

31 July 2026

Fiona Garrett

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dear Fiona,

RE: Remarkables Ski Area Upgrades and Doolans Expansion - Response to Natural Hazards Feedback

NZ Ski Limited (“**NZSki**”) would like to thank Central Otago District Council (“**CODC**”) for their engagement in regard to the Natural Hazards Assessment for the Remarkables Ski Area Upgrades and Doolans Expansion Fast Track project.

The documents detailing this engagement are attached as follows:

- > CODC pre-application feedback - Letter prepared on behalf of CODC by Mark Cruden of Meyer Cruden (13 May 2026) (**Attachment 1**)
- > NZ Ski response to Meyer Cruden memo - Memo prepared on behalf of NZ Ski by Derek Chinn of Stantec (10 June 2026¹) (**Attachment 2**)
- > CODC response to Stantec memo - Letter prepared on behalf of CODC by Mark Cruden of Meyer Cruden (8 July 2026²) (**Attachment 3**)

Stantec has reviewed the further comments within the 8 July 2026 letter from Meyer Cruden, and it is evident that both parties are generally aligned in their views. As such, we welcome feedback on that informally, and/or any remaining comments from Mr Cruden being provided through the formal comment period that will occur as part of the fast track process. Can you please confirm that CODC accept this approach.

¹ Sent via email on 25 June 2026.

² Sent via email on 17 July 2026.

In order to address the comments made by Mr Cruden in his 8 July 2026 letter, NZSki has updated the proposed draft consent conditions as follows and shown as track changes in **Attachment 4** to this letter:

1. Earthworks - Updated draft conditions EW.1, EW.3 and EW.4 to address Mr Crudens further comments.
2. Rockfall Hazard Assessment - Drafted additional conditions GEO.3 and GEO.4. These conditions require, and specify the required detail of, a rockfall hazard risk assessment to be undertaken in relation to the rockfall risk above the Water Storage Reservoir.

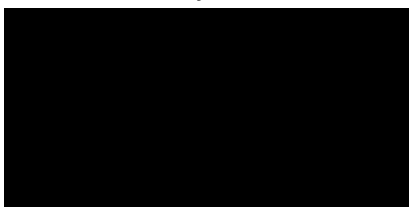
This differs from the recommendation made by Mr Cruden as it is for a rockfall hazard risk assessment and not a temporal assessment. Stantec have advised NZSki that it would not be meaningful to undertake a quantified temporal analysis of rockfall risk to the reservoir as there is not sufficient historical records of rockfall frequency in the area, or sufficient data on other factors such as rainfall intensity, to undertake a temporal assessment.

Instead, Stantec has recommended that a general rockfall hazard assessment be undertaken that will undertake a walkover inspection to identify potentially unstable rocks and model the potential rockfall to quantify the risk from rockfall to the reservoir site. Stantec anticipates that the existing slope above the reservoir will attenuate most rockfall, but analysis of the rockfall path will allow both the risk zone and path to be better understood. Site investigations to date of the larger rocks adjacent to the existing tarn site have revealed lichen growth on the individual rocks, and thus Stantec infers that the frequency of rockfall reaching the site of the proposed reservoir is low.

The assessment will subsequently identify any mitigations, if necessary, to be included into detailed design in relation to the risk of rockfall above the reservoir.

Please let us know if you have any questions in relation to the above.

Yours sincerely,

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Mitchell Daysh Limited

A small black rectangular redaction box covering a line of contact information.A black rectangular redaction box covering a line of contact information.

cc Louise Taylor, CODC Planning Consultant, [REDACTED]
Jenny Clafferty, DOC Planning Consultant, [REDACTED]
Onur Oktem, QLDC Principal Planner, [REDACTED]
Angela Fenemore, ORC Planning Consultant, [REDACTED]

Encl

Attachment 1: CODC pre-application feedback (13 May 2026)

Wednesday, 13 May 2026

Central Otago District Council

Attn Fiona Garret

Email: [REDACTED]

[REDACTED]
[REDACTED]

Ref: L_2026044.01

Fiona,

Re: Natural Hazards Assessment Peer Review, Remarkables Ski Area Expansion

My name is Mark Cruden. I have been engaged by the Central Otago District Council to undertake a pre application peer review of a Natural Hazards Assessment Report relating to the proposed Remarkables Ski Area expansion into Doolans Basin.

I am the Director and Senior Engineer at Meyer Cruden Engineering Ltd. I hold a Bachelor of Engineering (Honors). I am a Chartered Professional Engineer (Civil and Geotechnical) and a Professional Member of Engineering New Zealand. I have 25 years of experience and have worked as an engineer in the Central Otago region since 2003. My experience in ski area development began as a graduate engineer in Scotland, where I worked on ski area infrastructure and development projects for Cairngorm Mountain resort, Aviemore.

I have undertaken numerous natural hazard assessments and subsequent mitigation designs. Recent examples of my work in this area include: -

- landslide assessment and mitigation design for a proposed restaurant in Soho Basin at Cardrona Alpine Resort,
- landslide assessment and design for the Snowsports New Zealand Olympic Dryslope,
- rockfall risk assessment for the Mt Iron public walking trails on behalf of Queenstown Lakes District Council,
- landslide assessment and mitigation design for several locations on Central Otago District Council's roading network,
- numerous alluvial fan, flooding and liquefaction hazard assessments to facilitate residential development in the region.

This list is not exhaustive but provides a sample of the range and scale of projects I have been involved in.

In parallel with my engineering career I worked as a ski instructor from 1995 to 2015. I was employed as a trainer, examiner and demo team member by the New Snowsports Instructors Alliance between 2000 and 2015. My work in the ski industry has given me a good insight into the challenges associated with ski area development.

I have read and agree to comply with the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023.

Initial review and comments

In undertaking this review I have viewed the following documents:

- Remarkables Ski Area Expansion Project, Natural Hazards Assessment, Stantec New Zealand, dated 29 April 2026.
- Draft development plans prepared by Southern Land, numbered E300 S1.0 , E350 S2.0, E400 S 1.0, E 450 S1.0, E500 S1.0. E550 S1.0, E600 S1.0 and NZSki Project Overview February 2026 V2.

For simplicity I have provided my comments in the table appended with this letter.

Should you require further information please do not hesitate to contact the undersigned.

[REDACTED]

[REDACTED]

[REDACTED]

Table 1 – Peer review comments

Item	Section	Page	MCE comment
1	General		Overall the report provides a comprehensive assessment of the identified natural hazards with potential to impact on the development. The following comments are provided to assist in refining the report prior to submission.
2	Introduction	1	2 Use of the National Policy Statement for Natural Hazards (NPSNH) The report correctly benchmarks the risk assessment against the recently released policy statement. The NPSNH is a baseline document and represents the minimum requirement. In the case of some of the hazards identified there are other risk assessment methods that may be more applicable to the specific hazard being assessed. The NPSNH explanatory note permits the use of alternative more detailed methods where they are more applicable. This is discussed in more detail in the later comments.
3	Background	3	3 The Stantec report does not include a detailed commentary of a desktop study of the site. It is common practice when completing a natural hazards assessment to undertake an initial desktop exercise. In this case this could include a review of the ORC natural hazards portal, GNS geological maps, and Retrolens historic aerial imagery (available for this site back to 1950). Retrolens imagery is particularly useful for identifying any rock fall or landslide activity and may be useful to inform the findings of the report. It is noted that the author of the Stantec report has an intimate knowledge of the site and this may be why a desktop study was not reported in detail. However, I recommend a comprehensive geomorphic map be included to ensure all potential landslide hazards are identified. This would aid to convey a broader understanding of the site. This could be used to inform hazard identification, assessment and whether further investigation is required. I appreciate that this may have been done but not included in the final report.
4	Flood risk - Gondola Base Station and Base Building Flood risk	5.1	7 Gondola Base Station and Base Building Flood risk - Noting this is within the QLDC boundaries. No detailed information has been provided in relation to the SW modelling that informed the design. Were any blockage factors applied in the assessment of the channel capacity?

5	Flood risk - Gondola Return Station Flood risk	5.2	9	The return base area has been located on a rock knoll and the report comments that there is 5m height difference between the gondola station and the adjacent overland flowpath. Development plans show the ground under the return base being cut down some 2.5 to 3m. Does the 5m height difference reported allow for this cut down?
6	Solifluction Risk	6	12	I agree with the findings of this assessment. I note from reviewing historical aerial imagery that the feature has remained largely vegetation free and inactive since 1950.
7	Debris flow risk (east of helicopter ridge)	7.1	14	I agree with the findings of this assessment. A review of historic aerial imagery supports the view.
8	Debris Flow Within Doolans Creek	7.2	16	I am in general agreement with the findings but note that the true left bank and face above is mapped as Landslide on the ORC natural hazard portal. Does this feature require a more specific assessment to better inform the risk assessment?
9	Seismic Risk to structures	8	19	I note SNZ TS NZS1170 2025 is currently available but has not been fully adopted in place of the 2004 version. As such it represents an Alternative Solution under the NZ Building Code. The Technical Specification (TS) includes the new National Seismic Hazard Model (NSHM) 2022. The use of this model typically results in higher seismic actions than the current 2004 method. Will the structural design utilise this TS or the current 2004 version of NZS1170?
10	Seismic Risk to structures	8	19	Design of retaining structures MBIE module 6: Earthquake resistant retaining wall design is the current best practice guidance document for retaining wall design in New Zealand and I recommend it be considered in the design of retaining structures.
11	Topographic Amplification	8.2	21	MBIE module 6 provides guidance for the application of topographic amplification factors specific to retaining wall design.

12	Global Land Stability Risk	10.1		<p>Return terminal location - the level of investigation undertaken in relation to the Doolans base building foundation is at the lower end of what would be expected at a resource consent stage. Typically subsurface investigations would be carried out to better ascertain ground conditions, or at least superficial soils removed from atop rock surfaces to undertake a visual assessment of joint sets. I appreciate that the site location may limit the extent to which such investigations are practical. The NZ geological map series 1:250,000 also provides some high-level information that would be useful in assessing the potential properties of the underlying schist.</p> <p>Are Stantec satisfied that the investigations to date are sufficient to confirm that the location proposed is viable?</p>
13	Global Land Stability Risk	10		<p>Has an assessment of the reservoir site been undertaken to ensure that the site is stable and suitable to establish a reservoir? Typically subsurface investigations would be carried out to better ascertain ground conditions - drilled borehole. The Stantec report references the NZSOLD guidance for the detailed design of the reservoir. This guidance also includes a recommended approach to establishing the Potential Impact Classification (PIC) of the Dam and provides a risk assessment methodology for proposed Dams. Has a PIC assessment been undertaken for this Dam? Has Stantec considered using the NZSOLD risk assessment methodology in place of the baseline NPSNH methodology? My review of the Draft plans provided suggest that the reservoir will be formed entirely in cut with only minor filling being undertaken to achieve freeboard, but please confirm.</p> <p>With consideration of the above are Stantec satisfied that the investigations to date are sufficient to confirm that the reservoir location proposed is viable?</p>

14	Rockfall Risk from Ridge above Swan Lake and Snow making reservoir.	10.6 10.7		<p>I agree that the rock fall risk is significant and, in all probability, represents the highest risk associated with the development. The Swan Lake area is included in the Otago Regional Rockfall Screening Study (Oct 2022). This study mapped rockfall hazard awareness areas derived from simulated rockfall trajectories obtained from modelling. The study did not extend into the Doolans basin but as identified in the Stantec report rock fall hazards are present in this area.</p> <p>The site investigation included in the Stantec report provides a more detailed assessment of this risk at these locations. The Swan Lake area is of particular concern. As the Stantec report identifies, the risk is somewhat mitigated by the temporal nature of the activity in the area - but the residual risk rating remains "high" and I would concur with this finding.</p> <p>I also note that a ski run is proposed to be formed into the rock fall area near the Reservoir site and I consider that this represents a similar level of hazard.</p> <p>Have alternative routes to the above been considered?</p> <p>For both these cases, given the high consequences associated with the hazard and the temporal nature of the exposure I suggest that a more detailed quantitative risk assessment be completed which includes a specific temporal consideration. The NPSNH Explanatory note clarifies that the policy provides a baseline only and permits more detailed alternatives. The NZGS Slope Stability Geotechnical Guidance Series Unit 1 (2024) represents best practice in this area. It provides detailed semi quantitative and qualitative approaches to estimating landslide, and specifically rock fall hazard. This is covered in sections 6 and 12 of the NZGS guidance. Recommended methods included in the NZGS guidance include the "AGS Guideline for Landslide Susceptibility, Hazard and Risk Zoning 2007" approach and the "Department of Conservation Guidelines for Natural Hazard Risk Analysis (2020)" approach. The latter may be of particular relevance in this instance given DOC's interest in the site.</p>
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Attachment 2: NZ Ski response to CODC pre-application feedback (10 June 2026)

From: [REDACTED]
Sent: Thursday, 25 June 2026 12:58 pm
To: [REDACTED]
Cc: [REDACTED]
Subject: NZSki FTA - Response to CODC Natural Hazards Feedback
Attachments: NZSki FTA Natural Hazards CODC Feedback Response - June 2026.pdf

Kia ora [REDACTED]

Please find attached NZSki's response to the Natural Hazard feedback comments received from CODC. The response has been prepared by Stantec – [REDACTED] has addressed each of the points raised by [REDACTED] in turn. I understand [REDACTED] spoke briefly with [REDACTED] prior to commencing the response to clarify a couple of points.

We note a couple of the comments relate to natural hazard risks outside the CODC district but have nonetheless provided a response. Once the response has been reviewed, we'd welcome any further feedback or confirmation the comments have been satisfactorily addressed.

[REDACTED] – we assume this response would be useful to inform your respective ongoing reviews. The original comments received from CODC is transcribed within the Stantec response for your context.

Ngā mihi

[REDACTED]
Senior Consultant

[REDACTED]

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To: [REDACTED]
NZSki

From: Derek Chinn
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
Mail to: PO Box 13052,
Christchurch 8140

Project/File: 310104671

Date: 10 June 2026

Reference: Responses to Questions on Doolans Natural Hazards Assessment

The purpose of this technical memo is to respond to questions resulting from the peer review undertaken by Mr Mark Cruden of Meyer Cruden Limited on the Remarkables Ski Area Expansion Project Natural Hazards Assessment report for the Central Otago District Council.

For the purposes of clarity, we have maintained the question numbering regime in the Meyer Cruden Limited review document. A copy of the Meyer Cruden peer review document is attached for reference. We respond to each of the items raised in the Meyer Cruden peer review as follows:

1. General

The response from Mr. Cruden states;

"Overall the report provides a comprehensive assessment of the identified natural hazards with potential to impact on the development. The following comments are provided to assist in refining the report prior to submission."

The comments from Mr Cruden are acknowledged.

2. Introduction

Use of the National Policy Statement for Natural Hazards (NPSNH)

The response from Mr. Cruden states;

"The report correctly benchmarks the risk assessment against the recently released policy statement. The NPSNH is a baseline document and represents the minimum requirement. In the case of some of the hazards identified there are other risk assessment methods that may be more applicable to the specific hazard being assessed. The NPSNH explanatory note permits the use of alternative more detailed methods where they are more applicable. This is discussed in more detail in the later comments."

Reference: Responses to Questions on Doolans Natural Hazards Assessment

The confirmation from Mr Cruden of the correct application of the NPS(NH) is acknowledged.

3. Background

The response from Mr. Cruden states;

"The Stantec report does not include a detailed commentary of a desktop study of the site. It is common practice when completing a natural hazards assessment to undertake an initial desktop exercise. In this case this could include a review of the ORC natural hazards portal, GNS geological maps, and Retrolens historic aerial imagery (available for this site back to 1950).

Retrolens imagery is particularly useful for identifying any rock fall or landslide activity and may be useful to inform the findings of the report.

It is noted that the author of the Stantec report has an intimate knowledge of the site and this may be why a desktop study was not reported in detail.

However, I recommend a comprehensive geomorphic map be included to ensure all potential landslide hazards are identified.

This would aid to convey a broader understanding of the site. This could be used to inform hazard identification, assessment and whether further investigation is required. I appreciate that this may have been done but not included in the final report."

Mr Cruden notes that the report does not include a detailed commentary on a desk top study of the site but acknowledges the authors of the Natural Hazards Assessment report have an intimate knowledge of the site. We have discussed this directly with Mr Cruden and confirmed the authors have more than a decade of experience in the implementation of infrastructure within the Remarkables Ski Area, plus experience of the Remarkables geomorphology in general. In response to the rest of Mr Cruden's comment, we provide the following relevant documents which relate to the Natural Hazards at the site. Where applicable we provide a brief commentary for each element.

1. GNS 1:250,000 Wakatipu Geological Map

Reference: Responses to Questions on Doolans Natural Hazards Assessment

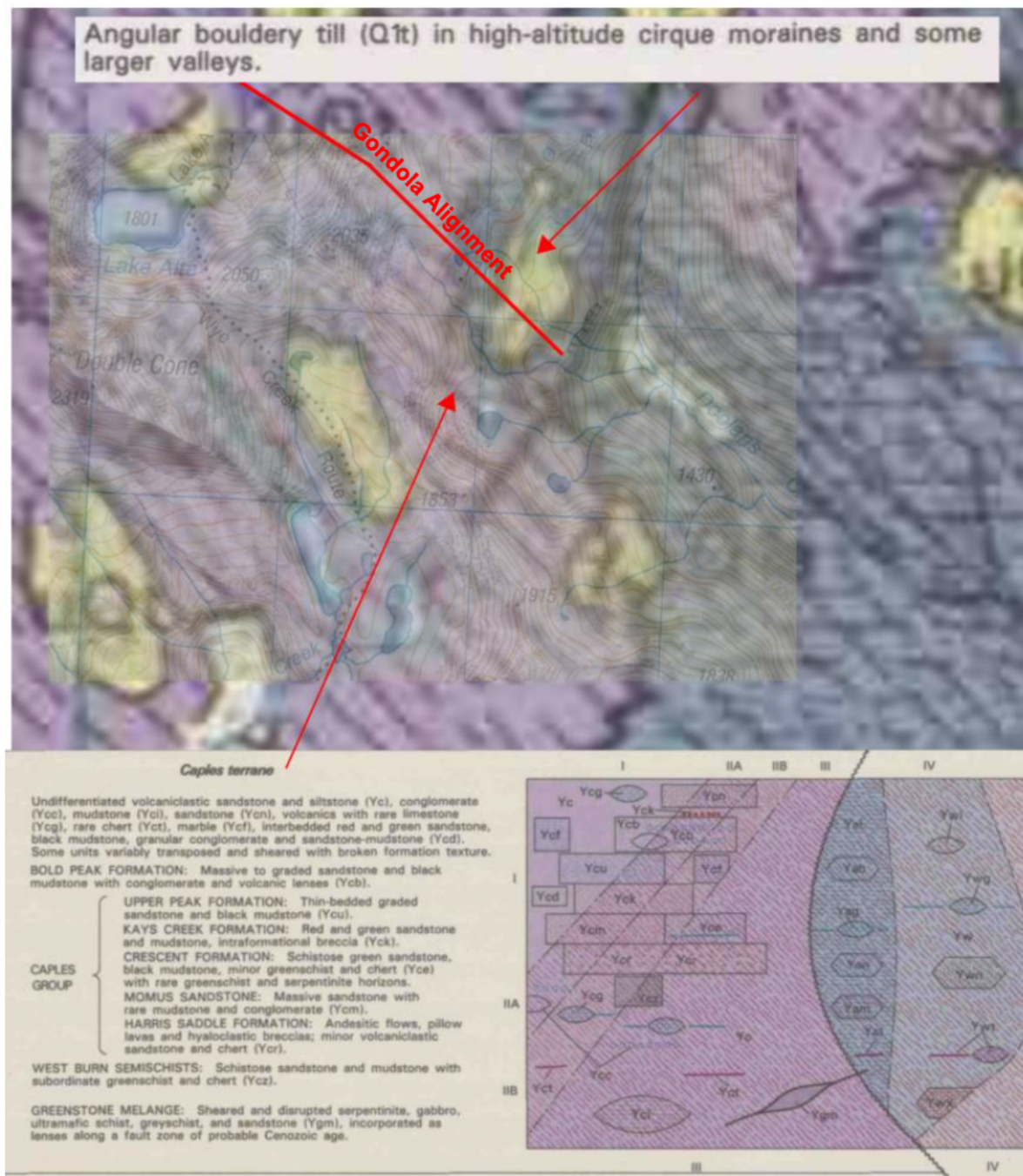


Figure 1. GNS Geological Map Sections

Generally angular glacial till overlying Caples Terrane Schist

Reference: Responses to Questions on Doolans Natural Hazards Assessment

2. GNS Google Earth Overlay

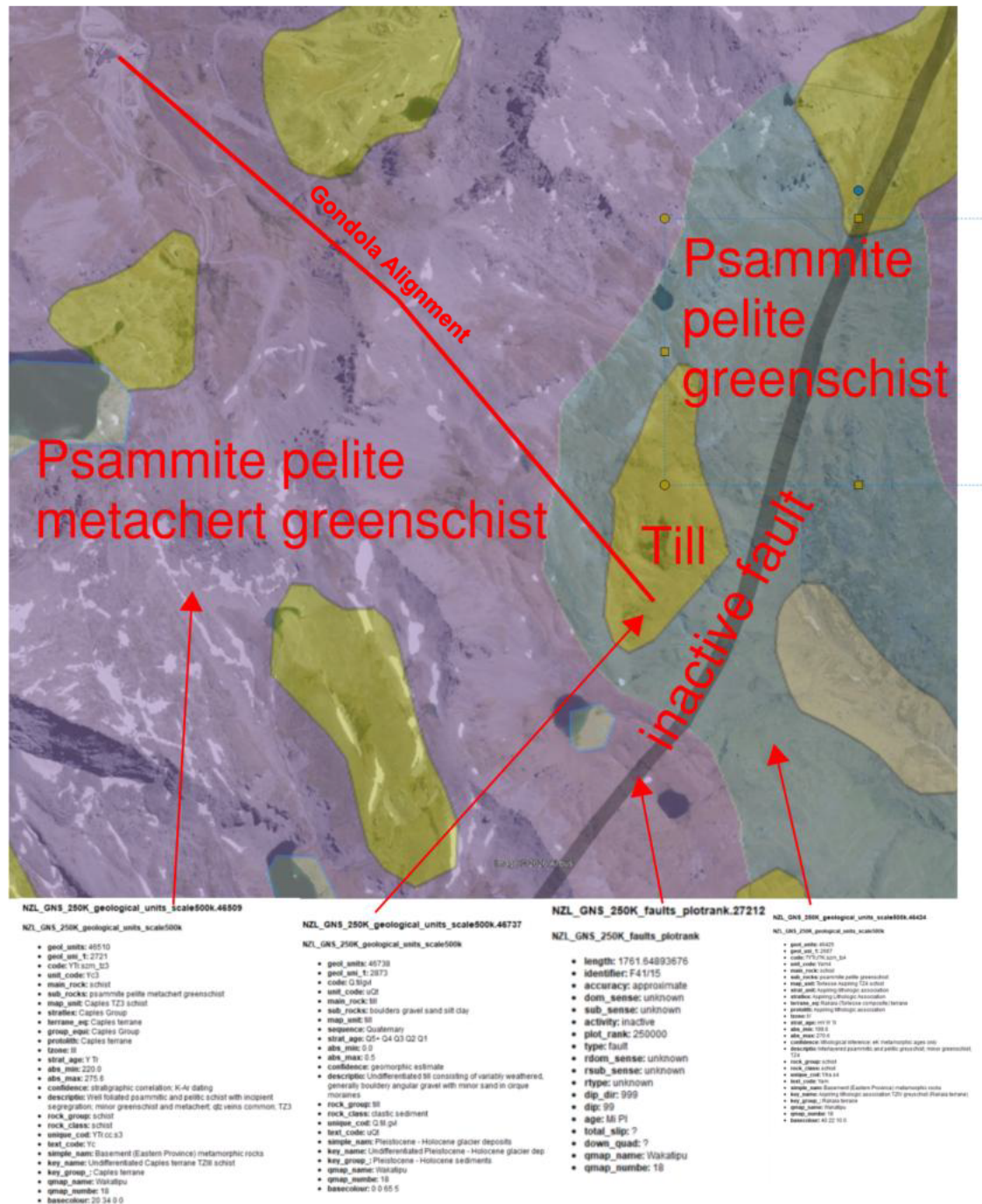


Figure 2. GNS layer on Google Earth

Reference: Responses to Questions on Doolans Natural Hazards Assessment

3. QLDC Active Faults Hazard Map



Figure 3. Section of QLDC Hazard Map identified Active Faults

4. QLDC Avalanche Hazard

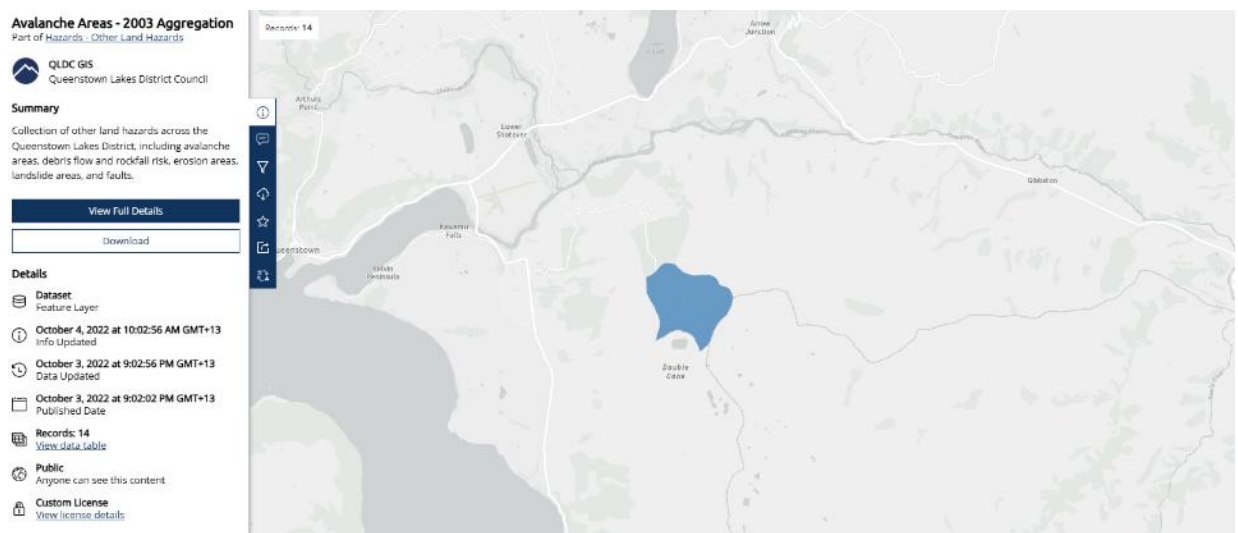


Figure 4. Section from QLDC Hazard Map - identified Avalanche Hazard

Reference: Responses to Questions on Doolans Natural Hazards Assessment

5. QLDC Debris Flow and Rockfall Risk

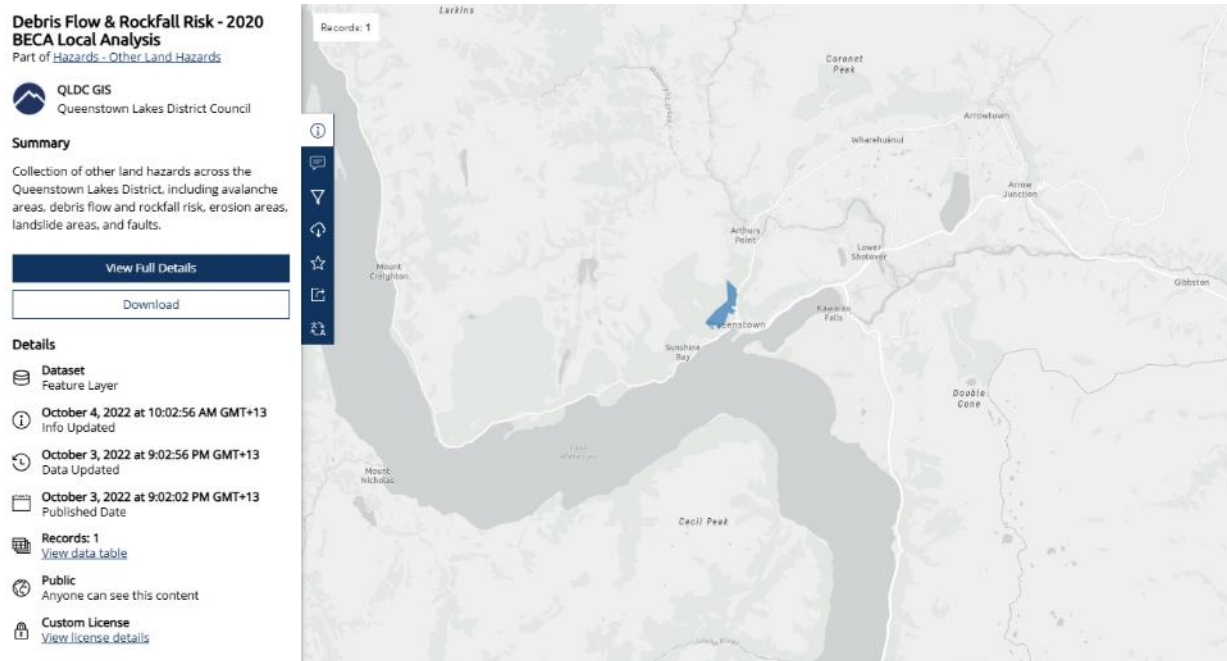


Figure 5. Section from QLDC Hazard Map – identified Debris Flow & Rockfall Hazards

6. QLDC Landslide Areas – ORC Regional Analysis

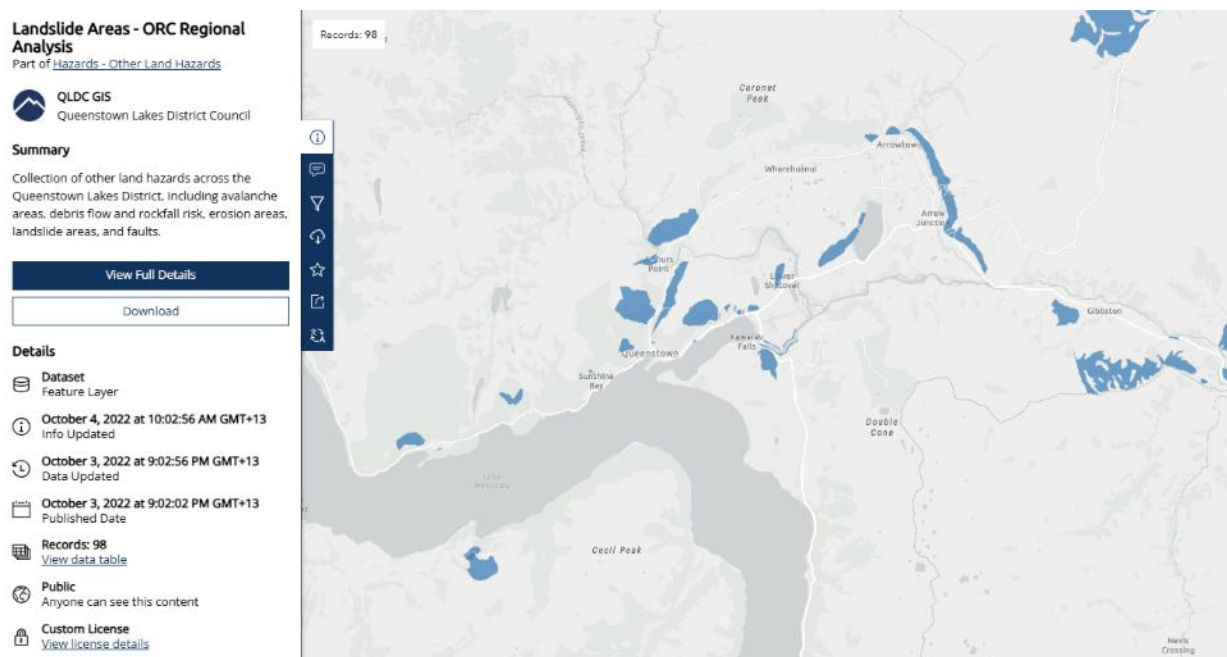


Figure 6 Section From QLDC Hazard Maps - identified Landslide Areas

Reference: Responses to Questions on Doolans Natural Hazards Assessment

7. QLDC Landslide Areas (Non-Verified /Outside Priority Areas) – ORC Regional Analysis

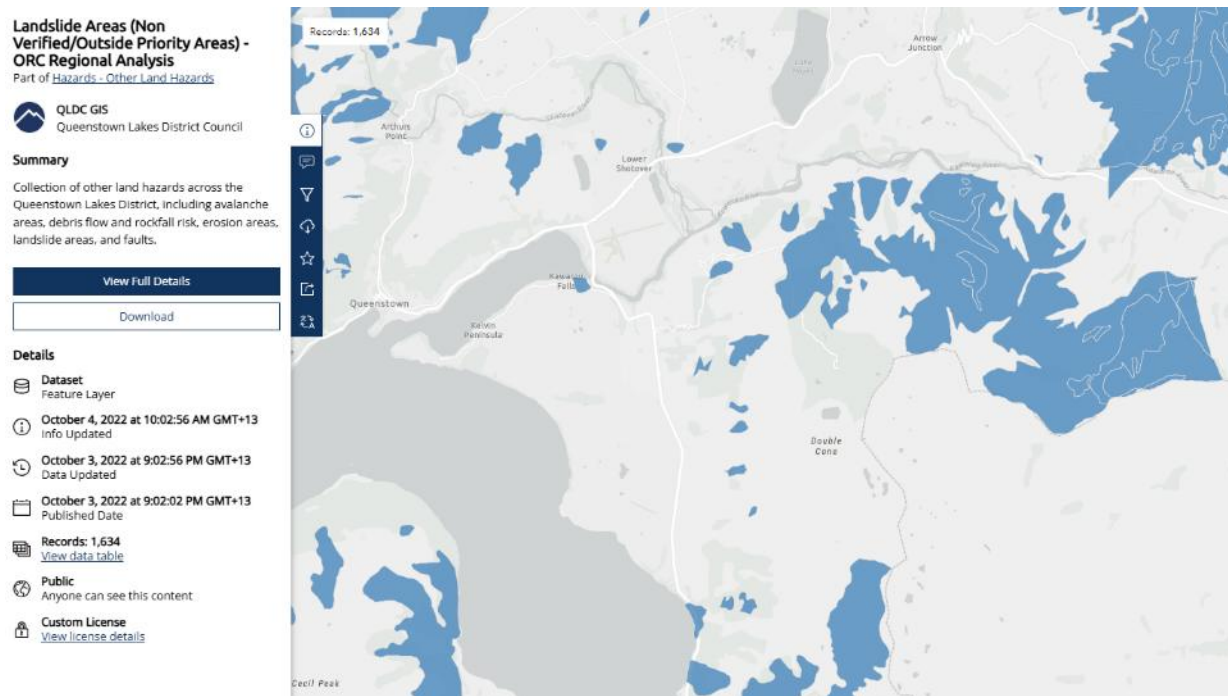


Figure 7 Section from QLDC Hazard Map Outside Priority Area identified Landslides

8. Otago Regional Council Landslide Hazards

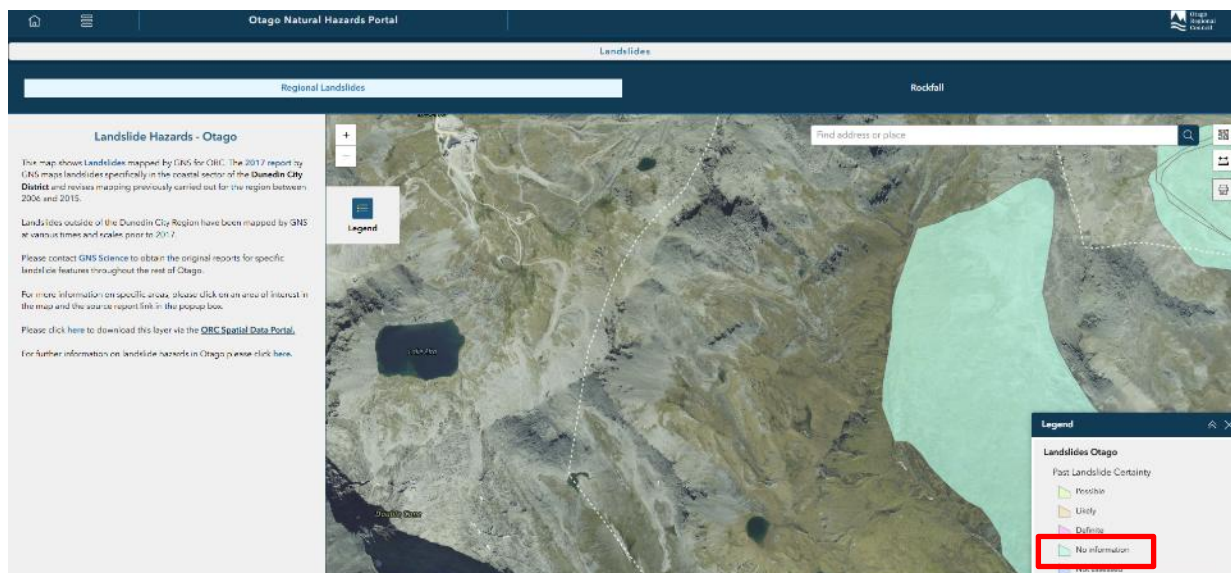


Figure 8. ORC Hazard Maps - Landslides

N.B the true left of the Right Branch is identified as a potential landslip but with 'no information'

Reference: Responses to Questions on Doolans Natural Hazards Assessment

The risk to proposed infrastructure associated with the development is low as there are no elements of the development proposed to be within this area. The slope is shown below.



Figure 9 Looking North to the True Left of the Doolans Creek Right Branch showing the nature of the topography on the True Left.



Figure 10. Looking down on the same slope as identified in Figure 9 above

Reference: Responses to Questions on Doolans Natural Hazards Assessment

9. Otago Regional Council Rockfall & Landslide

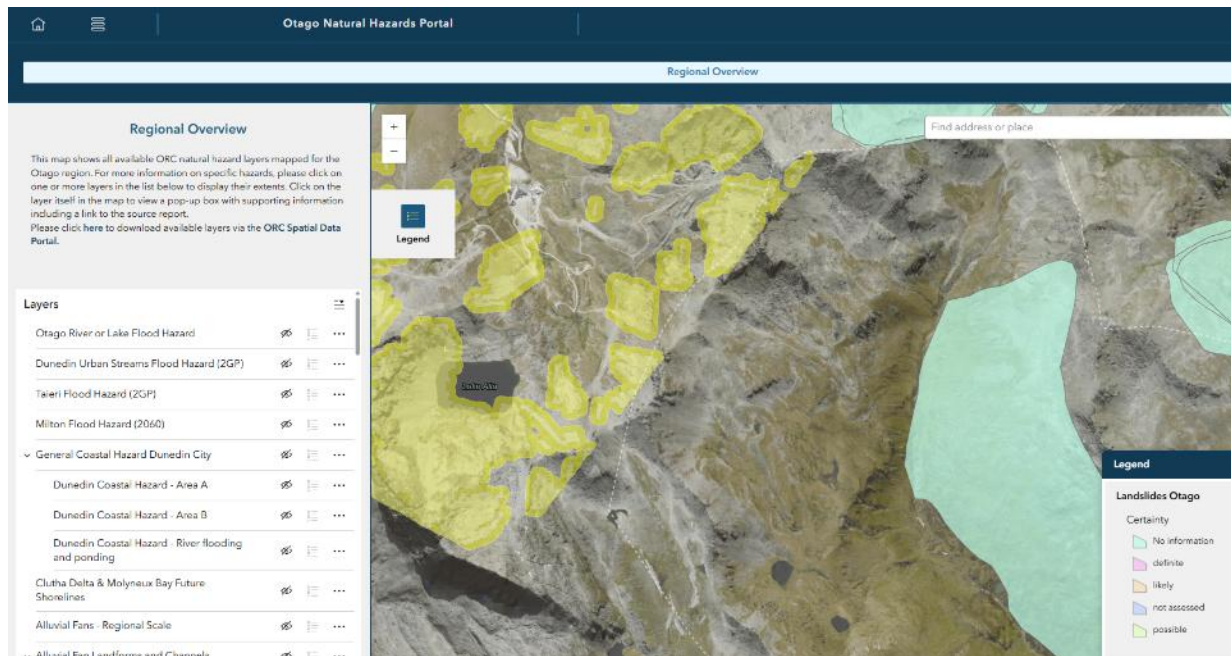


Figure 11 ORC Hazard Maps - Rockfall and landslide layers

N.B yellow is rockfall risk and is largely as identified in the Natural Hazards Report

Reference: Responses to Questions on Doolans Natural Hazards Assessment

10. 1959 Retrolens view



Figure 12 Retrolens view from 1959

4. Flood risk - Gondola Base Station and Base Building

The response from Mr. Cruden states;

"Gondola Base Station and Base Building Flood risk - Noting this is within the QLDC boundaries. No detailed information has been provided in relation to the SW modelling that informed the design. Were any blockage factors applied in the assessment of the channel capacity."

As noted by Mr Cruden this area is outside of the district boundaries of the CODC who commissioned the review.

The Gondola Base station is at the first-floor level of the Base Building. The area beneath the Gondola Base Station, in the 'drop off area' will be cut down by approximately 1.5m to form a loop road for bus and vehicle access to turn around beneath the Gondola Base Station. The Loop Road surface will be 1.5m approximately below building ground floor level. Thus, in the event that there was significant a blockage in the Rastus Burn adjacent to the Patrol Building, it is possible that water could spill out of the channel between the Patrol Building and the Sugar Bowl Lift Base Station onto the Drop Off Area surface. This water would flow down the cut slope and onto the loop road formation which acts as a Secondary Flow Path. This water would then flow down the road and would not be able to enter the base building as the road level is approximately 1.5m below ground floor level in the Base Building. This is shown in the diagram below:

Reference: Responses to Questions on Doolans Natural Hazards Assessment

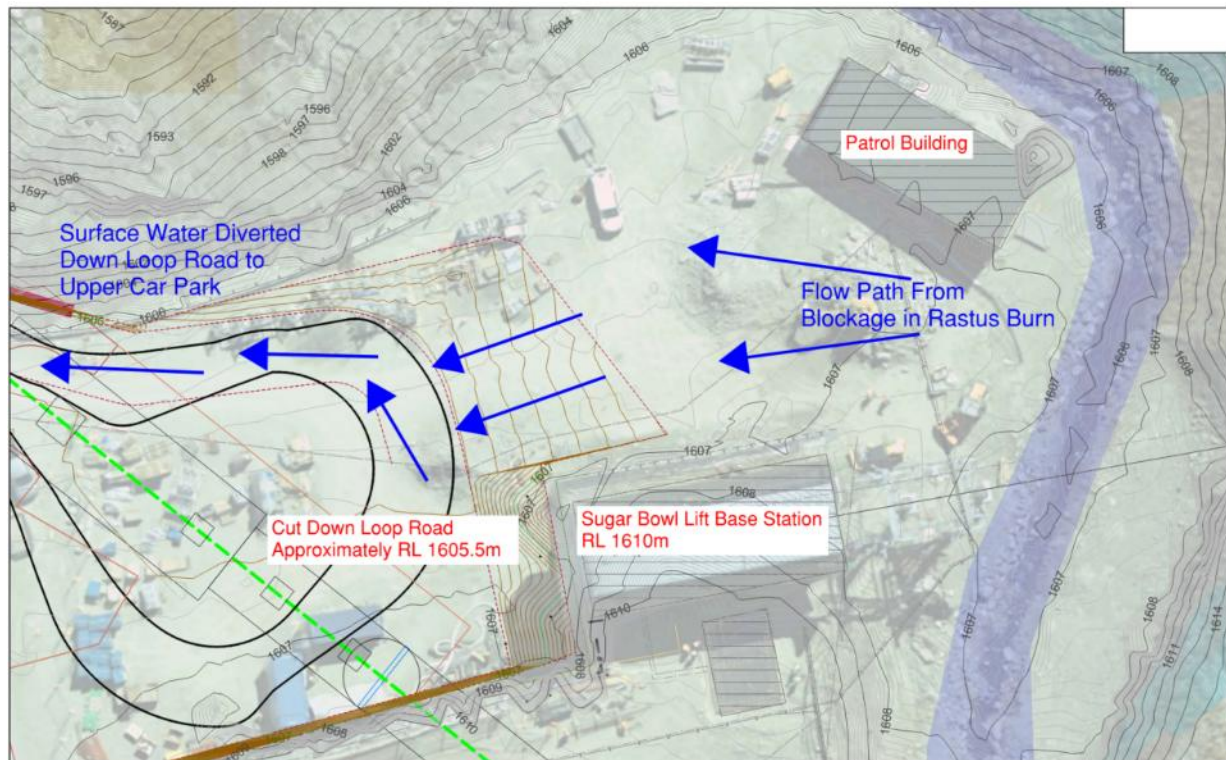


Figure 13. Stormwater flow diagram for overflow of the Rastus Burn Creek

The patrol building itself is also elevated as shown in the photograph below, and is consequently above any potential flood water level within the 'drop off' area:



Figure 14. Patrol Building on Elevated footings above potential flood level

Reference: Responses to Questions on Doolans Natural Hazards Assessment

5. Flood risk -Gondola Return Station Flood risk

The response from Mr. Cruden states;

"The return base area has been located on a rock knoll and the report comments that there is 5m height difference between the gondola station and the adjacent overland flowpath. Development plans show the ground under the return base being cut down some 2.5 to 3m. Does the 5m height difference reported allow for this cut down?"

We are confident, based on initial site investigations, that there is sufficient hydraulic capacity in the channel available to drain stormwater from the wetland adjacent to the Gondola Return Station without risk of inundation of the Gondola Return Station in a design level event.

The level of ground cut down at the location of the Gondola Return Station is only a maximum of approximately .1.5m.

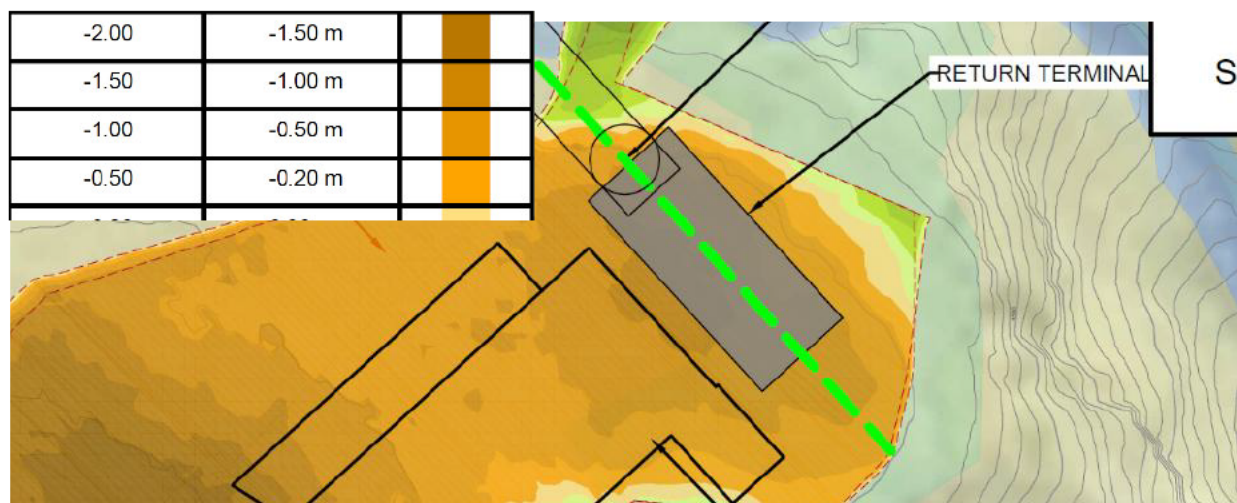


Figure 15. diagram of maximum cut level at Gondola Return Station

Sections through the Doolans Gondola Return Station have been prepared along the lines on the figure below to demonstrate the area of channel to drain the wetland adjacent to the Gondola Return Station. The contour interval is 2m in the contour view below.

- The level difference between the platform level and the riverbed to the north-east is approximately 16m as shown in Profile A
- The level difference between the platform level and the riverbed to the north is 2m
- The level difference between the finished platform level and the wetland to the north-west is approximately 0.5m as shown in profile B

Reference: Responses to Questions on Doolans Natural Hazards Assessment

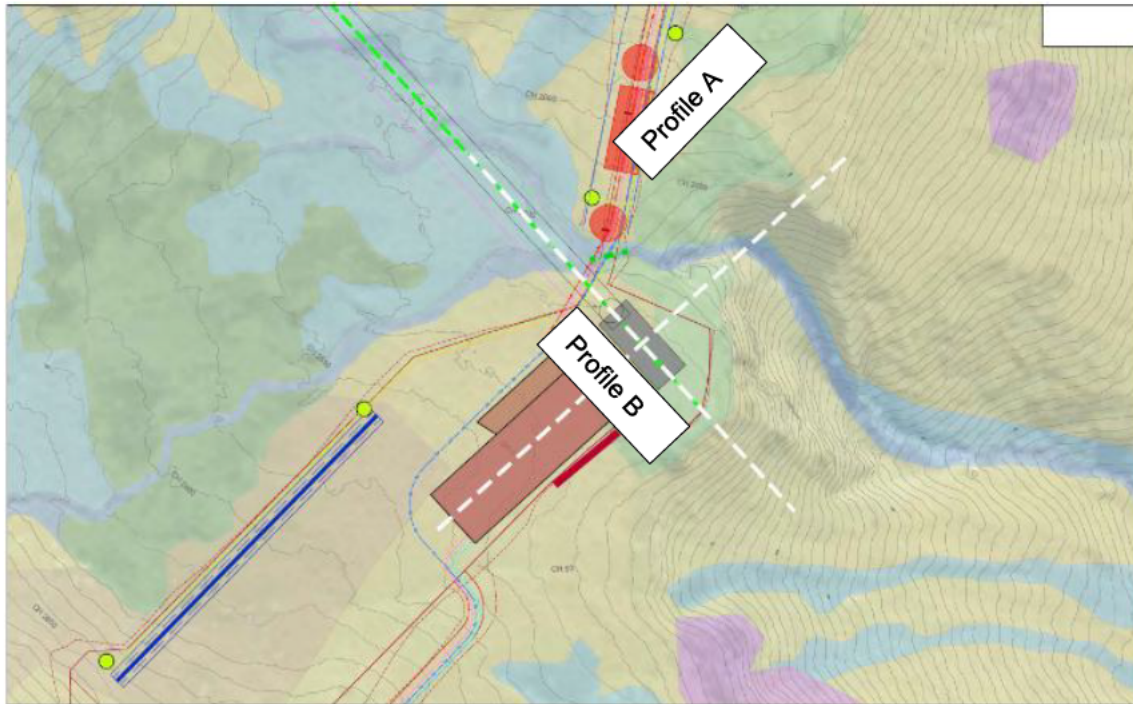


Figure 16. Contour plan of Gondola Return Station Area

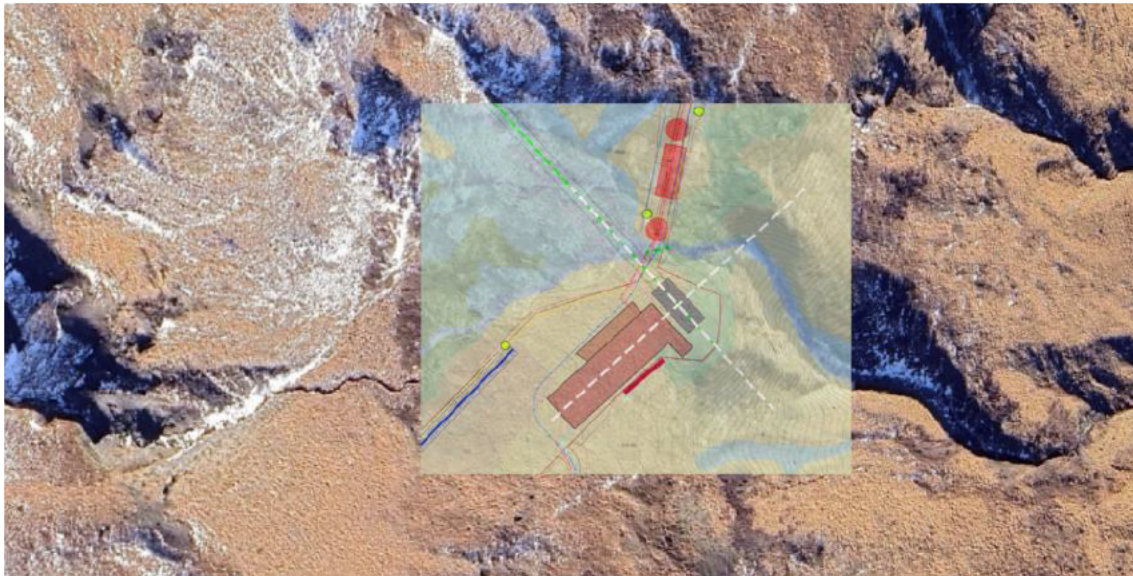


Figure 17. Gondola Return Station Plan overlaid on Google Earth Photograph

Reference: Responses to Questions on Doolans Natural Hazards Assessment

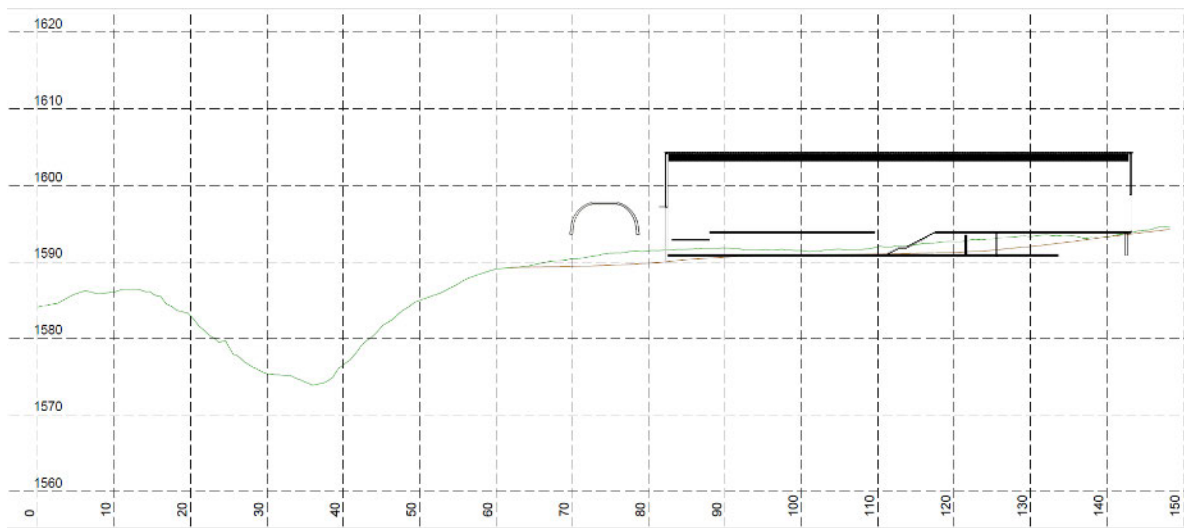


Figure 18. Gondola Return Station ground Profile A

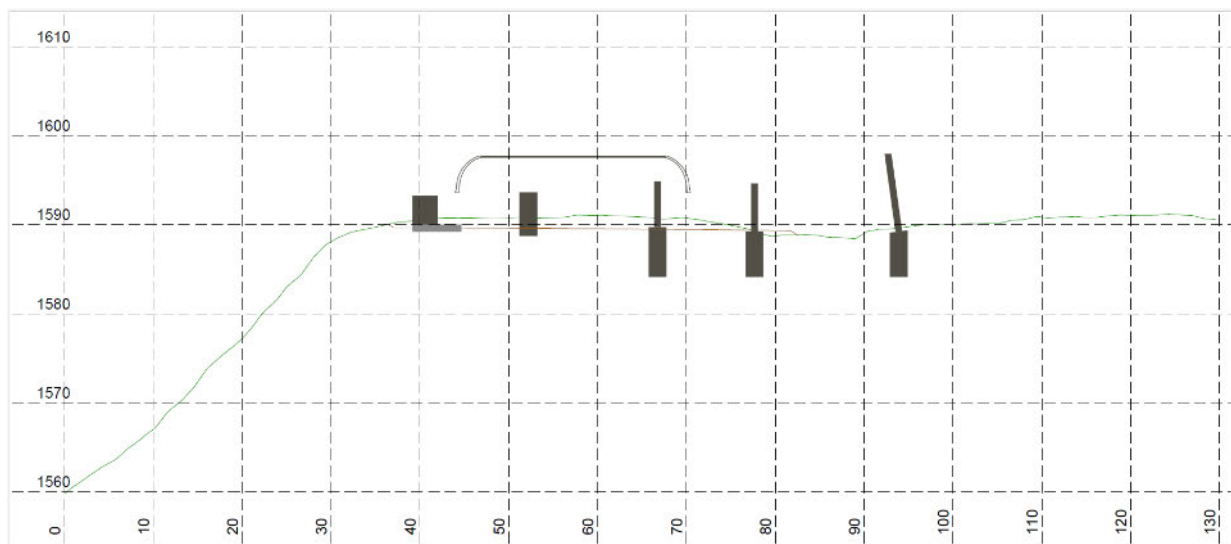


Figure 19. Gondola Return Station Profile B

While detailed design remains to be completed, for stormwater ponding in the wetland to reach the level of the ground at the Gondola Return Station, a channel up to approximately 2m deep and approximately 25m wide with significant gradient would need to be flowing at the outlet to the wetland adjacent to the Gondola Return Station. We anticipate super critical flow will occur in the channel downstream of the Gondola Return Station. Thus, there is significant hydrological capacity available to drain the wetland before the water level in the wetland reaches the level of the Gondola Return Station. This will need to be confirmed as part of Detailed Design.

Reference: Responses to Questions on Doolans Natural Hazards Assessment

This is shown in the figure below.

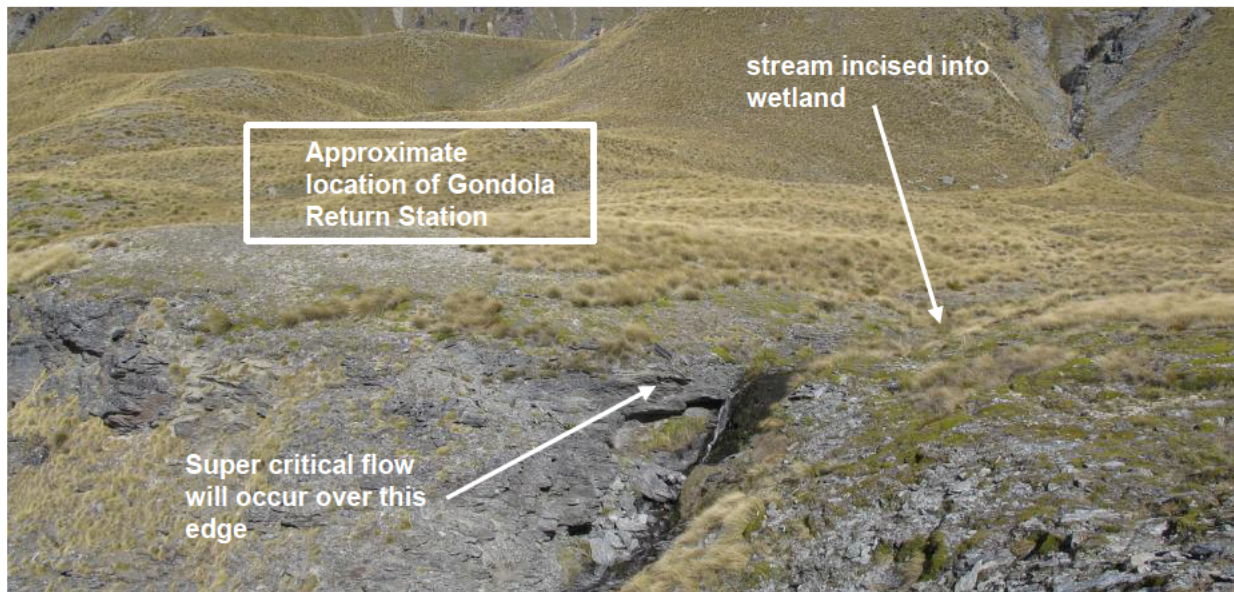


Figure 20. Gondola Return Station diagram and adjacent Stream



Figure 21. Gondola Return Station Location in Relation to Creek

Reference: Responses to Questions on Doolans Natural Hazards Assessment

6. Solifluction Risk

The response from Mr. Cruden states;

"I agree with the findings of this assessment. I note from reviewing historical aerial imagery that the feature has remained largely vegetation free and inactive since 1950."

We acknowledge Mr Cruden's agreement with our assessment of the Solifluction Risk

7. Debris Flow Risk on East Side of Helicopter Ridge

The response from Mr. Cruden states;

"I agree with the findings of this assessment. A review of historic aerial imagery supports the view."

We acknowledge Mr Cruden's agreement with our assessment of the Debris Flow Risk east of Helicopter Ridge.

8. Debris Flow Risk within Doolans Creek

The response from Mr. Cruden states;

"I am in general agreement with the findings but note that the true left bank and face above is mapped as Landslide on the ORC natural hazard portal. Does this feature require a more specific assessment to better inform the risk assessment?"

We acknowledge Mr Cruden's general agreement with our assessment of the Debris Flow Risk within Doolans Creek.

We consider that the risk of large-scale land instability resulting in a dam in the creek and potential dam break, leading to a Debris Flow to be low as no signs of recent large scale land movement have been detected.

We consider that a potential risk is local slip failure of the True Left bank of the stream in an area which is over steepened and deeply incised by Doolans Creek Right Branch. This risk is identified in the Natural Hazards report (as below) and is considered to be a low natural hazard risk. This low risk would be further mitigated by the following factors;

- operational procedures – most of the area in question is visible from above and can be inspected following events likely to induce localised land movement, such as a significant earthquake or flood event. Thus, if a landslip dam were to form it can be identified from above and appropriate measures taken

Reference: Responses to Questions on Doolans Natural Hazards Assessment

- If a dam were to form as the result of a storm event this is more likely to occur during spring or summer because in winter the creek bed is choked with snow and precipitation is more likely to fall as snow. During summer the facility is least used and visits will be infrequent
- The pump buildings are located on the terrace above the Doolans Creek Right branch and are outside the area affected by all but the most significant dam break events.
- Only infrequent inspection visits will be made to the intake structures within the Doolans Creek Right Branch, and these inspections will be during summer.

The relevant section of the Natural Hazards Assessment document is reproduced below.

7.2 Debris Flow Within Doolans Creek Right Branch

Debris flow as a result of a landslide dam within Doolans Creek Right Branch is considered a possibility. Slipping of the bank, potentially as a result of erosion, saturation, or both may result in localised failures of the bank which could result in a natural dam forming. The dam may fail because of water pressure and cause a debris flow within the creek bed.

The Upper Doolans Creek Right Branch is deeply incised and thus a localised naturally occurring dam is a possibility.

The deeply incised nature of the upper Doolans Creek Right Branch is visible in the figure below.



Figure 22. Relevant section of Natural Hazards Assessment which identifies the Risk of Localised Land Instability in Doolans Creek Right Branch

Reference: Responses to Questions on Doolans Natural Hazards Assessment

9. Seismic Risk to Structures

The response from Mr. Cruden states;

"I note SNZ TS NZS1170 2025 is currently available but has not been fully adopted in place of the 2004 version. As such it represents an Alternative Solution under the NZ Building Code. The Technical Specification (TS) includes the new National Seismic Hazard Model (NSHM) 2022. The use of this model typically results in higher seismic actions than the current 2004 method. Will the structural design utilise this TS or the current 2004 version of NZS1170?"

We confirm that best current practice for the seismic design will be adopted. This is currently TS NZS1170.5 2025. We appreciate that this is more onerous than the NZS 1170.5 2004, but the 2025 document represents best current practice.

10. Seismic Risk to Retaining Structures

The response from Mr. Cruden states;

"Design of retaining structures

MBIE module 6: Earthquake resistant retaining wall design is the current best practice guidance document for retaining wall design in New Zealand and I recommend it be considered in the design of retaining structures."

We confirm that MBIE Module 6 will be used for design of soil retaining structures.

11. Seismic Topographic Amplification in Relation to Road Retaining Structures

The response from Mr. Cruden states;

"MBIE module 6 provides guidance for the application of topographic amplification factors specific to retaining wall design."

The proposed works do not include significant retaining structures other than those which will be required to support the road formation between Sugar Bowl and Helicopter Ridge.

We do not consider that application of Topographic amplification factors for the retaining structures on the road between Sugar Bowl and Doolans Creek Right Branch is appropriate. Module 6 allows for designers' judgment in regard to this. The Road providing access to the Doolans Creek Right Branch Facilities is a secondary element of infrastructure and provided for maintenance access for NZSki Facilities. If this road were designed to incorporate topographic amplification, it would be inconsistent with most other local mountain roads including the Crown Range Road, Skippers Road, and parts of other Local Ski Area Access Roads including the access road to the Remarkables Ski Area itself. NZSki are comfortable with the possibility of seismic damage to the access road to Doolans Creek Right Branch in a design level earthquake.

Reference: Responses to Questions on Doolans Natural Hazards Assessment

The risk to life resulting from damage to retaining structures on the road formation between Sugar Bowl and Doolans Creek Right Branch is mitigated because the road would not open to public vehicle traffic. The road would be used initially only for construction traffic and, after completion of construction, for irregular intermittent summer NZSki vehicle access. Operational requirements along the road will include no stopping. During winter the road would be used only as a return ski run with no stopping/congregating areas.

Localised retaining structures associated with the Gondola Mid Station at Helicopter Ridge will include consideration of topographical amplification as such retaining structures would form part of the building infrastructure. These areas are also likely to be occupied during winter operation.

12. Global Land Instability Risk (Geological Investigation at Gondola Return Station)

The response from Mr. Cruden states;

"Return terminal location - the level of investigation undertaken in relation to the Doolans base building foundation is at the lower end of what would be expected at a resource consent stage. Typically subsurface investigations would be carried out to better ascertain ground conditions, or at least superficial soils removed from atop rock surfaces to undertake a visual assessment of joint sets. I appreciate that the site location may limit the extent to which such investigations are practical.

The NZ geological map series 1:250,000 also provides some high-level information that would be useful in assessing the potential properties of the underlying schist.

Are Stantec satisfied that the investigations to date are sufficient to confirm that the location proposed is viable?"

Both onsite visual inspection of the Gondola Return Station location, and review of relevant published information, has been undertaken. The Gondola Return Station site is founded on glacially shaped bench, and the underlying rock exposed on the face of the bench and surrounding exposures has a consistent, and favourable, orientation of the schist foliation. Within this area rock mass stability is considered to be governed by joint set location and resulting block stability. Investigations include our own on the ground site inspections of the area, aerial visual inspection, reference to aerial photography, review of published material and reference to published hazard documentation. Thus, we are satisfied the investigations to date are sufficient to confirm there is no cause for significant concern regarding the global stability or suitability of the site for the Gondola Return Station, but we agree with Mr Cruden that confirmation of the suitability of the return station site by physical investigation will be necessary prior to construction to confirm design assumptions.

We recognise that no ground below surface investigation has been undertaken at the Gondola Return Station location. Currently there is no road access to the site, and it is operationally infeasible to mobilise plant of sufficient size to undertake this investigation without road access.

When access is possible, after initial formation of the road, a hydraulic excavator will be used to clear the return station site and excavate slots through the overburden to allow inspection to identify if adverse joint sets are present within the rock mass. Should this site investigation reveal adverse joint sets, and consequently the risk of potentially unstable blocks, these will be remedied by an

Reference: Responses to Questions on Doolans Natural Hazards Assessment

appropriately designed pattern of rock bolts. Should rock bolts be required we anticipate vertical rock bolts would be drilled using a down-the-hole hammer drill rig. We expect that if rock bolts are required these will be passive anchors and will incorporate grouted 110mm diameter holes with centrally located fusion bonded epoxy coated galvanised bars. As the drilling is in rock, we do not anticipate that the holes will require casing.

As access to this location is more difficult than most other sites, we anticipate that a large excavator mounted down-the-hole hammer drill rig would be used should ground anchors be required. Depending on the stage of the road construction, it may be possible to walk a self-propelled drill rig to site, but it will be possible to mobilise an excavator mounted rig to site when the road in its early formation stages. The compressor necessary to drive the hammer can be drawn to site either by either the excavator or a bulldozer. We anticipate a 350 cfm Compressor would be required.

13. Global Land Instability Risk (Reservoir Site)

The response from Mr. Cruden states;

"Has an assessment of the reservoir site been undertaken to ensure that the site is stable and suitable to establish a reservoir? Typically subsurface investigations would be carried out to better ascertain ground conditions - drilled borehole.

The Stantec report references the NZSOLD guidance for the detailed design of the reservoir. This guidance also includes a recommended approach to establishing the Potential Impact Classification (PIC) of the Dam and provides a risk assessment methodology for proposed Dams. Has a PIC assessment been undertaken for this Dam? Has Stantec considered using the NZSOLD risk assessment methodology in place of the baseline NPSNH methodology? My review of the Draft plans provided suggest that the reservoir will be formed entirely in cut with only minor filling being undertaken to achieve freeboard, but please confirm.

With consideration of the above are Stantec satisfied that the investigations to date are sufficient to confirm that the reservoir location proposed is viable?"

A separate concept report for the reservoir site has been prepared, and we understand that this will be forwarded separately to Mr Cruden. In relation to the reservoir site, we note the following;

- The reservoir will be designed in accordance with the NZSOLD guidelines
- The reservoir is largely in cut and the outlet from the reservoir will be by pumping out, thus avoiding the necessity for a cut through the reservoir wall and as a result the reservoir will not be a Large and Classifiable Dam.
- Investigations to confirm the underlying ground conditions, including the rock depth and ground water level, will be undertaken when access to site for suitable plant is possible.

We have not identified issues which would preclude the use of the proposed reservoir location and consider the investigations to date are sufficient to confirm the proposed reservoir location is viable, but we agree with Mr Cruden the need to undertake specific investigation of the site prior to construction to confirm its suitability.

Reference: Responses to Questions on Doolans Natural Hazards Assessment

The proposed reservoir site is shown in the figure below to provide context.



Figure 23. Proposed Snow Making Reservoir location at existing tarn

The Executive Summary of the Reservoir Concept Report is reproduced below for reference;

Reference: Responses to Questions on Doolans Natural Hazards Assessment

Executive Summary

NZSki operates and manages The Remarkables, Coronet Peak and Mount Hutt Ski areas. NZSki wish to extend to operation of the Remarkables Ski Area into the Upper Doolans Creek Right Branch. This expansion will involve extending the existing ski area into the Doolans Creek Basin, which is southeast of the existing ski area and over a ridgeline known as Helicopter Ridge.

To support this expansion, a snow making reservoir is required to provide water supply for proprietary snow making equipment. This report presents the concept design for the snow making reservoir.

Key Design Features for the selected site are:

- Geometry for reservoir: Slopes: 2.5H:1V; Freeboard: 1.5 m; Crest elevation: 1709 m RL.
- Liner system: Geomembrane with anchorage and underdrainage to manage leakage and uplift.
- Stormwater: Perimeter swale and discharge points designed initially for 1-in-100 AEP event.

Regulatory Compliance

- The proposed reservoir does not qualify as a **Large & Classifiable Dam** under the Building Act and the Building (Dam Safety) Regulations.
- Compliance pathway: NZSOLD Dam Safety Guidelines (2024)
- Potential Impact Classification (PIC) assessment required to determine design return periods for seismic design case and design rainfall return period.

Recommendations for Future Work

- Undertake geotechnical investigations, bathymetric survey, and groundwater profiling.
- Develop detailed design for liner anchorage, drainage, and spillway.

Figure 24. Reservoir Concept Report Executive Summary

An approximate east-west cross section, taken from the Reservoir Concept Report, is reproduced in the figure below. This demonstrates that the reservoir is largely constructed into the existing slope and does not have significant embankments.

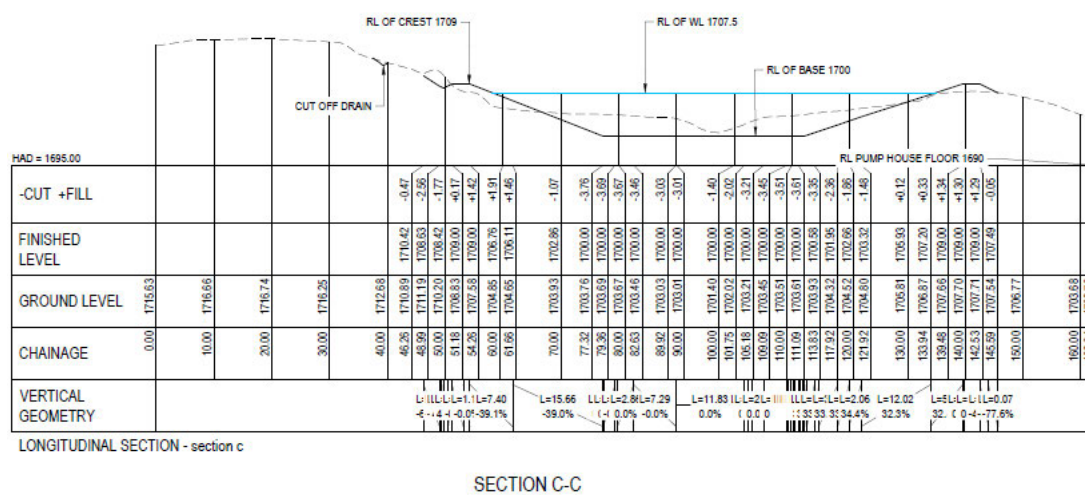


Figure 25. Section through proposed reservoir from Reservoir Concept Report

Reference: Responses to Questions on Doolans Natural Hazards Assessment

The Design Standards and Guidelines section of the Reservoir Concept Report is reproduced below for reference.

5 Design Standards and Guidelines

5.1 Overview

The following standards and guidelines are relevant to, and will be utilised to inform the detailed design of the proposed reservoir:

- New Zealand Dam Safety Guidelines – NZSOLD 2024 (referred to in this document as the NZSOLD Guidelines)
- AS/NZS1170 wind and seismic
- NZS 4402 Methods of testing soils for civil engineering purposes
- AS/NZS Buried flexible pipelines
- WorkSafe: Good Practice Guidelines – Excavation Safety
- Earthworks – compaction, general requirements
- Concrete and steel
- AS/NZS 4671: Steel Reinforcing Materials
- NZS 3104 : Specification for Concrete Production
- NZS 3109: Concrete Construction (in part – see later in this specification)
- NZS 3112 : Methods of Test for Concrete
- NZS 3124 : Specification for Concrete Construction for Minor Works, (and the standards to which it refers)
- NZS 3114: Specification for concrete surface finishes
- J.P. Giroud., M.H. Gleason., and J.G.Zornberg., (2019). Design of Geomembrane Anchorage Against Wind Action
- J.P. Giroud & R. Bonaparte., (1988). Leakage through Liners Constructed with Geomembranes - Part I. Geomembrane Liners.
- ICOLD Bulletin 135 Geomembrane Sealing Systems for Dams – Design Principals and Review of Experience (ICOLD, 2010)

Figure 26. Design Standards and Guidelines section of Reservoir Concept report

Reference: Responses to Questions on Doolans Natural Hazards Assessment

14. Rockfall Risk from Ridge above Swan Lake and Snow making Reservoir

The response from Mr. Cruden states;

"I agree that the rock fall risk is significant and, in all probability, represents the highest risk associated with the development.

The Swan Lake area is included in the Otago Regional Rockfall Screening Study (Oct 2022). This study mapped rockfall hazard awareness areas derived from simulated rockfall trajectories obtained from modelling. The study did not extend into the Doolans basin but as identified in the Stantec report rock fall hazards are present in this area.

The site investigation included in the Stantec report provides a more detailed assessment of this risk at these locations. The Swan Lake area is of particular concern. As the Stantec report identifies, the risk is somewhat mitigated by the temporal nature of the activity in the area - but the residual risk rating remains "high" and I would concur with this finding.

I also note that a ski run is proposed to be formed into the rock fall area near the Reservoir site and I consider that this represents a similar level of hazard.

Have alternative routes to the above been considered?

For both these cases, given the high consequences associated with the hazard and the temporal nature of the exposure I suggest that a more detailed quantitative risk assessment be completed which includes a specific temporal consideration.

The NPSNH Explanatory note clarifies that the policy provides a baseline only and permits more detailed alternatives. The NZGS Slope Stability Geotechnical Guidance Series Unit 1 (2024) represents best practice in this area. It provides detailed semi quantitative and qualitative approaches to estimating landslide, and specifically rock fall hazard. This is covered in sections 6 and 12 of the NZGS guidance. Recommended methods included in the NZGS guidance include the "AGS Guideline for Landslide Susceptibility, Hazard and Risk Zoning 2007" approach and the "Department of Conservation Guidelines for Natural Hazard Risk Analysis (2020)" approach. The latter may be of particular relevance in this instance given DOC's interest in the site."

We concur with the response from Mr Cruden regarding the rockfall risk in the area above Swan Lake on the northwest side of Helicopter Ridge.

We are familiar with the application of the Guidelines for Natural Hazard Risk Analysis on Public Conservation Lands and Waters, and we have applied this methodology to an analysis of the Remarkables Ski Area access road and to rock fall risk within the Homer Tunnel. Further detailed analysis as part of detailed design will be required to develop a quantified temporal assessment as neither frequency of rockfall, operational rules nor maintenance vehicle frequency is currently fully understood. High risk times for rockfall include spring thaw and during heavy rainfall events, during such times the presence of snow, inclement weather or NZSki operational rules may prevent use of the road for either staff or contractors, paying guests or members of the public. Earthquake precipitated rockfall may occur at any time. NZSki's lease allows control of public access for safety reasons and examples of this include road closures and control of access during avalanche control operations and snow grooming operations.

.The National Policy Statement for Natural Hazards (NPSNH) identifies 'likely' events as occurring at intervals between 20- and 50-years and 'possible' events occurring between 50- and 100-year intervals. There is insufficient rockfall record data to make an accurate quantified assessment of the frequency of significant rockfall in this area. Nevertheless, the presence of large rocks on the apron and slope beneath this section of ridge confirms that rockfall has occurred in recent geological time. We consider it reasonable to assume that rockfall is 'possible' (i.e. occurring with a frequency of 50-100 years) as the

Reference: Responses to Questions on Doolans Natural Hazards Assessment

Remarkables Ski Area has been operating for more than 40 years and we are not aware of recorded significant rockfall in this area over the time of operation. Irrespective of the rockfall frequency being 20-50 years or 50-100 years, the NPSNH identifies this risk as 'High' for both periods where the consequences are 'Major'.

The Department of Conservation risk thresholds for Natural Hazards are shown in the figure below. It is considered that there is a 'Higher risk threshold' for this site and activity and that mitigation measures such as operational rules and the practicalities of winter and spring operation will reduce or eliminate the use of the road at higher risk times. The Departments guidance is that 'higher risk' activities include tramping tracks, routes and grade 5 and 6 cycle trails. Thus, off-piste skiing could be considered a higher risk activity considering the risk and frequency of injuries sustained by skiers.

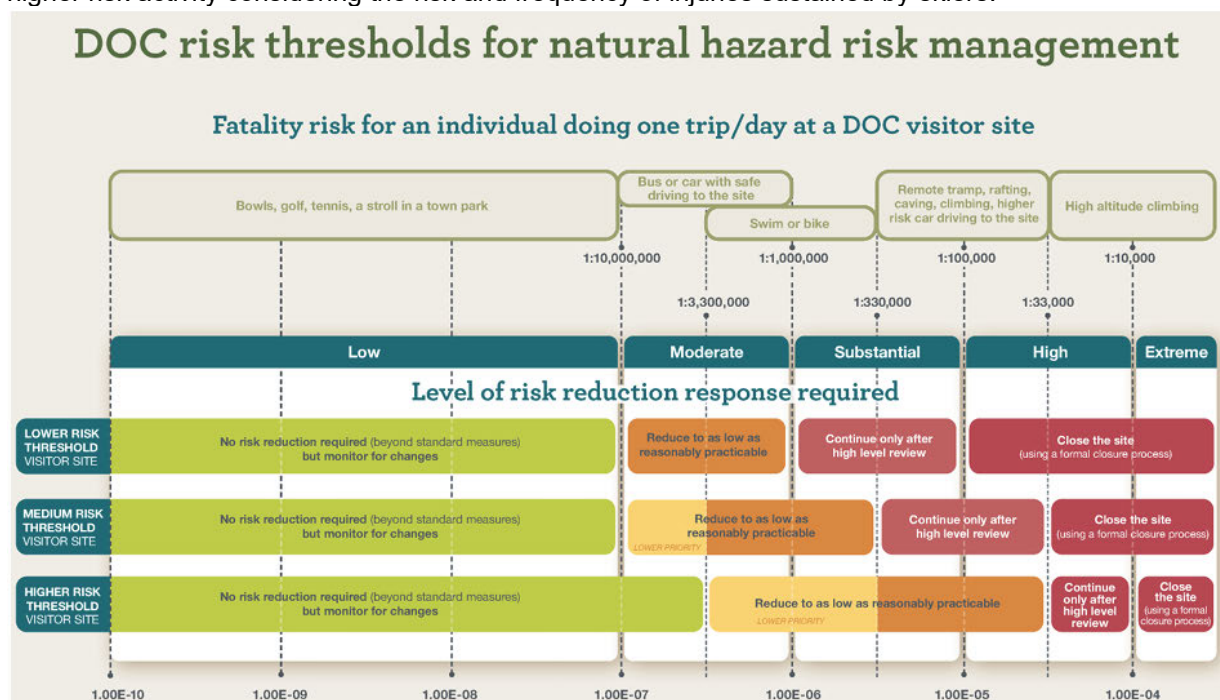


Figure 27. Department of Conservation Natural Hazard Risk Thresholds for Visitor Sites, likely potential status of the road above Swan Lake marked with circle

The primary purpose of the road is to provide temporary construction access and access for intermittent summer maintenance vehicles, as most maintenance access will be undertaken using the Gondola. Thus, risk reduction measures may involve the practical inability to use the road in spring due to snow and operational controls during heavy rain.

Overall, the road will generally be used for short durations at relatively low frequency in the summer. During winter the road formation cannot be used for wheeled vehicles due to the presence of snow and neither stopping nor resting areas will be provided along the return trail. This will minimise the length of exposure of guests to the risk. It is anticipated that skiing or boarding along this track as a return route will not be attractive to most visitors and it is anticipated that most visitors will take the gondola back to

Reference: Responses to Questions on Doolans Natural Hazards Assessment

the Rastus Burn Base Building rather than alight the gondola at Helicopter Ridge to use the return trail. Expert skiers and boarders are much more likely to use the more challenging 'Gallipoli Chutes' rather than using the circuitous return trail. Along the trail below the potential rockfall risk, winter avalanche control operations plus snow groomer operation make permanent signage difficult to maintain. Seasonal 'No Stopping Signs' can be installed by ski patrol along the length of the road identified as subject to the high rockfall risk.

During mid-winter conditions rocks may be partially embedded in snow which will reduce the risk of rockfall occurring during the depths of winter plus the severity of rockfall which does occur will be reduced by attenuation from the snow. However, we recognise that during periods of thaw the risk of rockfall will be increased. Nevertheless, the risk of rockfall on the road above Swan Lake is considered to be 'high' in accordance with the National Policy Statement for Natural Hazards 2025.

Rockfall from the ridge adjacent to the proposed reservoir, which is oriented north-west to south-east, is less than the rockfall risk from Helicopter Ridge in the area above Swan Lake. This is because the ridge adjacent to the reservoir has fewer potentially unstable rocks and has a more benign slope below. In addition, formed and groomed ski trails are located outside any likely rockfall runout zone. The area between the ski trails and the ridge line, up slope of the Reservoir, will not be groomed but will be opened for off-piste skiing when snow conditions allow. This physical separation between the groomed trails and the ridgeline is indicated in the Natural Hazards Report. The area between the ski trails and the ridge and the area will be skiable, off-piste, terrain. Off Piste skiing is clearly a higher risk threshold visitor activity and is likely only to be undertaken by competent skiers. Skiing in the area above the reservoir is a moderate risk activity, per the Department of Conservation figure above, and the number of skiers in this location is not expected to be high and the presence of skiers within this area is transitory. The road and trail route in relation to the ridge is shown in the figure below from the Natural Hazards Report.

Reference: Responses to Questions on Doolans Natural Hazards Assessment

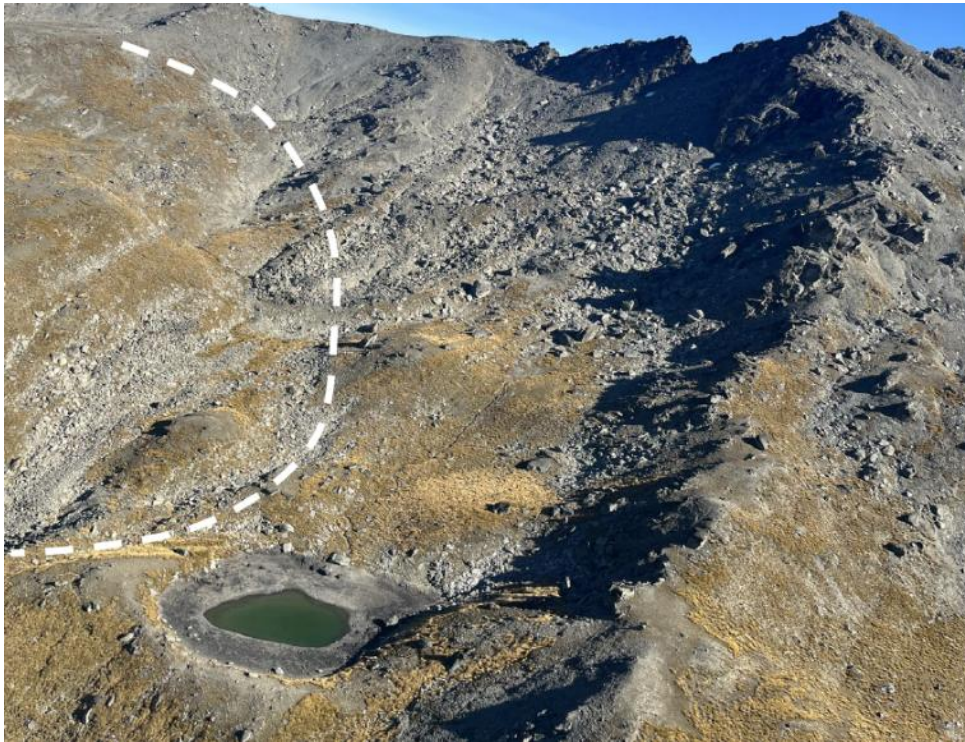


Figure 28. Diagram of approximate position of ski trails in relation to the ridge above the reservoir site (from Natural Hazards Report)

If rockfall occurs during the ski season rockfall energy will be attenuated by the presence of snow, although this effect is variable depending on the snow conditions and is thus not able to be accurately quantified. Overall, the natural hazard risk from rockfall above the reservoir is considered to be mitigated for the reasons set out above and is considered to be an acceptable level of risk for an activity occurring within an alpine environment. This level of risk is consistent with the level of risk associated with off piste skiing on commercial ski areas in New Zealand.

Yours sincerely

Stantec New Zealand

A handwritten signature in black ink, appearing to read 'DChinn'.

Derek Chinn BE (Civil), CPEng, IntPE, CMEngNZ, FEngNZ

Senior Principal Structures Engineer

Phone: [REDACTED]

Mobile: [REDACTED]

Attachment 3: CODC further comment (8 July 2026)

Wednesday, 8th July 2026

Central Otago District Council

Attn Fiona Garret

Email: [REDACTED]

[REDACTED]
[REDACTED]

Ref: L_2026044.02

Fiona,

Re: Natural Hazards Assessment, Response to Stantec Memo, Remarkables Ski Area Expansion

This letter reports the findings of my review of further information provided by Stantec in relation to their Natural Hazards Assessment for the Remarkable Ski Area Expansion. Stantec have provided this further information in response to queries I raised from my review of their initial Natural Hazards Assessment Report, R4, dated 29 April 2026. My initial review was provided to Central Otago in a letter dated 13th May 2026.

The further information from Stantec has been provided in a memo titled “Reference: Responses to Questions on Doolans Natural Hazards Assessment” dated 10 June 2026. This information has broadly satisfied my initial queries. This is reflected in the updated Table 1 Peer Review Comments (attached).

Notwithstanding that I recommend the following CODC consent conditions be included in any consent granted. These are in addition to those already included in the Draft Resource Consent Conditions Document– 19 May 2026:

Earthworks

Addition to draft condition EW.1

All earthworks shall be designed by a suitably qualified and experienced Geoprofessional who shall specify appropriate temporary and permanent cut and fill batters and heights, material requirements, drainage, and testing requirements.

Addition to draft condition EW.4

All earthworks shall be supervised by a suitability qualified and experienced Geoprofessional.

Rockfall Hazard Assessment

A temporal rockfall hazard risk assessment shall be undertaken in relation to the rockfall hazard present above the proposed reservoir site within the Doolans expansion. This shall be a Quantitative Temporal Assessment and shall be used to confirm any mitigation requirements to be included in the detailed design of the expansion, or ongoing operational management plans. The method of assessment shall be that described in the AGS Guideline for Landslide Susceptibility, Hazard and Risk Zoning 2007.

Should you require further information please do not hesitate to contact the undersigned.



Mark Cruden, Director



Table 1 – Peer review comments Rev 1, 8/7/26

Comment #	Item	section	page	MCE comment on Stantec Natural Hazards Assessment Report	MCE further comment on Stantec memo response
1	General			Overall the report provides a comprehensive assessment of the identified natural hazards with potential to impact on the development. The following comments are provided to assist in refining the report prior to submission.	Accepted, no further info required.
2	Introduction	1	2	Use of the National Policy Statement for Natural Hazards (NPSNH) The report correctly benchmarks the risk assessment against the recently released policy statement. The NPSNH is a baseline document and represents the minimum requirement. In the case of some of the hazards identified there are other risk assessment methods that may be more applicable to the specific hazard being assessed. The NPSNH explanatory note permits the use of alternative more detailed methods where they are more applicable. This is discussed in more detail in the later comments.	Accepted, no further info required.
3	Background	3	3	The Stantec report does not include a detailed commentary of a desktop study of the site. It is common practice when completing a natural hazards assessment to undertake an initial desktop exercise. In this case this could include a review of the ORC natural hazards portal, GNS geological maps, and Retrolens historic aerial imagery (available for this site back to 1950). Retrolens imagery is particularly useful for identifying any rock fall or landslide activity and may be useful to inform the findings of the report. It is noted that the author of the Stantec report has an intimate knowledge of the site and this may be why a desktop study was not reported in detail. However, I recommend a comprehensive geomorphic map be included to ensure all potential landslide hazards are identified. This would aid to convey a broader understanding of the site. This could be used to inform hazard identification, assessment and whether further investigation is required. I appreciate that this may have been done but not included in the final report.	The additional information includes a desktop review of the sources suggested in our initial commentary. No further info required.
4	Flood risk - Gondola Base Station and Base Building Flood risk	5.1	7	Gondola Base Station and Base Building Flood risk - Noting this is within the QLDC boundaries. No detailed information has been provided in relation to the SW modelling that informed the design. Were any blockage factors applied in the assessment of the channel capacity?	The additional information provided is a qualitative assessment of the flood risk i.e. not quantitative. However at a high level it indicates that there is a low likelihood of inundation of buildings resulting from blockage and overtopping from the Rastus Burn. As the area is outside the CODC boundaries no further information is requested.
5	Flood risk - Gondola Return Station Flood risk	5.2	9	The return base area has been located on a rock knoll and the report comments that there is 5m height difference between the gondola station and the adjacent overland flowpath. Development plans show the ground under the return base being cut down some 2.5 to 3m. Does the 5m height difference reported allow for this cut down?	The additional information provided indicates that there is low likelihood of inundation of the Gondola Return Station. No further information is requested.
6	Solifluction Risk	6	12	I agree with the findings of this assessment. I note from reviewing historical aerial imagery that the feature has remained largely vegetation free and inactive since 1950.	No further info required.
7	Debris flow risk (east of helicopter ridge)	7.1	14	I agree with the findings of this assessment. A review of historic aerial imagery supports the view.	No further info required.

8	Debris Flow Within Doolans Creek	7.2	16	I am in general agreement with the findings but note that the true left bank and face above is mapped as Landslide on the ORC natural hazard portal. Does this feature require a more specific assessment to better inform the risk assessment?	The additional information provided is a qualitative assessment of the landslide risk and its consequences. No further information is requested.
9	Seismic Risk to structures	8	19	I note SNZ TS NZS1170 2025 is currently available but has not been fully adopted in place of the 2004 version. As such it represents an Alternative Solution under the NZ Building Code. The Technical Specification (TS) includes the new National Seismic Hazard Model (NSHM) 2022. The use of this model typically results in higher seismic actions than the current 2004 method. Will the structural design utilise this TS or the current 2004 version of NZS1170?	The Stantec response confirms that TS NZS1170:2025 will be used. No further information is requested.
10	Seismic Risk to structures	8	19	Design of retaining structures MBIE module 6: Earthquake resistant retaining wall design is the current best practice guidance document for retaining wall design in New Zealand and I recommend it be considered in the design of retaining structures.	The Stantec response confirms that MBIE Module 6 will be used for the design of soil retaining structures. No further information is requested.
11	Topographic Amplification	8.2	21	MBIE module 6 provides guidance for the application of topographic amplification factors specific to retaining wall design.	The Stantec response relating to the use of topographic amplification factors is a pragmatic risk-based approach. No further information is requested.
12	Global Land Stability Risk	10.1		Return terminal location - the level of investigation undertaken in relation to the Doolans base building foundation is at the lower end of what would be expected at a resource consent stage. Typically subsurface investigations would be carried out to better ascertain ground conditions, or at least superficial soils removed from atop rock surfaces to undertake a visual assessment of joint sets. I appreciate that the site location may limit the extent to which such investigations are practical. The NZ geological map series 1:250,000 also provides some high-level information that would be useful in assessing the potential properties of the underlying schist. Are Stantec satisfied that the investigations to date are sufficient to confirm that the location proposed is viable?	The Stantec response provides further information on the detail of their investigations to date. They confirm they are satisfied the investigations to date are sufficient to confirm there is no cause for significant concern regarding the global stability or suitability of the site for the Gondola Return Station. They affirm the need to undertake physical investigations prior to construction to in order to validate design assumptions. They describe a methodology to undertake subsurface investigations. I recommend a Consent Condition be included requiring subsurface investigations to be undertaken to confirm ground conditions are consistent with design assumptions, or if not, any remediation required. These investigations should be completed and reported by a Suitability Qualified and Experienced Geoprofessional.
13	Global Land Stability Risk	10		Has an assessment of the reservoir site been undertaken to ensure that the site is stable and suitable to establish a reservoir? Typically subsurface investigations would be carried out to better ascertain ground conditions - drilled borehole. The Stantec report references the NZSOLD guidance for the detailed design of the reservoir. This guidance also includes a recommended approach to establishing the Potential Impact Classification (PIC) of the Dam and provides a risk assessment methodology for proposed Dams. Has a PIC assessment been undertaken for this Dam? Has Stantec considered using the NZSOLD risk assessment methodology in place of the baseline NPSNH methodology? My review of the Draft plans provided suggest that the reservoir will be formed entirely in cut with only minor filling being undertaken to achieve freeboard, but please confirm. With consideration of the above are Stantec satisfied that the investigations to date are sufficient to confirm that the reservoir location proposed is viable?	Stantec have confirmed they consider the investigations to date to be sufficient to confirm the reservoir location is viable. Geosolve have completed a Technical Audit of the proposed reservoir on behalf of ORC (Geosolve doc reference 240480.09). This audit includes recommended Regional Council Consent conditions. I consider these conditions sufficient and do not see a need for further CODC conditions to be applied.

14	Rockfall Risk from Ridge above Swan Lake and Snow making reservoir.	10.6 10.7		<p>I agree that the rock fall risk is significant and, in all probability, represents the highest risk associated with the development. The Swan Lake area is included in the Otago Regional Rockfall Screening Study (Oct 2022). This study mapped rockfall hazard awareness areas derived from simulated rockfall trajectories obtained from modelling. The study did not extend into the Doolans basin but as identified in the Stantec report rock fall hazards are present in this area.</p> <p>The site investigation included in the Stantec report provides a more detailed assessment of this risk at these locations. The Swan Lake area is of particular concern. As the Stantec report identifies, the risk is somewhat mitigated by the temporal nature of the activity in the area - but the residual risk rating remains "high" and I would concur with this finding.</p> <p>I also note that a ski run is proposed to be formed into the rock fall area near the Reservoir site and I consider that this represents a similar level of hazard. Have alternative routes to the above been considered?</p> <p>For both these cases, given the high consequences associated with the hazard and the temporal nature of the exposure I suggest that a more detailed quantitative risk assessment be completed which includes a specific temporal consideration. The NPSNH Explanatory note clarifies that the policy provides a baseline only and permits more detailed alternatives. The NZGS Slope Stability Geotechnical Guidance Series Unit 1 (2024) represents best practice in this area. It provides detailed semi quantitative and quantitative approaches to estimating landslide, and specifically rock fall hazard. This is covered in sections 6 and 12 of the NZGS guidance. Recommended methods included in the NZGS guidance include the “AGS Guideline for Landslide Susceptibility, Hazard and Risk Zoning 2007” approach and the "Department of Conservation Guidelines for Natural Hazard Risk Analysis (2020)" approach. The latter may be of particular relevance in this instance given DOC's interest in the site.</p>	<p>The Stantec response includes a more detailed qualitative response. It does not extend to a quantitative assessment, citing a lack of information relating to the rockfall frequency, operational rules and maintenance vehicle frequency.</p> <p>Of the two rock fall hazard areas only one is within the CODC boundary, being the rockfall hazard above the proposed reservoir site and a proposed ski trail. Based on the additional information provided I concur with Stantec that the rockfall risk at this location is lower than that present above Swan Lake within the QLDC boundary.</p> <p>In relation to the rockfall hazard within the CODC boundary we recommend a quantitative temporal assessment be undertaken in relation to this rock fall hazard at the detailed design stage to confirm any mitigation measures required.</p> <p>The rock fall hazard above Swan Lake within the QLDC boundary is a higher risk hazard. Whilst CODC do not have the ability to apply conditions in relation to this hazard I recommend that a temporal assessment should be undertaken at resource consent stage to confirm if the proposed access route can be adequately mitigated to be viable.</p>
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DISCLAIMER:

We ensure our professional services are performed with a degree of care and skill that would be normally exercised, under similar circumstances, by reputable consultants practicing in this field, at this date. No other warranty, expressed or implied, is made as to the professional advice presented in this report. The findings detailed within this report have been presented for the sole use of the client with respect to specific instructions given to us. No responsibility is accepted for the use of any information or advice contained in this report in any other context, or for any other purpose without our prior written agreement. This report may not be read or copied except in its entirety.

Attachment 4: Updated Conditions in Response to CODC Natural Hazards Feedback

7. EARTHWORKS

EARTHWORKS	
EW.1	Detailed design plans and drawings <u>prepared by a suitably qualified and experienced Geoprofessional</u> for earthworks necessary to establish the Remarkables Ski Area Upgrades and Doolan Expansion Project must be provided to the Consent Authority at least 20 working days prior to any earthworks commencing on the site.
EW.2	<p>The design must be in general accordance with that shown on the following plans:</p> <ul style="list-style-type: none"> (a) Southern Land Remarkables Ski Area Upgrades & Doolans Basin Expansion Access and Transportation Proposed Car Park B and Boneyard, Sheet E153, Drawing Reference A30043_E7 Revision K, dated 6 May 2026. (b) Southern Land Remarkables Area Upgrades & Doolans Basin Expansion Rastus Burn Wastewater Treatment Facility Proposed Infrastructure, Sheet E202, Drawing Reference A30043_7, Revision K, dated 6 May 2026. (c) Southern Land Remarkables Area Upgrades & Doolans Basin Expansion Rastus Burn Base Area Extension Cut and Fill, Sheet E352, Drawing Reference A30043_7, Revision K, dated 6 May 2026. (d) Southern Land Remarkables Area Upgrades & Doolans Basin Expansion Rastus Burn Access Roads and Utilities Cut and Fill, Sheet E402, Drawing Reference A30043_7, Revision K, dated 6 May 2026. (e) Southern Land Remarkables Area Upgrades & Doolans Basin Expansion Gondola Mid Station Cut and Fill, Sheet E456, Drawing Reference A30043_7, Revision K, dated 6 May 2026. (f) Southern Land Remarkables Area Upgrades & Doolans Basin Expansion Gondola Mid Station Cut and Fill, Sheet E502, Drawing Reference A30043_7, Revision K, dated 6 May 2026. (g) Southern Land Remarkables Area Upgrades & Doolans Basin Expansion Doolans Gondola, Cabin Building and Learners Area Cut and Fill, Sheet E552, Drawing Reference A30043_7, Revision K, dated 6 May 2026. (h) Southern Land Remarkables Area Upgrades & Doolans Basin Expansion Doolans Water Intake and Access Cut and Fill, Sheet E552, Drawing Reference A30043_7, Revision K, dated 6 May 2026. <p>along with any changes made to the preliminary / concept level design plans as necessary as a result of detailed design.</p>

Commented [MD1]: As the submitted earthworks plans are preliminary/indicative in nature, this is a reasonable amendment to Condition EW.1 suggested by CODC. "Geoprofessional" provides flexibility as to the exact person preparing the plans i.e. a geotechnical engineer or a civil engineer. D Chinn raised no issues with this wording.

EW.3	<p>1. The detailed design plans and drawings must include but not be limited to:</p> <ul style="list-style-type: none"> (a) Confirmation of the earthworks cut / fill balance; (b) Confirmation of the location and staging of earthworks; (c) <u>Better Cut and fill batters and heights details;</u> (d) <u>Slope stability design considerations;</u> (e) <u>Retaining wall design;</u> (f) <u>Stockpile requirements;</u> (g) <u>Identification of onsite reuse of excavated material; and,</u> (h) <u>Identification of offsite disposal of excavated material;</u> (i) <u>Drainage requirements; and</u> (j) <u>Testing requirements.</u> <p>2. <u>The detailed design plans and drawings shall identify which earthwork areas require supervision of a suitability qualified and experienced Geo-professional.</u></p>
EW.4	All earthworks must be carried out in accordance with best practice operations and in accordance with the Construction Environmental Management Plan and Erosion and Sediment Control Plans requires by Condition GC.9.
EW.5	If during earthworks any significant water is found within cuts that are not already designated for water crossings (culverts, fords or splash crossings), works must cease until a suitably qualified and experienced hydrologist has inspected the cut and confirmed whether further actions (including mitigation measures or the use of additional crossings) is required to maintain the hydrological connectivity of the water with the surrounding waterbodies.
EW.6	Trenching for the installation of servicing and utilities will be limited to a length of 150m per working construction face.
EW.7	Trenching for the installation of services and utilities within the Curvey Basin access track must be contained within the existing access track.

Commented [MD2]: These changes reflect the suggestions made by CODC Natural Hazard Response. D Chinn raised no issue with these suggestions.

12. GEOTECHNICAL CONSIDERATIONS

GEOTECHNICAL ASSESSMENT AND REPORTING	
GEO.1	<p>1. The Consent Holder must undertake geotechnical investigations to confirm site specific characterisations for the following project elements:</p> <ul style="list-style-type: none"> (a) Doolans Base Building (including Doolans Return Station) (b) Gondola Mid Station (c) Rastus Burn Base Area Extension (including the Doolans Base Station);

	<ul style="list-style-type: none"> (d) Gondola Towers (e) Water Storage Reservoir (f) Wastewater Treatment Facility (building) (g) Wastewater Infiltration Ponds (h) the retaining structure proposed along the Rastus Burn Mid-Return Road Access;
GEO.2	<ol style="list-style-type: none"> 1. The geotechnical investigations described in GEO.01 must be undertaken by a suitably qualified and experienced geotechnical engineer and must comprise of the following site specific investigations: <ul style="list-style-type: none"> (a) Doolans Base Building (including Doolans Return Station), Gondola Mid Station: At least two test pits must be dug to identify the bearing capacity of the soils and depth to rock at the sites described in Condition GEO.01(a) and (b). The test pits must inform the detailed design of the structures described in Condition GEO.01(a) and (b). (b) Rastus Burn Base Area Extension (including the Doolans Base Station): At least two test pits must be dug to identify the bearing capacity of the soils GEO.01(c) . The test pits must inform the detailed design of the structures described in Condition GEO.01(c). (c) Gondola Towers: the foundation excavation of the tower sites must be inspected during excavation to confirm the bearing capacity of underlying soils. If necessary, any unsuitable founding material will be undercut and replaced with an appropriate engineered foundation, as advised by the supervising geotechnical engineer. (d) Water Storage Reservoir: At least two test pits must be dug to confirm external ground water pressure, the depth to bedrock and to inform stability modelling. If necessary, additional drilling may be required to confirm depth to bedrock. The test pits must inform the detailed design of the water storage reservoir described in GEO.01(e). (e) Wastewater Treatment Facility (building): At least two test pits or bores must be dug to identify the bearing capacity of the soils and depth to rock at the site described in Condition GEO.01(e) . The test pits must inform the detailed design of the building described in Condition GEO.01(e). (f) Wastewater Infiltration Ponds: At least one filtration test must be at undertaken every three years to confirm the permeability of the Wastewater Infiltration Ponds. (g) Rastus Burn Mid-Return Road Access and Retaining Structures: during excavation, the stability and ground conditions of site described in Condition GEO.1(h) shall be confirmed. The supervising geotechnical engineering shall advise of any remedial action required to ensure the stability of the feature described in Condition GEO.1(h). 2. A results of the investigations identified in Conditions GEO.2(a), (b), (d) and (e) must be submitted to the relevant Consent Authority as part of detailed design of the relevant structure. The detailed design plans must identify how the design responds to the results of the investigation.

	3. A report identifying the results of the investigations identified in Condition GEO.2(c), (f) and (g) and how the structures were constructed in response to those results must be submitted to the relevant Consent Authority within 20 working days of the investigation being completed.
GEO.3	<u>A rockfall hazard risk assessment prepared by a suitably qualified and experienced Geoprofessional of the rockfall hazard present above the proposed Water Storage Reservoir site must be provided to the Consent Authority at least 20 working days prior to any earthworks commencing within the Doolans Basin.</u>
GEO.4	<p><u>The rockfall hazard risk assessment must include but not be limited to:</u></p> <ul style="list-style-type: none"> (i) <u>A walkover inspection to identify rocks at risk of falling into the Water Storage Reservoir site;</u> (ii) <u>Representative samples of the identified unstable rocks based on their surveyed location, size and shape;</u> (iii) <u>A model of the potential rockfall path, velocity and affected zone for the identified unstable rocks; and</u> <p><u>Identification of rockfall mitigation measures, if any, necessary to be included in the detailed design of the expansion.</u></p>

Commented [MD3]: Wording reused from CODC suggestion for the detailed earthworks plans conditions.

Commented [MD4]: Aligns with same requirement for other similar conditions.

Commented [MD5]: Details of rockfall hazard risk assessment based on D Chinn's recommendation/email dated 27/07/2026.

