



Road Safety Audit Report



Location: Bogong High Plans Road, Falls Creek, Victoria
Issue: Proposed Change Above Windy Corner
Audit Stage: Concept Design
Client: Jonathan Spring

Report Issue Date: 12 August 2022

RSA Reference: 12931



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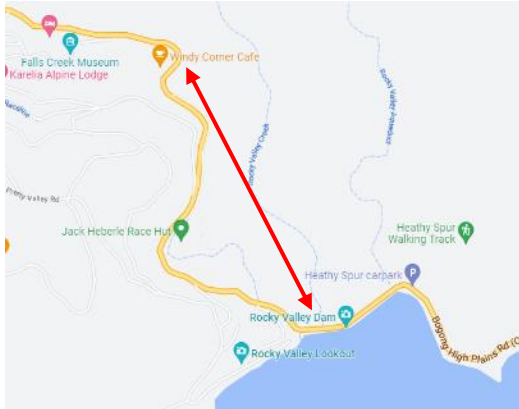
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Road Safety Audit Report

Bogong High Plains Road, Falls Creek, Victoria
Jonathan Spring

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Google Maps

Document Record

| Revision | Delivered | Road Safety Auditors | Contact |
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ROAD SAFETY AUDIT BACKGROUND

INTRODUCTION

This is a concept design stage road safety audit of proposed changes to the use of Bogong High Plans Road, Falls Creek, Victoria, between 'Windy Corner' and the ANARE building that is adjacent to Rocky Valley Dam (Dam). The audit has been undertaken by Road Safety Audits, commissioned by Jonathan Spring. It has been carried out in accordance with "Austroads Guide to Road Safety, Part 6: Road Safety Audit 2022" guidelines.

ROAD SAFETY AUDIT: OVERVIEW

A road safety audit is an independent examination of a design or condition to evaluate potential safety issues for all road user types. It is carried out by a team of suitably qualified people, typically engineers, and can provide treatment options for consideration by the client. It combines the experience of the individual team members with contemporary evidence-based knowledge on road crash types and countermeasures. It uses the principles of Austroads Guide to Road Safety Part 6: Road Safety Audit 2022 and DOT (VicRoads) / Austroads guidelines and standards as references where relevant. A road safety audit is not a checklist or a check of compliance to standards.

APPROACH TO AUDIT

The approach to this audit is to form an opinion on potential safety issues on their merits, based on observations, and taking account of local issues and operations. It combines the experience of the auditors as well as aids such as the prompt lists in Appendix H of Austroads Guide to Road Safety Audit Part 6 – 2022 (on right).

The audit focuses on the core safety issues arising from the concept and human factor elements and assesses fitness for purpose based on the real-world operating environment, by considering the following types of factors:

- *Road Conditions and Road Elements* (cross section, shoulders, verges, batters, horizontal and vertical curves, crossfall, pavement condition, roadside environment, intersections, sight distance, delineation, lighting, utilities, etc.).
- *Traffic and Operational Elements* (traffic composition, traffic volume, driver behaviour, skier and other non-motorised user behaviour, mix of motorised versus non-motorised traffic, operating speed, animals, traffic patterns, crash history).

The above factors are used to assess the following broad safety areas relevant to this road and when taking account of the proposed snow-clearing change:

- Vehicle safety on the road including its 'bookends'
- Skier safety on and about the road
- Safety of other vulnerable user-groups such as walkers or tobogganists

The road safety audit is limited to safety issues, not user amenity or other peripheral issues such as environment, strategic objectives, and other stakeholder issues.

CONDUCT OF THE SITE INSPECTION

A visit was carried out on foot during the day of Thursday 28 July 2022.



PROJECT BACKGROUND

PROJECT

A section of Bogong High Plains Road between Falls Creek Windy Corner and the Rocky Valley Dam (Dam) is proposed to be cleared of snow for winter access to the ANARE building. It is currently a 'three-season road' which does not carry traffic in the winter. The section of road is indicated by the red arrow superimposed on the image below.

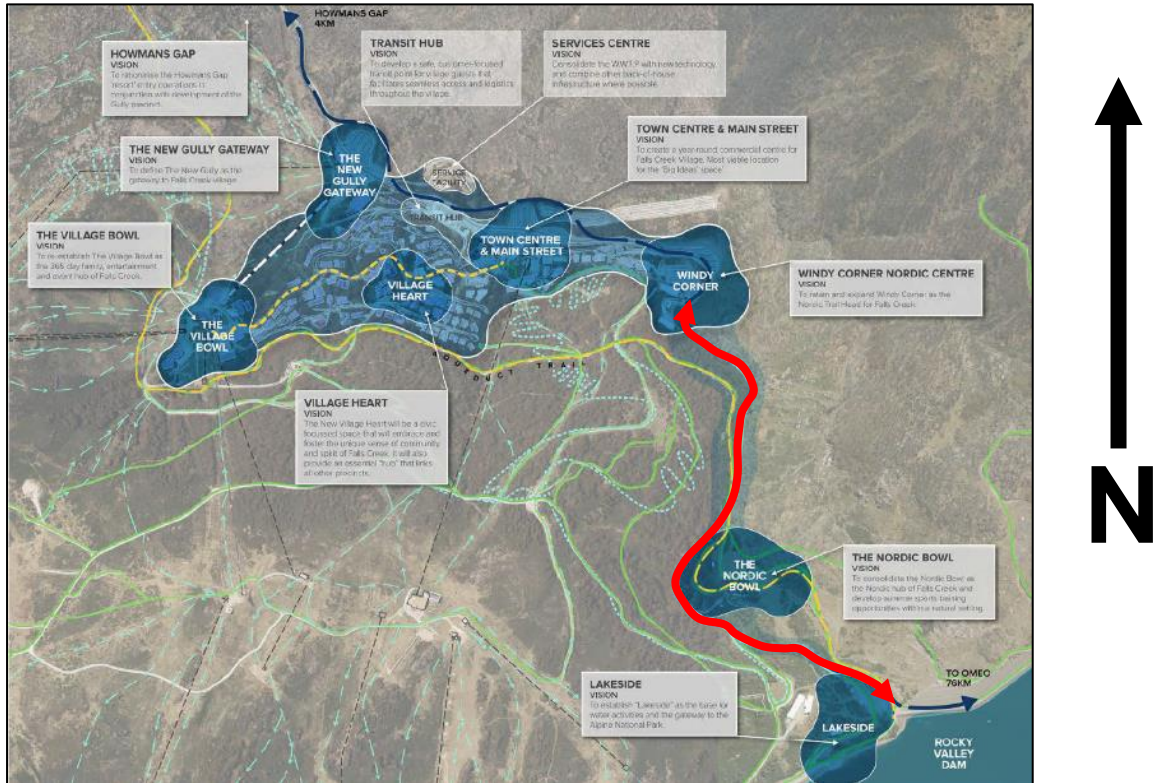
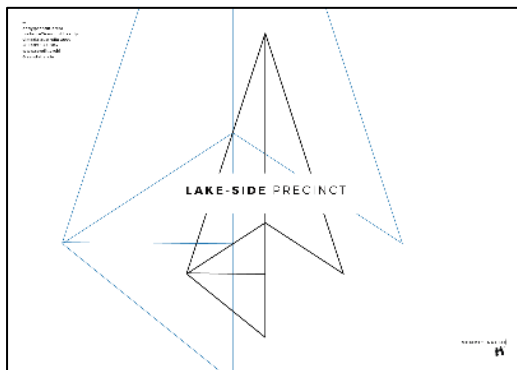


Figure 3 of the Sendit Archi Lakeside Precinct Plan

Resources that discuss proposed high-level changes to the road between Windy Corner and the Dam at Falls Creek include:

- Falls Creek web site with detailed information on the ANARE project: (<https://corporate.falls-creek.com.au/lakeside-development-project-planning/?fbclid=IwAR3HN4kLyRaKQDtg7z9JRN-uo9J43Dj8wpRP98kiuHwhWpaC6DSbG85aTP1>)
- Sendit Archi 15-page Lakeside Precinct plan
- Falls Creek Resort Master Plan 2016



The detailed information on the ANARE Project from the Falls Creek website indicates the following changes, with some of the key aspects relevant to this road safety audit highlighted:

Consideration of winter and summer user requirements including:

- Increase car parking capacity
- **Develop all-season car parking** to allow for up to 100 additional parking spaces.
- Provision of curbing and stormwater to suit snow clearing operations
- Use of green asphalt and recycled concrete for car park surfaces

Improve road access including:

- **Upgrade ANARE access road to all seasons use** with green asphalt
- Infrastructure integration for both mountain biking, water activations and cross-country skiing in this area
- **Consideration of snow clearing requirements for all-season activation**

Miscellaneous Statements relevant to this Audit

- Enhanced community recreation facilities for summer and winter, whilst also growing green and winter season visitation
- Drive further demand for alpine experiences, with a demonstrated Victorian market size of 1 million potential visitors for snow season and 996,000 for the green season over 2 years.
- Enhanced community recreation facilities for summer and winter, whilst also growing green and winter season visitation
- Increase in mountain capacity and visitor experiences

Will I need to fit chains out at Lakeside in winter?

Fitting of chains to any vehicle entering, or leaving the resort are determined by the road services team in accordance with current practices. During winter, all vehicles must carry chains, and when instructed, they must be fitted.

Will this road be closed numerous times per year due to snowfall?

This is not being proposed at the present time. Consistent with the resort's current snow clearing procedure for Bogong High Plains Road, the focus is on keeping all access roads open and safe for use throughout the winter season and maintained as per existing arrangements undertaken on behalf of Regional Roads Victoria. Any closures would only occur based on an assessment of conditions at the time, noting Falls Creek rarely closes access roads throughout winter.

Is the road narrow and not appropriate for traffic in winter?

The Road Safety Act 1986 obliges road users to have regard to all relevant factors when driving a motor vehicle, particularly the physical characteristics of the road, prevailing weather conditions, level of visibility, prevailing travel conditions, etc. Regional Roads Victoria, the coordinating road authority for Bogong High Plains Road, has been consulted. Falls Creek Alpine Resort Management Board (FCARMB) follows the guidelines under its responsibilities as outlined in the Road Management Act 2004 Code of Practice Operational Responsibility for Public Roads. FCARMB will clear snow in a manner that protects against road user hazards, including ensuring signage, speed limits and safe passing points are identified.

Will Bogong High Plains Rd will be cleared out to the Lakeside location?

It is proposed, that a 1.2km section of Bogong High Plains Road (BHP Rd) from Windy Corner to the Observation Deck can be cleared to allow all season access to the new facility.

Can I access the trail from Windy Corner car park that gets me out to the Nordic Bowl and Lakeside area?

Yes – the aqueduct trail will remain groomed and open for use. FCARMB is considering options to provide better/safer access to this location from the current Windy Corner facility.

It is also proposed to extend the current BHP Road **shuttle bus services** transporting people direct to both the Nordic Bowl and Lakeside area. Other bus access will also be facilitated, including direct access for up to Toyota Coaster size vehicles and turnaround locations for **larger bus sizes**. However, there will be no permanent bus parking out at these sites (drop off/pick up only).

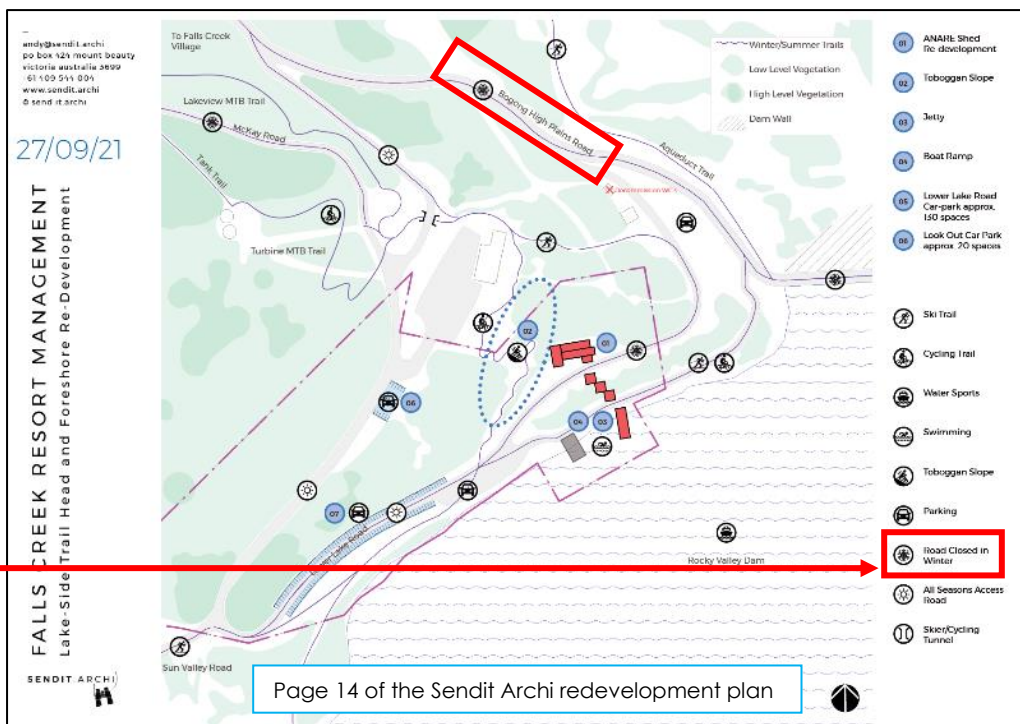
What is the plan to address trail quality impacts from clearing the road?

FCARMB utilises a range of snow clearing equipment and infrastructure during the winter period. Appropriate snow clearing equipment which allows snow to be blown from the road and into areas which have less trail impact are already in service.

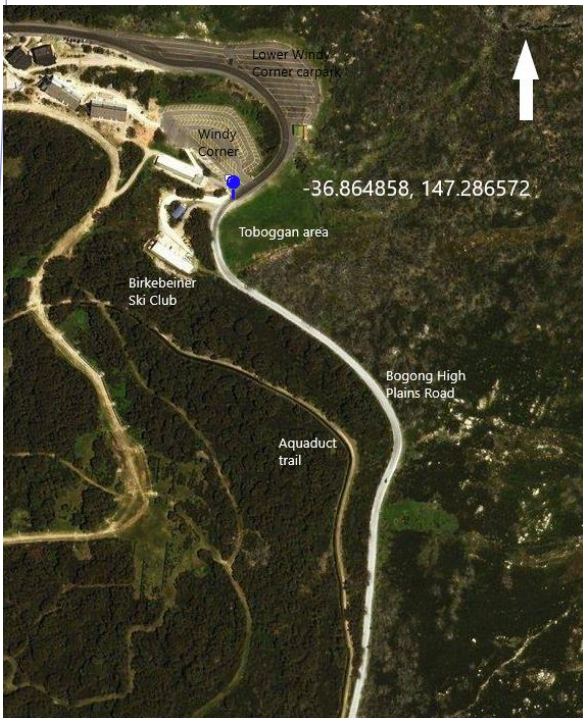
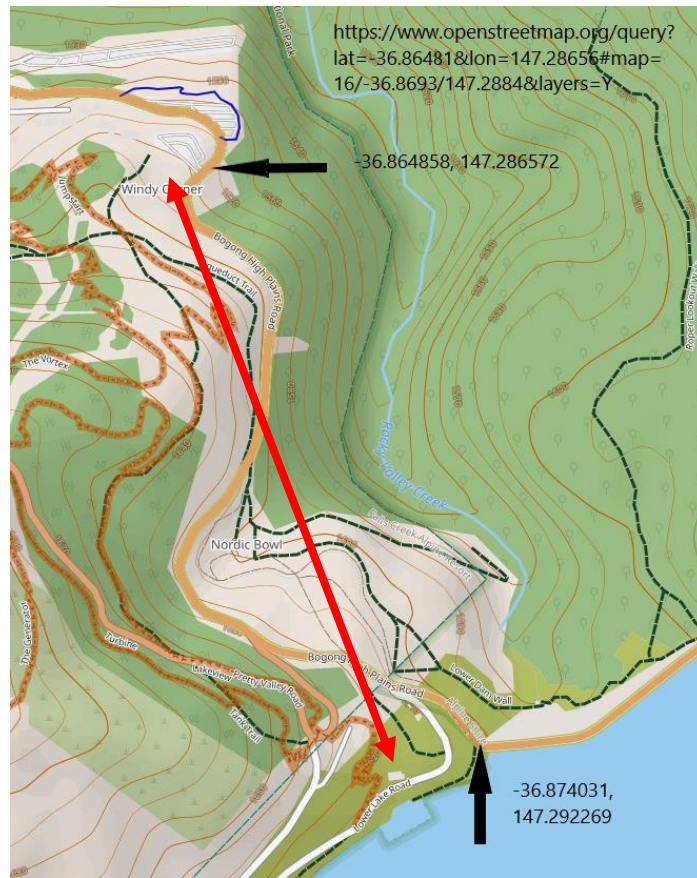
We will also be ensuring any road assets have appropriate infrastructure to assist in clearing operations and the protocol for de-icing minimises adjacent trail impact.

The available information indicates that the ANARE Shed is proposed to be redeveloped to 'facilitate commercial and visitor centre activation'. It is unclear from the available information whether the shed is intended be open / attract people at night time (from Falls Creek village). A night time site visit was not undertaken due to safety / logistical difficulties and the fact that there is no street or other lighting and therefore the visibility / light conditions at night can be easily predicted from a road safety auditor's perspective.

Note: The indicative layout plans in the Sendit Archi document show the Bogong High Plains Road 'closed in winter'. It is assumed that this refers to the existing condition rather than the intent within the other documentation which indicates a desire for it to be cleared of snow and open to vehicular traffic in winter.



Contour map and satellite images of the road from Windy Corner to Lakeside Precinct:



Currently during the winter, this section of Bogong High Plains (BHP) Road between Windy Corner and the Dam is not cleared of snow for vehicle access and is used by skiers and walkers. The road layout and conditions will be discussed in more detail in the section 'Conditions'.

Images below show the road during snow fall:



Images below show the road during a clear sky:



VEHICLE TYPES

With open access to the Lakeside Precinct, it could be expected that drivers using this road would have varying abilities and experience in winter conditions from novice to experienced.

Transportation vehicles using this section of road are likely to include the existing mini-buses used at Falls Creek (on left) and larger buses (on right) used for tourists and school groups.



The expected *operational / services* vehicles are likely to include snow ploughs, snow blowers, goods vehicles and possibly garbage and sewerage vehicles. Examples of vehicles below.



CONDITIONS

ROAD AND INTERSECTIONS

The road surface was covered with snow and could not be seen. Therefore, measurements of the road under the snow were deliberately conservative, assuming the 'best case' road pavement width. The actual width may well be slightly less.



The road cross section of this subject length, south of the Falls Creek centre, is likely to be similar in construction techniques to the section of road leading to Falls Creek from the northern side. It was measured to have a full width of ~6.5m and it likely consists of two 3.2-3.3m lanes for its majority, with narrower sections at some locations (described in the pages to follow). It appeared that the majority of the road length did not have shoulders, with the hinge-point of the cut batter (the 'drop-off') abutting the yellow edge-line. i.e. the road drops away at the edge line. As such, there appeared to be very little room for driver error. The overall width of this section of road + shoulder is approximately 6.5m, whereas a typical road lane width is 3.5m, plus curve widening, with even low-category roads having at least some shoulder.



The table drain on the fill side (the hill) couldn't be seen, however, based on the section of road near Windy Corner, it is assumed to *also* be hard up against the edge line.



*The subject section of road in question, under the snow south of Falls Creek, is expected to be similar to the table drain in the image above, which is just north of Windy Corner.

It's understood that the edge of the road has subsided in the area below (adjacent to the existing sign), just north of the Nordic Bowl. This section has a reduced width of approximately 5.5 to 6m (conservative estimate).



In general, it is likely in winter that the ground under the road surface, and abutting the road edge, has a higher moisture content. This would reduce its structural integrity thereby resulting in a softer pavement and increasing the risk of damage to the road and slippage (subsidence) of the road edges with passing vehicles. This risk of road edge slippages would increase with larger vehicles including buses, snow clearing equipment, freight vehicles and potentially sewerage and garbage collection vehicles.

Images of typical edge of pavement are shown below, taken near Windy Corner.



Other narrower road section is the first corner south of Windy Corner, estimated at 6m.



Looking south



Looking north

A third narrow road section was the first corner south of Windy Corner, estimated at 6m.



Additional images of the road are shown on the following pages:

Commencement of the road just south of Windy Corner



Typical intersection, this one being the Bikebeiner Nordic Ski Club House



Moving past the gates



Towards the first curve



At the first curve



At the first curve



Drop-off at the first curve down tiered embankments with occasional trees



At the first curve looking back towards Falls Creek



At the first curve looking back towards Falls Creek



Towards the area of the road that has slipped



The section of road that has slipped



The section of road that has slipped



Past the road that has slipped and towards the 'Nordic Bowl' intersection



Approaching the bowl intersection looking back towards Falls Creek



Approaching the bowl intersection looking back towards Falls Creek : showing the steep batter drop-off



Approaching the bowl intersection



At the bowl intersection with the trail on the right and the bowl area off to the left with the road continuing as per arrow



Looking back towards Falls Creek from the bowl intersection



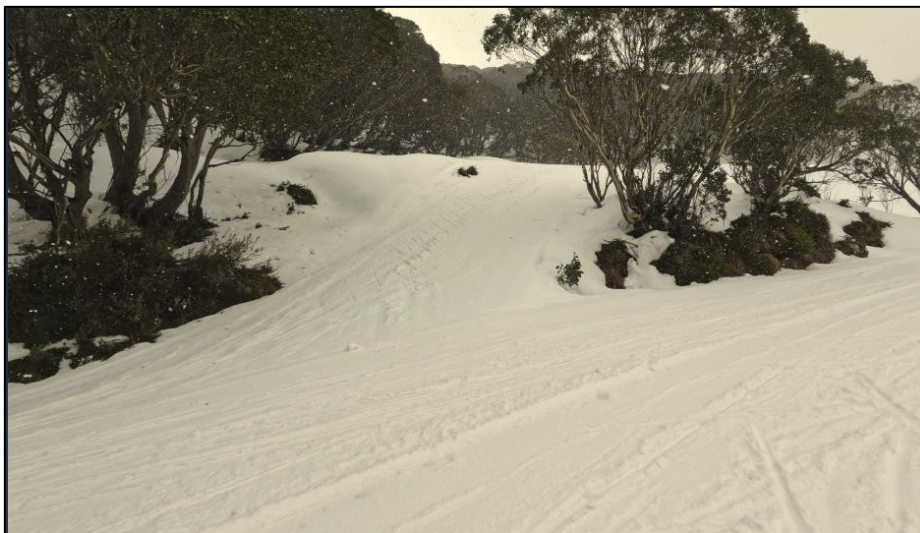
At the bowl intersection (restricted sight distance to the south from the ski trail)



At the bowl intersection looking back towards Falls Creek



A typical intersection with a cross-country ski trail is shown below. It has a steep approach and limited sight distance until right at the road. It is assumed to be unlikely that this trail could remain open if the road is cleared as the associated risks would be high.



Another key intersection apart from the bowl, with a skier-only trail (in winter), is where Mount McKay Road (to AGL corner) splits off to the right, with the road continuing left as per arrows.



HAZARDS

Typical roadside features that could result in occupant injury from point hazards or vehicles overturning included: the steep batters which were mostly 2(h):1(v) at their flattest, and as steep as 1:1; longitudinal drains at the bottom of embankments; deep holes formed from transverse road culverts; and trees of diameter 200mm+. The steep batters of 1:1 likely increase the risk of road edge slippage due to reduced structural support at those locations.



BEHAVIOUR OF VULNERABLE ROAD USERS

People seemed comfortable walking on and across the road between in and around Falls Creek village including the Windy Corner area. It is understood to increase significantly during school holidays and weekends with more visitors to the resort.



People were also observed walking on BHP road between Windy Corner and the Dam.



Therefore it is reasonable to expect that people will continue to walk on the (proposed) 'snow-cleared' section of BHP road between Windy Corner and the Dam. The ANARE project information confirms that shuttle-buses will be available for skiers and walkers to access the Bowl and ANARE building however it is highly likely, based on the current user behaviour at Falls Creek, that many people won't wait for a bus (and therefore walk), or would simply prefer to walk on BHP road from Windy Corner to the Dam regardless of buses. It is proposed that skiers could access the Bowl via the aqueduct trail. However, it is unknown whether the majority would do this rather than walking on BHP road.

A major toboggan area is right at the commencement of the section of road proposed to be cleared of snow. i.e. it abuts Windy Corner. There appears to be conflicting publicly available information about whether this sheltered toboggan area will be moved to the exposed slopes adjacent to BHP road on the approach to the ANARE building. This audit is therefore assessing the risks of maintaining the toboggan area where it is currently situated.



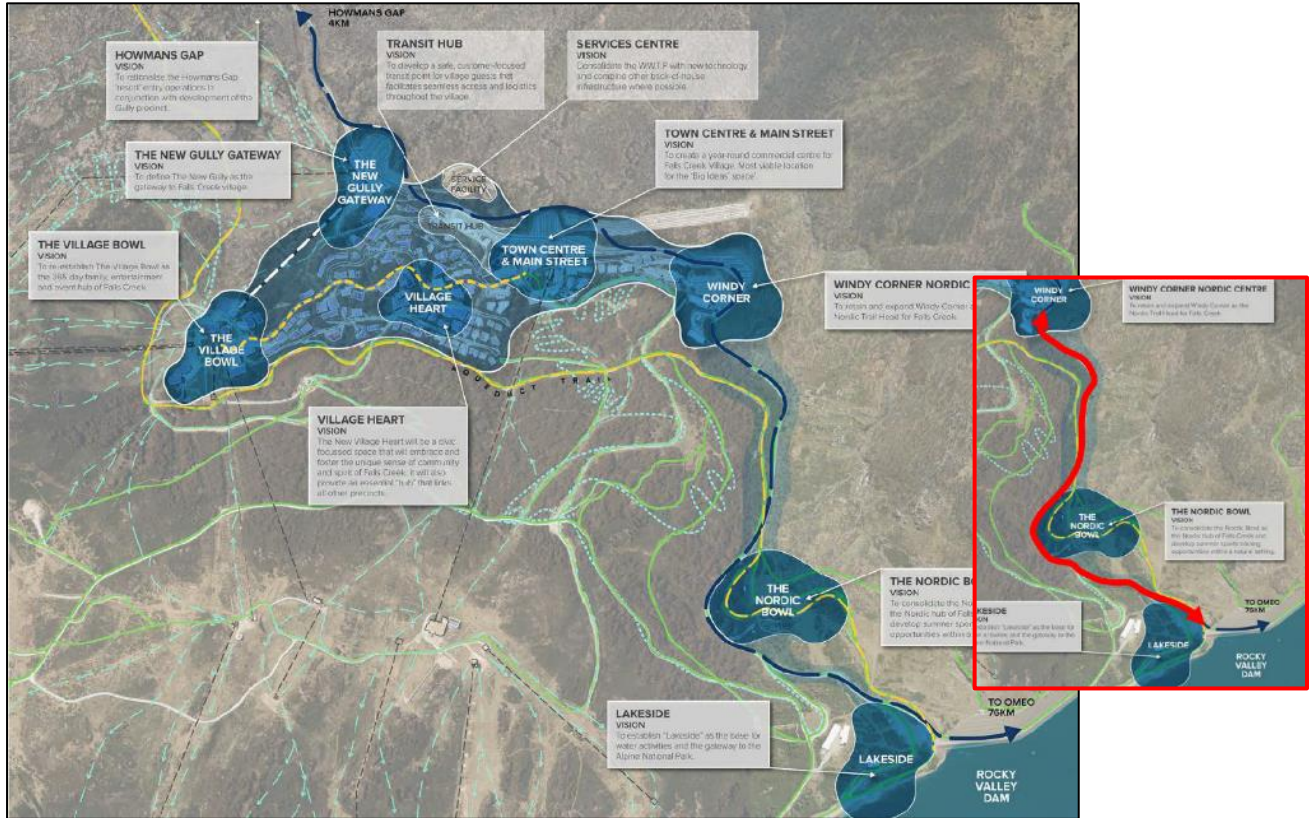


There will be significantly more traffic, including heavy vehicles, travelling past this toboggan area where people, including many children, are mingling, playing and crossing the road.



WEATHER

The subject section of road is situated above Falls Creek at an altitude of ~1600m. This area is more exposed, and based on local knowledge, it is subject to harsher weather with strong winds and reduced visibility caused by snow storms and low hanging clouds.



Page 4 of the Sendit Archi 15-page Lakeside Precinct Plan indicates areas of 'Prevailing Winds' along this road section.



Sendit Archi 15-page redevelopment plan

Images below show the subject section of road under snow-fall.



CRASH HISTORY

Records or reports of three crashes within the subject road length have been sourced through media articles and local sources:

December 2013 (car and bicycle accident)

A cyclist became a permanent and complete/incomplete Quad, complete Paraplegic in December 2013 when cycling and run off BHP road adjacent to the Nordic Bowl by a car coming up the road.

23 March 2015 (minibus accident)

A coach bus was heading down past the Nordic Bowl entrance (on BHP road) and a minibus was heading up from Windy Corner. When they crossed paths (between the Nordic Bowl and the Apex in the road towards Windy Corner), they each moved to their left and the road subsided under the minibus causing it to roll down the steep embankment. Two teenagers were taken to hospital. The road has not been repaired.



The Age, 23 March 2015

30 March 2022 (light vehicle and motorbike accident)

There was a traffic marshal in a FCRM vehicle stopping cars just before the Nordic Bowl entrance heading back to Windy Corner. The accident was around the bend after the Nordic Bowl entrance.

Notably, the above three crashes were *not* in winter, and there was no snow or ice on the road, and the ground under and adjacent to the road would likely have been firmer. If this road is cleared of snow and open to vehicles in winter, it is likely to result in an increased vehicle crash risk caused by a lower friction road surface (ie ice and snow) along with reduced visibility caused by snow-fall, low hanging clouds and high winds.

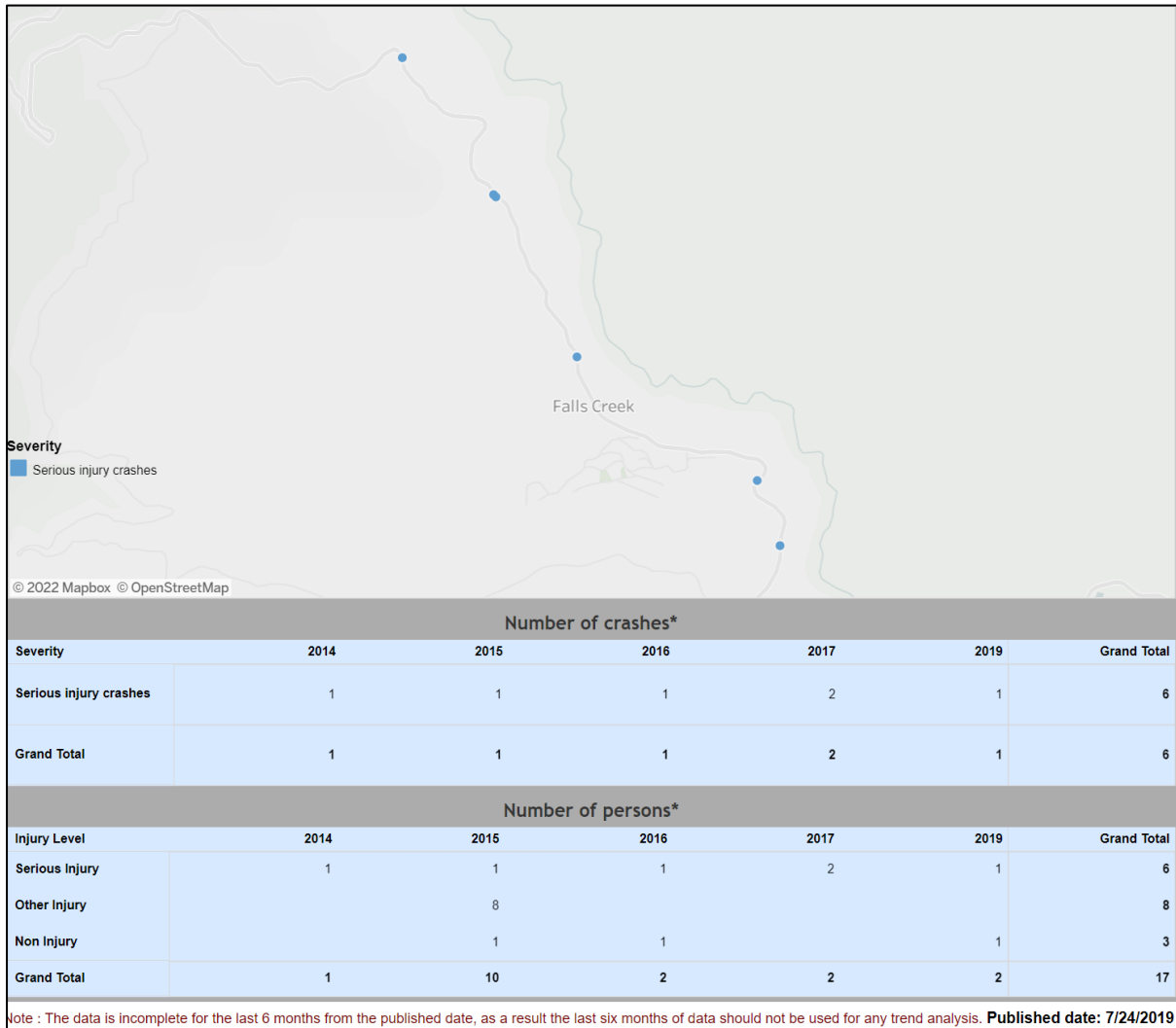
It is also reasonable to expect an increased risk of slippage / subsidence of the road edge with winter vehicle traffic due to softer ground (under and adjacent to the road) and an increase in heavy vehicles (buses, minibuses, snow clearing) and general traffic volume.

It is understood from local information that drivers regularly end up in the drain adjacent to the road on the upper-embankment side (the 'fill' side of the road) during heavy snow fall when the drain is hidden and/or there is a lower friction road surface (ie ice). This is understood to occur when drivers move away from traffic coming up-hill, or otherwise misjudge the curve, and drop their wheels down into the ditch which forms hard up against the edge of the road at the solid yellow line. It is understood that these incidents do not result in occupant injury, but occur frequently, and reduce the available road width for the remaining traffic.



This is a relevant consideration for assessing the safety implications of the road between Windy Corner and the Dam due to the similarities in the road.

Publicly available *casualty* crash information via Vicroads' web site between 2014 and 2019 (latest available) indicates six crashes, two of which are in the subject section south of Falls Creek. One of these crashes is the mini-bus crash noted previously.



Note : The data is incomplete for the last 6 months from the published date, as a result the last six months of data should not be used for any trend analysis. **Published date: 7/24/2019**
https://public.tableau.com/views/Crashstatactfacts/Mapviewbycrashes?%3Aembed=y&%3Adisplay_count=yes&%3AshowTabs=y&%3AshowVizHome=no#1&%3Adisplay_count=yes&%3Atoolbar=no&%3Arender=false

KEY RISKS WITH PROPOSED ROAD CHANGES

FACTORS AFFECTING SAFETY

Safety issues along the subject length will be influenced by various factors, with key factors being:

- climatic conditions
- road conditions – curves
- road conditions – narrow width
- road conditions – no shoulders
- road conditions – vertical grade
- road conditions – surface frictional properties particularly due to ice
- road conditions – edge slips
- traffic – volume
- traffic - vehicle type
- traffic – vehicle mix
- traffic – presence and behaviour of vulnerable road users

SPECIFIC RISKS

The current ANARE project planning is high-level only with few details of what changes there might be to the road, bus use and stops, interface with major intersections, interface with minor cross-country ski intersections, signage, and so on. Nevertheless, a list of key risks identified by the audit team is provided in Table 1 below. **The ratings assume that vehicle travel speed is low, and is a best-case risk-rating, averaging out severities across the whole length, and all 'scenarios' such as assuming seat-belts are worn on buses. In reality, these risks could be teased out further, which would result in some risk ratings being higher.**

| Risk | Affected Road Users | Risk Rating (Austroads GRS Part 6) |
|--|-------------------------|--|
| Light vehicles loses control and spills down embankment / culvert / tree. | Drivers | Risk Rating = Unlikely (3-7Y) + Moderate = Medium |
| Light vehicles loses control and ends up in the table drain. | Drivers | Risk Rating = Almost Certain (<1/M) + Insignificant = Medium |
| Light vehicles loses control and ends up in the table drain, causing other vehicles to pass through narrow road section. Passing vehicle loses control and spills down embankment / culvert / tree. | Drivers | Risk Rating = Possible (1-3Y) + Moderate = High |
| Light vehicles loses control and ends up in the table drain, causing other vehicles to pass in the residual road width. Passing vehicle has adverse interaction with pedestrians. | Pedestrians | Risk Rating: Rare (>7Y) + Serious = Medium (FSI) |
| Embankment slip, creating narrow sections. Increased risk to passing vehicles, and pedestrians. | Drivers and pedestrians | Risk Rating: Rare (>7Y) + Moderate = Low |
| Embankment slip due to heavy vehicle with vehicle leaving the road down the embankment. | Vehicle occupants | Risk Rating = Possible (1-3Y) + Moderate = High |
| Pedestrian struck by vehicle on a straight. | Pedestrians | Risk Rating = Unlikely (3-7Y) + Moderate = Medium |
| Pedestrian being struck by vehicle on a curve. | Pedestrians | Risk Rating = Unlikely (3-7Y) + Moderate = Medium |
| Pedestrians struck by vehicle at toboggan area. | Pedestrians | Risk Rating = Possible (1-3Y) + Moderate = High |
| Bowl intersection: skier at eastern trail struck by vehicle due to restricted sight distance to the south. | Skier | Risk Rating = Unlikely (3-7Y) + Moderate = Medium |
| Skier-driver conflict at cross-country trails (manoeuvring and ski-removal process at the approaches to the road, some of which have steep approach slopes). | Skier | Risk Rating: Rare (>7Y) + Moderate = Low |

Table 1 (Refer Appendix A for risk rating details)

SUGGESTED PLANNING AND TREATMENT OPTIONS

1. Planning: Careful planning would be required to guide the design. Questions that should be answered include the following:

- What is the pavement condition?
- Should there be vehicle size restrictions (depending on the season)?
- If the road was to be opened / cleared of snow, should it still be closed in certain weather conditions?
- How often should de-icing salt be applied to the road to reduce ice?
- Should there be public transport along the route with stops in between and can the stops be safely accommodated?
- Should pedestrians be discouraged / prohibited from walking on the road?
- How will the major intersections be safely managed? (at the Bowl and McKay Road)
- How will other ski trail interfaces be safely managed?
- How will the interface with the toboggan area be safely managed (or will it be moved)?

2. Design Approach: Context Sensitive Design

DOT Victoria's Road Design Note RDN 01-01 Context Sensitive Design for Road Projects states:

"Context sensitive road design is essential to the development, assessment, justification and the selection of a preferred design solution within a constrained environment.

Road design guides and standards outline an approach to road design, as well as values for road design elements, that cover a broad range of contexts and applications. However, the guidelines often focus on what should be done for new roads, substantial infrastructure upgrades and largely unconstrained environments (sometimes referred to as "greenfield" sites).

In constrained environments (such as built-up established road corridors or CBDs in urban environments or upgrading existing rural road corridors) it can be difficult to meet all criteria in road design guidelines and standards and provide the infrastructure that is needed without significant costs and/or impacts to the community or environment.

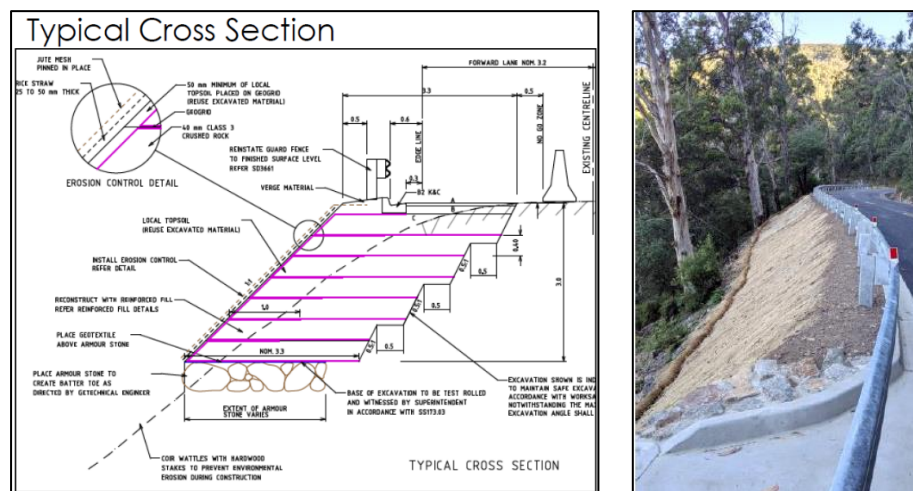
In these constrained environments, it is necessary that there be a consistent approach (or design philosophy) to ensure that risk is managed when developing a design to meet network, corridor or project objectives".

It is the view of the audit team that the road authority would need to provide substantial guidance for a project like this, possibly through this context sensitive design approach, following the key steps of:

- *Setting 'Performance-Based Criteria'*
- *Applying 'DoT Design Decision Making Principles'*
- *Exploring 'Flexible Design Solutions'*
- *Supporting 'Road-user and Stakeholder Engagement'*

- Road condition:** Narrow sections of road should be widened to have a consistent minimum road width to support the expected traffic volumes and types of heavy vehicles proposed to use this road (the project currently forecasts a significant increase in visitors using this road and it proposes that minibuses, buses and snow clearing vehicles will share this road. It is also reasonable to expect that freight vehicles, garbage disposal vehicles and sewerage removal trucks will be required to service the ANARE building).

The pavement condition should also be checked to identify weak areas that are at high risk of slips. As an example, a typical stabilisation + safety barrier approach is shown below.



- Safety barrier:** Safety barrier on the embankment side would address risks associated with the hazards on that side. The suitable barrier type would likely be semi-rigid TL-4 safety barrier such as thriebeam. A high degree of consideration would need to be taken with the post position relative to embankments, and the soil profile (the width behind the batter and the soil conditions will have a large influence on the performance of the barrier in matching predictable crash test performances). Reference will need to be made to relevant guides such as AASHTO's Guide Specifications for Highway Construction and their nominated CBRs.

Special note on safety barriers 1: The road width available for drivers would be reduced if the above mentioned barriers were installed *without* additional supporting ground. If the barriers were instead installed further into the road (away from the batter) to provide sufficient structural strength, the road width would decrease even further than the existing narrow width. This would appear unworkable, especially with heavy vehicle usage. Already buses probably need to protrude onto the opposite side of the road for tight curves due to the front overhang (ie the distance from the front axle to the front of the bus). This should be considered when reviewing the position of any safety barrier to allow sufficient road width.

Special note on safety barriers 2: Any barrier would have to be able to accommodate the snow ploughing activity. There might be issues such as the barrier stopping snow from drifting across the road, and instead building up against the guard fence. Also, when the snow plough shifts snow from the road, it could result in pushing the snow up against the barrier and form a continuous wall of snow. Such issues would need to be explored carefully throughout the design process.

- Signs and Line Marking:** Signs and line marking could be supportive treatments to address safety risks and navigational tasks.

FINALISATION

CONCLUDING STATEMENT

- The audit has attempted to balance the safety needs of all road users within the site/design constraints. As per Austroads guidelines, the treatment options provided have attempted to be realistic, feasible, and commensurate with the risk posed.
- The audit attempts to raise all potential safety risks, however at times this is not possible due to a limited knowledge of the site and the design.
- Agreement to the issues and/or suggestions does not necessarily eliminate risk.
- The project team should incorporate audit findings into the broader design process and ask the audit team further questions where necessary.

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RESPONDING TO THE ROAD SAFETY AUDIT

The audit findings should be carefully considered in combination with the knowledge and insight from the responding entity (client) and other stakeholders. The responding entity does not have to agree to the audit findings; however, a written response should be made to the audit findings raised. When responding to the audit, the responding entity is encouraged to focus on the 'audit finding', not the 'treatment option'. This is due to various options usually being available and Road Safety Audits having limited knowledge of the project background and constraints.

Road Safety Audits does not change the substance of the audit findings, or sign off on the responses from the responding entity. However, the client is encouraged to provide the responses to RSA to check that each audit point has been fully understood.

REFERENCES

Relevant guidelines, standards, Codes, road rules, and policy documents, including:

- Austroads Guide to Road Safety – Road Safety Audit – 2022
- State-specific road safety audit guides where applicable (e.g. *NSW Guidelines for Road Safety Audit Practices*)
- Austroads Guide to Road Design Series (AGRD)
- Austroads Guide to Traffic Management Series (AGTM)
- Austroads Guide to Road Safety Series (AGRS)
- Miscellaneous Austroads Publications relating to road trauma, crash causality and statistics, traffic engineering treatments and Safe System
- AS 1742 Manual of Uniform Traffic Control Devices
- State road authority supplements to above documents
- State road authority technical publications including standard drawings, road design notes and other publications
- Other industry knowledge as disseminated through industry conferences, seminars, workshops via organisations including ITE, ACRS, AITPM, TMAA and IRF

APPENDIX A

RISK RATINGS

Austrroads Road Safety Audit Part 6 suggests that the organisation responding to the audit uses the following risk assessment method as a tool to give an indication of risk. Road Safety Audits will typically offer its own evaluation of risk for the responder to use as a guide.

Figure 10.2: Austrroads RSA risk matrix

| | | Severity* | | | | | |
|-----------------------------------|----------------|-------------------|-----------------|--|----------------------|-----------------------------------|---------------|
| | | Insignificant | Minor | Moderate | Serious | Fatal | |
| | | Property damage | Minor first aid | Major first aid and/or presents to hospital (not admitted) | Admitted to hospital | Death within 30 days of the crash | |
| Likelihood (includes exposure) | Almost Certain | One per quarter | Medium | High | High | Extreme (FSI) | Extreme (FSI) |
| | Likely | Quarter to 1-year | Medium | Medium | High | Extreme (FSI) | Extreme (FSI) |
| | Possible | 1 to 3 Years | Low | Medium | High | High (FSI) | Extreme (FSI) |
| | Unlikely | 3 to 7 Years | Negligible | Low | Medium | High (FSI) | Extreme (FSI) |
| | Rare | 7 years+ | Negligible | Negligible | Low | Medium (FSI) | High (FSI) |

*see Severity Guidance Sheet

Safe System crash outcome threshold

Figure 10.3: The severity guidance sheet – to be used with the risk matrix (Figure 10.2)

| | | Crash Speed (km/h) | | | | | | | | | |
|------------|--------------------------|--|----|----|----|----|----|----|----|----|----|
| | | < 10 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| Crash Type | Pedestrian (vs HV) | Moderate Injury Serious Injury Fatal | | | | | | | | | |
| | Cyclist (vs HV) | | | | | | | | | | |
| | Motorcyclists (vs HV) | | | | | | | | | | |
| | Pedestrian (vs car) | | | | | | | | | | |
| | Cyclist (vs car) | | | | | | | | | | |
| | Pole/tree Impact (car) | | | | | | | | | | |
| | Motorcyclists (vs car) | | | | | | | | | | |
| | Side Impact (HV vs car) | | | | | | | | | | |
| | Side Impact (car vs car) | | | | | | | | | | |
| | Head On (HV vs car) | | | | | | | | | | |
| | Head On (car vs car) | | | | | | | | | | |
| | Head On (car vs car) | | | | | | | | | | |

“The corresponding priorities for mitigation are categorised as:

- Negligible – no action required
- Low – should be corrected or the risk reduced if the treatment cost is low
- Medium – should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high
- High – should be corrected or the risk significantly reduced, even if the treatment cost is high
- Extreme – must be corrected regardless of cost.

No definitive guidance can be given as to the respective monetary values of the terms ‘low’, ‘moderate’ or ‘high’ regarding treatment costs, but it is expected that consideration against the total project cost would be an important factor when categorising mitigation of each risk.” (AGRS-RSA2022)



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