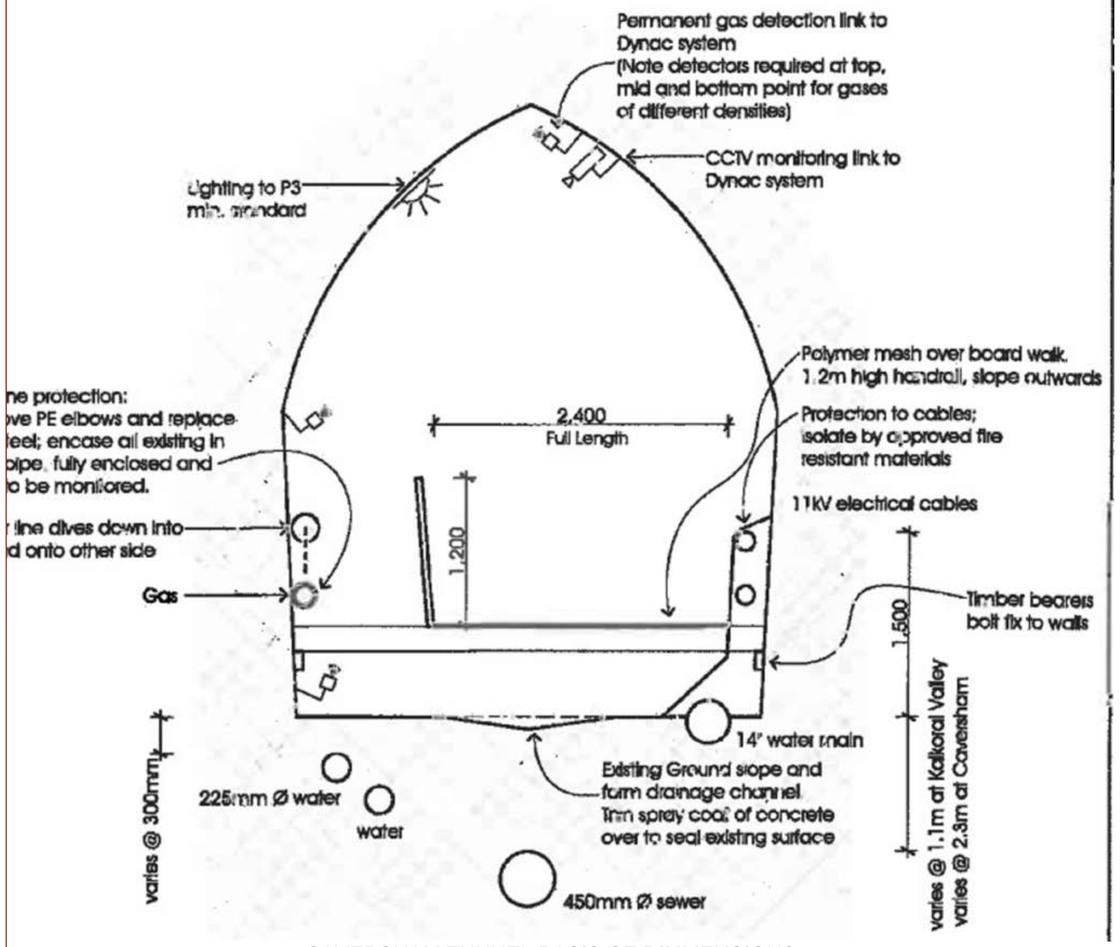
Appendix O. Risk register

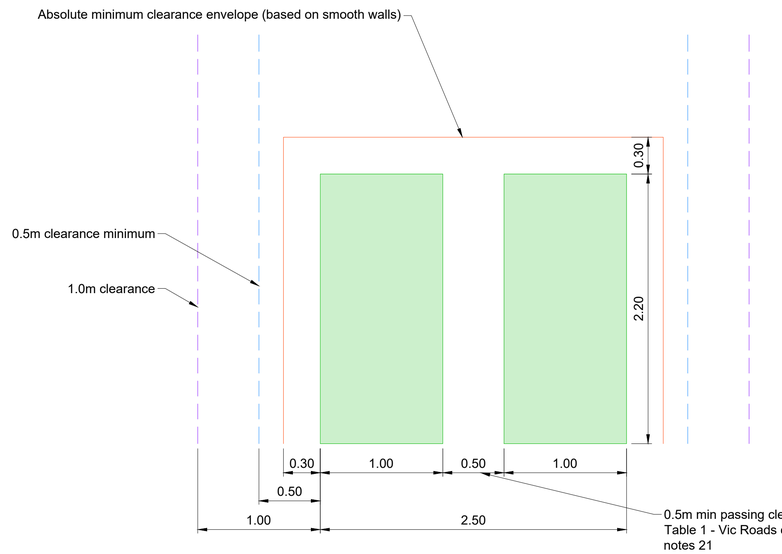
Dunedin Tunnels Trail Project Risk Register

Risk Code	Risk Description	Inherent Risk	Current Risk	Future Risk	Status	Inherent Risk Appetite	Revised Risk Appetite	Current P50 Projection	Current P90 Projection	Risk Category
MPP-CYT-008 (C0398)	access to the rail corridor will be required to facilitate execution of investigative and construction works	High	Medium	Low	Active	Out of Appetite	Within Appetite	0.000	0.000	Project Schedule
MPP-CYT-001 (C0596)	cost estimate uncertainty remains once the prelim design and business case is complete	Medium	High	Medium	Active	Out of Appetite	Out of Appetite	969670.000	1262829.000	Project Cost
MPP-CYT-009 (C0341)	related and required 3 Waters scope items are not determined in a timely manner	High	Medium	Low	Active	Out of Appetite	Within Appetite	0.000	0.000	Project Schedule
MPP-CYT-003 (C0499)	the Covid-19 pandemic may have prolonged and far reaching impacts on the ability to maintain project momentum with scarcity of resource, supply and uncertainty in activity durations	Medium	Medium	Low	Active	Out of Appetite	Within Appetite	0.000	0.000	Project Schedule
MPP-CYT-007 (C0506)	the Kiwi Rail agreement in principle could be retracted or altered meaning limited or no space to include an active transport pathway	High	High	Low	Active	Out of Appetite	Out of Appetite	0.000	0.000	Project Outcomes and Quality
MPP-CYT-004 (C0601)	Uncertainty as to consenting requirements and subsequent approvals	Low	Medium	Low	Active	Within Appetite	Out of Appetite	125000.000	194098.000	Project Schedule
MPP-CYT-018 (C0542)	the condition of either the Caversham or Chain Hills tunnel could be prohibitively expensive or complicated to resolve	Critical	High	Medium	Active	Out of Appetite	Out of Appetite	237702.000	451795.000	Project Cost
MPP-CYT-010 (C0551)	the land purchase activity required for the project will not occur as planned	Medium	Medium	Medium	Active	Out of Appetite	Out of Appetite	0.000	0.000	Project Schedule
MPP-CYT-012 (C0446)	the project objectives cannot be achieved within the current funding limits	Critical	High	High	Active	Out of Appetite	Out of Appetite	0.000	0.000	Project Cost
MPP-CYT-024 (C0619)	DCC cannot effectively maintain chain hills tunnel as they only own 50% of it.	Medium	Medium	Medium	Active	Out of Appetite	Out of Appetite	0.000	0.000	Project Cost
MPP-CYT-020 (C0216)	forming the Tunnels Trail will require extensive input from Kiwirail	High	Medium	Low	Active	Out of Appetite	Within Appetite	0.000	0.000	Project Schedule
MPP-CYT-037 (C0599)	archaeological artefacts are discovered within the route	Medium	Medium	Low	Active	Within Appetite	Within Appetite	10000.000	15528.000	Project Schedule
MPP-CYT-030 (C0500)	design (where applicable) does not fulfil other stakeholder objectives (KiwiRail, Waka Kotahi etc.) and design iterations are required	High	Medium	Low	Active	Out of Appetite	Within Appetite	80806.000	105236.000	Project Cost
MPP-CYT-038 (C0502)	issues are encountered with ground conditions (both structural and contaminated)	Medium	Medium	Low	Active	Out of Appetite	Out of Appetite	469670.000	762829.000	Project Cost
MPP-CYT-046 (C0501)	across the project there may be unknown or non recorded in ground services	High	High	Low	Active	Out of Appetite	Out of Appetite	71967.000	101283.000	Project Cost
MPP-CYT-048	cost estimate uncertainty as to related and required 3 Waters scope items	Medium	Medium	N/A	Active	Out of Appetite	Out of Appetite	271447.000	466886.000	Project Cost
MPP-CYT-049	costs escalate / increase due to the length of the project programme, the selected delivery method, and the current Covid affected supplier environment	Medium	Medium	N/A	Active	Out of Appetite	Out of Appetite	1454505.000	1894244.000	Project Cost
MPP-CYT-044 (C0594)	the business case does not fulfil Waka Kotahi requirements and thus does not receive related funding	Medium	High	Medium	Active	Out of Appetite	Out of Appetite	0.000	0.000	Project Outcomes and Quality
MPP-CYT-045 (C0607)	the rail boundary location is not well defined	Medium	Medium	Low	Active	Within Appetite	Within Appetite	27145.000	46689.000	Project Cost
							Total	$ 3,852,205.00	$ 5,493,037.00	

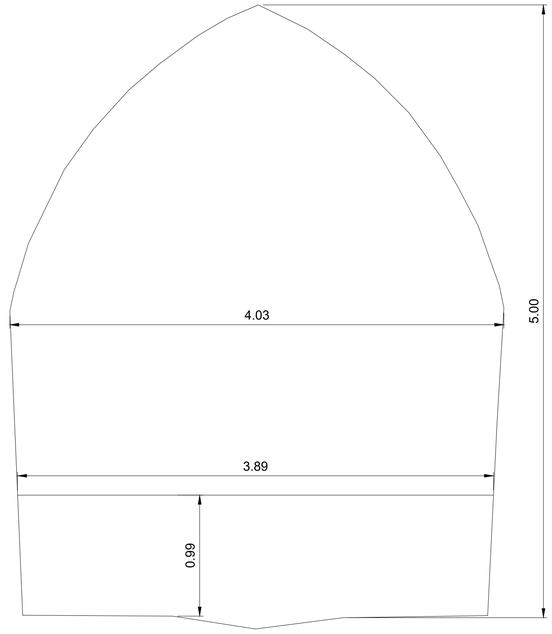
Appendix P. Tunnel cycle envelope



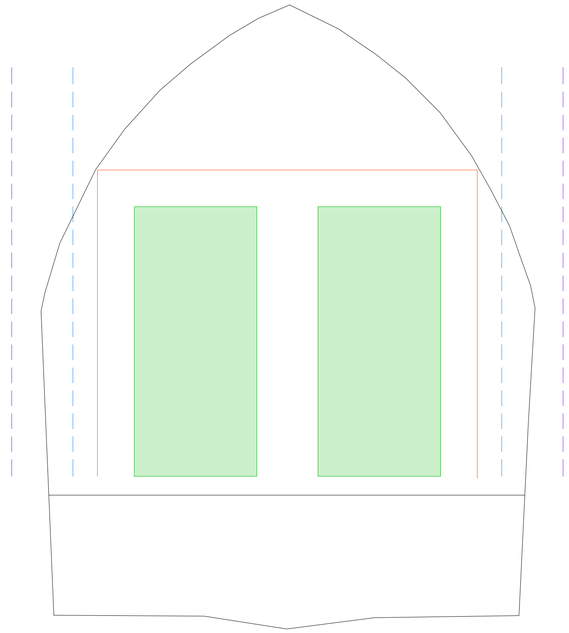
CAVERSHAM TUNNEL BASIS OF DIMMENSIONS - PRIMECORP JULY 2012 REPORT



AUSTROADS PART 6A - 2017 - CYCLE PATH ENVELOPE DETAIL



CAVERSHAM TUNNEL ASSUMED DIMENSIONS (TO BE CONFIRMED)



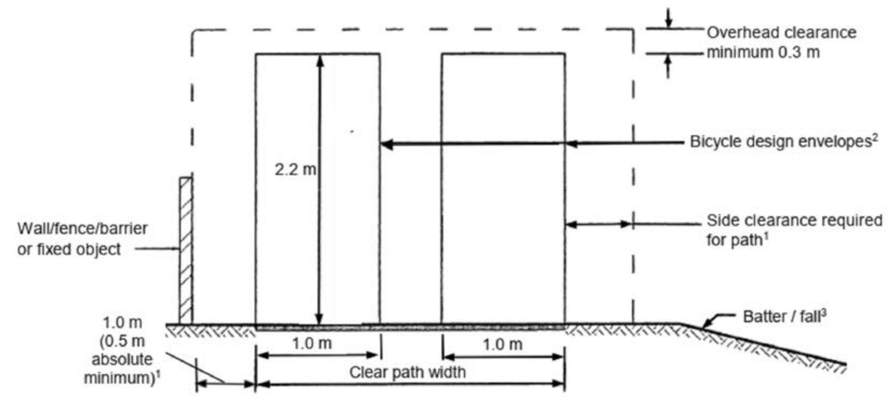
CAVERSHAM TUNNEL WITH CYCLE PATH ENVELOPE OVERLAID

5.5 Clearances, Batters and Need for Fences

5.5.1 Clearances

The clearances (Figure 5.7) may be used to construct the appropriate width of the facility required for paths that cyclists use. The envelope based on Figure 3.5, is assumed to be consistent over the range of operating conditions and allowance for higher speeds is provided through larger clearances to other cyclists and fixed objects beside the path.

Figure 5.7: Clearances between cyclist envelope and potential path hazards



1 *This may be reduced to 0.3 m where a fence or obstacle has smooth features.*
2 *Refer to Section 3.2.2 for guidance on bicycle design envelopes.*
3 *Refer to Section 5.5.3 for guidance on batters and need for a fence.*

AUSTROADS PART 6A - 2017

REV	REVISION DETAILS	DRN	CHK	APP	DATE

bonisch consultants
T 03 218 2546 F 03 214 4285 FP 0800 802 546
19 The Crescent, P.O. Box 1262, Invercargill 9840
E admin@bonisch.nz W www.bonisch.nz

CLIENT: [redacted]

PROJECT: DUNEDIN TUNNELS TRAIL

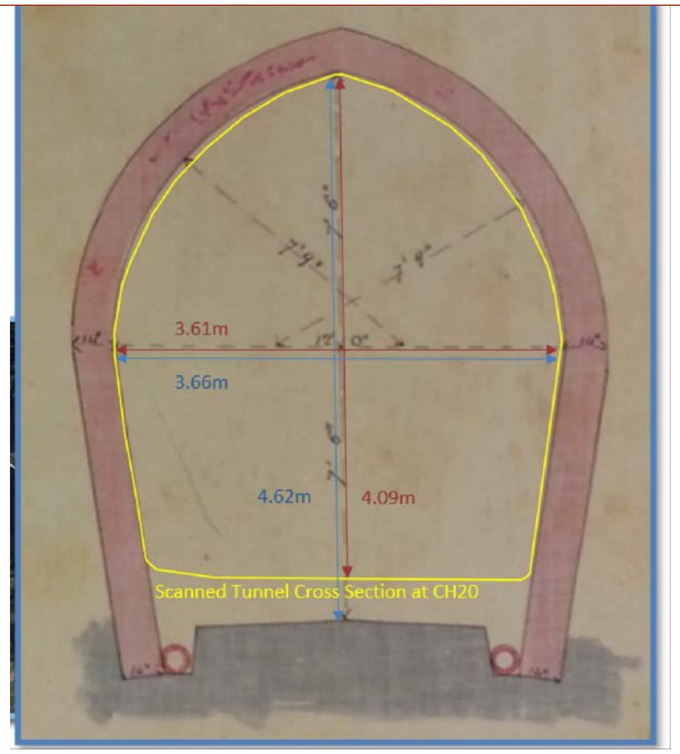
SHEET TITLE: CAVERSHAM TUNNEL - CYCLE PATH ENVELOPE COMPARISON

SURVEYED:		
DESIGNED:		
DRAWN:		
DRAWING CHECK:		
DESIGN CHECK:		
APPROVED:		

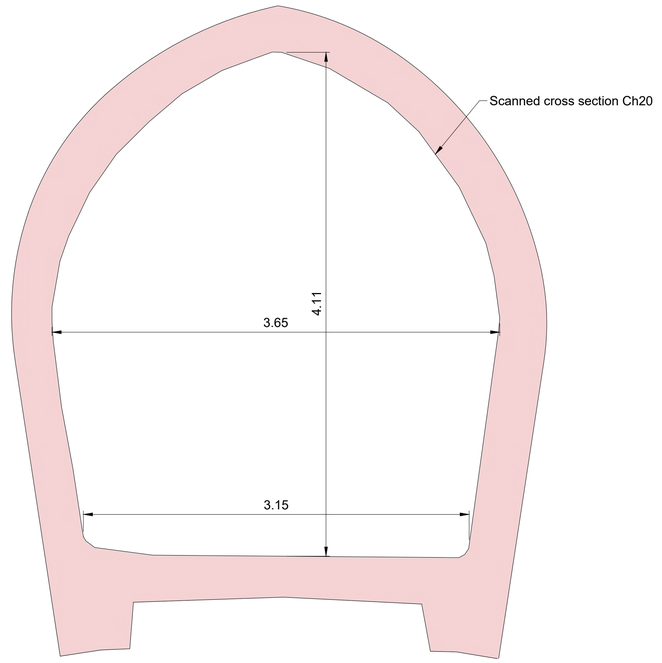
SCALE (ORIGINAL SIZE A1): 1:25
DATE ISSUED: 13/10/2020
JOB NO: 7332 SHEET: 1 of 1 REV: A

Last Edited by: Simon on ----

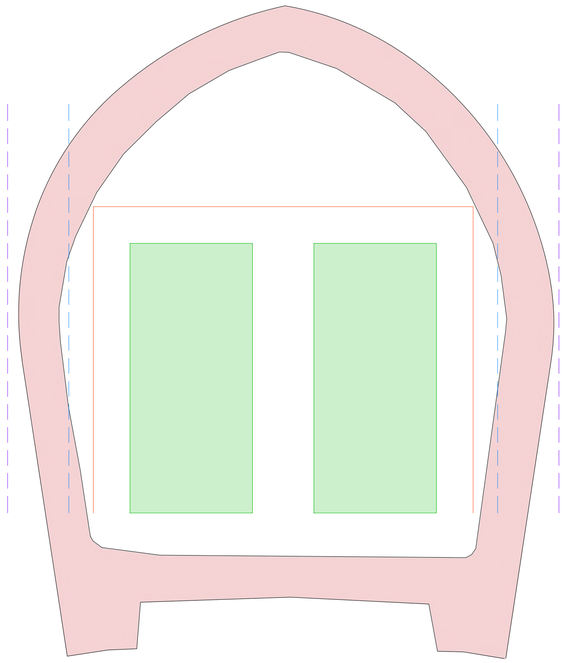
Drawing1.dwg



OTAGO UNI - 3D SCAN AND REPORT
CHAIN HILLS TUNNEL DIMENSIONS



CHAIN HILLS TUNNEL ASSUMED
DIMENSIONS (TO BE CONFIRMED)



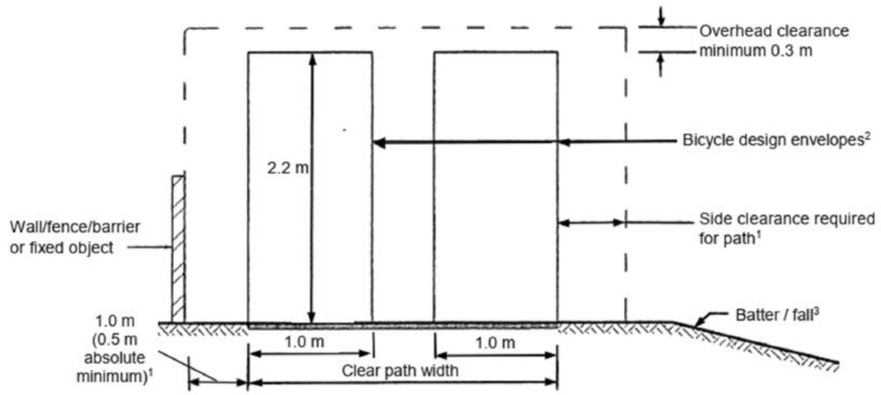
CHAIN HILLS TUNNEL WITH CYCLE PATH
ENVELOPE OVERLAID

5.5 Clearances, Batters and Need for Fences

5.5.1 Clearances

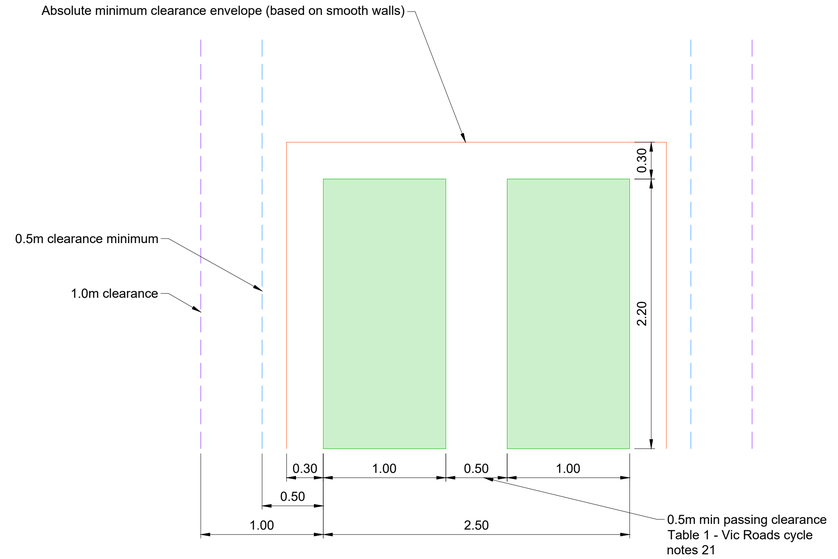
The clearances (Figure 5.7) may be used to construct the appropriate width of the facility required for paths that cyclists use. The envelope based on Figure 3.5, is assumed to be consistent over the range of operating conditions and allowance for higher speeds is provided through larger clearances to other cyclists and fixed objects beside the path.

Figure 5.7: Clearances between cyclist envelope and potential path hazards



1 *This may be reduced to 0.3 m where a fence or obstacle has smooth features.*
2 *Refer to Section 3.2.2 for guidance on bicycle design envelopes.*
3 *Refer to Section 5.5.3 for guidance on batters and need for a fence.*

AUSTROADS PART 6A - 2017



AUSTROADS PART 6A - 2017 - CYCLE PATH ENVELOPE DETAIL

REV	REVISION DETAILS	DRN	CHK	APP	DATE

bonisch consultants
T 03 218 2546 F 03 214 4285 FP 0800 802 546
19 The Crescent, P.O. Box 1262, Invercargill 9840
E admin@bonisch.nz W www.bonisch.nz

CLIENT: [redacted]

PROJECT: DUNEDIN TUNNELS TRAIL

SHEET TITLE: CHAIN HILLS TUNNEL - CYCLE PATH ENVELOPE COMPARISON

SURVEYED:		
DESIGNED:		
DRAWN:		
DRAWING CHECK:		
DESIGN CHECK:		
APPROVED:		

SCALE (ORIGINAL SIZE A1): 1:25
DATE ISSUED: 13/10/2020
JOB NO: 7332 SHEET: 1 of 1 REV.: A

Last Edited by: Simon on ---

Drawing1.dwg

Appendix Q. Safety audit report

Transport Planning and Design
Level 1, 284 Kilmore St
www.viastrada.co.nz

Dunedin Tunnels Trail

Concept design stage road safety audit

Report prepared for

DUNEDIN CITY COUNCIL | kaunihera a-rohe o Ōtepoti

February 2022

This document has been prepared for the benefit of Dunedin City Council. No liability is accepted by ViaStrada Ltd, or any of its employees or sub-consultants with respect to its use by any other party.

<table>
<tr><td colspan="3">Quality Assurance Statement</td></tr>
<tr><td rowspan="3">ViaStrada Ltd
Level 1,
284 Kilmore St
PO Box 22 458
Christchurch 8140
New Zealand
Phone: (03) 366-7605
www.viastrada.nz
enquiries@viastrada.nz</td><td>Project Manager:

Warren Lloyd</td><td>  </td></tr>
<tr><td>Prepared by:

Jon Ashford</td><td>  </td></tr>
<tr><td>Reviewed by:

Warren Lloyd</td><td>  </td></tr>
<tr><td>Project Number:
Project Name:</td><td colspan="2">1002-21-08-02
Dunedin Twin Tunnels Trail (alternate route)
Preliminary design stage road safety audit</td></tr>
<tr><td colspan="2">Document Version</td><td>Date</td></tr>
<tr><td colspan="2"></td><td></td></tr>
<tr><td colspan="2"></td><td></td></tr>
<tr><td colspan="2">First Draft V02 (For designer responses)</td><td>10 February 2022</td></tr>
</table>

Contents

1 Introduction

1.1. Context

ViaStrada has been commissioned by Dunedin City Council to conduct a second concept design stage road safety audit of the ammended alignment of the Twin Tunnels Trail between Mosgiel and Caversham.

Several options have previouslybeen developed for the route, with Option E selected for the initial audit. This option included a section of bi-directional shared use path through Green Island along the side of Main South Road as shown in Figure 1-1.

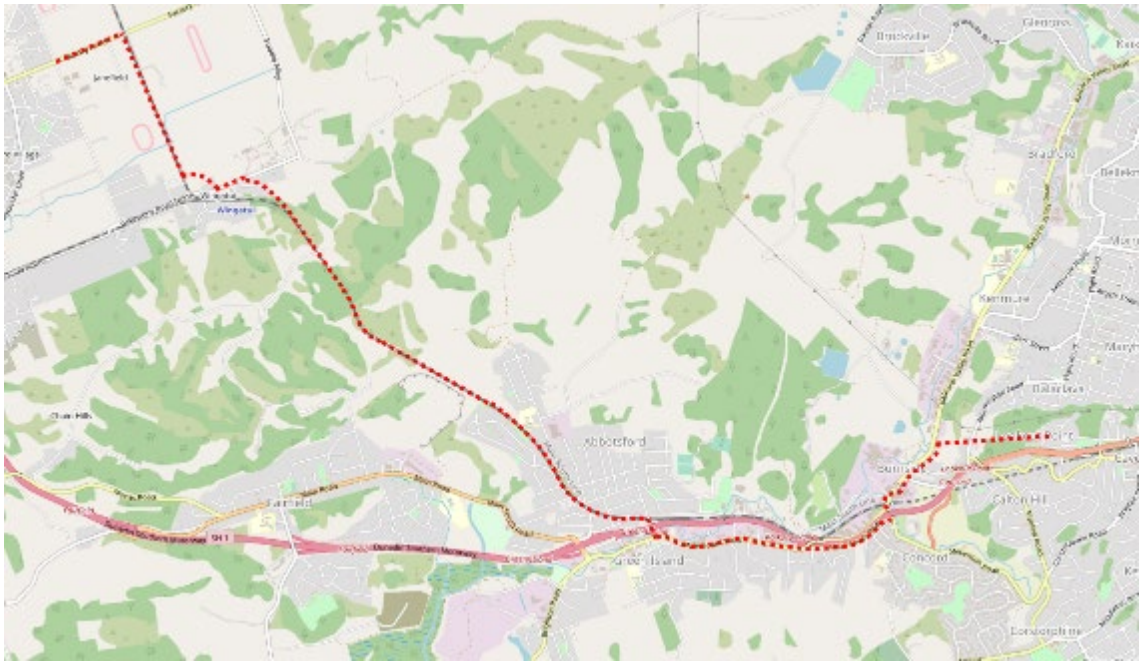


Figure 1-1: Twin Tunnels Trail - Option E route

The section through Green Island had a very different look and feel to the rest of the route and the safety auditors found many safety concerns with the Main South Road segment. The segment along the side of Main South Road has now been removed.

The latest Twin Tunnels route provided for this audit follows much of the Option E route, with more detail added at intersections and facility treatments. A separated, off-road shared use path along the rail corridor and through sections of Abbottsford and Burnside replaces the Main South Road segment.

The difference between the two options can be seen in Figure 1-2. The sections common with the Option E route are shown with the dashed black line, the previous route along Main South Road through Green Island has a red dashed line and the current alignment used in this audit is shown with a blue dashed line.

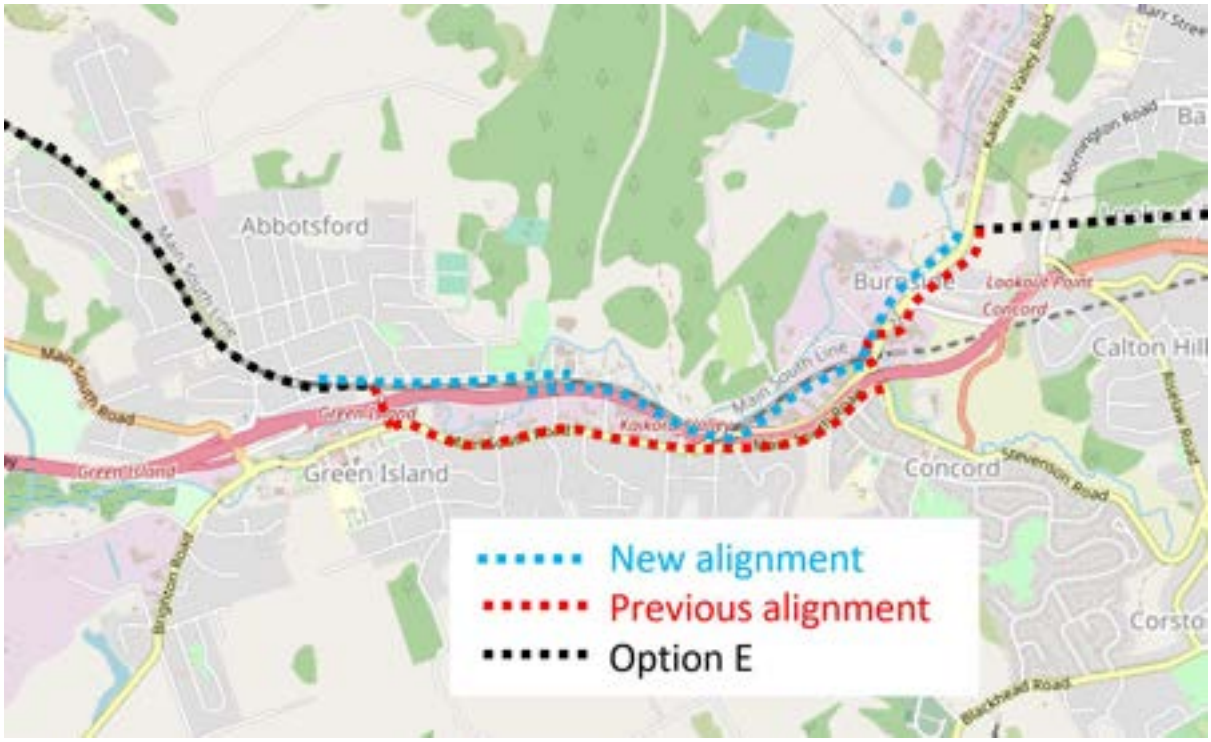


Figure 1-2: revised alignment through Abbottsford and Burnside

1.2. The safety audit team

The safety audit team (SAT) consisted of:

- Warren Lloyd – team leader
- Jon Ashford – team member

1.3. Site visit

The SAT undertook a daytime visit of the accessible sections of the route on Wednesday 2 February 2022. The auditors revisited most of the route to assess the additional detail and any changes made and focussed most of their attention on the new alignment. They did not revisit the Chain Hill and Caversham tunnels, as these were visited during the previous audit.

1.4. Crash history

Waka Kotahi holds a national database of crashes (CAS) for New Zealand. Crashes are generally investigated for the previous five years to ensure crash pattern can be identified or monitored, rather than responding to one-off events.

The crashes recorded in CAS are usually on-road and involve motorised vehicles. Where pedestrians or cyclists are involved in crashes, this is only recorded in CAS if there is an injury, or a motorised vehicle is involved. Most of the Twin Tunnels route is off-road and as such the crash history is not included in CAS. We have reviewed CAS at locations where the trail crosses the road network and there are very few recorded crashes.

1.5. Information received.

The following information was initially received as part of this safety audit:

- 211117 - PRELIM DESIGN DRAFT - SECTION 1.pdf
- 211117 - PRELIM DESIGN DRAFT - SECTION 2 and 3.pdf
- 211117 - PRELIM DESIGN DRAFT - SECTION 4 and 5.pdf
- 211117 - PRELIM DESIGN DRAFT - CROSS SECTIONS ALL.pdf

All the above plans were also provided in reduced size format.

- The following full set of preliminary design plans was then received: 211214 7332 Dunedin Tunnels Trails Full Set(A3).pdf

This is the set that has been referenced in this safety audit.

The plan set contains 100 drawing sheets, they are not appended to this report to reduce document size but can be provided on request.

1.6. Audit procedure

The reporting of safety issues and their ranking is generally based around the TFM9 Guidelines the NZ Transport Agency Road Safety Audit procedures for projects INTERIM RELEASE MAY 2013.

The expected crash frequency is qualitatively assessed based on expected exposure (how many road users will be exposed to a safety issue) and the likelihood of a death or serious injury resulting from the presence of the issue. The severity of a crash outcome is qualitatively assessed based on factors such as expected speeds, type of collision, and type of vehicle/object involved.

The frequency and severity ratings are used together to develop a combined qualitative risk ranking for each safety issue using the Concern Assessment Rating Matrix in Table 1-1 below. The qualitative assessment requires professional judgement and experience from a wide range of projects of varying sizes and locations. Note that the following information given in Table 1-1 and Table 1-2 is used to inform severity, frequency of crash events and the risks with suggested actions[1].

[1] Taken from the NZ Transport Agency 'Road Safety Audit Procedures TFM 9 Guidelines INTERIM RELEASE MAY 2013

Table 1-1 Severity rating matrix

Likelihood of death or serious injury	Frequency (probability of a crash)			
	Frequent	Common	Occasional	Infrequent
Very likely	Serious	Serious	Significant	Moderate
Likely	Serious	Significant	Moderate	Moderate
Unlikely	Significant	Moderate	Minor	Minor
Very unlikely	Moderate	Minor	Minor	Minor

The ranking of the frequency of crashes has been assessed in accordance with Table 1-2.

Table 1-2: Indicative crash frequency

Crash Frequency	Indicative description
Frequent	Multiple crashes (more than 1 per year)
Common	1 every 1 – 5 years
Occasional	1 every 5 – 10 years
Infrequent	Less than 1 every 10 years

While all safety concerns should be considered for action, the client will make the decision as to what action will be adopted. This report gives safety ranking guidance, and it is acknowledged the client must consider factors other than safety alone. The suggested action for each concern category is given in Table 1-3 below.

It should be noted that the severity rating assigned to the likelihood assigned to 'Death or Serious Injury' is often "Likely" or "Very likely" because crashes between pedestrians and motorised vehicles often results in serious injury or fatality crashes.

Table 1-3: Concern categories

Risk	Suggested Action
Serious	A major safety concern that must be addressed and requires changes to avoid serious safety consequences.
Significant	Significant concern that should be addressed and requires changes to avoid serious safety consequences.
Moderate	Moderate concern that should be addressed to improve safety
Minor	Minor concern that should be addressed where practical to improve safety.

1.7. Disclaimer

The findings and recommendations in this report are based on the site visit undertaken by the safety audit team (SAT) leader, an examination of available relevant plans, the specified road and environs, and the SAT's professional knowledge and experience. However, it must be recognised that no audit can guarantee the elimination of all possible safety concerns as all traffic environments consist of a multitude of elements that are never completely within the control of engineering design.

Safety audits, by nature, focus on aspects relating to safety and therefore do not constitute a complete review of design or assessment of standards with respect to engineering or planning documents. Similarly, the safety audit focuses on the plans provided; it is not the role of the SAT to identify all elements such as signage, markings, or pedestrian tactile pavers in the absence of more detailed plans.

This audit applies to the stated project. Whilst some issues covered are general and might be applicable to other locations, the SAT does not take any responsibility for transferral of concepts to other projects or locations.

While every effort has been made to ensure the accuracy of the report, it is made available on the basis that anyone relying on it does so at their own risk without any liability to the safety audit team or their organisations.

We invite our clients to suggest changes for our consideration as part of a client review process. Our preference for this is to use the track changes function of the editing software. We do not consent to any changes, however small they may appear, to be made to any of our writings in the main audit section of our report. This restriction includes our SAT responses.

We do not consent to any changes … to be made to the main audit section of our report.

Due to the location of the proposed path, not all sections of the proposed route could be sighted during the site visit.

1.8. Safety audit format

General safety issues applicable to the whole project are noted in Section 2.

The audit is then separated into the following 4 sections with safety issues that are specific to that section of the route:

Table 1-4: the new alignment sections, plan numbers and chainage

Section	Description	Plan Numbers
3	Factory Road (Wingatui Road) to Chain Hills Tunnel	01 – 16
4	Chain Hills tunnel to Abbotsford School Underpass	17 - 26
5	Abbotsford School Underpass to Haraway Underpass (opposite Armstrong Lane)	27 – 38
6	Haraway Underpass (opposite Armstrong Lane) to Barnes Drive	39 – 52

2. General safety issues

2.1.1. Shared path width constraints & in-path hazards	Minor
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Utility poles and services, driveway ramps and rubbish bins reduce the available width of the shared path. It is important for the shared path to be user-friendly and perceived as such. Providing a suitable width, clear path of travel will help to achieve this. There is an example at CH 940 – 990 where the path alignment is deviated past some KiwiRail hardware with a series of short sharp reverse curves, see Figure 2-1.	

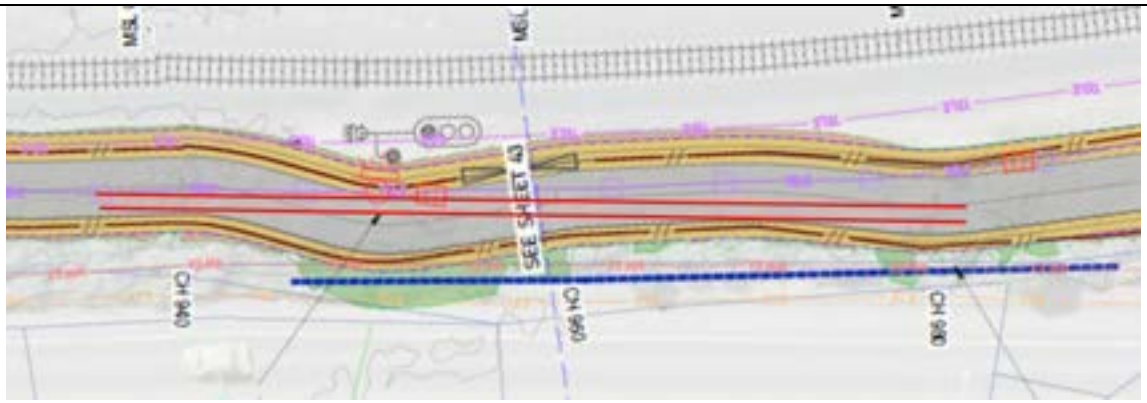


Figure 2-1: short sharp curves to avoid rail hardware

The SAT have drawn two parallel red lines in Figure 2-1 showing the direct line or path riders are likely to take through these curves.

The designer should also consider locations and placement of holding rails and tactile paving at all crossings as these can impact on how people can use the facility.

There are also several locations where utility service lids extend above the current gravel path surface. They can have sharp protruding edges that could be a hazard to path riders, see Figure 2-2 and Figure 2-3.

Figure 2-2: protruding path hazard

Figure 2-3: sharp edge hazard

Recommendations:	
2.1.1.1.	That a minimum clear path width of 2.5 m is provided at pinch points with a desirable clear path width of 3.0 m minimum for all other sections.
2.1.1.2.	That the designer confirms that the impacts of utility poles, driveway ramps, and rubbish bins has been allowed for in the proposed shared path width.
2.1.1.3.	That a minimum curve radius of 20 m – 30 m is used on the path alignment between intersections to avoid short sharp, reverse curves.

2.1.1.4.	That the designer advises how the risk of riders colliding with protruding utility service lids will be mitigated. Note: if a section of AC is installed, the AC should be bevelled to ensure the transition between the gravel surface and AC is not a hazard.

Designer Response: *Agree with SAT items 2.1.1.1 and 2.1.1.3 and they will be considered during the detailed design. The impact of Items 2.1.1.2 and 2.1.1.4 will be considered in the detailed design phase when topographical survey and detailed 3D design information is available. This info will help to identify existing services lids that need adjusting to make them flush with the path surface and ramping of gravel sections to join flush with asphalt surfacing. The Detailed design will also consider where possible, localised widening of the path for items such as utility poles which encroach on the shared path width.*

Safety Engineer: ***Agree with designers response. Additionally, ensure all remaining service covers left in the shared path are cycle friendly and flush to the path surface.***

Client Decision: ***Agree with comments, this will be addressed through detailed design.***

Action Taken: Click here to enter text.

2.1.2. Path status during maintenance	**Minor**

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

There are many locations along the path where public utility structures are located. Routine and or emergency maintenance of these structures may close or constrain the available path width. There are sections of the path where structures are on a gradient and riders may be traveling at higher speeds.

The preference would be that access for path users is always provided but possibly reduced in width at the maintenance site.

Recommendations:

2.1.2.1.	That the project team considers a generic path traffic management plan for maintenance events that retains access for path users.

Designer Response: *To be discussed in future phases of the project in conjunction with DCC's maintenance contract staff.*

Safety Engineer: ***Future maintenance should have TMP's associated with any track restrictions but agree that minimum widths, alternative routes, etc. would be advantageous to have organised beforehand.***

Client Decision: ***Agree with Safety Engineer. The maintenance team will be involved in detailed design process.***

Action Taken: Click here to enter text.

2.1.3. Shared path right angle turns — Minor

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

There are many examples where the path runs parallel to the road and then turns at a right angle to cross a road, bridge, etc. Very tight turns are difficult for most riders and restrict the path capacity to single file in these locations. A consequence is riders and pedestrians cutting the corner and or crossing in other locations, which creates a new risk for road users not expecting this to happen.

An example of a parallel path with a tight right angle turn that has been subsequently 'fixed' at the post construction stage can be seen in Figure 2-4. The photo shows that the local path widening is still insufficient as some riders are using the unsealed area to make their turn.

Figure 2-4: poor post construction fix for right angle turns in parallel paths

Recommendations:

2.1.3.1.	That the designer ensures the path does not feature tight right angle turns.
2.1.3.2.	That a pan-handle type facility is provided at road crossings.

Designer Response: *Agree with SAT that right angle turns are to be minimised as much as practicable. If a right angle turn is unavoidable, where possible localised widening will be included in the design.*

Safety Engineer: ***Agree with SAT. It is not unusual to see cycles with trailers or parents towing children on their own bikes, which are longer than a standard cycle. Widen the shoulder area as much as practical to accommodate non standard cycle combinations.***

Client Decision: ***Agree with SAT, the shoulder area will be widened through detailed design.***

Action Taken: Click here to enter text.

2.1.4. Small radius curves — Minor

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

There are many locations where the design has adopted a short radius curve between two straights. The small radius curves can be a hazard to inexperienced cyclists and can often restrict inter-visibility with approaching cyclists who could be travelling at a different speed as a consequence of the gradient. In a worst case this could result in a head on crash if riders are inattentive.

They can prevent side by side cycling, and in most cases prevent two-way flow. In a worst case this could result in a head on crash if riders are inattentive.

The SAT note that in some locations the alignment is constrained, however, by slightly deviating the approach alignments, the radius can be increased to improve the flow of the path.

Recommendations:

2.1.4.1.	That the designer adopts a minimum curve radius (20 – 30 m) for all midblock sections of path. Noting that this can reduce as the path approaches intersections and tunnels.

Designer Response: *Agree with SAT recommendation. Where constraints allow, the detailed design phase will include 20 – 30m minimum curve radius for all mid-block path sections.*

Safety Engineer: ***Agree with SAT. Minimise all curve radii to avoid cyclists straight lining through curves.***

Client Decision: ***Minimum curve radius will be included in the detailed design.***

Action Taken: Click here to enter text.

2.1.5. KiwiRail access	**Minor**

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

There are multiple gates provided in the path side fence for KiwiRail access. The SAT note that in several locations, these appear to be inaccessible for vehicles using the path and a vehicle may not have sufficient space to access the rail corridor. The SAT are uncertain if the expectation is that KiwiRail vehicles will remain in the path corridor and use the gates for pedestrian access only. There is also the concern that gates may open over the path, in preference to encroaching the rail corridor.

As an example, sheet 27 Ch 2,550, sheet 28 Ch 2,720 and 2,815, sheet 29 Ch 3,015, sheet 31 Ch 3,200 can only be accessed from North Taieri Road, meaning vehicles drive along the path for over 700 m and may not be able to manoeuvre off the path because of the tight space in the rail and path corridor.

Recommendations:

2.1.5.1.	Designer to confirm the access requirements and operation of the gates, and that every gate can be accessed from the road and railway line where vehicle access is required.

Designer Response: *In consultation with Kiwirail they have advised that their requirement is for pedestrian access gates to be installed between the path and Kiwirail infrastructure. Between North Taieri bridge and ch 3100 pull over bays will be included in the design at regular intervals to allow Kiwirail maintenance vehicles to pull over and allow cyclists to pass.*

Safety Engineer: ***The gate issue should be mitigated as far as possible. Where there is space in the rail corridor gates should open away from the path. If this is not possible, consider sliding gates. Ensure maximum visibility between***

maintenance vehicle routes and path users and ensure plantings and maintenance of the sight lines are carried out.
Client Decision: ***Safety Engineer comments will be included through detailed design.***
Action Taken: Click here to enter text.

2.1.6. Path connections to existing network	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Various sheets	
There are many locations where the proposed path intersects with existing paths. Most connections are not changed in any way and the existing path retains the existing alignment. We accept that this is indicative at the preliminary stage but note that where paths meet at acute and obtuse angles this can result in a conflict with other path users, often as a result of poor inter-visibility. The SAT acknowledge that these connections are usually out of scope, but this doesn't reduce the risk or consequence of crashes. Ideally the path connections will be made as close to 90 degrees as possible and preferably on a level gradient. In some cases, this will not be possible, and consideration may need to be given to closing or significantly changing the intersection locations and or alignments. This could be done in collaboration with DCC to future proof the project and avoid the need to remove sections of built environment in the future.	
Recommendations:	
2.1.6.1.	Designer to look to make all existing path connects as safe and user-friendly as possible.
2.1.6.2.	The project team look to align with Councils walking and cycling team/s to see where and how safe path connections can be achieved.
Designer Response: *Existing Path intersections with the proposed path will be reviewed as part of the detailed design phase once topo survey information is available.*	
Safety Engineer: ***Agree with SAT. Ensure coordination with other projects and joins to existing infrastructure should be according to best practice principles.***	
Client Decision: ***Existing path intersections/connections will be included in the detailed design. The design team will continue to work with the Transport Planning and Delivery teams to ensure coordination between other projects and this one.***	

Action Taken: Click here to enter text.

2.1.7. Parking setbacks	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Vehicles parked parallel to the kerb, between a cycleway and the road can restrict intervisibility at driveways. An option to increase intervisibility is restricting the parking density and not permitting people to park too close to driveways. A set-back from a driveway can be used to locate bins and this prevent bins from obstructing the shared path.	
Recommendations:	
2.1.7.1.	That parking setbacks at driveways are provided in accordance with TN002 Section 2.5.
Designer Response: *Agree with SAT, to be considered during detailed design.*	
Safety Engineer: ***Agree, assess in detailed design***	
Client Decision: ***Parking setbacks will be assessed in detailed design.***	
Action Taken: Click here to enter text.	

2.1.8. Shared path "dooring zone"	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
In some locations, the proposed design has the bi-directional shared path located against the kerb. Cyclists riding close to parallel parked cars could be at risk of 'dooring'. Any vehicles parked beside the shared path will have a passenger side "dooring zone" risk. The width of the path may not permit a suitable buffer zone, and this would also push path users closer to the property boundary where there can be limited intervisibility due to fences, hedges etc.	
Recommendations:	

2.1.8.1.	That the designer mitigates the "dooring" risk where the bi-directional shared path is located against the kerb.
Designer Response: *To be considered during detailed design phase. Compare options of marking no parking lines against the additional space requirements for creating a buffer zone.*	
Safety Engineer: ***Agree with SAT, limit the potential for "dooring" wherever possible.***	
Client Decision: ***Car dooring potential will be considered during detailed design.***	
Action Taken: Click here to enter text.	

2.1.9. Rail tunnel & underpass environment	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
To avoid being a deterrent to trail use, the tunnels must not only be safe but be perceived as safe by the trail users. A well-constructed and well-lit environment through the tunnel should mitigate most safety and user concerns for people. However, the risk remains for harm from anti-social activity by others. The Caversham tunnel walls, and roof are currently coated with mineral deposits that may enhance the experience for some users and have the opposite effect on others. It is not clear to the SAT what the intended treatment is for the tunnel surfaces. Also refer to the CPTED report.	
Recommendations:	
2.1.9.1.	The tunnel should: • have a trail surface that is dry and free from slipping hazards such as mud, leaves and loose detritus. • have a minimum clear path width, see Austroads 6 A. • be free from obstructions (such as the existing utility valves) • be well lit. • be free from dripping water, falling debris, etc. • have video surveillance. • have cell phone coverage, for all providers. • have an emergency phone available 24/7.

2.1.9.2.	Designer to consider providing standard signs or interpretation boards at all tunnels and underpasses to inform users of what to expect. This could also include length, directions or simple map sign, things of interest pertaining to the tunnel / underpass.
2.1.9.3.	That the CPTED report recommendations regarding tunnels are adopted.

Designer Response: *Agree with SAT recommendations. Allowance for the above has been made in the preliminary design cost estimate except for the provision of emergency phones. The need for emergency phones is still under consideration.*

Safety Engineer: ***Agree with SAT. Some users will be visiting to appreciate the historic nature of the tunnels so a balance needs to be kept.***

Client Decision: ***The recommendations from the SAT have mostly been accounted for in the preliminary design, and will consider all other aspects, to ensure users are able to access emergency assistance safely and conveniently, through detailed design. The team will continue to work with emergency services to ensure the measures are fit for purpose.***

Action Taken: Click here to enter text.

2.1.10. Timber boardwalk	**Minor**

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

Some sections of the path are timber boardwalk construction. Timber surfaces can be very slippery when wet or icy and in parts of the route may also get covered with wet leaves. This is a hazard to all path users, particularly at corners.

Recommendations:

2.1.10.1.	That the designer advises how the timber surface will be treated to mitigate the risk of slipping and falling.

Designer Response: *Agree that timber boardwalk surfaces need to be treated to mitigate the risk of slipping and falling. A treatment has not yet been identified and will be determined during the detailed design phase.*

Safety Engineer: ***Agree with SAT. Suggest designers consider use of the same materials as used on the Peninsula Connection boardwalks so we have consistent surfacing.***

Client Decision: ***The team will consider timber boardwalk treatment through detailed design.***
Action Taken: Click here to enter text.

2.1.11. Route signs and markings	**Comment**
• *Risk ranking:* **Comment**	
The trail makes many changes in direction and is quite remote is some places. Trail users should be able to easily follow coherent route signs and markings.	
Recommendations:	
2.1.11.1.	That a wayfinding plan is developed with clear and coherent route signage. This should be provided for the whole route.
2.1.11.2.	That the route sign guidance is supplemented with well-placed road markings, including logos and green surfacing to inform on-road to off-road transitions and direction changes along the route.
Designer Response: *Agree with SAT. Wayfinding and route sign guidance will be included within the scope of the detailed design phase.*	
Safety Engineer: ***Agree with SAT.***	
Client Decision: ***Wayfinding and route signage will be included in the detailed design.***	
Action Taken: Click here to enter text.	

2.1.12. Regulatory signs, markings, holding rails & TGSI	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
The SAT recognise that this is a concept design stage audit and does not include much detail of the regulatory signs and road markings, holding rails or any Tactile Ground Surface Indicators (TGSI). However, these need to be considered as they often take more room than expected and can change the design alignment at intersections, where space is often limited.	
Recommendations:	

2.1.12.1.	That the designer considers the location of regulatory signs, markings, holding rails and TGSI as part of every intersection and crossing.
Designer Response: *Agree with SAT. This will be carried out as part of the detailed design.*	
Safety Engineer: ***Agree with SAT.***	
Client Decision: ***Regulatory signs, markings, rails and TGSI will be included in the detailed design.***	
Action Taken: Click here to enter text.	

2.1.13. CPTED	**Comment**
• *Risk ranking:*	**Comment**
A CPTED report has been prepared by others and we are in general agreement with its findings and recommendations. The potential for undesirable people to lurk or sleep in the Caversham Tunnel is a concern that should be monitored by Police and Council. If there is a problem during the hours of darkness, consideration should be given to closing the tunnel at night. We suggest that signs with an 0800 number are located along the route for trail users to report incidents, safety concerns or trail damage. The SAT observed long sections of the proposed path that are separated from the road and is not generally visible to the public. This can cause path users to feel isolated and vulnerable along these sections of path. Ideally all path users should feel they are connected to the community, even if it is just by sight and any visual barriers should be mitigated.	
Recommendations:	
2.1.13.1.	That the CPTED report recommendations are implemented.
2.1.13.2.	That sections of the path that are separated from the public road by dense trees and bushes should be identified and addressed. This could include removal of all dense ground plantings and crown lifting of larger trees to provide improved intervisibility between public space and the path. Specific sections include • Sheets 35 – 38 Ch 3,980 to 4,550 • sheets 40 - 46 Ch 280 to 1,460.
Designer Response: *2.1. 13 and 2.1.13.1 - Agree that the findings of the CPTED report should be followed. Ongoing monitoring of the tunnel will also be important post*	

construction and if there is a problem in the hours of darkness the tunnel could be closed at night. The use of an 0800 number will be considered during the detailed design phase. 2.1.13.2 This will be considered during the detailed design phase. We note that from the 3D preliminary design most of the vegetation from ch 280 – 1460 will be cleared to allow construction of the path.
Safety Engineer: ***Agree with SAT and designers response***
Client Decision: ***Agree with SAT and designer response.***
Action Taken: Click here to enter text.

2.1.14. Ramp markings	**Comment**
• *Risk ranking:* **Comment**	
The ramp markings for speed humps have recently been updated.	
Recommendations:	
2.1.14.1.	That speed hump ramp markings are in accordance with the latest Waka Kotahi Traffic control devices manual.
Designer Response: *Agree with SAT recommendation. To be included in detailed design phase.*	
Safety Engineer: ***Agree with SAT and designers response. All markings should be to Motsam standard design.***	
Client Decision: ***Agree with SAT, speed hump markings will be in line with TCD manual, this will be shown in the detailed design.***	
Action Taken: Click here to enter text.	

2.1.15. Routine monitoring and maintenance	**Comment**
• *Risk ranking:* **Comment**	
There are multiple locations where the path will be subject to stormwater flow, side slope erosion, general detritus including leaves on the trail during autumn. These will be difficult to prevent and will be an ongoing issue for some sections of the trail. To ensure the trail is safe and accessible for all users throughout the year, all surface detritus should be routinely cleared from the trail.	
Recommendations:	

2.1.15.1.	Routine inspections and regular maintenance should be undertaken to ensure the trail is kept in good condition and any damage promptly repaired. Also refer Item 2.1.2.
Designer Response: *Agree with SAT recommendation. DCC to agree scope and budget allowance for maintenance of the track prior to award of practical completion of the first section.*	
Safety Engineer: ***Agree with SAT. DCC may need to monitor the path quite frequently until earthworks stabilise and plantings establish, etc. Any small rock falls or gravel migration, etc. will be particularly hazardous to cyclists.***	
Client Decision: ***DCC Maintenance team will be included in the detailed design phase, to ensure ongoing maintenance costs and requirements are understood prior to practical completion.***	
Action Taken: Click here to enter text.	

3. Factory Road (Wingatui Rd) to Chain Hills Tunnel

3.1.1. Factory Road roundabout and connections	**Moderate**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Likely** • *Risk ranking:* **Moderate**	
Sheet 1	
The roundabout at Factory Road / Wingatui Road intersection has been constructed with raised platforms to slow vehicle entry but there is limited provision for pedestrians and no provision for cycling. The SAT also noted that the buffered cycle lanes along factory Road, between Centre Street and the Wingatui Road were not provided on the north side. The road appears too narrow to accommodate cycle lanes without removing parking along one side of the Road. The traffic speed and volume are expected to be too high for vehicular cycling (riders taking the traffic lane) and this can be a deterrent to many riders. *We acknowledge this is beyond the project scope, but we consider these issues relevant to the safety of Twin Trails users and the recommendations should be discussed with the appropriate DCC staff.*	
Recommendations:	

3.1.1.1.	That safe provision is made for cycling through or around the Wingatui Road roundabout.
3.1.1.2.	That consideration is given to providing for pedestrians on Factory Road, east of Wingatui Road and on at least one side of Wingatui Road south of the roundabout.
3.1.1.3.	Safe provision should be made for cycling along Factory Road between Centre Street and the Wingatui Road roundabout.

Designer Response: *3.1.1.1 and 3.1.1.3 - These issues currently sit outside of the tunnels trail project scope. DCC to advise what scope elements (if any) of the above should be included in the tunnels trail detailed design scope. 3.1.1.2 A footpath along factory road is not likely to be highly utilised and is not supported by the designer as DCC funds could be better spent on other infrastructure. Pedestrians who want to walk through the chain hills tunnel and along the track should be catered for with parking on or near Gladstone Road for easy access to the Chainhills Tunnel.*

Safety Engineer: ***3.1.1.1. The low speed environment allows for cyclists to be in the traffic lanes and "claim the lane" which is the safest option in low speed environments. 3.1.1.2 Agree with SAT to a certain extent but the levels of demand for pedestrian access to this end of the trail are unknown, especially considering the provision of a car park at the beginning of the off road section of the trail. DCC should monitor the pedestrian demand and provide a footpath if the demand dictates it is needed. 3.1.1.3. Agree, adequate cycle facilities need to be provided to link nearby cycle infrastructure.***

Client Decision: ***3.1.1.1 and 3.1.1.3 Provision for cyclists from Centre Street through the roundabout will be addressed through a separate project that will look to upgrade to buffered cycle lanes along the length of Factory road and install new buffered cycle lanes between Centre Street. 3.1.1.2 agree with safety engineer comment, DCC will continue to monitor the demand for pedestrian demand along this section, and provide a footpath if demand dictates. 3.1.1.3 provision for cyclists along Factory Road to the Wingatui Roundabout will be provided for.***

Action Taken: Click here to enter text.

3.1.2. Factory Road cycle lanes	**Moderate**

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Likely**
- *Risk ranking:* **Minor**

Sheets 1 & 2
Given there are some residential properties along Factory Road, it seems likely that there may be some parking demand, this may become evident during consultation. There is a risk that parked vehicles will encroach the cycle lane forcing cyclists into the traffic lane. It is difficult for cyclists to check directly behind for approaching traffic and they may enter the traffic lane when it is not safe to do so.
Recommendations:

3.1.2.1.	The SAT recommend that parking is banned along this section of Factory Road and the design / consultation drawings show the restriction.
3.1.2.2.	That the project team considers if some parking provision should be provided in the form of indented parking bays.
3.1.2.3.	That the designer considers having tactile edge lines or RRPMs along the chevrons along the buffered cycle lane to alert motorists they are on the edge line.

Designer Response: *Consultation with residents on Factory Road to be undertaken during the detailed design phase to understand on street parking demand. The banning of or treatment for on street parking to be determined following consultation.*
Safety Engineer: Agree with designers response. Also consider the placement of mail boxes and mail/courier deliveries. 3.1.2.3. Audio tactile marking and RRPM's is recommended.
Client Decision: Agree with designers response, engagement with residents will be undertaken through detailed design phase, and will inform the final treatment along this section.
Action Taken: Click here to enter text.

3.1.3. Factory Road speed	**Moderate**

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Likely**
- *Risk ranking:* **Minor**

Sheets 1 & 2
Factory Road (from the rural speed threshold, 100 m east of Wingatui Road to the Railway crossing) has the following speed information from the Waka Kotahi MegaMap database. • Posted speed 70 km/h. • Operating speed 75-79 km/h.

- Safe And Appropriate Speed 60 km/h.

The change in the road environment with cycle lane markings and presence of walkers and riders on Factory Road, means the operating speed and posted speed limits are too high for the safe operation of this road.

The Waka Kotahi 2013: Road Safety Audit Procedures TFM 9 Figure 3.2: Risk of Fatality Versus Speed graph indicates that pedestrians and cyclists have a 50% risk of fatality in a 30 km/h impact crash and 100% at 70 km/h respectively.

The design plans indicate the design is completed on the basis that the speed limit is lowered to 50 km/h.

Recommendations:

3.1.3.1.	That the posted speed limit on Factory Road is reduced.
3.1.3.2.	That the general traffic speed along Factory Road (buffered cycle lane section) is measured to confirm the traffic operating speed.

Designer Response: *Agree with SAT recommendations. Measuring of traffic speed on Factory Road should be carried out post speed limit reduction.*

Safety Engineer: ***Agree this section of Factory Rd needs to have the speed limit reduced. Traffic calming measures may need to be considered to slow traffic from the east as they are coming from a higher speed environment.***

Client Decision: ***Agree that the speed limit should be reduced, DCC will look to consult on this during the detailed design phase, and include in the DCC speed management plan.***

Action Taken: Click here to enter text.

3.1.4. Factory Road level crossing — Minor

- *Crashes are likely to be:* **Occassional**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

Sheets 2 & 3

The plans note that the existing track crossing construction to be extended to accommodate on-road cycle lanes and that the 'existing rail signal pole relocated to the south to accommodate road widening'. These changes to the crossing may instigate the requirement for a Level Crossing Safety Impact Assessment (LCSIA). During the site visit it appeared that the hardware may require relocation on both sides to accommodate the lanes as proposed.

Figure 3-1: northside of crossing

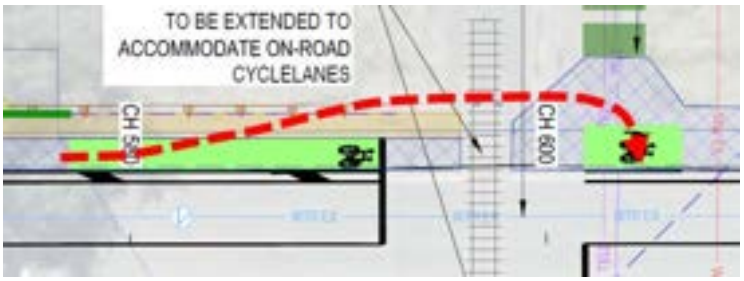
Figure 3-2: southside of crossing

From the west approach (northside) riders can see their destination of the rail corridor and may want to take a diagonal route across Factory Road. This will be easier and more direct than the tight right-angle bend currently provided. An alternate layout is provided in 3.1.4.2 that avoids rail hardware and aligns crossing path user better for crossing the road. This could be supported kerbing and landscape planting.

The plans show a "future cycle rail extension to connect to Silverstream". This would create a four-way shared path connection that could be compromised by the current layout.

Cyclists arriving at the intersection from the south or east are not accommodated. As described in general 2.1.3 the path users are likely to make their own route and cut corners to avoid the tight corners. This makes it more difficult for drivers to anticipate where riders will be.

Recommendations:

3.1.4.1.	That the designer contact KiwiRail to determine if a LCSIA is required for the Factory Road level crossing.
3.1.4.2.	If a LCSIA is required, then consideration is given to separating the north side path away from the road as shown in Figure 3-3. Any separation between the path and the carriageway at the crossing should be supported by a raised island with landscape planting.  Figure 3-3: northside path option
3.1.4.3.	That the project team considers future proofing this level crossing to accommodate the link to Silverstream.
3.1.4.4.	That better provision is made for cyclists to access the rail corridor path from the east and for riders approaching from the path (south) and turning left into Factory Road.

Designer Response: *3.1.4.1 Agree with SAT recommendation. 3.1.4.2. - 3.1.4.4 SAT proposal will be considered as part of the detailed design development of the rail crossing.*

Safety Engineer: ***3.1.4.1.Agree 3.1.4.2.Agree with SAT, cyclists will take the shortest most direct route, especially if they are not going to have to wait to cross the road. Cyclists also need to be guided to cross the rails at 90 degrees to avoid bike wheels slipping between the track and road surface. SAT option may help but there will still be temptation to cross early, even if the buffer is fenced some will choose to travel on the road to avoid slowing down. Consider moving the road crossing point to the Mosgiel side of the railway to eliminate the shortcut. 3.1.4.3. Agree. 3.1.4.4. Agree***

Client Decision: ***Agree with designer response and safety engineer comments, this crossing will be addressed through the detailed design.***

Action Taken: Click here to enter text.

3.1.5. Railside path hazards (Ch 620 – 1,560)	Comment
• *Risk ranking:* **Comment**	
Sheets 3 - 9	
The path route and surrounds should be checked for any abandoned rail hardware, equipment, other objects, and structures that could be hazards for path users. Angled deviations such as Ch 1540 & 1560 should be replaced by large radius curves to improve visibility and facilitate side by side and two-way riding.	
Recommendations:	
3.1.5.1.	That any obstacles or obstructions in the path route that constitute a potential hazard to path users are removed or mitigated.
3.1.5.2.	That angled deviations are replaced by large radius curves.
Designer Response: *Agree with SAT recommendations. Note that obstacles and obstructions can be determined in the detailed design phase once topo survey information is available.*	
Safety Engineer: ***Agree with designers response***	
Client Decision: ***Agree with designer response, this will be determined through detailed design.***	
Action Taken: Click here to enter text.	

3.1.6. Path screening	Comment
• *Risk ranking:* **Comment**	
Sheets 9 - 11	
A visual screening barrier between the path and racetrack is proposed to Ch 1,760. However, it seems the same sight line risk exists along the path further to the south.	
Recommendations:	
3.1.6.1.	That the designer considers extending the visual barrier be to Ch 2,050 or possibly Gladstone Road.
Designer Response: *SAT recommendation will be considered in consultation with the racecourse. Feedback received from the racecourse to date is that screening is only required to ch 1760.*	

Safety Engineer: ***It is unclear if the screening is to protect horses from distraction due to passing cyclists or the other way around! Outcome determined by consultation.***

Client Decision: ***The screen is intended to protect horses, the extent of the screen/barrier will be determined through consultation with the race course through the detailed design phase.***

Action Taken: Click here to enter text.

3.1.7. Pony Club entrance — Minor

- *Crashes are likely to be:* **Occassional**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

Sheet 11

The pony club entrance is beside the shared path connection to Gladstone Road. There is a possibility that trailered vehicles could block the path or restrict intervisibility when parked to open and close the pony club gates.

Figure 3-4: proximity between pony club and path

There is also a fence and hedge between the path and pony club driveway that restricts intervisibility.

Recommendations:

3.1.7.1.	That the design includes a separation area between the pony club entrance and path. This could be hard or soft landscaped to improve intervisibility.

Designer Response: *Agree with SAT recommendation. To be considered during detailed design phase.*

Safety Engineer: ***Agree with designer response***

Client Decision: ***Agree with designer response, will consider separation during detailed design.***

Action Taken: Click here to enter text.

3.1.8. Hump bypass	**Minor**

- *Crashes are likely to be:* **Occassional**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

Sheet 11

The first road hump outside 275 Gladstone Road is located where there is a wide unsealed section of road, see Figure 3-5. This is likely to be used by drivers bypassing the hump.

Figure 3-5: wide unsealed berm at 275 Gladstone Road

Recommendations:

3.1.8.1.	That the designer provides something to prevent drivers avoiding the hump at 275 Gladstone Road.
Designer Response: *Agree with SAT recommendation. To be considered during detailed design phase.*	
Safety Engineer: ***Agree, design to prevent vehicles bypassing the speed hump.***	
Client Decision: ***Agree, detailed design will consider ways to prevent vehicles bypassing.***	
Action Taken: Click here to enter text.	

3.1.9. Cycle use warning on Gladstone Road	**Minor**
• *Crashes are likely to be:* **Occassional** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 11 and 13	
Drivers that are unfamiliar with Gladstone Road should be informed of the cycle use along Gladstone Road between 275 and 309.	
Recommendations:	
3.1.9.1.	That PW-35 Cyclist warning signs should be installed on the Gladstone Road approaches to the 30 km/h section. Ensure appropriate inter-visibility is available in both locations where the path intersects with Gladstone Road.
Designer Response: *Agree with SAT recommendation.*	
Safety Engineer: ***Agree with SAT***	
Client Decision: ***Agree, signage will be included in the detailed design.***	
Action Taken: Click here to enter text.	

3.1.10. Hump visibility	**Minor**
• *Crashes are likely to be:* **Occassional** • *Death or serious injury is:* **Likely** • *Risk ranking:* **Minor**	

Sheet 12	
The hump at Ch 2,280 is just below the apex of the vertical curve and may not be visible to westbound drivers.	
Recommendations:	
3.1.10.1.	Humps should have appropriate sightlines and safe stopping sight distance and all humps on Gladstone Road should be checked for these.
Designer Response: *Sight distance to proposed humps will be reviewed once topo survey information is available. Agree with SAT that appropriate sight distance should be provided to all speed humps.*	
Safety Engineer: ***Agree with designer response***	
Client Decision: ***Agree, sightlines and stopping distances will be considered in detailed design once topo information is available.***	
Action Taken: Click here to enter text.	

3.1.11. Swale capacity	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 15	
The typical cross section for Ch 2,875 to 2,990 shows a relatively small swale. This section of path is on a steep (6.2%) gradient and there is a possibility that storm water runoff may not be contained by the swale and wash over the path. This can result in minor flooding, detritus on the path and a slippery surface.	
Recommendations:	
3.1.11.1.	Designer to confirm that the swale capacity is adequate and gradient suitable for the expected stormwater flow.
Designer Response: *Stormwater design will be carried out as part of the detailed design phase. This will include sizing all swales to cater for the 10% AEP event.*	
Safety Engineer: ***Agree with designer response.***	
Client Decision: ***Agree with designer response.***	

Action Taken: Click here to enter text.

4. Chain Hills tunnel to Abbotsford School Underpass

4.1.1. Trail design	Minor
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheets 13 to 19	

The trail route south of Chain Hill Tunnel (Figure 4-1) can get very wet and trail design should ensure stormwater runoff does impact the track, creating scour or spreading mud and detritus on the surface.

The concept drawings do not identify the trail gradient. Excessive uphill gradients are a deterrent to users and excessive downhill gradients can result in loss of control falls and collisions at higher speeds.

The trail looks to run close to drop-offs and or batters.

Figure 4-1: trail route south of Chain Hills Tunnel

This section of the trail is remote will be difficult for emergency services to readily access in case of emergency.

The trail may cross and or includes vehicle driveways, where there is a risk of conflict between motorised vehicles and trail users, some of whom may be small children.	
Recommendations:	
4.1.1.1.	That the trail design ensures stormwater runoff does not impact the track or its surface.
4.1.1.2.	That vegetation is routinely cleared from the track, far enough from the sides to prevent wet leaves being an ongoing hazard to trail users. Refer Item 2.1.15
4.1.1.3.	That maximum gradient parameters are agreed with stakeholders and applied throughout the trail. If this is exceeded, then level platforms for resting or decelerating should be provided.
4.1.1.4.	Any steep drop-offs or batters are fenced in accordance with Austroads Guide to Road Design Part 6 A: Paths for Walking and Cycling.
4.1.1.5.	That a clearing appropriate for a helicopter to land is considered in the vicinity of the southern end of Chain Hill Tunnel. Also consider having functional cell phone coverage for all communication providers or some emergency phone facility.
4.1.1.6.	That adequate intervisibility is provided where there is a risk of conflict between motorised vehicles and trail users.
Designer Response: *Due to the unavailability of lidar data in this area no gradient could be shown on the preliminary design drawings. Topo survey will be undertaken throughout this area during the detailed design phase. This information will be used to design appropriate trail gradients through this area.*	
Safety Engineer: ***In general terms an existing disused railway should be relatively straight and have gentle slopes, however, detailed design should ensure that there are no hazards for cyclists that may not have been relevant when the trail was used as a railway. Steep slopes or drops should be fenced and the trail maintained to a suitable standard. Cell phone coverage may be limited but the tunnels are not in a remote area and may be no worse than some of the hills and valleys. Perhaps signage can be provided that indicates distance to reasonable signal strength.***	
Client Decision: ***Agree with designer response and safety engineer comments, gradients and mitigating drop offs will be considered through detailed design.***	
Action Taken: Click here to enter text.	

4.1.2. Transition on tight curve	Minor

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

Sheet 21

The path transitions from 3.0 m to 2.5 m on a tight bend at Ch 1,380. Having the width transition on a tight radius may catch out faster downhill riders that are not expecting the path to narrow around the corner.

Recommendations:

4.1.2.1.	Designer to consider relocating the transition to CH 1,340 – 1,360 where it is on a straight and is clearly visible and anticipated by path users.

Designer Response: *This will be investigated during the detailed design phase. A combination of a larger horizontal radius and relocation of the path narrowing to ch 1360 will be investigated.*

Safety Engineer: ***I would prefer the extra width be maintained on the corner with the transition around CH 1400***

Client Decision: ***Extra width will be considered through detailed design.***

Action Taken: Click here to enter text.

4.1.3. Unknown cross section	Comment

Sheet 21

The SAT could not find a typical cross section for Ch 1,380 – 1,485 where there is a proposed 2.0 m high retaining wall. The safety concern is the shy zone from a high wall can limit available 2.5 m path width and capacity. Ideally the retaining wall will slope away from the track to minimise the shy zone or be offset from the path as per the fences.

Recommendations:

4.1.3.1.	Designer to confirm the typical cross section for Ch 1,380 – 1,485

Designer Response: *The typical cross section through ch 1380 - 1485 will be determined once geotechnical testing and topo survey investigations are completed in the detailed design phase. We agree with the SAT recommendations regarding shy line and will investigate retaining wall options that are laid back from the path.*

Safety Engineer: ***Path should be kept as wide as possible, and any fencing or railings designed and positioned to reduce the chances of handlebars snagging or pedal strike.***
Client Decision: ***Agree with SAT and safety engineer comments, extra width will be included where possible, and will be considered in detailed design.***
Action Taken: Click here to enter text.

4.1.4. Path fence requirement	**Comment**
• *Risk ranking:* **Comment**	
Sheet 23 - 25	
The plans show a 1.2 m high rail protection fence, from Ch 1,720 to 2,150 where the rail is over 14 m away.	
Recommendations:	
4.1.4.1.	Designer to confirm the need for the fence in this location.
Designer Response: *Designer to engage with Kiwirail in detailed design phase and determine if a fence is required through this section and if so what is the minimum requirement.*	
Safety Engineer: ***Agree with designer response.***	
Client Decision: ***Agree with designer response. The team will continue to engage with KiwiRail through detailed design.***	
Action Taken: Click here to enter text.	

4.1.5. Abbotsford School underpass connection	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 26	
There are several safety issues with the proposed path on the south side of the underpass that can be addressed with careful design, see Figure 4-2. These include • The AC path is proposed to be extended part way up the slope. The top of this slope is loose gravel, and the plans show that it is probably not far enough up the	

hill. Riders can struggle on loose gravel on steep gradients and when required to turn and or stop.

- This is a four-way intersection and having these paths all connecting in a small area, on the side of a slope creates potential for conflict with other users and falling issues for less experienced riders.

Figure 4-2: path intersections on a gradient

Recommendations:

4.1.5.1.	That the designer provides a sealed accessible path from the underpass to the top of the slope to the south.
4.1.5.2.	That the designer considers a safe, coherent, and user-friendly path intersection layout that will accommodate all four routes at acceptable gradients and allow good intervisibility for all path users. Consider using hard and soft landscaping between paths to provide separation and sight lines

Designer Response: *Agree with SAT recommendations. For consideration in the detailed design phase.*

Safety Engineer: ***Agree with SAT***

Client Decision: ***Agree with SAT, will be considered in detailed design.***

Action Taken: Click here to enter text.

5. Abbotsford School Underpass to Haraway Underpass

5.1.1. Path connection to school link	**Minor**

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**

• *Risk ranking:* **Minor**	
Sheet 27	
The proposed path has a tight radius immediately north of the underpass Ch 2,470. This blind bend can result in head on crashes between path users as discussed in 2.1.4.1. This is also where the link to the Abbotsford School is located increasing the risk to path users.	
Recommendations:	
5.1.1.1.	Designer to consider a safe and user-friendly path intersection design that moves the curve further from the underpass and creates a safe and user-friendly connection to the school link path.
Designer Response: *Consideration of sight lines and land purchase requirements to input into the detailed design of this intersection.*	
Safety Engineer: ***Agree with designer response.***	
Client Decision: ***Agree with designer response, will consider through detailed design.***	
Action Taken: Click here to enter text.	

5.1.2. Historic building foundations	**Comment**
• *Risk ranking:* **Comment**	
Sheet 27	
During the site visit we saw several concrete foundations on the proposed path route, see the (4) yellow circles in Figure 5-1. These may have some significance, and this should be determined prior to the detail design stage.	

Figure 5-1: foundations in proximity to path alignment

Recommendations:

5.1.2.1.	Designer to confirm the significance of the foundations and amend the path alignment as required.

Designer Response: *Agree with SAT recommendations. To be carried out in the detailed design phase.*

Safety Engineer: ***Agree with designer.***

Client Decision: ***Agree with designer response.***

Action Taken: Click here to enter text.

5.1.3. North Taieri Road crossing	**Significant**

- *Crashes are likely to be:* **Common**
- *Death or serious injury is:* **Likely**
- *Risk ranking:* **Significant**

Sheet 31

There are multiple issues with the proposed path treatment at the North Taieri Road, Severn Street and Abbotsford Road intersection including,

- Three right angle bends on the boardwalk.
- The platform on Severn Street can create uncertainty for people using the intersection as it may appear that drivers are slowing down for people at the

intersection, but they may only be slowing for the platform, some drivers may accelerate off from the platform into the intersection as they have right of way.

- North Taieri Road has 3,800 VPD that must give way to 1,250 VPD on Severn Street and 5,000 VPD on Abbotsford Road. The location of the limit lines on North Taieri Road will result in the path crossing being blocked by queued vehicles.
- Riders waiting on either side of North Taieri Road must check three roads before crossing. They must look at least 270 degrees to make sure it is safe to cross. They will also have to check for vehicles exiting from Patterson Street.
- Due to the limited inter-visibility, uncertainty of driver intent and high volumes on North Taieri Road, people using this crossing are at risk of being struck by vehicles.
- There is a new kerb proposed on the departure side of Abbotsford Road and no change to the approach kerb alignment on Severn Street. The existing alignment constrains the path crossing location and directs traffic into the new widened kerb on the departure side.
- The plans show that the existing zebra crossing and kerb buildout on Severn Street are being removed, and no benefit of this is being gained in the proposed alignment.

Recommendations:

5.1.3.1.	Provide radiused corners on the boardwalk.
5.1.3.2.	Do not include a platform on Severn Street unless it is a formal zebra crossing and there is an expected crossing demand.
5.1.3.3.	Do not locate the path crossing where it will be blocked by queuing vehicles.
5.1.3.4.	Do not locate the crossing where path users must check in so many directions and may be uncertain of a driver's intent.
5.1.3.5.	Have any path crossing on a raised safety platform to increase the conspicuity of the crossing and reduce the severity of any crashes.
5.1.3.6.	Designer to consider improving the kerb alignment on the Severn Street approach to guide drivers across the intersection and align with the new departure kerb on Abbotsford Road.
5.1.3.7.	Even with all the interventions above, and the design to get path users back to the north side of the railway line at Runciman Street, the SAT suggest the safety of this crossing location is compromised. The designer to reconsider alternate locations for this crossing. One option is shown in Figure 5-2 that has a raised platform, slowing all vehicles on all approaches, the path desire line is not blocked by queuing vehicles, the intervisibility between path users and driver is improved.

	 Figure 5-2: North Taieri Road crossing concept This option could enable the path to continue along Patterson Street if this is feasible or cross the railway via a bridge to the east of the road bridge.
5.1.3.8.	As a temporary measure, the project team could consider utilising the wide and unused section of double track rail corridor between Ch 3,180 and 4,020.

Designer Response: *5.1.3.1 – 5.1.3.7 Additional options for the North Tairei Road / Severn Street intersection will be investigated in the detailed design phase to take account of the issues raised by the SAT. The signalised intersection option as shown in figure 5.2 will be developed as an option for further consideration. 5.1.3.8 – Utilising the section of double track between ch 3180 and 4020 is not feasible due to Kiwirail clearance requirements, existing infrastructure, new fencing and retaining requirements leaving insufficient space for a cycle path. It also creates a very undesirable environment from a CPTED perspective as the path becomes bordered by a 1.8m high solid fence on one side and a 10m high retaining wall on the other. The SAT proposed option is not recommended for further investigation in the detailed design phase as it has been investigated and discarded as part of the option selection process.*

Safety Engineer: Agree with SAT. The Abbotsford Rd/Severn St/North Taieri Rd intersection has had ongoing safety issues for several years. The continued increase in traffic volumes from developments has increased the number of complaints received over the last few years. Paterson St also has some issues related to the lack of footpath. The SAT's plan (5.2) seems the easier and more logical route and avoids most of the issues identified in the audit. I would go further and include making Paterson St one way, entry only. This will provide space for the shared path to continue into Paterson before crossing the railway via a boardwalk. Any traffic can still exit the area via Alexander St (existing one way) or Runciman/Neill St. The zebra crossing across Severn St should be

removed. Additional traffic calming on North Taieri Rd may be required if the above is progressed.
Client Decision: ***Options for this intersection will be developed further in detailed design and consulted on.***
Action Taken: Click here to enter text.

5.1.4. Unsworth Street greenway	**Comment**
• *Risk ranking:* **Comment**	
Sheet 32, 33	
Unsworth Street is to be made a 4.5 m wide one-way street, which will be too narrow for kerb side parking. This may result in residents parking with two wheels on the shared path.	
Recommendations:	
5.1.4.1.	That the designer includes no stopping restrictions along Unsworth Street.
Designer Response: *Agree with SAT recommendation.*	
Safety Engineer: ***A 4.5m one way street could encourage higher than desirable vehicle speeds, especially with parking removed. Consider using the extra roadspace as part of the shared path.***	
Client Decision: ***Consideration for reducing the width of the proposed changes to Unsworth Street will be addressed through detailed design and community consultation.***	
Action Taken: Click here to enter text.	

5.1.5. Runciman rail overbridge	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 33	
The proposed new bridge features right angle corners where inexperienced cyclists will find it difficult to manoeuvre the tight turns and are at risk of falling.	

No gradients are noted for the proposed bridge and its connections and fencing may also restrict intervisibility.	
Recommendations:	
5.1.5.1.	That the designer confirms the bridge will allow acceptable gradients and that radiused turns are provided for cyclists accessing and exiting the bridge.
Designer Response: *Current bridge design is concept level only. The detailed design phase will ensure that acceptable gradients and radiused turns are incorporated into the design.*	
Safety Engineer: ***Agree with SAT. 90 degree turns are very difficult to achieve and impossible to do whilst staying on the correct side of the path.***	
Client Decision: ***Detailed design will ensure acceptable gradients and turns.***	
Action Taken: Click here to enter text.	

5.1.6. Runciman & Neil Street shared path	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 33 to 36	
On Runciman and Neill Streets, the trail is a shared path on the south side of the road separated by kerb and channel. This path is likely to require significant retaining structures and safety from falling fences. There is a large residential area to the north of Runciman & Neill Streets and people are likely to want to access the new path. Also refer Item 2.1.8.	
Recommendations:	

5.1.6.1.	That safe access points to the shared path are provided for pedestrians and cyclists coming from north of Runciman & Neil Streets.
5.1.6.2.	Between Ch 3,700 and 3,820 consider reducing the road width (there is no parking demand) to two traffic lanes (say 7.5 m) and provide new Kerb & Channel to accommodate the path on the existing level surface. This option may cost less than the retained path option.
5.1.6.3.	Between Ch 3,830 and 3,990 consider having path further from the carriageway, providing more separation and more pleasant environment for riders. This will align better with the Neil Street rail over bridge.
5.1.6.4.	If the project team retains the path alignment (Ch 3,700 to 3,820) consider alternate cantilever boardwalk type cross section options.

Designer Response: *5.1.6.1. – 5.1.6.4 These recommendations will be investigated and developed further as part of the detailed design for this section of path.*

Safety Engineer: ***5.1.6.1. Agree with SAT 5.1.6.2. May be an option but consider heavy traffic use that avoids the low bridge at Carnforth St. 5.1.6.3. Agree with SAT. 5.1.6.4. Agree with SAT Additionally, the Green Island rugby club have investigated using the railway sidings as parking for Saturday rugby. If this proceeds parking may be available to access the shared path at other times.***

Client Decision: ***Agree with safety engineer comments, these will be considered in detailed design, the team will also ensure the rugby club is invited to submit on consultation to ensure parking and the trail are able to work together.***

Action Taken: Click here to enter text.

5.1.7. Neil Runciman intersection	**Minor**

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

Sheet 34

This intersection has several safety concerns including.

- There are 1,700 VPD on Neil Street and 530 VPD on Runciman Street. Riders waiting on either side of Neil St must look 270 degrees and check three approach roads to make sure it is safe to cross.
- Vehicles queued on the Neil Street south approach will block the path.

Recommendations:

5.1.7.1.	The crossing is provided on a raised safety platform located 4.5 m - 5.0 m behind the Limit.

Designer Response: *The design of the crossing facility will be developed further in the detailed design phase once topo survey information is available. Due to the steep gradient down to the bridge it may not be possible to locate a raised safety platform 4.5 – 5.0m behind the limit.*

Safety Engineer: ***Users are unlikely to detour to a set-back crossing point but the crossing should be designed to encourage cyclists to slow for the intersectionAgree***

Client Decision: ***Agree with safety engineer. This will be considered in detailed design.***

Action Taken: Click here to enter text.

5.1.8. Pedestrian overbridge	**Minor**

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

Sheet 35

There is an existing very narrow rail overbridge connecting to Neill Street (opposite Dall Street). This path is constrained with barriers and is very steep.

The proposed path connection to Neill Street from the overbridge appears to only accommodate south to west movement and not for people wanting to head from south to northeast (into Dunedin). There is an unformed pedestrian desire line to the northeast, as seen in Figure 5-3.

The proposed path immediately east of the end of the overbridge is very steep at 14.8% for 25 m. This will be very difficult to less confident riders to ride up, especially any that want to turn onto the overbridge. This gradient creates a real speed differential between uphill and downhill riders.

Figure 5-3: existing pedestrian desire line

Recommendations:

5.1.8.1.	That full directional access to the shared path is provided for pedestrians and cyclists coming from the existing rail overbridge opposite Dall Street.
5.1.8.2.	Designer to consider a small roundabout or triangle-about to accommodate the three path directions at the north end of the bridge.
5.1.8.3.	Designer to reduce the gradient between Ch 3,990 and 4,015. Alternately provide sections of level path for resting and keep the area at the end of the bridge level.

Designer Response: *The existing rail overbridge is significantly lower than Neill Street in this location which creates a vertical grade issue when trying to connect the bridge with the new path. The detailed design phase will look to provide connections from the bridge in both directions at acceptable grades. This may be better achieved by relocating the path adjacent to Neill Street from ch3980 - 4160. This would also mitigate CPTED concerns with this section in regard to passive surveillance. To be further investigated and developed in the detailed design phase once topo survey information is available.*

Safety Engineer: ***Agree with designer response.***

Client Decision: ***Agree with designer response, further investigation through detailed design.***

Action Taken: Click here to enter text.

6. Haraway Underpass to Barnes Drive

6.1.1. Chainage numbering	**Comment**
• *Risk ranking:* **Comment**	
Sheet 38/39	
The chainage numbers overlap at the Haraway Underpass. Sheet 38 has Ch 4,520 to 4,678 and sheet 39 shows Ch 20 to Ch 180 for the same section.	
Recommendations:	
6.1.1.1.	Retain single continuous chainage for the whole route.
Designer Response: *Agree with recommendation. To be rectified in the detailed design phase.*	
Safety Engineer: ***Agree***	
Client Decision: ***Agree, to be rectified at detailed design.***	
Action Taken: Click here to enter text.	

6.1.2. Existing underpass opposite Armstrong Lane	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 38 & 39	

Figure 6-1: North approach

Figure 6-2: North entry

As can be seen in Figure 6-1 & Figure 6-2, the underpass does not currently present as an attractive or pleasant environment. There is a safety concern regarding restricted intervisibility at this underpass.

Recommendations:

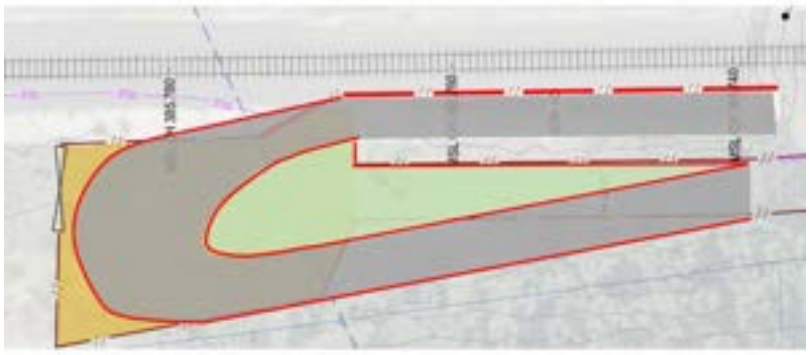
6.1.2.1.	That the detail design trail alignment addresses the restricted intervisibility on all approaches.
6.1.2.2.	In the tunnel, consider providing CCTV surveilance.
6.1.2.3.	In the tunnel, consider providing a convex mirror to help path users see others approaching at the blind right angle turns.
6.1.2.4.	This location in the tunnel also requires good way finding signs and markings to define route. It could be a location where riders just follow to the end of the tunnel and find themselves in Green Island.

Designer Response: *6.1.2.1 – Agree with recommendation. Detailed design team will include urban designers and landscape architects with scope to improve restricted intervisibility on all approaches. 6.1.2.2. CCTV not currently included in project scope this structure is relatively short in length, straight, lit with visible exits from inside the underpass. 6.1.2.3 recommend that a convex mirror be installed if necessary once sight distance improvements have been carried out. This should be assessed during the implementation phase. 6.1.2.4 Comprehensive wayfinding signage strategy to consider signage in the tunnel during the detailed design phase.*

Safety Engineer: ***Agree with designer response.***

Client Decision: ***Agree with designer response.***

Action Taken: Click here to enter text.

6.1.3. Ramp and turning area	Comment
Sheet 39	
There is a large rectangular area for path users to make the 180 degree turn between the underpass ramp and the path between the state highway and railway line. This will not be intuitive for unfamiliar riders. A slight realignment of the path and a section of fence as shown in Figure 6-3 would allow a more coherent turn.	
Recommendations:	
6.1.3.1.	Designer to consider realigning the fence on the south side to provide a more intuitive turning area.
	 Figure 6-3: concept for ramp and turning area
Designer Response: *Agree with SAT recommendation. This will be included in the detailed design of this section once topo survey information is available.*	
Safety Engineer: ***Agree with SAT. The switchback needs to be as wide as possible to allow users to double back. Consider taking the track closer to the motorway to make the turns easier. The new bridge over the culvert may not be required if the track can run alongside the motorway but screening would probably be required.***	
Client Decision: ***Agree with SAT, switchback width will be addressed through detailed design.***	
Action Taken: Click here to enter text.	

6.1.4. Extensive removal of vegetation	Comment
Sheets 40 - 44	

There is a dense area of planting between the railway and the motorway that will need to be removed to accommodate the path. In this area the path will be below the road and path users may be exposed to spray from traffic during heavy rain events.	
Recommendations:	
6.1.4.1.	Designer to advise how this area will be treated with respect to vegetation removal and replacement.
Designer Response: *Agree with SAT that most of the vegetation in this area will be cleared to allow for the path construction. We recommend that the Detailed Design scope include landscaping design through this section to improve the environment which is constrained by the rail on one side and the motorway on the other.*	
Safety Engineer: ***Agree with designer response.***	
Client Decision: ***Agree with designer response, landscaping to be included in detailed design scope.***	
Action Taken: Click here to enter text.	

6.1.5. Main South Road emergency access	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 44	
There is a gravel access to the path for vehicles, from Main South Road at Ch 1,030. This may be a location where the path needs to be protected from unauthorised and or unwanted vehicular access.	
Recommendations:	
6.1.5.1.	Designer to confirm what or if anything is to be provided to restrict unwanted vehicular access to the path at Ch 1,030.
Designer Response: *Consider in detailed design phase in consultation with emergency services. Designer to confirm with emergency services if removable bollards will be an acceptable solution.*	
Safety Engineer: ***Agree with designer response.***	
Client Decision: ***Agree with designer response.***	

Action Taken: Click here to enter text.

6.1.6. Existing path connections	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 47	
There are two locations in proximity Ch 1,550 and 1,610 where the proposed path intersects with the existing footpath network. There is no change to the existing paths and the resultant intersections are unsafe and not user-friendly, see 2.1.6. At Ch 1,550 the area is relatively level and a simple roundabout or triangle about would allow the paths to meet in a safe and user-friendly way. However, at Ch 1,610 The path meets at a very acute angle and is at a steep gradient, resulting in a very unsafe and not user-friendly layout. In this situation, it may be a case of closing this link off at a location where the path can be redirected to the new path in a more desirable location. Note that removing this link would allow the short reverse curve alignment Ch 1,600 to 1,620 to be replaced with larger radii, facilitating side by side and two-way cycling and increased ability for path users to see what is ahead rather than concentrating on negotiating the tight path alignment.	
Recommendations:	
6.1.6.1.	That the designer considers a simple roundabout or triangle about at Ch 1,550.
6.1.6.2.	That the designer considers closing the link at Ch 1,610 and relocating it to a better location.
Designer Response: *6.1.6.1 Agree with SAT recommendation and a roundabout or triangle about will be considered for this location in the detailed design phase. 6.1.6.2. The detailed design of ch 1610 will look to smooth the horizontal and vertical alignment in this area. There is a current DCC project to remove the existing garden from the bridge which will enable more space to construct the path in this area.*	
Safety Engineer: Resolve the levels and interactions of the approach lanes in detailed design	
Client Decision: Agree with safety engineer comment, levels and interactions of the approach lanes will be addressed at detailed design.	

Action Taken: Click here to enter text.

6.1.7. Reverse curve in kerb	Comment
• *Risk ranking:* **Comment**	
Sheet 48	
The design includes a short reverse curve at Ch 1,650 in the Kaikorai Valley Road kerb and channel leading into Eclipse Road. It is not clear why this is done as there were no apparent service lids to be avoided.	
Recommendations:	
6.1.7.1.	Designer to remove the short reverse curve and mate the kerb into Eclipse Road with a single curve.
Designer Response: *Preliminary design of this kerb line at ch 1650 includes a taper to create additional road width on approach to the Eclipse Road intersection. This will be reviewed and smoothed if necessary during the detailed design of the intersection.*	
Safety Engineer: ***Agree with designer response.***	
Client Decision: ***Agree with designer response.***	
Action Taken: Click here to enter text.	

6.1.8. Crossing Eclipse Road	Moderate
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Likely** • *Risk ranking:* **Moderate**	
Sheet 48	
Pedestrians and riders waiting to cross Eclipse Road have several safety concerns, • high-speed turning traffic is facilitated with the large radii curves • they must look 270 degrees to see if they are safe to cross • they need to check three road approaches for potential conflict before crossing This location looks to suit and accommodate a RSP with 4.5 m to 5 m between RSP and limit line. Eclipse Road volumes will increase by 220 VPD to 1,080 VPD when McLeod Road closes, increasing the crossing risk and delays for path users.	
Recommendations:	

6.1.8.1.	Designer to provide a raised safety platform across Eclipse Road.
Designer Response: *Agree with SAT recommendation. To be included in detailed design of the intersection.*	
Safety Engineer: ***Agree with designer response.***	
Client Decision: ***Agree with designer response.***	
Action Taken: Click here to enter text.	

6.1.9. Flush median width at Eclipse Road	**Moderate**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Likely** • *Risk ranking:* **Moderate**	
Sheet 48	
The proposed flush median width on Kaikorai Valley Road at the Eclipse Road intersection narrows to less than a metre. This is insufficient for a small vehicle to take refuge from the through traffic lanes. As this is a busy commercial area, there is a high percentage of heavy commercial vehicles turning here. There is currently a very narrow flush median in this location, but there is room for through traffic to undertake a vehicle waiting to turn right here. The risk with vehicles waiting where they feel unsafe and can feel pressured to turn is that the drivers may pick very small gaps in approaching traffic and not notice pedestrians and or riders crossing Eclipse Road. It appears that a wider flush median on Kaikorai Valley Road north of Eclipse Road would be achievable by amending the new kerb alignment proposed for Kaikorai Valley Road.	
Recommendations:	
6.1.9.1.	Designer to provide a 2.0 m wide flush median on Kaikorai Valley Road up to the right turn location for Eclipse Road.
Designer Response: *The preliminary design of the eclipse Road intersection matches the existing intersection layout on Kaikorai Valley Road. The location of the rail overbridge restricts the ability to widen the flush median at Eclipse Road. Designer recommendation is to retain the existing intersection layout for the detailed design as upgrading intersections is outside of the scope and budget of the tunnels trail project.*	
Safety Engineer: ***Disagree with designer response. The proposed design significantly changes the intersection and the volume of traffic using it. The design***	

will need to cater for increased right turning traffic and a wider median should at least be investigated.
Client Decision: ***Agree with safety engineer comment, wider median to be investigated at detailed design.***
Action Taken: Click here to enter text.

6.1.10. Kaikorai Valley Rd / Eclipse Rd intersection	**Comment**
Sheet 48	
Given the high number of heavy commercial movements at this intersection, it may be worthwhile getting input / feedback from local industries whose vehicles use the intersection regularly.	
Recommendations:	
6.1.10.1.	Designer to consider discussing proposed changes at this intersection with local industries whose vehicles use the intersection regularly.
Designer Response: *Agree with SAT that Consultation with local business should be carried out in the detailed design phase.*	
Safety Engineer: ***Agree with designer response.***	
Client Decision: ***Agree with designer response, engagement with businesses will occur through detailed design phase.***	
Action Taken: Click here to enter text.	

6.1.11. Existing bus stop	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 48	
Google street view shows an existing Bus Stop 704 on Kaikorai Valley Road, Ch 1,910 opposite the intersection of Ensor Street. There is no reference relating to this stop on the plans. It is important that the location of this stop is confirmed as part of the concept design process, so it can be safely accommodated within the design if required. The bus stop cannot be retained in the existing location with the proposed median island location as following vehicles cannot pass the stopped bus.	

Recommendations:	
6.1.11.1.	Designer to confirm the location and accommodation of this bus stop 704.
Designer Response: *Agree with the SAT that the detailed design along Kaikorai Valley Road should allow for existing bus stops. Once topo survey information is collected designer to use the information to locate bus stop 704 and the proposed pedestrian crossing in appropriate locations.*	
Safety Engineer: ***Bus stop locations should be reviewed and spacing checked to comply with ORC requirements.***	
Client Decision: ***Agree, detailed design to review bus stop locations in line with ORC requirements.***	
Action Taken: Click here to enter text.	

6.1.12. Median island width	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 48	
Due to the available width of the road, high traffic volumes and high percent of heavy commercial vehicles, this island is considered too small. It appears to be the minimum size from the design template and is more suited to quiet residential streets where space is restricted due to the proximity of driveways. There are limited driveways in this location and this small island is likely to be struck by drivers on Kaikorai Valley Road.	
Recommendations:	
6.1.12.1.	Designer to consider a larger median island to increase its conspicuity and provide increased refuge for pedestrians crossing the road.
6.1.12.2.	This should be done in conjunction with the bus stop issue 6.1.11
Designer Response: *Agree with SAT recommendation*	
Safety Engineer: ***Agree with SAT***	
Client Decision: ***Agree with SAT, will be addressed in detailed design.***	

Action Taken:	Click here to enter text.

6.1.13. Proposed cross section south of tunnel entry	**Moderate**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Likely** • *Risk ranking:* **Moderate**	
Sheet 49	
From Ch 2,020 to 2,180 the proposed lane marking cross section does not allow for cyclists on Kaikorai Valley Road or drivers wanting to access properties and businesses along here. The SAT do not know the level of cycling that occurs along this road, but observed many bikes parked at local businesses in the area and assume these are experienced and confident commuter cyclists using Kaikorai Valley Road for access. It is not reasonable to assume that all cyclists will want to get on and off Kaikorai Valley Road at the new signalised crossing.	
Recommendations:	
6.1.13.1.	That Council confirms or undertakes a cycle count on Kaikorai Valley Road to determine the use made by cyclists.
6.1.13.2.	Designer to consider an alternate cross section that accommodates cycling. One option is an edge line at 1.2 m which can be used as a de-facto cycle lane and will improve the amenity of path users by providing some separation from traffic, two 3.0 m traffic lanes, a 2.0 m wide flush median, a 1.7 m wide cycle lane SW bound and a 2.0 m parking lane for this section of Kaikorai Valley Road. Another option is to remove parking and distribute this width across the road. Consider a 1.9 m edge line / cycle lane (uphill), two 3.2 m traffic lanes, a 2.8 m wide flush median, and a 1.8 m wide cycle lane (downhill).
Designer Response: *Recommend consultation with local businesses is undertaken to understand the demand for access by cyclists. The Preliminary design layout allows for on road cyclists with 4.2m wide lanes which allow sufficient width for a cyclist to ride in the left of the lane. This will accommodate confident cyclist who would be the most likely user group to want to access the adjacent businesses. If DCC are agreeable to removing parking then the designer agrees that this space could be reallocated to provide on road cycle lanes in addition to the 3m wide shared path.*	

Safety Engineer: ***Agree with designer but the final design is likely to be influenced by the consultation process.***
Client Decision: ***Agree with safety engineer, final design to be informed by consultation process.***
Action Taken: Click here to enter text.

6.1.14. Intervisibility at signals	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 49	
Ch 2,100 to 2,180 has scrub and bushes around the curve of this boundary. This means there is limited intervisibility between general traffic and path users waiting to cross at the signals on the west side of Kaikorai Valley Road. Even though the crossing has signals, it is desirable that approaching drivers and waiting pedestrians can see each other.	
Recommendations:	
6.1.14.1.	That the scrub and bushes along the boundary between Ch 2,100 and 2,180 are removed. Ideally permanently so it is not an ongoing safety concern.
Designer Response: *Agree with SAT recommendation. To be included in scope of the detailed design.*	
Safety Engineer: ***Agree with designer response.***	
Client Decision: ***Agree with designer response.***	
Action Taken: Click here to enter text.	

6.1.15. Signal crossing type	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 49	

The plans show a standard signalised pedestrian crosswalk over Kaikorai Valley Road. Legally people are not permitted to ride across these, and this layout is out of context for the project. A dual crossing layout on a raised safety platform that accommodates pedestrians and riders would be more appropriate in this location.	
Recommendations:	
6.1.15.1.	Designer to consider a dual crossing for this location.
6.1.15.2.	Designer to consider putting the dual crossing on a raised safety platform.
6.1.15.3.	That the traffic signal design should also be audited at the concept stage to ensure it is safe, functional, and achievable.
Designer Response: *6.1.15.1 Agree with SAT recommendation – wide crossing already proposed to allow for dual use. Detailed design will develop this concept to a dual crossing layout. 6.1.15.2 Agree with SAT recommendation. 6.1.15.3 Signal design will be carried out in the detailed design phase and will be subject to a detailed design safety audit*	
Safety Engineer: ***Agree with designers response.***	
Client Decision: ***Agree with designer response.***	
Action Taken: Click here to enter text.	

6.1.16. Tunnel ramp access	**Minor**
• *Crashes are likely to be:* **Infrequent** • *Death or serious injury is:* **Unlikely** • *Risk ranking:* **Minor**	
Sheet 49	
There is a kerb buildout at the traffic signals, but the section of kerb between the signals and the access to the top of the ramp Ch 2,235 to 2,265 retains the existing kerb line. This section of path is too narrow for the type of movement activity expected in this location. There will be bi-directional pedestrians and bi-directional cyclists on the footpath along with riders coming off Kaikorai Valley Road (at speed) that may be accessing the tunnel or the signal crossing.	
Recommendations:	

6.1.16.1. Agree	Designer to consider widening the kerb to the top of the ramp to provide for the various pedestrian and cyclist movement expected here. A concept sketch is shown in Figure 6-4.  Figure 6-4: concept for widening
Designer Response: *Agree with SAT recommendation. To be developed during detailed design phase.*	
Safety Engineer: ***Agree with the designers response. Additionally, if the switchbacks are turned through ninety degrees to run parallel with the road, the tight turn to join the road can be eliminated and a straighter transition installed. If a tight turn is required to join at the top there will be less risk if a rider does get it wrong.***	
Client Decision: ***Agree with designer response, develop switchback through detailed design.***	
Action Taken: Click here to enter text.	

6.1.17. Tunnel access ramp design	Minor

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

Sheet 50

The plan for the tunnel access ramp design has four 180-degree switchback curves on the way down the ramp. Looking at the long section, the short flat sections on the ramp do not align with the turning areas. Many riders struggle with switchback turns and having them on a gradient makes them even more challenging. The small radii also prevent two-way flow.

Recommendations:

6.1.17.1.	Designer to consider having every 180-degree curve on a level piece of path. This can be extended 1 m - 2 m to increase the length of flat turning area. This layout can accommodate more people on the path at the same time and will make the 180-degree turn safer and more comfortable for most riders.
6.1.17.2.	Designer to consider increased path width at corners.

Designer Response: *SAT recommendations will be investigated in the detailed design phase once topo survey information is available. Path width and grade needs to be balanced against available space and extent of retaining required.*

Safety Engineer: ***Agree with SAT, flat turns would be easier to ride.***

Client Decision: ***Agree, turns to be investigated through detailed design.***

Action Taken: Click here to enter text.

6.1.18. Tunnel to Caversham Valley Road	Minor

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

Sheet 51

Figure 6-5: Trail route north of Caversham Tunnel

The trail route north of Caversham Tunnel can become very wet and the design should ensure stormwater drainage does not impact the track, creating scour or spreading mud and detritus on the surface.

The route was covered in a thick layer of wet leaves and small branches which are a slipping / falling hazard for path users.

The existing pump shed is to be removed but existing cavities in the rock wall could be used by people to hide.

The existing track surface climbs steeply as it approaches the Caversham Valley Road footpath, and the proposed trail gradient should be within the agreed parameters. Adequate intervisibility and manoeuvring space should be provided where the trail meets Caversham Valley Road footpath.

Recommendations:

6.1.18.1.	That the trail design at the tunnel entrance/exit ensures stormwater drainage does not impact the track or its surface.
6.1.18.2.	That vegetation is routinely cleared from the track, far enough from the sides to prevent wet leaves being an ongoing hazard to trail users.
6.1.18.3.	That the large existing cavities in the rock wall are filled or blocked.
6.1.18.4.	That maximum gradient parameters are agreed with stakeholders and applied throughout the trail. If this is exceeded, then level platforms for resting or decelerating should be provided.
6.1.18.5.	That adequate intervisibility and manoeuvring space should be provided where the trail meets the Caversham Valley Road footpath.

Designer Response: *6.1.18.1 Stormwater design intent at the tunnel portals is to install a positive drainage system to capture stormwater. At the Kaikorai Valley portal sumps will capture stormwater and discharge to the Kaikorai Valley. At the Caversham end stormwater will drain to a pump station which will discharge to the existing stormwater network. 6.1.18.2 Project scope includes clearing of the vegetation above the track to improve natural light which will reduce the wet leaf hazard. This is also an item to be included in the maintenance scope at project handover. 6.1.18.3 This has not been recommended by the CPTED review and not currently part of the project scope. The CPTED report recommends retaining the existing cavities for amenity reasons. 6.1.18.4 Design vertical gradients and applicable standards are detailed in the preliminary design report. There are some instances in the preliminary design where these grades could not be achieved cost effectively. Each one of these locations will be further developed in the detailed design and any exceptions will be identified and agreed with DCC prior to completion of the detailed design. 6.1.18.5 Agree with SAT recommendation. This will be considered during the detailed design of this area.*

Safety Engineer: ***Agree with designer response. Additionally, appropriate lighting and something placed in the cavities should lessen the risk of them being used as hiding places.***

Client Decision: ***Agree with designer response and safety engineer comments, additional lighting to be investigated through detailed design.***

Action Taken: Click here to enter text.

6.1.19. Barnes Drive connections	**Minor**

- *Crashes are likely to be:* **Infrequent**
- *Death or serious injury is:* **Unlikely**
- *Risk ranking:* **Minor**

Sheet 52

The shared path terminates at the intersection of Rockyside Terrace and Barnes Drive. This is not a coherent location, and it is not obvious where the route goes from here.

Recommendations:

6.1.19.1.	That provision is made for cyclists to cross Barnes Drive to access the shared path connection to the city from the end of Barnes Drive and or the connections to South Dunedin on the other side of Caversham Valley Road (SH1).
6.1.19.2.	That wayfinding signs are required, plus consider green surfacing, hold lines, give way symbols and holding rails at intersection to help unfamiliar riders find their way.
6.1.19.3.	Consider sharrows along Barnes Drive if speeds are acceptable for shared use.

Designer Response: *The preliminary design for the tunnels trail ties into the existing shared path route at Barnes Drive. Upgrading the route beyond this point was outside the scope of the preliminary design. DCC to advise if the detailed design of the tunnels trail should extend along the full extent of Barnes Drive.*

Safety Engineer: ***Wayfinding signage will need to be placed to advise users of the options to link to other routes beyond this point.***

Client Decision: ***Agree with SAT, connections to the trail will be included in the detailed design scope, additionally, connections through Caversham along South Road will be addressed through the Safer Streets project, and into the central city along (SFDT) Princes Street Corridor Safety Improvement project.***

Action Taken: Click here to enter text.

7. Audit statement

We certify that we have used the available plans, and have examined the specified roads and their environment, to identify features of the project we have been asked to look at that could be changed, removed, or modified to improve safety. The safety issues identified are noted in this report.

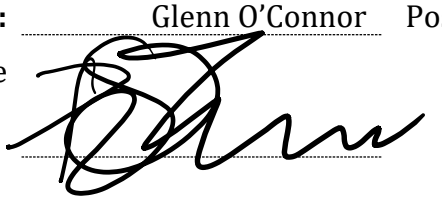
The number of road safety issues identified are summarised in Table 7-1 below.

Table 7-1: Summary of Issues

Serious	Significant	Moderate	Minor	Comments	Totals
	1	6	36	15	58

Safety Audit Team Leader: Name **Warren Lloyd** Position Traffic and Transportation Engineer, Director ViaStrada

Signature  Date 10/02/2022

Designer:	Glenn O'Connor	Position	Team Leader
Signature		Date	11/3/22
Auditors Comment:		Position	
Signature		Date	
Council Safety Engineer:	Ian Martin	Position	Principal Advisor – Road Safety
Signature		Date	11/04/2022
Project manager:		Position	
Signature		Date	
Action completed:		Position	
Signature		Date	
Project manager to distribute completed audit report to all signatories and project file		Date	

Appendix R. Peer review memo

Jacobs

Memorandum

Carlaw Park
12-16 Nicholls Lane, Parnell
Auckland 1010
PO Box 9806, Newmarket
Auckland 1149
New Zealand
T +64 9 928 5500

Subject	**Peer Review Memo**	**Project Name**	Dunedin Tunnels Cycle Trail SSBC
Attention	Matthew Hartley	**Project Number**	IA233100
From	Jacobs Peer Review Team		
Date	14 April, 2022		
Copies to	Glen O'Connor, Stephen Carruthers		

1. Introduction

Dunedin City Council (the Council) has commissioned Jacobs NZ Ltd to undertake a peer review of the Dunedin Tunnels Cycle Trail Streets Single Stage Business Case (SSBC) documents, in accordance with the Waka Kotahi NZ Transport Agency (Waka Kotahi) guidance 'Peer Review of Proposals' for the 2021-24 NLTP Investment Assessment Framework (IAF). This memorandum documents the SSBC peer review findings and captures how the peer review feedback has been addressed in updates to the SSBC.

As per the Waka Kotahi guidance the purpose of the peer review is to *reduce the risks that project either does not deliver on the outcomes forecast in the funding application or fails to deliver the outcomes at the level of efficiency and effectiveness stated in the application.pp*

2. Peer Review Approach

This peer review has assessed the project, through the SSBC documents provided, against the Waka Kotahi guidance "Peer Review of Proposals' criteria:

- Point of Entry;
- Conformity;
- Credibility;
- Choice of Do Minimum;
- Identification and selection of alternatives and options;
- Results alignment rating;
- Cost estimate;
- Cost-benefit appraisal rating;
- Risk assessment, analysis and mitigation; and
- Sensitivity analysis.

The SSBC documents provided to Jacobs for the peer review include:

- Dunedin Tunnels Cycle Trail Single Stage Business Case Part A, Dunedin City Council, 27 April 2021 (received on 18 June 2021)
- Dunedin Tunnels Cycle Trail Single Stage Business Case Final draft, Dunedin City Council, 21 January 2022 (received on 11 February 2022)
- Tunnels Final Alignment Economic Appraisal Calculations received on 25 February 2022 via email.
- Cost Estimate Detailed Breakdown (received on 2 March 2022)

After the completion of the peer review, Jacobs and the SSBC Project Team met via TEAMS on the 8 March 2022 to discuss the Peer Review findings.

To confirm the peer review findings raised by Jacobs were addressed, Jacobs received the following revised documents:

- Dunedin Tunnel Cycle Trail SSBC Peer Review Register FINAL, 28 March 2022 (received on 5 April 2022)
- Dunedin Tunnel Cycle Trail SSBC Final, Dunedin City Council, 4 April 2022 (received on 6 April 2022)
- Updated Economics Analysis, (received on13 April 2022)

3. Peer Review

The peer review has been documented in a register to capture the peer review findings and how they have been addressed in an updated SSBC. The Peer Review Register, is attached as Appendix A. The comments below are a high level summary of the main items identified and subsequently resolved:

- Conformity: The proposed project conforms to National, Regional and Local policy. The 'Strategic Context' section should be near the beginning of the Business case, not at the end. Suggest moving from Section 11 to Section 3 before 'Context'.
- Credibility: The case for investment in a safer, more connected, coherent and attractive cycle route between Dunedin and Mosgiel focuses on four problem statements. Evidence is provided in Section 5-8 to support each of these problem statements as outlined below:

    1) The perceived safety issues between Mosgiel and Dunedin deter active modes choice, limiting viable travel options.

This is supported by strong evidence from DCC's Residents' Opinion Survey (2012-2019) and On Streets consultation which shows low satisfaction with the suitability of the road network for cyclists (Figure 16) and 91% support or new and more cycleways. Three routes were identified between Dunedin and Mosgiel however only CAS data was only considered for one route. The SSBC recognises underreporting of cycle crashes and uses Waka Kotahi research on the relationship between impact speed and fatality risk as further evidence of the risk to cyclists on all routes. The SSBC provides adequate evidence to support problem statement 1: Perceived Safety Issues.

    2) The disconnected active mode network creates a severance between local & regional communities constraining tourism, recreational, social, employment opportunities.

Further emphasis should be given to the ***three*** Great Rides in the Otago region, the two mentioned (Otago Central Rail Trail and Clutha Gold Trail) are linked by the Roxburgh Gorge Trail and it is becoming increasing popular for locals and visitors to link these three Great Rides into extended cycling holidays and

multi-day bikepacking trips. Suggest including a map showing these Great Rides in relation to Dunedin/Mosgiel.

3) The poor cycling level of service, particularly steep gradients, discourages the use of active mode travel.

This project has taken cycle level of service guidance from the Waka Kotahi Cycle Network Guidance (CNG) which considers gradient, carriageway width, vehicle separation and vehicle speeds in determining the level of service. The SSBC also references Austroads GTRD Part 6A for further guidance. Each of the three main routes from Dunedin to Mosgiel have been assessed against CNG and Austroads however some data used is incorrect and misleading. Listing the length of a hill and maximum gradient at a single location gives a false representation of the difficulty of a climb.

4) Low active mode usage does not support a low carbon transport system or realise healthy lifestyles.

Figure 27 of the SSBC clearly shows the dominance of private car and low active mode share in the key suburbs within the study area. This section goes on to explain the consequence of low active mode share on the DCC 'Net zero carbon emission goal' and healthy lifestyles citing research from DCC and Waka Kotahi:

Would be better to provide emissions data for road travel only or land based travel (road and rail) if this is available as Cycling is not an alternative to air travel. This data is potentially misleading as air travel is likely to make up a significant portion of transport emissions.

Potential to cite specific research and provide New Zealand examples to further strengthen the case for cycling improving health outcomes. Could also add that cycling has benefits to mental health as well as physical heath.

The SSBC provides adequate evidence to support problem statement 4: Low active mode usage. However more detail could be provided to strengthen case towards *Net zero carbon emissions goal* and *Healthy Lifestyles.*

- Choice of Do Minimum:

The do minimum has been identified in the economics section and it describes a realistic level of investment to provide the minimum required level of service on the route. It describes the expected function of the existing southern cycle route including changes that will occur as a result of planned and approved projects.

The do minimum has been identified as the Southern Cycle route. However in the strategic case, two other existing cycle routes were also identified between Mosgiel and Dunedin (Friends Hill Track and Three Mile Hill Road). It was important to clarify what influenced the decision for selecting the Southern cycle route as the do minimum over the other two routes.

- Identification and selection of alternatives and options:

Scoring of the options was undertaken in accordance with Waka Kotahi Guidance and the Alternative and Options Assessment Multi Criteria Analysis approach was applied using a five-point scale ranging from '1' for poor alignment, to '5' for a high alignment against a particular criterion.

Whilst the five-point scale allows for sufficient granularity to differentiate between multiple corridor options, the options were not scored or presented in a consistent manner, using the scoring system. It was suggested to give each option a score from 1-5 using the five-point scale scoring system with additional explanation provided in the summary to justify the scoring. This way the reader can easily understand and differentiate the performance of each shortlist options against the various assessment criteria.

The conclusion of the short list MCA assessment stated that two options proceeded to concept design (Option 2 and Option 4). However, it was not clear why Options 3 and 5 were discounted or if they performed better or worse than Option 2 and 4. It is important to document which aspects of the MCA determined that decision. Additional commentary and rationale was therefore needed to support the decision.

It was suggested that the options could be ranked from best to worst (or total sum of scores presented). Additionally further explanation was needed to justify the findings of the MCA assessment, and the key factors that influenced the decision making for progressing Options 2 and 4 to concept design (and not Option 3 and 5).

- Results alignment rating:

The project has been assessed against the Waka Kotahi Investment Prioritisation Method for the 2021-24 National Land Transport Programme. The investment profile has been assessed as VHML with a Very High for GPS alignment, Medium for Scheduling and Low for Efficiency. As such this proposal gets a Priority Order of 3 according to the Investment Prioritisation three-factor Matrix.

The SSBC stated the incorrect priority order.

- Cost Estimate

We have reviewed the comments received back from Bonisch consulting following their review of our Cost Audit Report dated 11.03.2022. We agree with some of their responses, but not all of them, however this comment is more to do with the fundamentals of estimating rather than just the actual project costings. We note that the Bonisch consulting has increased their estimate now close to the value we recommended -within 3%. Based on Bonisch increasing their cost estimate we are confident Bonisch have responded to our review in good faith and thus we are happy to close out this project review millstone as acceptable. We do not require any further actions from Bonisch if their overall cost plan is within 3% of our review noting we have still not received a copy of this cost plan and out conclusion is based on their memo response only.

Finally, given the state of the current New Zealand and world construction markets, we would recommend a further peer review be completed at the next design millstone. The review will help mitigate the risk of cost item omissions during this subsequent design phase. We would also recommend a during the next design phase a Monte Carlo 95th percentile be completed through a simulation program such as @Risk.

- Cost-Benefit Appraisal Rating

The economic analysis has been updated to the latest MBCM and stated a BCR of 1.0 for the base case without WEBs and a BCR of 2.1 including WEBS (tourism).

- **Risk Assessment**

Significant live design risks have been summarised within the report and mitigation measures proposed to be undertaken at the detailed design phase.

Safety in design process has identified significant safety risks during construction, operation and maintenance. Realistic mitigation measures have been considered and discussed within the SSBC.

Financial and funding risks have been captured within the Financial Case and Management Case Risks have been identified for the project within the Management Case.

It was noted in the SSBC that a project risk register has been created for the project and is being regularly monitored and updated by the DCC project manager. However the risk register was not included within the SSBC.

All the risks identified in the SSBC should be accounted for within the risk register, outlining the bearer of risk and responsibilities etc and included within the SSBC.

- Sensitivity Analysis

Sensitivity tests as part of the economic evaluation incorporate all standard tests as well as additional appropriate tests.

The following general items were also identified in the peer review and subsequently resolved:

- **Project Objectives***:* Final 'project objective' bullet should be corrected and expanded to include the 3 designated 'Great Rides' in the Otago region which this project would improve access to: C*lutha Gold Trail, Otago Central Rail Trail and Roxburgh Gorge Trail*
- **Key Stakeholders**: SSBC mentions Green Island Community Network and Saddle Hill Community Board as Stakeholders. Has DCC also involved Mosgiel-Taieri Community Board in business case process?
- **Broad Context**: Section 3 of the SSBC adequately outlines the broader context including land use and urban form, social and economic, and existing projects. More detail could be added under Section 3.2 Transport System – particularly around existing infrastructure and cycle tourism as described below.
- **Existing Transport Infrastructure**: Figure 7 does not clearly show the location and type cycle facility (both existing and proposed). There are also facilities missing from this image – for example connection from Kinmont Park to Mosgiel. Update Figure 7 and description to clearly show all cycle facilities within study area.
- **Cycle Tourism**: Under Cycle Tourism section, reference should first be made the NZCN and should include descriptions of the three 'Great Rides' in the Otago region. The Roxburgh Gorge Trail has been left out which links the Otago Central Rail Trail to the Clutha Gold Trail.
- **Related Projects**: On page 20 under related cycle project suggest including cycle projects in and around Mosgiel included Gladfield Road Bridge replacement and Dunedin to Waihola Heartland Ride which are being implemented in 2021. Maybe also mention potential of existing shared path along the banks of Silver Stream in Mosgiel. These all show DCC commitment to improving cycle connectivity.

4. Conclusion

The Dunedin Tunnels Cycle Trail Single Stage Business Case has been prepared in accordance with the Waka Kotahi Business Case Guidelines. There are no outstanding items from the peer review that need to be resolved.

Jacobs

Memorandum

Carlaw Park
12-16 Nicholls Lane, Parnell
Auckland 1010
PO Box 9806, Newmarket
Auckland 1149
New Zealand
T +64 9 928 5500

Appendix A – Peer Review Register

- This register captures the peer review undertaken by Jacobs on the Dunedin Tunnels Cycle Trail Single Stage Business Case in accordance with Waka Kotahi's peer review guidelines[1]. The peer review findings raised by Jacobs below were addressed within the Dunedin Tunnel Cycle Trail SSBC Final, Dunedin City Council, 4 April 2022 (received on 6 April 2022).

#	Peer review theme	BC ref.	Peer Review Feedback	Action/s	SSBC Author response	Author Actioned?	Peer Review Closeout
Waka Kotahi Peer Review Guidance themes:							
1	Point of entry (PoE)	Part A: Section 1	The SSBC (Part A) Introduction (Section 1) describes the PoE approval: The PoE for this Dunedin Tunnels Trail Single Stage Business Case was approved by Waka Kotahi in May 2019. Section 1.1 clearly states the purpose of SSBC: …to determine if there is a need for a walking and cycling connection between Mosgiel and Dunedin, and if so, to identify the most appropriate route	(for record – no action needed)	NA	N/A	Y
1	Point of entry (PoE)	Part A: Section 1.2 Project Scope	Section 1.2 states project scope is between Dunedin and Mosgiel however the physical extents could be defined more clearly with an image showing the area under consideration rather than a map of preferred route. This gives the impression that route has already been decided. Section 4.2 States: …while the project was initially formulated around developing the Chain Hills and Caversham rail tunnels as part of the Mosgiel	Consider including a map showing study area rather than map showing the preferred route.	Agreed. Have put in a new map.	Y	Y

[1] https://www.nzta.govt.nz/planning-and-investment/planning-and-investment-knowledge-base/201821-nltp/2018-21-nltp-investment-assessment-framework-iaf/peer-review-of-proposals/#:~:text=The%20purpose%20of%20the%20peer,effectiveness%20stated%20in%20the%20application

			to Dunedin cycleway, that the pre-determination of such an outcome is not part of the business case process.				
2	Conformity	Part A: Section 11 Strategic Context Section 11.4	The 'Strategic Context' section should be near the beginning of the Business case, not at the end. Suggest moving from Section 11 to Section 3 before 'Context'. Alternatively the 'Strategic Context' could be included as a sub-section under 'Context' as Section 3.1. The proposed project conforms to National, Regional and Local policy. This key statement under Section 11.4 should not be hidden at end of SSBC: The review has demonstrated that there is a very strong strategic direction for investing in active modes in Dunedin, and specifically between Mosgiel and the city centre.	Consider revising report structure with Strategic Context up front.	Agreed. The order has been changed to reflect this recommendation.	Y	Y
3	Credibility (Problem Statement 1)	Part A	The case for investment in a safer, more connected, coherent and attractive cycle route between Dunedin and Mosgiel focuses on four problem statements. Evidence is provided in Section 5-8 to support each of these problem statements as outlined below: The perceived safety issues between Mosgiel and Dunedin deter active modes choice, limiting viable travel options. This is supported by strong evidence from DCC's Residents' Opinion Survey (2012-2019) and On Streets consultation which shows low satisfaction with the suitability of the road network for cyclists (Figure 16) and 91% support or new and more cycleways. Three cycle routes were identified between Dunedin and Mosgiel however only CAS data was only considered for one route. The SSBC recognises underreporting of cycle crashes and uses Waka Kotahi research on the relationship between impact speed and fatality risk as further evidence of the risk to cyclists on all routes. While the record of historical crashes itself does not reveal a significant safety issue, it should not be considered in isolation as a reflection of low risk. Crash records are the most direct measure	Explain why crash analysis was only carried out for one route. Consider adding map of cycle crash locations or breakdown of crash types involving cyclists.	The location of cyclist crashes has been clarified with a map has been added showing crashes.	Y	Y

			of safety performance, but it is important to note that crashes are rare events and therefore is a highly reactive measure of risk. The SSBC provides adequate evidence to support problem statement 1: Perceived Safety Issues.				
3	Credibility (Problem Statement 2)	Part A	The disconnected active mode network creates a severance between local & regional communities constraining tourism, recreational, social, employment opportunities. Figure 18 adequately shows the disconnect in the Cycle Network to the west of Dunedin City however the Key is not relevant to the map. Further emphasis should be given to the three Great Rides in the Otago region, the two mentioned (Otago Central Rail Trail and Clutha Gold Trail) are linked by the Roxburgh Gorge Trail. It is becoming increasingly popular for locals and visitors to link these three Great Rides into extended cycling holidays and multi-day bikepacking trips. MBIE holds data on all 22 Great Rides across NZ which can be used to support the tourism/economic benefits. A Heartland Ride (designated on-road cycle route) has been proposed between Mosgiel and Waihola (start of Clutha Gold Trail) and will be signposted in 2021. Waka Kotahi are also currently planning a Heartland Ride connection from Mosgiel to Middlemarch (start of Otago Central Rail Trail). Suggest including a map showing these Great Rides in relation to Dunedin/Mosgiel and the potential Otago loop.	Remove Key from map. SSBC could further discuss wider economic benefits of connecting Dunedin to the NZCN given Otago has 3 'Great Rides' which is more than any other region in NZ.	Key has been removed. Map and additional text added.	Y	Y
3	Credibility (Problem Statement 3)	Part A	The poor cycling level of service, particularly steep gradients, discourages the use of active mode travel. This project has taken cycle level of service guidance from the Waka Kotahi Cycle Network Guidance (CNG) which considers gradient, carriageway width, vehicle separation and vehicle speeds in determining the level of service. The SSBC also references Austroads GTRD Part 6A for further guidance. Each of the three main routes from Dunedin to Mosgiel have been assessed against CNG and Austroads however some data on length of climb and gradient may be incorrect and misleading. Listing the length of a hill and maximum gradient at a single	Suggest using the average gradient over the length of		Y	Y

			point on the hill gives a false representation of the difficulty of a climb. For example, Three Mile Hill Road is 2.5km long with an average gradient of 9.3% (climb of 236m in altitude) and Friends Hill is 3.4km long with an average gradient of 10.4% (climb of 355m in altitude). Suggest checking distances and length of climbs for accuracy and adding labels 'Dunedin' and 'Mosgiel' to profile graphs for clarity because direction of travel is not clear	climb and correcting figures.	The figures have been confirmed. Put more emphasis on the average gradient than the maximum and included the elevation.		
3	Credibility (Problem Statement 4)	Part A	Low active mode usage does not support a low carbon transport system or realise healthy lifestyles. Figure 27 of the SSBC clearly shows the dominance of private car and low active mode share in the key suburbs within the study area. This section goes on to explain the consequence of low active mode share on the DCC 'Net zero carbon emission goal' and healthy lifestyles citing research from DCC and Waka Kotahi: The Dunedin City Community Carbon Footprint 2019 identifies that transport (road, rail, and air travel) is the largest source of emissions, accounting for 43% of total gross emissions. Would be better to provide emissions data for road travel only or land based travel only (road and rail) if this is available as cycling is not an alternative to air travel. This data is potentially misleading as air travel is likely to make up a significant portion of transport emissions. Waka Kotahi Research Report 359 notes there is strong evidence that those who live in environments that support walking and cycling have better health profiles than people in neighbourhoods with poorer walkability. Potential to cite specific research and provide New Zealand examples to further strengthen the case for cycling improving health outcomes. Could also add that cycling has benefits to mental health as well as physical heath. The SSBC provides adequate evidence to support problem statement 4: Low active mode usage. However more detail could	Use land based travel only for emissions data. Cite specific research to provide further evidence. Should emphasis the benefits to mental health as well as physical heath.	Agreed, this has been updated for road transport. Included reference to climate rapid review report. More information has been added. More information has been added	Y	Y

			be provided to strengthen case towards Net zero carbon emissions goal and Healthy Lifestyles.				
4	Choice of Do Minimum	Part B, Section 2.1 Do minimum option Page 54	The do minimum has been identified in the economics section and it describes a realistic level of investment to provide the minimum required level of service on the route. It describes the expected function of the existing southern cycle route including changes that will occur as a result of planned and approved projects.	No action	No action	N/A	Y
		Part B, Section 2.1 Do minimum option Page 54	The do minimum has been identified as the Southern Cycle route. However in the strategic case, two other existing cycle routes were also identified between Mosgiel and Dunedin (Friends Hill Track and Three Mile Hill Road).	Clarify what influenced the decision for selecting the Southern cycle route as the do minimum over the other routes	Agreed, sentence added.	Y	Y
		Part B, Section 2.1 Do minimum option Page 54 & Appendix B, Section 6.1	Do minimum option described in Section 2.1 includes 'Main South Road (from the Brighton Road roundabout to Church Street) will be treated with speed limit reductions, traffic calming and sharrows with the expectation that cyclists will cycle within the traffic'. However the do minimum option described in Appendix C, Section 6.1 does not mention this.	Confirm what the Do minimum includes and be consistent in the descriptions	Explained during the meeting that the do-min changed during the course of the project as a new project was funded. The record is correct as of time of writing.	Y	Y
5	Identification and selection of alternatives and options	Part B, Chapter 2 Tunnels fatal flaw assessment Page 54	The SSBC states "it was confirmed that the width and height of the tunnels was appropriate for two-way walking and cycling and was consistent with design guidance".	Specify the width and height of the tunnels (i.e. design envelop) that was confirmed to be appropriate for two-way walking and cycling and also	Added into an appendix	Y	Y

				reference the design guidance.			
		Part B, Section 2.2 Option Developmen t, Page 55	SSBC states "The long list options were focused on selecting the best corridor between Mosgiel to Dunedin including connections into Green Island, Fairfield and Abbotsford" The long list should be focused on selecting a wide range of realistic and possible options for achieving the investment objectives.	Consider rephrasing the term 'best corridor"	Agreed, the wording has been updated.	Y	Y
		Part B, Section 2.3 Long list of options and alternatives, Table 2, Page 55	Section 2.2 states that the long list options were developed through three methods; review of previous work, engineering judgement by the project team and long list workshop. It would be good to clarify at this point, which of the four options were brought in from the Southern Cycleway Project Feasibility Report and which ones were developed at the longlist workshop held on 3 November 2020 etc.	Consider grouping options accordingly in Table 2 or clarify within the summary	A note has been made identifying the options from the PFR	Y	Y
		Part B, Section 2.4 Long list assessment Table 3, Page 58	The long list evaluation should include the Do min option that defines the core functionality and essential requirements for the project, which then get carried forward to the short list as a comparator.	Include do minimum option in the long list evaluation	Agreed, added into the table.	Y	Y
		Part B, Section 2.4 Long list assessment, Table 3, Page 58	Table 3 column 3 is titled "Considered for further assessment" however, includes both rejected options and also options accepted for further assessment.	Give appropriate heading for column 3	Updated	Y	Y
	Short List Assessment Tables	Part B, Section 2.6 Short list option assessment, page 60	Scoring of the options was undertaken using a five-point scale ranging from '1' for poor alignment, to '5' for a high alignment against a particular criterion. Whilst the five-point scale allows for sufficient granularity to differentiate between multiple corridor options, the final assessment scores presented in Table 4 to Table 9 is confusing and does not reflect the scoring system.	Clearly show the five-point scale scoring system that will be used to differentiate the performance of each	Table added.	Y	Y

			Suggest outlining the scoring system up front in a table that clearly shows the score definition and score/ colour. For example Score definition / Score High alignment/ achievement / 5 xx / 4 Neutral / 3 xx / 2 Poor alignment/ achievement / 1	shortlist option against the various assessment criteria.			
	Short List Assessment Tables	Part B, Section 2.6 Short list option assessment, Table 5, Page 62	The Do minimum was given a score of 5 against the 'technical or practical ease/ difficulties when implementing' criterion. The footnote however states "Later considered to be an incorrect scoring".	Need further explanation as to if/how the error was resolved or result was justified.	Resolved through change to the scoring system	Y	Y
	Short List Assessment Tables	Part B, Section 2.6 Short list option assessment, Table 5, Page 62	The score colour does not reflect the correct score (i.e. score rating 5 should be green as per the scoring system).	Review score colour	Updated all scores and colours	Y	Y
	Short List Assessment Tables	Part B, Section 2.6 Short list option assessment, Table 6, Page 63	Capital cost of the Do minimum option to be confirmed to justify its positive score.	Provide estimate of capital cost for 'Do Min'	Included into the description	Y	Y

	Short List Assessment Tables	Part B, Section 2.6 Short list option assessment, Table 6, Page 63	Options should be scored in a consistent manner, using the scoring system defined in section 2.6 (i.e. 1 to represent a poor score and 5 to represent a high alignment score). Table 6 shows other information instead of the score, which is confusing.	Give each option a score from 1-5 within the table. Any additional information/ rationale for the score could be explained in the summary.	Table has been updated	Y	Y
	Short List Assessment Tables	Part B, Section 2.6 Short list option assessment, Table 7, Page 64	Summary states "all options were rated similarly for their impact on climate change and Te Ao Maori considerations" yet the score colour does not reflect this. Table 7 shows other information instead of the score, which is confusing. Need more explanation in the summary to explain what is meant by "reduce", "maybe" and "none identified" within the context of the criteria being assessed.	Review score colour. Give each option a score from 1-5 within the table. Any additional information/ rationale for the score could be explained in the summary.	Updated text and scoring	Y	Y
	Short List Assessment Tables	Part B, Section 2.6 Short list option assessment, Table 8, Page 65	As above, give each option a score from 1-5 within the table. The rationale for the score should be provided within the summary rather than in the table.	Review score colour. Give each option a score from 1-5 within the table. Any additional information/ rationale for the score could be explained in the summary.	Updated	Y	Y
	Short List Assessment Tables	Part B, Section 2.6 Short list option assessment,	The conclusion states that two options proceeded to concept design (option 2 and option 4). However, it is not clear why Options 3 and 5 were discounted or if they performed better or worse than Option 2 and 4. Which aspects of the MCA determined the decision?	Additional commentary and rationale to support the decision	Additional table and text added.	Y	Y

		conclusion, Page 66	The options could be ranked from best to worst (or total sum of scores presented). Need more explanation to justify the findings of the MCA assessment, and the key factors that influenced the decision making for progressing options 2 and 4 to concept design (and not option 3 and 5).	Include additional table with sum of criteria scores			
	Cost Estimate	Section 2.7 Concept Design, Cost Estimate, Page 69	Option 4 cost estimate stated here ($27.1M) is different to the cost estimate stated in the Short list MCA Table 6 ($28.7M) on page 63.	Additional commentary to justify the difference in cost estimates	Removed the text as it was confusing and not adding to the business case	N	Y Agree with the changes made.
	Cost Estimate	Section 2.7 Concept Design, Cost Estimate, Page 70	Option 2 cost estimate stated here ($17.5M) is different to the cost estimate stated in the Short list MCA Table 6 ($28M) on page 63.	Additional commentary to justify the difference in cost estimates	Removed the text as it was confusing and not adding to the business case	N	Y Agree with the changes made.
	Short List Assessment Tables	Section 2.9 Short list re-assessment	This section compares the original scoring of the previous short list assessment in Section 2.6 with the new scoring of the re-assessment. For example "The upgrade existing route score also significantly increased in the reassessment from 4.5 to 12.5, with the technical difficulty and consentability criteria being scored higher due to the significant retaining that is required along Morris Road to provide separation from traffic" However, total scores were not presented or discussed in the previous short list assessment in Section 2.6. As noted earlier, it would make sense to present and discuss total scores in the previous short list assessment for consistency.		Assessment updated and scores added into table 11.	Y	Y
6	Results alignment rating	Part B 3.10 Assessment profile Page 99	The project has been assessed against the Waka Kotahi Investment Prioritisation Method for the 2021-24 National Land Transport Programme. The investment profile has been assessed as VHML with a Very High for GPS alignment, Medium for Scheduling and Low for Efficiency. As such this proposal gets a Priority Order of 3 according to the Investment Prioritisation three-factor Matrix - https://www.nzta.govt.nz/assets/planning-and-	Review investment profile and confirm priority order against the Investment Prioritisation three-factor Matrix.	Updated to priority order 3, and updated exec summary.	Y	Y

			investment/docs/Waka-Kotahi-Final-Investment-Prioritisation-Method-for-2021-24-NLTP.pdf, SSBC reports a priority order of 4. Please review. Also review wording in the executive summary (which records the investment profile to be VHLL).				
7	Cost Estimate	Trade Rates	We have completed a global check of the trade rates which indicate 'plus and minuses' between elements on the whole with some various cost issues identified. Refer to cost audit report for details.	Refer to cost audit report for details.	We have reviewed the comments and accepted Jacobs recommendations where appropriate. Overall, this has increased the expected cost estimate to $25.95M and the 95th percentile funding risk estimate to $27.84M. There is now only a 3% difference between the Jacobs 95th percentile estimate of $28.74M and the Bonisch estimate.	Y	Y
		P&G Costs	The cost estimate includes an allowance for Preliminaries and General of 11% of the trade costs. We note within the trade items there appear to be some Preliminary and General items such as 'Traffic Control' and 'Fan Hire Generator and Gas Monitors".	Remove the P&G items within trade costs and increased the P&G percentage to 15%.	Recommend no change. Items such as traffic control and rail protection officer are very specific to the individual section being estimated. Each section has been costed in this manner to allow DCC to easily mix and match what sections could be constructed in various packages and have an accurate cost for the specialist items of traffic control or rail protection required for each section. Does not alter the overall expected cost estimate for the project.	Y	Y

		Contractors Margin	We note there is no section within the estimate stating where the contractor's margin is included. We have assumed it is included within the trade works component of the estimate.	No Action	The contractors' margin is included within the trade works component of the estimate.	Y	Y
		Design Fees	The project has a 14% professional fee allowance we note Jacobs have included the same percentage in our audit.	No Action	Noted	Y	Y
		Fees	The cost estimate includes an allowance for "Legal fees, council rates and levies, RMA costs, NZTA fees, Kiwirail fees, and lease costs, Building consent costs and contributions" of 5% of the trade cost. This allowance appears reasonable, Jacobs has included this allowance in our review.	No Action	Noted	Y	Y
		Land acquisition	As this is a quantity surveyor cost audit, we are not qualified to comment on whether the $670K land acquisition cost represents a realistic budget for the cost estimate.	No Action	Noted	Y	Y
		Contingency	No 95th Percentile contingency has been provided – this is a normal NZTA requirement and would expect one to be completed on a project of this value. The contingency also appears low at only 15% at this level of design.	Add 95th percentile cost and review 15% contingency	The 95th Percentile risk allowance has been analysed and calculated from the project risk register and added to the cost estimate and cost estimate summary. As stated above the Bonisch and Jacobs 95th percentile cost estimates now only differ by a margin of 3%.	Y	Y
		Cost Escalation	Cost Escalation has been excluded – this means the budget will have a shortfall for any cot increase between the date of the estimate and the date of tender. We would recommend escalation be included.	Include cost escalation in estimate.	It is not a requirement of Waka Kotahi to include cost escalation in a DBE project estimate. However due to the current high rate of inflation / cost escalation this has been included in the risk register and quantified as part of the	Y	Y

					project expected and 95th percentile estimates.		
8	Cost Benefit Appraisal Rating	Part C – Economic Evaluation	The analysis has been completed using the 2020 release of the MBCM, using base year 2020 and time zero 2021. These years should be updated, as update factors for a 2021 base date are now available, and the project would be submitted in FY 2022. The new release of the MBCM also has an updated process for calculating greenhouse gas emissions using the VEPM. If emissions reduction is an important benefit of this project, consider using the new procedure.	Update to 2021 base date 2022 time zero, and consider new emissions procedure (MBCM 3.4)	Agreed, updated Agreed, updated	Y Y	Y Y (note typo in Table 16, WEB Tourism should be $26,739,000 [rounded up], Total number correct. Crash Cost Savings update factor, should be 1.10 instead of 1.15 as per MBCM update factors.
		Part C – Economic Evaluation – EEM Parameters	The value of travel time uses a simple average of commuter and other trip purpose values. This assumes that trips are evenly split between those two purposes. Can you state and justify this assumption?	Clarify assumption of even split, or use data to get a weighted average.	Updated to utilise weighted average of HTS trip counts (40% JTW, 60% other)	Y	Y
		Part C – Economic Evaluation – EEM Parameters	The value of health and environmental benefits uses a simple average of bike and e-bike values. This assumes that trips are evenly split between those two modes. Can you state and justify this assumption?	Clarify assumption of even split, or use data to get a weighted average.	This is a conservative assumption due to a lack of local data.	Y	Y
		Part C – Economic Evaluation – EEM Parameters	The mean cycle trip length used for the analysis, 3.56 km, is labelled as coming from HTS data, which is a good source for local trip length and appropriate to use. However, the spreadsheet links to an external sheet, and the value does not match the average length of trips in the HTS data in the "I; Option Seg + HTS Data" tab.	Clarify how the average trip length was calculated.	HTS data in tab has been superseded, 3.56km/trip is the correct distance for the analysis.	Y	Y

			This is a minor issue and not likely to have much impact, but could you please check and clarify the average trip length?				
		Part C – Economic Evaluation – Maintenance Cost / Amenity	The length of the tunnels trail used to calculate maintenance cost (11.56 km) is not consistent with the length of the project used to calculate amenity benefits (12.5 km). Is there a reason for these to be different, such as different maintenance requirements for tie-ins?	Check these values and clarify if there is a reason for the difference.	11.56km is the correct length for analysis, updated.	Y	Y
		Part C – Economic Evaluation – Demand Estimation	The analysis uses the buffer method (a modified version of the MBCM procedure) to estimate that there will be 106 new cyclists as a result of the project. The VOC calculation assumes there will be 156.56 mode shift trips per peak, which is calculated in an external spreadsheet (not provided). The reporting notes that there would be 125 work commuters and 30 school commuters that shift modes. However, there is no explanation in the report or the spreadsheet of how this is calculated or what its relationship is to the buffer analysis. Health benefits are calculated for both sets of demand. Could you clarify why two different methods were used to calculate two sets of demands, with different benefits? Can you verify that double-counting is not occurring, especially relating to the health and environmental benefits?	Clarify why two methods were used to calculate two sets of demands.	There are two segments of uptake analysed – a) the number of cyclists reasonably expected if the barrier (hills) was mitigated. This is calculated using an estimate of cycle share of trips by trip length for comparable urban areas. b) the increase in amenity and accessibility due to providing a higher than minimum facility is expected to result in an increase in local cycling – this is independent of effect a) and is estimated via the buffer method.	Y	Y
		Part C – Economic Evaluation – Travel Time / Amenity	The amenity benefits have only been counted for one 3.56km trip per user day. The amenity benefit calculation refers to AADT. Is the number of users from the buffer analysis equal to the AADT? Or should that be doubled to assume that users make two trips per day?	Check need to double the amenity benefits to represent 2-way trips.	Agreed, updated to two trips per cyclist per day.	Y	Y
		Part C – Economic Evaluation – Safety	The analysis has used $0.05 per user-km, for both new and existing users. This method is used in SP11 in the absence of a specific crash analysis.	None.	Noted.		

			It is noted that the SSBC contains a crash history of the alternate route, which could potentially be used as part of a crash-by-crash analysis as per SP11. However, as the MBCM does not provide clear guidance on the crash reduction of a new off-road cycle path, it is considered that the method used is appropriate.				
		Part C – Economic Evaluation – VOC / Emissions	As noted above, please clarify the basis of the mode shifted trips used for calculating VOC and emissions benefits. The new emissions procedure using the VEPM and the reduction in VKT as a result of mode shifted trips could provide a different emissions result and would be in line with the latest MBCM guidance. Consider updating to use this method.	As noted above – clarify mode shift calculation and consider using new emissions procedure.	Updated using current MBCM method.	Y	Y
		Part C – Economic Evaluation – WEB (Tourism)	The analysis evaluates the tourism benefits of the Tunnels Trail, particularly as it will connect the Clutha Gold trail to central Dunedin. This is an appropriate benefit to include; however, the calculations have been done in an external spreadsheet (not provided) so the calculation could not be reviewed.	None.	Noted.		
9	Risk assessment, analysis and mitigation	Section 3.5, Preliminary Design Page 88	Significant live design risks have been summarised within the report and mitigation measures proposed to be undertaken at the detailed design phase. Safety in design process has identified significant safety risks during construction, operation and maintenance. Realistic mitigation measures have been considered and discussed within the Business Case. Financial and funding risks have been captured within the Financial Case and Management Case Risks have been identified for the project within the Management Case. It is noted that a project risk register has been created for the project and is being regularly monitored and updated by the DCC project manager (this is not included in the appendix). All the risks identified in the business case should be accounted for within the risk register, outlining the bearer of risk and responsibilities etc.	Reference project risk register in an Appendix.	Added as an appendix	Y	Y

10	Sensitivity analysis	Part C	Sensitivity tests as part of the economic evaluation incorporate all standard tests as well as additional appropriate tests.	None.		N/A	N/A
General Peer Review Comments							
11	Project Objectives	Part A: Section 1.2 Project Scope	Final 'project objective' bullet should be corrected and expanded to include the 3 designated 'Great Rides' in the Otago region which this project would improve access to: Clutha Gold Trail, Otago Central Rail Trail and Roxburgh Gorge Trail	Correct name of Clutha Gold Trail and add Roxburgh Gorge Trail.	Agreed, change made	Y	Y
12	Key Stakeholders	Part A: Section 2.2	SSBC mentions Green Island Community Network and Saddle Hill Community Board as Stakeholders. Has DCC also involved Mosgiel-Taieri Community Board in business case process?	Confirm whether Mosgiel-Taieri was engaged	Confirmed by Stacey that they were involved but were unable to be at the workshops.	Y	Y – Mosgiel-Taieri community board now included as a stakeholder
13	Broad Context	Part A Section 3: Context	Section 3 of the SSBC adequately outlines the broader context including land use and urban form, social and economic, and existing projects. More detail could be added under Section 3.2 Transport System – particularly around existing infrastructure and cycle tourism as described below.	Refer to comments below	NA	N/A	N/A
14	Existing Transport Infrastructure	Part A Section 3.2 Transport System	Figure 7 does not clearly show the location and type cycle facility (both existing and proposed). There are also facilities missing from this image – for example connection from Kinmont Park to Mosgiel. Update Figure 7 and description to clearly show all cycle facilities within study area.	Update image and description	Now figure 9 map has been updated, but too larger scale for type of facility.	Y - in part	Y
15	Cycle Tourism	Part A Section 3.2 Transport System	Under Cycle Tourism section, reference should first be made to the New Zealand Cycle Network and should include descriptions of the three 'Great Rides' in the Otago region. The Roxburgh Gorge Trail has been left out which links the Otago Central Rail Trail to the Clutha Gold Trail. There is also a proposed Heartland Ride linking Dunedin to Waihola (start of Clutha Gold Trail) and investigations are underway into best cycle route from Dunedin to Middlemarch (start of Otago Central Rail Trail) which would provide a multi-day cycle tourism loop incorporating all three Great Rides in the Otago Region.	Include further details of cycle tourism potential	Agreed. Detail added in.	Y	Y

16	Related Projects	Part A Section 3.4 Related Projects	On page 20 under related cycle project suggest including cycle projects in and around Mosgiel included Gladfield Road Bridge replacement and Dunedin to Waihola Heartland Ride which are being implemented in 2021. Maybe also mention potential of existing shared path along the banks of Silver Stream in Mosgiel. These all show DCC commitment to improving cycle connectivity.	Add cycle & pedestrian projects in and around Mosgiel.	Added in Gladfield Bridge and Dunedin to Waihola. Stacey recommended not adding in Silver Stream.	Y – in part	Y
17	Investment Objectives	Part A Section 10 Investment Objectives	Four objectives were agreed at the ILM workshop. Object 1, 2 and 4 can be clearly measured. Objective 3 was not clear exactly what KPI will be reduced by 50% by 2030. 3. To improve the level of service for active mode network for communities to enable cohesion and participation in social, commercial and employment opportunities by 50% by 2030	Clarity objective 3 and how this will be measured	Noted that there are three KPIs related to this investment objective - Improved accessibility for active modes, Improve level of service for active modes, Reduced health expenditure.	Y	Y – objective amended to remove '50%' as there are three KPIs related to this IO as defined in Table 1.
18	Key Performance Indicators	Part A Section 10 Investment Objectives	Table 1: Key Performance Indicators (page 45) clearly describes how objective 1, 2 and 4 will be measured but it's not clear how some KPIs associated with objective 3 are measured to meet the objective: …to enable cohesion and participation in social, commercial and employment opportunities by 50% by 2030.	Provide further detail on how LOS and health expenditure relates to the objective	Agreed in discussion that no change was required.	N/A	Y
19	Commercial Case	Chapter 5	Traditionally the business case is structured in the following order, in accordance with the five case model – Strategic case, Economic Case, Commercial Case, Financial Case and Management Case. The Financial Case in this SSBC is presented prior to the Commercial Case.	Consider rearranging to match the five case model structure.	Moved.	Y	Y