8.1.1 Zone A

Should provide stable conditions for residential development pending the usual specific geotechnical assessments undertaken for the purposes of subdivision consent and foundation design. Likely to provide ground conditions suitable for either traditional NZS3604 design or SED.

8.1.2 Zone C

Requires further and comprehensive geotechnical investigation to better delineate the Zone C boundaries. Subsequent to further investigations the geotechnical risks, in particular relating to potential instability within the Zone, will be better understood. This will lead to developing a ground model from which areas of potential development can be identified with and without engineering solutions needed to mitigate risk associated with ground conditions and natural hazards. SED is likely to be required for all dwellings within Zone C.

While further investigation is likely to identify specific areas suitable for development of building platforms, sections of the Zone C are likely to remain unsuitable for residential development.

Any areas within Zone C identified as potential building platforms must remain cognisant of the Building Act 2004, in particular Sections 71 & 72, that address building on land subject to natural hazards.

8.1.3 Zone B

Our current investigations to date indicate that sections of Zone B should provide stable conditions for residential development. However, in order to delineate these areas further detailed geotechnical assessment and study is required so that the zone can be reclassified into either Zone A or Zone C.

The spatial extent of the zones is shown on Drawing 005 as shaded areas. The zones are summarised as follows:

8.2 ZONE A

8.2.1 General

Zone A (shaded light green) includes the western and central portions of the subdivision down-slope of the landslide zone. The slopes are typically gently to moderately sloping.

Development within Zone A would likely consist of construction closely following the existing slope contour given the relatively shallow nature of schist bedrock.

8.2.2 Potential Risks

The main risks to subdivision development within the Zone A include:

- Rock fall: rock fall from loose boulders and destabilized bluffs poses a risk to the upper portions of Zone A. Rock fall can be managed via a number of methods including rock pinning, removal of loose boulders, slope planting, debris diversion structures, benches and retained walls / fences.

- Schist rock: While the proposed SED philosophy of the subdivision means that large excavations for individual residential dwellings are not anticipated, significant excavation of schist rock may be required to form access-ways and individual building platforms depending on the slope geometry. This can be costly and time consuming for both the developer and lot owners. This can be managed to a degree by adopting SED dwellings, single lane roads, passing bays, off-street parking, houses constructed on existing slope grades.
- Surface water flow paths: The overland flow paths which extend through Zone A may require diversion or development positioned to allow the progress of the surface water features.

8.3 ZONE B

Zone B (shaded yellow) includes the upper landslide areas within the central portion of the site and the eastern steep slopes below the mapped landslide zone. These areas may provide suitable subdivision development areas for residential purposes with appropriate SED foundation and structural design, slope stabilization solutions, constraints on site earthworks and controls on development pending further geotechnical analysis.

8.4 ZONE C

Zone C (shaded light blue) includes the steep slopes located along the toe of the landslide. The slopes are heavily disturbed with a number of 'geologically' recent tension cracks were observed within these slopes. Given the scale of the slope movement and slope steepness, it is likely that development within Zone C will be cost prohibitive considering the likely engineered solutions required to adequately stabilise the slopes. However, pending further investigation, parts of Zone C may provide specific building platforms suitable for SED dwellings provided Sections 71 & 72 of the Building Act 2004 are appropriately addressed and satisfied.

Forestation has been demonstrated to have a positive impact on shallow slope stability within superficial soils and can provide protection against soil erosion and debris flow. However recent studies and experience from Christchurch has shown that trees are not as successful in mitigating slope stability issues and are also prone to fire and disease, which effectively removes them from the equation.

Zone C is currently being cleared of its remnant forestry cover. Therefore, consideration should be given to the impact this may have on site and whether planting of more appropriate species has merit.

9 FUTURE WORKS

We understand that if the development progresses, this will be undertaken in a staged process beginning within the lower southern portion of the site and migrating to the western portions. This is considered to be feasible and specific investigation of "Stage 1" should be undertaken for the purposes of subdivision consent. We can provide a program of investigations around this as required.

As discussed previously, we also recommend that survey marks are protected and continued to be monitored.

We also recommend that the testing data of the borehole core be reviewed when complete.

10 LIMITATIONS

10.1 GENERAL

Ground Consulting Ltd has undertaken this assessment in accordance with the brief as provided, based on the site and location as shown on Drawing 003. This report has been provided for the benefit of our client, and for the authoritative council to rely on for the purpose of processing the consent for the specific project described herein. No liability is accepted by this firm or any of its directors, servants or agents, in respect of its use by any other person, and any other person who relies upon information contained herein does so entirely at their own risk.

The sub-surface conditions have been extrapolated between the investigations undertaken. Whilst care has been taken to provide sufficient sub-surface information following best practice, no guarantee can be given on the validity of the inference made and it must be appreciated that actual conditions could vary from the assumed model.

10.2 FURTHER INVESTIGATIONS REQUIRED

This assessment has been undertaken for the proposed site development to date. Any structural changes, alterations and additions made to the proposed development should be checked by a suitably qualified person and may require further investigations and analysis.

Geotechnical inspections will be required during construction to assess site slopes, foundation excavations, retaining walls and other geotechnical aspects of the development. This is to ensure ground conditions encountered are in accordance with the findings of this assessment. If ground conditions differ from those presented in this report, advice on design and construction modifications should be sought from a suitably qualified person.

11 REFERENCES

Bell Geoconsulting Ltd (2018): Unpublished consulting report (BGL Reference 1908/01) dated 31 October 2018 for Steve Middleton.

Stossel, D L (1990): *The Engineering Geology of Frankton Arm*. Unpublished MSc Thesis, University of Canterbury.

DRAWINGS

GCL Ground Consulting Ltd

Silver Creek Ltd

Goldfield Heights, Queenstown

SITE LOCATION PLAN

Rev	Date	Status	Drafted	Reviewer
A	07/05/2019	Issued	S.W	F.W

File Ref. MAC:\Projects_4500\4726\R4726-1A\R4726-1A-DRW001.a

1:20,000

0 80 400 800m

Project No. 4726

Report Ref. R4726-1

Drawing No. 001

GCL Ground Consulting Ltd

Silver Creek Ltd

Goldfield Heights, Queenstown

Site Plan

Rev	Date	Status	Drafted	Reviewer
A	07/05/2019	Issued	S.W	F.W

File Ref. MAC:\Projects_4500\4726\R4726-1A\R4726-1A-DRW002.vsi

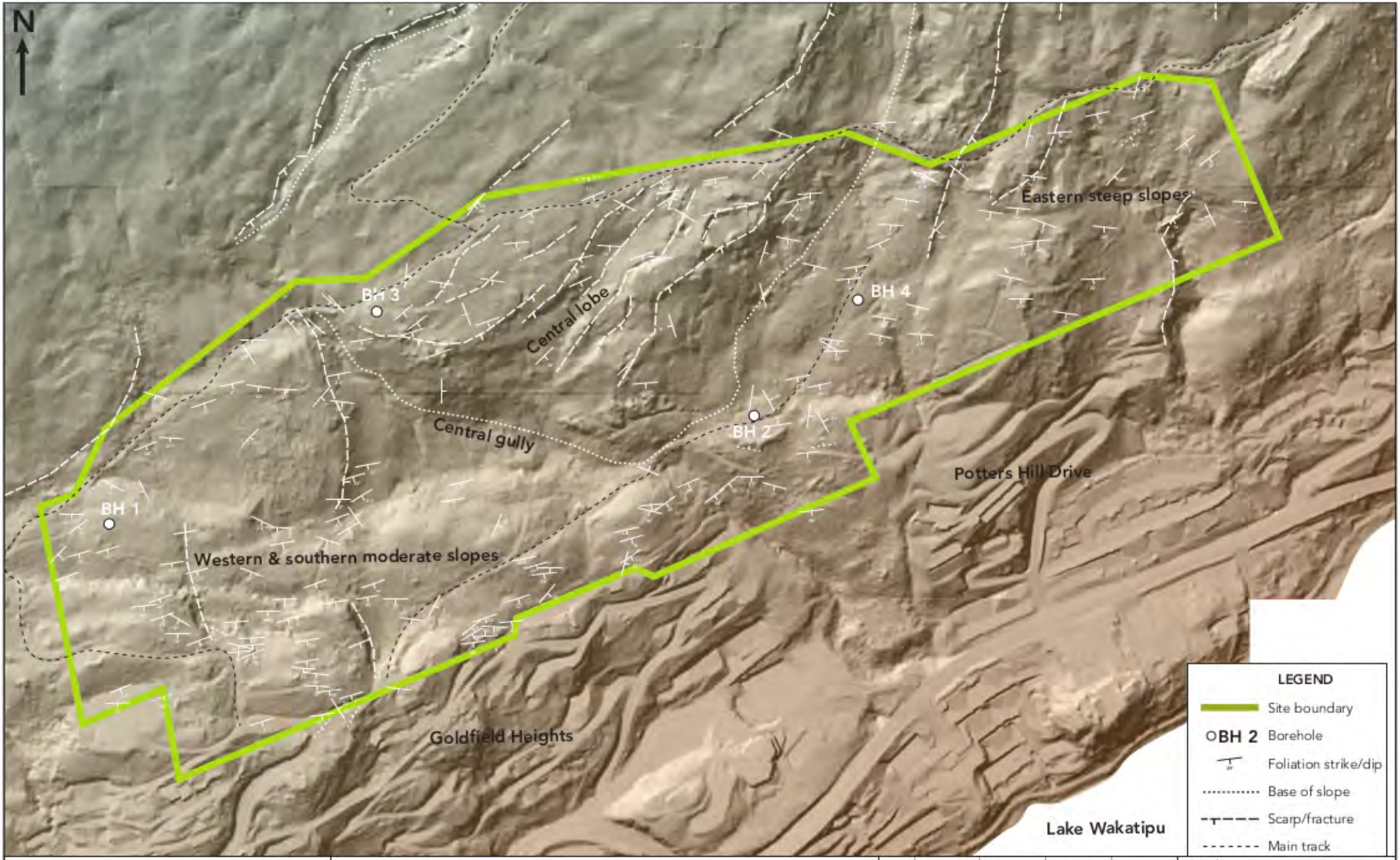
Scale (A4) 1:3000

0 85 170m

Project No. 4726

Report Ref. R4726-1

Drawing No. 002



GCL Ground Consulting Ltd

Silver Creek Ltd

Goldfield Heights, Queenstown

Site Geomorphology

Rev	Date	Status	Drafted	Reviewer
A	07/05/2019	Issued	S.W	F.W

File Ref. M:\AC\Projects\4726\R4726-1A\R4726-1A-DRW[0]

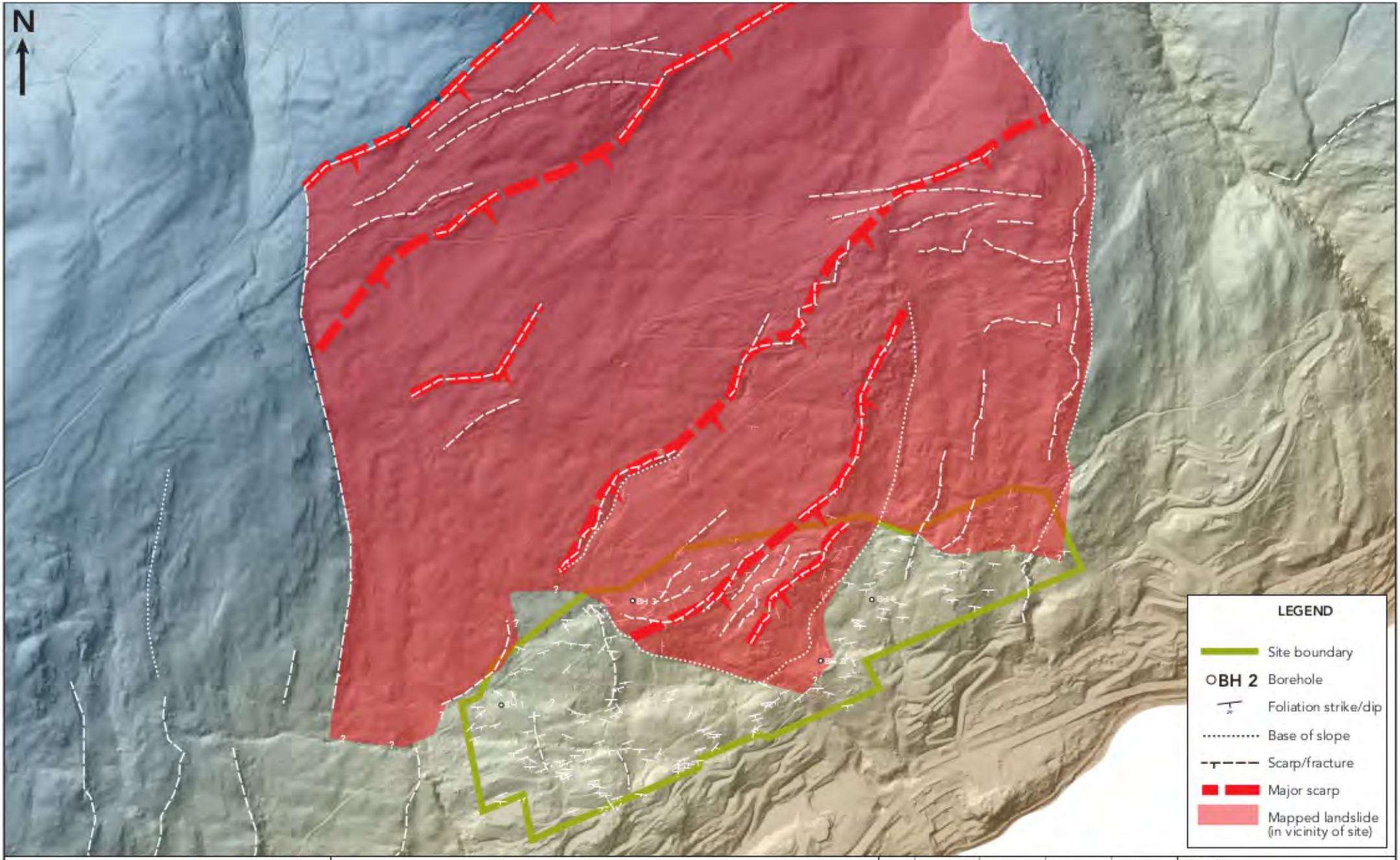
Scale (A4) 1:3000

0 85 170m

Project No. 4726

Report Ref. R4726-1

Drawing No. 003



GCL Ground Consulting Ltd

Silver Creek Ltd

Goldfield Heights, Queenstown

Interpretative Geomorphology

Rev	Date	Status	Drafted	Reviewer
A	07/05/2019	Issued	S.W	F.W

File Ref. M:\AC\Projects_4500\4726\R4726-1A\R4726-1A-DRW.dwg

Scale (A4) 1:6000

0 170 340m

Project No. 4726

Report Ref. R4726-1

Drawing No. 004

N

BH 3

BH 4

BH 2

BH 1

Central lobe

Central gully

Eastern steep slopes

Western & southern moderate slopes

Potters Hill Drive

Goldfield Heights

Lake Wakatipu

LEGEND

- Site boundary
- BH 2 Borehole
- Foliation strike/dip
- Base of slope
- Scarp/fracture
- Zone A
- Zone B
- Zone C

GCL Ground Consulting Ltd

Silver Creek Ltd

Goldfield Heights, Queenstown

Subdivision Development Zones / Suitability

Rev	Date	Status	Drafted	Reviewer
A	07/05/2019	Issued	S.W	F.W
B	15/01/2021	Issued	J.W	P.F

File Ref. 4500/4726/R4726-1B/R4726-1B-DRW005

Scale (A4) 1:3000

0 85 170m

Project No. 4726

Report Ref. R4726-1B

Drawing No. 005

APPENDIX A: INVESTIGATION LOGS

BOREHOLE LOG

HOLE NO.: BH1

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 15/04/2019

END DATE: 15/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Moderately weathered; light grey; fine fabric; foliation, gently inclined, laminated, weak; Schist. Alpha = 70.	Rotary cored	100%	25%						
Slightly weathered; light grey; weak; Fault.		0%							
Unweathered; light grey; fine fabric; foliation, gently inclined, laminated; moderately strong; Schist. Alpha = 70.		100%	53%	1.0					
Unweathered; light grey; weak; Fault.		90%							
Unweathered; light grey; , foliation, gently inclined, laminated; moderately strong; Schist. Alpha = 70.		100%	60%	2.0					
Slightly weathered; light grey; , foliation, gently inclined, laminated; moderately strong; Orange staining in places. Possible increased quartz content in places; Schist. Alpha = 70. 100mm thick foliation shears at 2.8m & 3.1m.		90%	50%						
Unweathered; light grey; , foliation, gently inclined, laminated; moderately strong; Schist. Alpha = 70.		100%	59%	3.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist; becoming more pelitic (darker) in appearance, quartz segregation more marked. Alpha = 70.				4.0					

REMARKS

HOLE DEPTH: 25m

Created: 5/29/2019 12:45:20 PM

BOREHOLE LOG

HOLE NO.: BH1

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 15/04/2019

END DATE: 15/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist, becoming more pelitic (darker) in appearance, quartz segregation more marked Alpha = 70.	Rotary cored	100%	68%						
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 70.		90%		6.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 70.		100%	58%	7.0					
Unweathered; dark grey; weak; Fault		80%		8.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 70.		100%	50%	9.0					

REMARKS

HOLE DEPTH: 25m

Created: 5/29/2019 12:45:20 PM

BOREHOLE LOG

HOLE NO.: BH1

CLIENT: Gavin Moore

PROJECT: Mooreliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 15/04/2019

END DATE: 15/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; dark grey; , foliation: gently inclined, thinly laminated; moderately strong: Schist: Alpha = 70.	Rotary cored	100%	50%	11.0					
Unweathered; dark grey; , foliation: gently inclined, thinly laminated; moderately strong: Schist: Alpha = 70.		100%		12.0					
Unweathered; dark grey; , foliation: gently inclined, thinly laminated; weak; Schist: Alpha = 70.		70%		13.0					
Unweathered; dark grey; weak; Fault: 1.6m of core loss; schist reduced to gravel; suspect fines washed out by drilling fluids. Occasional sections where foliation still visible; alpha looks consistent ~70.		40%		14.0					

REMARKS

HOLE DEPTH: 25m

Generated by GEROC Core GS

Created: 5/29/2019 12:45:20 PM

BOREHOLE LOG

HOLE NO.: BH1

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 15/04/2019

END DATE: 15/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; dark grey; weak; Fault. 1.6m of core loss, some reduced to gravel, suspect fines washed out by drilling fluids. Occasional sections where foliation still visible, alpha looks consistent ~70 :	Rotary cored	40%							
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 70.		91%		16.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 65. 10mm foliation shear at 16.9m .		100%	50%						
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 65.		100%		17.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 65.		100%	56%	18.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 70.		91%		20					

REMARKS

HOLE DEPTH: 25m

Created: 5/29/2019 12:45:20 PM

BOREHOLE LOG

HOLE NO.: BH1

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 15/04/2019

END DATE: 15/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered, dark grey; , foliation, gently inclined, thinly laminated; moderately strong. Schist. Alpha = 70.	Rotary cored	90%							
Unweathered, light grey; , foliation, gently inclined, laminated; moderately strong. Schist. More psammitic (lighter) appearance, less intense quartz banding. Alpha = 70. Drilling mis-tube, 0.4m core loss, signs of spinning core.		100%		21.0					
Unweathered, light green; , foliation, gently inclined, laminated; moderately strong. Schist. Alpha = 70.		100%	59%	22.0					
Unweathered, dark grey; , foliation, gently inclined, thinly laminated; moderately strong. Schist. Darker more pelitic appearance. Alpha = 70.		100%	50%	23.0					
				24.0					

REMARKS

HOLE DEPTH: 25m

Created: 5/29/2019 12:45:20 PM

BOREHOLE LOG

HOLE NO.: BH1

CLIENT: Gavin Moore

PROJECT: Moorelivng - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 15/04/2019

END DATE: 15/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
		25 50 75	25 50 75		3 6 9	5 10 15 20 25 30 35 40 45			

SCnt 25m

REMARKS

HOLE DEPTH: 25m

Created 5/29/2019 12:45:23 PM

BOREHOLE LOG

HOLE NO.: BH2

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 16/04/2019

END DATE: 17/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Highly weathered; light grey, very weak, Schist derived gravels with occasional cobble, assume fines washed out by drilling.	Rotary cored	60%		1.0					
Moderately weathered; light grey; , foliation, gently inclined laminated; weak; Schist, Alpha = 50 (not likely in situ).		90%	0%						
Highly weathered; light grey; very weak; Fault.		30%							
Slightly weathered; dark grey; , foliation, gently inclined laminated; weak; Schist, darker pelitic appearance, Alpha = 70.		90%							
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist, orange staining. Occasional quartz veins at 30 to core axis. Alpha = 70.		80%		2.0					
Moderately weathered; dark grey; , foliation, gently inclined, thinly laminated; weak; Fault/crush zone, Foliation still visible, alpha = 70.		50%		3.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist, Alpha = 85.		100%	3%						
Highly weathered; dark grey; weak; Fault, schist derived crushed material. Margins parallel to foliation.		30%							
Slightly weathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist, orange staining, Alpha = 85.		90%		4.0					
Highly weathered; dark grey; weak; Fault. Schist derived gravels, fines washed out by drilling.		50%							
Slightly weathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist, minor orange staining. Alpha = 55.		90%							
Moderately weathered; dark grey; weak; Fault, Schist reduced to gravel, suspect fines washed out by drilling fluids.		50%							
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist, Alpha = 45.		90%							

REMARKS

HOLE DEPTH: 26.5m

Created: 5/29/2019 12:45:20 PM

Generated by GEROC Core GS

BOREHOLE LOG

HOLE NO.: BH2

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 16/04/2019

END DATE: 17/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; dark grey; , foliation, gently inclined, thinly laminated, moderately strong. Schist. Alpha = 45.	Rotary cored	90%							
Moderately weathered; dark grey; , foliation, gently inclined, thinly laminated; weak, Schist. Crush zone, but fabric/foliation intact. Alpha = 45.		100%							
Moderately weathered; dark grey; , foliation, gently inclined, thinly laminated; weak, Schist, crushed an broken with foliation still visible in places. Alpha = 80. Silt filled joint perpendicular to foliation.		80%		6.0					
Moderately weathered; dark grey; , foliation, gently inclined, thinly laminated; very weak; Schist, crushed in places but generally intact Two 30mm faults parallel to foliation. Alpha = 85.		91%							
Highly weathered; dark grey; very weak, Fault. Schist derived fragments.		50%		7.0					
Unweathered; dark grey; , foliation, gently inclined, laminated moderately strong. Schist. 5mm quartz vein perpendicular to foliation. Alpha = 70.		97%							
Moderately weathered; dark green; , foliation, gently inclined, thinly laminated; weak, Schist crush/fault zone. Foliation intact in places; zones of fault gouge or gravels in others. Alpha = 70.		70%		8.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated, moderately strong. Schist. Darker more pelitic appearance. Alpha = 70.		91%		9.0					

REMARKS

HOLE DEPTH: 26.5m

Created: 5/29/2019 12:45:20 PM

Generated by GEROC Core GS

BOREHOLE LOG

HOLE NO.: BH2

CLIENT: Gavin Moore

PROJECT: Mooreliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 16/04/2019

END DATE: 17/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; dark grey; , foliation, gently inclined, finely laminated; moderately strong. Schist. Dominmore pelitic assemblance. Alpha = 70	Rotary cored	90%							
Highly weathered; dark grey; very weak; Fault, Schist reduced to gravel, fines washed out by drilling.		40%		11.0					
Highly weathered; dark grey; very weak; Fault. Gouge, May have been compacted during drilling.		40%							
Highly weathered; dark grey; very weak; Fault. Fines washed out of schist derived gravels.				12.0					
Highly weathered; dark brown; extremely weak; Fault. Gravelly gouge.		80%							
Highly weathered; dark grey; very weak; Fault, some fines washed out.				13.0					
Completely weathered; dark grey; extremely weak; Fault gouge.		80%		14.0					
Highly weathered; dark grey; very weak; Fault, Sandy gravels and occasional cobbles. Occasional intact schist. alpha = 45		40%							

REMARKS

HOLE DEPTH: 26.5m

Created: 5/29/2019 12:45:21 PM

BOREHOLE LOG

HOLE NO.: BH2

CLIENT: Gavin Moore

PROJECT: Mooreliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 16/04/2019

END DATE: 17/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Highly weathered; dark grey; very weak; Fault. Sandy gravels and occasional cobbles. Occasional intact schist. alpha = 45	Rotary cored	40%		16.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 80.		70%							
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 80.		90%	3						
Highly weathered; dark grey; weak; Fault. Schist derived gravel.				11.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 80.		90%	3						
Moderately weathered; dark grey; , foliation, gently inclined, thinly laminated; weak; Fault. Intact schist with zones of gravel, cobbles in places. Alpha = 60.		93%		12.0					
				18.0					
Moderately weathered; dark grey; , foliation, gently inclined, thinly laminated; weak; Schist. Crush zone; foliation intact. Alpha = 60		80%							
Highly weathered; dark grey; weak; Fault. Schist derived gravels.		35%							
Unweathered; dark grey; , foliation, gently inclined, thinly		90%							

REMARKS

HOLE DEPTH: 26.5m

Created: 5/29/2019 12:45:21 PM

BOREHOLE LOG

HOLE NO.: BH2

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 16/04/2019

END DATE: 17/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
laminated; moderately strong; Schist. Alpha = 80	Rotary cored	95%							
Moderately weathered; dark grey; , foliation, gently inclined, thinly laminated; weak; Fault. Schist derived gravel (fines washed out), with intact schist in places. Alpha =60.		50%		21.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Quartz veins perpendicular to foliation, orange staining in places. Alpha = 65.		100%							
Unweathered; light grey; , foliation, gently inclined, laminated; moderately strong; Schist, more psammitic appearance Alpha = 65.		100%	30%	22.0					
Highly weathered; light grey; , foliation, gently inclined, laminated; very weak; Fault. Schist derived gravel with some gouge. Intact schist in places.		56%							
Unweathered; light grey; , foliation, gently inclined, laminated; moderately strong; Schist. Alpha = 65.		91%		23.0					
Moderately weathered; light grey; , foliation, gently inclined, laminated; weak; Fault. Gravels with intact schist in places.		53%		24.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist, phyllic appearance Alpha = 70.		140%	30%						

REMARKS

HOLE DEPTH: 26.5m

Created: 5/29/2019 12:45:21 PM

BOREHOLE LOG

HOLE NO.: BH2

CLIENT: Gavin Moore

PROJECT: Mooreliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 16/04/2019

END DATE: 17/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; light grey; , foliation, gently inclined, laminated, Schist. Core damaged in places. At least one fault in the interval.	Rotary cored	95%		26.0					
EOH: 26.5m.									

REMARKS

HOLE DEPTH: 26.5m

Created: 5/29/2019 12:45:21 PM

Generated by GEROC Core GS

BOREHOLE LOG

HOLE NO.: BH3

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 18/04/2019

END DATE: 29/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Moderately weathered; light brown; , foliation, gently inclined laminated; weak; Schist. Orange staining. Core quite diskd. Two small faults with fine gravel infill parallel to foliation.	Rotary cored	80%							
Slightly weathered; light grey; , foliation gently inclined; laminated; moderately strong; Schist. Occasional orange staining. Occasional voids in quartz veins (chlorite dissolution?). Alpha = 65.		100%	93%	1.0					
Highly weathered; dark grey; , foliation, gently inclined, thinly laminated; very weak; Fault. Darker more pelitic looking schist derived gravels and sands. Schist intact in places. Alpha = 65.		82%		2.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Occasional voids in quartz veins. Alpha = 70.		100%	86%	3.0					
Unweathered; dark grey; , foliation; gently inclined, thinly laminated; moderately strong; Schist, darker pelitic appearance. Increased chlorite content in quartz veins? Alpha = 70.		90%		4.0					
Unweathered; light grey; , foliation, gently inclined; laminated, moderately strong; Schist. Occasional quartz veins at 30 to core axis. Alpha = 70.		100%	80%						

REMARKS

HOLE DEPTH: 24.5m

Created: 5/29/2019 12:45:21 PM

BOREHOLE LOG

HOLE NO.: BH3

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 18/04/2019

END DATE: 29/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; light grey; , foliation, gently inclined, laminated; moderately strong; Schist. Occasional quartz veins at 30 to core axis. Alpha = 70.	Rotary cored	100%	80%						
Highly weathered, light grey; very weak; Fault. Schist derived gravels, suspect fines washed out during drilling.									
Unweathered; light grey; , foliation, gently inclined, laminated; moderately strong; Schist. Alpha = 65.		100%	70%	6.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. More pelitic dark material. Alpha = 65.		90%	80%	7.0					
Unweathered, light grey; , foliation, gently inclined, laminated; moderately strong; Schist. psammitic appearance. Alpha = 60.		90%	50%						
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Darker pelitic material, orange staining in places, foliation variable in places. Alpha = 65.		60%		8.0					
Unweathered; light grey; , foliation, gently inclined, laminated; moderately strong; Schist. Alpha = 60.		100%	60%						
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 65.		90%	70%	9.0					
Unweathered; light grey; , foliation, gently inclined, laminated; moderately strong; Schist. Alpha = 65.		100%	70%						

REMARKS

HOLE DEPTH: 24.5m

Created: 5/29/2019 12:45:21 PM

BOREHOLE LOG

HOLE NO.: BH3

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 18/04/2019

END DATE: 29/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; light grey; ; foliation, gently inclined, laminated; moderately strong; Schist. Alpha = 65.	Rotary cored	100%	70%	11.0					
Moderately weathered; dark grey; ; foliation, gently inclined, thinly laminated; weak; Schist. Alpha = 70.		95%							
Moderately weathered; light grey; ; foliation, gently inclined, laminated; weak; Schist. Alpha = 70.		100%	88%	12.0					
Moderately weathered; light grey; ; foliation, gently inclined, laminated; very weak; Schist. Core broken for no apparent reason. Alpha = 70.		90%							
Unweathered; light grey; moderately strong; Schist. Alpha = 75.		100%	84%	13.0					
Unweathered; dark grey; ; foliation, gently inclined, laminated; moderately strong; Schist. Orange staining in places. Alpha = 70.		100%	80%						
Unweathered; light grey; ; foliation, gently inclined, laminated; moderately strong; Schist. Alpha = 70.		100%	80%						
Unweathered; dark grey; ; foliation, gently inclined, thinly laminated; moderately strong; Schist. Darker more pelitic appearance, color distinction becoming more subtle. Alpha = 70.		92%	36%	14.0					
Unweathered; light grey; ; foliation, gently inclined, laminated; moderately strong; Schist. Alpha = 70.		100%	70%						

REMARKS

HOLE DEPTH: 24.5m

Created: 5/29/2019 12:45:21 PM

BOREHOLE LOG

HOLE NO.: BH3

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 18/04/2019

END DATE: 29/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; light grey; , foliation, gently inclined, laminated, moderately strong; Schist. Alpha = 70.	Rotary cored	100%	70%						
Unweathered; dark grey; , foliation, gently inclined, thinly laminated, moderately strong; Schist. Minor orange staining. Alpha = 65.		100%	70%						
Highly weathered; dark grey; very weak; Fault. Schist derived gravel and coarse sand.		100%							
Unweathered; dark brown; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha 65.		90%	30%	10.0					
Highly weathered; dark grey; very weak; Fault. gravelly clayey silt.		90%							
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 65.		90%	30%	11.0					
Highly weathered; dark grey; very weak; Fault. Gravels and sands with inlaid schist common. alpha = 45.		70%		12.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist. Alpha = 65.		90%		18.0					

REMARKS

HOLE DEPTH: 24.5m

Created: 5/29/2019 12:45:21 PM

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BOREHOLE LOG

HOLE NO.: BH3

CLIENT: Gavin Moore

JOB NO.: R4726

PROJECT: Moorelliving - Subdivision Feasibility

SITE LOCATION: Middleton Block

START DATE: 18/04/2019

CO-ORDINATES: 0mE, 0mN ()

END DATE: 29/04/2019

DATUM: Ground

RIG:

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; dark grey; , foliation: gently inclined, thinly laminated; moderately strong; Schist. Alpha = 85.	Rotary cored	90%		21.0					
Highly weathered; dark grey; very weak; Fault. Schist derived gravel.		83%							
Unweathered; dark grey; , foliation: gently inclined, thinly laminated; moderately strong; Schist. Occasional voids in quartz veins. Alpha = 80.		100%	90%	22.0					
Unweathered; dark grey; , foliation: gently inclined, thinly laminated; moderately strong; Schist. Alpha = 80.		90%		23.0					
Moderately weathered; dark grey; , foliation: gently inclined, thinly laminated; weak; Schist. Alpha = 80.		100%	70%	24.0					
Highly weathered; dark grey; very weak; Fault. Schist derived gravels and clay.		70%							
Unweathered; dark grey; , foliation: gently inclined, thinly laminated; moderately strong; Schist. Alpha = 80.		90%	70%						
EOH: 24.5m									

REMARKS

HOLE DEPTH: 24.5m

Created: 5/29/2019 12:45:21 PM

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BOREHOLE LOG

HOLE NO.: BH4

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 23/05/2019

END DATE: 24/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Highly weathered; dark brown; weak; Topsoil with fragments of weathered schist.	Rotary cored	70%							
Moderately weathered; dark grey; , foliation, gently inclined, laminated; moderately strong; Schist, darker pelitic appearance, alpha = 90. Orange staining common, especially on joint planes. Some cross cutting quartz veins (alpha = 30)		100%							
Moderately weathered; light grey; , foliation, gently inclined laminated; moderately strong; Schist, lighter psammitic appearance, alpha = 80. Cross cutting quartz vein (alpha = 30); Joint (alpha = 30) with orange staining and rootlets.		100%		1.0					
Moderately weathered; light grey; , foliation, gently inclined laminated; moderately strong; Schist, lighter psammitic appearance with darker pelitic looking bands in places, alpha = 80. Quartz veins partially weathered out in places, and orange staining. Cross cutting quartz vein. Occasional voids in quartz veins.		100%	90%						
Slightly weathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist, darker pelitic appearance, some orange staining, alpha = 80.		90%							
Slightly weathered; light grey; , foliation, gently inclined, laminated; moderately strong; Schist, lighter psammitic appearance, with occasional bands of darker material, alpha = 80. Quartz weathered out in places		100%	80%	2.0					
Slightly weathered; dark grey; very weak; Schist, darker pelitic appearance. Drilling mis-tube, core broken and approximately 0.5m core loss.		70%		3.0					
Slightly weathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist, darker pelitic appearance, alpha = 90. Occasional orange staining on quartz veins and joint planes. RQD probably more representative of previous interval damaged by mis-tube.		90%	30%	4.0					

REMARKS

HOLE DEPTH: 25m

Created: 5/29/2019 12:45:21 PM

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BOREHOLE LOG

HOLE NO.: BH4

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 23/05/2019

END DATE: 24/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Slightly weathered; dark grey; , foliation, gently inclined, thinly laminated, moderately strong; Schist, darker pelitic appearance, alpha = 80. Occasional orange staining on quartz veins and joint planes. RQD probably more representative of previous interval damaged by mis-tube.	Rotary cored	90%	20%						
Unweathered; dark grey; , gently inclined; weak; Fault, schist derived gravels. Fault margins parallel to foliation (alpha = 80).		95%							
Unweathered; dark grey; , foliation, gently inclined, thinly laminated, moderately strong; Schist, darker pelitic appearance, alpha = 80.Occasional weathering in quartz veins, occasional cross-cutting quartz veins (alpha = 20).		100%	90%	6.0					
Unweathered; dark grey; , gently inclined; weak; Fault. Schist derived gravels with occasional cobbles. Margins appear parallel to foliation (alpha = 80).		70%		7.0					
Unweathered; light grey; , foliation, gently inclined, laminated, moderately strong; Schist, lighter psammitic appearance with occasional bands of darker material, alpha = 80. Cross-cutting quartz vein (alpha = 25).		90%	70%	8.0					
Unweathered; dark grey; , foliation, gently inclined, laminated moderately strong; Schist, lighter psammitic appearance, alpha = 80. High RQD.		100%	90%	9.0					

REMARKS

HOLE DEPTH: 25m

Created: 5/29/2019 12:45:21 PM

Generated by GEROC Core GS

BOREHOLE LOG

HOLE NO.: BH4

CLIENT: Gavin Moore

PROJECT: Moorelliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 23/05/2019

END DATE: 24/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; dark grey; , foliation, gently inclined, laminated moderately strong, Schist, lighter psammitic appearance alpha = 90. High RQD.	Rotary cored	100%	96%						
Unweathered; dark grey; , foliation, gently inclined, thinly laminated moderately strong; Schist, darker pelitic appearance, alpha = 80.		97%	90%						
Unweathered; light grey; , foliation, gently inclined, laminated, moderately strong; Schist, lighter psammitic appearance alpha = 90.		100%	98%	11.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist, darker pelitic appearance, alpha = 80.		100%	90%	12.0					
Moderately weathered; light grey; , foliation, gently inclined, laminated; very weak, Schist, lighter psammitic appearance, alpha = 90, Some orange staining in quartz veins.		100%	70%	13.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist, darker pelitic appearance, alpha = 80.		100%	0%						
Unweathered; light grey; , foliation, gently inclined, laminated moderately strong, Schist, lighter psammitic appearance occasional orange staining in quartz veins, alpha = 90.		91%	70%	14.0					

REMARKS

HOLE DEPTH: 25m

Created: 5/29/2019 12:45:21 PM

BOREHOLE LOG

HOLE NO.: BH4

CLIENT: Gavin Moore

PROJECT: Mooreliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 23/05/2019

END DATE: 24/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; light grey; , foliation: gently inclined: laminated; moderately strong; Schist; lighter psammitic appearance occasional orange staining in quartz veins; alpha = 90.	Rotary cored	93%	70%						
Unweathered; dark grey; , foliation: gently inclined; thinly laminated; moderately strong; Schist; darker pelitic appearance; occasional orange staining in quartz veins; alpha = 80.		90%	50%						
Unweathered; light grey; , foliation: gently inclined; laminated; moderately strong; Schist; lighter psammitic appearance alpha = 80.		100%	90%	10.0					
Unweathered; dark grey; , foliation: gently inclined; thinly laminated; moderately strong; Schist; darker appearance alpha = 80.		90%	80%	15.0					

REMARKS

HOLE DEPTH: 25m

Created: 5/29/2019 12:45:21 PM

BOREHOLE LOG

HOLE NO.: BH4

CLIENT: Gavin Moore

PROJECT: Mooreliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 23/05/2019

END DATE: 24/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist; darker appearance alpha = 90	Rotary cored	90%	60%	21.0					
Highly weathered; dark grey; , gently inclined; weak; Fault schist derived gravels, margins parallel to foliation.		70%							
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist; darker pelitic appearance, alpha = 80		90%	60%	22.0					
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist; darker appearance alpha = 90.		70%	0%						
Unweathered; dark grey; , foliation, gently inclined, thinly laminated; moderately strong; Schist; darker appearance alpha = 90. Small fault at 24.2m, parallel to foliation.		90%	50%	23.0					
				24.0					

REMARKS

HOLE DEPTH: 25m

Created: 5/29/2019 12:45:21 PM

BOREHOLE LOG

HOLE NO.: BH4

CLIENT: Gavin Moore

PROJECT: Mooreliving - Subdivision Feasibility

JOB NO.: R4726

SITE LOCATION: Middleton Block

CO-ORDINATES: 0mE, 0mN ()

DATUM: Ground

RIG:

START DATE: 23/05/2019

END DATE: 24/04/2019

OPERATOR: Jamie Edgar

DESCRIPTION	METHOD	TCR (%)	RQD (%)	DEPTH	GRAPHIC / SBT	SPT Blows (uncorrected)	DATA	WATER	INSTALLATION
		85 90 75	25 50 75		3 4 6 9	5 10 15 20 25 30 35 40 45			

SCPT 25m

REMARKS

HOLE DEPTH: 25m

Created 5/29/2019 12:45:21 PM

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Tel: 03 442 5700

20 July 2022

Mr Gavin Moore

Silver Creek Ltd
820 Frankton Road
Queenstown

CC: Joshua Moore

By Email

Dear Gavin,

RE: RE-CLASSIFICATION OF SUBDIVISION DEVELOPMENT ZONES

Background
In 2019 GCL was commissioned by Silver Creek Limited to conduct a geotechnical feasibility assessment of what has become known as Silver Creek subdivision to assess potential for future development.

The intent of this report was to characterise ground conditions across the subdivision, identify areas where development will require different levels of remediation and/or engineering controls, and provide commentary on potential geotechnical risks associated with future development.

Recommendations provided in the report were underpinned by review of previous studies in the area, a significant amount of field/structural mapping, four diamond drilled boreholes, and interpretation of all of these. Given the amount of vegetation across the subdivision at the time findings and recommendations were provided with the caveat that further investigation be undertaken on an ongoing basis once clearance of vegetation commenced.

See GCL report R4726-1B Combined.pdf for further information.

Development Zones
As previously indicated, the initial geotechnical feasibility assessment was undertaken when the majority of the site was heavily forested and was prepared for the purpose of due diligence for future residential development of the block.

Since this initial report was authored, several key factors have occurred that now allow GCL to revise the initial subdivision development zones and locations, they are as followed:

- With tree clearance now complete on a large portion of the site, more detailed inspections of the site have become possible.

- GCL have been actively involved with monitoring of earthworks under RM200095. During the course of these site visits, additional specific investigation have been undertaken in several areas where future development is proposed. *Please refer to SIN 4736-12 Combined.pdf & L4726-1E Combined.pdf.*

- The completion of Laura Gneskos thesis on "*Geomorphology And Geotechnical Characterization Of The Queenstown Hill Landslide".* This thesis performed an in-depth investigation into the geomorphology and geotechnical properties of the Queenstown Hill landslide and included detailed lidar mapping along with in the field investigation, paired with a detailed ground model that allowed for better understanding of the implications for future land development.

Given that points outlined above, GCL have redefined the three development zones outlined in Section 8 of the original report to a new four zone model that are outlined below with locations defined in the updated drawing R4726-1C-005.

Revised Development Zones for Residential Construction (Drawing 005)

Zone A
Zone A (shaded green) includes the western and eastern portions of the subdivision. The slopes are typically gently to moderately sloping. Zone A provides stable conditions for residential development and are likely to provide ground conditions suitable for traditional NZS3604 design.

Zone B
Zone B (shaded yellow) includes the upper area within the central portion of the site and the lower slopes of the central gully. Our current site investigations to date indicate that Zone B provides stable conditions for residential development with appropriate SED foundations and structural design. *Please refer to SIN 4736-12 Combined.pdf & L4726-1E Combined.pdf for site specific inspection reports.*

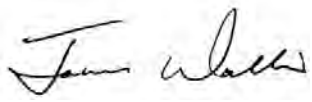
Zone C
Zone C (shaded orange) includes areas in on the eastern & western slope as well as centrally located along the toe of the relic landslide. Based on future further geotechnical investigation, these areas will be better understood and will be rezoned as either with (Zone B, yellow) and without (Zone A, green) SED solutions. Appropriate SED foundations and structural design will most likely be required for dwellings within Zone C. With further investigation, some sections of the Zone C may potentially remain unsuitable for residential development (Zone D, red).

Zone D
Zone D (shaded red) includes the steep slopes located along the central gully and certain areas located within the landslide toe. Given the large number of relic landforms present in these areas, it is unlikely that development within Zone C will occur give the considerable costs associated with the engineered solutions required to adequately stabilise the slopes.

Closure
We trust that this meets your immediate needs and provides an objective assessment of the overall geotechnical risks for the Silver Creek subdivision, as they currently stand.

Should you require any further information regarding this, or any other, project please do not hesitate to contact me.

Yours sincerely,



James Wallis
Engineering Geologist BSc MEngNZ

N

BH 3

Central lobe

BH 4

Eastern steep slopes

Central gully

BH 2

Potters Hill Drive

BH 1

Western & southern moderate slopes

Goldfield Heights

Lake Wakatipu

LEGEND

- Zone A
- Zone B
- Zone C
- Zone D
- Site boundary
- BH Borehole
- Foliation strike/dip
- Base of slope
- Scarp/fracture
- Main track

GCL Ground Consulting Ltd

Silver Creek Ltd

Goldfield Heights, Queenstown

Subdivision Development Zones / Suitabity for Roading

Rev	Date	Status	Drafted	Reviewer
A	07/05/2019	Issued	S.W	FW
B	15/01/2021	Issued	J.W	P.F
C	25/10/2022	Issued		

File Ref. Silver Creek/Design/Geotech/Siteplan RevC.pdf

Scale (A4) 1:3000

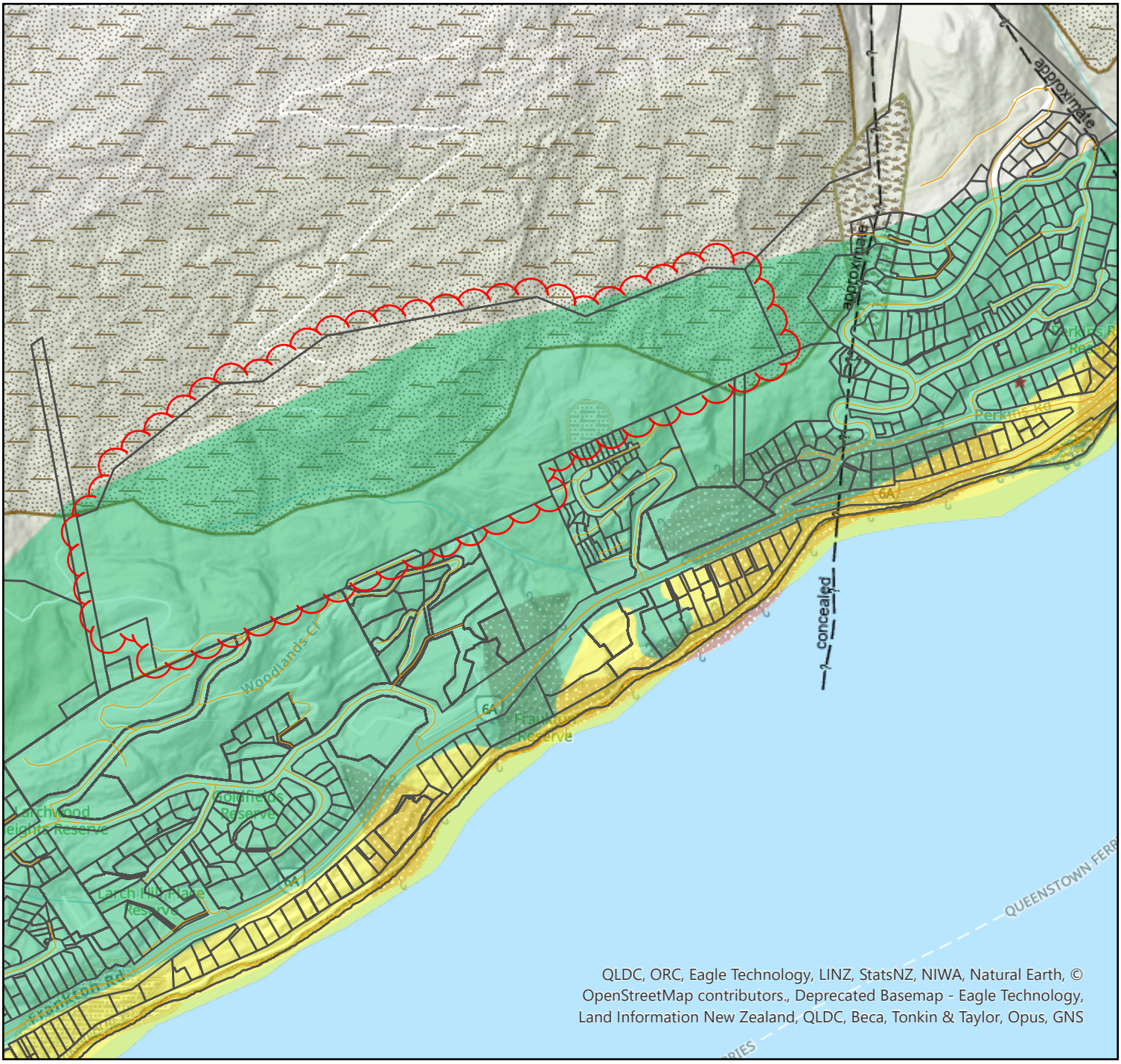
0 85 170m

Project No. 4726

Report Ref. R4726-1C

Drawing No. 005

QLDC Natural Hazards Map



Roads

Parcels and Properties

Dangerous Goods License

POTENTIALLY CONTAMINATED SITE

Building Act Hazards

Faults 2001 GNS

Inactive Fault - Location approximate

2012 ORC Aggregation - Rainfall Flooding

Return Period of Flood Events

150 Year

100 Year

75 Year

50 Year

2012 Tonkin & Taylor Local Analysis - Aggregation

Classification

LIC 1 - Nil to Low

LIC 1 (P) - Probably Low

2007 GNS Regional Analysis - Otago Alluvial Fans Project

Active, Composite - Location approximate

Landslide Areas - ORC Regional Analysis

Active Pre-existing Schist Debris Landslides

Pre-existing Schist Debris Landslides (Activity Unknown)

Slope Failure Hazard in Superficial Deposits

0 0.25 0.5 1 km

Scale: 1:9,028

Map Date: 26/04/2024

N

SITE LANDSCAPE ARCHITECTS ^

SILVER CREEK

MASTERPLAN SHEET 1

CONCEPT_ 1:3,000 @ A3

350_
26.04.24 . rev B

SK-01

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