



Appendix

04

Powerhouse Fast-track Application

Preliminary Geotechnical Report



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15 December 2025

GEOCONSULTING LTD

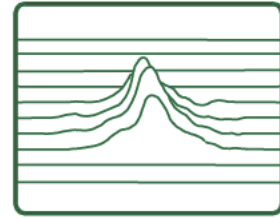
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Bowen Peak Development

PRELIMINARY GEOTECHNICAL ASSESSMENT



Prepared for:

Bowen Peak Ltd

Date prepared:

18 November

2025

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SUMMARY

Geoconsulting Ltd was commissioned by Bowen Peak Ltd to undertake a preliminary geotechnical assessment for the proposed Fernhill Heights housing subdivision and an aerial ropeway (Funifor) connecting the development to the One Mile Powerhouse Reserve and the top of Bowen Peak. This report addresses concerns raised by regulatory bodies regarding natural hazards and outlines the feasibility of the development based on existing data and site conditions. Recommendations for detailed geotechnical investigations are also provided for the next substantive phase of this FastTrack application.

Fernhill Heights Development

The subdivision spans 56.6 ha (Lot 1 DP 20613) and includes 175 multi-unit chalets across four spurs separated by gullies requiring bridge crossings. The terrain consists of southeast-facing slopes (20–25°), underlain by schist bedrock with colluvium and till soils. Natural hazards identified include:

- Faulting: The Two Mile Fault, likely inactive, crosses the site.
- Landslides: Historical slides noted; further investigation required.
- Rockfalls: High awareness area above RL 800 m; risk to be assessed post- tree clearance.
- Debris Flows: Alluvial fan deposits mapped; revised extents proposed.
- Liquefaction: Assigned nil risk due to geological conditions.

Geotechnical feasibility is supported by comparisons to similar developments in Queenstown. Cut slopes in schist are expected to be stable with appropriate design and engineering interventions. No geotechnical constraints preclude development. Staged investigations in advance of proposed development planned to proceed in an east to west direction are recommended.

Aerial Ropeway (Gondolas and Funifor)

Three, contiguous aerial ropeways are proposed to span 5,540 m with a 1,300 m elevation gain, supported by five pylons and four stations. The route traverses One Mile and Two Mile Creek catchments and ridgelines. Key hazard considerations include:

- Alluvial Fans & Debris Flows: Affect lower structures; initial assessments suggest adequate elevation and setback.
- Landslides & Rockfalls: No known active features at structure sites; further assessment needed.
- Other Hazards: Two HAIL sites nearby; further investigation required.

Feasibility is affirmed, with lower structures accessible by road and upper structures requiring helicopter access. Minimal earthworks are anticipated for remote sites. A staged geotechnical investigation is planned, integrating environmental and archaeological assessments.

1 INTRODUCTION

1.1 BACKGROUND

Geoconsulting Ltd have been commissioned by Bowen Peak Ltd to carry out a preliminary geotechnical investigation for a proposed housing development (to be known as Fernhill Heights) and an aerial ropeway system servicing the housing development and Bowen Peak from a base building complex located in the lower reaches of One Mile Creek.

The frontispiece provides an overall view showing approximate housing development outline and approximate alignment of the aerial ropeway.

1.2 BRIEF AND SCOPE

The brief for the work was provided to Geoconsulting from Bowen Peak Ltd by way of an email dated 14/09/25 and updated on 16/09/25 with further expansion in our email dated 23/09/25. An initial application under the 'Fast Track' process has been declined due to substantial concerns around 'risks associated with natural hazards' raised by Department of Conservation (DoC), Otago Regional Council (ORC) and Queenstown lakes District Council (QLDC) as principal respondents.

The scope of work called for a high-level study that would address the concerns surrounding natural hazards and act as a lead-in to a more detailed geotechnical assessment. In this preliminary report the physical characteristics of the site are described and the likely impact of natural hazards are discussed to address concerns raised by others.

1.3 WORK UNDERTAKEN

This assessment is based on a desk study of available Geoconsulting reports, other geotechnical reports available on QLDC Edocs and relevant aerial photographs from our library, lidar and satellite imagery. No specific reports on the subject site, Lot 1 DP 20613, were found on Edocs.

From our records, we have identified reports undertaken on eleven properties (including a Council reservoir site) in the following places:

- Lochy Rd: No. 16, 25, 31,35 & 45.
- Greenstone Place: No.37.
- Wynyard Crescent: No. 136, reservoir site.
- Vanda Place: No.1.
- Caples Place: No.6.
- Von Place: No.17.
- Jade Lake Crescent: Stream crossing.

Of most significance are the site investigations for the combined lots at 31, 35 & 45 Lochy Road, a block of land of approximately 16 ha near the south corner of the subject site. That investigation involved excavation of 12 test pits and drilling of 8 cored holes.

Apart from familiarity with this site and the local area as a Queenstown based geotechnical consultant with over three decades experiences, no further field work has been undertaken.

2 PROPOSED DEVELOPMENT

Two distinct components are proposed: a housing subdivision known as Fernhill Heights and three contiguous aerial ropeways servicing the latter area and Bowen Peak. There is potential for other complimentary developments but these are outside the scope of this report.

2.1 FERNHILL HEIGHTS

The Fernhill Heights part of the development lies within the 56.6 ha property with legal description Lot 1 DP 20613. At the time of writing, the subdivision will comprise some 175 multi-unit chalets serviced by a network of roads with access off Wynyard Crescent and Lochy Road. Access will also be gained by aerial ropeway coming in from the eastern side. Three major gullies will need to be bridged to provide links between various slices of the subdivision for both vehicles and pedestrians.

The development programme envisaged for Fernhill Heights calls for progressive development of three ridges (eastern, central and western) starting from the eastern side where access will be gained off Wynyard Crescent and later by aerial ropeway. Each stage will begin with clearance of wilding conifers followed by road construction then building of the chalets. On completion, work will begin on the next ridge over until completion of the project. The total lifespan of the project is expected to take approximately 26 years with completion in 2053.

2.2 AERIAL ROPEWAYS

A Doppelmayr system comprising a gondola-funifor-gondola arrangement has been selected to provide access to Fernhill Heights and Bowen Peak. The proposed system will commence at a base station in the Powerhouse Reserve situated in lower One Mile Creek, pass through a mid-level station at Fernhill Heights and an upper station in the saddle between Ben Lomond and Bowen Peak then terminate at a viewing platform on Bowen Peak itself. Five towers will provide intermediate support between stations.

Final aerial ropeway types, alignment and configuration of stations and pylons will be determined during the substantive phase of the Fast Track application. The proposed contiguous gondola-funifor-gondola system is expected to prevail subject to much wider expert input into the final design.

3 GEOMORPHOLOGY AND GEOLOGY

3.1 GEOMORPHOLOGY

The project area lies on the southeast facing flank of the Ben Lomond (1748 m) – Bowen Peak (1631 m) ridgeline. One Mile and Two Mile Creeks drain this flank in the area of interest with several unnamed drainage lines also running through the Fernhill Heights area. All the Whakatipu Basin has been subject to multiple glacial advances and retreats leaving only a few areas of ice-smoothed bedrock and glacial till on lower slopes as local reminders. However, the present-day topography is dominated by post glacial erosional and depositional processes with deeply incised gullies interspersed by moderate to steep slopes.

3.2 GEOLOGY

Grey, pelitic schist underlies the hillsides around Queenstown with numerous rocky outcrops visible on upper slopes. At lower altitudes, outcrops become less frequent with a soil overburden forming an almost continuous blanket across the Fernhill slopes and lower reaches of One Mile Creek. The commonest soils are colluvium (predominant on slopes above RL 500 m) and till (on lower slopes). Landslide deposits and debris flow deposits are locally sporadic and fan deposits flank the outlets of both One Mile and Two Mile Creeks,

4 FERNHILL HEIGHTS

4.1 SITE DESCRIPTION

The southeast facing hillside has slopes ranging from 20-25° along the broad faces with steeper slopes falling into various unnamed gullies traversing the property. Three major gullies with semi-permanent flows are shown on the topographical map while several smaller gullies carrying only ephemeral flows are also known. Photos 1 & 2 show views of the Fernhill Heights hillside.



Photo 1: Fernhill Heights area looking northeast. Lot 1 DP 20613 outline indicative only.



Photo 2: Fernhill Heights area looking southwest. Lot 1 DP 20613 outline indicative only.

The bulk of the slope is thickly wooded with mature conifers. The exceptions are small, cleared areas above the residential areas above Caples Place and Wynyard Crescent. The conifers first took hold in the 1950's then spread rapidly in the following decades up to around 900 m although recent herbicide spraying has constrained further upward spreading of wildings. A few pockets of native trees are present in the damper gullies.

4.2 NATURAL HAZARDS

Natural hazard portals run by QLDC and ORC have been examined as has our own desk-based examination of aerial photographs, lidar imagery and Google Earth satellite imagery. This study is considered to be more relevant due to the availability of more recent and more comprehensive resources. Some areas of possible interest have been identified from aerial photograph interpretation and will be subjected to ground truthing and closer examination when access is available. As noted previously, no field checking has been undertaken. Hazard features of interest are shown on Figure 2.

4.2.1 FAULTING

A mapped fault (QMAP 1:250k geological map dataset) passes through the area and can be traced via a strong lineation prominent on lidar imagery in particular. The position shown on Figure 2 is some 50-60 metres to the east of previous mapped positions. This feature is known as Two Mile Fault and is attributed as probably 'inactive' despite the prominence of the topographic steps (D.Barrell GNS pers comm).

4.2.2 LANDSLIDES

The central part of the proposed subdivision has one mapped landslide recorded in an earlier, district-wide study (Cunningham 1994ⁱ) and this feature plus a smaller landslide were noted in our report at 31, 35 & 45 Lochy Road (Geoconsulting 2007ⁱⁱ). A further area of instability labelled as 'schist debris slide' (GNS 2000ⁱⁱⁱ) is shown on the northeast flanks of the gully crossing the central part of Dart Place. Part of this slide area may encroach into the southwest corner of Lot 1 DP 20613. All such features are subdued, degraded features that appear no longer active but warrant further investigation once the ground is cleared and access available. No further evidence for recent slope instability, e.g. disruption in forest cover, has been noted in the area of interest. All features identified in this and previous studies are shown on Figure 2.

4.2.3 ROCKFALLS

Much of the property has been identified as being in a 'high rockfall awareness area' on the ORC Natural Hazards Portal. 1959 aerial photographs, taken prior to spread of conifers up the hillsides, show rock outcrops increasing in prominence above around RL 800 m or above the present-day tree line. The rockfall threat associated with these outcrops and from any lower-level outcrops not picked up by this initial assessment will be determined once slope clearance has allowed closer inspection.

The steep slopes adjacent to the deeply incised gullies may also be source areas for rockfalls and rockslides. However, these gullies are purposefully left outside of the housing development areas and need not be investigated further except around abutments for bridge crossings.

4.2.4 DEBRIS FLOWS

Debris flow deposits have been mapped at 45 Lochy Road and 1959 aerial photographs show a small fan extending into 13 & 11 Lochy Road and possibly parts of adjacent properties. Hazards webmaps identify a 'alluvial fan (regional) active composite' extending out of the gully crossing the middle part of Dart Place and also encroaching into the southwest corner of the subject site. Alluvial fans are also associated with debris flow deposition. The limit of this fan appears to extend further than would be topographically feasible. Accordingly, a revised extent is shown on Figure 2 along with the fan at 13 & 11 Lochy Road.

4.2.5 OTHER HAZARDS

The QLDC hazards webmap identifies the lower part of the property as having a 'nil to low risk' liquefaction susceptibility. The geology, geological history and topography are not compatible with liquefaction susceptibility and thus we consider an assignment of 'nil risk' is appropriate for this site.

4.3 GEOTECHNICAL CONSIDERATIONS FOR DEVELOPMENT

4.3.1 PROJECT DESCRIPTION

The proposed development is for 175 multi-unit chalets scattered across the four broad spurs that traverse the site. Three, narrow gullies separate the four development areas which will have to

be bridged to provide access from one area to another. A preliminary layout for the chalets and roading is shown on Figure 3.

Each chalet will occupy a 28 m x 12 m footprint with the breadth split into two x 6 m platforms separated by a 3 m lift. The cut at the rear will vary in height depending on slope angle and whether the cut is free-standing or needs to be retained. It is anticipated that each platform will be founded on rock with minor or nil parts of the building footprint resting on soil overburden.

The proposed subdivision will begin on the eastern side with access off Wynyard Crescent. Development will progress in a staged manner towards the west with expansion onto the neighbouring spurs. A time span ranging between 2029 to 2053 has been provisionally adopted for realization of the project.

4.3.2 FEASIBILITY

Fernhill Heights development on 20-25° slopes is comparable to other subdivisions with similar aspect along Frankton Road, e.g. Potters Hill Drive (average slope 28°) and Middleton Drive (average slope 18°).

As with these subdivisions, earthworks comprise mainly cut slopes with fill slopes limited to road formation and amenity areas within properties. The proposed cut slope excavations are expected to be primarily in schist bedrock. The stability of rock excavations is generally governed by the strength and orientation of rock defects which can interact to form unstable blocks. Various slope angles are possible depending on rock quality and proximity to other structures but, in general, the steeper the cut the higher the risk of instability. Several support options are available should unfavourably oriented defects be present. A staged investigation will look at rock mass stability concerns from a subdivision-wide scale down to a building site by building site scale to progressively advance geotechnical design.

At this stage, there do not appear to be any geotechnical constraints that would preclude development. The proposed staged investigation will undoubtedly uncover challenges but we are confident that these could be dealt with by current geotechnical engineering methods.

4.3.3 FURTHER WORK

A detailed geotechnical investigation will need to be undertaken in a staged fashion and in advance of the proposed development programme. The intended programme will start at the eastern end above Wynyard Crescent then progress through to the central and western ridges as development nears completion.

For each ridge, we suggest clearance of the forest in bands (say 20-30 m width) parallel to the contours to minimise environmental impacts such as soil erosion and mobilisation of sediment and slash. Such impacts can be severe when triggered by severe rainstorms and the consequences high considering the urban development downslope. The engagement of specialist consultants with expertise in environmental impacts of forest clearance is strongly recommended.

A fundamental part of any site investigation is an area-wide engineering geological mapping exercise. Mapping can only precede once sufficient forest clearance has been done to allow

access and to allow greater visibility of outcrops and exposures. Clearance will also allow tracks to be constructed for diggers and drill rigs to facilitate subsurface exploration.

The proposed investigations will target infrastructure routes such as road alignments and bridge abutments with extension into individual building sites as development progresses. Investigations will also focus on known hazard areas and newly discovered hazards identified during the initial engineering geological mapping. Findings from these investigations will inform engineering layout design and provide the basis for more detailed hazard and risk analysis.

5 BOWEN PEAK AERIAL ROPEWAYS

5.1 SITE DESCRIPTION

The proposed route (Figure 3) traverses across both One Mile and Two Mile Creek catchments and from there traverses the ridge line between the saddle and Bowen Peak. The route starts from its base at the Powerhouse Reserve (PR) passes through intermediate stations at Fernhill Heights and the Ben Lomond-Bowen Peak Saddle (Te Taumata O Hakiketura) (SS) to terminate at a viewing platform on Bowen Peak (BP). Five pylons provide intermediate support between stations. The route rises some 1300 m over 5,540 m ropeway length.

The lower part passes over a mixture of exotic and native forest draped over the two named creeks, a number of tributaries and their intervening spurs. The bushline is reached above 1000-1060 m with upper slopes dominated by tussock and subalpine vegetation. Photo 3 shows an overall view of the proposed route.

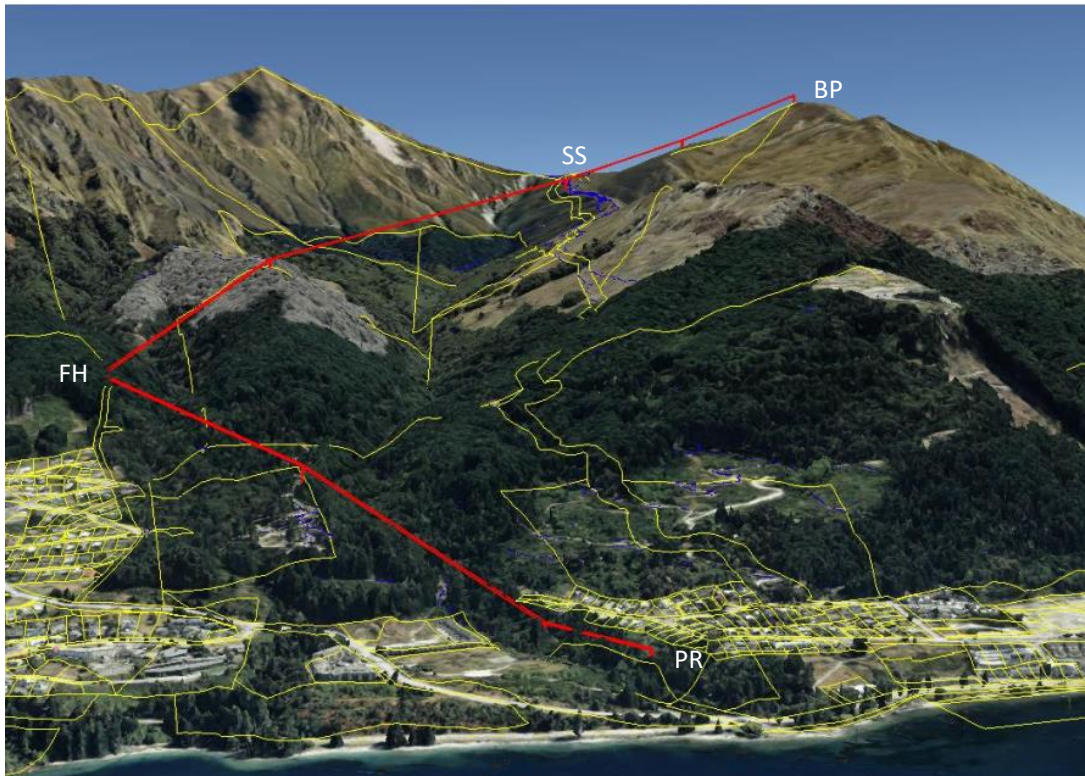


Photo 3: Schematic overlay of funifor route. PR = Powerhouse Reserve station, FH = Fernhill Heights station, SS = Saddle station, BP = Bowen Peak viewing platform.

5.2 NATURAL HAZARDS

Natural hazard portals run by QLDC and ORC have been examined and complemented by our own desk-based examination of aerial photographs, lidar imagery and Google Earth satellite imagery. This study is considered to be more relevant due to the availability of more recent and more comprehensive resources. Some areas of possible interest have been identified from aerial photograph interpretation and will be subjected to ground truthing and closer examination when access is available. As noted previously, no field checking has been undertaken. Hazard features of interest are shown on Figures 4, 5 & 6. Photos 4 - 8 show positions of all locations with features of interest. Note that alignment and structure positions are only approximate.

5.2.1 ALLUVIAL FAN AND DEBRIS FLOW HAZARDS

Alluvial fan hazards are shown as affecting the lower One Mile Creek section where the Powerhouse Reserve station and Pylon 1 are located. The Powerhouse Reserve station and Pylon 1 are situated on degraded terraces elevated several metres above the valley floor (+ 11 m and + 9 m respectively). Photo 4 shows an aerial view of the lower part of One Mile Creek with indicative positions of the base station and Pylons 1 & 2.



Photo 4: Approximate alignment of lower gondola route from One Mile Powerhouse Reserve station via pylons 1 & 2.

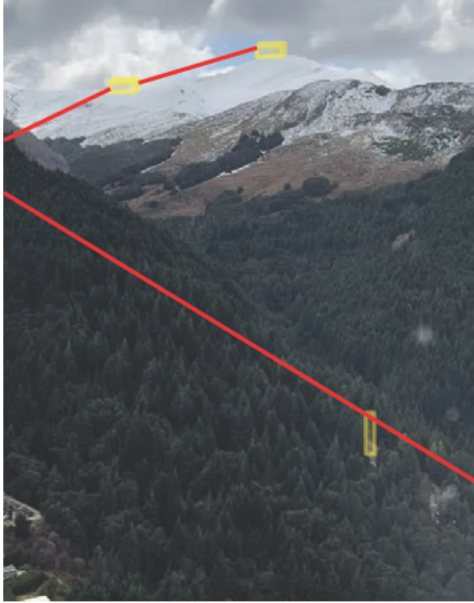


Photo 5: Wynyard Crescent and Pylon 2 in foreground, Bowen Peak and Station Saddle to rear.



Photo 6: Fernhill Heights Station to rear and Pylon 3 on ridge between One Mile and Two Mile Creeks.

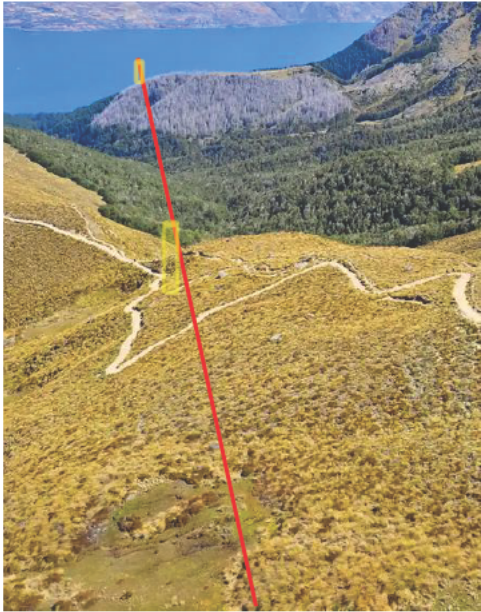


Photo 7: Pylons 2 & 3.



Photo 8: Bowen Peak Aerial Ropeway station with viewing platform.

The ORC and QLDC hazard portals both show alluvial fan hazards (sourced from various studies) as being present in the lower part of the valley (Figure 6). Alluvial fan and flood hazards will be addressed in more detailed studies but initial thoughts are that both the base station and Pylon 1 have sufficient horizontal and vertical displacement to put them outside any potential hazard zone.

5.2.2 LANDSLIDES

All structures are shown (Figure 4) to lie outside known landslide areas. The Powerhouse Reserve Station and Pylon 1 lie on the flanks of lower One Mile Creek which is shown to be heavily wooded on 1959 aerial photographs. No obvious signs of instability are seen on these or subsequent photographs, however, the structures' position on valley sides suggest further assessment is required.

All other structures (Pylons 2 – 5 and Fernhill, Saddle and Bowen Peak stations) lie on spur or ridge crests, positions not known to be susceptible to slope instability. Soil erosion may be of concern on locations with sparse vegetation and weak soils.

5.2.3 ROCKFALL

Rockfall susceptibility areas are shown on Figure 5. The areal extent is quite speculative and not backed by field assessments. The favourable locations of the upslope structures providing a low susceptibility to slope instability also apply to the rockfall threat. The lower structures in One Mile Creek do not have any rock outcrops upslope and thus have nil susceptibility to rockfall. Photos 4 – 8 show overall views of these locations.

5.2.4 OTHER HAZARDS

Two HAIL sites are shown on QLDC webmaps (Figure 6) which are indicated to lie outside the current positions of the Powerhouse Reserve station and Pylon 1. Further investigation is needed to determine whether they will be affected by the proposed developed and what mitigation measures might be necessary to lessen or avoid any hazards.

5.3 FEASIBILITY

The Powerhouse Reserve Station and Pylon 1 are readily accessible from the existing track to the Powerhouse. Pylon 2 and Fernhill Heights Station will both require new access roads and vegetation clearance to form the building platforms. All other structures will require helicopter access for construction although some temporary access may be possible from the Moonlight Creek side subject to further investigation and run holder agreement.

A mixture of ground conditions ranging from glaciofluvial sediments at the lower levels to bedrock with a shallow overburden at the majority of positions is anticipated. The less accessible positions will have to be designed with minimal earthworks due to the difficulty of getting anything but a very small excavator on site.

At this stage, there do not appear to be any geotechnical constraints that would preclude development. The proposed staged investigation will undoubtedly uncover challenges but we are confident that these could be dealt with by current geotechnical engineering methods.

5.4 FURTHER WORK

A detailed geotechnical investigation will need to be undertaken in a staged fashion and in advance of the proposed development programme. Engineering geological mapping and subsurface investigations will be integrated with the Fernhill Heights geotechnical investigation. Site investigations for the Powerhouse Reserve and Pylon 1 sites can be initiated as soon as resource consent has been granted. Pylon 2 and Fernhill Heights Station sites are accessible on foot but will first need an access track to be established prior to any subsurface assessment. All other structure positions will be accessed on foot but the nature of the terrain suggests only rudimentary investigations will be necessary.

For the lower stations, we recommend the engagement of consultants specialising in hydrology (flood and debris flow risk), environmental management (landfill disturbance risk) and archaeologists (historic workings or occupation in One Mile Creek).

QLDC are proposing an arterial road bypass from Thompson St to a new, elevated, roundabout some 60 m to the west of the existing roundabout at One Mile Creek. Preliminary drawings show the road formation and supporting fill slope passing just to the south of the Powerhouse station. Further investigations will be required should revised bypass plans necessitate a relocation of the station.

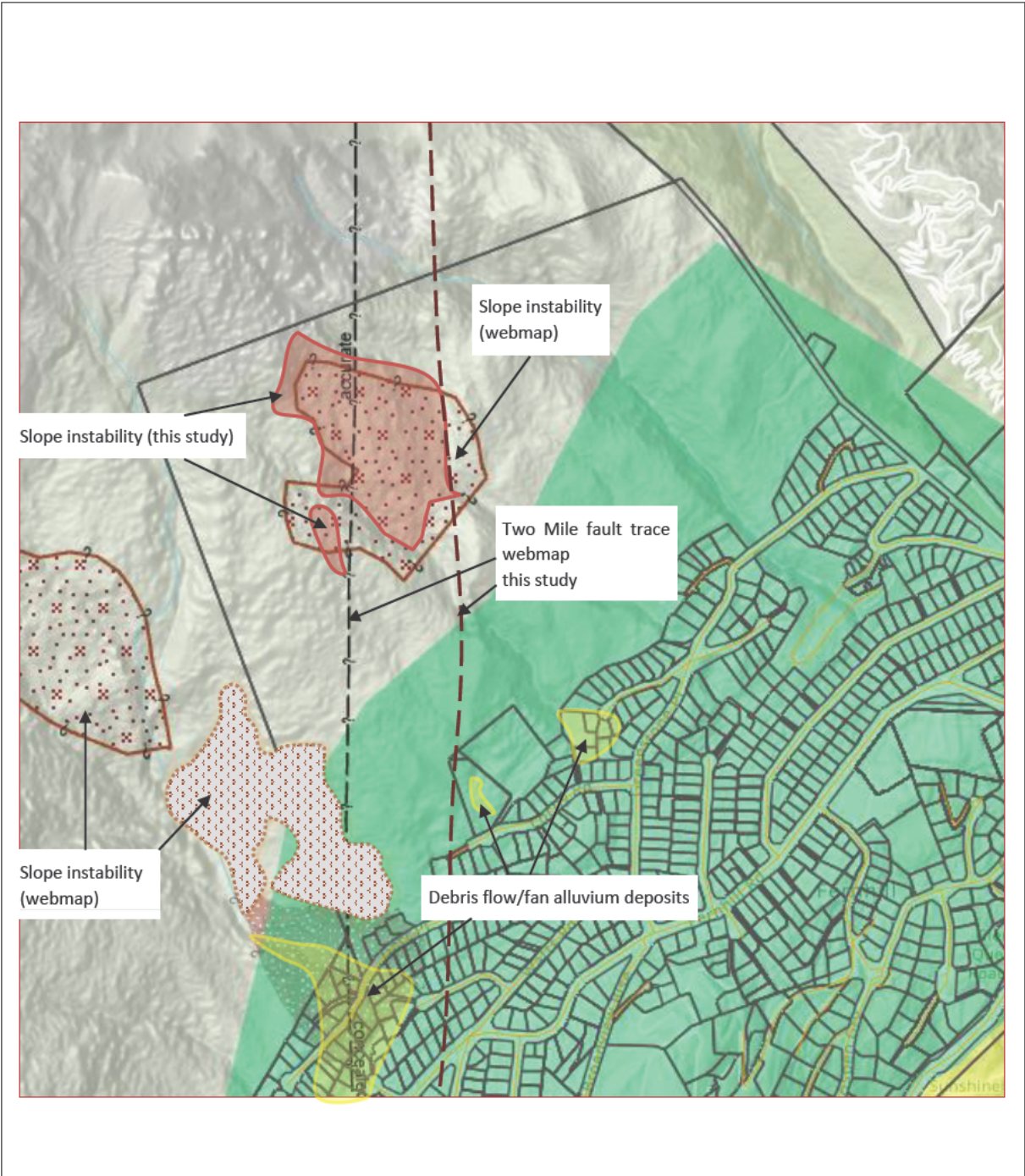
Limitation

This report has been prepared solely for the benefit of Bowen Peak Ltd as our client with respect to the brief outlined in Section 1.2. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

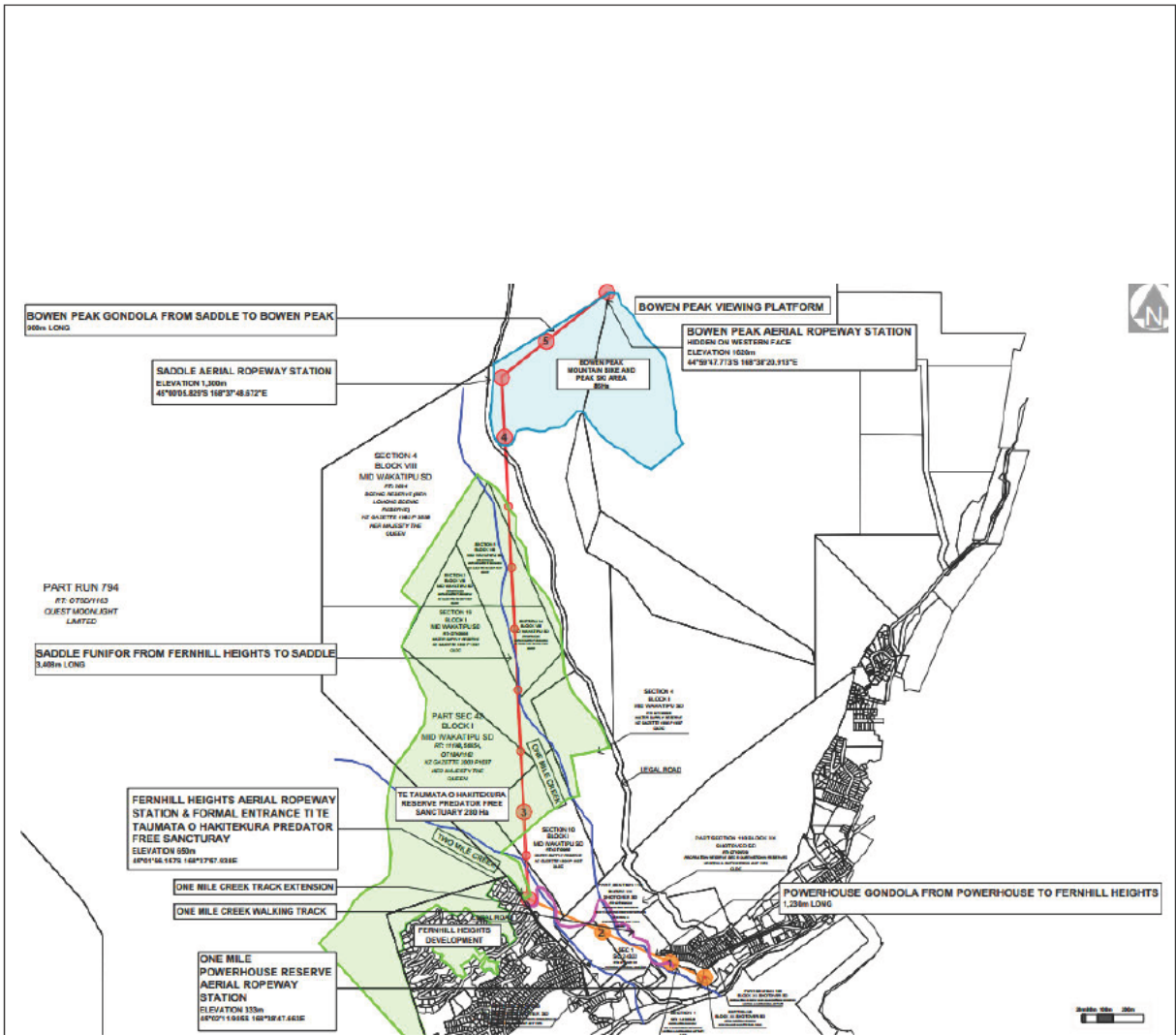
Recommendations and opinions in this report are based on data from limited inspection points. The nature and continuity of ground conditions away from the observation locations are inferred, and it must be appreciated that actual conditions could vary considerably from the assumed model.




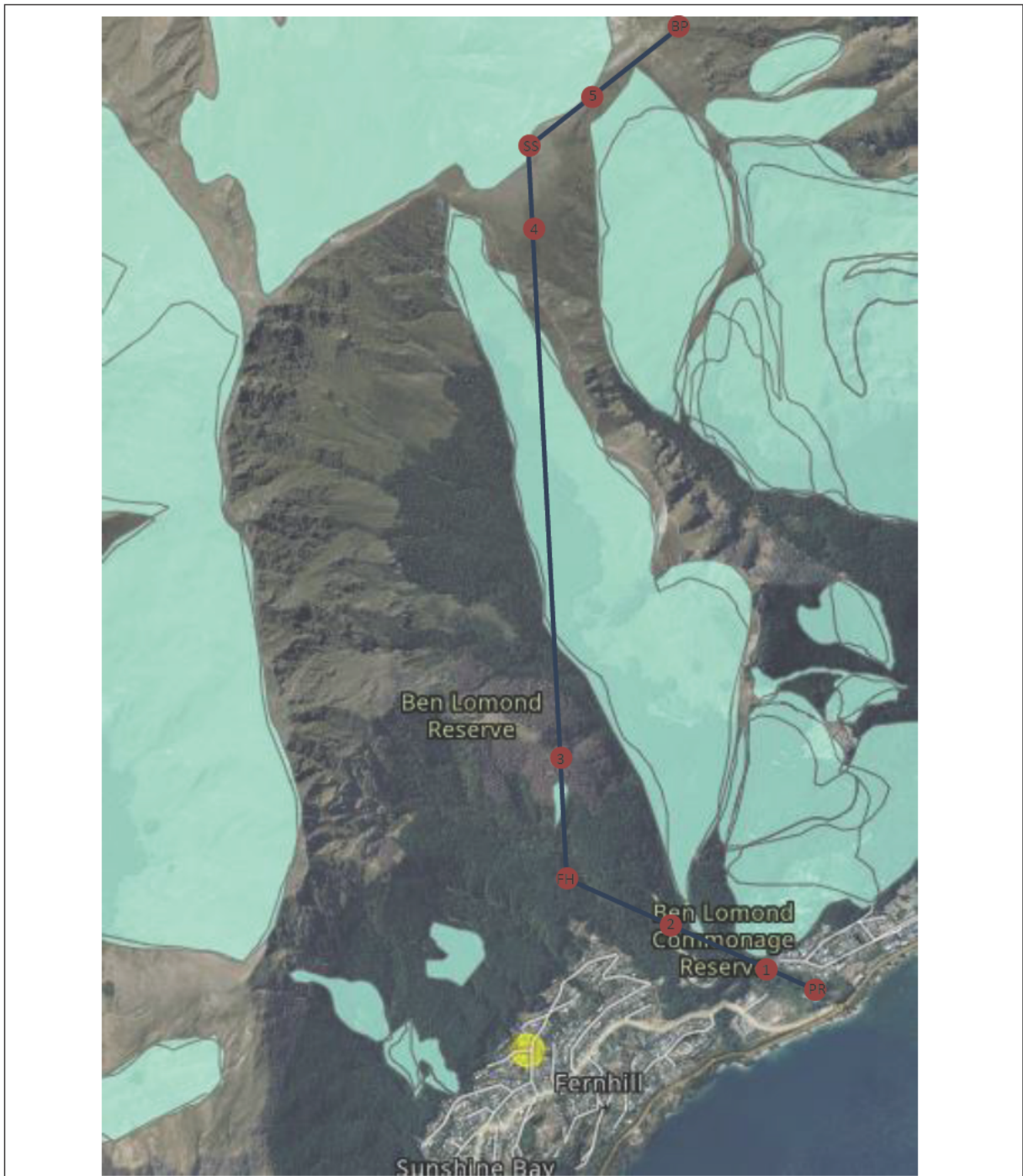
 JEFF BRYANT GEOCONSULTING Ltd	PROJECT: Bowen Peak Ltd	FIGURE: 1
	DESCRIPTION: Fernhill Heights Development. Site plan showing preliminary scheme layout as of January 2025.	Scale: NTS
	Source: Clark Fortune Macdonald job 16592 dwg13/001	Report:
		Date: 18/11/2025

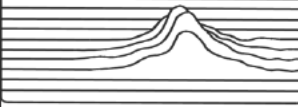


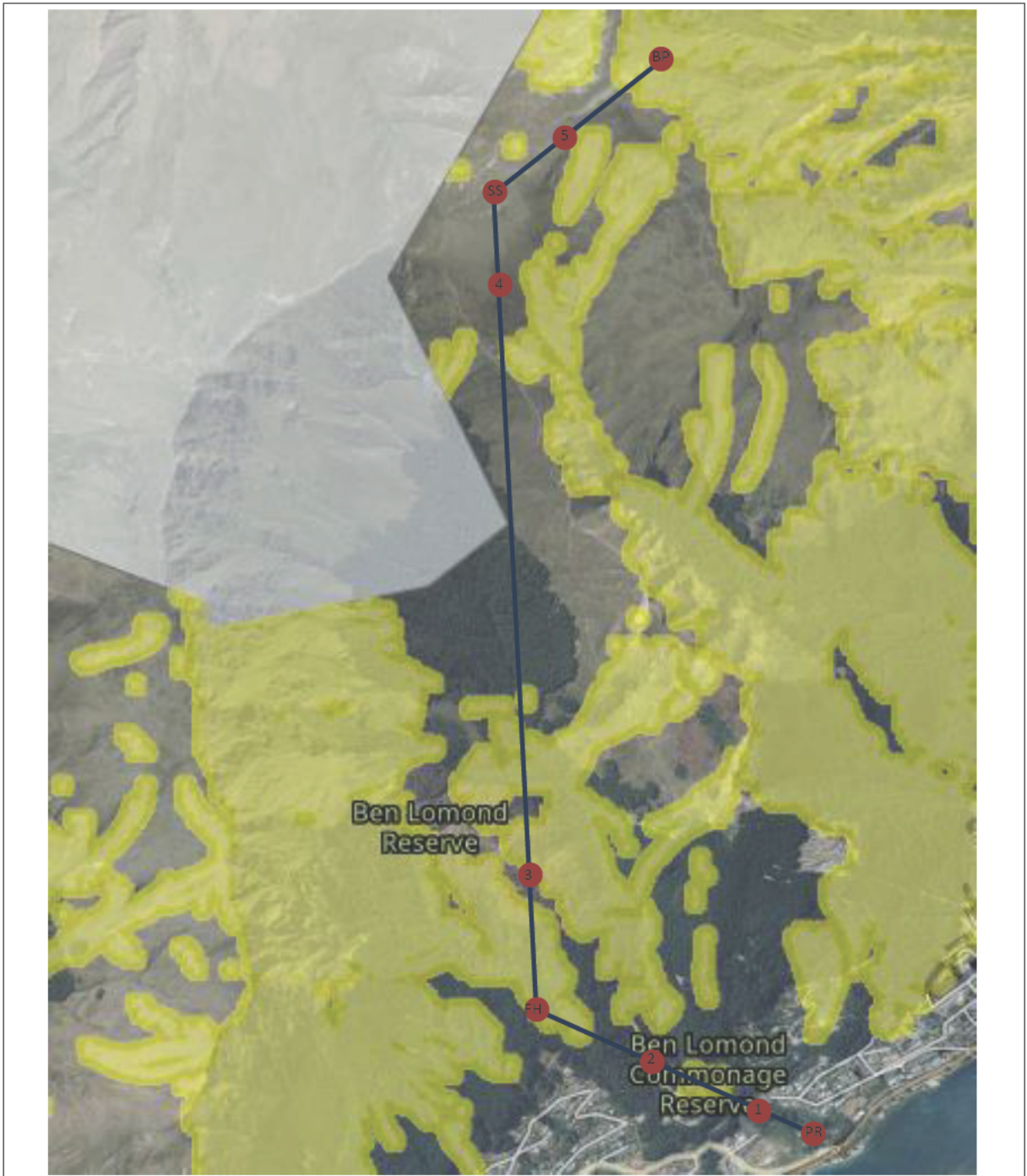
 <p>JEFF BRYANT GEOCONSULTING Ltd</p>	PROJECT: Bowen Peak Ltd	FIGURE: 2
	DESCRIPTION: Fernhill Heights – known hazards, amended as necessary.	Scale: NTS
		Report:
		Date: 18/11/2025




 <p>JEFF BRYANT GEOCONSULTING Ltd</p>	PROJECT: Bowen Peak Ltd	FIGURE: 3
	DESCRIPTION: Site plan showing scheme layout of Powerhouse – Fernhill Heights – Bowen Peak funifor showing stations and pylon sites (1 – 5).	Scale: NTS
	Source: Clark Fortune Macdonald job 16592 dwg03/001	Report:
		Date: 18/11/2025

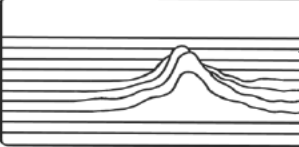


 JEFF BRYANT GEOCONSULTING Ltd	PROJECT: Bowen Peak Ltd	FIGURE: 4
	DESCRIPTION: One Mile and Two Mile Creek catchments. Areas of landslide instability identified on ORC Otago Natural Hazards Portal. Blue areas combined from several sources. No information available and low level of certainty.	Scale: NTS
		Report:
		Date: 18/11/2025



 JEFF BRYANT GEOCONSULTING Ltd	PROJECT: Bowen Peak Ltd	FIGURE: 5
	DESCRIPTION: One Mile and Two Mile Creek catchments. Areas of rockfall instability identified on ORC Otago Natural Hazards Portal. Light yellow area is rockfall hazard awareness area. Dark yellow rim is hazard area uncertainty buffer.	Scale: NTS
		Report:
		Date: 18/11/2025



 <p>JEFF BRYANT GEOCONSULTING Ltd</p>	PROJECT: Bowen Peak Ltd	FIGURE: 6
	DESCRIPTION: One Mile and Two Mile Creek catchments. Areas of Alluvial fan hazard identified on ORC Otago Natural Hazards Portal.Light (top) and QLDC webmap (lower). Green outlines are HAIL sites 00465.01 (Fernhill closed landfill) and 02036..01 (mine tailings)	Scale: NTS
		Report:
		Date: 18/11/2025

REFERENCES

ⁱ Geoconsulting Ltd 2007 “Blue Skies Development 31 Lochy Road, Queenstown”

ⁱⁱ Cunningham, V 1994 ‘Land use Planning and Development Suitability in Queenstown, New Zealand’ University of Canterbury Masters thesis.

ⁱⁱⁱ Geology and Nuclear Sciences 2000: ‘Geology of the Wakatipu Area’ Qmap series 18