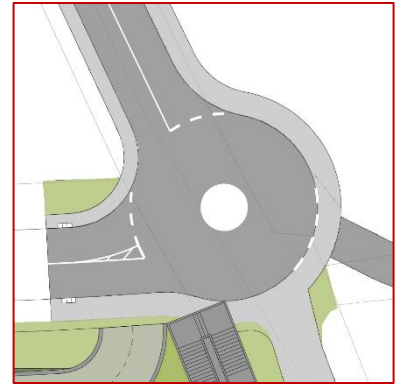
- 4.5 Cross sections D-D, E-E, and F-F for the Diswellstown Road Junction do not sufficiently convey the proposed road layout with the incorrect number of traffic lanes indicated. The drawings should be amended to ensure consistency with the plan drawings and to prevent confusion during construction.



4.6 A grass verge is indicated between the bottom of the footbridge ramp and footpath at the Porterstown Level Crossing & Pedestrian/Cyclist Footbridge. It is assumed that this is a CAD error, however the drawing should be amended to show the bottom of the ramp tying into the footpath to prevent confusion during construction.



4.7 Junction control has not been indicated at the proposed roundabout on the northern side of the Porterstown level crossing. Yield road markings should be provided at the entrance to the roundabout circulating carriageway on all arms to clearly advise drivers of the priority at the roundabout.



5 Road Safety Audit Team Statement

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

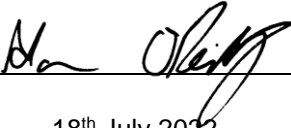
The problems identified have been noted in this report together with associated safety improvement suggestions, which we would recommend should be studied for implementation.

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

ROAD SAFETY AUDIT TEAM LEADER

Alan O'Reilly

Signed:



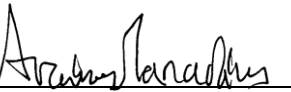
Dated:

18th July 2022

ROAD SAFETY AUDIT TEAM MEMBER

Antonios Papadakis

Signed:



Dated:

18th July 2022

Appendix A – Road Safety Audit Brief Checklist

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

	Yes	No
1. The Design Brief	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Departures from Standard	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Scheme Drawings	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Scheme Details such as signs schedules, traffic signal staging	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Collision data for existing roads affected by scheme	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Traffic surveys	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Previous Road Safety Audit Reports and Designer's Responses/Feedback Form	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Previous Exception Reports	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. Start date for construction and expected opening date	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Any elements to be excluded from audit	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Any other information?

(if 'Yes', describe below)

<input type="checkbox"/>	<input checked="" type="checkbox"/>
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Appendix B – Documents Submitted to the Road Safety Audit Team

DOCUMENT/DRAWING TITLE	DOCUMENT/DRAWING NO.	REVISION
DESIGN- LC02: COOLMINE CASTLEKNOCK ROAD JUNCTION- GENERAL ARRANGEMENT SHEET LAYOUT	MAY-MDC-HRW-LC02-DR-C-0173	V01
DESIGN- LC02: COOLMINE CASTLEKNOCK ROAD JUNCTION- GENERAL ARRANGEMENT SHEET 1 OF 2	MAY-MDC-HRW-LC02-DR-C-0174	V01
DESIGN- LC02: COOLMINE CASTLEKNOCK ROAD JUNCTION- GENERAL ARRANGEMENT SHEET 2 OF 2	MAY-MDC-HRW-LC02-DR-C-0175	V01
DESIGN- LC02: COOLMINE CASTLEKNOCK ROAD JUNCTION- CROSS SECTIONS SHEET 01 OF 02	MAY-MDC-HRW-LC02-DR-C-0186	V01
DESIGN- LC02: COOLMINE CASTLEKNOCK ROAD JUNCTION- CROSS SECTIONS SHEET 02 OF 02	MAY-MDC-HRW-LC02-DR-C-0187	V01
STRUCTURE DESIGN OBG11.BRIDGE DECK RECONSTRUCTION CURRENT STATE	MAY-MDC-HRW-RS09-DR-C-0002	V04
STRUCTURE DESIGN OBG11.BRIDGE DECK RECONSTRUCTION FINAL STATE	MAY-MDC-HRW-RS09-DR-C-0002	V04
STRUCTURE DESIGN OBG11.BRIDGE DECK RECONSTRUCTION FINAL STATE DETAIL	MAY-MDC-HRW-RS09-DR-C-0002	V04
STRUCTURE DESIGN OBG11.BRIDGE DECK RECONSTRUCTION STRUCTURAL DESIGN DETAIL	MAY-MDC-HRW-RS09-DR-C-0002	V04
STRUCTURE DESIGN- LC04: CLONSILLA- OPTION 1 PEDESTRIAN, CYCLE AND MOBILITY IMPAIRED BRIDGE GENERAL ARRANGEMENT SHEET 1 OF 3	MAY-MDC-HRW-LC04-DR-C-0201	V01
STRUCTURE DESIGN- LC04: CLONSILLA- OPTION 1 PEDESTRIAN, CYCLE AND MOBILITY IMPAIRED BRIDGE GENERAL ARRANGEMENT SHEET 2 OF 3	MAY-MDC-HRW-LC04-DR-C-0202	V01
STRUCTURE DESIGN- LC04: CLONSILLA- OPTION 1 PEDESTRIAN, CYCLE AND MOBILITY IMPAIRED BRIDGE GENERAL ARRANGEMENT SHEET 3 OF 3	MAY-MDC-HRW-LC04-DR-C-0203	V01
DESIGN- LC04: CLONSILLA GENERAL ARRANGEMENT SHEET LAYOUT	MAY-MDC-HRW-LC04-DR-C-0100	V01
DESIGN- LC04: CLONSILLA GENERAL ARRANGEMENT SHEET LAYOUT SHEET 1 OF 2	MAY-MDC-HRW-LC04-DR-C-0101	V01
DESIGN- LC04: CLONSILLA GENERAL ARRANGEMENT SHEET LAYOUT SHEET 2 OF 2	MAY-MDC-HRW-LC04-DR-C-0102	V01
DESIGN- LC04: CLONSILLA FENCING SHEET 1 OF 2	MAY-MDC-HRW-LC04-DR-C-0107	V01
DESIGN- LC04: CLONSILLA FENCING SHEET 2 OF 2	MAY-MDC-HRW-LC04-DR-C-0108	V01
DESIGN- LC04: CLONSILLA PLAN, ELEVATION SECTIONS (FOOTBRIDGE & GREENWAY) SHEET LAYOUT SHEET 1 OF 3	MAY-MDC-HRW-LC04-DR-C-0116	V01
DESIGN- LC04: CLONSILLA PLAN, ELEVATION SECTIONS (FOOTBRIDGE & GREENWAY) SHEET LAYOUT SHEET 2 OF 3	MAY-MDC-HRW-LC04-DR-C-0117	V01
DESIGN- LC04: CLONSILLA PLAN, ELEVATION SECTIONS (FOOTBRIDGE & GREENWAY) SHEET LAYOUT SHEET 3 OF 3	MAY-MDC-HRW-LC04-DR-C-0118	V01
DESIGN- LC02: COOLMINE CLONSILLA ROAD JUNCTION- GENERAL ARRANGEMENT SHEET LAYOUT	MAY-MDC-HRW-LC02-DR-C-151	V01
DESIGN- LC02: COOLMINE CLONSILLA ROAD JUNCTION- GENERAL ARRANGEMENT SHEET 1 OF 3	MAY-MDC-HRW-LC02-DR-C-0152	V01
DESIGN- LC02: COOLMINE CLONSILLA ROAD JUNCTION- GENERAL ARRANGEMENT SHEET 2 OF 3	MAY-MDC-HRW-LC02-DR-C-0153	V01
DESIGN- LC02: COOLMINE CLONSILLA ROAD JUNCTION- GENERAL ARRANGEMENT SHEET 3 OF 3	MAY-MDC-HRW-LC02-DR-C-0154	V01
DESIGN- LC02: COOLMINE CLONSILLA ROAD JUNCTION- CROSS SECTION SHEET 1 OF 3	MAY-MDC-HRW-LC02-DR-C-0170	V01
DESIGN- LC02: COOLMINE CLONSILLA ROAD JUNCTION- CROSS SECTION SHEET 2 OF 3	MAY-MDC-HRW-LC02-DR-C-0171	V01
DESIGN- LC02: COOLMINE CLONSILLA ROAD JUNCTION- CROSS SECTION SHEET 3 OF 3	MAY-MDC-HRW-LC02-DR-C-0172	V01
DESIGN – LC02: COOLMINE CLONSILLA ROAD JUNCTION – CROSS SECTIONS SHEET 1 OF 3	MAY-MDC-HRW-LC02-DR-C-0170	V01
DESIGN – LC02: COOLMINE CLONSILLA ROAD JUNCTION – CROSS SECTIONS SHEET 2 OF 3	MAY-MDC-HRW-LC02-DR-C-0171	V01
DESIGN – LC02: COOLMINE CLONSILLA ROAD JUNCTION – CROSS SECTIONS SHEET 3 OF 3	MAY-MDC-HRW-LC02-DR-C-0172	V01

DOCUMENT/DRAWING TITLE	DOCUMENT/DRAWING NO.	REVISION
DESIGN – LC02: COOLMINE LEVEL CROSSING – GENERAL ARRANGEMENT SHEET LAYOUT	MAY-MDC-HRW-LC02-DR-C-0100	V01
DESIGN – LC02: COOLMINE LEVEL CROSSING – GENERAL ARRANGEMENT SHEET 1 OF 1	MAY-MDC-HRW-LC02-DR-C-0101	V01
STRUCTURES DESIGN – LC02: COOLMINE PEDESTRIAN, CYCLE AND MOBILITY IMPAIRED BRIDGE GENERAL ARRANGEMENT SHEET 1 OF 3	MAY-MDC-STR-LC02-DR-C-0203	V02
STRUCTURES DESIGN – LC02: COOLMINE PEDESTRIAN, CYCLE AND MOBILITY IMPAIRED BRIDGE GENERAL ARRANGEMENT SHEET 2 OF 3	MAY-MDC-STR-LC02-DR-C-0204	V02
STRUCTURES DESIGN – LC02: COOLMINE PEDESTRIAN, CYCLE AND MOBILITY IMPAIRED BRIDGE GENERAL ARRANGEMENT SHEET 3 OF 3	MAY-MDC-STR-LC02-DR-C-0205	V02
DESIGN – LC02: COOLMINE DISWELLSTOWN ROAD JUNCTION – GENERAL ARRANGEMENT SHEET LAYOUT	MAY-MDC-HRW-LC02-DR-C-0115	V01
DESIGN – LC02: COOLMINE DISWELLSTOWN ROAD JUNCTION – GENERAL ARRANGEMENT SHEET 1 OF 5	MAY-MDC-HRW-LC02-DR-C-0116	V01
DESIGN – LC02: COOLMINE DISWELLSTOWN ROAD JUNCTION – GENERAL ARRANGEMENT SHEET 2 OF 5	MAY-MDC-HRW-LC02-DR-C-0117	V01
DESIGN – LC02: COOLMINE DISWELLSTOWN ROAD JUNCTION – GENERAL ARRANGEMENT SHEET 3 OF 5	MAY-MDC-HRW-LC02-DR-C-0118	V01
DESIGN – LC02: COOLMINE DISWELLSTOWN ROAD JUNCTION – GENERAL ARRANGEMENT SHEET 4 OF 5	MAY-MDC-HRW-LC02-DR-C-0119	V01
DESIGN – LC02: COOLMINE DISWELLSTOWN ROAD JUNCTION – GENERAL ARRANGEMENT SHEET 5 OF 5	MAY-MDC-HRW-LC02-DR-C-0120	V01
DESIGN – LC02: COOLMINE DISWELLSTOWN ROAD JUNCTION – CROSS SECTIONS SHEET 1 OF 4	MAY-MDC-HRW-LC02-DR-C-0146	V01
DESIGN – LC02: COOLMINE DISWELLSTOWN ROAD JUNCTION – CROSS SECTIONS SHEET 2 OF 4	MAY-MDC-HRW-LC02-DR-C-0147	V01
DESIGN – LC02: COOLMINE DISWELLSTOWN ROAD JUNCTION – CROSS SECTIONS SHEET 3 OF 4	MAY-MDC-HRW-LC02-DR-C-0148	V01
DESIGN – LC02: COOLMINE DISWELLSTOWN ROAD JUNCTION – CROSS SECTIONS SHEET 4 OF 4	MAY-MDC-HRW-LC02-DR-C-0149	V01
DESIGN LC03 – PORTERSTOWN GENERAL ARRANGEMENT OVERALL LAYOUT	MAY-MDC-HRW-LC03-DR-C-0100	V01
DESIGN LC03 – PORTERSTOWN GENERAL ARRANGEMENT SHEET 1 OF 2	MAY-MDC-HRW-LC03-DR-C-0101	V01
DESIGN LC03 – PORTERSTOWN GENERAL ARRANGEMENT SHEET 2 OF 2	MAY-MDC-HRW-LC03-DR-C-0102	V01
DESIGN LC03 – PORTERSTOWN FENCING SHEET 1 OF 2	MAY-MDC-HRW-LC03-DR-C-0107	V01
DESIGN LC03 – PORTERSTOWN FENCING SHEET 2 OF 2	MAY-MDC-HRW-LC03-DR-C-0108	V01
STRUCTURES DESIGN – LC03: PORTERSTOWN PEDESTRIAN, CYCLE AND MOBILITY IMPAIRED BRIDGE GENERAL ARRANGEMENT SHEET 1 OF 3	MAY-MDC-STR-LC03-DR-C-0101	V01
STRUCTURES DESIGN – LC03: PORTERSTOWN PEDESTRIAN, CYCLE AND MOBILITY IMPAIRED BRIDGE GENERAL ARRANGEMENT SHEET 2 OF 3	MAY-MDC-STR-LC03-DR-C-0102	V01
STRUCTURES DESIGN – LC03: PORTERSTOWN PEDESTRIAN, CYCLE AND MOBILITY IMPAIRED BRIDGE GENERAL ARRANGEMENT SHEET 3 OF 3	MAY-MDC-STR-LC03-DR-C-0103	V01
OPTIONS SELECTION – LC03: PORTERSTOWN – OPTION 2 PEDESTRIAN FOOTBRIDGE GENERAL ARRANGEMENT SHEET 1	MAY-ROD-STR-LC03-DR-C-0201	V1.0
DESIGN – LC02: COOLMINE PORTERSTOWN ROAD JUNCTION – GENERAL ARRANGEMENT SHEET LAYOUT	MAY-MDC-HRW-LC02-DR-C-0188	V01
DESIGN – LC02: COOLMINE PORTERSTOWN ROAD JUNCTION – GENERAL ARRANGEMENT SHEET 1 OF 1	MAY-MDC-HRW-LC02-DR-C-0189	V01
STRUCTURE DESIGN OBG9. BRIDGE DECK HEAVY LIFTING CURRENT STATE SHEET 1 OF 5	MAY-MDC-STR-RS08-DR-C-0002	V06
STRUCTURE DESIGN OBG9. BRIDGE DECK HEAVY LIFTING FINAL STATE SHEET 2 OF 5	MAY-MDC-STR-RS08-DR-C-0002	V06

DOCUMENT/DRAWING TITLE	DOCUMENT/DRAWING NO.	REVISION
STRUCTURE DESIGN OBG9. BRIDGE DECK HEAVY LIFTING FINAL STATE DETAIL SHEET 3 OF 5	MAY-MDC-STR-RS08-DR-C-0002	V06
STRUCTURE DESIGN OBG9. BRIDGE DECK HEAVY LIFTING STRUCTURAL DESIGN DETAIL SHEET 4 OF 5	MAY-MDC-STR-RS08-DR-C-0002	V06
STRUCTURE DESIGN OBG9. BRIDGE DECK HEAVY LIFTING TEMPORARY DECK LIFTING STRUCTURE DETAIL SHEET 5 OF 5	MAY-MDC-STR-RS08-DR-C-0002	V06

Appendix C – Feedback Form

Road Safety Audit Feedback Form

Scheme: DART+ West Project- Section B: M50 to Barberstown

Route No.: Porterstown Road, Luttrellstown Road, Diswellstown Road, Clonsilla Road, Coolmine Road, Blanchardstown Road South, and Castleknock Road

Audit Stage: 1 **Date Audit Completed:** 07.04.2022

To be Completed by Designer				To be Completed by Audit Team Leader
Paragraph No. in Safety Audit Report	Problem Accepted (Yes/No)	Recommended Measure(s) Accepted (Yes/No)	Describe Alternative Measure(s). Give reasons for not accepting recommended measure	Alternative Measures or Reasons Accepted by Auditors (Yes/No)
3.1.1	Yes	Yes		
3.1.2	Yes	Yes		
3.1.3	Yes	Yes		
3.1.4	Yes	Yes		
3.1.5	Yes	Yes		
3.1.6	Yes	Yes		
3.1.7	Yes	Yes		
3.1.8	Yes	Yes		
3.2.1	Yes	Yes		
3.2.2	Yes	Yes		
3.2.3	Yes	Yes		
3.3.1	Yes	Yes		
3.3.2	Yes	Yes		
3.4.1	Yes	Yes		
3.4.2	Yes	Yes		
3.4.3	Yes	Yes		
3.4.4	Yes	Yes	Steps to be reorientated	
3.5.1	Yes	Yes		

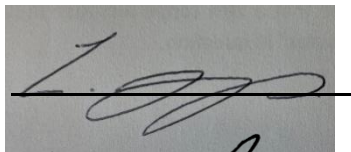
Road Safety Audit Feedback Form

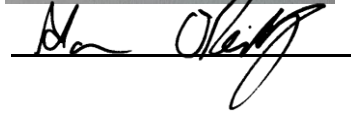
Scheme: DART+ West Project- Section B: M50 to Barberstown

Route No.: Porterstown Road, Luttrellstown Road, Diswellstown Road, Clonsilla Road, Coolmine Road, Blanchardstown Road South, and Castleknock Road

Audit Stage: 1 **Date Audit Completed:** 07.04.2022

To be Completed by Designer				To be Completed by Audit Team Leader
Paragraph No. in Safety Audit Report	Problem Accepted (Yes/No)	Recommended Measure(s) Accepted (Yes/No)	Describe Alternative Measure(s). Give reasons for not accepting recommended measure	Alternative Measures or Reasons Accepted by Auditors (Yes/No)
3.5.2	Yes	Yes		

Signed:  Designer **Date** 15/07/2022

Signed:  Audit Team Leader **Date** 18th July 2022

Signed: _____ Employer **Date** _____

Appendix D – Problem Locations

General Problem 3.1.1

General Problem 3.1.2

General Problem 3.1.3

General Problem 3.1.4

General Problem 3.1.5

General Problem 3.1.6

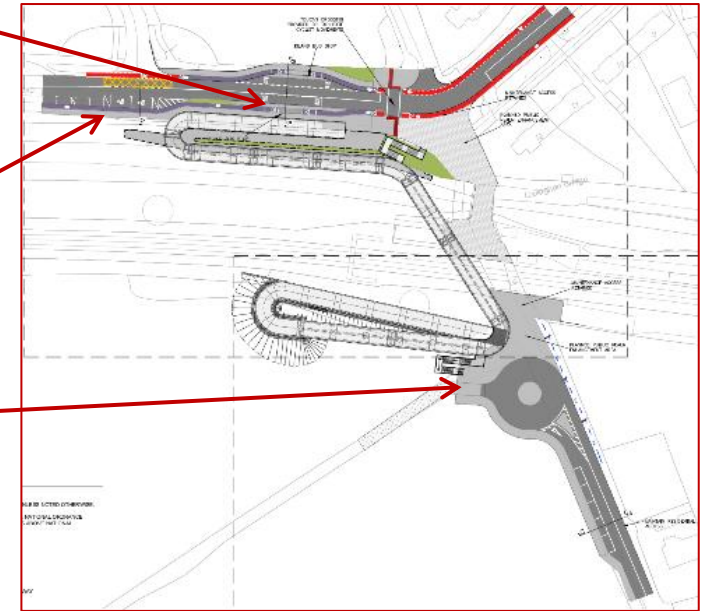
General Problem 3.1.7

General Problem 3.1.8

Problem 3.2.1

Problem 3.2.2

Problem 3.2.3



Problem 3.3.2

Problem 3.3.1

