IDOM Engineering

DART+ West Project
Section A: Spencer Dock to M50

Stage 1 Road Safety Audit

P·M·C·E

July 2022

IDOM Engineering

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Table of Contents

Index of Figures

1 Introduction

1.1 General

This report results from a Stage 1 Road Safety Audit on Section A (Spencer Dock to M50) 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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Road Safety Audit Team Member

The Road Safety Audit took place during March 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 14th and 28th March 2022. Weather conditions during the site visit on the 14th March 2022 were wet and the road surface was wet. Weather conditions during the site visit on the 28th March 2022 were dry and the road surface was dry. Traffic volumes during the site visits were moderate, pedestrian and cyclist volumes were moderate and traffic speeds were considered to be generally within the posted speed limit.

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

This 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) Publications website.

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

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

1.2 Items Not Submitted for Auditing

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

- Vehicle swept paths
- 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 intended to improve the existing rail network within Dublin by 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.50 km 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, a connection to the Phoenix Park Tunnel and a new EMU Depot. It also includes the 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.

2.2 DART+ West Project

The DART+ West project will introduce electrified high-capacity trains at increased frequency for all station between the Maynooth/M3 Parkway and Dublin City Centre at Connolly Station and the 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 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, proposed depot (including rail and road realignment), 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 covers changes to road layouts within Section A. This includes the Ashtown Road Accessibility Bridge, the Ashtown Road Level Crossing Replacement, Preston Street Shared Street, the permanent compound access at Sheriff Street Upper and the Broombridge Station Bridge reconfiguration.

The proposed changes at the four sites are as follows: -

- Ashtown Road Accessibility Bridge & Ashtown Road Level Crossing Replacement:
    - Closure of the level crossing;
    - Removal of the existing pedestrian and cyclist bridge north of Ashtown Station;
    - Widening of the northern Platform at Ashtown station;
    - Provision of bridge for cyclist and pedestrian over Ashdown Station;
    - Diversion of traffic by providing an underpass through Mill Lane (west of Ashtown station);
    - Provision of accee Road for the old Mill Lane Road; and
    - Improve the pedestrian and cyclist facilities along Ashtown road.
- Preston Street Shared Street:
    - Provision of new access for pedestrian to the Connolly Trian Station via Preston Street;
    - Removal of parking along Preston Street;
    - Improve the landscape of the street; and
    - Provision of lighting.
- Proposed permanent compound access at Sheriff Street Upper:
    - Provision of new access road for the Buses depot including safety barriers; and
    - Construction of new station platform under Sheriff Street Upper; and
    - Provsoin of Parapet along Sheriff Street Upper above the new train station.
- Broombridge station Bridge reconfiguration
    - Amendments to the vertical road profile of Broombridge bridge.

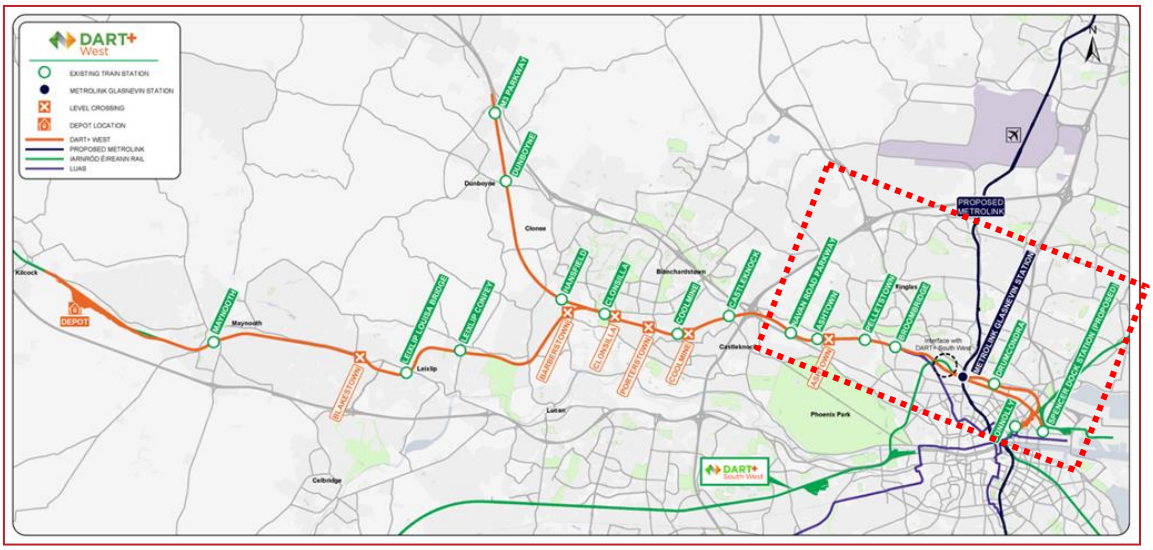


FIGURE 2-1: LOCATION PLAN

2.3 Collision History

The Road Safety Authority website (www.rsa.ie) was consulted to identify historical collisions in the vicinity of the proposed schemes. The website includes summary information on recorded collision occurrence for the period 2005 to 2016 (see Figures 2-2 to 2-5).

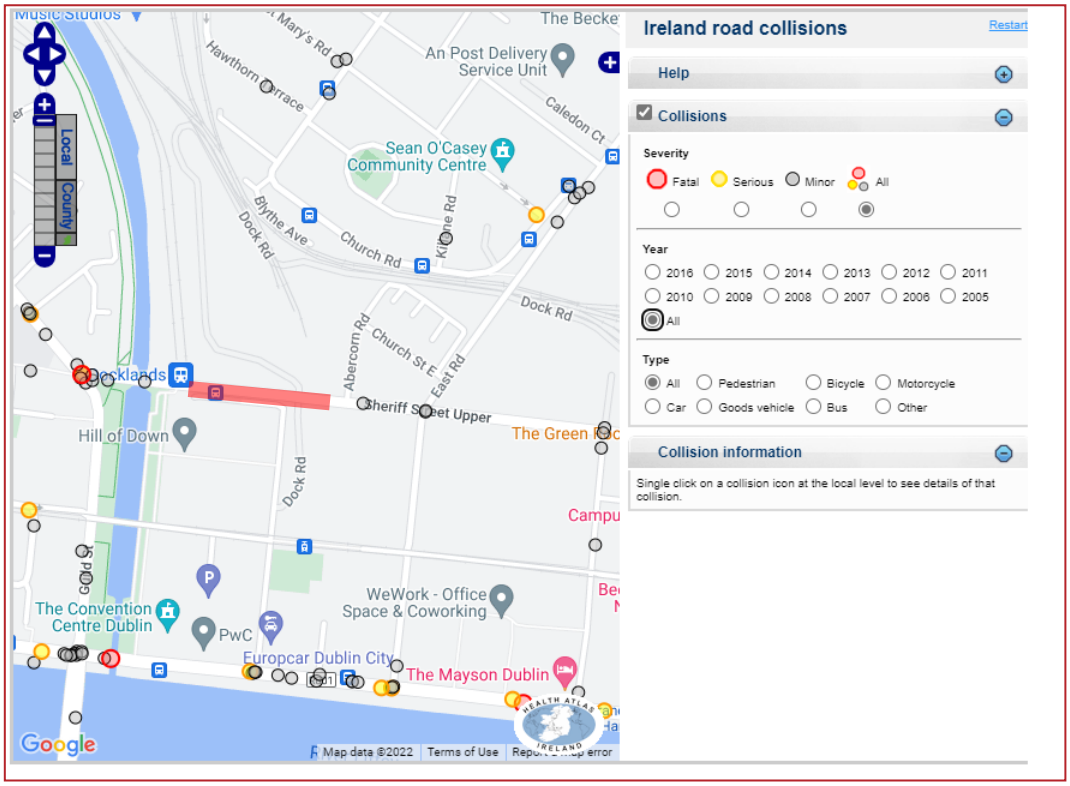


FIGURE 2-2: HISTORICAL COLLISIONS IN THE VICINITY OF SHERIFF STREET UPPER (SOURCE WWW.RSA.IE)

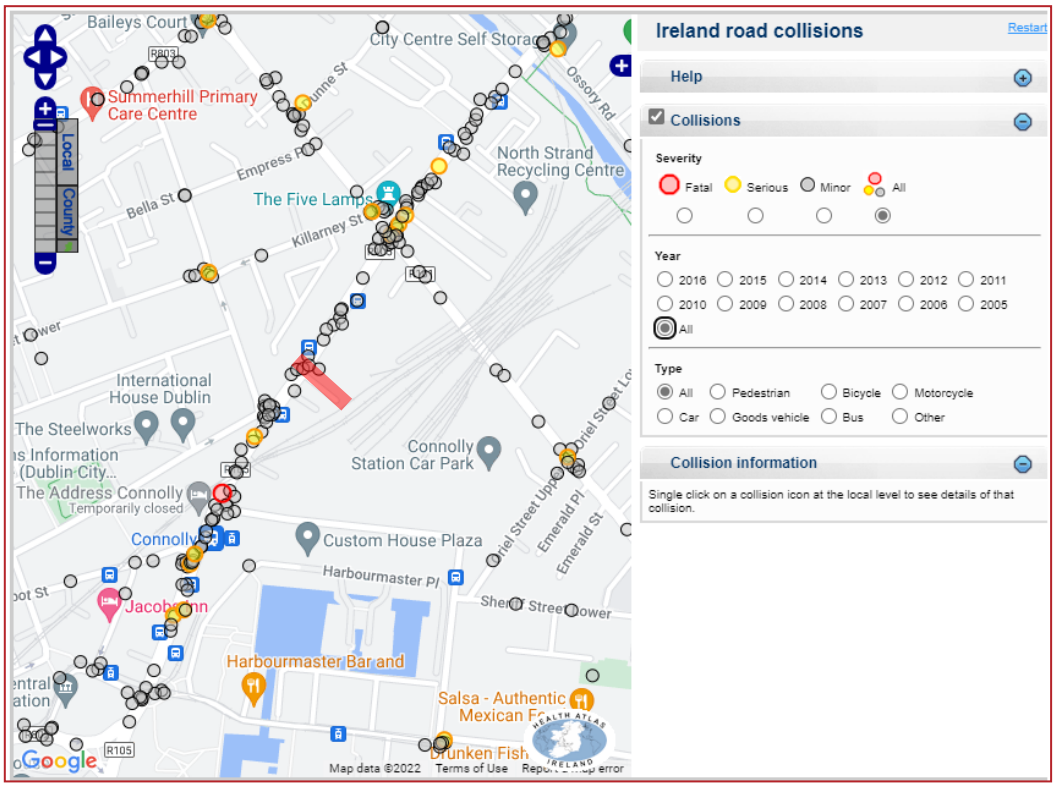


FIGURE 2-3: HISTORICAL COLLISIONS IN THE VICINITY OF PRESTON STREET (SOURCE WWW.RSA.IE)

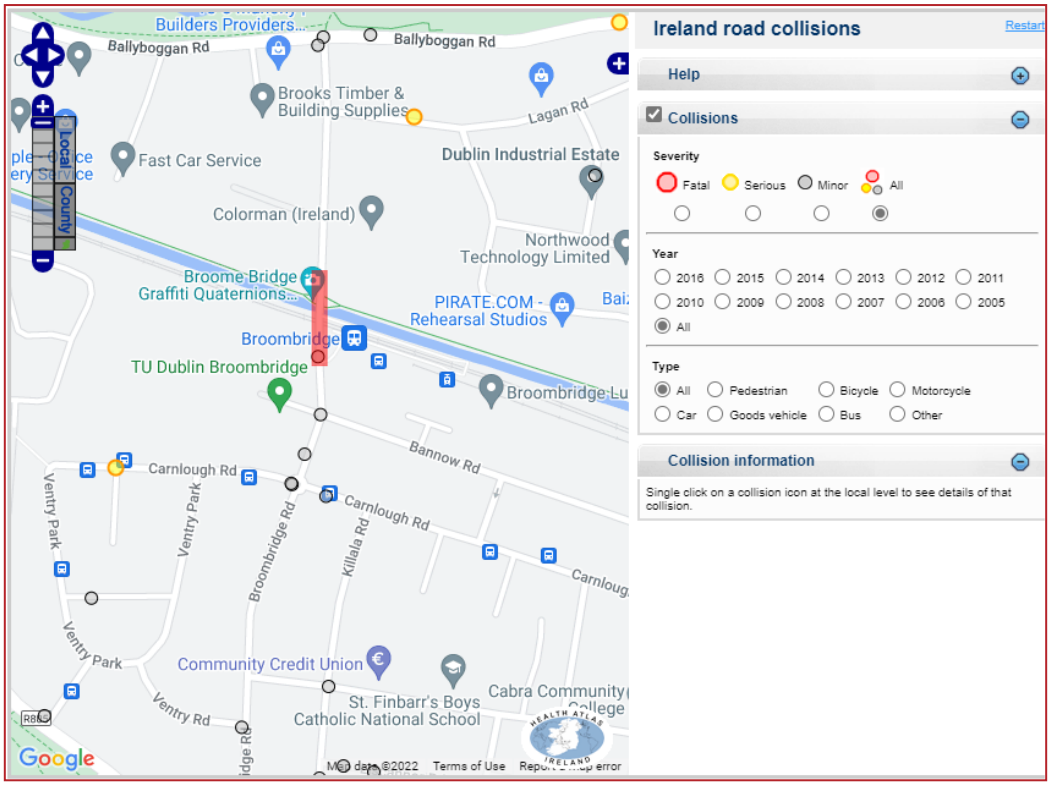


FIGURE 2-4: HISTORICAL COLLISIONS IN THE VICINITY OF BROOMBRIDGE (SOURCE WWW.RSA.IE)

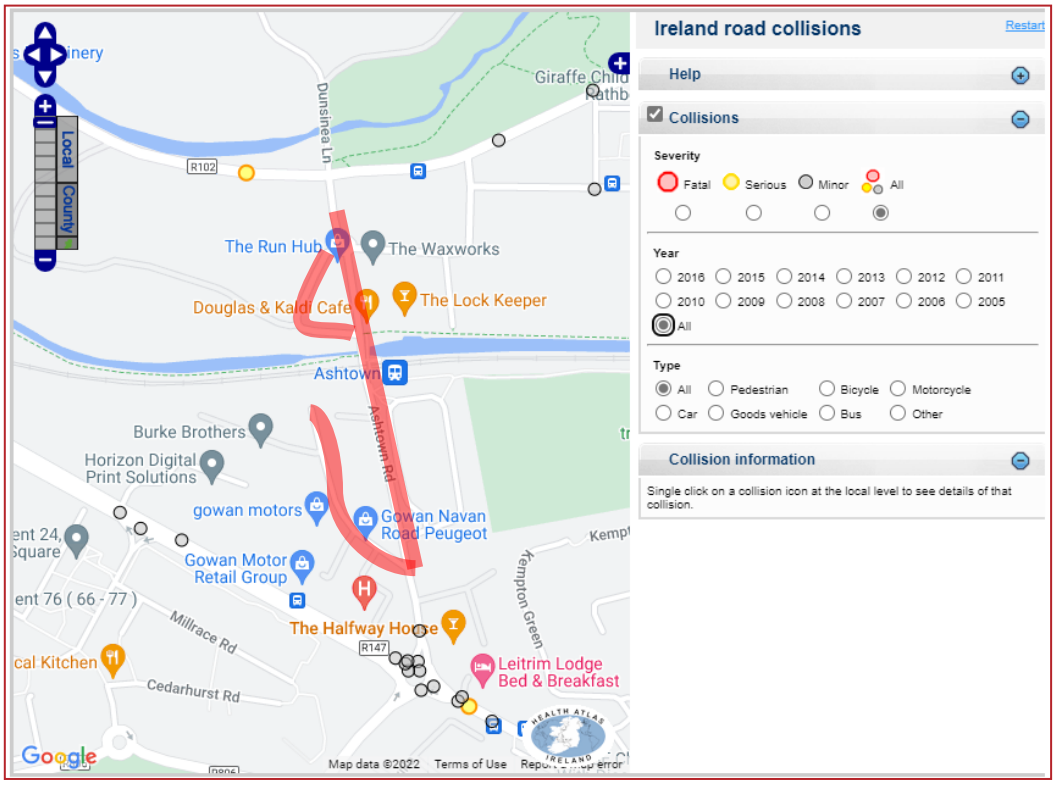


FIGURE 2-5: HISTORICAL COLLISIONS IN THE VICINITY OF ASHTOWN STATION (SOURCE WWW.RSA.IE)

No collisions were recorded at Sheriff Street Upper or in the vicinity of the Ashtown Station Scheme. However, 1 collision was recorded in the vicinity of Broombridge scheme and 5 at the junction between Preston Street and Amiens Street. Table 2-1 below shows a summary of the collision recorded in the vicinity of the four sites.

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

Year	Vehicle	Circumstances	Day	Time	Speed Limit	Severity
Preston Street						
2016	Car	Other	Friday	2300-0300	30 KPH	Minor
2014	Bicycle	Other	Wednesday	1900-2300	30 KPH	Minor
2014	Motorcycle	Other	Friday	1900-2300	50 KPH	Minor
2008	Car	Other	Wednesday	1600-1900	50 KPH	Minor
2005	Car	Pedestrian	Friday	1000-1600	30 KPH	Minor
2005	Car	Head-on right turn	Friday	1600-1900	50 KPH	Minor
Broombridge						
2012	Car	Single Vehicle only	Sunday	2300-0300	60KPH	Minor

3 Main Report

3.1 Sheriff Street Upper

3.1.1 Problem

Drawing: *MAY-MDC-HRW-SC01-DR-Z-0001-C (V02)*

Summary: *Working width for the VRS/Safety Barrier*

A Vehicle Restraint System (VRS) has been indicated on either side of the proposed compound access on the immediate approach to its junction with Sheriff Street.

A verge width of 0.5m has also been indicated on the Access, and it is unclear if this verge is of sufficient width to accommodate the proposed VRS with the required setback & working width.

A lack of sufficient Working Width for the safety barrier may result in the barrier not performing as expected when struck resulting in an increased injury severity outcome for occupants of an errant vehicle.

Recommendation

Level ground should be provided within the extents of the working width of the proposed VRS/safety barrier and the working Width should be kept free of items of roadside furniture (e.g. sign supports, public lighting columns).

3.1.2 Problem

Drawing: *MAY-MDC-HRW-SC01-DR-Z-0001-C (V02)*

Summary: *Existing footpath across compound access may be unable to withstand vehicular loading.*

It is proposed to provide a new access for the compound via Sherrif Street, however, no changes have been indicated to the existing footpaths on Sheriff Street.

It is presumed that it is intended to maintain a continuous footpath across the proposed compound access, which the Audit Team consider appropriate as it prioritises non-motorised road users over vehicles entering/exiting the compound.

It is unclear, however, if the existing footpath construction is capable of withstanding vehicular loading. Should it not be able to withstand the loading of vehicles entering/exiting the compound this could result in deformation or deterioration of the footpath leading to an increased likelihood of slips, trips and falls for pedestrians.

Recommendation

The footpath across the proposed compound access should be capable of withstanding the expected vehicular loading.

3.1.3 Problem

Drawing: *MAY-MDC-HRW-SC01-DR-Z-0001-C (V02)*

Summary: *Unclear if there will be sufficient inter-visibility available between pedestrians and drivers at the new access.*

The proposed VRS and/or the existing parapet wall along the northern side of Sheriff Street may impede inter-visibility between drivers exiting the compound access and pedestrians, in particular children, travelling along the footpath on the northern side of Sheriff Street.

Insufficient inter-visibility could result in unsafe exiting manoeuvres and vehicular/pedestrian collisions.

Recommendation

Sufficient inter-visibility should be provided between drivers and pedestrians at the compound access.

3.1.4 Problem

Drawing: *MAY-MDC-HRW-SC01-DR-Z-0001-C (V02)*

Summary: *No footpath indicated along the new access road.*

It is unclear if it is intended to permit pedestrian access at the proposed new compound access. Even if regular pedestrian access is not intended, it may be required from time to time. Where a pedestrian chooses to enter/exit the compound by the new access, and no footpath provided, they will be required to travel within the carriageway where they are at an increased risk of being struck by a vehicle.

Recommendation

Should pedestrian access be envisaged via the proposed new Compound Access, then facilities to cater for pedestrians should be provided. It may be necessary to provide public lighting along the route, ensuring that it will not conflict with the proposed VRS, where pedestrian access is to be permitted.

Where it is not intended to permit pedestrian access then measures should be put in place to ensure that this does not occur and an appropriate alternative pedestrian access should be provided.

3.1.5 Problem

Drawing: *MAY-MDC-HRW-SC01-DR-Z-0001-C (V02)*

Summary: *Steep embankment may present risk of falls should pedestrians be permitted to travel along the new access road.*

It is unclear if it is intended to permit pedestrian access at the proposed new compound access. Even if regular pedestrian access is not intended, it may be required from time to time. Where a pedestrian travels along the new access, and if no footpath is provided, they may choose to travel in the verge area to the rear of the VRS, placing them in close proximity to the proposed high, steep, embankment with a resulting risk of falls from height.

Recommendation

Should pedestrian access be intended along the proposed new Compound Access, then measures to prevent falls at the steep embankment should be provided.

3.1.6 Problem

Location: *Sherrif Street*

Summary: *Visibility at Sherrif Street may be impeded by on-street parking, leading to possible side swipe collisions.*

There is existing roadside parking on both sides of Sheriff St, Upper in the vicinity of the proposed new Compound Access.

It is unclear if it is intended to remove/restrict the existing parking along the northern side of Sheriff Street either side of the access.

Parked vehicles could impede visibility for exiting drivers resulting in unsafe exiting manoeuvres. This could result in drivers entering the carriageway ahead of oncoming vehicles when it is unsafe to do so leading to side swipe collisions.

Recommendation

Adequate visibility should be available to drivers exiting the proposed compound access towards approaching cyclists/vehicles on Sherrif Street. Where necessary, existing on-street parking should be removed/restricted.

3.1.7 Problem

Location: *Sherrif Street*

Summary: *It is unclear if there will be sufficient space for the swept path of vehicles entering/exiting the compound.*

Information regarding the swept path of vehicles has not been provided, and it is unclear if there will be sufficient space for large vehicles to enter/exit the new access within the proposed road layout, in particular where the existing roadside parking is retained on the southern side of Sheriff Street in the vicinity of the new access.

If sufficient space is not available for large vehicles to safely undertake entry/exit manoeuvres this could lead to vehicles colliding with items of roadside furniture or with parked vehicles.

Recommendation

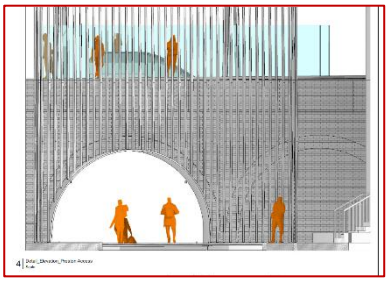
The proposed compound access should be capable of accommodating the swept of the vehicles expected to use the new access.

3.2 Preston Street Shared Street

3.2.1 Problem

Drawing: *MAY-MDC-ARC-RS02-DR-A-0006-C (V01)*

Summary: *No 'Safe Zone' indicated along Preston Street.*



It is proposed to provide new pedestrian access route to Conolly Station via Preston Street. It is unclear if vertical separation is proposed within the revised street layout, implying the provision of a "Shared Street" arrangement.

However no "Safe Zone" has been indicated, the absence of which could create difficulties for visually-impaired pedestrians in safely & independently navigating the proposed street layout.

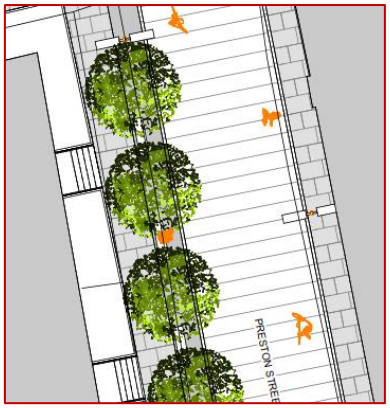
Recommendation

A "Safe Zone" should be provided in line with guidance by the National Disability Authority. The Safe Zone should extend up to/into the station entrance and connect with the footpath along Amiens Street.

3.2.2 Problem

Drawing: *MAY-MDC-LAN-RS02-DR-A-0001-C (V01)*

Summary: *Lighting column(s) position may reduce the effective width of the "footpath" along the eastern side of Preston Street.*



It is proposed to provide lighting columns close to the interface between the eastern footpath and the shared-area/carriageway. The position of these lighting columns could reduce the effective width of the "footpath" area presenting an obstacle to the mobility-impaired or a hazard to the visually-impaired.

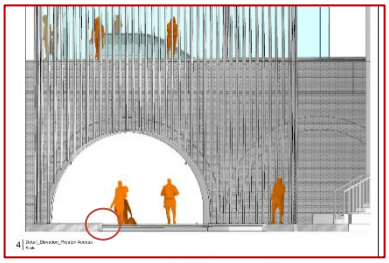
Recommendation

The lighting columns should be positioned to the rear of the footpath, or if possible lighting columns provided only within the "buffer area" along the western side of the street.

3.2.3 Problem

Drawing: *MAY-MDC-ARC-RS02-DR-A-0006-C (V01)*

Summary: *Upstand within pedestrian area may present a trip hazard.*



Elevation 4 appears to indicate a small level difference between the shared surface/carriageway area and the adjacent footpaths. It is unclear what the height of this level difference is intended to be. Should the proposed level difference be too small it may present a trip hazard for inattentive pedestrians or the partially-sighted.

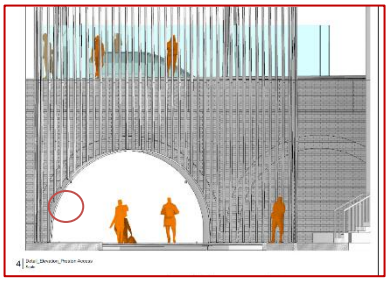
Recommendation

Care should be taken to ensure that the level difference does not present a potential trip hazard, and that the footway area extends into the station entrance.

3.2.4 Problem

Drawing: *MAY-MDC-ARC-RS02-DR-A-0006-C (V01)*

Summary: *Height hazard at the arched entrance to the station.*



Elevation 4 indicates that there will be a footpath on either side of the arch at the entrance to the station. There is a concern that that due to the low height of the arch on both sides, visually-impaired pedestrians might not be aware of the height hazard and may result in personal injury if struck.

Recommendation

Measures should provided to ensure that pedestrian are guided away from the arch sections with height lower than 2.1m.

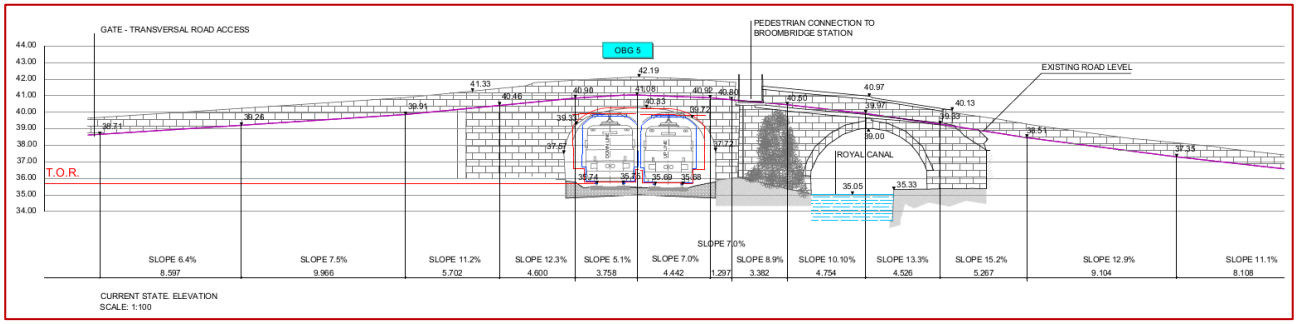
3.3 Broombridge Station Bridge

3.3.1 Problem

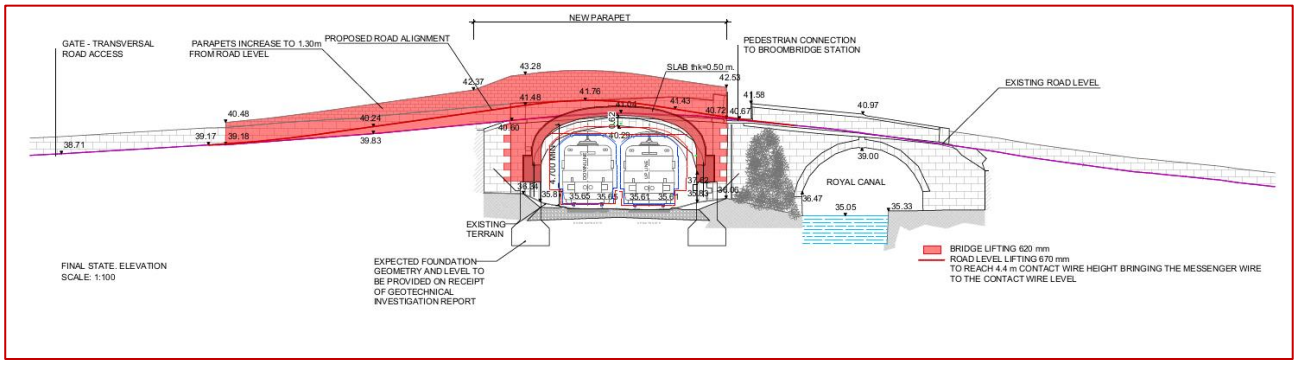
Drawing: *MAY-MDC-STR-RS05-DR-C-0002-C (V04)*

Summary: *Proposed changes to the vertical alignment may create difficulties during wet/icy weather or lead to vehicle "grounding" at the crest.*

No details have been provided in relation to the proposed vertical alignment of Broombridge Road. It would appear that it is proposed to increase the gradient and, possibly, reduce the k-value of the crest curve in the vicinity of the railway crossing.



A reduced crest curve k-value could lead to reduced forward visibility for drivers on Broombridge Road towards the pedestrian and cyclist crossing on the northern side of the bridge resulting in possible overshoot collisions. A reduced crest k-value could also result in large vehicles (e.g. buses) 'grounding' on the crest.



Increased gradients could increase the difficulties, in particular for elderly or mobility-impaired pedestrians, travelling along Broombridge Road, or for all pedestrians during wet or icy weather resulting in slips or falls. The increased gradient could also give rise to difficulties for vehicles in ascending the gradient during icy weather, in particular for the north-facing section of the road.

Recommendation

The vertical alignment, and in particular the gradients, should be such so as not to create hazards for vehicles or non-motorised road users in particular during wet/icy weather.

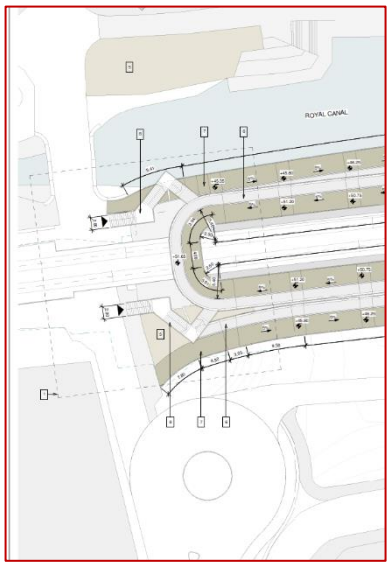
The crest curve k-value should be such that it does not reduce a northbound driver's forward visibility towards the existing toucan crossing at the Greenway and is capable of being safely traversed by all vehicles permitted or likely to use the road.

3.4 Ashtown Road Accessibility Bridge

3.4.1 Problem

Drawing: *MAY-MDC-ARC-RS07-DR-A-0003-C (V03)*

Summary: *No clearly defined route between the proposed bridge and adjacent pedestrian/cyclist facilities.*



It is unclear what treatment is proposed to the existing carriageway on the canal overbridge (between the new mini-roundabout to the north and the access to the stairs/ramp/platform), although it is presumed that this will be a shared pedestrian/cyclist surfaces. No clearly defined route has been indicated connecting the new overbridge ramps/steps to the footpaths in the vicinity of the mini-roundabout, including dropped kerbs & tactile paving. It is therefore unclear what route mobility-impaired non-motorised road users should take to/from the northern steps/ramp.

Similarly, it is unclear how cyclists are intended to transition from the carriageway to the new shared surface.

An absence of appropriate provisions could result in difficulties for the mobility-impaired travelling to/from the new facility from the existing roads to the north of the canal.

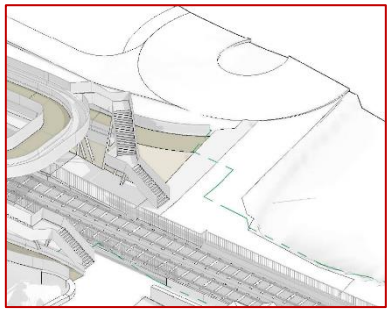
Recommendation

Measures to cater for cyclist and pedestrian access to the new overbridge to/from the area north of the canal should be incorporated during the design development.

3.4.2 Problem

Drawing: *MAY-MDC-ARC-RS07-DR-A-0004-C (V02)*

Summary: *Unclear if sufficient inter-visibility will be available between cyclists and pedestrians at the bottom of the ramp on the southern side of the railway.*



A fence is indicated along the outside edge of the ramp on the southern side of the new overbridge. It is unclear what type of fence is proposed, and whether it will afford inter-visibility between cyclists descending the ramp and pedestrians approaching from the eastern side of the turning head.

The proposed layout will result in pedestrians approaching the ramp, wishing to pass in front of it to access the station or the steps/ramp, not being visible to a descending cyclist and vice versa, resulting in possible cyclist/pedestrian collisions.

Recommendation

The layout at the foot of the ramp should be such that it minimises, or removes, the need for pedestrians travelling to the station or steps to have to cross the path of cyclists travelling to/from the ramp. Where this is not feasible/practicable, then the layout should ensure adequate inter-visibility between all users approaching the bottom of the ramp and sufficient space provided to accommodate the expected volumes of pedestrians/cyclists at this location.

In addition, a clear route to/from the ramp & the "carriageway" for cyclists should be provided.

3.5 Ashtown Road Level Crossing Replacement

3.5.1 Problem

Drawing: *General Problem*

Summary: *No horizontal or vertical geometry information supplied.*

No information has been provided in relation to the proposed horizontal or vertical geometry. Consequently, it has not been possible to audit the geometry proposed road layout, and it is therefore unclear, for example, whether lane-widening is required at some locations in order to accommodate the swept path of large vehicles traversing the new road layout without encroaching into the opposing traffic lane.

Similarly, it is unclear whether the proposed gradients are appropriate for the type of use (e.g. steep gradients could give rise to treacherous conditions particular during icy weather), in particular, north-facing steep gradients which are likely to receive less sunlight during the winter months, possibly resulting in ice failing to clear.

Recommendation

Ensure that where there is narrow radius with road alignment sufficient width is provided. In addition, ensure steep gradients are minimised practically where there is limited sunlight.

3.5.2 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0101-C (V01)*

Summary: *Proximity of car-park access to the mini-roundabout may give a rise to conflicting manoeuvres.*

The proposed mini-roundabout at the Mill Lane junction with the Ashtown Road is in close proximity to the entrance to the Ashtown Gate carpark. In addition, a signalised crossing is indicated immediately south of the mini-roundabout.

The proximity of the car park access and the signalised crossing to the roundabout could result in complicated combinations of turning manoeuvres leading to driver uncertainty regarding the intentions of other drivers when indicating to turn resulting in possible shunts.

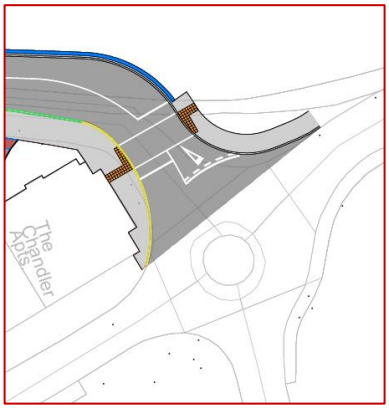
Recommendation

The proposed junction layout should be reconsidered, and it may be that a signalised junction would better accommodate the expected turning manoeuvres & volumes, and the proximity of the Ashtown Gate carpark access within it.

3.5.3 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0103-C (V01)*

Summary: *Unclear if the existing Ashtown Road/Rathborne Avenue roundabout can safely accommodate the swept path of large vehicles.*



The re-routing of traffic will result in larger volumes of southbound traffic turning right, and northbound traffic turning left, at the existing Ashtown Road/Rathborne Avenue roundabout.

It is unclear if the existing roundabout can safely accommodate the swept path of all the vehicles that are likely to travel through it. Large may encroach on footways which could result in conflict with pedestrians on the paths.

Recommendation

A swept path analysis should be undertaken to confirm that all vehicles expected to use the roundabout can do so safely and without encroaching into the adjacent footpaths.

3.5.4 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0101-C (V01)*

Summary: *Large vehicles may encroach on footpaths/cycle-track at the proposed mini-roundabout.*

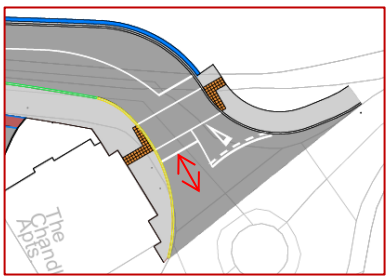
It is unclear from the information provided whether the proposed junction layout between Mill Lane and the Ashtown Road can safely accommodate the swept-path of large vehicles without encroachment into the adjacent footways or cycle track.

Where large vehicles overhang the adjacent paths or cycle tracks when turning at the proposed mini-roundabout, this could result in collisions with pedestrians or cyclists.

Recommendation

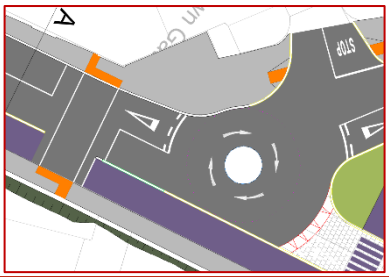
The proposed road layout should accommodate the swept-path of all vehicles expected to use the junction without encroachment into the adjacent non-motorised road user areas.

3.5.5 Problem



Drawing: *MAY-MDC-HRW-LC01-DR-C-0103-C (V01)*

Summary: *Proximity of crossing to the roundabout might increase the risk of overshoot collision*



It is proposed to provide a signalised crossing across the western arm of the Ashtown Road/Rathborne Avenue roundabout and across the southern arm of the Ashtown Road/Mill Lane mini roundabout.

The proximity of the proposed signalised crossings to the roundabouts may be too close for exiting drivers to recognise the status of the signals in enough time to come to a halt, resulting in a risk of overshoot collisions.

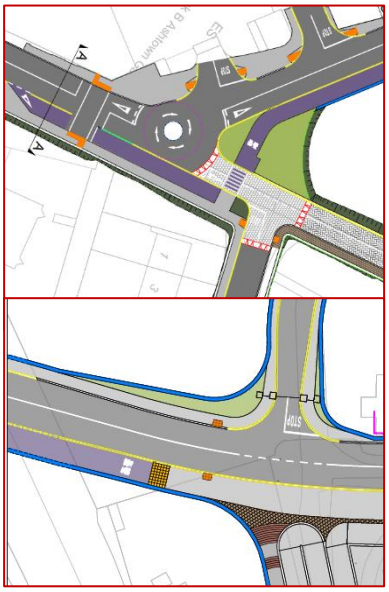
Recommendation

Signalised crossings should be located a sufficient distance from the roundabout's to allow drivers exiting from the roundabouts adequate distance/time to come to a halt.

3.5.6 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0101-C (V01)*
MAY-MDC-HRW-LC01-DR-C-0103-C (V01)

Summary: *Lack of a clearly defined route for cyclists to/from the two-way cycle track.*



It is proposed to provide two-way cycle-track along the eastern side of the Ashtown Road. However, it is unclear how it is intended that cyclists on the Ashtown Road north of this location are intended to access/leave the two-way cycle facility. The absence of a clearly defined route might result in cyclists undertaking unsafe manoeuvres to cross/join the roads or cycle within footpath where there is an increased risk of conflicts between cyclists and pedestrians or vehicles.

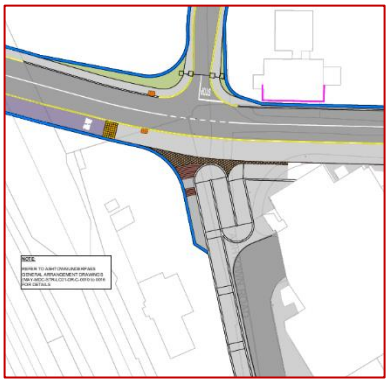
Recommendation

The routes for cyclists joining/leaving the proposed two-way cycle facility should be clearly defined and permit cyclists to safely transition to/from the cycle facility and the adjacent road network.

3.5.7 Problem

Drawing: *General Problem*

Summary: *Multiple crossings for cyclist might deter them from using the proposed two-way cycle track.*



A two-way cycle track is proposed commencing south of the proposed mini-roundabout between Ashdown Road and Mill Lane. Northbound cyclists are required to cross the carriageway twice and to share a section of the route with pedestrian. There is a concern cyclists may choose to travel within the carriageway instead of undertaking multiple crossings, increasing the risk of collisions with vehicles.

In addition, it is unclear how it is intended that cyclists travelling in either direction within the two-way cycle track would access the ramp or the carriageway at the northern terminal of the facility.

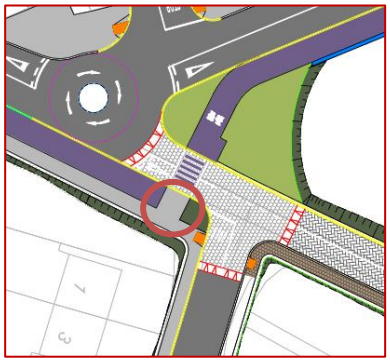
Recommendation

The proposed two-way cycle track should be amended and/or extended, to ensure that there is a safe transition to/from the existing routes for cyclists and/or carriageways without the facility, and that access/egress to the cycle track can be readily achieved without multiple crossings.

3.5.8 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0101-C (V01)*

Summary: *Link between the two-way cycletrack and the footpath might result in conflict between cyclists and pedestrians.*



It is proposed to provide a two-way cycle track crossing of the Ashtown Road. A short link is indicated between the footpath on the eastern side and this crossing, which could give pedestrians the mistaken impression that the crossing and the cycle track along the eastern side of Mill Lane can be used by pedestrians, with a resulting increased risk of pedestrian/cyclist collisions.

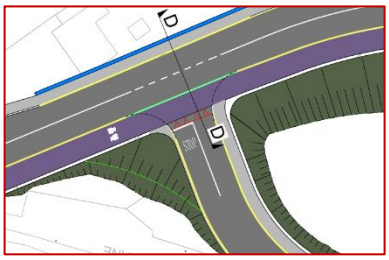
Recommendation

The footpath link should be removed, and vertical separation should be provided between the cycle-track and the footpath.

3.5.9 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0101-C (V01)*

Summary: *Unclear if earthworks cut-slope will impede visibility for drivers exiting the severed section of Mill Lane.*



It is unclear if the required visibility will be available for drivers exiting from the severed section of Mill Lane on the northern side of the realigned Mill Lane, west of the junction with Ashtown Road. A cutting has been indicated on either side of this side road junction, which may impede visibility for drivers exiting at this location. Insufficient visibility could result in drivers exiting from the side road when it is unsafe to do leading to side-on collisions.

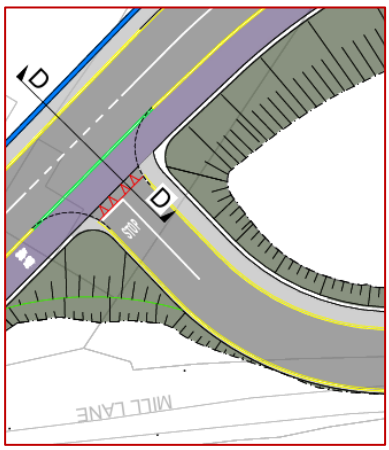
Recommendation

Adequate visibility should be provided for exiting side-road drivers at all junctions within the scheme.

3.5.10 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0102-C (V01)*

Summary: *Lack of connectivity between the footpath on Mill Lane Access Link and the footpaths on the realigned Mill Lane.*



It is proposed to provide a footpath along the Mill Lane Access Link, however no connection has been indicated to the footpath on the realigned Mill Lane, presenting difficulties for the mobility-impaired in safely and independently navigating the proposed road layout.

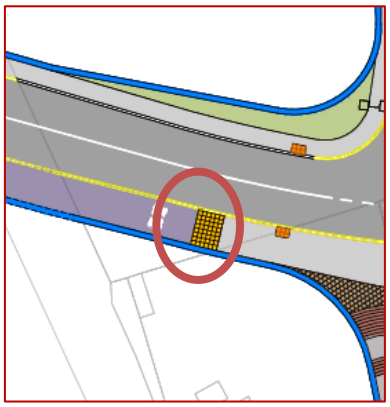
Recommendation

A crossing should be provided between the footpath on the realigned Mill Lane and the Mill Lane Access Link.

3.5.11 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0103-C (V01)*

Summary: *Unclear if Tramline Tactile Paving is proposed at the commencement of the two-way cycle track.*



Tactile paving has been indicated at the commencement of the two-way cycle track, however, it is unclear from the drawing if 'Tramline' tactile paving is proposed at this location. The absence of the appropriate tactile paving at this location may result in visually-impaired pedestrians not being aware that they are entering a section of path dedicated to cyclist use, increasing the risk of conflicts with cyclists.

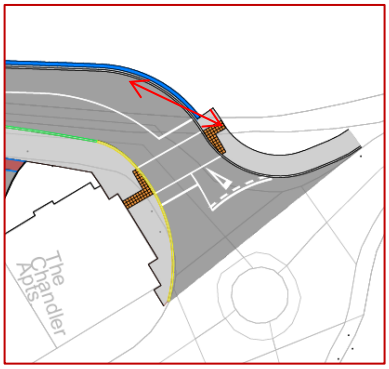
Recommendation

Tramline tactile paving should be provided at the interface of the two-way cycle track and the footpath.

3.5.12 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0103-C (V01)*

Summary: *Inter-visibility between pedestrians at the controlled crossing and approaching drivers may be impeded by the adjacent boundary/retaining wall.*



A controlled crossing is proposed across the western arm of the Ashtown Road/Rathborne Avenue roundabout.

The boundary/retaining wall to the west of the northern crossing point may impede inter-visibility between a pedestrian about to commence a crossing and an approaching driver resulting in a failure to stop and possible vehicular/pedestrian collisions.

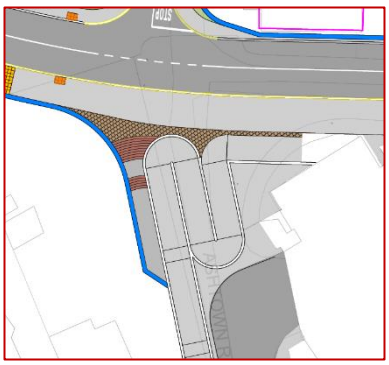
Recommendation

Adequate inter-visibility should be provided between pedestrians at the crossing and approaching drivers.

3.5.13 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0103-C (V01)*

Summary: *Warning tactile paving not indicated at proposed steps.*



It proposed to provide steps to/from the footpath linking to the Ashtown Road, on the northern side of the train station, from the realigned Mill Lane. No hazard tactile paving has been indicated at the steps, possibly resulting in a visually-impaired pedestrian failing to detect the height hazard, resulting in possible falls.

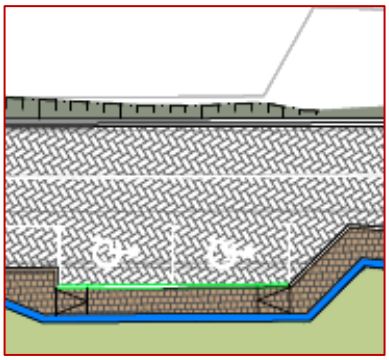
Recommendation

Hazard tactile paving should be provided at the top and bottom of steps.

3.5.14 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0104-C (V01)*

Summary: *No tactile paving provided at the dropped kerb at proposed mobility-impaired parking spaces.*



Mobility impaired parking spaces have been indicated on Ashtown Road, to the south of the canal/railway. A dropped kerb has been indicated between the footpath and the parking spaces, however, no tactile paving has been indicated at this dropped kerb.

The absence of tactile paving at the dropped kerb location could result in a visually-impaired pedestrian inadvertently entering the carriageway where there is an increased risk of collisions with vehicles or cyclists.

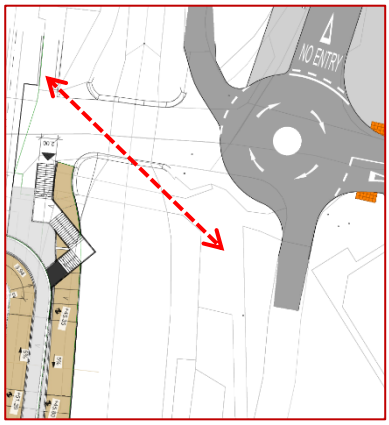
Recommendation

At locations where mobility impaired parking spaces are provided at a different level to the adjacent footpath tactile paving should be provided at the dropped kerb as recommended in Building for Everyone: External Environment and Approach,' published by the National Disability Authority (NDA).

3.5.15 Problem

Drawing: *MAY-MDC-HRW-LC01-DR-C-0104-C (V01)*

Summary: *Unclear if route will be provided for cyclists between the northern & southern sides of the Greenaway.*



It is unclear what treatment is proposed to the existing carriageway on the canal overbridge (between the new mini-roundabout to the north and the access to the stairs/ramp/platform).

The Royal Canal Greenway switches sides at this location from south of the canal to north of the canal. A lack of clear provisions along the likely cyclist route might increase the risk of conflicts between pedestrians & cyclists.

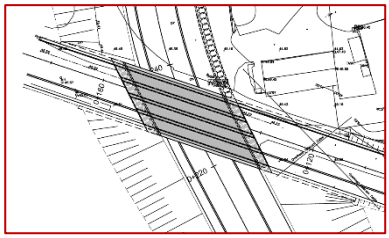
Recommendation

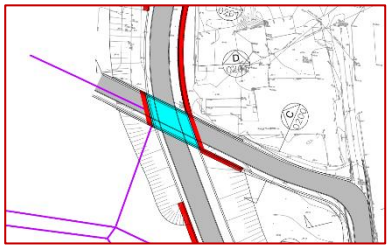
A clear route for cyclists travelling along the Greenway to the south and north of the canal should be provided.

3.5.16 Problem

Drawing: *MAY-MDC-STR-LC01-DR-C-0010-C (V03)*

Summary: *Unclear what vertical clearance is proposed at the Mill Lane Link overbridge.*





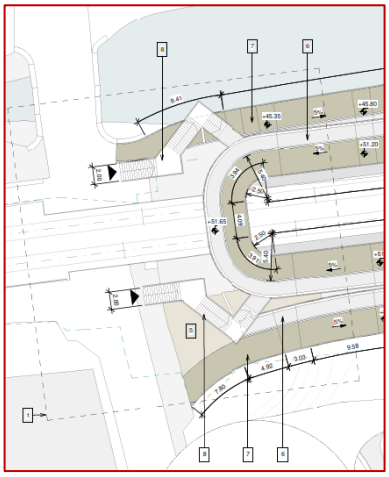
It is proposed to provide an overpass for the Mill Lane Link, however no information is provided on the proposed vertical clearance under this overbridge. Should insufficient clearance be provided this could result in material damage collisions for high vehicles traveling along the realigned Mill Lane.

Recommendation

Adequate vertical clearance should be provided at this location.

4 Observations

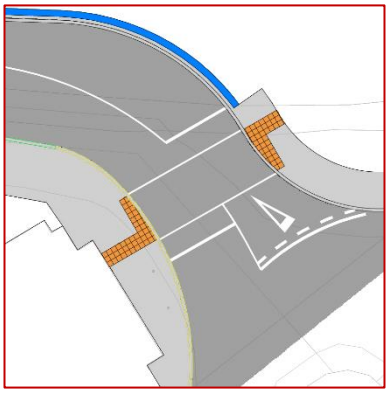
4.1 Ashtown Road Accessibility Bridge



4.1.1 There may be insufficient landings on the proposed steps either side of the railway. The National Disability Authority guidance is that there should be a landing for every 1.5m in rise.

The total level difference appears to be c. 6.5m, which would require 3 intermediate landings. The landings should be equal in depth to the width of the stairs.

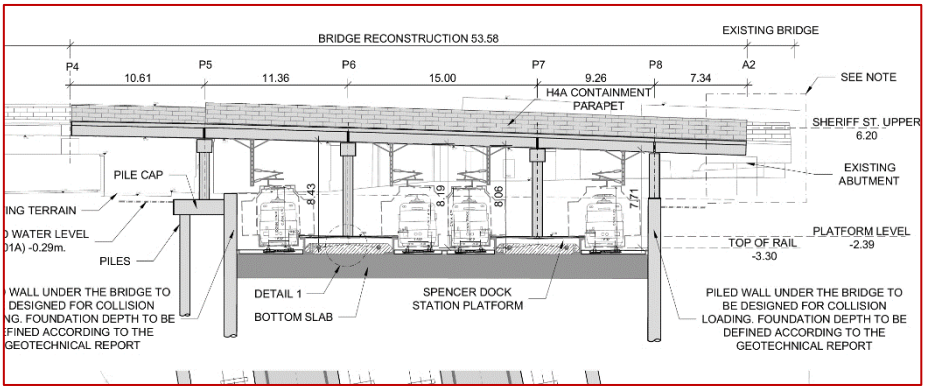
4.2 Ashtown Road Level Crossing Replacement



4.2.1 It is proposed to provide a controlled crossing of the western arm of the Ashtown Road/Rathborne Avenue roundabout. The tactile paving colour at the crossing is indicated as being buff in colour which is incorrect for a controlled crossing. This should be revised to a red colour.

4.3 Sheriff Street Upper

4.3.1 It is proposed to remove a section of Sheriff Street Bridge and reinstate it. It would appear from the drawings provided that no vertical changes are proposed. Care should be taken during the reinstatement of the carriageway that the road's longitudinal profile is smooth and curvilinear.



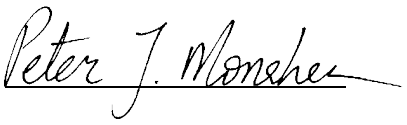
5 Road Safety Audit Team Statement

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

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

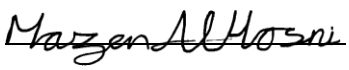
No one on the Road Safety Audit Team has been involved with the design of the scheme.

ROAD SAFETY AUDIT TEAM LEADER

Peter Monahan Signed: 

Dated: 19th July 2022

ROAD SAFETY AUDIT TEAM MEMBER

Mazen Al Hosni Signed: 

Dated: 19th 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	☑	☐
2.	Departures from Standard	☐	☑
3.	Scheme Drawings	☑	☐
4.	Scheme Details such as signs schedules, traffic signal staging	☐	☑
5.	Collision data for existing roads affected by scheme	☐	☑
6.	Traffic surveys	☐	☑
7.	Previous Road Safety Audit Reports and Designer's Responses/Feedback Form	☐	☑
8.	Previous Exception Reports	☐	☑
9.	Start date for construction and expected opening date	☑	☐
10.	Any elements to be excluded from audit	☐	☑

Any other information?

(if 'Yes', describe below)

☐ ☑

Appendix B – Documents Submitted to the Road Safety Audit Team

DOCUMENT/DRAWING TITLE	DOCUMENT/DRAWING NO.	REVISION
Ashtown Station		
Station DesignAshtown Station - Station Location - Existing	MAY-MDC-ARC-RS07-DR-A-0001-C (Sheet 1 of 2)	V02
Station Design Ashtown Station - Station Location - Proposed	MAY-MDC-ARC-RS07-DR-A-0001-C (Sheet 2 of 2)	V02
Station Design Ashtown Station - Demolition Plan	MAY-MDC-ARC-RS07-DR-A-0002-C (Sheet 1 of 2)	V02
Station Design Ashtown Station - Demolition Plan	MAY-MDC-ARC-RS07-DR-A-0002-C (Sheet 2 of 2)	V02
Station Design Ashtown Station - Platform Level Plan	MAY-MDC-ARC-RS07-DR-A-0003-C (Sheet 1 of 2)	V03
Station Design Ashtown Station - Platform Level Plan	MAY-MDC-ARC-RS07-DR-A-0003-C (Sheet 2 of 2)	V03
Station Design Ashtown Station - Axonometric View	MAY-MDC-ARC-RS07-DR-A-0004-C (Sheet 1 of 2)	V02
Station Design Ashtown Station - Axonometric View	MAY-MDC-ARC-RS07-DR-A-0004-C (Sheet 2 of 2)	V02
Station Design Ashtown Station - Footbridge Plans	MAY-MDC-ARC-RS07-DR-A-0005-C	V03
Station Design Ashtown Station - Footbridge Cross Sections	MAY-MDC-ARC-RS07-DR-A-0006-C	V02
Station Design Ashtown Station - Footbridge Longitudinal Sections	MAY-MDC-ARC-RS07-DR-A-0007-C	V02
Station Design Ashtown Station - Footbridge Elevation	MAY-MDC-ARC-RS07-DR-A-0008-C	V02
Station Design Ashtown Station - Footbridge Axonometric Views	MAY-MDC-ARC-RS07-DR-A-0009-C	V02
Station Design Ashtown Station – Shelters	MAY-MDC-ARC-RS07-DR-A-0010-C	V02
Ashtown LC01		
Option Selection- LC01: Ashtown Option 10 General Arrangement Sheet Layout	MAY-MDC-HRW-LC01-DR-C-0100-C	V01
Design - LC01: Ashtown Option 10 General Arrangement Sheet 1 of 4	MAY-MDC-HRW-LC01-DR-C-0101-C	V01
Design - LC01: Ashtown Option 10 General Arrangement Sheet 2 of 4	MAY-MDC-HRW-LC01-DR-C-0102-C	V01
Design - LC01: Ashtown Option 10 General Arrangement Sheet 3 of 4	MAY-MDC-HRW-LC01-DR-C-0103-C	V01
Design - LC01: Ashtown Option 10 General Arrangement Sheet 4 of 4	MAY-MDC-HRW-LC01-DR-C-0104-C	V01
Design - LC01: Ashtown Ashtown Road Alignment - Typical Cross Sections Sheet 01 of 03	MAY-MDC-HRW-LC01-DR-C-0105-C	V01
Design - LC01: Ashtown Ashtown Road Alignment - Typical Cross Sections Sheet 02 of 03	MAY-MDC-HRW-LC01-DR-C-0106-C	V01
Design - LC01: Ashtown Ashtown Road Alignment - Typical Cross Sections Sheet 03 of 03	MAY-MDC-HRW-LC01-DR-C-0107-C	V01
Structures Design - LC01: Ashtown Underpass General Arrangement – Plan Sheet 1 of 7	MAY-MDC-STR-LC01-DR-C-0010-C	V03
Structures Design - LC01: Ashtown Underpass General Arrangement – Elevations Sheet 2 of 7	MAY-MDC-STR-LC01-DR-C-0011-C	V04
Structures Design - LC01: Ashtown Underpass General Arrangement – Cross Sections Sheet 3 of 7	MAY-MDC-STR-LC01-DR-C-0012-C	V04
Structures Design - LC01: Ashtown Underpass General Arrangement – Cross Sections Sheet 4 of 7	MAY-MDC-STR-LC01-DR-C-0013-C	V04
Structures Design - LC01: Ashtown Underpass General Arrangement – Longitudinal Section Sheet 7 of 7	MAY-MDC-STR-LC01-DR-C-0016-C	V04
Structures Design - LC01: Ashtown Underpass - Retaining Walls General Arrangement – Sections Sheet 1 of 7	MAY-MDC-STR-LC01-DR-C-0200-C	V03
Structures Design - LC01: Ashtown Underpass - Retaining Walls General Arrangement - Sections Sheet 2 of 7	MAY-MDC-STR-LC01-DR-C-0201-C	V03
Structures Design - LC01: Ashtown Underpass - Retaining Walls General Arrangement - Sections Sheet 3 of 7	MAY-MDC-STR-LC01-DR-C-0202-C	V03
Structures Design - LC01: Ashtown Underpass Ramp Details Sheet 1 of 1	MAY-MDC-STR-LC01-DR-C-0210-C	V03
Preston		
Design Report Connolly Station Elevations	MAY-MDC-ARC-RS02-DR-A-0006-C	V01
Design Report Connolly Station Landscape And Urban Integration Plan	MAY-MDC-LAN-RS02-DR-A-0001-C	V01
Sheriff Street Compound Access		
Permanent Way Design Sheriff Street Plan	MAY-MDC-HRW-SC01-DR-Z-0001-C	V02

DOCUMENT/DRAWING TITLE	DOCUMENT/DRAWING NO.	REVISION
Permanent Way Design Sheriff Street Elevation	MAY-MDC-HRW-SC01-DR-Z-0002-C	V02
Permanent Way Design Sheriff Street Typical Cross Section	MAY-MDC-HRW-SC01-DR-Z-0003-C	V02
Permanent Way Design Sheriff Street Pavement	MAY-MDC-HRW-SC01-DR-Z-0004-C	V01
Permanent Way Design Sheriff Street Utilities	MAY-MDC-HRW-SC01-DR-Z-0005-C	V01
Broombridge		
Structure Design OBG5. Bridge Deck Reconstruction Current State	MAY-MDC-STR-RS05-DR-C-0002-C (Sheet 1 of 4)	V04
Structure Design OBG5. Bridge Deck Reconstruction Final State	MAY-MDC-STR-RS05-DR-C-0002-C (Sheet 2 of 4)	V04
Structure Design OBG5. Bridge Deck Reconstruction Final State Detail	MAY-MDC-STR-RS05-DR-C-0002-C (Sheet 3 of 4)	V04
Structure Design OBG5. Bridge Deck Reconstruction Structural Design Detail	MAY-MDC-STR-RS05-DR-C-0002-C (Sheet 4 of 4)	V04
Sheriff Street Bridge		
Structure Design Sheriff Street Bridge Reconstruction Plan, Elevation & Section Detail Sheet 1 of 3	MAY-MDC-STR-SC01-DR-C-0002-C (Sheet 1 of 3)	V02
Structure Design Sheriff Street Bridge Reconstruction Plan, Elevation & Section Detail Sheet 2 of 3	MAY-MDC-STR-SC01-DR-C-0002-C (Sheet 2 of 3)	V02
Structure Design Sheriff Street Bridge Reconstruction Plan, Elevation & Section Detail Sheet 3 of 3	MAY-MDC-STR-SC01-DR-C-0002-C (Sheet 3 of 3)	V02

Appendix C – Feedback Form

Road Safety Audit Feedback Form

Scheme: DART+ West Project

Route No.: R101/ Preston Street/ Broombridge Street/ Ashtown Road &Mill lane

Audit Stage: 1 **Date Audit Completed:** 6th April 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)**
Sheriff Street Upper				
3.1.1	Yes	Yes		
3.1.2	Yes	Yes	In permanent arrangement, footpath to be continued across the mouth of the junction to provide pedestrian priority. Footpath to be constructed to withstand required vehicle loading	
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		
Preston Street Shared Street				
3.2.1	Yes	Yes	“Safe Zone” to be demarcated by tactile paving only	
3.2.2	Yes	Yes	The design has been amended to position lighting columns in buffer zone on building side only.	
3.2.3	Yes	Yes		

Road Safety Audit Feedback Form

Scheme: DART+ West Project

Route No.: R101/ Preston Street/ Broombridge Street/ Ashtown Road &Mill lane

Audit Stage: 1 **Date Audit Completed:** 6th April 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)**
3.2.4	Yes	Yes		
Broombridge Station Bridge				
3.3.1	Yes	Yes		
Ashtown Road Accessibility Bridge				
3.4.1	Yes	Yes		
3.4.2	Yes	Yes		
Ashtown Road Level Crossing Replacement				
3.5.1	Yes	Yes		
3.5.2	Yes	No	Tabletop pedestrian crossing to be provided at pedestrian crossing on Navan Road approach. Tabletop will slow vehicles to acceptable speed on approach to the roundabout.	Yes
3.5.3	Yes	Yes		
3.5.4	Yes	Yes		
3.5.5	Yes	No	The crossing is located outside of the roundabout flare, in accordance with standards. The crossings located 9m from roundabout, in	Yes

Road Safety Audit Feedback Form

Scheme: DART+ West Project

Route No.: R101/ Preston Street/ Broombridge Street/ Ashtown Road &Mill lane

Audit Stage: 1 **Date Audit Completed:** 6th April 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)**
			accordance with standards. Include ramp at crossing.	
3.5.6	Yes	Yes	It is intended that the section from Aston House Gate to the roundabout on the northside of the roadway is to be a shared pedestrian and cyclists' area. Cyclists can follow the shared area to the northern roundabout where a toucan crossing is provided. Design to be updated with adequate signage.	
3.5.7	Yes	No	Cyclists not required to cross multiple times. Shared surface is provided to extend the cyclist facility from the end of the segregated cycle track to the roundabout to the north. Drawings to be updated to clearly indicate shared area.	Yes
3.5.8	Yes	Yes		
3.5.9	Yes	Yes		
3.5.10	Yes	Yes		
3.5.11	Yes	Yes		
3.5.12	Yes	Yes		
3.5.13	Yes	Yes		

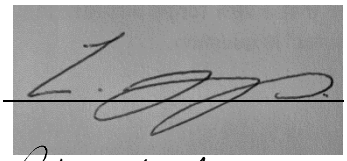
Road Safety Audit Feedback Form

Scheme: DART+ West Project

Route No.: R101/ Preston Street/ Broombridge Street/ Ashtown Road &Mill lane

Audit Stage: 1 **Date Audit Completed:** 6th April 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)**
3.5.14	Yes	Yes		
3.5.15	Yes	Yes		
3.5.16	Yes	Yes		

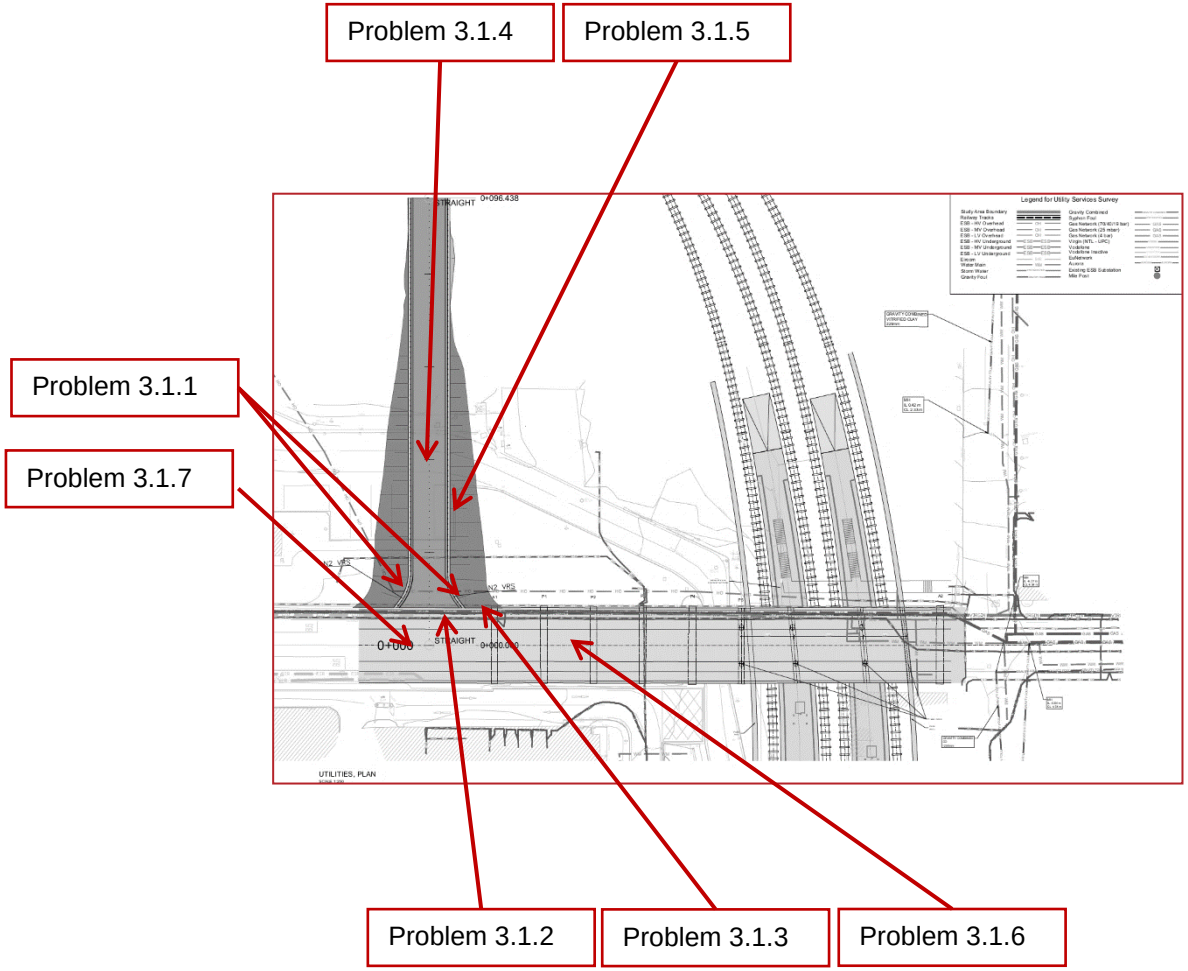
Signed:  Designer **Date** 15/07/2022

Signed: Peter J. Monahan Audit Team Leader **Date** 17th July 2022

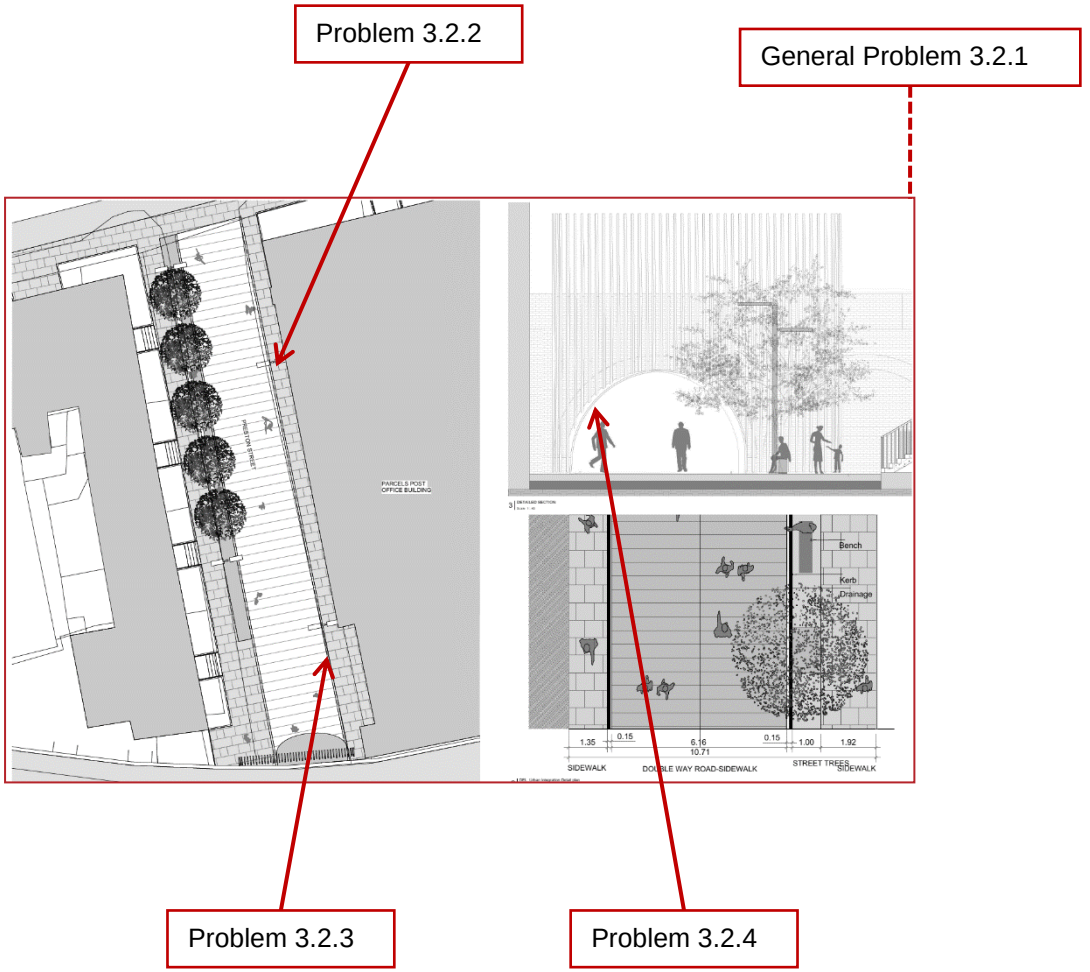
Signed: _____ Employer **Date** _____

Appendix D – Problem Locations

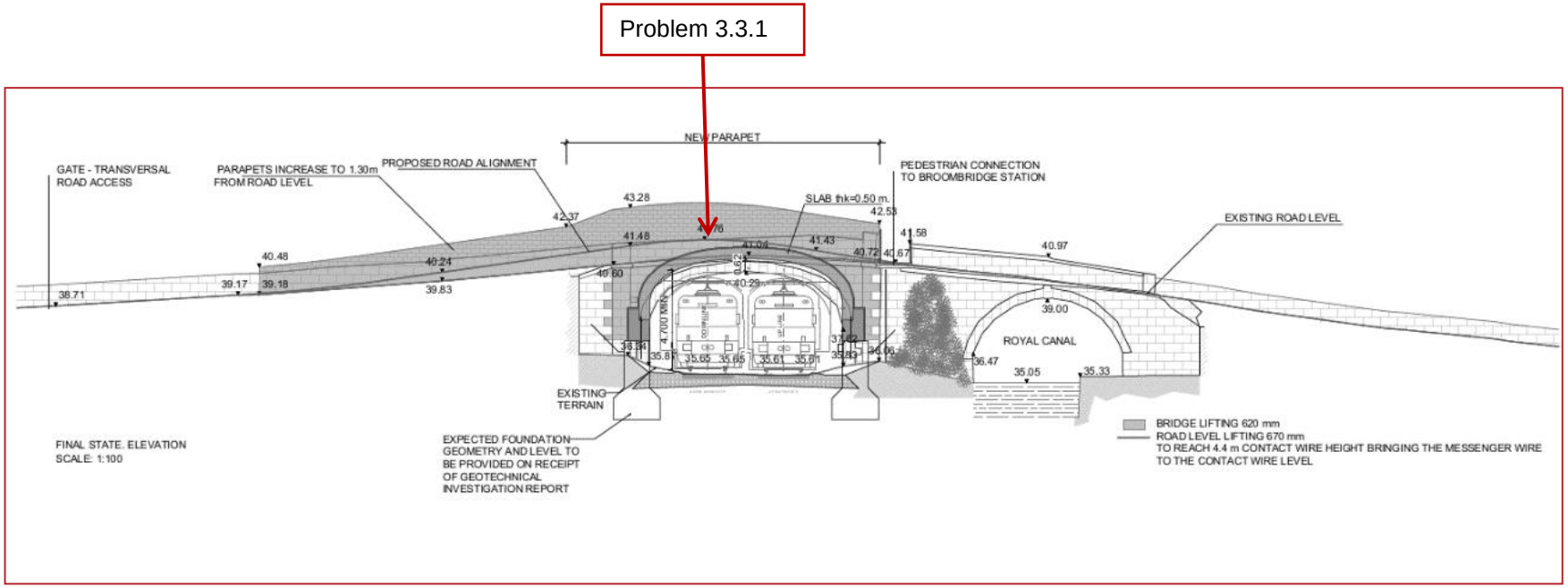
Sheriff Street Upper



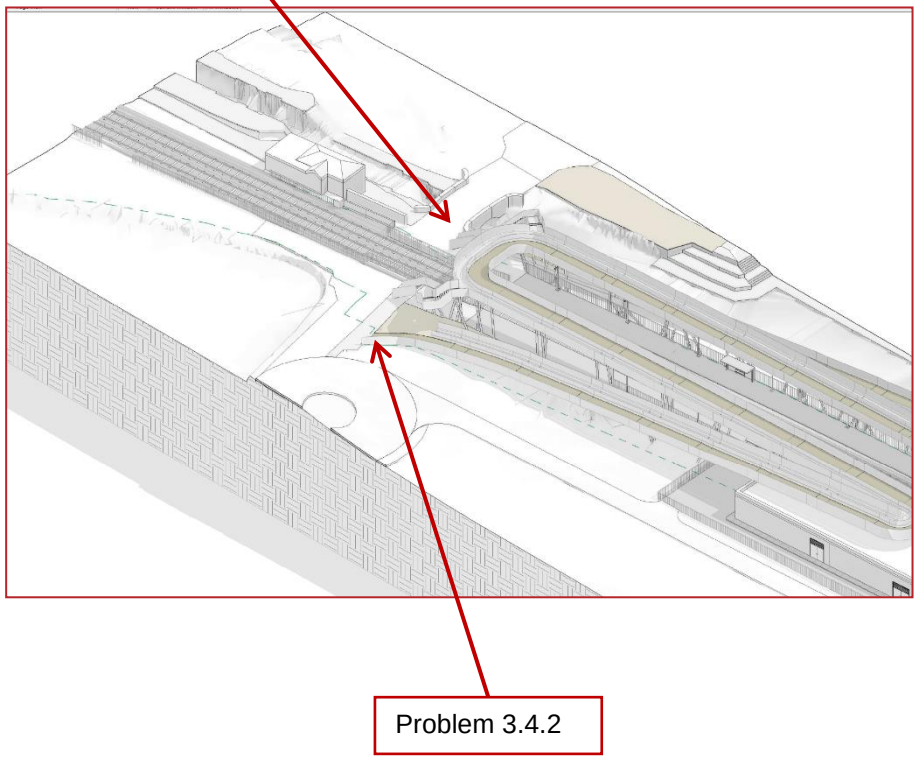
Preston Street Shared Street



Broombridge Station Bridge



Ashtown Road Accessibility Bridge



Ashtown Road Level Crossing Replacement