



# Curlew St Streetscape Upgrade Pre-Construction Concept Design Road Safety Audit

Prepared for:  
Northrop

14 March 2023

The Transport Planning Partnership

# Curlewis St Streetscape Upgrade Old South Head Road to Campbell Parade

## Pre-Construction Concept Design Road Safety Audit

Client: Northrop

Version: V01

Date: 14 March 2023

TPP Reference: 23067

### Quality Record

Version	Date	Prepared by	Reviewed by	Approved by	Signature
V01	14/03/2023	James Goodman, Doris Lee, Jessica Ng Sherlock You	Doris Lee	Wayne Johnson	

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## Table of Contents

1	Road Safety Audit Summary .....	1
2	Introduction .....	2
	2.1 Background.....	2
	2.2 Audit Objective .....	2
	2.3 Procedures and Reference Material .....	2
	2.4 Audit Team .....	2
3	Road Safety Audit Program.....	3
	3.1 Commencement Meeting .....	3
	3.2 Site and Field Audit.....	3
	3.3 Completion Meeting.....	3
4	Road Safety Audit Findings.....	4
	4.1 Introduction .....	4
	4.2 Responding to the Audit Report .....	5
	4.3 Road Safety Audit Findings .....	5
5	Concluding Statement .....	34

## Tables

Table 4.1:	Risk Matrix .....	4
Table 4.2:	Road Safety Audit Findings .....	6

## APPENDICES

### A. DESIGN DRAWINGS

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# 1 Road Safety Audit Summary

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Audited project:	Curlewis Street Cycleway – Old South Head Road to Campbell Parade
Client:	Northrop
Project manager:	Milan Basson
Email address:	<a href="mailto:MBasson@northrop.com.au">MBasson@northrop.com.au</a>
Telephone:	02 9241 4188
Audit Team:	Wayne Johnson (level 3 lead road safety auditor) Doris Lee (level 3 road safety auditor) Jessica Ng (level 1 road safety auditor) Sherlock You (level 1 road safety auditor) James Goodman (observer)
Audit type:	Concept Design (Pre-Construction)
Commencement meeting:	N/A
Audit date:	Wednesday 8 March 2023
Completion meeting:	Not required

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## 2 Introduction

### 2.1 Background

A bi-directional cycleway is proposed along the north side of Curlewis Street between Old South Head Road and Campbell Parade for approximately 800m in length.

The Transport Planning Partnership (TPPP) has been commissioned by Northrop to complete a Concept Design (pre-construction) Road Safety Audit of the 75% complete plans along the Curlewis Street corridor for the cycleway and streetscape upgrade.

### 2.2 Audit Objective

The objective of this Audit was to examine road safety issues associated with the concept design of the cycleway and associated streetscape upgrades on Curlewis Street.

### 2.3 Procedures and Reference Material

The procedures used are described in the following guidelines:

- Roads and Maritime Services' 2011 Guidelines for Road Safety Audit Practices
- Austroads Guide to Road Safety 2019: Part 6 Managing Road Safety Audits
- Austroads Guide to Road Safety 2019: Part 6A Implementing Road Safety Audits.

### 2.4 Audit Team

The RSA was carried out by the following team:

- Wayne Johnson (RSA-02-0769) – level 3 road safety auditor (lead auditor)
- Doris Lee (RSA-02-0128) – level 3 road safety auditor (team member)
- Jessica Ng (RSA-02-1207) – level 1 road safety auditor (team member)
- Sherlock You (RSA-02-1209) – level 1 road safety auditor (team member)
- James Goodman – observer

Wayne, Doris, Jessica and Sherlock are registered road safety auditors with the NSW Centre for Road Safety and are experienced in traffic engineering and design/ inspection of traffic management schemes.

## 3 Road Safety Audit Program

### 3.1 Commencement Meeting

A formal meeting was not held.

### 3.2 Site and Field Audit

Day and night time inspections were carried out on Tuesday 7 March and Wednesday 8 March 2023. Weather during the inspections was fine and visibility was excellent.

The audited road sections were driven and the cycleway was walked to identify road safety concerns. Photographs and driving footage were captured during the site inspection and have been included in the audit findings (Section 4.3).

### 3.3 Completion Meeting

Not required.

## 4 Road Safety Audit Findings

### 4.1 Introduction

Table 4.1 provides specific details of the audit findings and a risk rating as high, medium or low. The risk ratings have been based on the risk matrix presented in Table 4.1, which has been adopted from the standard Austroads Risk Matrix.

**Table 4.1: Risk Matrix**

Likelihood Severity	Highly probable	Occasional	Improbable
Major	High	High	Medium
Moderate	High	Medium	Low
Minor	Medium	Low	Low

The terms in Table 4.1 are described below.

Likelihood:

- Highly probable: It is likely that more than one crash of this type could occur within a five-year period.
- Occasional: It is likely that less than one crash of this type could occur within a five-year period.
- Improbable: Less than one crash of this type could occur within a 10-year period.

Severity:

- Major: The crash is likely to result in a fatality or serious injuries  
For example, high/medium speed vehicle collision, high/medium speed collision with a fixed object, pedestrian struck at high speed, and cyclist hit by car.
- Moderate: The crash is likely to result in minor injuries or large scale of property damage  
For example, some slow speed vehicle collisions, cyclist falls, and rear end crashes.
- Minor: The crash is likely to result in minor property damage or many near miss crash events  
For example, some slow speed collisions, pedestrian walks into object (no head injury), and car reverses into post.

Priority:

- High: Very important, and needs to be addressed urgently.
- Medium: Important, and needs to be addressed as soon as possible.
- Low: Needs to be considered as part of regular maintenance/planning program.

## 4.2 Responding to the Audit Report

As set out in the road safety audit guidelines, the responsibility for the road rests with the project manager, not with the auditor. The project manager is under no obligation to accept the audit findings. Neither is it the role of the auditor to agree to, or approve the project manager's responses to the audit.

The audit provides the opportunity to highlight potential road safety problems and have them formally considered by the project manager in conjunction with all other project considerations.

## 4.3 Road Safety Audit Findings

The audit findings are documented in Table 4.2 which provides:


- specific details of the road safety issues identified during the audit
- a risk level rating for each of the road safety audit findings.

It should be acknowledged that positive attributes of the audited road section have not been discussed. Deficiencies that do not cause a safety problem are also not listed.

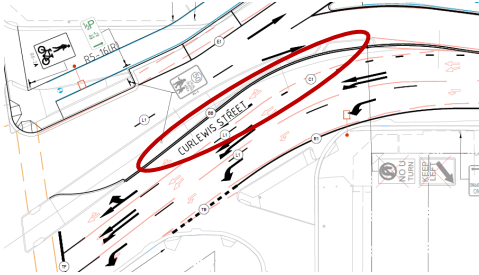
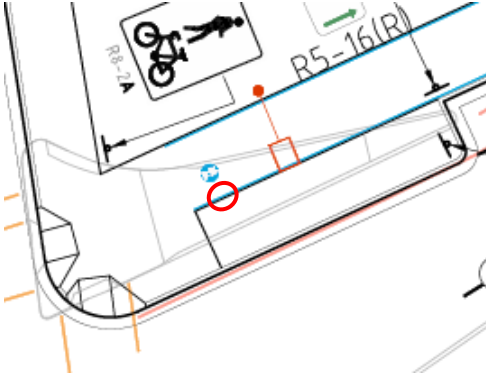

In-line with TfNSW's best practice recommendations have not been included in the road safety audit findings.

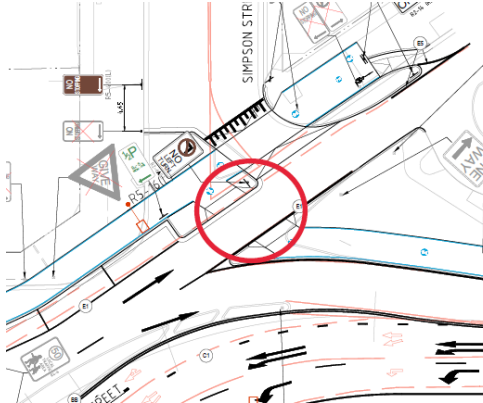
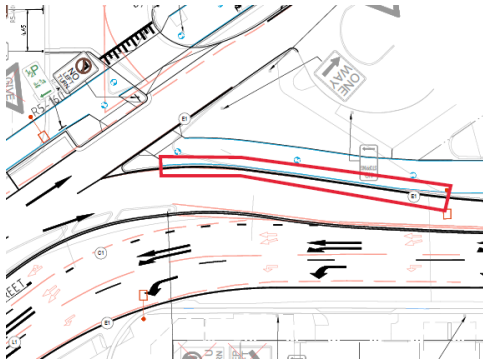


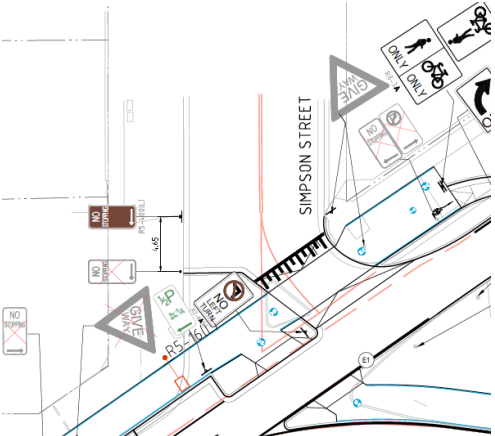
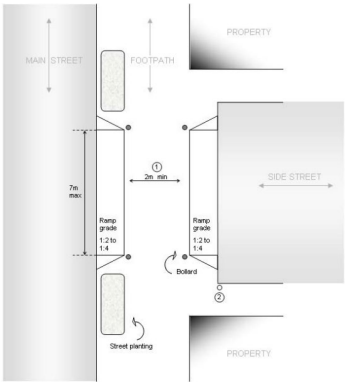
**Table 4.2: Road Safety Audit Findings**

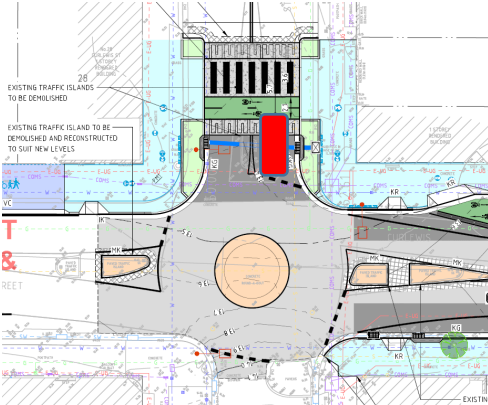
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
1.	Diverge Point to Blair Street on Curlewis Street	<p>Drivers may not be aware of the diverge point on Curlewis Street as a result of the following issues:</p> <ul style="list-style-type: none"> <li>The sign plan does not show the existing direction sign for Bondi Beach. However it is likely to be relocated to make way for the proposed shared path.</li> <li>Pavement arrows give late notice of the split in traffic, road users not familiar with the area may make late lane change to avoid taking the wrong turn.</li> <li>The gore area is not well delineated with insufficient line marking and signage to emphasise its presence.</li> </ul> <p>Late lane change may cause turbulence in the traffic stream, which may increase the risk in side-swipe and rear-end collisions.</p> <p>Furthermore, the proposed shared path and crossing point are located directly behind the gore area which is not well delineated. There is a risk of errant vehicles colliding into the shared path which may result in conflicts with pedestrians and cyclists.</p>	 	Occasional	Moderate	Medium	<p>The risk is noted, and directional signage will be relocated and shown on final drawings. It is noted that the diverge is an existing condition and provision of the off-road cycleway improves the safety.</p>

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
2.	Old South Road, Curlewis Street and O'Sullivan Road intersection	<p>The design does not include an upgrade of the marked footpath crossing in Old South Road to enable a safe connection between the proposed shared use path on Curlewis Street and the existing one on O'Sullivan Road:</p> <ul style="list-style-type: none"> <li>The existing marked footpath crossing is 2.8m wide, which is less than the minimum requirement of 3.6m based on the TfNSW Delineation Guide.</li> <li>Bicycle lanterns are not provided on either side of the marked crossing in Old South Head Road.</li> <li>The existing kerb ramp at the north-western corner of the intersection is too narrow to accommodate both pedestrians and cyclists across Old South Head Road.</li> </ul> <p>Consequently, this may increase the conflicts between cyclists and pedestrians in the crossing. They may also travel outside the marked foot crossing which may lead to potential conflicts with passing vehicles.</p> <p>If the shared path ends at Old South Head Road, no End Shared Path signage is provided.</p>	 	Improbable	Moderate	Low	<p>Noted and subject to further discussion and Approval in Principle with TfNSW.</p> <p>The project team is reviewing options to promote cyclist crossings at Curlewis Street and Old South Head Road to connect to the Birriga Road bike lane.</p> <p>Separate works by Woollahra Council in O'Sullivan Road will review and amend intersection as required on the western side.</p>

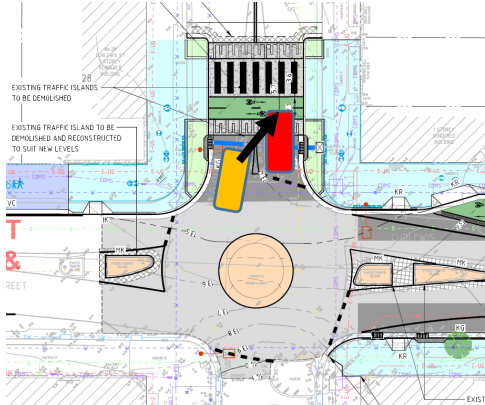
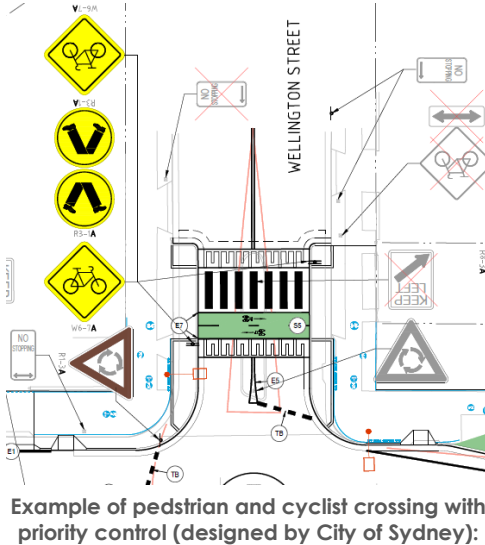
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
3.	Old South Road and Curlewis Street intersection	<p>The shared through and right turn lane is 2.7m wide on Curlewis Street westbound, and may not be sufficient to accommodate the design vehicle along the curve towards the intersection, noting that the existing central median will be removed.</p> <p>Vehicles not staying within the lane may result in a side-swipe incident with vehicles in the adjacent lane.</p>		Improbable	Moderate	Low	<p>The lane widths are increased vs existing due to removal of on-road cycleway. However, it's noted the removed median does increase the risk. The risk is mitigated by the fact that only heavy vehicles sweep close to the extents of the BB line.</p>
4.	Curlewis Street west of Old South Head Road	<p>Utilities located within the future shared path area, if retained, will become hazardous to pedestrians and cyclists.</p>	 	Occasional	Minor	Low	<p>Utilities within the zone of the future shared path will be adjusted clear.</p>

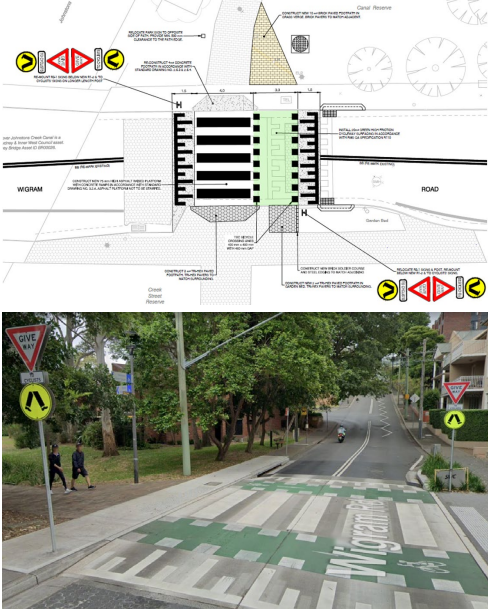
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
5.	Curlewis Street and Blair Street intersection	<p>The design does not provide a crossing facility nor a clearly defined priority for shared path users at the crossing point in Blair Street.</p> <p>For cyclists travelling straight across Blair Street, this location is immediately following a diverge point.</p> <p>This may increase the risk of collisions with shared path users.</p>		Improbable	Moderate	Low	It is preferred to avoid a priority crossing for pedestrians/cyclists at this location due to proximity to the Old South Head Road intersection and potential impacts to that intersection
6.	Curlewis Street east of Blair Street	<p>No buffer is provided between the shared path and roadway. The TfNSW cycleway toolbox suggests that a minimum of 0.4m should be provided. A lack of clearance between the two will increase the chances of a side-swipe collision between vehicles and share path users.</p> <p>In the absence of a buffer, there is also no provision of physical separation from the travel lane along the outside of the curve. This would leave pedestrians and cyclists unprotected on the shared use path.</p> <p>This deficiency would increase the likelihood of conflicts between an errant vehicle and share path users.</p>		Improbable	Moderate	Low	Path width will be increased to provide buffer width in the final design - noting there is sufficient space available already, and sufficient width provided further east.

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
7.	Blair Street and Simpson Street intersection	<p>The continuous footpath treatment is not designed based on the TfNSW specification stipulated in TDT2013/05.</p> <p>Inconsistency with the standard design may confuse road users, resulting in a lower degree of compliance when using the crossing facility. This would increase the likelihood of conflicts between road users.</p> <p>n.b. Piano key markings should not be provided.</p> <p>The gradient of the threshold should be as per the TDT2013/05 Continuous footpath treatment specifications.</p> <p>Recommend give way line marking adjacent the give way signage.</p>	 <p>TDT2013/05 Continuous footpath treatments:</p>  <p>NOTES:</p> <ol style="list-style-type: none"> <li>1. Preferably 2m min, but will depend on original width of footpath. Path may need to be widened to accommodate the treatment.</li> <li>2. Stop, give way or warning signage required if vehicles exiting from side street across the treatment. R1-1, R1-2 or R2-10 or R6-1 and R2-2.</li> </ol>	Improbable	Moderate	Low	<p>The standard arrangement in TDT2013/05 is difficult to apply in this context due to the wide ramp needed to accommodate vehicle swept paths. That said, elements of TDT2013/05 will be incorporated in the final design where possible</p>

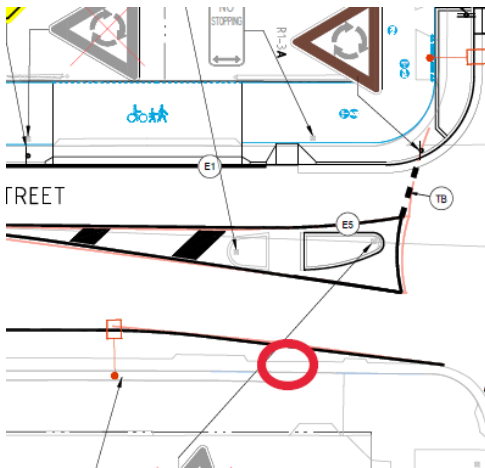
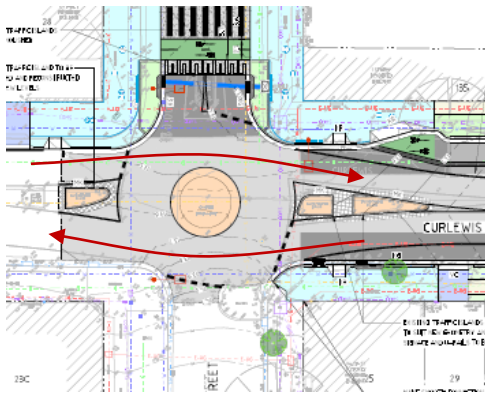
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
8.	Wellington Street – Pedestrian Crossing	There does not appear to be 6m between the give way line marking on the Wellington Street north approach. Consequently, vehicles may encroach the cycleway crossing which may lead to conflict with cyclists. This safety concern is exacerbated when a large vehicle waits at the give way line.	 	Improbable	Moderate	Low	Currently around 5m clearance is achieved, suitable to accommodate most light vehicles. Unfortunately due to existing driveways it is not possible to set the crossing back any further. It is noted that any heavy vehicle would encroach on the crossing even with a 6m setback.

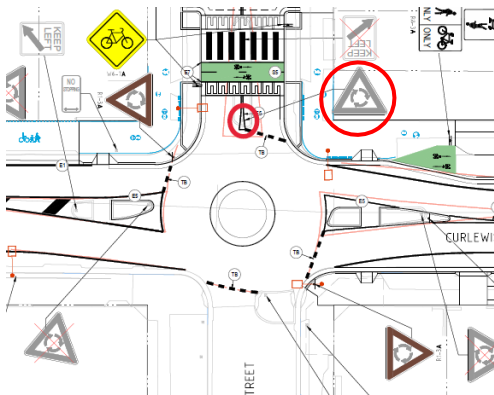
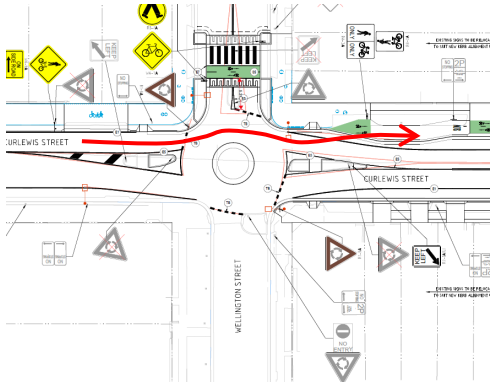



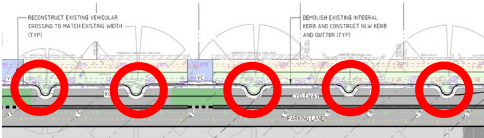
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
9.	Wellington Street – Pedestrian Crossing	<p>Motorists waiting on the Wellington Street north approach to the roundabout may restrict visibility to motorists traveling northbound on Wellington Street.</p> <p>This would increase the likelihood of conflicts with cycleway users at this location.</p> <p>Lastly, if the pedestrian and cycle crossing is busy, the roundabout operation may become gridlocked which may lead to driver frustration and illogical driver behaviour.</p>		Improbable	Moderate	Low	<p>This configuration is true of any near-intersection raised threshold and the combination of the raised threshold and warning signage is relied upon to reduce vehicle speeds.</p> <p>Traffic analysis of the crossing has been undertaken which suggests the crossing will not have an adverse impact on roundabout performance.</p>
10.	Wellington Street – Pedestrian Crossing	<p>There is undefined priority between vehicles and cyclists which may cause confusion and false perception of priority over other road users. This may result in possible collisions involving vehicles, pedestrians and cyclists.</p> <p>The lack of Give Way signs may be perceived that motorists are not required to give way to cyclists crossing Wellington Street.</p> <p>An example design prepared by City of Sydney is provided which involves Give Way signs for vehicles.</p>		Improbable	Moderate	Low	<p>Replacement of Bicycle signs with Give Way (including "TO CYCLISTS" plate) is under consideration for final design</p>

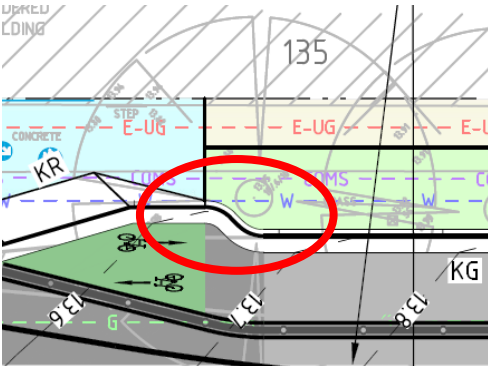
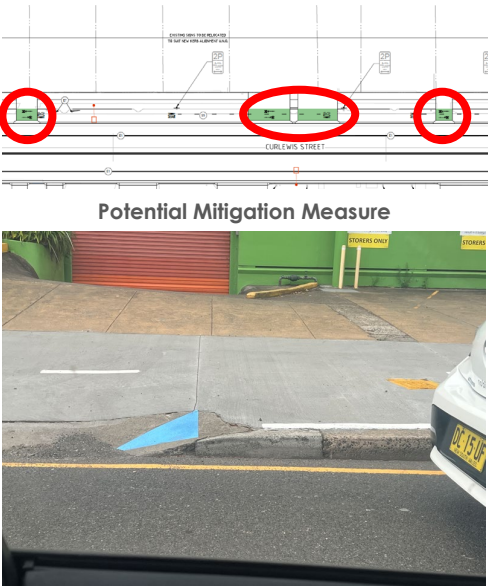
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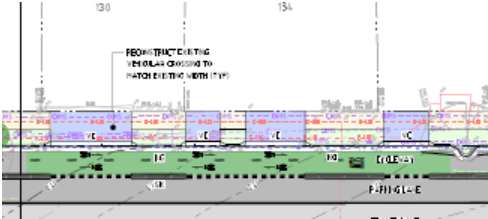


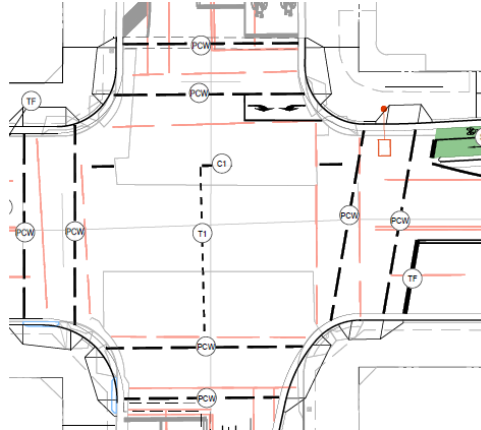
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
11.	Wellington Street, Curlewis Street roundabout	<p>No kerb ramp has been provided on the south side of the west leg of the Wellington Street and Curlewis Street roundabout.</p> <p>Absence of the kerb ramp would not provide a smooth transition between the roadway and footpath for pedestrians with prams and in wheelchairs. They may walk in the roadway and cause conflicts with passing vehicles.</p>		Improbable	Moderate	Low	<p>This is an existing condition with no works proposed to the southern kerb line at this location. Consideration is being given to the feasibility of providing a kerb ramp here, which may be included in the final design</p>
12.	Wellington Street, Curlewis Street roundabout	<p>Kerb build-outs on both Curlewis Street approaches to Wellington Street provide little deflection for motorists heading westbound and eastbound on Curlewis Street.</p> <p>Vehicle speeds may remain high when travelling through the roundabout, and increase the likelihood of collisions with other road users.</p>		Improbable	Moderate	Low	<p>Reconfiguration of the existing roundabout to achieve deflections in accordance with Austroads is beyond the scope of this project (and likely unachievable within the available footprint).</p>

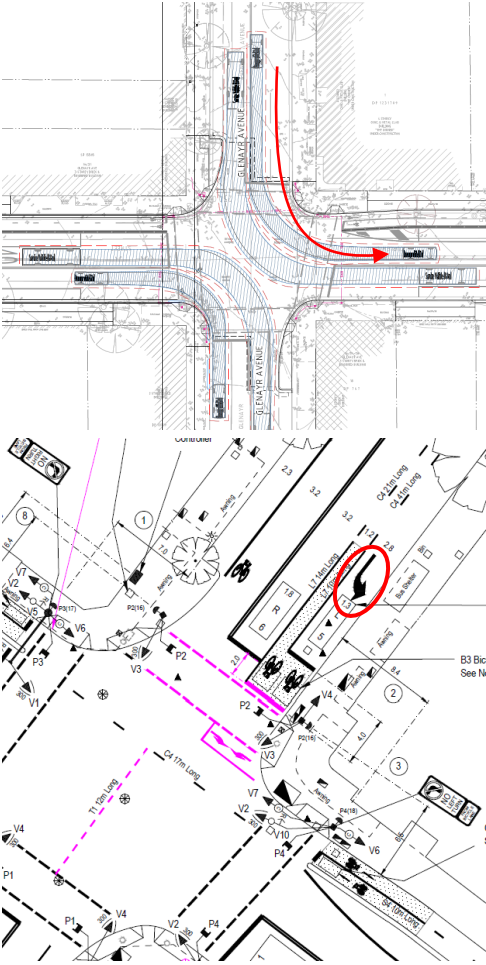
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
13.	Wellington Street, Curlewis Street roundabout	<p>A 'Roundabout Give Way' sign is located within a small painted median island on the north leg of the roundabout.</p> <p>The signpost could be knocked down by turning vehicles in the absence of a raised median island. This could possibly cause injury to passing cyclists on the crossing or damage other vehicles.</p> <p>This could also result in vehicles not noticing the signage and entering the roundabout not expecting to give-way to other vehicles to their right, resulting in incidents.</p>		Improbable	Moderate	Low	The sign will be relocated to the LHS verge in the final design.
14	Wellington Street, Curlewis Street roundabout	<p>Confident cyclists cycling eastbound on Curlewis Street may avoid the shared path facility west of Wellington Street, however they may want to connect with the cycleway when it transitions to a bi-directional cycleway.</p>		-	-	Note only.	Consideration is being given to providing this facility in the final design

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
15.	Wellington Street, Curlewis Street roundabout	The design plan does not indicate whether the existing Raised Retro-Reflective Pavement Markers (RRPM) would be replaced to delineate the shifted centreline in Curlewis Street, on approach to the Wellington Street roundabout.		-	-	Note only	Final drawings will clarify that linemarking is to be in accordance with TfNSW specifications R142 and R145 to ensure compliant RPMs are installed.
16.	General finding	<p>Kerb blisters are provided around existing trees in various sections of the cycleway.</p> <p>The width of the cycleway is also reduced from 2.4m to 1m to retain the existing trees between Glenayr Street and Gould Street. The reduced width is just enough to accommodate one cyclist at a time based on the Austroads cyclist design envelope of a 1m width.</p> <p>Given the cycleway does not provide any warning of the width reduction, it is likely to result in cyclists having head on-collisions or side-swiping each other.</p>		Occasional	Minor	Low	The revised design with elevated cycleway allows increased width to be provided however there is still some width reduction. the SLOW pavement markings are intended to prepare cyclists for the hazard.

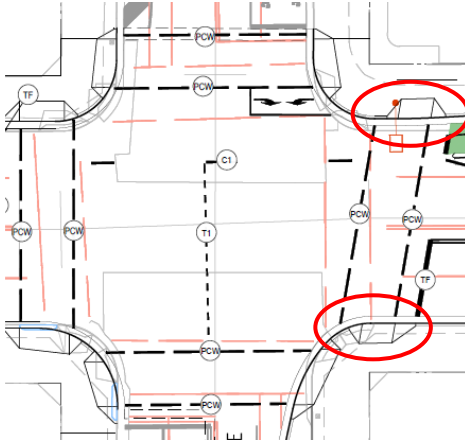
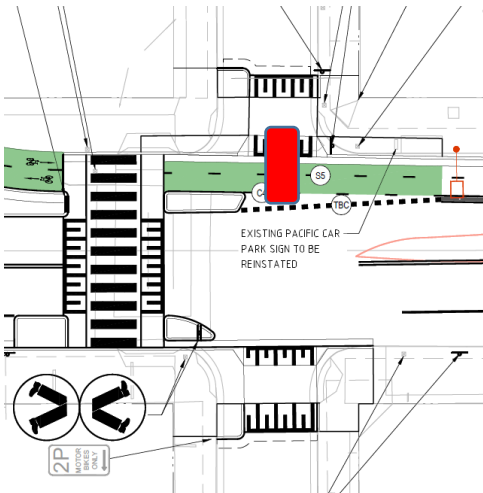
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
17.	East of Wellington Street	There is a sharp change in kerb alignment for eastbound cyclists east of Wellington Street. Cyclists may not be aware of the change in alignment particularly during night-time conditions. This issue is exacerbated when following another cyclist when forward visibility is limited.		Improbable	Moderate	Low	This hazard is reduced by the adopted raised cycleway option, which removes the kerb at this location.
18.	General finding	<p>Cyclists travelling across the driveways would traverse the ridge of the layback which could be hazardous to cyclists.</p> <p>Consequently, cyclists may not expect the sudden dip and destabilise and lose control.</p> <p>Another possibility is cyclists may swerve to the opposite side of the cycleway to avoid the layback. This would result in conflicts with other cyclists in the opposite direction.</p>	 <p>Potential Mitigation Measure</p>	Improbable	Moderate	Low	Cycle lane width of westbound cyclists to be measured from the back of laybacks, to ensure adequate width is available with that lane.

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
19.	General finding	<p>There are several driveways along the route where motorists will be required to reverse across the proposed cycleway as there is insufficient area on-site to enter and exit in a forward direction.</p> <p>Inter-visibility between a cyclist and a driver turning into the driveway from Curlewis Street may be obstructed by vehicles parked in the parking lane.</p> <p>A motorist may not have full visibility of oncoming cyclists when reversing which may lead to them reversing into cyclists.</p> <p>Furthermore, vehicles awaiting a gap in traffic at a driveway may impede both directions of the cycleway. Likewise, vehicles entering a driveway from Curlewis Street may also impede the cycleway when they yield to pedestrians in the footpath.</p> <p>There is a potential risk to cyclists if motorists failed to cross the cycleway at an appropriate and safe time.</p>		Occasional	Moderate	Medium	<p>This item is unavoidable as any cycleway would require vehicles to cross it to move between properties and the roadway. Green surface treatment is provided at conflict points in accordance with the relevant specifications and guidelines.</p>

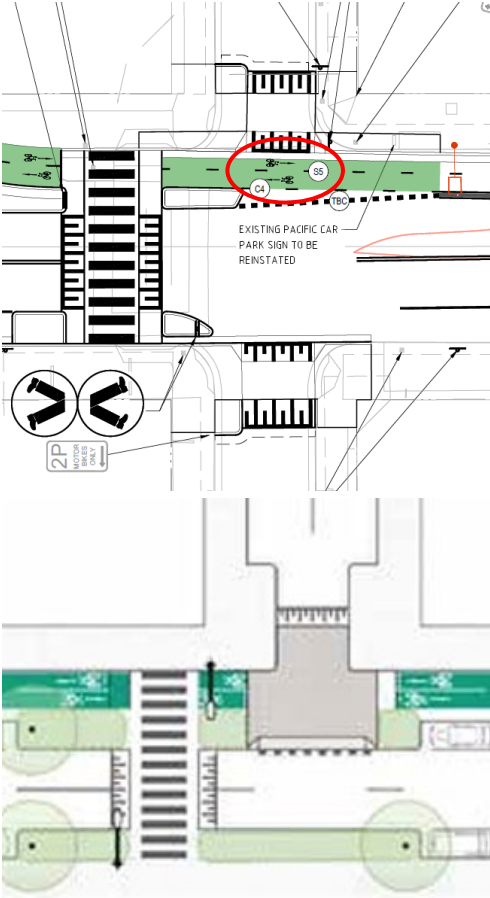
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
20.	Glenayr Avenue and Curlewis Street intersection	<p>The hook turn bay is 4.3 to 5.2m long to accommodate eastbound cyclists waiting to turn right, and westbound cyclists waiting to turn left towards Glenayr Avenue southbound.</p> <p>Considering Austroads require 3m for the hook turn bay (one direction), the proposed bay is too short to accommodate two bicycles in opposite directions. This may result in conflicts between cyclists, or cyclists storing outside the hook turn bay.</p> <p>Furthermore, the hook turn bay has no bicycle line marking (i.e. green paint and bike symbol) and therefore may not be used correctly. Cyclists may ignore this and will use a conventional right-turn which has a greater risk of collision with vehicles.</p> <p>Of note, hook turns can be used as an alternative to a conventional right-turn from the centre of the road under the <i>Australian Road Rules (National Transport Commission 2012)</i>, however, there is no mention of left turn hook turns within the Austroads Guide.</p> <p>Lastly, consideration should be given to providing a hook turn for the Glenayr Avenue to Curlewis Street right turn movement.</p>		Occasional	Minor	Low	<p>This item will be further explored with TfNSW as the project seeks Approval In Principle for the TCS design.</p> <p>The left turn from Curlewis Street to Glenayr Avenue (southbound) is consistent with the intent of providing a safe turning opportunity and the absence of any sheltered facility may result in irrational cyclist behaviour (e.g. moving into the vehicular traffic stream).</p>

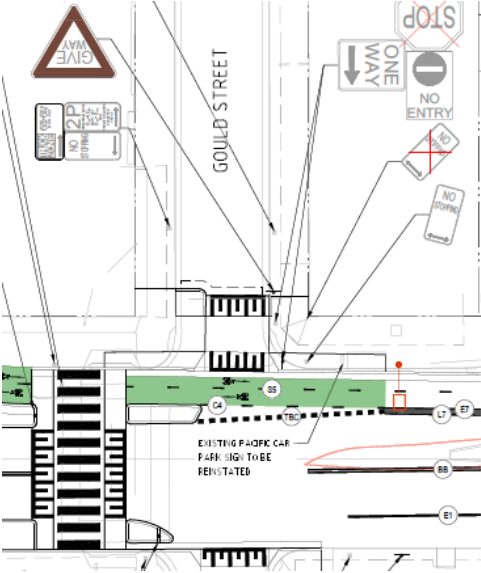
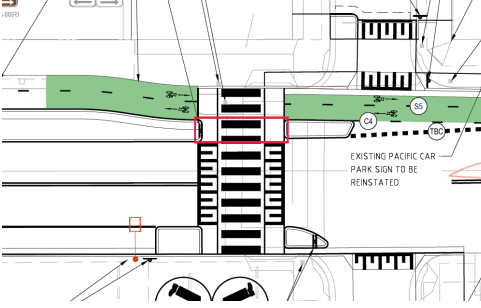
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
21.	Glenayr Avenue and Curlewis Street intersection	The swept path assessment shows the left turn movement being made from the second lane (median lane) on Glenayr Avenue onto Curlewis Street rather than straddling both lanes. Consequently, motorists turning left from the kerbside lane may conflict with motorists turning left from the median lane.		Improbable	Moderate	Low	Swept paths will be confirmed to work while straddling the lanes.


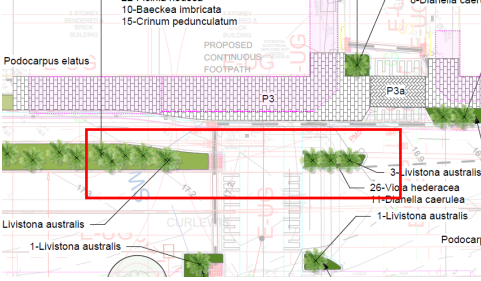


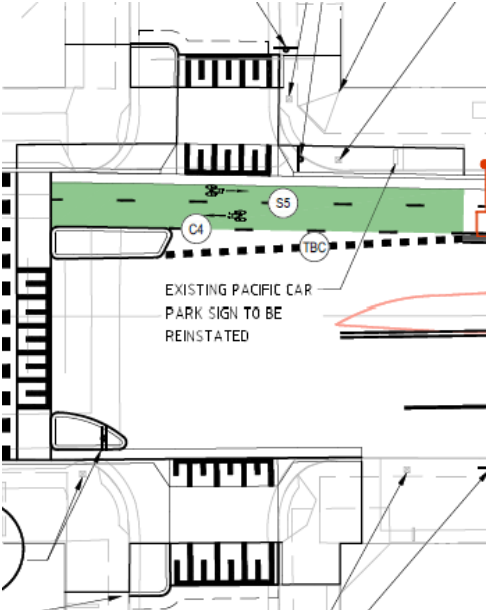
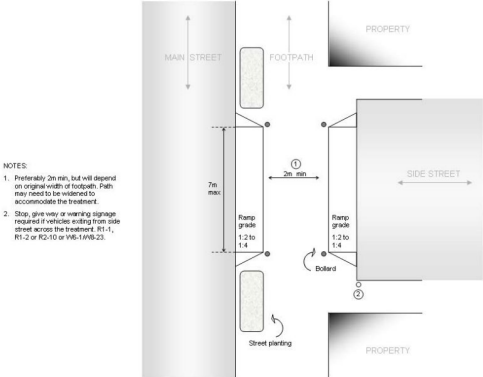
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
22.	Curlewis Street, east leg at the Glenayr Avenue intersection	<p>The proposed kerb ramps are 2.3m wide in Curlewis Street and do not extend the full width of the marked foot crossings which are about 3.6m wide on Curlewis Street.</p> <p>RMS Guide to Traffic Signals Appendix D suggests kerb ramps should ideally be the full width of the crossing.</p>		-	-	Note only	Non-conformance to Appendix D to be accepted by TfNSW through Approval in Principle of the TCS design.
23.	Gould Street – north approach	<p>Motorists traveling southbound on Gould Street may not be able to see motorists traveling eastbound and westbound on Curlewis Street from where the Give Way signage is located i.e. north of the raised pedestrian facility.</p> <p>Traffic volumes on Gould Street are unknown, however it is anticipated motorists will wait on the cycleway when exiting Gould Street which may lead to conflicts with cyclists. Cyclists may use the travel lane to avoid queued vehicles which increases the risk of accidents.</p>	 <p>Example of similar raised crossing (TfNSW Cycleway Toolbox):</p>	Improbable	Moderate	Low	<p>Gould Lane traffic volumes are not significant, and the installation of raised thresholds is intended to make it a less desirable "rat run".</p> <p>The GIVE WAY sign will be relocated to the southern side of the threshold. While this will encourage queueing on the pedestrian path, it will improve sight lines and serve to discourage queueing over the cycleway.</p> <p>The project team is exploring options where GIVE WAY signage/linemarking is provided at multiple locations to maintain cyclist priority. This may incorporate adoption of the 'Toolbox' solution outlined in Item 24.</p>

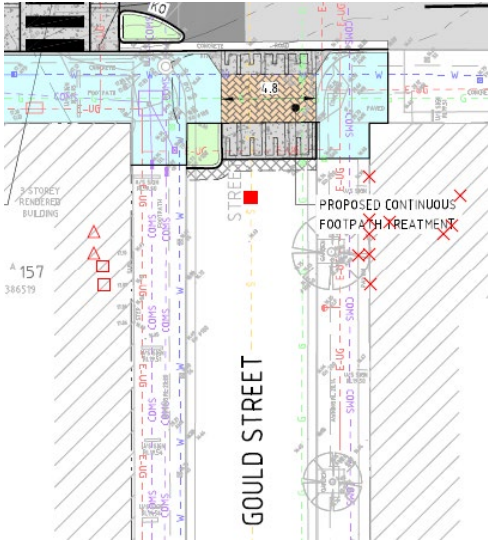



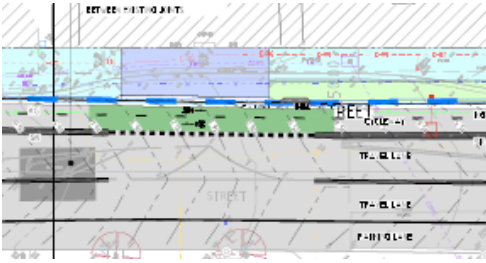

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
24.	Gould Street – north approach	<p>The cycleway is not included in the raised continuous footpath treatment.</p> <p>An example design stipulated in TfNSW cycleway Toolbox involves an extension of the raised platform past the intersection.</p>	 <p>EXISTING PACIFIC CAR PARK SIGN TO BE REINSTATED</p>	Improbable	Moderate	Low	<p>A raised threshold in accordance with the Toolbox is under consideration for adoption in the final design. This would assist with the issue raised in Item 23.</p>

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
25.	Gould Street – north approach	<p>No advance cycle crossing ahead signage is provided on the Gould Street north approach to Curlewis Street.</p> <p>Drivers may not be aware of the cycle crossing after the raised pedestrian facility and could collide with passing cyclists.</p>		Improbable	Moderate	Low	Additional advanced warning signage is under consideration for inclusion in the final design
26.	Pedestrian crossing on Curlewis Street west of Gould Street	<p>The storage area for pedestrians travelling south on the pedestrian crossing between the cycleway and road is small.</p> <p>Pedestrians may store outside the storage area which may result in conflicts with cyclists or passing vehicles.</p> <p>Further, given this area is a decision point for pedestrians, it should not be marked as a pedestrian crossing.</p>		Improbable	Moderate	Low	<p>Pedestrians have priority over cyclists at this location so there is no need for storage. We consider the removal of pedestrian crossing linemarking here likely to cause additional confusion.</p> <p>Appropriate signage to inform cyclists to give way to pedestrians is under consideration for inclusion in the final design.</p>



Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
							
27.	Pedestrian crossing on Curlewis Street west of Gould Street	<p>Pedestrians queueing from the footpath may have their sight distance impeded by landscaping.</p> <p>The landscaping design plans indicate that <i>livistona australis</i> palms will be installed within the kerb build outs. Mature palms can grow 10 to 25 metres, which may impact sight visibility between pedestrians and cyclists.</p> <p>Insufficient sight visibility at the pedestrian crossing and cycleway increases risks to pedestrians as cyclists may not see pedestrians crossing in the northbound direction. Similarly, pedestrians may not see oncoming vehicles in the other direction.</p> <p>Landscaping within the kerb buildout should not be higher than 1.0m to allow for reciprocal visibility as per design principles in the Cycleway Design Toolbox.</p>		Improbable	Moderate	Low	Planting matrix within kerb build outs to be reviewed prior to final design to ensure sight distances are not obstructed.



Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
28.	Gould Street, north and south of Curlewis Street	<p>The continuous footpath treatment is not designed based on the TfNSW specification stipulated in TDT2013/05.</p> <p>Inconsistency with the standard design may confuse road users, resulting in a lower degree of compliance when using the crossing facility. This would increase the likelihood of conflicts between road users.</p> <p>n.b. Piano key markings should not be provided.</p> <p>The gradient of the threshold should be as per the TDT2013/05 Continuous footpath treatment specifications.</p> <p>Recommend give way line marking adjacent the give way signage, if not shown.</p>	 <p>TDT2013/05 Continuous footpath treatments:</p>  <p>NOTES:</p> <ol style="list-style-type: none"> <li>1. Preferably 2m min, but will depend on original width of footpath. Path may need to be widened to accommodate the treatment.</li> <li>2. Stop, give way or warning signage required if vehicles exiting from side street across the treatment. R1-1, R1-2 or R2-10 or min. (min R2-3).</li> </ol>	Improbable	Moderate	Low	Where practicable the design will be updated to reflect aspects of TDT2013/05.

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
29.	Gould Street south of Curlewis Street	<p>There is no provision of a street light directly above the proposed continuous footpath in Gould Street (south). Although an existing street light is located some 10m to the south, the illumination level may not be sufficient.</p> <p>Insufficient level of illumination at the continuous footpath increases the risk to pedestrians as drivers may not sight the facility and the users on it during the night time.</p>	 	Improbable	Moderate	Low	Lighting calculations have been undertaken along Curlewis Street to ensure compliance.

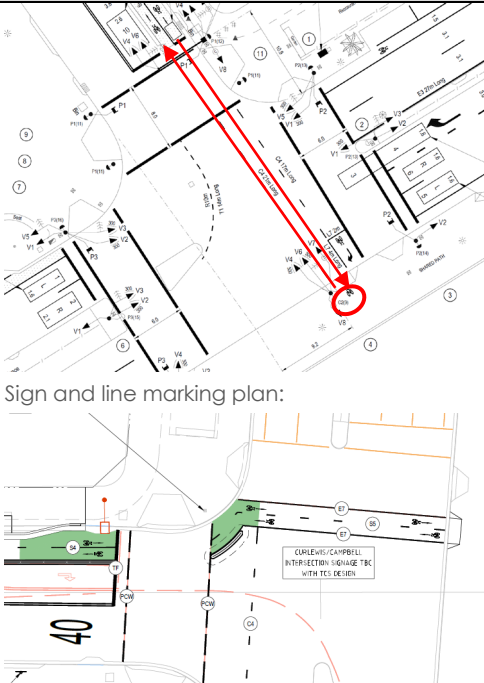

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
30.	Pacific Car Park	<p>During busy periods, vehicles queueing for the boom gate when entering the car park may queue across the cycleway. This would increase the chance of a conflict between cyclists and queued vehicles.</p> <p>Cyclists may also use the roadway or footpath to avoid vehicles queued across the cycle lane which increases the chances of incidents with vehicles or pedestrians.</p>	 	Improbable	Moderate	Low	Noted, however this cannot be avoided. It is hoped that vehicle wishing to enter the carpark would queue on the road, without stopping on the cycleway. This may be monitored after construction and additional signage installed if compliance is poor.
31.	Carlogy, east of Glenayr Avenue	<p>Outside Carlogy cars park in at a 90 degree angle across the driveway. In the future, these cars may park across the cycleway, however for the purposes of this audit it is assumed motorists would not park in this location in the future.</p>		-	-		Council will enforce legal parking as required.

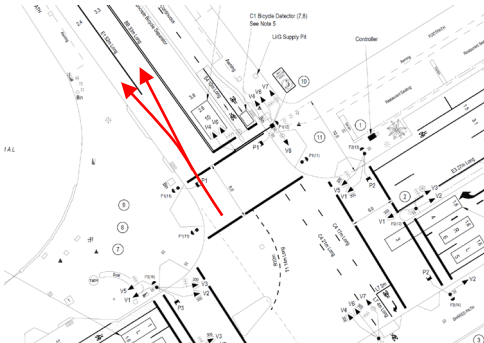


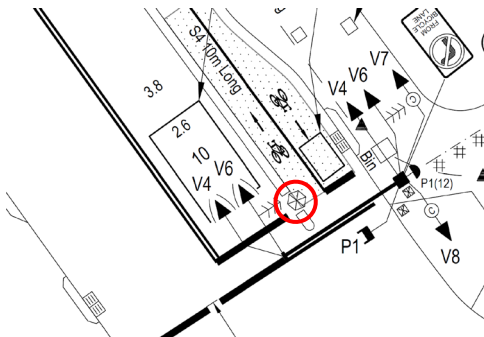


Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
32.	General comment	Similarly, delivery vehicles were observed parked across the driveway. In the future, these service vehicles would be parked across the cycleway. In the future, these cars may park across the cycleway, however for the purposes of this audit it is assumed motorists would not park in this location in the future.		-	-	Note only	Council will enforce legal parking as required.
33.	General comment	<p>Several trees are located in the road verge on the north side of the cycleway. In some instances, vegetation overhanging into the proposed cycleway would intrude into the cyclist design envelope and become a potential head hazard.</p> <p>A 2.2m vertical clearance is required for the cyclist design envelope (plus another 0.3m for overhead clearance) in accordance with Austroads.</p> <p>Overhanging vegetation reduces visibility and could be a hazard to cyclists. Vegetation would need to be trimmed on a regular basis in the future.</p> <p>Trimming vegetation should be included in Council's maintenance program.</p>		Improbable	Minor	Low	Initial trimming of trees to be undertaken post-construction and then ongoing maintenance to be continued.

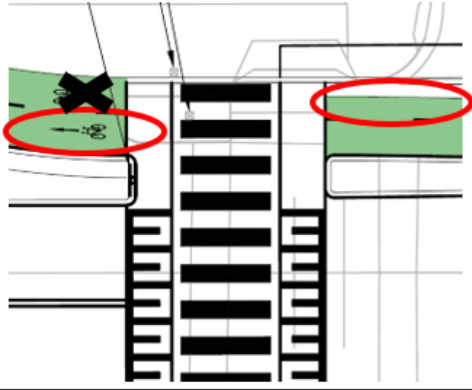
Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
34.	General comment	The existing trees to be retained adjacent to the cycleway have large tree roots that may disturb the cycleway pavement. Overgrowing roots may lift the pavement overtime.		-	-	Note only	Suitable pavements over the tree roots to minimise risk are currently being further explored
35.	North side of Curlewis Street, west of Glenayr Avenue	It is not clear whether the Curlewis Community Garden located within the footpath west of Glenayr Avenue can be maintained.		-	-	Note only	Retention of this garden is not included in the project scope
36.	Campbell Parade, north west of the Curlewis	There are discrepancies between the TCS and sign and line marking plans for the design of the bicycle crossing in Campbell Parade.	TCS plan:	-	-	Note only	Designs are subject to ongoing coordination and review with TfNSW



Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
	Street intersection	<p>The TCS plan indicates the existing C4 guideline permits cyclists to ride in both directions and access the bike ramp. However, the pavement markings on the southern SUP on Campbell Parade indicates northbound direction only. This may cause confusion for cyclists and result in potential conflicts between riders. Furthermore, the bicycle crossing and the kerb ramp are narrower than the width of the bi-direction cycleway in Curlewis Street. This may result conflicts between cyclists travelling in the northbound and southbound directions.</p> <p>Contrastingly, the sign and line marking plan indicates bi-directional bicycle crossing with a widened kerb ramp would be provided in Campbell Parade. However, a hook turn bay is not provided for cyclists turning right onto Campbell Parade.</p>	 <p>Sign and line marking plan:</p>				Designs are subject to ongoing coordination and review with TfNSW and these comments are under consideration
38.	West leg approach side of Campbell parade	<p>The design does not indicate any connectivity or restriction for cyclist turning movements from the existing on-road cycleway on Campbell Parade (west approach) to Curlewis Street. This would potentially cause confusion for cyclists and result in conflicts with other road users.</p> <p>In Phase A, when both cyclists and vehicles are given a green phase, cyclists can only go straight ahead along Campbell Road. However, cyclists may ride on the Campbell Parade footpath before joining the proposed cycleway.</p>		Occasional	Moderate	Medium	Designs are subject to ongoing coordination and review with TfNSW and these comments are under consideration

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
		This may cause conflicts with the pedestrians on the footpath.					
39.	Curlew Street departure side	The E1 edge line on Curlew Street departure lane lacks a closed end or taper. This may potentially cause motorists misjudging their travel path and result in side-swipe conflicts when merge to the travel lane.		Occasional	Minor	Low	A taper is being considered for this edge line

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
40.	Curlew Street approach to the Campbell Parade intersection	<p>The ridge between the pavement and utility pit exceeds the surface tolerance of 10mm specified in Austroads Guide to Road Design Part 6A.</p> <p>If not repaired, the change in level of the surface may unseat a cyclist.</p>	 	Improbable	Moderate	Low	Adjustment of lid/pavement levels/both to be included in scope of work.
41	Curlew Street, near Campbell Parade.	<p>Signage should be provided to delineate the bidirectional cycleway and adjacent pedestrian footpath at the commencement of the facility, and the end of the facility.</p>		Note only			Additional signage to be added to final design

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
42	General	<p>Markings for all cycleway entry points should be: Direction arrow + bicycle symbol + "ONLY" - in top to bottom order. No pavement markings on exit.</p>			Note only		To be adjusted in final drawings
43.	General	<p>There are a number of existing driveways along the edge of the cycleway. Many of these are constructed with lips.</p> <p>The courts have found that any ramp adjacent to a cycleway may be used for access to/from the cycleway by bikes. In these cases, the vehicular ramps may be used by users.</p> <p>Lips at kerb ramps effectively function like tram tracks and can logically be expected to dislodge bikes leading to predictable injuries.</p>		Improbable	Moderate	Low	Provision of driveway laybacks without a lip/bull-nose is under review for inclusion in the final design subject to further risk assessment and consideration of previous judgments

## 5 Concluding Statement

The findings and opinions in the report are based on the examination of the specific road and environs, and might not address all concerns existing at the time of the audit.

The auditors have endeavoured to identify features of the road that could be modified in order to improve safety, although it must be recognised that safety cannot be guaranteed since no road can be regarded as absolutely safe.

While every effort has been made to ensure the accuracy of this report, it is made available strictly on the basis that anyone relying on it does so at their own risk without any liability to the Auditors.



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# Appendix A

## Design Drawings

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