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 Ridgeburn Limited
 Cameron Hodgson

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Geotechnical Review for Proposed Development at Morven Ferry Road, Queenstown

Kirk Roberts Consulting has been engaged by Ridgeburn Limited (the client) to complete Geotechnical Review in support of a Fast Track Consent application for the proposed residential development at Morven Ferry Road, Queenstown.

This letter aims to review the available geotechnical desktop information and development plans to identify the geotechnical conditions on site and address any further investigation that may be required for the detailed design stage.

It should be noted that Kirk Roberts did not undertake our own sub-surface site investigations to inform this letter. The assessment and recommendation presented herein is based entirely on the information presented on public database sources.

1 Site Description

The legal description, address and parcel area are presented in Table 1 below.

Table 1: Site Identification¹

Address	Legal Description	Area
122 Morven Ferry Road	Lot 2 DP 601937	17.6 ha
Morven Ferry Road	Lot 5 DP 3000661	9.5 ha
Morven Ferry Road	Section 23 Block VIII Shotover SD	10.5ha
Morven Ferry Road	Section 71 Block VIII Shotover SD	10.1 ha
Morven Ferry Road	Section 64 Block VIII Shotover SD	10.4 ha
Morven Ferry Road	Section 25 Block IX Shotover SD	23.3 ha
Morven Ferry Road	Lot 4 DP 300661	17.5 ha
Morven Ferry Road	Lot 4 DP 300661	17.5 ha

A review of recent aerial photography¹ reveals that the site is currently occupied by a standalone residential dwelling with associated gardens and driveways. Additionally, the property is located within a rural area and has 7 accessory buildings around the remainder of the property.

Refer to Attachment 1 for the site location and layout plan. The site is located on the southern side of Morven Ferry Road. The Kawarau River is located along the southern boundary of the property with farm land located across the eastern and western boundaries of the site.

A topographical plan for the site has not been provided at the time of preparing this letter however the site is located on the eastern toe slopes of Morven Hill and therefore, the subject site slopes gently toward the east. Along the southern boundary of the development within Lot 4 DP 300661 and Section 25 Block IX Shotover SD, an alluvial embankment is present, providing access down to the Kawarau River.

¹ Queenstown Lakes District Council, Property Webmap, data retrieved April 2025 from <https://experience.arcgis.com/experience/80c97d34e5764669bb9aab99e40d5b8d>

2 Site Proposed Development

Kirk Roberts has been provided with a proposed development plan² (Master Plan) showing the development of 1,242 residential lots. The existing dwelling and ancillary buildings will be demolished and removed from the site. The proposed development plans are included in Attachment 2.

3 Database Review

3.1 Historic Aerial Images

Publicly available historical aerial photographs for the site have been sourced from the Retrolens - Historical Image Resource³ and Google Earth⁴. A review of the aerial photographs was undertaken to identify any changes in land use activities on the site and surrounding properties. A review of aerial photography dated back to 1956 indicates the primary use of the land to be farming. Review of photography through to November 2024 indicates the primary land use remained as farming. No apparent bulk earthworks or land use changes were identified in the historical imagery search.

3.2 Geological Setting

We have reviewed the data published by GNS Science on the New Zealand Geology Web Map⁵ for the published surface geology beneath the site. The northern and southern portion of the site consists of River Deposits with a ridge of Schist through the central area. This is summarized in Table 2.

Table 2: Published Geology (1:250k scale)

Geological group	Geological sub-group	Geological age	Description
OIS2 (Late Pleistocene) Outwash Deposits	Late Pleistocene River Deposits	≤ 0.012 million years	Generally unweathered, well sorted, loose, sandy to bouldery gravel forming large terraces and outwash plains
Aspiring Lithologic Association TZIV Pelitic Schist (Rakaia Terrane)	Basement (Eastern Province) Metamorphic Rocks	176 – 251 million years	Very well segregated and laminated; abundant pelitic and subordinate psammitic greyschist; minor greenschist and metachert; TZIV

3.3 Active Fault

A review of the GNS Active Faults Database⁶ indicates that the closest GNS mapped active fault trace is the Cardrona Fault located approximately 10 km southeast of the site. Therefore, the site is located outside the minimum 20 m Fault Avoidance Zone recommended by the Ministry for the Environment⁷.

3.4 Hazard Maps

The Queenstown Lakes District Council Hazard Map¹ indicate no natural hazard features associated with the subject site.

4 Geotechnical Assessment Report by RDA Consulting

In 2018, RDA Consulting prepared a Geotechnical Investigation Report for the property located across the eastern site boundary for a proposed 7 Lot subdivision. Their work comprised:

² Ridgeburn – Arrowtown Junction – Master Plan prepared by Novak + Middleton dated 9th May 2025

³ Retrolens, data retrieved in April 2025 from <https://retrolens.co.nz/>

⁴ Google Earth, data retrieved in April 2025 from <https://earth.google.com/web>

⁵ GNS Science – New Zealand Geology Web Map, date retrieved in April 2025 from <http://data.gns.cri.nz/geology/>

⁶ Geological and Nuclear Sciences (2004). Active Faults Database, date retrieved in April 2025 from <https://data.gns.cri.nz/af/>

⁷ Planning for Development of Land on or Close to Active Faults: A Guideline to Assist Resource Management Planners in New Zealand (Published July 2003).

- On site review of available desktop information.
- 14 x machine excavated test pits to final depths of between 0.8 m and 3.2 m below ground level (bgl), where rock or machine limits were encountered.
- 30 x Scala penetrometer tests to final depths of between 0.4 m and 1.8 m bgl, where refusal was met.

The reporting is publicly available on QLDC Edocs⁸.

4.1 Soil profile

The soil profile as encountered by the shallow investigation indicated topsoil and silt overlying alluvial sand to a depth of approximately 0.8 to >3.0 m below existing ground level. Haast Schist was encountered in 12 of the 14 test pits conducted at depths ranging from 0.6 m to >3.2 m below existing ground level.

4.2 Groundwater

Groundwater seepage was encountered within 3 test pit locations however was not indicative of the local groundwater table. The seepage was associated with an irrigation race located through the property which could be mitigated during subdivision development.

4.3 Liquefaction-Induced Ground Settlement

No deep geotechnical investigations were conducted as part of the RDA Consulting Report however based on the shallow depth to rock and the lack of groundwater; the liquefaction risk was considered to be nil.

5 Geotechnical Hazard Assessment

Potential geotechnical hazards and their risk to development of the site are presented in Table 3. The hazards are considered in general terms to assist in determining the feasibility of future development at the site from a geotechnical perspective.

Table 3: Assessment of hazards and their risk to proposed developments.

Hazard	Description	Risk to development
Falling Debris	The site is located across the toe slopes of Morven Hill. Rockfall analysis will be conducted at time of Resource Consent application.	Low: Low. Where required, mitigation via passive protection recommended.
Volcanic and Geothermal Activity	The GNS database does not identify any active volcanoes within the South Island. We consider the risk of material damage due to volcanic and geothermal activity is not likely.	Low: No risk was identified.
Flood Risk	The Queenstown Lakes District Council Map ¹ indicates the site is not at risk of flooding.	Low: No risk was identified.
Soft Ground / Low Geotechnical Bearing Capacity	Soft ground implies a low geotechnical ultimate bearing capacity which impacts the structural foundation design. This issue can be mitigated by (1) specific engineering design of the foundation system allowing for low bearing capacity; and/or (2) ground improvement to increase the bearing capacity of the soils.	Low: Low, shallow rock and alluvial gravels present.
Site Subsoil Class	The site subsoil class impacts geotechnical and structural seismic loadings.	Low:

⁸ QLDC Edocs, viewed May 2025 via <https://edocs.qldc.govt.nz/>

Hazard	Description	Risk to development
		RDA Consulting concluded that the site subsoil category in terms of NZS1170.5 Clause 3.1.3 is Class B (Rock) and Class C (shallow soils). However, Kirk Roberts do not have enough information to comment on this. Further site-specific deep investigations will be required during the detailed design stage to confirm the site subsoil class.
Groundwater	<p>If the groundwater is within the proposed excavation depths, then water can flood excavations. This can result in damage and softening of founding soils.</p> <p>Groundwater can also exert buoyancy forces on embedded structures (e.g., foundations, manholes, pipes etc.)</p> <p>This issue can be mitigated by implementing dewatering measures, and specific engineering design to account for buoyancy effects.</p>	<p>Low:</p> <p>The site is elevated above surrounding areas and the RDA Consulting Report indicates the local groundwater table</p>
Liquefaction Potential	<p>Not all soils are susceptible to liquefaction. Generally, for liquefaction to occur, there is a need for three soil preconditions:</p> <ul style="list-style-type: none"> Geologically young (less than ~10,000 years old), loose sediments, that are Fine-grained and non-cohesive (coarse silts and fine sands), and Saturated (below the water table) 	<p>Low:</p> <p>The has shallow bedrock and the local groundwater table is expected to be greater than 10 m below existing ground level. Liquefaction potential is low.</p>
Expansive Soils	<p>Expansive soils are those that experience notable volume change when soil moisture is altered⁹ (groundwater, drains roads etc.).</p> <p>Building damage due to volume changes associated with expansive soils can be reduced through proper foundation design.</p>	<p>Low:</p> <p>Expansive soils are not present on site.</p>
Long Term Consolidation Settlement	<p>Consolidation settlement occurs in saturated soils with low permeability or Peat and can be triggered by (1) imposed building loads; or (2) groundwater drawdown which is sometimes necessary for excavations.</p> <p>This type of settlement generally occurs over a long period of time.</p>	<p>Low:</p> <p>The limited shallow investigation test results by RDA Consulting on a neighbouring site, along with the GNS Geology Web Map, indicate the site is underlain by sand and bedrock. Sand is known to be of medium to high permeability. Hence, long-term consolidation and creep settlements are not likely.</p>
Immediate Static Settlement	<p>Soils most prone to immediate static settlement are compressible soils which include:</p> <ul style="list-style-type: none"> Soft cohesive soils (clays/silts); Loose sands; Peat/fibrous organic material; and Historic landfill. 	<p>Low:</p> <p>Soils underlying the site are unlikely susceptible to static settlement.</p>
Earthworks and erosion control	<p>The site is flat to gently sloping.</p> <p>The final depth of cut and fill earthworks will depend</p>	<p>Low to Medium:</p> <p>Depending on the required final excavation depth,</p>

⁹ BRANZ 2008. Soil Expansivity in the Auckland Region. Fraser Thomas Ltd: No. 120A (2008).

Hazard	Description	Risk to development
	on the final development plans.	site-specific earthworks controls and the staging of earthworks over drier months may be required to mitigate any risk.
Site Stability/Lateral Movement	The central and northern portion of the site is flat and level. The southern portion of the development is located across an alluvial terrace, with a riser down to the Kowarau River	Low: Slope stability through the central to northern portion of the development is low. Low to Medium: Slope stability analysis is required along the alluvial riser slope along the southern portion of the site.
Retaining Requirements	The proposed development plan does not include any retaining walls.	Low: Further assessment will be required once the proposed development plans are finalised and the foundation requirements are confirmed.
Foundation Options	Foundation options will depend on the structural design requirement and loading demands.	Low: <ul style="list-style-type: none"> The foundations within the residential development are expected to be designed in accordance with NZS3604:2011. The commercial buildings will require specific engineering design.

6 Possible Foundation Options

Based on the results of our site-specific investigations, desktop review, and the proposed development, the subgrade across the site is consistent with “Good Ground” in accordance with NZS3604:2011. The following methods are considered valid solutions:

- Shallow NZS3604:2011 timber piles.
- NZS3604:2011 concrete foundations.
- Concrete raft foundations by suppliers such as RibRaft, MAXRaft or other proprietary raft foundation providers.

Please note that Kirk Roberts did not undertake any design calculations to confirm the design requirements of the above options. The design requirements were provided as a guide only based on our general understanding of the site conditions and are not suitable for the final design.

7 Conclusion

Following the investigation detailed above and a thorough review of available desk top information, geotechnical hazards have been assessed to be generally low risk for the proposed development. All low-risk hazards are able to be managed or mitigated through typical engineering design practices during subdivision development.

The results of the desktop investigation indicate the conditions on site are generally expected to align with “Good Ground” in accordance with NZS3604:2011. Prior to detailed design of the development, it is recommended that a site-specific geotechnical investigation report is conducted to confirm the subgrade geotechnical parameters, review rock fall risk along the eastern boundary and conduct slope stability modelling along the southern riser terraces. Due to the limited available sub-surface data within the site, we recommend additional investigations be undertaken to assist with developing an accurate ground model and to minimise the effects of unforeseen ground conditions during construction.

8 Limitations

This report has been prepared at the specific instructions of our client in connection with the above project.

Whilst every care was taken during our desktop review, site investigation and interpretation of subsurface conditions, there may well be subsoil strata and features that were not detected.

It must be appreciated that the actual characteristics of the subsurface materials may vary significantly between adjacent test locations and sample intervals other than where observations, explorations and investigations have been made.

It should be noted that because of the inherent uncertainties in subsurface evaluations, changed or unanticipated subsurface conditions may occur that could affect total project cost and/or execution. Kirk Roberts Consulting does not accept responsibility for the consequences of significant variances in the conditions and the requirements for the execution of the works.

This report has been prepared to provide a preliminary assessment of the proposed development and to help with the Resource Consent application. This report is not considered suitable to support the Building Consent application without further investigation/assessment once the final development plans are known for the proposed future hotel. This report is not intended to address the subdivision or earthworks of the original site.

Only our client and the Council are entitled to rely upon this report, and then only for the purpose stated above. Kirk Roberts Consulting Engineers Ltd accepts no liability to anyone other than these parties in any way in relation to this report and the content of it and any direct or indirect effect this report may have. Kirk Roberts Consulting Engineers Ltd does not contemplate anyone else relying on this report or that it will be used for any other purpose.

Third parties: This report has been prepared for the sole use of our client, for the particular brief and on the terms and conditions agreed with our client. It may not be used or relied on (in whole or part) by anyone else, or for any other purpose, or in any other contexts, without our prior written agreement. We will not be liable for any loss, damage, cost, or expense incurred by such other persons.

Disciplines are limited to those stated: Although we are a multi-disciplinary organisation, we only provide input on each project from the particular disciplines engaged by our client and expressly stated in this document and our obligations are limited to the inputs expected from those specified disciplines. Please let us know if you would like to engage additional services or disciplines for your project.

Should anyone wish to discuss the content of this report with Kirk Roberts Consulting Engineers Ltd, they are welcome to contact us on 03 379 8600 and www.kirkroberts.co.nz.

Yours faithfully,

Author



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Geotechnical Team Leader - Queenstown

Reviewed and Approved for issue



Jordan Walker
BSc, CMEngNZ, CPEng, IntPE(NZ)
Principal Geotechnical Engineer

Attachments:

Attachment 1: Site Location Plan	(1 page)
Attachment 2: Proposed Development Plans	(1 page)

Attachment 1 : Site Location Plan



Attachment 2 : Proposed Development Plans





- Legend**
- Ponds and waterways
 - Historic water race and 7m setback to edges
 - Primary Rooding network
 - Pedestrian / Cycle amenity network
 - Secondar and tertiary rooding network
 - Outstanding Natural Landscape (ONL) boundary
 - Site boundary
 - Escarpment edge and 30m setback
 - Native dry shrubland management
 - natural landscape planting areas
 - Existing rocky outcrops with tussock planting
- Ridgeburn Entrance
 - Retail and hospitality commercial hub
 - Affordable living units
 - Existing farm buildings
 - Lookout
 - Water race
 - Community node + playground
 - Development edge rural landscape buffer
 - Development edge Morven Ferry Road landscape buffer
 - Development edge 30 escarpment buffer
 - Connection to twin rivers trail
 - Wetlands and stormwater management areas
 - Wastewater disposal area
 - Native dry shrubland areas of ecological restoration
 - Relocated farm shed / community node

RIDGEBURN

ARROWTOWN JUNCTION

Ridgeburn - Arrowtown Junction

at 122 Morven Ferry Road for Ridgeburn Ltd

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AC28_Site Masterplan_Lots off.pln

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Scale @ A1: Not to Scale **NOT FOR CONSTRUCTION**

Master Plan

Drawing:

GIBBONS | CO NOVAK+MIDDLETON

Site Master Plan

Drawing number / Revision:

PD102/



- Legend**
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RIDGEBURN

ARROWTOWN JUNCTION

Lot Legend

Lot Type - Affordable	#
Type 1 - 1 Storey / 1 Bedroom / Car Pad	54
Type 2 - 1 Storey / 2 Bedroom / Garage	46
Type 3 - 2 Storey / 3 Bedroom / Garage	12
Type 4 - 2 Storey / Dual-Key / Car Park	52
Type 5 - 2 Storey / 2 Bedroom / Car Park	16
TOTAL - 180	

Lot Type - House / Land	#
Lot 100m ²	12
Lot 300m ²	521
Lot 350m ²	250
Lot 400m ²	190
Lot 450m ²	83
Lot 1000+m ²	6
TOTAL - 1062	

Ridgeburn - Arrowtown Junction

at 122 Morven Ferry Road for Ridgeburn Ltd



Kirk Roberts Consulting

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