

Our ref: 4793-L1-Rev1  
2 December 2019



John Moran c/o Dezignteam  
By email: johnhanrahan76@gmail.com

**Attention: John Hanrahan**

Dear John,

## **ALTERATIONS & ADDITIONS, LOT 774 DIGGINGS TERRACE, THREDBO NSW GEOTECHNICAL ASSESSMENT - FORM 4**

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### **1. INTRODUCTION**

Further to your approval to proceed on 10 January 2018, a Principal Geotechnical Engineer (Mark Green) inspected the site on behalf of Asset Geotechnical Engineering P/L (Asset) on 25 January 2018.

The proposed alterations and additions are understood to include extensive alterations and additions to the existing property. This includes new balconies and additional floor space, a deck extension, car port and external steel staircase to the west, a new basement level floor and associated retaining structures up to 1.5m height. Additional foundations will also be required.

We refer to Dezignteam drawings dated 12 November 2019: -

- DA001 – Site Plan
- DA002 - Basement Floor Plan
- DA003 – Level 1 Floor Plan
- DA004 – Level 2 Floor Plan
- DA005 – Level 3 Floor Plan
- DA010 – Elevations
- DA011 – Sections

Structural Details by G. Janssen, sheets 1 to 4, dated September 2019 were also referred to.

The site inspection consisted of a site walkover to assess the surface and subsurface geological conditions and potential for slope instability.

This letter must be read in conjunction with the attached “Important Information about your Geotechnical Report”. Particular attention is drawn to the limitations inherent in site investigations and the importance of verifying the subsurface conditions inferred herein.

## 2. SITE INSPECTION

The site was inspected on 25 January 2018. The proposed extension site sits to the west of the existing structure adjacent to a surface water channel. The site slopes approximately 30° to the north but increases to around 45° adjacent to the road.

The site is thinly grassed with many granite corestone outcrops. Completely decomposed granite (silty sand colluvium) forms the matrix between the corestones. Rockhead is anticipated within about 1m depth. There was no evidence of any slope instability in the immediate vicinity of the site. The asphalt surface to Diggings Terrace is heavily crazed, presumably from frost damage.

Below the existing building the exposed surface is formed of very dry, loose, silty soil. The former trees have died back. Closer to the road under the main building a shallow gabion wall can be seen supporting the road edge. The remainder of the slope is as outside.

There was no evidence of shallow groundwater or surface water channels.

## 3. CONCLUSIONS & RECOMMENDATIONS

The shallow granite rock is suitable for founding the proposed alterations and additions. Some cut into the slope is proposed up to 1.5m requiring retaining structures for permanent support, unless site inspection by a Geotechnical Engineer shows rock cuts are adequately stable. Due to the limited access these retaining structures are anticipated to be gabion basket structures or cemented granite block wall. These must be founded on the underlying rockhead on strip footings and must be engineer-designed including free-draining backfill and appropriate subsoil drainage. Temporary battering will be required during construction, formed no steeper than 1H:1V. Steeper slopes may be possible in highly or less weathered granite, depending on the condition of the rock and degree of weathering. Construction of batter slopes must take into consideration existing services, road and footings that may be present within the ground upslope of the proposed wall, that could be affected by the temporary excavation.

The proposed shallow piers are a suitable foundation option in a similar fashion to the existing foundations. The patchy surface colluvium is suitable for a minimum allowable bearing capacity of 100kPa, but it is recommended that all footings go to rock to avoid any differential settlement issues and to key in the structure against any landslide issues (surcharging of the colluvium is to be avoided). Particularly on the western elevation, note must be taken of overland flows. The adjacent surface water channel drain services a relatively large catchment and has the potential to overflow and cause scour to the loose surface soils and hence footings on that side *must* be keyed minimum 150mm into the underlying weathered rock.

The highly weathered granite rock is allocated an allowable bearing capacity of at least 300kPa.

The suitably completed Form 4 – Minimal Impact Certification - is attached.

## 4. LIMITATIONS

In addition to the limitations inherent in site investigations (refer to the attached Information Sheets), it must be pointed out that the recommendations in this report are based on assessed subsurface conditions from limited investigations and observations – no invasive investigation has been undertaken. Where subsurface conditions encountered during construction are different to that described in this report, additional

geotechnical advice must be sought. Drilling of boreholes or other subsurface investigation could be carried out before construction to reduce the uncertainty regarding subsurface conditions at the site.

This report may have included geotechnical recommendations for design and construction of temporary works (e.g. temporary batter slopes or temporary shoring of excavations). Such temporary works are expected to perform adequately for a relatively short period of time only, which could range from a few days (for temporary batter slopes) up to six months (for temporary shoring). This time period depends on a range of factors including but not limited to: site geology; groundwater conditions; weather conditions; design criteria; and level of care taken during construction. If there are factors which prevent temporary works from being completed and/or which require temporary works to function for periods longer than originally designed, further advice must be sought from the Geotechnical Engineer and Structural Engineer.

The attached document "Important Information about your Geotechnical Report" provides additional information about the uses and limitations of this report.

Please do not hesitate to contact the undersigned if you have any questions regarding this report or if you require further assistance.

For and on behalf of

**Asset Geotechnical Engineering Pty Ltd**

A handwritten signature in black ink, appearing to read "M Green".

**Mark Green**

BSc (Hons) MIEAus CPEng NER CGeol FGS APEC IntPE(Aus)  
Principal Geotechnical Engineer

*Encl: Form 4 – Minimal Impact Certification  
Important Information about your Geotechnical Report  
Explanation Sheets and Field Investigation Results*

## DOCUMENT CONTROL

### Distribution Register

Copy	Media	Recipient	Location
1	Secure PDF	John Moran	c/o Dezignteam Architects
2	Secure PDF	Mark Bartel	Asset Geotechnical Engineering

### Document Status

Rev	Revision Details	Author	Reviewer		Approved for Issue		
			Name	Initials	Name	Initials	Date
0	Initial issue	M. Green	M. Green	MAG	M. Bartel	MAB	30 January 2018
1	Updated drawing references and minor text update.	M. Green	M. Green	<i>MAG</i>	M. Green	<i>MAG</i>	2 December 2019

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# Geotechnical Policy – Kosciuszko Alpine Resorts Form 4 – Minimal Impact Certification

Date received: \_\_\_\_/\_\_\_\_/\_\_\_\_

DA no: \_\_\_\_\_

This form may be used where minor construction works which present minimal or no geotechnical impact on the site or related land are proposed to be erected within the “G” line area of the geotechnical maps. A geotechnical engineer or engineering geologist must inspect the site and/or review the proposed development documentation to determine if the proposed development requires a geotechnical report to be prepared to accompany the development application. Where the geotechnical engineer determines that such a report is not required then they must complete this form and attach design recommendations where required. A copy of form 4 with design recommendation, if required, must be submitted with the development application.

**Please contact the Alpine Resorts Assessments Team in Jindabyne for further information.**  
Phone 02 6456 1733.

To complete this form, please place a cross in the boxes  and fill out the white sections.

## 1. Declaration made by geotechnical engineer or engineering geologist in relation to a nil or minimal geotechnical impact assessment and site classification

I,

Mr  Ms  Mrs  Dr  Other

Mark

Family name  
 Green

OF

Company/organisation

Asset Geotechnical Engineering P/L

certify that I am a geotechnical engineer /engineering geologist as defined by the “Policy” and I have inspected the site and reviewed the proposed development known as

Lot 774, 5 Diggings Terrace, Thredbo

As a result of my site inspection and review of the following documentation

(List of documentation reviewed)

Peter W Burns - Job 4987- sheet 01/01 rev A -Contour and Detail Survey

Dezignteam Architects 12/11/19      DA001 - Site Plan; DA002 - Basement Floor Plan; DA003 - Level 1 floor plan

DA004 - Level 2 floor plan; DA005 - Level 3 - floor plan; DA010 - elevations; DA011 - Sections

G Janssen, Structural Details, Sheets 1-4, dated Sept 2019

I have determined that;

- the current load-bearing capacity of the existing building will not be exceeded or adversely impacted by the proposed development, and
- the proposed works are of such a minor nature that the requirement for geotechnical advice in the form of a geotechnical report, prepared in accordance with the "Policy", is considered unnecessary for the adequate and safe design of the structural elements to be incorporated into the new works, and
- in accordance with AS 2870.1 Residential Slabs and Footings, the site is to be classified as a type

(insert classification type)


A

- I have attached design recommendations to be incorporated in the structural design in accordance with this site classification.

I am aware that this declaration shall be used by the Department as an essential component in granting development consent for a structure to be erected within the "G" line area (as identified on the geotechnical maps) of Kosciuszko Alpine Resorts without requiring the submission of a geotechnical report in support of the development application.

#### 4. Signatures

Signature



Name

Mark Green

Chartered professional status

MIEAus CPEng NER CGeol FGS

Date

2 December 2019

#### 5. Contact details

**Alpine Resorts Assessments team**

Snowy River Avenue

PO Box 36 JINDABYNE 2627

t: 02 6456 1733

f: 02 6456 1736

e: [alpineresorts\\_assessments@dipnr.nsw.gov.au](mailto:alpineresorts_assessments@dipnr.nsw.gov.au)

## SCOPE OF SERVICES

The geotechnical report ("the report") has been prepared in accordance with the scope of services as set out in the contract, or as otherwise agreed, between the Client and Asset Geotechnical Engineering Pty Ltd ("Asset"), for the specific site investigated. The scope of work may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

The report should not be used if there have been changes to the project, without first consulting with Asset to assess if the report's recommendations are still valid. Asset does not accept responsibility for problems that occur due to project changes if they are not consulted.

## RELIANCE ON DATA

Asset has relied on data provided by the Client and other individuals and organizations, to prepare the report. Such data may include surveys, analyses, designs, maps and plans. Asset has not verified the accuracy or completeness of the data except as stated in the report. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations ("conclusions") are based in whole or part on the data, Asset will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Asset.

## GEOTECHNICAL ENGINEERING

Geotechnical engineering is based extensively on judgment and opinion. It is far less exact than other engineering disciplines. Geotechnical engineering reports are prepared for a specific client, for a specific project and to meet specific needs, and may not be adequate for other clients or other purposes (e.g. a report prepared for a consulting civil engineer may not be adequate for a construction contractor). The report should not be used for other than its intended purpose without seeking additional geotechnical advice. Also, unless further geotechnical advice is obtained, the report cannot be used where the nature and/or details of the proposed development are changed.

## LIMITATIONS OF SITE INVESTIGATION

The investigation program undertaken is a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions. The data derived from the site investigation program and subsequent laboratory testing are extrapolated across the site to form an inferred geological model, and an engineering opinion is rendered about overall subsurface conditions and their likely behavior with regard to the proposed development. Despite investigation, the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies.

The engineering logs are the subjective interpretation of subsurface conditions at a particular location and time, made by trained personnel. The actual interface between materials may be more gradual or abrupt than a report indicates.

Therefore, the recommendations in the report can only be regarded as preliminary. Asset should be retained during the project implementation to assess if the report's recommendations are valid and whether or not changes should be considered as the project proceeds.

## SUBSURFACE CONDITIONS ARE TIME DEPENDENT

Subsurface conditions can be modified by changing natural forces or man-made influences. The report is based on conditions that existed at the time of subsurface exploration. Construction operations adjacent to the site, and natural events such as floods, or ground water fluctuations,

may also affect subsurface conditions, and thus the continuing adequacy of a geotechnical report. Asset should be kept apprised of any such events, and should be consulted to determine if any additional tests are necessary.

## VERIFICATION OF SITE CONDITIONS

Where ground conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities, it is a condition of the report that Asset be notified of any variations and be provided with an opportunity to review the recommendations of this report. Recognition of change of soil and rock conditions requires experience and it is recommended that a suitably experienced geotechnical engineer be engaged to visit the site with sufficient frequency to detect if conditions have changed significantly.

## REPRODUCTION OF REPORTS

This report is the subject of copyright and shall not be reproduced either totally or in part without the express permission of this Company. Where information from the accompanying report is to be included in contract documents or engineering specification for the project, the entire report should be included in order to minimize the likelihood of misinterpretation from logs.

## REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the Client and no other party. Asset assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of Asset or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own inquiries and obtain independent advice in relation to such matters.

## DATA MUST NOT BE SEPARATED FROM THE REPORT

The report as a whole presents the site assessment, and must not be copied in part or altered in any way.

Logs, figures, drawings, test results etc. included in our reports are developed by professionals based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These data should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

## PARTIAL USE OF REPORT

Where the recommendations of the report are only partially followed, there may be significant implications for the project and could lead to problems. Consult Asset if you are not intending to follow all of the report recommendations, to assess what the implications could be. Asset does not accept responsibility for problems that develop where the report recommendations have only been partially followed if they have not been consulted.

## OTHER LIMITATIONS

Asset will not be liable to update or revise the report to take into account any events or emergent circumstances or fact occurring or becoming apparent after the date of the report.

## LOG ABBREVIATIONS AND NOTES

### METHOD

#### borehole logs

AS	auger screw *
AD	auger drill *
RR	roller / tricone
W	washbore
CT	cable tool
HA	hand auger
D	diatube
B	blade / blank bit
V	V-bit
T	TC-bit
* bit shown by suffix e.g. ADV	

#### excavation logs

NE	natural excavation
HE	hand excavation
BH	backhoe bucket
EX	excavator bucket
DZ	dozer blade
R	ripper tooth

### coring

NMLC, NQ, PQ, HQ

### SUPPORT

#### borehole logs

N	nil
M	mud
C	casing
NQ	NQ rods

#### excavation logs

N	nil
S	shoring
B	benched

### CORE—LIFT

	casing installed
⊢	barrel withdrawn

### NOTES, SAMPLES, TESTS

D	disturbed
B	bulk disturbed
U50	thin-walled sample, 50mm diameter
HP	hand penetrometer (kPa)
SV	shear vane test (kPa)
DCP	dynamic cone penetrometer (blows per 100mm penetration)
SPT	standard penetration test
N*	SPT value (blows per 300mm)
* denotes sample taken	
Nc	SPT with solid cone
R	refusal of DCP or SPT

### USCS SYMBOLS

GW	Gravel and gravel-sand mixtures, little or no fines.
GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels
GM	Gravel-silt mixtures and gravel-sand-silt mixtures.
GC	Gravel-clay mixtures and gravel-sand-clay mixtures.
SW	Sand and gravel-sand mixtures, little or no fines.
SP	Sand and gravel sand mixtures, little or no fines.
SM	Sand-silt mixtures.
SC	Sand-clay mixtures.
ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity.
CL, CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays.
OL	Organic silts
MH	Inorganic silts
CH	Inorganic clays of high plasticity.
OH	Organic clays of medium to high plasticity, organic silt
PT	Peat, highly organic soils.

### MOISTURE CONDITION

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

### CONSISTENCY

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable

### DENSITY INDEX

VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

## GRAPHIC LOG

### Soil

	Fill
	Peat, Topsoil
	Clay
	Silty Clay
	Gravelly Clay
	Sandy Clay
	Silt
	Sandy Silt
	Clayey Silt
	Gravelly Silt
	Gravel
	Sandy Gravel
	Clayey Gravel
	Silty Gravel
	Sand
	Gravelly Sandy
	Silty Sand
	Clayey Sand

### Rock

	Sandstone
	Shale
	Clayey Shale
	Siltstone
	Conglomerate
	Claystone
	Dolerite, Basalt
	Granite
	Limestone
	Tuff
	Porphyry
	Pegmatite
	Gneiss, Schist
	Quartzite
	Coal

### Other

	Asphalt
	Concrete
	Brick

### Water

	Level
	Inflow
	Outflow (complete)
	Outflow (partial)

### Boundaries

	Known
	Probable
	Possible

### WEATHERING

XW	extremely weathered
HW	highly weathered
MW	moderately weathered
SW	slightly weathered
FR	fresh

### STRENGTH

VL	very low
L	low
M	medium
H	high
VH	very high
EH	extremely high

### RQD (%)

$$= \frac{\text{sum of intact core pieces} > 2 \times \text{diameter}}{\text{total length of core run drilled}} \times 100$$

### DEFECTS:

#### type

JT	joint
PT	parting
SZ	shear zone
SM	seam

#### coating

cl	clean
st	stained
ve	veneer
co	coating

#### shape

pl	planar
cu	curved
un	undulating
st	stepped
ir	irregular

#### roughness

po	polished
sl	slickensided
sm	smooth
ro	rough
vr	very rough

### inclination

measured above axis and perpendicular to core



## AS1726-2017

Soils and rock are described in the following terms, which are broadly in accordance with AS1726-2017.

## SOIL

### MOISTURE CONDITION

Term	Description
Dry	Looks and feels dry. Fine grained and cemented soils are hard, friable or powdery. Uncemented coarse grained soils run freely through hand.
Moist	Soil feels cool and darkened in colour. Fine grained soils can be moulded. Coarse soils tend to cohere.
Wet	As for moist, but with free water forming on hand.

Moisture content of cohesive soils may also be described in relation to plastic limit ( $W_p$ ) or liquid limit ( $W_L$ ) [ $\gg$  much greater than,  $>$  greater than,  $<$  less than,  $\ll$  much less than].

### CONSISTENCY OF FINE GRAINED SOILS

Term	Su (kPa)	Term	Su (kPa)
Very soft	< 12	Very Stiff	>100 – ≤200
Soft	>12 – ≤25	Hard	> 200
Firm	>25 – ≤50	Friable	-
Stiff	>50 – ≤100		

### RELATIVE DENSITY OF COURSE GRAINED SOILS

Term	Density Index (%)	Term	Density Index (%)
Very Loose	< 15	Dense	65 – 85
Loose	15 – 35	Very Dense	>85
Medium Dense	35 – 65		

### PARTICLE SIZE

Name	Subdivision	Size (mm)
Boulders		> 200
Cobbles		63 – 200
Gravel	coarse	19 – 63
	medium	6.7 – 19
	fine	2.36 – 6.7
Sand	coarse	0.6 – 2.36
	medium	0.21 – 0.6
	fine	0.075 – 0.21
Silt & Clay		< 0.075

### MINOR COMPONENTS

Term	Proportion by Mass:	
	coarse grained	fine grained
Trace	≤ 15%	≤ 5%
With	>15% – ≤30%	>5% – ≤12%

### SOIL ZONING

Layers	Continuous across exposures or sample.
Lenses	Discontinuous, lenticular shaped zones.
Pockets	Irregular shape zones of different material.

### SOIL CEMENTING

Weakly	Easily broken up by hand pressure in water or air.
Moderately	Effort is required to break up by hand in water or in air.

### USCS SYMBOLS

Symbol	Description
GW	Gravel and gravel-sand mixtures, little or no fines.
GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels.
GM	Gravel-silt mixtures and gravel-sand-silt mixtures.
GC	Gravel-clay mixtures and gravel-sand-clay mixtures.
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ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity.
CL, CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays.
OL	Organic silts
MH	Inorganic silts
CH	Inorganic clays of high plasticity.
OH	Organic clays of medium to high plasticity, organic silt
PT	Peat, highly organic soils.

## ROCK

### SEDIMENTARY ROCK TYPE DEFINITIONS

Rock Type	Definition (more than 50% of rock consists of .....
Conglomerate	... gravel sized (>2mm) fragments.
Sandstone	... sand sized (0.06 to 2mm) grains.
Siltstone	... silt sized (<0.06mm) particles, rock is not laminated.
Claystone	... clay, rock is not laminated.
Shale	... silt or clay sized particles, rock is laminated.

### LAYERING

Term	Description
Massive	No layering apparent.
Poorly Developed	Layering just visible. Little effect on properties.
Well Developed	Layering distinct. Rock breaks more easily parallel to layering.

### STRUCTURE

Term	Spacing (mm)	Term	Spacing
Thinly laminated	<6	Medium bedded	200 – 600
Laminated	6 – 20	Thickly bedded	600 – 2,000
Very thinly bedded	20 – 60	Very thickly bedded	> 2,000
Thinly bedded	60 – 200		

### STRENGTH (NOTE: Is50 = Point Load Strength Index)

Term	Is50 (MPa)	Term	Is50 (MPa)
Extremely Low	<0.03	High	1.0 – 3.0
Very low	0.03 – 0.1	Very High	3.0 – 10.0
Low	0.1 – 0.3	Extremely High	>10.0
Medium	0.3 – 1.0		

### WEATHERING

Term	Description
Residual Soil	Material is weathered to an extent that it has soil properties. Rock structures are no longer visible, but the soil has not been significantly transported.
Extremely .....	Material is weathered to the extent that it has soil properties. Mass structures, material texture & fabric of original rock is still visible.
Highly .....	Rock strength is significantly changed by weathering; rock is discolored, usually by iron staining or bleaching. Some primary minerals have weathered to clay minerals.
Moderately .....	Rock strength shows little or no change of strength from fresh rock; rock may be discolored.
Slightly .....	Rock is partially discolored but shows little or no change of strength from fresh rock.
Fresh	Rock shows no signs of decomposition or staining.

### DEFECT DESCRIPTION

Type	Description
Joint	A surface or crack across which the rock has little or no tensile strength. May be open or closed.
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub-parallel to layering/bedding. May be open or closed.
Sheared Zone	Zone of rock substance with roughly parallel, near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects.
Seam	Seam with deposited soil (infill), extremely weathered insitu rock (XW), or disoriented usually angular fragments of the host rock (crushed).

### Shape

Planar	Consistent orientation.
Curved	Gradual change in orientation.
Undulating	Wavy surface.
Stepped	One or more well defined steps.
Irregular	Many sharp changes in orientation.

### Roughness

Polished	Shiny smooth surface.
Slickensided	Grooved or striated surface, usually polished.
Smooth	Smooth to touch. Few or no surface irregularities.
Rough	Many small surface irregularities (amplitude generally <1mm). Feels like fine to coarse sandpaper.
Very Rough	Many large surface irregularities, amplitude generally >1mm. Feels like very coarse sandpaper.

### Coating

Clean	No visible coating or discolouring.
Stained	No visible coating but surfaces are discolored.
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Coating	Visible coating =1mm thick. Thicker soil material described as seam.