Attachment A

CEO Update – Protecting People Cycling, dated 10 November 2020

MEMO

FILE:	X020922.017	**DATE:**	10 November 2020
TO:	Monica Barone, Chief Executive Officer		
FROM:	Graham Jahn, Director City Planning, Development and Transport		
SUBJECT:	**CEO Update – Protecting People Cycling**		

Recommendation

For the information of the Lord Mayor and Councillors.

Background

At the Council meeting on 26 October 2020, Council requested information about how the City considers and manages safety throughout the life of a cycleway project. Council requested the documents relating to the design, planning and safety assessments conducted for pop-up cycleways the City has been responsible for delivering, and requested the same information from Transport for NSW. Two additional questions were asked during council's discussion of the motion and are also answered below.

Processes for managing safety for pop-up cycleways

For the City's pop-up cycleway projects, we have the following processes in place to identify, review and address possible safety risks:

- A Design Safety Assessment (DSA) identifies design risks to all users and documents how they were mitigated and why design decisions were made. They are live documents that are updated at various stages throughout the design.
- Approval in principle from Transport for NSW
- Endorsement by the Local Pedestrian Cycling and Traffic Calming Committee (based on Traffic Management Plan (TMP) documentation of the project)
- A Road Safety Audit (RSA) by an independent team of qualified road safety auditors, which is then reviewed by the City and responses to the issues raised are documented.
- City staff are conducting weekly onsite monitoring.
- Any safety issues raised in correspondence to the City or in letters to the Lord Mayor and Councillors are passed on to the project team to be assessed and addressed.
- Corrective Actions process and reporting to address issues raised in the RSA process

Pop-up cycleway safety documentation

The Design Safety Assessment (DSA) and Road Safety Audit (RSA) for each of the three City-delivered pop-up cycleway projects are attached.

City staff have sent a request to Transport for NSW for their safety processes and documentation.

Cycleway openings

The City does not open cycleways until construction is complete and generally this is made clear by the use of water filled barriers blocking the cycleway (for example this is currently the case on the Lawson Street cycleway).

There are some cases where further work is done later. For example, a pedestrian refuge on Henderson Road (at Alexander Street) was added after the cycleway had opened at the request of residents. Another example was the delayed removal of a pole by Ausgrid on the Wilson Street cycleway where it was safer to fence off the pole and allow people to ride on the cycleway out of the traffic.

Transport for NSW Corrective Action Responses on Bridge Road

City staff have sent a request to TfNSW to provide the latest update on its Corrective Actions Responses for the Bridge Road pop-up cycleway. City of Sydney staff undertake regular site visits to check on progress of Corrective Actions.

Previous bike lane proposal on Bridge Road (2015)

In April 2015, the local bike group, BikeSydney, heard RMS were re-sheeting a section of Bridge Road. BikeSydney asked RMS to comply with their own policy, Technical Direction 99/4: “When maintenance work falls due on RTA roads, simultaneous improvements for safe cycling are to be included”. The proposal was for painted bike lanes (not separated cycleway). RMS indicated it was too difficult because they needed to complete the works by the end of the financial year.

On 4 June 2015, RMS wrote to BikeSydney and the City to say they would not include the bike lanes because the NSW Government’s *Sydney’s Cycling Future* did not identify this link as a Priority Strategic Cycleway Network and due to safety concerns. The safety concerns related to:

- risk from riding around parked cars (more frequent merges, and dooring)
- risk from cars driving into the bike ***lane*** to pass right-turning vehicles
- risk from heavy vehicles at the outbound bend under the rail bridge
- risk from exiting concrete trucks at the batching plant.

The current pop-up is much safer than the 2015 proposal because:

- it removes the risks from car parking
- it provides for separated cycleways for most of the length – the separator prevents cars driving into the bike lane
- the bikes are diverted off the road at the dangerous bend
- the speed limit has been lowered from 60km/h to 40km/h reducing the speed differential between road users and increasing reaction time.

Identification of Bridge Road for a pop-up cycleway

City staff put forward the Bridge Road cycleway for consideration by TfNSW because it met the criteria for pop-up cycleways:

- It is a direct and important connection into the City for commuters as an alternative to buses along Parramatta Road,
- It is part of the planned bike network adopted in the City’s Cycling Strategy and the NSW Government’s *Principle Bicycle Network*
- It was already a well-used cycling route that was in need of safety improvement.

Transport for NSW decided to adopt Bridge Road as a pop-up cycleway as it met its criteria and delivered the project because Bridge Road is a State Road.

Graham Jahn AM, Director City Planning, Development and Transport

Prepared by Fiona Campbell, Manager Cycling Strategy

TRIM Document Number: 2020/478535

Attachments

2020/479889 – Dunning Avenue – Road Safety Audit

2020/479887 – Pitt Street – Road Safety Audit

2020/479881 – Henderson Road – Road Safety Audit

2020/478535-01 – Dunning Avenue – Design Safety Assessment

2020/478535-02 – Pitt Street – Design Safety Assessment

2020/478535-03 – Henderson Road – Design Safety Assessment

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approved

P. M. Barone

Monica Barone
Chief Executive Officer

Transport
Roads & Maritime
Services

Dunning Avenue, Rosebery & Zetland – Pop-up Cycleway

Construction - Pre-opening

Road Safety Audit Report

RDE20-0111

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1. Client details

Client	City of Sydney
Client address	Town Hall House, Level 2, 456 Kent Street, Sydney NSW 2000
Project Manager / Sponsor	Tim Bale
Phone	9265 9870 / 0436 650 412

2. Audit statement

We, the undersigned, declare that we have reviewed the material and data listed in this report and identified the risks to road safety listed in Section 5. Reasons are given to explain why an identified item is considered a risk to road safety including crash type. The auditors listed are independent to the project.

Design or construction deficiencies that do not cause a safety problem are not listed in this report. Risks identified only relate to road safety and the relevant road users.

It should be noted that while every effort has been made to identify potential risks to road safety, no guarantee can be made that every problem or deficiency has been identified.

It is recommended that identified risks to road safety be investigated and corrective actions implemented by the Project Manager.

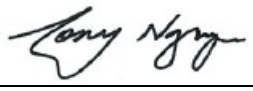
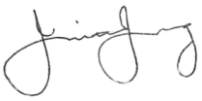
Role	Name	Auditor Level	ID Number	Signature	Date
Lead Road Safety Auditor	Tony Nguyen	3	RSA-02-0317		2/09/2020
Road Safety Audit Team Member	Luke Wilby	2	RSA-02-1002		2/09/2020
Road Safety Audit Team Member	Jullietta Jung	1	RSA-02-1442		2/09/2020
Road Safety Audit Team Member	Steven Nguyen	0	TBC		2/09/2020

Table 1 Audit team statement

3. Audit details

3.1. Description of project*

The City of Sydney and the NSW Government are creating new spaces for people walking and riding to allow for safer travel between workplaces, schools, health care and the city centre. These include 6 new pop-up cycleway connections.

These important new bike links, will enable people to ride and free up space on public transport and roads. This will help the community to return to work and local businesses safely, supporting NSW's economic recovery.

*Source: https://www.cityofsydney.nsw.gov.au/vision/better-infrastructure/streets-and-public-places/current-works/pop-up-cycleways

The Dunning Avenue pop-up cycleway is an important link in Sydney's bike network with connections to new cycleways at Epsom Road and Geddes Avenue as well as cycleways on Bourke and George streets. It will provide access from the south eastern suburbs to Green Square town centre, and safe transport to JJ Cahill Memorial High School.

This cycleway provides a safe alternative to bus travel for commuters who would usually rely on the M20, 343 and 303 bus routes.

Kerbside bike lanes will be built, running between footpaths and a relocated parking lane, on both sides of the road.

The bike lanes may be shown using painted markings, divider barriers, flexible posts and temporary kerbs.

Approximately 63 parking spaces will be removed at intersections and where there are safety implications of having a cycleway and parking.

Start: Gardeners Road, Rosebery

Finish: Hansard Street, Zetland

Length: 1.4km approximately

Figure 1 outlines the route of the pop-up cycleway.

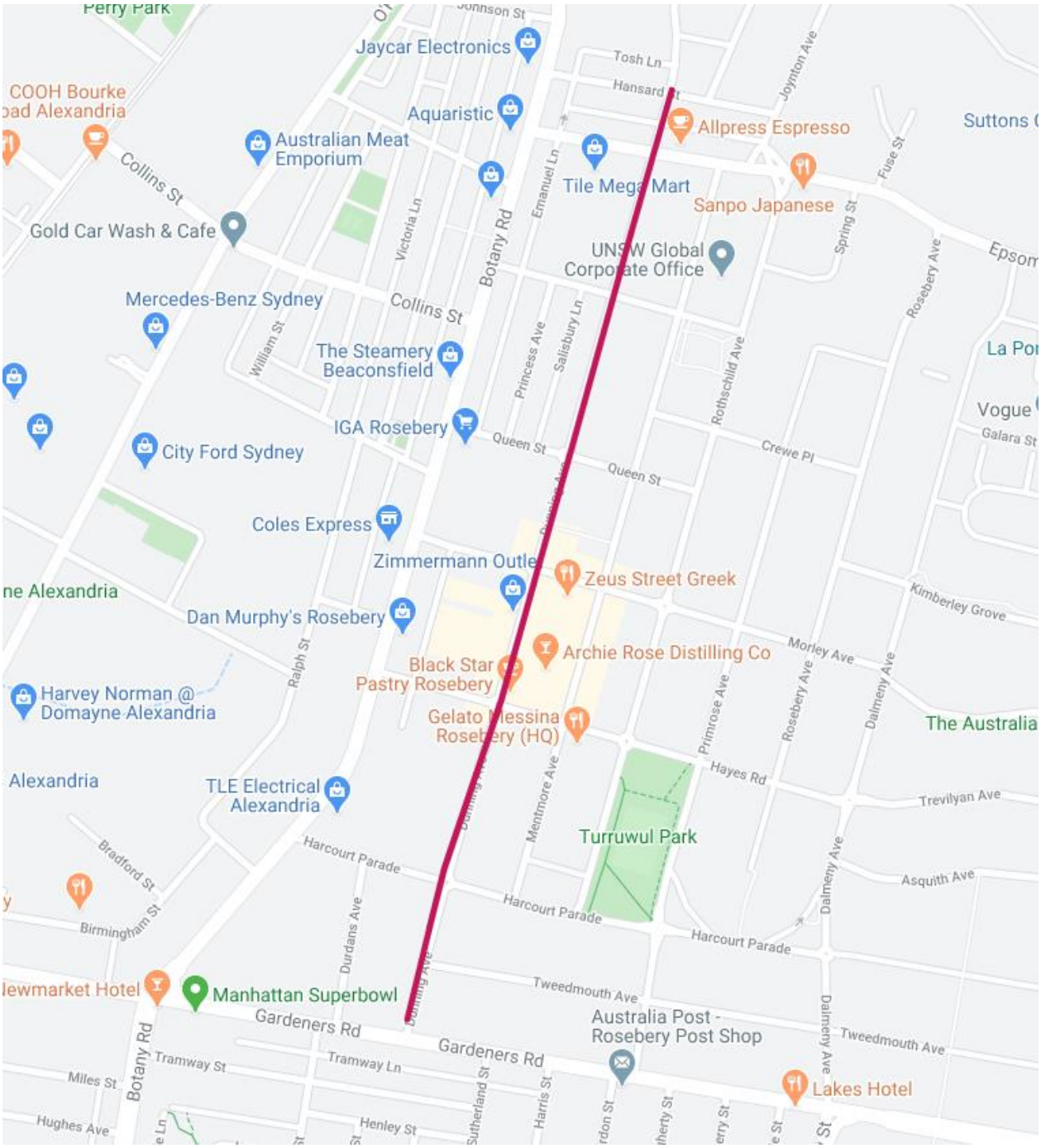


Figure 1 Dunning Avenue, Rosebery & Zetland Pop-up cycleway (source: Transport for NSW, Google maps)

3.2. Scope of audit

This Construction Pre-opening Road Safety Audit (RSA) aims to identify potential risks to road safety in the existing environment taking into account the completed construction works in relation to the pop-up cycleway. This report has sought to identify and assess potential safety hazards that may impact on road user safety or lead to future incidents.

The scope of the RSA includes a review of relevant information provided by the Project Sponsor/manager however the focus of the RSA is on the constructed facility within the context of the surrounding road network, land uses and how this may affect road user safety in consideration of the various expected users.

3.3. Considerations

This RSA was undertaken during the COVID-19 restrictions where the general community was advised by the Australian Government to remain working from home where possible and reduce the need for non-essential trips. Consequently, traffic conditions and the road network saw significant reductions in congestion with peak traffic periods lessening considerably. Formal recommendations from the Australian Government advised face masks should be worn which was adhered to during the site inspection.

Therefore, the RSA site inspection was undertaken in the absence of normal road traffic patterns to attain an understanding/observation of the typical traffic conditions in consideration for the assessment of the relevant risks identified.

3.4. Exclusions

Risks outlined in this report pertain to road safety only where Workplace Health and Safety (WHS) issues are excluded. Should a WHS issue be deemed relevant to road safety, the audit team will consider/include its relevance to the RSA scope and findings.

This RSA has not considered crash data as this information does not form part of the audit process.

3.5. Specialist advisors / observers

Other audit team members are as shown in Table 2.

Role	**Name**
Specialist advisor	David Ballm Associate Director Planning (CBD) Sydney Coordination Office, Transport for NSW
Active observer	Tim Bale Project Manager City of Sydney

Table 2 Specialist advisors / observers

3.6. Audit process

This road safety audit was carried out in accordance with Transport for NSW 'Guidelines for Road Safety Audit Practices' in conjunction with the Austroads Guide to Road Safety Part 6: Managing Road Safety Audits, Part 6A: Implementing Road Safety Audits.

Road Safety Audits are aimed at proactively identifying road safety issues and are a fundamental component of the Safe System approach. The findings of this audit have been prepared in consideration of Safe System requirements, particularly in relation to vulnerable road users such as pedestrians and cyclists.

The Austroads publication Integrating Safe System with Movement and Place for Vulnerable Road Users provides guidance on the correlation of travel speeds, vehicle stopping distances and the impact forces to the human biomechanical limits indicates that fatal injury risk to pedestrians:

- Reduces by 75-80% when a driver chooses to travel at 30 km/h instead of 40 km/h
- Reduces by 90-95% when a driver chooses to travel at 30 km/h instead of 50 km/h
- Reduces by 75-80% when a driver chooses to travel at 40 km/h instead of 50 km/h

Additional information on Safe System considerations is provided in Appendix A.

3.7. Audit program

Activity	Date
Commencement meeting	Tuesday, 4/08/2020 3.30 PM – 3.45 PM
Day site inspection	Tuesday, 4/08/2020 3.45 PM – 5.15 PM
Night site inspection	Tuesday, 4/08/2020 6.15 PM – 6.45 PM
Draft report issued	17/08/2020
Completion meeting	28/08/2020
Final report issued	2/09/2020

Table 3 Audit program

3.8. Commencement meeting

A commencement meeting was held on Tuesday 4 August 2020 on-site prior to the audit inspection between the audit team, Project Sponsor/manager, specialist advisor with the construction contractors to discuss the background of the project and provide the auditors an understanding of the constructed facility. The RSA scope was clarified, inputs, process and outputs confirmed in addition to discussing elements of the project of specific relevance to the audit site inspection.

3.9. Information supplied

Table 4 lists the supplied auditable material included in the scope of the RSA.

Documentation	Date	Document Title
Design drawings	2/06/2020	TACTICAL CYCLEWAY DELIVERY COVID-19 RESPONSE POP UP CYCLEWAYS

Table 4 Information supplied

3.10. Site inspections

The audit team, along with the Project Sponsor/manager, specialist advisor and construction contractors, inspected the subject site on Wednesday 8 July 2020 during the day time to gain an understanding of the location constraints in the context of the completed facility and road users. The audit team inspected the site again during the night time to gauge an understanding of lighting conditions. The Lead Auditor, Level 1 Audit team member Active observer rode bicycles along the study area to assess the perspective from a cyclist. Formal recommendations from the Australian Government advised face masks be worn which was adhered to during the site inspection.

3.11. Completion meeting

The completion meeting was carried out online via Microsoft Teams on Friday 28 August 2020 and attended by:

- Project sponsor/manager – Tim Bale, City of Sydney
- Project advisor – David Ballm, Transport for NSW
- Road Safety Audit team:
    - Lead auditor – Tony Nguyen, Transport for NSW
    - Audit team member – Luke Wilby, Transport for NSW
    - Audit team member – Steven Nguyen, Transport for NSW

The completion meeting discussed options to improve the safety of the facility by reviewing the audit findings and clarified the risk descriptions and ratings. Preliminary/potential corrective actions were discussed between attendees with the overall intention to enhance and bolster the proposed mitigation measures as a way forward.

The corrective action response form completed by the City of Sydney is provided in Appendix B.

4. Risk assessment

Probability	Description
Frequent	Once or more per week (>50 crashes per year)
Probable	Once or more per year (a crash cluster)
Occasional	Once every five or ten years
Improbable	Less often than once every ten years

Table 5 Likely frequency with which associated crash will occur

Severity	Description	Examples
Catastrophic	Likely multiple deaths	High-speed, multi-vehicle crash on freeway Car runs into crowded bus stop Bus and petrol tanker collide Collapse of a bridge or tunnel
Serious	Likely death or serious injury	High or medium-speed vehicle/vehicle collision High or medium-speed collision with a fixed roadside object Pedestrian or cyclist struck by a car
Minor	Likely minor injury	Some low-speed vehicle collisions Cyclists falls from bicycle at low speed Left-turn rear-end crash in a slip lane
Limited	Likely trivial injury or property damage only	Some low speed vehicle collisions Pedestrian walks into object (no head injury) Car reverses into post

Table 6 What is the likely severity of the resulting crash type?

		Frequency			
		Frequent	**Probable**	**Occasional**	**Improbable**
Severity	**Catastrophic**	Intolerable	Intolerable	Intolerable	High
	Serious	Intolerable	Intolerable	High	Medium
	Minor	Intolerable	High	Medium	Low
	Limited	High	Medium	Low	Low

Table 7 The Resultant Level of Risk

Risk Rating	Level of prioritisation
Intolerable	Must be corrected immediately
High	Should be corrected in the very near future, even if costs are high. Temporary mitigation measures should be considered until final correction action taken.
Medium	Should be corrected in the very near future, even if costs are moderate. A delay until the routine maintenance should be justified. Temporary mitigation measures should be considered until final correction action taken.
Low	Should be corrected at a suitable time, if cost is low.

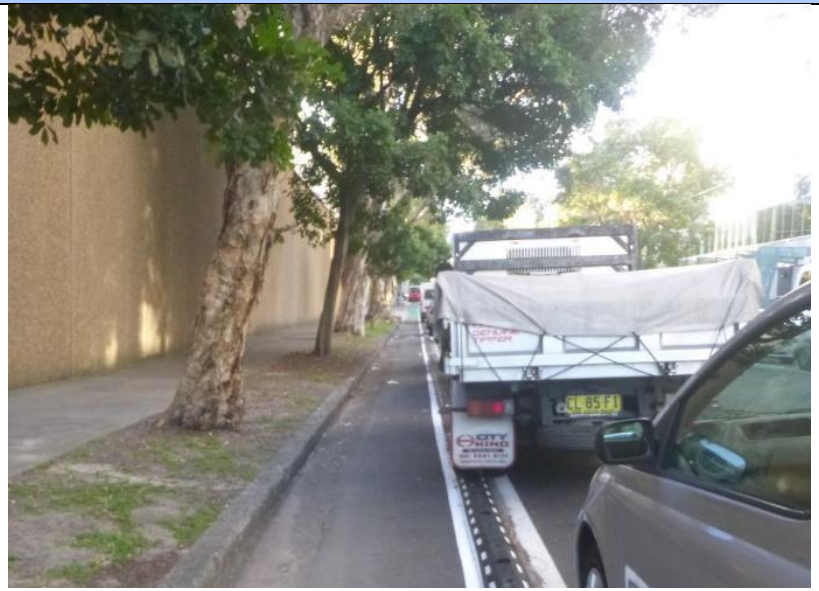
Table 8 Suggested level of prioritisation based on risk rating

5. Road safety risks

The RSA findings are documented in this section where Table 9 provides details of the risks to road safety identified by the audit team in relation to the site inspection in conjunction with the supplied auditable material.

The risks outlined in this section are not presented nor ordered in any relative importance/priority. Rather, the description of each risk and its associated ratings should be assessed objectively in the context of the project, surrounding environment and expected road users. The identified risks are assigned road safety categories to assist in the management of corrective actions by the Project Manager (also known as Project Sponsor). Each risk is assessed with a rating as Intolerable, High, Medium or Low derived as a function of Frequency and Severity, as outlined in the tables of Section 4.

Table 9 Risks to road safety audit findings

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
1	 *Figure 2 Dunning Avenue, between Morley Avenue and Queen Street, facing north* *Vehicles parked adjacent to and on the low profile physical separator between the cycleway and the parking lane.*	Vehicles are parked adjacent to the majority of the cycleway. Passengers may open the vehicle doors as they exit. This may cause a collision between a bicycle rider and the vehicle door. It was also observed that some vehicles were parked in a driveway and were hanging out or obstructing the cycleway (Refer to Figure 3). The low profile physical separator between the cycleway from the parking lane allows vehicles to easily mount and park onto it. Vehicles which are parked onto the physical separator may overhang the cycleway and can potentially cause a collision between a bicycle rider and the vehicle.	Cyclist infrastructure	Occasional	Minor	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
	 *Figure 3 Dunning Avenue, eastern side, north of Tweedmouth Avenue, looking north* Vehicle parked on driveway across cycleway					

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
2	 *Figure 4 Dunning Avenue, at Tosh Lane, facing south* *Uneven surface and pavement defects on the road and cycleway.*	At various sections of the cycleway, the surface was observed to be inconsistent, damaged and uneven. The uneven and damaged road or cycleway surface increases the risk of cyclist losing control by experience wheel instability and falling from their bicycle. Further, the inconsistent treatment may be perceived as discomforting to bicycle riders, and cause them to engage in unsafe cycling behaviours such as riding on the footpath instead.	Cyclist infrastructure	Occasional	Limited	Low

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
3	 *Figure 5 Dunning Avenue, near Gardeners Road, facing north from Tweedmouth Avenue* *Low profile physical separator between cycleway and parking lane.*	The low profile physical separator lies between the cycleway from the parking lane. Passengers leaving a parked vehicle on the side adjacent to the separator risk trips/slips/fall hazards by tripping over as stepping out of vehicles.	Safety barriers	Occasional	Limited	Low

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
4	 *Figure 6 Dunning Avenue, near Gardeners Road, facing south* Debris, bins, vehicles and vegetation overhanging or obstructing the cycleway, driveways and road.	Debris, vegetation and other objects including bins, rubbish and signage, were observed to be obstructing or overhanging various sections of the cycleway and roadway. It was also observed that some vehicles were parked in a driveway and were hanging out or obstructing the cycleway. The obstacles on or overhanging the cycleway or road may limit the sight distance for cyclists. There is the potential for an incident to occur should an obstacle come into contact with a bicycle or vehicle. There is also an increased risk that debris may cause a cyclist to lose control and fall over (Refer to Figure 7).	Roadside hazards	Probable	Limited	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
	 *Figure 7 Vegetation debris near Tweedmouth Avenue, western side of Dunning Avenue, looking north*					

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
5	 *Figure 8 Dunning Avenue, near Cressy Street, facing north* *Water and silt build up in the gutter and on the cycleway.*	Water was observed to be residing in the gutter along sections of the cycleway. The existing road surface did not allow the water to properly drain. On a number of dry areas, a build-up of silt and sand was also observed which indicates water ponding locations and/or poor drainage. Water and silt/sand build up on the cycle path have the potential to cause a bicycle rider to lose control and fall over.	Drainage	Occasional	Limited	Low

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
6	 *Figure 9 Dunning Avenue, near Morley Avenue, facing north* *Obstruction and lack of warning and regulatory signage.*	Along Dunning Avenue, a number of warning and regulatory signs were observed to be obscured by vegetation. The limited visibility to the signage may encourage road users to engage in unsafe practices, not being appropriately warned/informed/advised, including cycling on a footpath instead of the shared path section or parking in a No Stopping zone. In addition, a number on the side roads on approach to Dunning Avenue did not have visual indicators to warn of the likely presence of cyclists in the area. With the lack of warning signage on approach to intersections, merge points or driveways, there is an increased risk of a collision between the various road users as other road users are not expecting large volumes of cyclists in this location.	Traffic signs	Occasional	Minor	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
7	 *Figure 10 Dunning Avenue, between Cressy Street and Queen Street, facing north* *Narrow lane widths and speed hump on Dunning Avenue.*	The narrow traffic lanes coupled with traffic calming devices, such as speed humps, along Dunning Avenue increase the likelihood on head-on or side-swipe collisions between oncoming vehicles. It is noted that Dunning Avenue is also a bus route. It was observed that buses and vehicles travelling in opposite direction had difficulty in negotiating to pass one another.	Road alignment and cross section	Occasional	Minor	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
8	 *Figure 11 23 Dunning Avenue driveway, near Cressy Street, facing north* *Wide gap across a driveway on the cycleway.*	Southbound bicycle riders on the cycleway potentially risk having their wheels being caught in the gap between the driveway and raised concrete treatment. Bicycle riders may lose control and fall over as a result. The night time lighting in this area was provided from an illuminated office sign – if that were to be inoperable then this hazard would be difficult for a cyclist to observe.	Cyclist infrastructure	Occasional	Minor	Medium

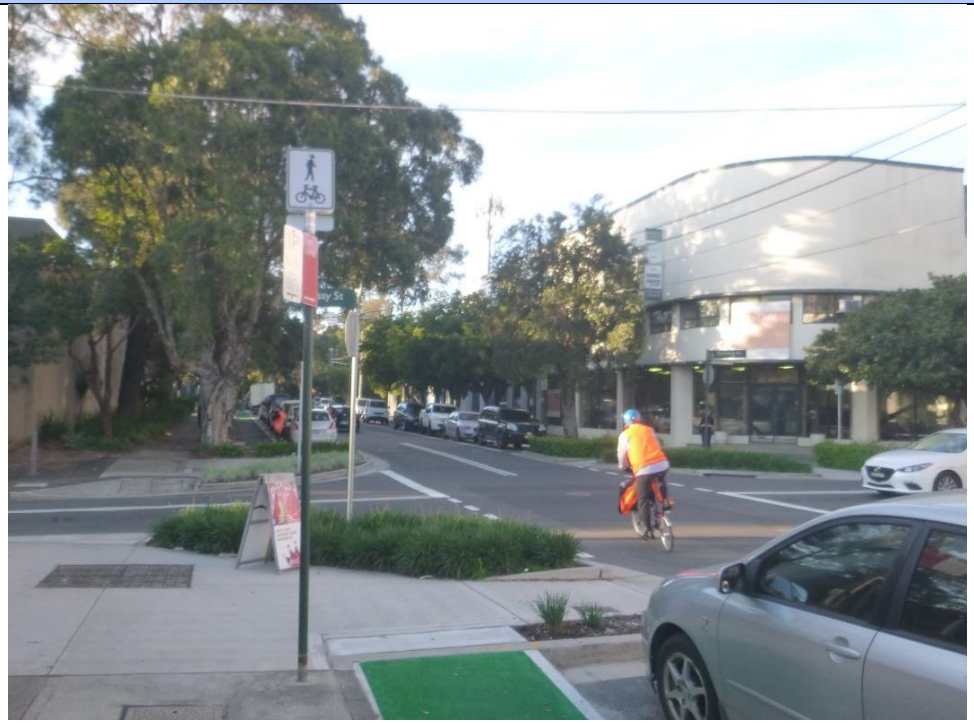
Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
9	 *Figure 12 Dunning Avenue, between Hansard Street and Chester Lane, facing south* *Geometry of cycleway on approach to tree.*	Cyclists have limited line of sight when having to ride around the tree. There is the risk of cyclists not being able to see if there is a hazard present behind the tree. The uneven surface surrounding the tree may also cause cyclists to lose control of their bicycle and fall as a result. In addition, during times when there will be poor lighting, cyclists will have an increased risk in colliding into the tree.	Cyclist infrastructure	Occasional	Minor	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
10	  *Figure 13 Dunning Avenue, at Gardeners Road, facing south* *Bus Stop near intersection with Gardeners road, towards the start/end of the cycle path.*	There are bus stops located on either side of the start and end of the cycleway near Gardeners Road. In addition, parking is permitted immediately prior to the Bus Zone. A bus driver may pull into the Bus Zone as a cyclist may be approaching the Bus Zone. Bus drivers may have limited visibility to the cyclists or the cycleway due to vehicles parking adjacent to the cycleway. Cyclists may also pull out to move around a bus picking up or dropping off passengers. Due to the close proximity of the intersection they may not see a vehicle turning into Dunning Avenue and accelerating. As a consequence, there is the potential for a bus to veer into a cyclist or side-swipe/rear-end crash with other vehicles.	Bus infrastructure	Occasional	Serious	High

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
11	 *Figure 14 Dunning Avenue, at Queen Street, facing north* *Merge points between the cycleway and general traffic.*	Along Dunning Avenue, there exists a number of merge arrangements between the cycleway and general traffic lane on the approach to an intersection. There is no indication on which road user has right of way and the angle of the merges involves a cyclist looking back over their right shoulder at a sharp angle. This, paired with sight distance restrictions created by parked vehicles along Dunning Avenue, increases the likelihood of either road users failing to observe or give way to the other – potentially resulting in a collision. Adding to the risk were vehicles observed to park just after the merge point (refer to Figure 14). This then creates a situation where cyclists are popping out from between parked cars and further increases the risk of collision. There were no signs restricting this parking.	Cyclist infrastructure	Improbable	Serious	Medium

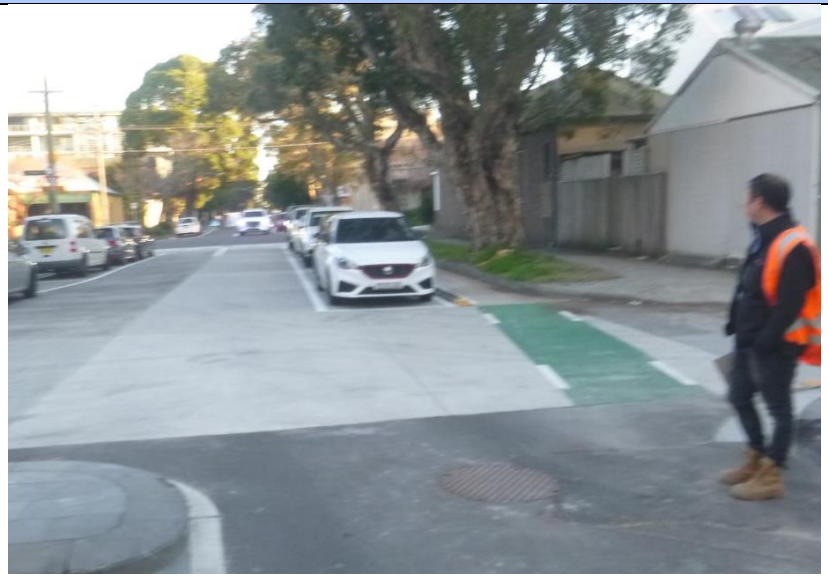
Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
12	 *Figure 15 Dunning Avenue and Epsom Road, facing north* *Faded, inconsistent and illegible pavement markings.*	The faded, inconsistent and illegible line/pavement markings, e.g. bicycle pavement markings and pavement numeral markings, observed at various locations on Dunning Avenue may confuse/misinform road users. Figure 15 shown is not intuitive as it encourages drivers to increase speed as they approach a stop sign. As a consequence road users may engage in unsafe driving or cycling practices such as speeding or cycling in inappropriate areas.	Delineation	Improbable	Minor	Low

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
13	 *Figure 16 Dunning Avenue, at Cressy Street, facing south* *Inconsistent treatment on approach to shared paths.*	It was observed that treatments implemented on approach to and at the end of the shared path were inconsistent. At some locations, line markings such as arrows and bicycles pavement markers were used to guide cyclists onto and from the shared paths. At other locations, there were no visual indicators to guide the cyclists or the shared path end signs were before cyclists could safely return to the cycleway (prior to the ramps). In addition, at certain sections, cyclists are guided towards a driveway instead of a kerb ramp to access the shared path. This inconsistency may lead cyclists to becoming confused and engage in unsafe or unexpected practices such as cycling on the footpath or road instead and putting themselves at greater risk of collision with another road user.	Cyclist infrastructure	Improbable	Limited	Low

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
14	 *Figure 17 Dunning Avenue, at Cressy Street, facing north* *Lack of wayfinding guidance at the transition point from the cycleway to shared path.*	Bicycle riders are directed up onto the shared path by the new kerb ramps. However, there is a lack of visual guidance/wayfinding as to direct where cyclists should continue to get across intersections. A cyclist may divert onto the traffic lane instead of continuing through the shared path as intended, increasing the risk of them being struck by a vehicle as they make sudden and unexpected manoeuvres.	Cyclist infrastructure	Improbable	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
15	 *Figure 18 Frontage of 21-27 Dunning Avenue* *Lack of visibility on egress from driveways.*	Motorists whom are leaving from driveways along Dunning Avenue have limited visibility to the road and cycleway due to the landscaping and vehicles parked adjacent to the cycleway. Due to the reduction in sight distances, motorists have an increased risk colliding with another vehicle or bicycle when exiting the driveway. The frequency and spacing of all driveways along Dunning Avenue (residential, commercial/industrial land uses) may present this risk.	Access impacts	Improbable	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
16	 *Figure 19 Dunning Avenue, between Queen and Cressy Streets, eastern side, photo facing south.* *Lack of lighting on cycleway and road carriageway.*	Lighting along Dunning Avenue at various sections contained poorly lit areas, where a number of streets appeared to be inoperable. With limited visibility, road users risk not being able to see objects, obstacles and other hazards/road users that may be present on the cycleway or road.	Lighting	Occasional	Minor	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
17	 *Figure 20 Dunning Avenue, at Tosh Lane, facing south* *Horizontal geometry of the road on approach to the intersection with Tosh Lane.*	At Tosh Lane (pictured) the cycleway ends abruptly without warning of merge with the travel lane. At this section, the road width also narrows and the damaged kerb indicates that larger vehicles struggle through this section of the road. The unexpected merge may result in collisions between cyclists and vehicles, or result in cyclists being dislodged from their bicycle as they attempt to access the footpath.	Road alignment and cross section	Improbable	Serious	Medium

6. Completing the road safety audit

The project manager / sponsor is recommended to take the following steps to complete the road safety audit process:

- Attend the completion meeting
- Review the report
- Accept the Road Safety Audit report
- Produce a corrective action program (Template attached as Appendix B)
- Implement corrective actions
- Close the corrective action program.

Further details are available in the Guidelines for Road Safety Audit Practices[1].

7. Confidentiality and copyright

The information in this Road Safety Audit report is confidential and copyrighted. This document does not form part of a contract.

[1] NSW Centre for Road Safety, Roads and Traffic Authority of New South Wales (2011), *Guidelines for Road Safety Audit Practices*, Sydney.

Appendix A – Safe System Considerations

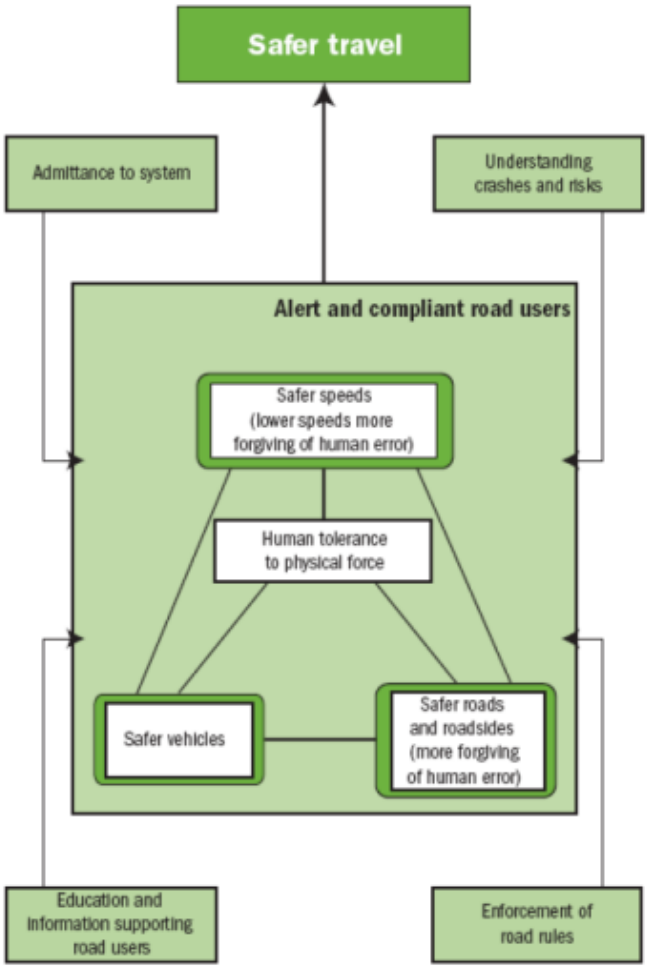
A. Safe System Considerations

A.1 The safe system approach

The identification and removal or treatment of road elements which may contribute to crash occurrence or crash severity is a key component of the safe system approach to road safety. A safe system acknowledges that human error within the transport system is inevitable, and that when it does occur the system makes allowance for these errors so as to minimise the risk of serious injury or death. In a safe system, therefore, roads (and vehicles) should be designed to reduce the incidence and severity of crashes when they inevitably occur.

The safe system approach requires, in part (Australian Transport Council, 2006):

- Designing, constructing and maintaining a road system (roads, vehicles and operating requirements) so that forces on the human body generated in crashes are generally less than those resulting in fatal or debilitating injury
- Improving roads and roadsides to reduce the risk of crashes and minimise harm: measures for higher speed roads including dividing traffic, designing 'forgiving' roadsides, and providing clear driver guidance. In areas with large numbers of vulnerable road users or substantial collision risk, speed management supplemented by road and roadside treatments is a key strategy for limiting crashes
- Managing speeds, taking into account the risks on different parts of the road system.



A.2 Key elements of a safe system

Safer road user behaviour, safer speeds, safer roads and safer vehicles are the four key elements that make up a safe system. In relation to speed the Australian Transport Council (2006) reported that:

- Speed in urban areas greater than 5 km/h above average and 10 km/h above average in rural areas doubles the risk of an injury crash.
- Reductions of as little as 1 to 2% in average speed result in substantially greater reductions in fatalities and serious injuries.
- Chances of surviving a crash decrease markedly above certain speeds, depending on the type of crash:

Type of Crash	Speed Relationship
Pedestrian struck by vehicle	20 to 30km/h
Motorcyclist struck by vehicle (or falling off)	20 to 30km/h
Side-impact vehicle striking a pole or tree	30 to 40 km/h
Side-impact vehicle to vehicle	50 km/h
Head-on vehicle to vehicle (equal mass)	70km/h

Appendix B – Corrective Action Response Form

As set out in the road safety guidelines, responsibility of the risks (inherent or residual) always rests with the designer/project manager and ultimately end-client (project sponsor), not with the auditor. A project manager (client/project sponsor representative) is under no obligation to accept or agree with the audit findings. Also, it is not the role of the auditor to agree to or approve the project manager's corrective action response to the audit risk findings. Rather, the audit provides the opportunity to highlight potential road safety issues and have them formally considered for corrective intervention/mitigation, in conjunction with all other project considerations.

This formal road safety audit report and identified findings should be responded to in writing, being the purpose of Appendix B. If any findings in this report are rejected by the Project Manager, then in each case reasons for this rejection should be included in the written response with the table below. Acceptance of a finding may require no further comment, but an explanation of how or when the action will be taken may be useful and should be provided where possible.

Project Name: Dunning Avenue, Rosebery & Zetland – Pop-up Cycleway			
Audit No	**RDE20-0111**	**Audit stage**	**Construction - Pre-opening**

Ref No.	**Risk Rating**	**Corrective Action Response (CAR)**	**Priority for action (To be completed by Project Manager)**	**Revised Probability**	**Revised Severity**	**Residual Risk Rating (if any)**
1	Medium	Vertical bollards to be installed on the separator approx. 3m apart. Monitor compliance and use enforcement to address illegal parking.	Immediate	Occasional	Minor	Medium

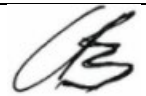
Ref No.	Risk Rating	Corrective Action Response (CAR)	Priority for action (To be completed by Project Manager)	Revised Probability	Revised Severity	Residual Risk Rating (if any)
2	Low	• Major inconsistencies were reviewed onsite by CP&P & City and subsequently addressed via isolated re sheets of agreed areas to enable temporary popup cycleway. • Complete re sheet will be reviewed for the permanent cycleway. • Ongoing maintenance will monitor.	Desirable	Improbable	Limited	Low
3	Low	• No customer complaints to date (25/08/20). • Item 1 (see above) Vertical Bollards will be in place to provide additional visual cues	Desirable	Occasional	Limited	Low
4	Medium	• Daily cleaning schedule commenced. • Monitoring and enforcement for parking compliance. • Community engagement / education campaign to explaining expected behaviours.	Desirable	Frequent	Minor	Low
5	Low	• Maintaining sediment cleaning via daily cleaning schedule. • Water ponding to be rectified in permanent cycleway and SW upgrade	Desirable	Occasional	Limited	Low
6	Medium	Review signage location and relocate signs where required for visibility	Necessary	Improbable	Limited	Low

Ref No.	Risk Rating	Corrective Action Response (CAR)	Priority for action (To be completed by Project Manager)	Revised Probability	Revised Severity	Residual Risk Rating (if any)
7	Medium	No change proposed because: • Width of traffic lanes is consistent along the street. • Narrow lane width is intentional to slow traffic. • Good sight lines and forward visibility. • No buses route over speed humps on Dunning Ave (bus route within southern section only - Gardner's Hardcourt Parade).	Not actioned	Improbable	Minor	Low
8	Medium	Infill over gap along driveway, linemarking to highlight gap along kerb.	Necessary	Improbable	Minor	Low
9	Medium	• Vertical bollards with reflective tape will be installed in the kerb separators to increase visibility of cycleway alignment. • Ausgrid has been notified street lighting outages. • Lighting upgrade will be undertaken as part of permanent cycleway. • Ongoing monitoring to identify if further measures are required.	Necessary	Improbable	Minor	Low

Ref No.	Risk Rating	Corrective Action Response (CAR)	Priority for action (To be completed by Project Manager)	Revised Probability	Revised Severity	Residual Risk Rating (if any)
10	High	• There is no parking on approach to the northbound bus stop. Bike riders are visible. • Parking finishes 10m on approach to the southbound bus zone. Bike riders are visible to bus drivers. (Check that signage has been installed correctly). • Install shared paths alongside bus zones on both sides of the street to provide an option for bike riders to avoid riding through the bus zones or around a stationary bus. • Install additional “give way” linemarking text and TBB line at the end of the cycleway on approach the bus zone.	Necessary	Improbable	Serious	Medium
11	Medium	• Additional signage and/or linemarking to increase legibility of ‘no stopping’ area. • Monitor and enforce parking compliance. • Add “give way” TBB at the end of the cycle path before the merge.	Necessary	Improbable	Serious	Medium
12	Low	• Remove or re-apply speed limit pavement markings	Desirable	Improbable	Minor	Low

Ref No.	Risk Rating	Corrective Action Response (CAR)	Priority for action (To be completed by Project Manager)	Revised Probability	Revised Severity	Residual Risk Rating (if any)
13	Low	• Line marking arrows was installed at ramps where not intuitive. • Shared path markings will be installed at the top of each ramp to increase legibility for both bike riders and pedestrians. • Note: on approach to roundabouts bike riders have the option of using the shared path or merging into mixed traffic.	Desirable	Improbable	Limited	Low
14	Medium	• Install arrow line marking on shared path	Desirable	Improbable	Serious	Medium
15	Medium	• Monitor and review sightlines on site and adjust extent of parking if required. • Note: parking and vegetation have not changed with the introduction of the cycleway.	Desirable	Improbable	Serious	Medium
16	Medium	• Ausgrid has been notified street lighting outages. Lighting upgrade will be undertaken as part of permanent cycleway.	Necessary	Occasional	Minor	Medium
17	Medium	• Install PS-3 bike symbol on the road to alert drivers to the presence of bike riders. • Reduce extent of kerbside parking to increase visibility of bike riders on approach to the merge.	Necessary	Improbable	Serious	Medium

Ref No.	Risk Rating	Corrective Action Response (CAR)	Priority for action (To be completed by Project Manager)	Revised Probability	Revised Severity	Residual Risk Rating (if any)
City response completion meeting 3pm-4pm 24/8/20. Attendees: Tim Bale Sam Wheatley Maren Parry Justin Murphy Beth Robrahn Peter Wright Fiona Campbell Dean Arnold TfNSW close out meeting 2:30pm-3:30pm 28/8/20 - Attendees: Tony Nguyen Luke Wilby David Ballm Post TfNSW close out meeting 3:30pm-4pm 1/9/20 to finalise City response - Attendees: Tim Bale Sam Wheatley Maren Parry Justin Murphy Fiona Campbell						

Ref No.	Risk Rating	Corrective Action Response (CAR)			Priority for action (To be completed by Project Manager)	Revised Probability	Revised Severity	Residual Risk Rating (if any)
Project Manager / Tim Bale		Signature		2/09/2020				
Project Manager / Justin Murphy		Signature		2/09/2020				

Transport
Roads & Maritime
Services

Pitt Street North, King Street to Alfred Street, Sydney – Pop-up Cycleway

Construction - Pre-opening

Road Safety Audit Report

RDE20-0092

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1. Client details

Client	City of Sydney
Client address	Town Hall House, Level 2, 456 Kent Street, Sydney NSW 2000
Project Manager / Sponsor	Satwinder Saini, Project Manager, Professional Services
Phone	9288 5888 0415 242 319

2. Audit statement

We, the undersigned, declare that we have reviewed the material and data listed in this report and identified the risks to road safety listed in Section 5. Reasons are given to explain why an identified item is considered a risk to road safety including crash type. The auditors listed are independent to the project.

Design or construction deficiencies that do not cause a safety problem are not listed in this report. Risks identified only relate to road safety and the relevant road users.

It should be noted that while every effort has been made to identify potential risks to road safety, no guarantee can be made that every problem or deficiency has been identified.

It is recommended that identified risks to road safety be investigated and corrective actions implemented by the Project Manager.

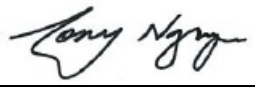
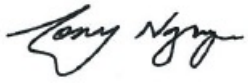
Role	Name	Auditor Level	ID Number	Signature	Date
Lead Road Safety Auditor	Tony Nguyen	3	RSA-02-0317		27/08/2020
Road Safety Audit Team Member	Luke Wilby	2	RSA-02-1002		27/08/2020
Road Safety Audit Team Member	Jullietta Jung	1	RSA-02-1442	pp 	27/08/2020

Table 1 Audit team statement

3. Audit details

3.1. Description of project*

The City of Sydney and the NSW Government are creating new spaces for people walking and riding to allow for safer travel between workplaces, schools, health care and the city centre. These include 6 new pop-up cycleway connections.

These important new bike links, will enable people to ride and free up space on public transport and roads. This will help the community to return to work and local businesses safely, supporting NSW's economic recovery.

*Source: https://www.cityofsydney.nsw.gov.au/vision/better-infrastructure/streets-and-public-places/current-works/pop-up-cycleways

This cycleway forms an important link for people travelling between the city and Sydney's northern suburbs. In conjunction with the future Castlereagh Street cycleway, it will provide an important north to south route through the city centre, supporting the Kent Street cycleway that serves the western side of the city. This cycleway provides a safe alternative to public transport for workers accessing the high-density employment area in the city centre.

Extra space for people walking will be created too, reducing crowding in an area of high pedestrian activity.

Two western lanes will be converted into additional space for people walking and a separated cycleway. The cycleway will serve riders travelling south initially. It will be converted to a 2-way cycleway in August 2020 when traffic signals are modified to provide two-way bike traffic.

The cycleway and protected area for people walking may be shown using painted markings, divider barriers, flexible posts and some stretches of temporary kerbs.

The speed limit will be reduced to 30km/h along the corridor. Approximately 39 loading spaces will be removed on the western side of Pitt Street. A recent study into the use of Pitt St loading zones found 50% of vehicles using these spaces were not there to make deliveries.

Start: Near Reiby Place, Circular Quay

Finish: King Steet, city centre

Length: 775 m approximately

Figure 1 outlines the route of the pop-up cycleway.

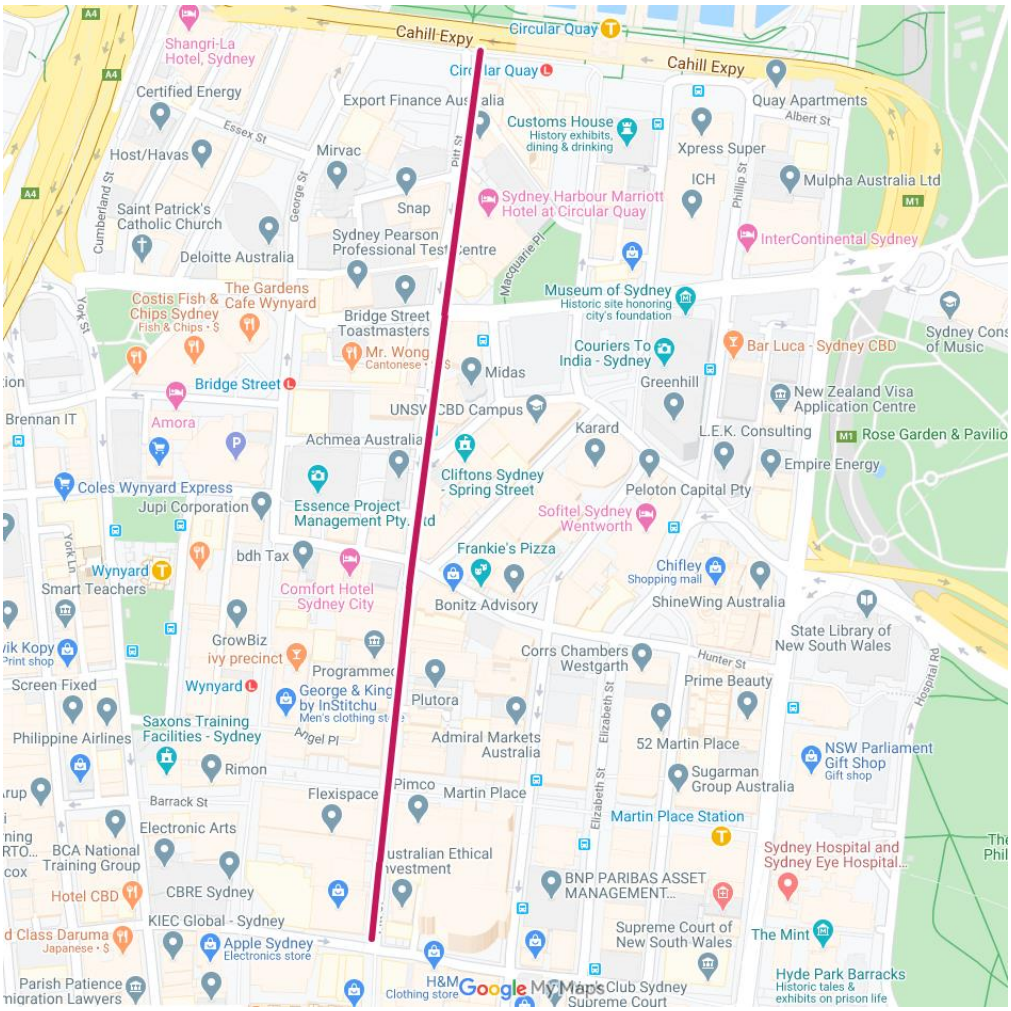


Figure 1 Pitt Street North, King Street to Alfred Street Pop-up cycleway (source: Transport for NSW, Google maps)

3.2. Scope of audit

This Construction Pre-opening Road Safety Audit (RSA) aims to identify potential risks to road safety in the existing environment taking into account the completed construction works in relation to the pop-up cycleway. This report has sought to identify and assess potential safety hazards that may impact on road user safety or lead to future incidents.

The scope of the RSA includes a review of relevant information provided by the Project Sponsor/manager however the focus of the RSA is on the constructed facility within the context of the surrounding road network, land uses and how this may affect road user safety in consideration of the various expected users.

3.3. Considerations

This RSA was undertaken during the COVID-19 restrictions where the general community was advised by the Australian Government to remain working from home where possible and reduce the need for non-essential trips. Consequently, traffic conditions and the road network saw significant reductions in congestion with peak traffic periods lessening considerably.

Therefore, the RSA site inspection was undertaken in the absence of normal road traffic patterns to attain an understanding/observation of the typical traffic conditions in consideration for the assessment of the relevant risks identified.

3.4. Exclusions

Risks outlined in this report pertain to road safety only where Workplace Health and Safety (WHS) issues are excluded. Should a WHS issue be deemed relevant to road safety, the audit team will consider/include its relevance to the RSA scope and findings.

This RSA has not considered crash data as this information does not form part of the audit process.

3.5. Specialist advisors / observers

Other audit team members are as shown in Table 2.

Role	**Name**
Specialist advisor	David Ballm Associate Director Planning (CBD) Sydney Coordination Office, Transport for NSW
Active observer	Satwinder Saini Project Manager City of Sydney

Table 2 Specialist advisors / observers

3.6. Audit process

This road safety audit was carried out in accordance with Transport for NSW 'Guidelines for Road Safety Audit Practices' in conjunction with the Austroads Guide to Road Safety Part 6: Managing Road Safety Audits, Part 6A: Implementing Road Safety Audits.

Road Safety Audits are aimed at proactively identifying road safety issues and are a fundamental component of the Safe System approach. The findings of this audit have been prepared in consideration of Safe System requirements, particularly in relation to vulnerable road users such as pedestrians and cyclists.

The Austroads publication Integrating Safe System with Movement and Place for Vulnerable Road Users provides guidance on the correlation of travel speeds, vehicle stopping distances and the impact forces to the human biomechanical limits indicates that fatal injury risk to pedestrians:

- Reduces by 75-80% when a driver chooses to travel at 30 km/h instead of 40 km/h
- Reduces by 90-95% when a driver chooses to travel at 30 km/h instead of 50 km/h
- Reduces by 75-80% when a driver chooses to travel at 40 km/h instead of 50 km/h

Additional information on Safe System considerations is provided in Appendix A.

3.7. Audit program

Activity	**Date**
Commencement meeting	Monday, 13/07/2020 3.30 PM – 3.45 PM
Day site inspection	Monday, 13/07/2020 3.45 PM – 4.30 PM
Night site inspection	Monday, 13/07/2020 5.30 PM – 5.45 PM

Activity	Date
Draft report issued	6/08/2020
Completion meeting	13/08/2020
Final report issued	27/08/2020

Table 3 Audit program

3.8. Commencement meeting

A commencement meeting was held on Wednesday 8 July 2020 on-site prior to the audit inspection between the audit team, Project Sponsor/manager and specialist advisor to discuss the background of the project and provide the auditors an understanding of the constructed facility. The RSA scope was clarified, inputs, process and outputs confirmed in addition to discussing incomplete elements of the project during the audit site inspection.

3.9. Information supplied

Table 4 lists the supplied auditable material included in the scope of the RSA.

Documentation	Date	Document Title
Design drawings	1/07/2020	TACTICAL DESIGN - PHASE "A", Concept Design, Sheet LC101 to LC106

Table 4 Information supplied

3.10. Site inspections

The audit team, along with the Project Sponsor/manager and specialist advisor, inspected the subject site on Monday 13 July 2020 during the day time to gain an understanding of the location constraints in the context of the completed facility and road users. The audit team inspected the site again during the night time to gauge an understanding of lighting conditions. The Lead Auditor, Level 1 Audit team member and specialist advisor rode bicycles along the study area to assess the perspective from a cyclist.

3.11. Completion meeting

The completion meeting was carried out online via Microsoft Teams on Thursday 13 August 2020 and attended by representatives from City of Sydney, Transport for NSW with the Road Safety Audit team.

The completion meeting discussed risks identified for the project, reviewed the audit findings and clarified the risk descriptions and ratings where required. Attendees discussed potential corrective actions that aimed to enhance and bolster the proposed mitigation measures as a way forward for the road users.

The corrective action response form is provided in Appendix B.

4. Risk assessment

Probability	Description
Frequent	Once or more per week (>50 crashes per year)
Probable	Once or more per year (a crash cluster)
Occasional	Once every five or ten years
Improbable	Less often than once every ten years

Table 5 Likely frequency with which associated crash will occur

Severity	Description	Examples
Catastrophic	Likely multiple deaths	High-speed, multi-vehicle crash on freeway Car runs into crowded bus stop Bus and petrol tanker collide Collapse of a bridge or tunnel
Serious	Likely death or serious injury	High or medium-speed vehicle/vehicle collision High or medium-speed collision with a fixed roadside object Pedestrian or cyclist struck by a car
Minor	Likely minor injury	Some low-speed vehicle collisions Cyclists falls from bicycle at low speed Left-turn rear-end crash in a slip lane
Limited	Likely trivial injury or property damage only	Some low speed vehicle collisions Pedestrian walks into object (no head injury) Car reverses into post

Table 6 What is the likely severity of the resulting crash type?

		Frequency			
		Frequent	**Probable**	**Occasional**	**Improbable**
Severity	**Catastrophic**	Intolerable	Intolerable	Intolerable	High
	Serious	Intolerable	Intolerable	High	Medium
	Minor	Intolerable	High	Medium	Low
	Limited	High	Medium	Low	Low

Table 7 The Resultant Level of Risk

Risk Rating	Level of prioritisation
Intolerable	Must be corrected immediately
High	Should be corrected in the very near future, even if costs are high. Temporary mitigation measures should be considered until final correction action taken.
Medium	Should be corrected in the very near future, even if costs are moderate. A delay until the routine maintenance should be justified. Temporary mitigation measures should be considered until final correction action taken.
Low	Should be corrected at a suitable time, if cost is low.

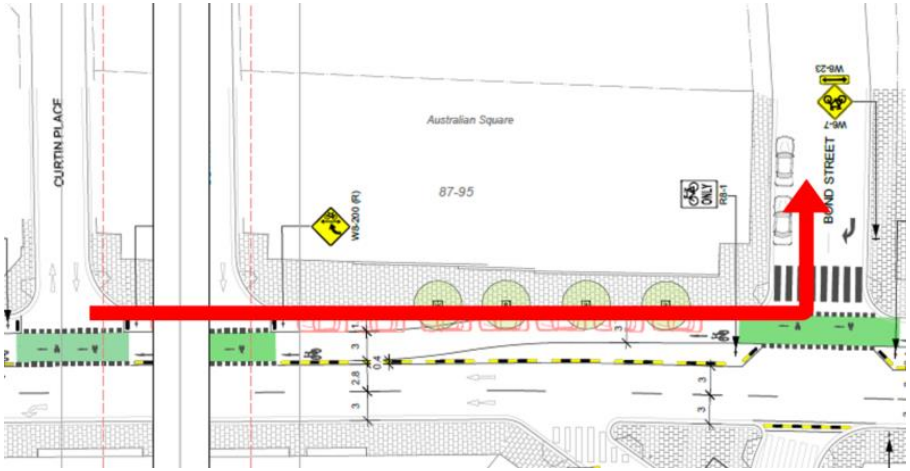
Table 8 Suggested level of prioritisation based on risk rating

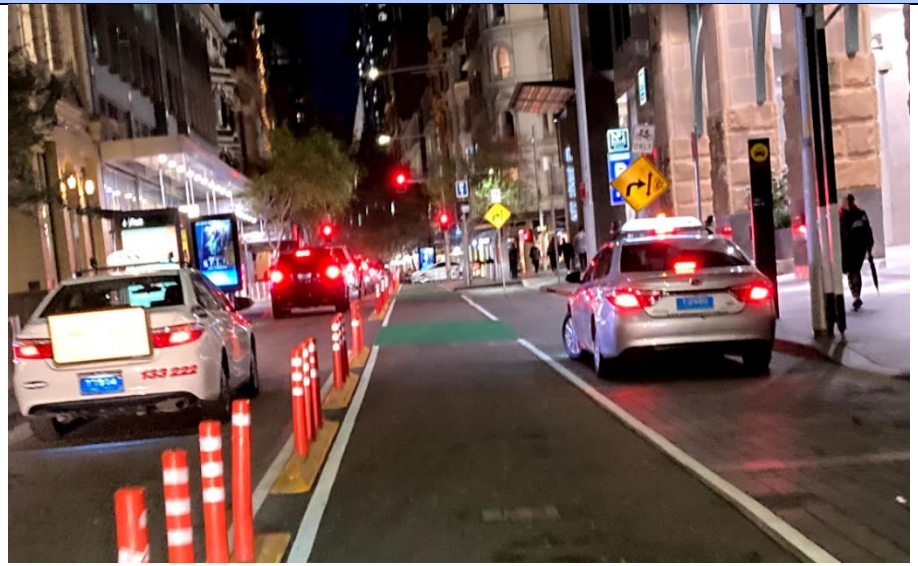
5. Road safety risks

The RSA findings are documented in this section where Table 9 provides details of the risks to road safety identified by the audit team in relation to the site inspection in conjunction with the supplied auditable material.

The risks outlined in this section are not presented nor ordered in any relative importance/priority. Rather, the description of each risk and its associated ratings should be assessed objectively in the context of the project, surrounding environment and expected road users. The identified risks are assigned road safety categories to assist in the management of corrective actions by the Project Manager (also known as Project Sponsor). Each risk is assessed with a rating as Intolerable, High, Medium or Low derived as a function of Frequency and Severity, as outlined in the tables of Section 0.

Table 9 Risks to road safety audit findings

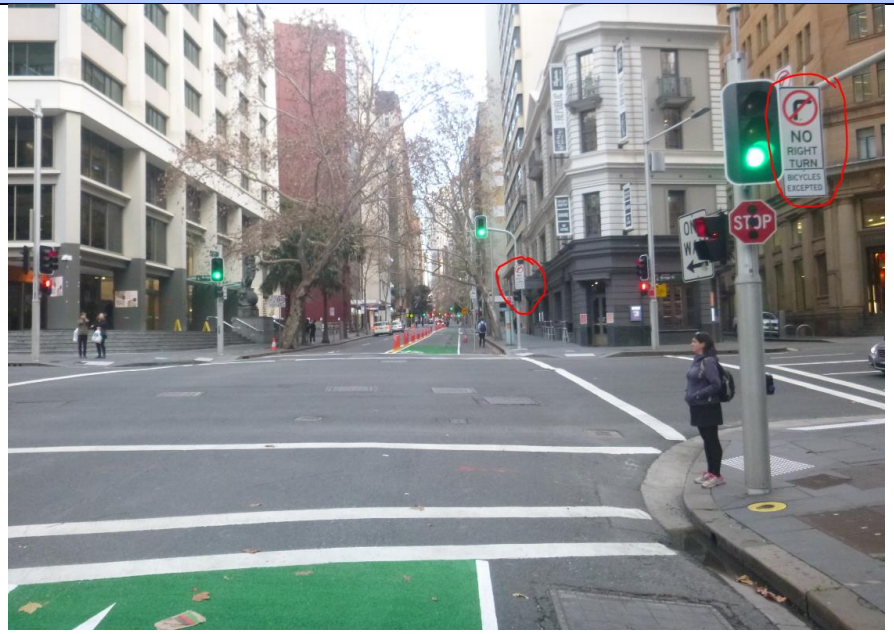
Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
1	 *Figure 2 Pitt Street, Sydney (between Bond Street and Curtain Place)* *Motorists attempt to access Bond Street from Curtain Place using the cycleway*	It was observed during the site inspection that vehicles exiting Curtain Place onto Pitt Street are attempting to (illegally) turn left and enter the cycleway to access Bond Street. Vehicles driving along the wrong way to oncoming cyclists/vehicles may result in a relatively slower speed head-on collision with a person riding a bicycle and/or a vehicle.	Access impacts	Improbable	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
2	 *Figure 3 Pitt Street in front of hotels and other business with existing taxi ranks, photo looking south* *Taxi drivers inappropriately accessing the cycleway, paying attention to passengers and not approaching cyclists*	The taxi stand signs indicate to taxi drivers and people that the kerbside is still a taxi stand and are able to service passengers at the taxi stands. The taxi driver in Figure 3 admitted to reversing into the cycleway to access the taxi stand. This has the potential to result in taxi drivers driving in the cycleway to access the taxi stand and a collision with a bicycle rider.	Roadside activities	Improbable	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
3	 *Figure 4 Pitt Street intersection with Bridge Street, photo looking south* *Parking meters appear to the public as operational and on-street parking permitted*	The parking meter indicates to drivers that the kerbside still allows on-street parking, which may result in car drivers driving in the cycleway to access the parking spot and collisions occur with a bicycle rider.	Roadside activities	Occasional	Minor	Medium

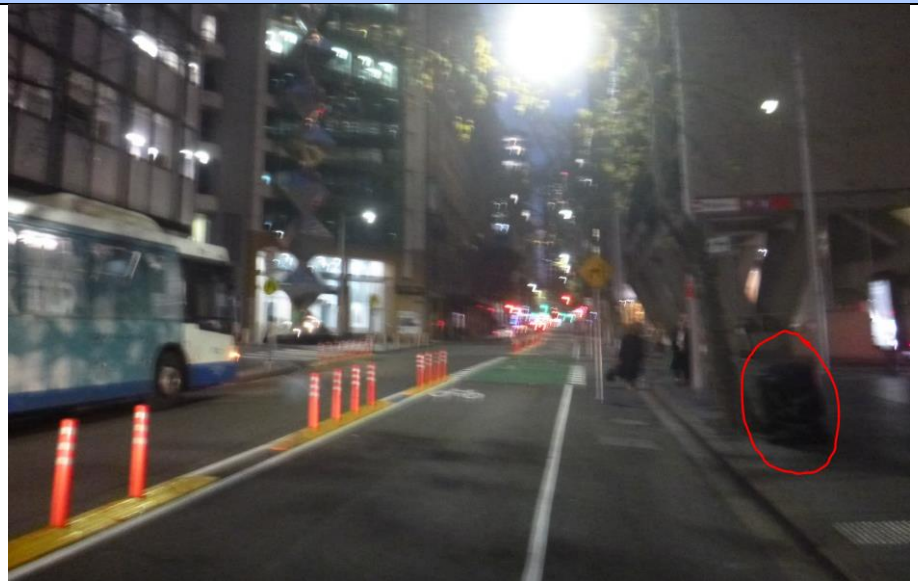
Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
4	  *Figure 5 119 Pitt Street, photo looking north* *Turning vehicles drive over the guide kerb separator*	Vehicles were observed to be driving over the curb separators delineating the cycleway as motorists access/egress the driveways of parking lots, loading docks and other businesses. The turn paths for various vehicles appear restricted which may contribute to nuisance impacts between manoeuvring and parked vehicles.	Road alignment and cross section	Occasional	Limited	Low

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
5	 *Figure 6 Pitt Street intersection with King Street, photo looking south* *Unclear wayfinding or visual cues for cyclists to proceed south of cycleway*	It is unclear at the end of the intersection of the cycleway (intersection of King Street) for bicycle riders to know where to continue, this may result in confusion and people riding on the footpath or the wrong travel lane when turning left. There is also no turn lines to guide vehicles turning left – increasing the likelihood of conflict between vehicles and cyclists. This has the potential for conflicts between cyclists, pedestrians and vehicles turning at the signals. It was observed food delivery cyclists continued travelling through the intersection irrespective of the signal phasing or movement of other road users.	Delineation	Improbable	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
6	 *Figure 7 Pitt Street intersection with Bridge Street, no right turn restriction, photo looking south*	The right turn at the signalised intersection from Pitt Street into Bridge Street has been banned to address the risk of conflict between right turning vehicles and cyclists riding along Pitt Street (Refer to Figure 7). However during the audit site inspection there was a number of vehicles observed to either miss or ignore the no right turn signage and still complete the manoeuvre (Refer to Figure 8). This may result in collisions between cyclists and right turning vehicles as the cyclist emerges from the driver's blind spot (over the right shoulder). It was noted that the current signage is located to the right of the vehicle approach lanes and may be difficult for a driver to see.	Traffic management and operations	Occasional	Serious	High

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
	 *Figure 8 Pitt Street intersection with Bridge Street, car indicating to turn right from north approach, photo looking north*					

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
7	 *Figure 9 Pitt Street intersection with Bridge Street, photo looking northeast* *Pedestrians exposed to left turning vehicles from Pitt Street onto Bridge Street*	There is a potential conflict in movements between pedestrians (blue arrows in Figure 9) and left turning vehicles from Pitt Street to Bridge Street (red arrow in Figure 9) as there is no green on green protection provided for pedestrians from the left turn. This means that vehicles turning left have a green signal at the same time that pedestrians have a green walk signal to cross Bridge Street (eastern leg). This may result in collisions between pedestrians and vehicles.	Traffic management and operations	Improbable	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
8	 *Figure 10 Pitt Street intersection north of Bond Street, photo looking south* *Garbage bins put out by businesses and also existing street bins*	During the night time inspection there were a number of bins observed on the western kerb (cycle lane side) of Pitt Street (Refer to Figure 10). It is unclear how garbage trucks would access these bins. There is the potential for obstruction on the cycle lane while emptying the bins and also if the bins are left in the cycle lane either before or after pick up. This creates a collision hazard for cyclists.	Roadside activities	Occasional	Limited	Low

6. Completing the road safety audit

The project manager / sponsor is recommended to take the following steps to complete the road safety audit process:

- Attend the completion meeting
- Review the report
- Accept the Road Safety Audit report
- Produce a corrective action program (Template attached as Appendix B)
- Implement corrective actions
- Close the corrective action program.

Further details are available in the Guidelines for Road Safety Audit Practices[1].

7. Confidentiality and copyright

The information in this Road Safety Audit report is confidential and copyrighted. This document does not form part of a contract.

[1] NSW Centre for Road Safety, Roads and Traffic Authority of New South Wales (2011), *Guidelines for Road Safety Audit Practices*, Sydney.

Appendix A – Safe System Considerations

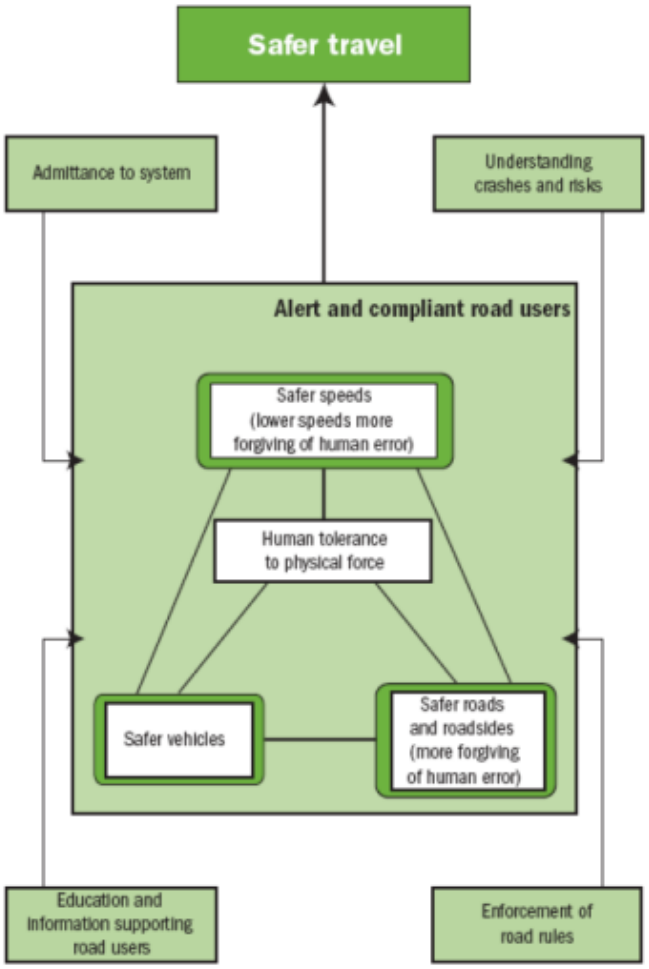
A. Safe System Considerations

A.1 The safe system approach

The identification and removal or treatment of road elements which may contribute to crash occurrence or crash severity is a key component of the safe system approach to road safety. A safe system acknowledges that human error within the transport system is inevitable, and that when it does occur the system makes allowance for these errors so as to minimise the risk of serious injury or death. In a safe system, therefore, roads (and vehicles) should be designed to reduce the incidence and severity of crashes when they inevitably occur.

The safe system approach requires, in part (Australian Transport Council, 2006):

- Designing, constructing and maintaining a road system (roads, vehicles and operating requirements) so that forces on the human body generated in crashes are generally less than those resulting in fatal or debilitating injury
- Improving roads and roadsides to reduce the risk of crashes and minimise harm: measures for higher speed roads including dividing traffic, designing 'forgiving' roadsides, and providing clear driver guidance. In areas with large numbers of vulnerable road users or substantial collision risk, speed management supplemented by road and roadside treatments is a key strategy for limiting crashes
- Managing speeds, taking into account the risks on different parts of the road system.



A.2 Key elements of a safe system

Safer road user behaviour, safer speeds, safer roads and safer vehicles are the four key elements that make up a safe system. In relation to speed the Australian Transport Council (2006) reported that:

- Speed in urban areas greater than 5 km/h above average and 10 km/h above average in rural areas doubles the risk of an injury crash.
- Reductions of as little as 1 to 2% in average speed result in substantially greater reductions in fatalities and serious injuries.
- Chances of surviving a crash decrease markedly above certain speeds, depending on the type of crash:

Type of Crash	Speed Relationship
Pedestrian struck by vehicle	20 to 30km/h
Motorcyclist struck by vehicle (or falling off)	20 to 30km/h
Side-impact vehicle striking a pole or tree	30 to 40 km/h
Side-impact vehicle to vehicle	50 km/h
Head-on vehicle to vehicle (equal mass)	70km/h

Appendix B – Corrective Action Response Form

As set out in the road safety guidelines, responsibility of the risks (inherent or residual) always rests with the designer/project manager and ultimately end-client (project sponsor), not with the auditor. A project manager (client/project sponsor representative) is under no obligation to accept or agree with the audit findings. Also, it is not the role of the auditor to agree to or approve the project manager's corrective action response to the audit risk findings. Rather, the audit provides the opportunity to highlight potential road safety issues and have them formally considered for corrective intervention/mitigation, in conjunction with all other project considerations.

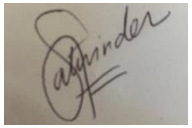
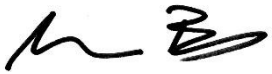
This formal road safety audit report and identified findings should be responded to in writing, being the purpose of Appendix B. If any findings in this report are rejected by the Project Manager, then in each case reasons for this rejection should be included in the written response with the table below. Acceptance of a finding may require no further comment, but an explanation of how or when the action will be taken may be useful and should be provided where possible.

Project Name: Pitt Street North, King Street to Alfred Street, Sydney – Pop-up Cycleway			
Audit No	**RDE20-0092**	**Audit stage**	**Construction - Pre-opening**

Ref No.	**Risk Rating**	**Corrective Action Response (CAR)**	**Priority for action (To be completed by Project Manager)**	**Revised Probability**	**Revised Severity**	**Residual Risk Rating (if any)**
1	Medium	Additional bollards have been installed at intersections and driveways to prevent vehicles from entering the cycleway or pedestrian space.	Immediate	Improbable	Minor	Low

Ref No.	Risk Rating	Corrective Action Response (CAR)	Priority for action (To be completed by Project Manager)	Revised Probability	Revised Severity	Residual Risk Rating (if any)
2	Medium	Cover taxi stand signs to improve legibility. Note: bollards have already been installed (refer CAR 1) and are preventing vehicle access into the cycleway.	Immediate	Improbable	Minor	Low
3	Medium	The parking meters have been bagged to remove perception of parking availability	Immediate	Improbable	Limited	Low
4	Low	The kerb separator indicated in the photo at 119 Pitt Street has been removed to aid manoeuvrability	Immediate	Improbable	Limited	Low
5	Medium	Install additional pavement markings: left pavement arrow in cycleway and T1 guidance line through the intersection to direct cyclists into the southern kerbside lane on King Street and other turning vehicles into the second lane.	Necessary	Improbable	Serious	Medium
6	High	• Notify TfNSW as the owner and operator of the traffic signals and related signage. • TfNSW to monitor driver behaviour. • CoS to install left and straight ahead pavement arrows to improve legibility at intersections.	Necessary	Occasional	Serious	High

Ref No.	Risk Rating	Corrective Action Response (CAR)	Priority for action (To be completed by Project Manager)	Revised Probability	Revised Severity	Residual Risk Rating (if any)
7	Medium	Notify TfNSW as the owner and operator of the signals. Note: This is a pre-existing condition, not related to the pop-up cycleway.	Immediate	Improbable	Serious	Medium
8	Low	Fixed street litter bins have been covered and will be removed. Mobile street litter bins have been provided. These are wheeled to garbage trucks in the nearest cross street.	Desirable	Improbable	Limited	Low

Project Manager / Sponsor Name	Signature		12/08/2020	Satwinder Saini – Project Manager
Project Manager / Sponsor Name	Signature		20/08/2020	Maren Parry, Development Manager - Bike Network

Transport
Roads & Maritime
Services

Bridge Street, Railway Parade, Henderson Road, Erskineville – Pop-up Cycleway

Construction - Pre-opening

Road Safety Audit Report

RDE20-0091

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1. Client details

Client	City of Sydney
Client address	Town Hall House, Level 2, 456 Kent Street, Sydney NSW 2000
Project Manager / Sponsor	Satwinder Saini, Project Manager, Professional Services
Phone	9288 5888 0415 242 319

2. Audit statement

We, the undersigned, declare that we have reviewed the material and data listed in this report and identified the risks to road safety listed in Section 5. Reasons are given to explain why an identified item is considered a risk to road safety including crash type. The auditors listed are independent to the project.

Design or construction deficiencies that do not cause a safety problem are not listed in this report. Risks identified only relate to road safety and the relevant road users.

It should be noted that while every effort has been made to identify potential risks to road safety, no guarantee can be made that every problem or deficiency has been identified.

It is recommended that identified risks to road safety be investigated and corrective actions implemented by the Project Manager.

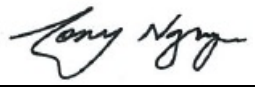
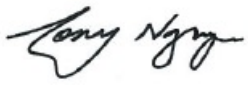
Role	Name	Auditor Level	ID Number	Signature	Date
Lead Road Safety Auditor	Tony Nguyen	3	RSA-02-0317		27/08/2020
Road Safety Audit Team Member	Luke Wilby	2	RSA-02-1002		27/08/2020
Road Safety Audit Team Member	Jullietta Jung	1	RSA-02-1442	pp 	27/08/2020

Table 1 Audit team statement

3. Audit details

3.1. Description of project*

The City of Sydney and the NSW Government are creating new spaces for people walking and riding to allow for safer travel between workplaces, schools, health care and the city centre. These include 6 new pop-up cycleway connections.

These important new bike links, will enable people to ride and free up space on public transport and roads. This will help the community to return to work and local businesses safely, supporting NSW's economic recovery.

*Source: https://www.cityofsydney.nsw.gov.au/vision/better-infrastructure/streets-and-public-places/current-works/pop-up-cycleways

This Ashmore to South Eveleigh pop-up cycleway is an important link in Sydney's bike network and connects the inner west to central and eastern Sydney, providing a direct connection to South Eveleigh and Redfern.

A two-way cycleway has been built on the western and northern side of Bridge Street, Railway Parade and Henderson Road at Erskineville and Alexandria.

The cycleway has been installed using painted markings, divider barriers, flexible posts and temporary kerbs.

Approximately 32 parking spaces on the eastern side of Bridge Street will be removed. Most parking spots will remain on both sides of Henderson Road. 16 parking spots will be removed along Railway Parade and Henderson Road while the pop-up cycleway is in place. Left turns will no longer be permitted from Swanson Street on to Railway Parade for traffic travelling east. Traffic will need to use Park Street or Mitchell Road to access Railway Parade and Henderson Road.

Start: Bridge Street Erskineville, north of Ashmore Street

Finish: Davy Road Eveleigh, opposite Mitchell Road

Length: 1.3km approximately

Figure 1 outlines the route of the pop-up cycleway.

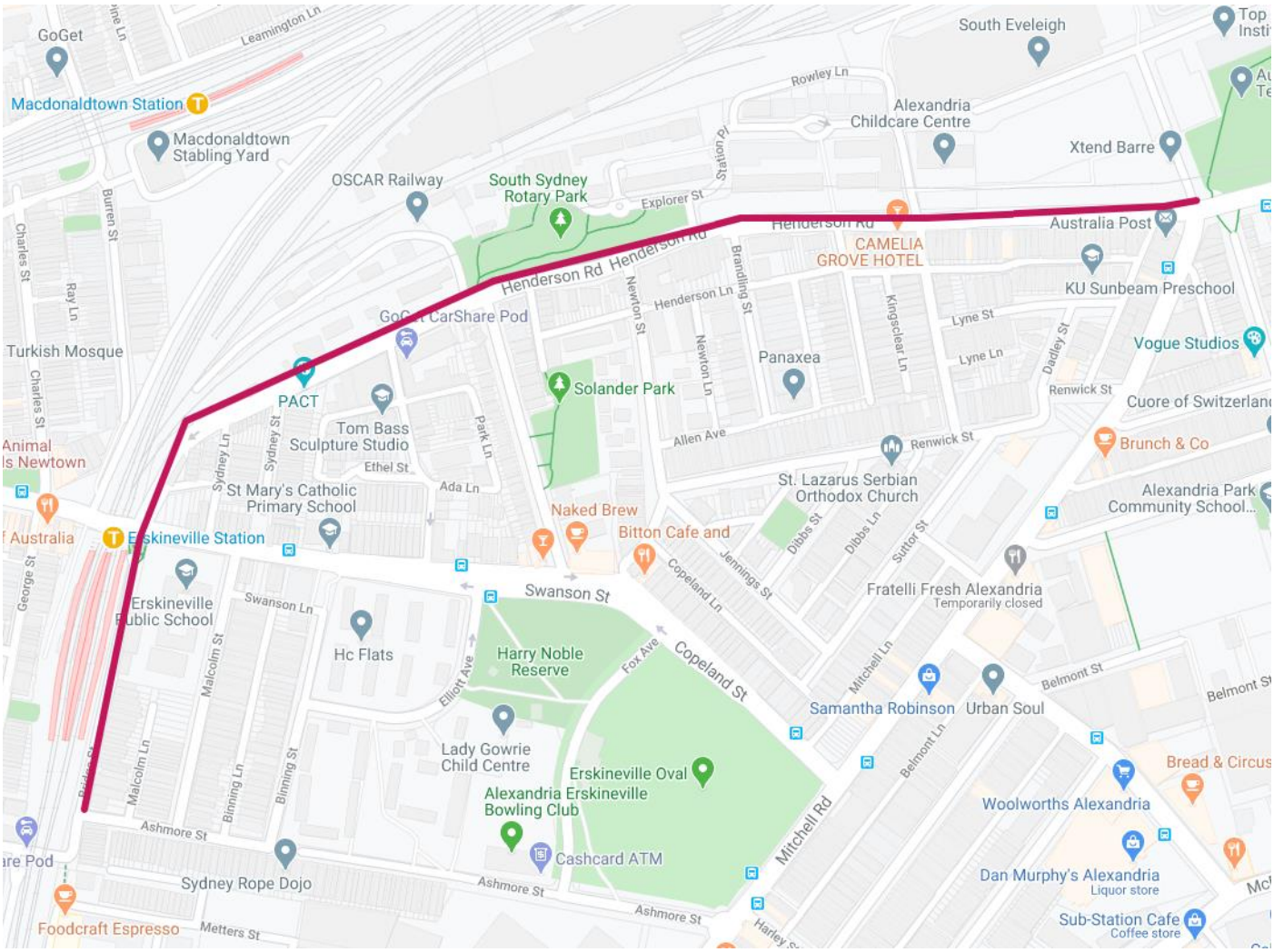


Figure 1 Bridge Street, Railway Parade, Henderson Road at Erskineville Pop-up cycleway (source: Transport for NSW, Google maps)

3.2. Scope of audit

This Construction Pre-opening Road Safety Audit (RSA) aims to identify potential risks to road safety in the existing environment taking into account the completed construction works in relation to the pop-up cycleway. This report has sought to identify and assess potential safety hazards that may impact on road user safety or lead to future incidents.

The scope of the RSA includes a review of relevant information provided by the Project Sponsor/manager however the focus of the RSA is on the constructed facility within the context of the surrounding road network, land uses and how this may affect road user safety in consideration of the various expected users.

3.3. Considerations

This RSA was undertaken during the COVID-19 restrictions where the general community was advised by the Australian Government to remain working from home where possible and reduce the need for non-essential trips. Consequently, traffic conditions and the road network saw significant reductions in congestion with peak traffic periods lessening considerably.

Therefore, the RSA site inspection was undertaken in the absence of normal road traffic patterns to attain an understanding/observation of the typical traffic conditions in consideration for the assessment of the relevant risks identified.

3.4. Exclusions

Risks outlined in this report pertain to road safety only where Workplace Health and Safety (WHS) issues are excluded. Should a WHS issue be deemed relevant to road safety, the audit team will consider/include its relevance to the RSA scope and findings.

This RSA has not considered crash data as this information does not form part of the audit process.

3.5. Specialist advisors / observers

Other audit team members are as shown in Table 2.

Role	**Name**
Specialist advisor	David Ballm Associate Director Planning (CBD) Sydney Coordination Office, Transport for NSW
Active observer	Satwinder Saini Project Manager City of Sydney

Table 2 Specialist advisors / observers

3.6. Audit process

This road safety audit was carried out in accordance with Transport for NSW 'Guidelines for Road Safety Audit Practices' in conjunction with the Austroads Guide to Road Safety Part 6: Managing Road Safety Audits, Part 6A: Implementing Road Safety Audits.

Road Safety Audits are aimed at proactively identifying road safety issues and are a fundamental component of the Safe System approach. The findings of this audit have been prepared in consideration of Safe System requirements, particularly in relation to vulnerable road users such as pedestrians and cyclists.

The Austroads publication Integrating Safe System with Movement and Place for Vulnerable Road Users provides guidance on the correlation of travel speeds, vehicle stopping distances and the impact forces to the human biomechanical limits indicates that fatal injury risk to pedestrians:

- Reduces by 75-80% when a driver chooses to travel at 30 km/h instead of 40 km/h
- Reduces by 90-95% when a driver chooses to travel at 30 km/h instead of 50 km/h
- Reduces by 75-80% when a driver chooses to travel at 40 km/h instead of 50 km/h

Additional information on Safe System considerations is provided in Appendix A.

3.7. Audit program

Activity	**Date**
Commencement meeting	Wednesday, 8/07/2020 3.00 PM – 3.15 PM
Day site inspection	Wednesday, 8/07/2020 3.15 PM – 4.00 PM
Night site inspection	Wednesday, 8/07/2020 5.15 PM – 5.45 PM

Draft report issued	5/08/2020
Completion meeting	13/08/2020
Final report issued	27/08/2020

Table 3 Audit program

3.8. Commencement meeting

A commencement meeting was held on Wednesday 8 July 2020 on-site prior to the audit inspection between the audit team, Project Sponsor/manager and specialist advisor to discuss the background of the project and provide the auditors an understanding of the constructed facility. The RSA scope was clarified, inputs, process and outputs confirmed in addition to discussing incomplete elements of the project during the audit site inspection.

3.9. Information supplied

Table 4 lists the supplied auditable material included in the scope of the RSA.

Documentation	**Date**	**Document Title**
Design drawings	10/06/2020	General Arrangement Plan, Sheet 1 to 7

Table 4 Information supplied

3.10. Site inspections

The audit team, along with the Project Sponsor/manager and specialist advisor, inspected the subject site on Wednesday 8 July 2020 during the day time to gain an understanding of the location constraints in the context of the completed facility and road users. The audit team inspected the site again during the night time to gauge an understanding of lighting conditions. The Lead Auditor and Level 1 Audit team member rode bicycles along the study area to assess the perspective from a cyclist.

3.11. Completion meeting

The completion meeting was carried out online via Microsoft Teams on Thursday 13 August 2020 and attended by representatives from City of Sydney, Transport for NSW with the Road Safety Audit team.

The completion meeting discussed risks identified for the project, reviewed the audit findings and clarified the risk descriptions and ratings where required. Attendees discussed potential corrective actions that aimed to enhance and bolster the proposed mitigation measures as a way forward for the road users.

The corrective action response form is provided in Appendix B.

4. Risk assessment

Table 5 Likely frequency with which associated crash will occur

Probability	Description
Frequent	Once or more per week (>50 crashes per year)
Probable	Once or more per year (a crash cluster)
Occasional	Once every five or ten years
Improbable	Less often than once every ten years

Table 6 What is the likely severity of the resulting crash type?

Severity	Description	Examples
Catastrophic	Likely multiple deaths	High-speed, multi-vehicle crash on freeway Car runs into crowded bus stop Bus and petrol tanker collide Collapse of a bridge or tunnel
Serious	Likely death or serious injury	High or medium-speed vehicle/vehicle collision High or medium-speed collision with a fixed roadside object Pedestrian or cyclist struck by a car
Minor	Likely minor injury	Some low-speed vehicle collisions Cyclists falls from bicycle at low speed Left-turn rear-end crash in a slip lane
Limited	Likely trivial injury or property damage only	Some low speed vehicle collisions Pedestrian walks into object (no head injury) Car reverses into post

Table 7 The Resultant Level of Risk

		Frequency			
		Frequent	**Probable**	**Occasional**	**Improbable**
Severity	**Catastrophic**	Intolerable	Intolerable	Intolerable	High
	Serious	Intolerable	Intolerable	High	Medium
	Minor	Intolerable	High	Medium	Low
	Limited	High	Medium	Low	Low

Table 8 Suggested level of prioritisation based on risk rating

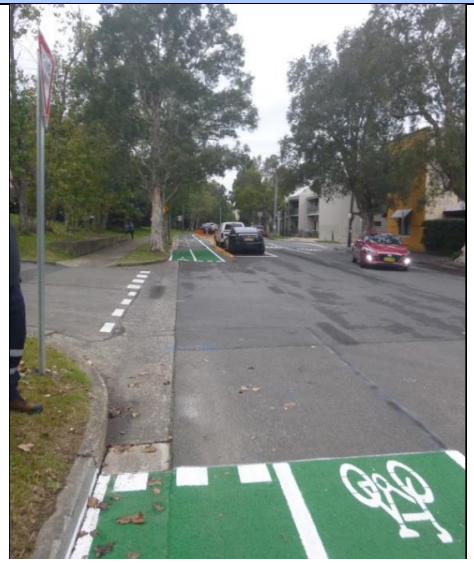
Risk Rating	Level of prioritisation
Intolerable	Must be corrected immediately
High	Should be corrected in the very near future, even if costs are high. Temporary mitigation measures should be considered until final correction action taken.
Medium	Should be corrected in the very near future, even if costs are moderate. A delay until the routine maintenance should be justified. Temporary mitigation measures should be considered until final correction action taken.
Low	Should be corrected at a suitable time, if cost is low.

5. Road safety risks

The RSA findings are documented in this section where Table 9 provides details of the risks to road safety identified by the audit team in relation to the site inspection in conjunction with the supplied auditable material.

The risks outlined in this section are not presented nor ordered in any relative importance/priority. Rather, the description of each risk and its associated ratings should be assessed objectively in the context of the project, surrounding environment and expected road users. The identified risks are assigned road safety categories to assist in the management of corrective actions by the Project Manager (also known as Project Sponsor). Each risk is assessed with a rating as Intolerable, High, Medium or Low derived as a function of Frequency and Severity, as outlined in the tables of Section 4.

Table 9 Risks to road safety audit findings

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
1	  *Figure 2 Progress Road and Alexander Street intersections with Henderson Road respectively, photos facing east* *Cycle pavement symbols and colour discontinuous across intersections.*	The green painted cycle lane markings do not continue across all intersections or major driveways (e.g. Progress Road and Alexander Street in Figure 2). This may confuse all road users as to whom has right of way and could result in vehicles colliding with cyclists as the vehicles turn into the side streets, potentially resulting in serious injuries. Note in the first photo of Figure 2 for Progress Road the give way sign is facing south for the incorrect/unintended road user.	Cyclist infrastructure	Improbable	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
2	 *Figure 3 Lantern positioning for cyclist outside field of view, photo facing south* *Dual primary cyclist lanterns may not be seen by approaching cyclists due to its location on the far right.*	The cycle lanterns at the intersection of Swanson Street and Railway Parade are located out of the line of sight of the cyclist (far right of the barriers) and directly below the normal traffic signal. This increases the likelihood that a cyclist may see a green signal for general traffic and attempt to proceed across the intersection – increasing their risk of being struck by a right turning vehicle who is not expecting the cyclist to be moving through the intersection. This has the potential to result in serious injuries.	Traffic signals	Improbable	Serious	Medium

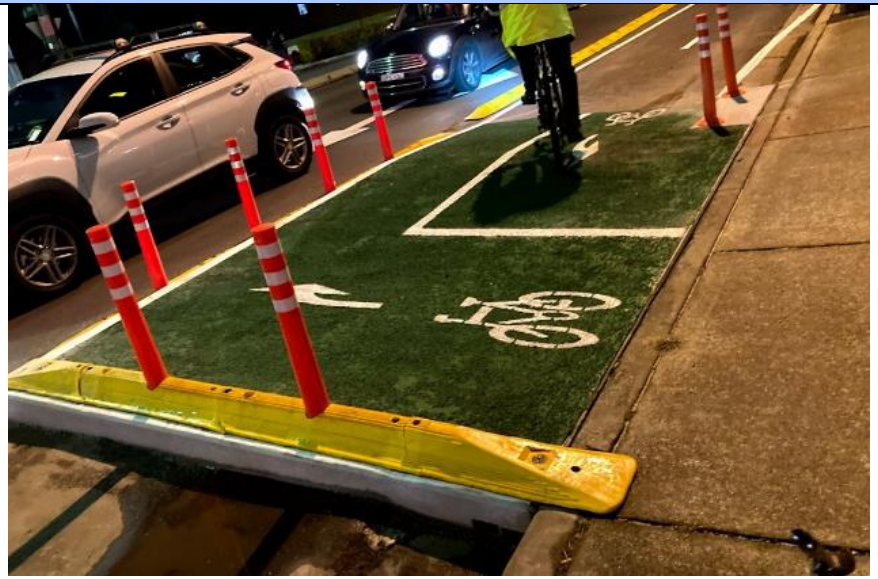
Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
3	 *Figure 4 Bridge Street, Erskineville and Ashmore Street intersection (facing south), day and night photo* *Concrete jersey barrier orientated and placed at end/start of Bridge Street cycleway*	The southern end of the cycleway along Bridge Street, near Ashmore Street, transitions from a separated cycleway to on-road where it is terminated with a concrete barrier. The orientation-angled of the barrier is located and points in the middle of the cycleway which may result in a bicycle rider snagging/stopping abruptly and colliding into a sharp corner or other road users.	Safety barriers	Occasional	Minor	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
4	 *Figure 5 Henderson Road (Alexander Street intersection) facing south and east respectively* *Westbound motorists able to skirt around the concrete barriers placed in the middle of Henderson Road, opposite Alexander Street.*	The concrete barriers in the middle of the road at the intersection with Alexander Street do not have adequate delineation/reflectivity and there is a risk that a vehicle travelling North along Alexander Street may try to proceed straight through the intersection. This would likely result in serious injuries to the vehicle occupants. Further to this, Westbound vehicles along Henderson Road are able to do an illegal U-turn (red arrow in Figure 5) and/or right turn into Alexander Street (blue arrow in Figure 5) around the concrete barriers which results with crossing into the cycleway. These movements were observed on more than one occasion during the audit inspection. This has the potential to contribute in a collision with a cyclist (particularly a westbound rider) not expecting the manoeuvre from a westbound vehicle.	Traffic management devices	Improbable	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
5	 *Figure 6 Bridge Street cul-de-sac (intersection with Erskineville Road), Erskineville, facing north* *Existing kerb ramp is not orientated for southbound cyclists to transition.*	The end of the lane separator meets the kerb ramp at an angle that may result in bicycle rider colliding into the separator. Furthermore, the existing kerb ramp at this location is intended for southbound cyclists to transition onto the separate cycleway, however the splays are aligned to the cyclists travel path which may cause riders to drop down the kerb instead of the ramp. This has the potential to cause instability issues for less experienced riders and could result in a fall.	Cyclist infrastructure	Improbable	Minor	Low

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
6	 *Figure 7 Railway Parade (Intersection Erskineville Road), Erskineville, facing south* *Cyclists and pedestrians crossing Railway Parade, southbound, converging towards the station fence along the footpath and cycleway*	The signal phase for the bicycle rider is slightly delayed and shorter than the pedestrian phase which may result in bicycle riders and pedestrians travelling south at the same time towards the shared path resulting in bicycle riders not being able to clear the crossing and/or having to weave through/around pedestrians. This has the potential to increase the incidences of pedestrian and cyclist collisions.	Traffic signals	Occasional	Limited	Low

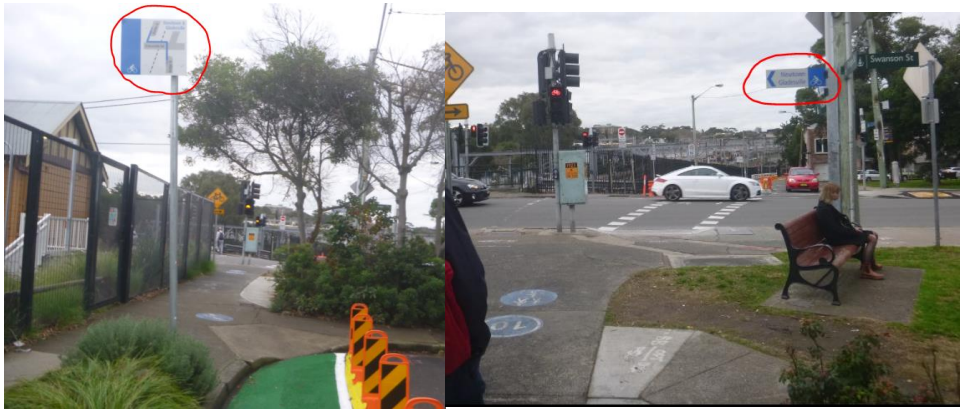
Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
7	 *Figure 8 Henderson Road (intersection Mitchell Road), Eveleigh, facing east* *Lack of wayfinding visual cues at the eastern end of the cycleway route*	Cyclists unfamiliar with the surrounding area may be confused where to proceed at the eastern end of the cycleway as it was observed there isn't much wayfinding at the Henderson Road and Mitchell Road end of the route. This may increase the incidence of movement conflicts between pedestrians and/or cyclists as people abruptly stopping on the shared path to navigate.	Traffic signs	Occasional	Limited	Low

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
	 *Figure 9 Henderson Road (intersection Mitchell Road), Eveleigh, facing west* *Right-angled configuration of cycleway transition, riders will cut across.*					

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
8	 *Figure 10 Henderson Road (intersection Sydney Street), facing west* *Unclear permitted travel direction of Railway Parade, west of Sydney Street*	The two direction of Railway Parade between Sydney Lane and Sydney Street has been changed to one way, however there is very little signage, pavement and line markings provided to reinforce this. The presence of vehicles parked in the wrong direction also may add to the confusion. There is a risk of vehicles proceeding the wrong way along Railway Parade and being involved in lower speed head on collisions.	Traffic management and operations	Improbable	Minor	Low

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
9	 *Figure 11 Bridge Street cycleway, facing north* *Vegetation debris building up on cycleway.*	There are a number of larger trees along the alignment which may result in branches and other debris falling into the cycle lane. This may pose a hazard to cyclists and increase the likelihood of instability and falling from their bicycle.	Landscaping	Occasional	Minor	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
10	 *Figure 12 Tree stumps and roots impacting kerb/gutter protruding onto cycle path, west of Newton Street on Henderson Road , photo facing east* *Pavement defects and uneven surfaces a hazard to cyclists*	There were a couple of spots along the alignment with uneven surfaces and damaged pavement. These locations present hazards to cyclists and increase the risk of them falling from their bicycle.	Pavement condition	Occasional	Limited	Low

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue) *Tip: IDENTIFY > CONSEQUENCE > SUBSTANTIATE*	Road Safety Audit Category	Frequency	Severity	Risk Rating
11	 *Figure 13 Existing and superseded cyclist wayfinding signs, photo facing north* *Superseded wayfinding signs confusing cyclists.*	There is a general lack of destination wayfinding along the alignment, or existing signage which is now incorrect and points cyclists away from continuing along the cycle lane. This may transfer road safety risk to other areas where cyclist facilities are not as safe or non-existent – this is especially a concern when these cycleways are intended to encourage cyclists who are not confident on the road and this may result in them being forced to ride on road. Further to this, a lack of wayfinding creates an environment that is not intuitive and increases the likelihood of unexpected manoeuvres that may result in crash potential.	Wayfinding	NA	NA	NA

6. Completing the road safety audit

The project manager / sponsor is recommended to take the following steps to complete the road safety audit process:

- Attend the completion meeting
- Review the report
- Accept the Road Safety Audit report
- Produce a corrective action program (Template attached as Appendix B)
- Implement corrective actions
- Close the corrective action program.

Further details are available in the Guidelines for Road Safety Audit Practices[1].

7. Confidentiality and copyright

The information in this Road Safety Audit report is confidential and copyrighted. This document does not form part of a contract.

[1] NSW Centre for Road Safety, Roads and Traffic Authority of New South Wales (2011), *Guidelines for Road Safety Audit Practices*, Sydney.

Appendix A – Safe System Considerations

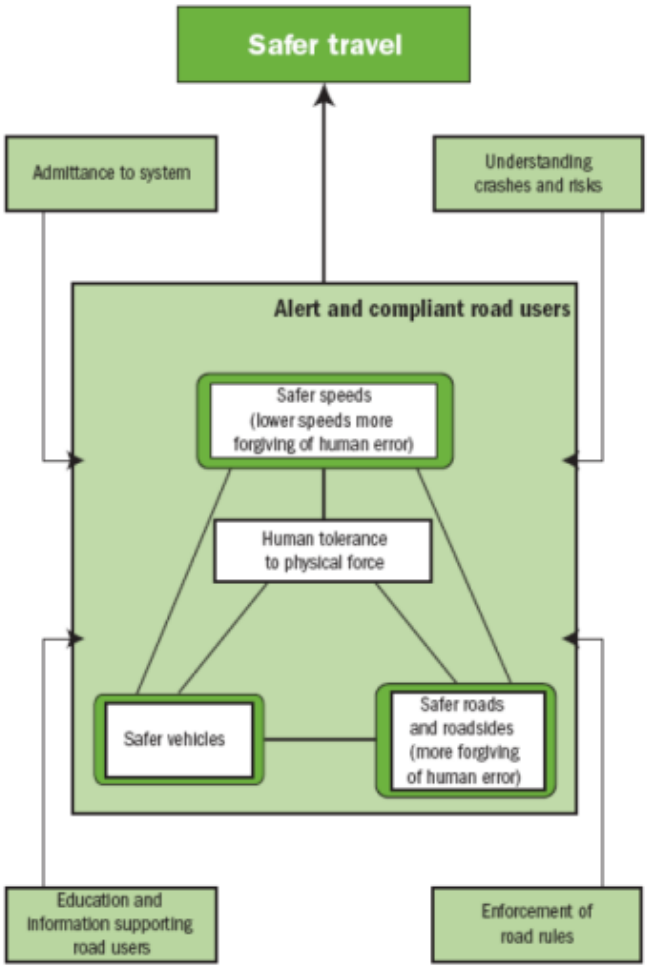
A. Safe System Considerations

A.1 The safe system approach

The identification and removal or treatment of road elements which may contribute to crash occurrence or crash severity is a key component of the safe system approach to road safety. A safe system acknowledges that human error within the transport system is inevitable, and that when it does occur the system makes allowance for these errors so as to minimise the risk of serious injury or death. In a safe system, therefore, roads (and vehicles) should be designed to reduce the incidence and severity of crashes when they inevitably occur.

The safe system approach requires, in part (Australian Transport Council, 2006):

- Designing, constructing and maintaining a road system (roads, vehicles and operating requirements) so that forces on the human body generated in crashes are generally less than those resulting in fatal or debilitating injury
- Improving roads and roadsides to reduce the risk of crashes and minimise harm: measures for higher speed roads including dividing traffic, designing 'forgiving' roadsides, and providing clear driver guidance. In areas with large numbers of vulnerable road users or substantial collision risk, speed management supplemented by road and roadside treatments is a key strategy for limiting crashes
- Managing speeds, taking into account the risks on different parts of the road system.



A.2 Key elements of a safe system

Safer road user behaviour, safer speeds, safer roads and safer vehicles are the four key elements that make up a safe system. In relation to speed the Australian Transport Council (2006) reported that:

- Speed in urban areas greater than 5 km/h above average and 10 km/h above average in rural areas doubles the risk of an injury crash.
- Reductions of as little as 1 to 2% in average speed result in substantially greater reductions in fatalities and serious injuries.
- Chances of surviving a crash decrease markedly above certain speeds, depending on the type of crash:

Type of Crash	Speed Relationship
Pedestrian struck by vehicle	20 to 30km/h
Motorcyclist struck by vehicle (or falling off)	20 to 30km/h
Side-impact vehicle striking a pole or tree	30 to 40 km/h
Side-impact vehicle to vehicle	50 km/h
Head-on vehicle to vehicle (equal mass)	70km/h

Appendix B – Corrective Action Response Form

As set out in the road safety guidelines, responsibility of the risks (inherent or residual) always rests with the designer/project manager and ultimately end-client (project sponsor), not with the auditor. A project manager (client/project sponsor representative) is under no obligation to accept or agree with the audit findings. Also, it is not the role of the auditor to agree to or approve the project manager's corrective action response to the audit risk findings. Rather, the audit provides the opportunity to highlight potential road safety issues and have them formally considered for corrective intervention/mitigation, in conjunction with all other project considerations.

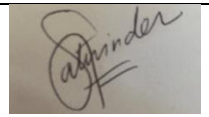
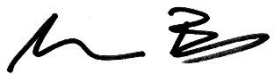
This formal road safety audit report and identified findings should be responded to in writing, being the purpose of Appendix B. If any findings in this report are rejected by the Project Manager, then in each case reasons for this rejection should be included in the written response with the table below. Acceptance of a finding may require no further comment, but an explanation of how or when the action will be taken may be useful and should be provided where possible.

Project Name: Bridge Street, Railway Parade, Henderson Road, Erskineville – Pop-up Cycleway			
Audit No	**RDE20-0091**	**Audit stage**	**Construction - Pre-opening**

Ref No.	**Risk Rating**	**Corrective Action Response (CAR)**	**Priority for action (To be completed by Project Manager)**	**Revised Probability**	**Revised Severity**	**Residual Risk Rating (if any)**
1	Medium	Install additional linemarking through intersection, including: continuous green paint, cycleway continuity lines, bike and arrow pavements symbols, stop control for vehicles exiting side streets.	Necessary	Improbable	Serious	Medium

Ref No.	Risk Rating	Corrective Action Response (CAR)	Priority for action (To be completed by Project Manager)	Revised Probability	Revised Severity	Residual Risk Rating (if any)
2	Medium	• Widen the footpath on the NW corner of the intersection as part of the permanent cycleway. The traffic signal pole will then be relocated to the new kerb line, closer to the cycleway. • Monitor cyclist behaviour during the pop-up evaluation period and install additional signage if required to alert cyclists to the separate bike lanterns.	Necessary	Improbable	Serious	Medium
3	Medium	Remove Jersey kerb and replace with Klemmfix lane separator, angled in the direction of travel of bike riders.	Necessary	Improbable	Limited	Low
4	Medium	Replace concrete barriers with a 2m wide median island which will also extend further along Henderson Road. Additional “left turn only” signage	Necessary	Improbable	Limited	Low
5	Low	Remove Klemfix at the cul-de-sac along the single lane cycleway.	Desirable	Improbable	Limited	Low
6	Low	As the owner and operator of the traffic signals, TfNSW has been made aware of this issue.	Desirable	Occasional	Limited	Low

Ref No.	Risk Rating	Corrective Action Response (CAR)	Priority for action (To be completed by Project Manager)	Revised Probability	Revised Severity	Residual Risk Rating (if any)
7	Low	Install wayfinding signage.	Desirable	Improbable	Limited	Low
8	Low	Install additional signage to clearly indicate extent of the one way arrangements.	Desirable	Improbable	Limited	Low
9	Medium	Update cleaning schedule and clean cycleways daily.	Necessary	Improbable	Minor	Low
10	Low	Further kerb and gutter repairs will be carried during construction of the permanent cycleway.	Desirable	Improbable	Limited	Low
11	N/A	Review and update wayfinding signage.	Desirable	Select a Frequency	Select a Severity	Select the corresponding Risk level

Project Manager / Sponsor Name	Signature		17/08/2020	
Project Manager / Sponsor Name	Signature		20/08/2020	

Design Safety Assessment (DSA)

Design Safety Assessment — Date [date/month/year]

Project Name	**Dunning Avenue tactical cycleway**
Project Location	**Dunning Avenue , Rosebery**
Project Team	**Maren Parry, Tim Bale, Sam Wheatley, Justin Murphy, Fiona Campbell, Beth Robrahn**
Business Unit	**City Projects & Property**
Designer or	**CITO**

					INITIAL ASSESSMENT				REVISED ASSESSMENT					
Life Phase	**Hazard Identified**	**Location and work activity of WHS Hazard**	**Potential impact of hazard**	**Persons Affected**	**Likelihood**	**Consequences**	**Risk Rating**	**Alternatives/Suggested Controls**	**Likelihood**	**Consequences**	**Risk Rating**	**Responsibility/Management**	**Residual Risk**	**Additional Requirements**
3.0 Useability														
3.1	Traffic Management	along full length - narrow bike lane (*1.2-1.4m wide) with insufficnient clearance from vertical obstacles on both sides (parked cars, trees, poles)	bike rider may collide with obstacle	bike riders	B	2	11	1 - maximise width of bike lane as much as possible by minimising parking (2.1) and general traffic (2.6) lanes 2 - install separator kerb to reduce risk of cars parking partially in the bike lane	C	2	17	CoS	monitoring	consider width of cycleway in the permanent design
3.2	Traffic Management	narrow general traffic lanes (2.6m north of Harcourt Parade, 2.8m to accommodate buses south of Harcourt Parade)	motor vehicle collision	motorists	B	1	16	40km/h speed limit in place - slow speed environment	C	1	21	CoS	Vehicles may not be able to pass each other	Monitor and review. If necessary, locally remove parking to provide width required for vehicles to pass each other.
3.3	Traffic Management	At intersections with kerb extensions - Bike riders are obscured by parked cars and have to merge back into mixed traffic	Collision between bike rider and motor vehicle.	bike riders	B	3	8	Kerb ramps added to move all riders onto the footpath. Riders do not merge into mixed traffic.	C	3	12	CoS		Monitor and review 1 - Narrow shared paths do not allow sufficient social distancing.
	Traffic Management	riders at intersections with kerb extensions have to merge onto narrow shared path	Collision between bike rider and pedestrian	pedestrian and/or bike rider	B	2	11	regulatory shared path signage & include in education program	C	2	17	CoS	sightlines	provide option for riders to merge into mixed traffic. Added extra pavement markings to show everyone it is shared path
3.4	Traffic Management	On approach to roundabout - Bike riders are obscured by parked cars and have to merge back into mixed traffic at a point where they also have to watch out for pedestrians.	Collision between bike rider and motor vehicle. Collision between bike rider and pedestrian.	bike riders, pedestrians	A	3	4	1 - Pull back parking lane 35m on approach to create a certain length where the bike lane is adjacent to moving traffic and riders are therefore visible. 2 - Install warning signs for both motorists and bike riders on approach to the merge. "watch for bikes" 4 - Install bicycle symbol on roadway to indicate mixed traffic on approach to the roundabout 5 - Convert the footpath to a shared path near the intersection to provide an alternative for bike riders	C	3	12	CoS		Monitor and review 1 - Narrow shared paths do not allow sufficient social distancing. 3 - install speed cushion to slow motorists on approach to the merge - review roundabouts in permanent design - remove more parking to improve sight lines
3.5	Traffic Management	At existing speed humps with planted median separator - speed hump has steep crossfall in the alignment with the bike lane	bike riders may lose balance and fall	bike riders	C	2	17	Widen bike lane to include a section of the flat top area of the speed hump. This will allow bike riders to avoid the area with a steep crossfall. Note: Parking can not be accommodated across the speed hump due to insufficient road width.	D	2	22	CoS		permanent might remove speed hump in area of bike lane
3.6	Traffic Management	Bike lane adjacent to moving traffic. - Motor vehicles encroach into bike lane.	Collision between bike rider and motor vehicle.	bike riders	B	3	8	Install raised separator kerb with vertical flags or bollards to provide physical separation between the bike lane and cars.	D	3	18	CoS		
3.7	Slips, Trips and Falls	separator kerb poses trip hazard, especially where it is obscured by parked cars and therefore less visible when pedestrians cross the road	injury due to fall	pedestrians, people decanting from parked cars	B	2	11	2 - Use separator kerbs with sufficient colour contrast to road surface. 3 - Include high visibility vertical flags or bollards where appropriate to emphasise presence of obstacle. 4 - Edge lines along the cycleway further improve the contrast between road and separator the separator type has a flat top and a non-slip surface	C	2	17	CoS	Monitor and review	Locally remove separators and replace with linemarking. Or add vertical flags.
3.8	Slips, Trips and Falls	lip between gutter and asphalt	injury due to fall	bike riders	B	2	11	surface repairs where a level difference / lip exists	C	2	17	CoS		
3.9	Traffic Management	tree in parking lane	collision with tree	bike riders	C	2	17	riders diverted around, linemarking added vertical bollard on approach with reflectors	D	2	22	CoS		
3.1	Traffic Management	Using existing driveways to allow riders to transition onto the footpath on approach to intersections with roundabouts or kerb extensions	Bike rider may lose balance and fall as existing driveways have lips.	bike riders	B	2	11	construct new kerb ramps without lips as an alternative to using driveways	E	2	24	CoS		
3.11	Traffic Management	Cyclists riding through bus stop at the same time that the bus is pulling in to stop at the kerb.	Collision between bus and bike rider	bike riders	B	4	5	Parking removed on approach to bus stop to increase visibility of cyclists. Give way linemarking added. Added an off road, shared path alterntative with ramp	D	3	18	CoS		

Design Safety Assessment (DSA)

Design Safety Assessment — **Date** [date/month/year]

Project Name	**Pitt Street North - Phase B pop up cycleway**
Project Location	**Pitt Street (between King and Reiby)**
Project Team	**Maren Parry, Fiona Campbell, Satwinder Saini**
Business Unit Designer or Design	**City Projects & Property**
	WSP (for City Access & Transport)

Life Phase	Hazard Identified	Location and work activity of WHS Hazard	Potential impact of hazard	Persons Affected	INITIAL ASSESSMENT Likelihood	Consequences	Risk Rating	Alternatives/Suggested Controls	REVISED ASSESSMENT Likelihood	Consequences	Risk Rating	Responsibility/ Management	Residual Risk	Additional Requirements
3.0 Useability														
3.1	Traffic Management	Drivers may try to drive or park in the cycleway and/or the former parking lane (now extra footway)	conflict between bike riders and motor vehicles	bike riders, pedestrians	A	1	15	Spearator kerb along the full length of the cycleway including vertical elements. Green paint and standard cycleway linemarking to communicate that this is a cycleway. Regulatory signs. Install barriers in former parking lane either side of driveways and at intersections to block vehicle access.	B	1	16	CoS	Motorists may ignore signage and linemarking.	Review and monitor. Notify police, enforce rules.
3.2	Traffic Management	Parallel turning movement of bikes and motor vehicles from Pitt into King Street	bike getting side swiped by motor vehicle	bike riders	B	3	8	T1 guidance line and bike logo in target lane (lane 4) in King Street.	C	2	17	CoS		Install cycleway on King Street to clearly indicate where bikes should aim for.
3.3	Slips, Trips and Falls	Pedestrian crossing the road,	tripping over separator kerb	pedestrian	B	2	11	Use high vis material for separator and vertical plastic bollards to increase visibility of separator kerb. Leave gaps at regular intervals to allow pedestrians to cross the road without stepping over the separator kerb.	C	2	17	design team, CoS		Monitor, identify desirelines, address in design for permanent cycleway.
	Traffic Management	Pedestrian crossing the road,	May look for cars but not for bikes or misjudge the speed of a bike.	bike riders, pedestrians	B	2	11	Pavement symbols and green liemarking. Communication and media to raise awareness of new cycleway.	C	2	17	design team, CoS communications team		
3.4	Traffic Management	Larger vehicles parking on the eastern side may overhang or cross into the cycleway when they swing in.	collision between bikes and motor vehicles	bike riders	C	1	21	Separator kerb with vertical bollards to ensure maximum visibility of the edge of the travel lane. Additional space available for cyclists in the former parking lane to move away from separator kerb.	C	1	21	CoS	Less space will be available in two-way (phase B) design.	Monitor. If necessary, onstruct more substantial separator kerbs in the long term. Review linemarking and increase the painted buffer zone along the separator if required.
3.5	Traffic Management	Riders passing Martin Place with no physical separation.	Motorists my encroach on cycleway.	bike riders	E	3	20	This risk exists at any intersection. Use solid edge line through intersection to clearly communicate to drivers	E	3	20	CoS	Linemarking through the intrsection may not communicate to drivers that they can not enter the cycleway.	Monitor, review.
3.6	Traffic Management	Pedestrians at Martin Place my store in the cycleway or cross on red.	Collision between bike riders and pedestrians	bike riders, pedestrians	B	3	8	Education. Increased cyclist volumes over time will increase legibility for pedestrians and improve compliance.	B	3	8	CoS		monitor
3.7	Traffic Management	Cyclists may ignore the red signal at mid block crossings Martin Place (or Angel Place in Phase A).	Collision between bike riders and pedestrians	bike riders, pedestrians	B	3	8	Education	B	3	8	CoS		monitor
3.8	Traffic Management	Vehicles turning into or coming out of driveways	blocking the cycleway or collide with a rider.	bike riders	B	3	8	Green paint, cycleway linemarking and signs to alert drivers to the cycleway.	C	2	17		Drivers may ignore markings & signs	
3.8	Traffic Management	Vehicles turning right into Hunter or Bridge Streets across the cycleway not anticipating cyclists to their right	Collision	bike riders	B	4	5	Right turn from Pitt Street into Hunter and Bridge Streets banned for motor vehicles.	E	4	19		Vehicles may disobey right turn ban.	
3.9	Traffic Management	Vehicles turning in or out of Curtin Place, Abercrombie Lane or Dalley Street.	blocking the cycleway or collide with a rider.	bike riders	D	4	13	Treat intersection similar to busy driveways - Green paint and cycleway linemarking to alert drivers to the cycleway. Additional warning signs. Curtin Palce is a dead end, Abercrombie Lane and Dalley Street have very low vehicle numbers (less than some commercial carparks along Kent Street).	E	4	19	CoS		Add signage in Curtin Place and other side streets to alert motorists. Monitor. Review during operation of two-way cycleway if driveway reatment is appropriate long term.
3.11	Traffic Management	Motorists entering Spring Street from Bond Street may block Pitt Street when they give way to pedestrians on the zebra crossing.	collision between vehicles	motorists	A	2	7	Block entry into Spring Street from Pitt Street and Bond Street.	E	1	25			
3.12	Traffic Management	Strong pedestrian desire line across Pitt Street near Bond Street.	tripping over separator kerb	pedestrians	B	2	11	Use high vis material for separator and vertical plastic bollards to increase visibility of separator kerb. Pedestrians not encouraged to cross here - no kerb ramps in pop up design.	C	2	17	CoS	Pedestrians continue to cross in this location due to the desireline.	Monitor, review in design for permanent cycleway how pedestrian access can be safely provided at this location. Consider signalising the intersection.
3.13	Traffic Management	Buses unable to comfortably turn left from Hunter into Pitt Streets.	Overhang or cross into cycleway	bike riders	A	2	11	Increase No Stopping distance on eastern side by 6m.	C	2	17	CoS		Monitor and consider in permanent design
3.14	Traffic Management	Turning path of large vehicles turning from Pitt Street into King overhangs footpath kerb edge.	Truck collides with pedestrian on footpath when turning.	pedestrians	E	4	19	WSP concerned, but only the "buffer" area of tracking cuts footpath, not wheels. Traffic Ops advise this is common in city context and ok as is.	E	4	19	CoS		Monitor

3.15	Traffic Management	Vehicles turning in or out of Bond Street	blocking the cycleway or collide with a rider.	bike riders	D	4	13	Treat intersection similar to busy driveways. Add pedestrian crossing which reinforces message to drivers to give way	E	4	19	CoS	Monitor and consider in permanent design
3.16	Traffic Management	Existing parking space in Bond Street is non-compliant (< 10m from kerb)	collision between driver and pedestrian crossing road due to obstructed sightline	pedestrian	C	3	12	Change space from loading zone to mail zone, which is only occupied for a few minutes a few times a day - leaving clear sight lines almost always	E	3	20	CoS	Monitor
3.17	Traffic Management	Existing parking space in Bond Street is non-compliant (< 10m from kerb)	collision between driver and pedestrian crossing road due to obstructed sightline	pedestrian	C	3	12	Change space from loading zone to mail zone, which is only occupied for a few minutes a few times a day - leaving clear sight lines almost always	E	3	20	CoS	Monitor
3.18	Traffic Management	Construction truck turning into Pitt from Reiby drives over cycleway to make the sharp turn.	Collision between truck and bicycle rider	bike rider	B	4	5	Terminate cycleway at Underwood until 5 year construction of APDG site finished. Thereafter consider large vehicle restriction in Reiby Place.	n/a			CoS	Monitor
3.19	Traffic Management	Construction truck (with poor visibility) or other driver turning into Pitt from Reiby doesn't look for on-road bikes coming from Alfred.	collision between driver and bicycle rider	bike rider	C	4	9	Add warning sign and stop line at Reiby Place. Thereby reduced speed, and time to see each other	D	3	18	CoS	Monitor
3.2	Traffic Management	Bicycle rider collides with pedestrian on shared path due to insufficient width on western side to avoid each other due to construction hoarding	Collision between bicycle rider and pedestrian	bike rider and/or pedestrian	C	3	12	Avoid installing shared path on western side until construction hoarding removed (maybe 5 years?)	D	3	18	CoS	Monitor
3.21	Traffic Management	Construction truck (with poor visibility) or other driver turning into Pitt from Reiby doesn't look for non-compliant, northbound on-road bikes	collision between driver and bicycle rider	bike rider	C	4	9	Clear signage to bike riders that path ends and they must walk their bikes to Circular Quay	D	4	13	CoS	Monitor and consider in permanent, or another interim, solution such as bike crossing to eastern side shared path

Design Safety Assessment — Date: 12-Jun-20

Project Name	**Pop-up cycleway Bridge Street, Railway Parade & Henderson Road**
Project Location	**Bridge Street, Railway Parade & Henderson Road**
Project Team	**CoS: James Kidd, Maren Parry, Satwinder Saini, Sam Wheatley. AECOM: Daniel Fettell, Fabio Chinato, Cameron Ward, Anoop Sridhar, Ghizlane Chergaoui, Vivie Eccles**
Designer or Design Consultants	**AECOM Australia Pty Ltd**

	Life Phase	Hazard Identified	Location and work activity of WHS Hazard	Potential impact of hazard	Persons Affected	INITIAL ASSESSMENT Likelihood	Consequences	Risk Rating	Alternatives/Suggested Controls	REVISED ASSESSMENT Likelihood	Consequences	Risk Rating	Responsibility/ Management	Residual Risk	Additional Requirements
3.00	**Useability**														
3.01		Cyclists travelling southbound on downhill gradient may gain too much speed to be able to stop safely prior to giving way to northbound traffic on Bridge St and having to merge into traffic at Ashmore St	Bridge St / Ashmore St intersection	Injury to cyclists trying to stop at high speed or cyclists not stopping in time before merging into traffic	Cyclists	C	3	13	Central lane divider deflects riders and slows them down, indicating the change.	D	3	17			For permanent scheme: Add advanced signage to warn cyclists to give way ahead and to merge into traffic; kerb buildout to narrow carriageway lanes and slow cars down
3.02		The head of the cul-de-sac is one of few places in Bridge St available for the required U-turn. The existing turn space is already quite tight and requires multi-point turns by some vehicles. The cycleway will further reduce the availabe road width.	Northern end of Bridge St	Motor vehicle conflict with cyclists and/or pedestrians while performing u-turn	Cyclists, pedestrians	C	4	18	1 - Convert footpath alongside the turning circle to a shared path for northbound cyclists. Only southbound cyclists will need to ride through the cul-de sac turning area. 2 - Demarcate southbound cycleway with paint only through the cul-de sac to maxismise available road width for turning vehicles.	D	4	21	CoS		Monitor and review
3.03		Cyclists are required to giveway to pedestrians on Swanson St and within the parklet at the end of Bridge St. These two conflict points are located within close proximity of each other. An increased number of cyclist and pedestrian conflict points increases the likelihood of an incident.	Bridge St / Swanson St intersection	Injury to cyclists and/or pedestrians from crashes	Cyclists, pedestrians	C	4	18	Widened the shared path through the parklet to provide more space to navigate around each other. Run onsite education sessions there.	D	4	21	CoS	Traffic, cyclists and pedestrians do not behave in accordance with expected calmed context	Regular review of traffic behaviour, implementation of remedial measures where this is not consistent with safe operations
3.04		Northbound cyclists may speed through shared path upon seeing a green light across Swanson St.	Bridge St / Swanson St intersection	Injury to cyclists and/or pedestrians from crashes	Cyclists, pedestrians	C	4	18	Onsite education sessions. Ramp to shared path slows riders, and they are already going uphill, so already going slowly.	D	4	21	CoS	monitor and review	Consider additional measures in permanent design toi further slow cyclists down and/or further widen the shared path.
3.05		Cyclists may queue in shared path zone and forcing pedestrians to make unsafe maneuvers around cyclists.	Bridge St / Swanson St intersection	Injury to pedestrians who make unsafe maneuvers around cyclists	Pedestrians	D	4	21	Path area has been widened.	E	4	23			
3.06		Converting southern end of Railway Parade from two-way to one-way southbound may create confusion to drivers, and/or diversion to use routes less suitable to through traffic such as Park St.	Railway Parade / Swanson St intersection	Injury to motorists from wrong-way crashes	Motorists	D	4	21	Provide proper signage for one-way street, check swept paths on potential diversion routes and identify constraints, implement traffic calming measures on diversion routes, introduce turn bans and install signage as necessary Place Variable Message Sign for one month on western approach to Railway Parade to alert drivers to the changed traffic conditions.	E	4	23			Permanent design will consider continuous footpath treatment on Park Street to make it less attractive to drivers.
3.07		The Erskineville Rd bridge has a short section of auxiliary lane, which effectively forms the left turn lane into Railway Pde. With this southern section of Railway Pde becoming one-way southbound the left turn lane is superfluous to requirements. Leaving it in place could lead to undesirable “undertaking” manoeuvres and collisions between merging and accelerating vehicles on the departure side of the signals. The footpath on the northern side of the bridge is very busy and very narrow and not suitable for shared use with bikes.	Swanson St Bridge	Injury to motorists, pedestrians and/or cyclists due to collisions	Cyclists, pedestrians, motorists	C	4	18	Remove left turn lane on east bound Swanson St bridge; convert to eastbound bike lane Add changed traffic condition sign	D	4	21			
3.08		No physical barrier between eastbound cycleway and eastbound traffic on Swanson St bridge.	Swanson St Bridge	Injury to cyclists if motorists inadvertently drive into bike lane	Cyclists	C	3	13	Provide sufficient painted chevron buffer with highly reflective markings between bike lane and traffic lane. Add green paint at start of bike lane and bike logo to make it clear. Linemarking to guide motorists into through lane	D	3	17		Possibility of driver entering bike lane.	Ensure adequate lighting on bridge
3.09		Footpath on the northwest corner of Swanson St/Railway Parade intersection is very narrow with non-compliant kerb ramps.	Swanson St / Railway Parade intersection	Injury to pedestrians waiting to cross Swanson St due to non-compliant kerb ramps and insufficient waiting space	Pedestrians	D	4	21	Removal of left turn for vehicles so no conflict and more space.	E	4	23			Widen footpath and install compliant kerb ramps for permanent version.

3.10		The northern footpath on Railway Parade / Henderson Road is well used but very narrow with many obstructions such as signposts, lighting masts, trees and guardrail. The guardrail a path-side hazard of its own right and it becomes redundant with the northbound traffic removed. The trees are casuarinas and have damaged the path surface, creating trip hazards. There is a risk peds may choose to walk in the cycleway with the potential of ped-bike crashes.	Railway Parade	Injury to pedestrians and cyclists from ped-bike crashes	Pedestrians, cyclists	C	4	18	Cycleway linemarking is offset from the footpath to create extra space for walking.	D	4	21			
3.11		Excessive leaves/debris on cycleway can create a slippery surface for cyclists.	Railway Parade near Sydney Lane	Injury to cyclists when they lost control on slippery surface	Cyclists	C	4	18	Regular cleaning and maintenance to minimise debris on cycleways	D	4	21	CoS		
3.12		Existing trees are very close to the kerb line and within the clearance zone. Bark and roots of some existing trees protrude onto the cycleways. Low hanging branches that do not provide sufficient vertical clearance for cycleways.	Railway Parade, Henderson Rd	Injury to cyclists when they crash into trees, trip over barks/roots, hit low-hanging branches or swerve to opposing cycle lane to avoid obstructions, leading to collisions.	Cyclists	C	4	18	1 - Repair asphalt where it has been damaged by tree roots 2 - Locally adjust cycleway edge linemarking to visiually narrow the cycleway and direct cyclists away from trees close to the kerb. 3 - Prune low tree branches which encroach into the cyclist operating envelope.	D	4	21	CoS		
3.13		Separator median can be tripping hazard for people crossing cycleway after parking their cars or crossing the road.	Railway Parade, Henderson Rd	Injury to pedestrians from tripping over separator median and potential crash with cyclists when crossing cycleway	Pedestrians	C	4	18	1 - Use temporary lane separator in highly visible colour (yellow) and good colour contrast to surrounding road surface. 2 - Provide gaps in the lane separator at pram ramps near intersections and in regular intervals along the cycleway.	D	4	21	CoS		In the permanent design marked parking bays and specific gaps in the separator kerb will further reduce the trip hazard for people decanting from cars.
3.14		Dooring accidents when people open their doors after parking their cars and not looking for oncoming cyclists	Railway Parade, Henderson Rd	Injury to cyclists from crashing into parked car doors	Cyclists	B	3	9	1 - Parking typically provided on straights providing a clear view for passengers of the oncoming rider. 2 - Depending on available road width, maximise buffer zone between cycleway and parking lane.	D	4	21			
3.15		Most of the existing driveways have lip that can form a tram track which captures the bike wheel, dislodging the rider.	Railway Parade, Henderson Rd	Injury to cyclists if they get dislodged	Cyclists	B	4	14	1 - Maximise width of cycelway to allow cyclists to ride away from the driveway edge. 2 - Install white edge linemarking to make the edge of the cycleway clearly visible.	D	4	21	CoS		Regrade pavement near existing driveways to remove the lip
3.16		Existing cracked kerb and gutter can be trip hazards to cyclists.	Henderson Rd / Progress Rd intersection	Injury to cyclists when they lose balance	Cyclists	C	4	18	Repair cracked kerb and gutter.	D	4	21	CoS		
3.17		Removal of roundabouts may cause speeding issues with cars, and resultant removal of pedestrian refuge areas create unsafe conditions for pedestrians crossing the road	Park St, Brandling St, and Alexander St	Injury to pedestrians from car-peds collisions	Pedestrians	B	2	5	Add speed cushions to slow cars down; ensure safe crossing facilities for pedestrians based on desire lines.	C	3	13	CoS	non-compliance with speed limit	Monitor vehicle speeds and consider additional speed cushions if required.
3.18		Cyclists entering or exiting side streets having to cross Railway Parade and Henderson Rd.	Railway Parade, Henderson Rd	Injury to cyclists hit by cars	Cyclists	B	2	5	Ensure adequate sightlines for cyclists and cars at all side street crossings; provide refuge area for cyclists prior to entering or exiting cycleways; add speed cushions for cars to slow down on approach.	C	3	13			
3.19		Vehicles entering and existing side streets have to cross the cycleway and may collide with cyclists.	Henderson Rd / Progress Rd, Henderson Rd / Alexander St intersections	Injury to cyclists and motorists from crashes	Cyclists, pedestrians, motorists	B	3	9	1 - Continue green paint, cycleway linemarking and pavement symbols through the intersections to alert drivers to the presence of the cycleway. 2 - Change "give way" to "stop" signs for vehicles exiting side streets. 3 - Make Alexander Street left-in-left-out only to reduce the number of vehicles crossing the cycleway.	C	4	18	CoS		Monitor operations and implement additional safety controls as required.
3.20		Banning right turn movements at Henderson Rd and Alexander St may lead to traffic diversions and illigal u-turn movements.	Henderson Rd / Alexander St intersection	Injury to cyclists or motorists from crashes	Cyclists, motorists	C	3	13	install median through the intersection to 1 - provide safe refuge for poedestrians and cyclists crossing Henderson Road 2 - narrow the width of Henderson Road to discourage u-turns 3 - signage and linemarking to indicate allowed turns.	D	3	17		non-compliance illegal u-turn movements	
3.21		Existing drainage grates and pit lids are not bike-safe.	Railway Parade, Henderson Rd	Injury to cyclists when their wheels get trapped in grate openings	Cyclists	A	2	3	Upgrade all existing drainage grates within cycleways to bike-safe grates; ensure all drainage grates and pit lids are flush with asphalt	D	3	17	CoS	Bike-safe grates generally have lower inlet capacity and may cause localised ponding areas. Ensure all grates have sufficient inlet capacities for the catchment area.	
3.22		Risk to cyclists, pedestrians and motorists due to insufficient drainage and blocking of overland flow paths	Railway Parade, Henderson Rd	Flooding and ponding leading to vehicle and cyclist safety issues such as tyre slipping, buoyancy, swerving, slipping etc. Blockage of inlets/ drains/ pipes/ pits and if occurred frequently over time can reshape road pavement. Danger to pedestrians and cyclists as a result of fast moving flows.	Public	D	3	17	Monitor	D	3	17	CoS	Current high risk flood precincts will be maintained as per existing conditions	Drainage design for permanent cycleway to review pre- and post-development conditions and to ensure overland flow will not be made worse as a result of the works.

3.23		Pedestrians crossing Henderson Road need to cross cycleway as well as two lanes of vehicular traffic.	Alexander Street / Henderson Road intersection	Injury to pedestrians	Public, Pedestrians	C	3	13	1 - Median refuge island allows pedestrians to cross tHenderson Road in two stages. 2 - Narrowed vehicle lanes and speed cushions on Henderson Road reduce vehicle speeds.	D	3	17				