Seven Oaks Kinloch Limited

Seven Oaks Subdivision, Kinloch

Geotechnical Completion Report - Stages 4 to 6

220223
20 April 2023

Seven Oaks Kinloch Limited

Seven Oaks Subdivision, Kinloch

Geotechnical Completion Report - Stages 4 to 6

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5. NZS 4431:2022 Statement of Suitability of Earth Fill (Fill Certificate).

1. INTRODUCTION

Cheal Consultants Limited (Cheal) was engaged by Seven Oaks Kinloch Limited (Client) to verify soil compaction of 34 lots which were filled in excess of 300mm depth within Stages 4 to 6 of the Seven Oaks Subdivision, Kinloch, and to provide a Geotechnical Completion Report for these lots. The purpose of this report is to determine the bearing capacity against the requirements of NZS 4431:2022, New Zealand Standard for Engineered Fill Construction for Lightweight Structures.

This report is required to meet Condition 9 of the resource consent (Taupō District Council reference RM200117 & RM200118) which states:

"Where earthworks involving more than 0.3m fill has occurred, a geotechnical completion report for those entire lots shall be provided to Council prior to the release of the section 224 Resource Management Act certificate for each stage. If the geotechnical report has any construction conditions for building developments on the lots, these shall be incorporated into a consent notice on the title(s) of the relevant lots."

2. SUBDIVISION LOCATION

Seven Oaks Subdivision Stages 4 to 6 , 34 new residential lots are accessed via Seven Oaks Drive from Okaia Drive, Kinloch. To the west and south, Stages 4 to 6 Lots share a boundary with Department of Conservation (DoC) Land.

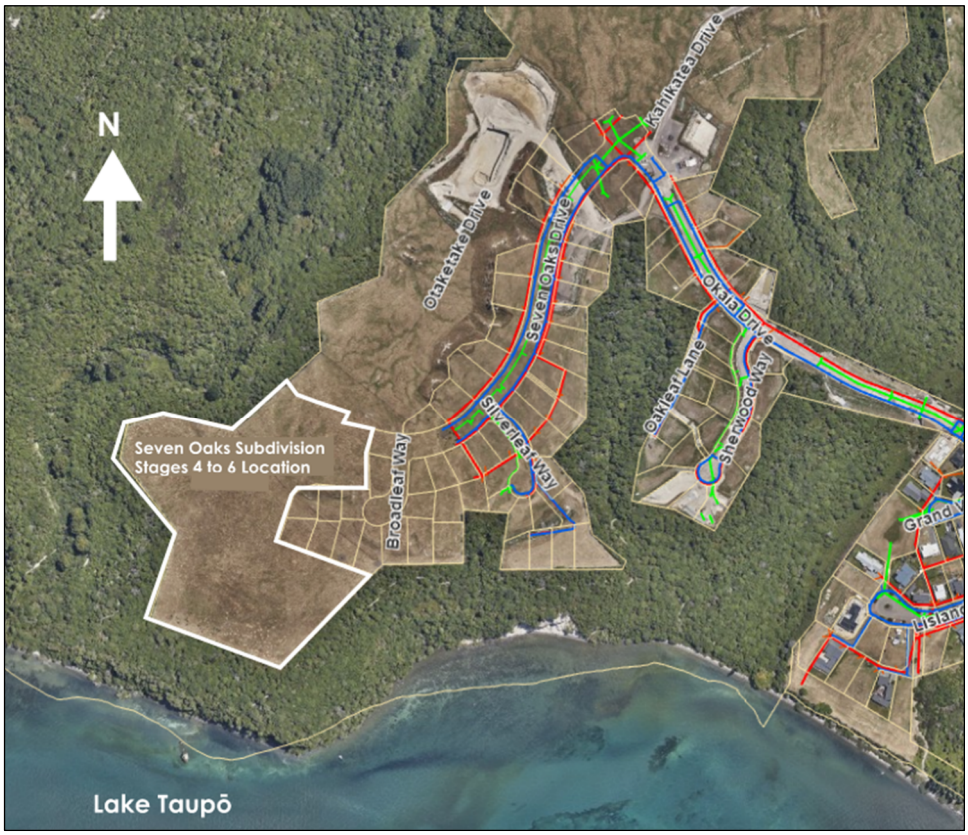


Figure 1: Location Plan (Taupō District Council's GIS map)

The topography of Stages 4 to 6 subdivision generally slopes downwards in a south-easterly direction.

Stage 4 to the north-east boundary adjoins Otaketake Stream Reserve (DoC land), all other boundaries are surrounded by lots and inland within the Seven Oaks Stage 7, currently under construction. This part of the site provides access to Stage 5 and future stages. The natural contours of the land falls south-west.

Stage 4: 15 Residential Lots comprising Lots 78 to 84, 100, 101 and 106 to 111 ranging in area's from 800m^2 to 1,013m^2 and Road Lot 403.

Most of Stage 5 lot areas required no earthworks other than Lot 85. The formation of the public road and private right of way encompasses most of the earthworks. The area is located on a lower terrace in relation to Stage 4, within which Seven Oaks Drive provides access. Stage 5 land falls in a south-west direction and is surrounded by DoC reserve on its east, south and west boundaries. Only the northern boundary is inland within Seven Oaks Stage 4.

Stage 5: 15 Residential Lots comprising Lots 85 to 99 ranging in area's from 800m^2 to 1,394m^2; Road Lot 305 LP Reserve (Drainage). Lots 86 to 90 share a ROW access road.

Stage 6 is comprised of four larger lots with common boundaries with DoC Land to the North, South and West. To the east is inland to Stage 4. Access to Stage 6 is gained off Mapleleaf Way.

Stage 6: 4 Residential Lots comprising Lots 102 to 105 ranging in area from 1336m^2 to 1647m^2.

3. GEOTECHNICAL INVESTIGATION

From the period spanning January 2021 to October 2021, March 2022, August 2022, January 2023 and April 2023, Cheal and Seay personnel attended the subdivision and undertook a series of Scala Penetrometer Tests (Scala) over the 34 lots. The Scala locations are shown on plan 220223-AB202 included in Appendix 1.

Seay carried out a total of 23 Scala tests during the fill placement. Testing was carried out in 1.0m lifts to confirm adequate compaction was achieved prior to backfilling and compacting the next lift of material. The data provided has been collated to present a full profile of the fill placement. The test locations are denoted as "C" (Contractor) and the test results are included in Appendix 2.

Further, Cheal returned to the site once the final platforms were constructed and carried out an additional 141 Scala across the lots, with at least 4 tests within each lot. The tests were performed to confirm adequate compaction had been achieved in fill areas and also to provide an indication of bearing capacity of soils within the proposed buildable areas. Scala test results are included in Appendix 3.

All natural ground and fill on the development is clean, well graded pumiceous sand. There was no indication of any variance of pumice soils across the overall development site. Therefore, Hand Augers were not undertaken due to the knowledge of both the underlying natural ground and fill material gained through the construction of the subdivision.

4. SLOPE STABILITY ASSESSMENT LOT 111

Sigma Prima Geoengineering (Sigma) was engaged to carry out definition of setbacks for the construction of NZS3604:2011 type residential structures exclusively for Lot 111 within moderate embankments to the northern boundary with Stage 7. This has also included setbacks on lots adjacent to the toe of steep embankments on neighbouring properties (part of Stage 7) not included in this report.

A specific setback measured from boundary lines on Lot 111 is provided for minimum Building Envelope Setback line for Lot 111 '*Northern Boundary Setback distance for Building envelopes minimum 3m'. All other sides shall comply with the setback from TDC minimum setbacks'*.

Please refer to full Sigma Email Report in Appendix 4 for comments and recommendations.

5. DWELLING STORMWATER DISPOSAL SOLUTIONS

We recommend the future homeowner to carry out specific stormwater design for their property as permeability rates vary across the lots. The stormwater disposal system shall take this into account as necessary.

Nevertheless, we recommend drilled concrete lined soakholes should be the preferred method of disposal, installed to a depth determined appropriate from on-site testing of each lot. Soakholes shall be located and designed considering the depth of the fill material on the particular lot. Fill material has been compacted to a standard that limits the degree of soakage within the fill material. The depths of the fill material placed on individual lots varies as shown on Cheal Earthworks Asbuilt Fill Depth Plans 220223-AB202 and AB203 in Appendix 1. Soakholes shall have impermeable concrete liners from the surface down to 1m below the depth of fill or a minimum of 2m if in an area not containing fill.

Shallow soak pits should only be used when a qualified engineer/geotechnical professional has been engaged to assess suitability (permeability of soils, setbacks/volumes/etc) and Council agreement/consent shall be obtained.

For soakage systems situated on lots adjacent to slopes, it is recommended to construct soakholes on natural ground as far from the slope edge as possible. Minimum setback for soakholes apply as per the Summary Table in Appendix 1.

6. FILL TESTING RESULTS

As per the site testing, we consider the top 300mm as covered under the Topsoil and therefore below the Topsoil, the near surface fill material has been compacted in compliance with NZS 4431:2022, New Zealand Standard for Engineered Fill Construction for Lightweight Structures. A

fill certificate has been issued in conjunction with this report in accordance with NZS4431:2022 as presented in Appendix 5.

Some tests (as indicated in attached summary table and Scala results tables) showed Scala readings slightly lower than expected. This is due to the nature of the natural pumiceous materials in areas undisturbed during earthworks rather than a consequence of using unsuitable materials and/or inappropriate compaction procedures.

7. COMPARISON TO NZS 3604:2011

The test results stating that earth fill has been placed in compliance with the terms of NZS 4431 **does not remove the necessity** for normal inspection and design of foundations in accordance with NS3604:2011, The New Zealand Standard for Timber Buildings. However, testing that has been carried out on both pumice fill and the natural soils indicate that most lots have an ultimate bearing capacity of 300kPa, the requirement of "Good Ground" in accordance with NZS 3604:2011.

For lots that do not achieve a geotechnical ultimate bearing capacity of 300kPa, there are many alternative shallow foundation solutions available to the purchaser. Although engineering input and further geotechnical investigation may be required, the foundation solution may be as simple as prescribing a low demand foundation system such as RibRaft or MAXRaft, or shallow ground improvement in natural soils.

All topsoil should be removed from the building footprint prior to construction of foundations. Additionally, all slope faces are to be grassed and well-maintained to reduce the risk of scour and associated slope instability.

8. DISCLAIMER

This Report has been prepared solely for the use of our client with respect to the particular brief given to Cheal Consultants.

No liability is accepted in respect of its use for any other purpose or by any other person or entity. All future owners of this property should seek professional geotechnical advice to satisfy themselves as to its ongoing suitability for their intended use.

The opinions, recommendations and comments given in this report are the result from the application of accepted industry methods of site investigation. As factual evidence over much of the site has been obtained solely from local knowledge and Scala Penetrometer Tests, which by their nature only provide information about that exact location, there may be special conditions pertaining to this site which have not been identified by the investigation and which have not been taken into account in the report.

If variations in the subsoils occur from those described or assumed to exist then the matter should be referred back to Cheal Consultants immediately.

Appendix 1

Summary Table of Geotechnical Completion Report

Earthworks Asbuilt Finished Contours Plan 220223–AB201

Earthworks Asbuilt Fill Depth Plan 220223-AB202

SUMMARY TABLE OF GEOTECHNICAL COMPLETION REPORT

Lot No.	Foundation Design Comment [1]	Required Minimum Building Setback distance from Boundary Line for Geotech Purposes (m)	Required Minimum Soakhole Setback distance from Boundary Line [4 5] (m)
Stage 4			
78	Consistent with NZS3604:2011	None	None [(4)(5)]
79	**Further Geotech Assessment / SED req'd [3]**	None	None [(5)]
80	Consistent with NZS3604:2011	None	None [(4)(5)]
81	Consistent with NZS3604:2011	None	None [(4)(5)]
82	Consistent with NZS3604:2011	None	None [(5)]
83	Consistent with NZS3604:2011	None	None [(5)]
84	Consistent with NZS3604:2011	None	None [(5)]
100	**Further Geotech Assessment / SED req'd [3]**	None	None [(5)]
101	Consistent with NZS3604:2011	None	None [(4)]
106	**Further Geotech Assessment / SED req'd [3]**	None	None [(4)]
107	Consistent with NZS3604:2011	None	None
108	Consistent with NZS3604:2011	None	None
109	Consistent with NZS3604:2011	None	None [(5)]
110	Consistent with NZS3604:2011	None	None [(5)]
111	Consistent with NZS3604:2011	None [2]	None [(5)] Located on Southern Half
Stage 5			
85	Consistent with NZS3604:2011	None	None [(5)]
86	Consistent with NZS3604:2011	None	None [(5)]
87	Consistent with NZS3604:2011	None	None [(5)]
88	**Further Geotech Assessment / SED req'd [3]**	None	None [(5)]
89	**Further Geotech Assessment / SED req'd [3]**	None	None
90	**Further Geotech Assessment / SED req'd [3]**	None	None
91	**Further Geotech Assessment / SED req'd [3]**	None	None
92	**Further Geotech Assessment / SED req'd [4]**	None	None
93	**Further Geotech Assessment / SED req'd [5]**	None	None
94	**Further Geotech Assessment / SED req'd [3]**	None	None
95	**Further Geotech Assessment / SED req'd [3]**	None	None
96	Consistent with NZS3604:2011	None	None
97	**Further Geotech Assessment / SED req'd [3]**	None	None
98	**Further Geotech Assessment / SED req'd [3]**	None	None
99	**Further Geotech Assessment / SED req'd [3]**	None	None [(4)]
Stage 6			
102	Consistent with NZS3604:2011	None	None [(4)]
103	Consistent with NZS3604:2011	None	None [(4)]
104	**Further Geotech Assessment / SED req'd [3]**	None	None
105	**Further Geotech Assessment / SED req'd [3]**	None	None [(4)]

Notes

[1] For specific Geotechnical Information please see Cheal Geotechnical Completion Report 220223 dated 20 April 2023

[2] For specific Slope Stability Assessment for Lot 111 please refer to Sigma Prima Geoengineering Email Report dated 5 April 2022 in Section 4 of Cheal Report

[3] A low demand foundation system would likely be the most appropriate solution. Alternatively, shallow footings as per NZS3604:2011 might be suitable provided shallow ground improvement is undertaken.

[4] Drilled concrete lined soakholes shall be located and designed considering the depth of fill material in the particular lot. Please see Cheal As-built Fill Depth Plans 220223-AB202 to AB203 and Cheal Report.

[5] It is recommended that drilled concrete lined soakholes to be located on the front half of the lot adjacent to the public road.



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NOTES:

Asbuilt utilities may have other services in close proximity which are not shown for the purposes of this plan.
Please identify existing utility locations and depths with Taupo District Council GIS before any field investigation or construction.

Underground services shown are indicative only. It is the contractors responsibility to identify existing utility locations and depths prior to construction.

Coordinates are in terms of New Zealand Geodetic Datum 2000, Mt Eden Circuit.
Reduced Levels are in terms of Moturiki Vertical Datum 1953
Level Origin : DT8J
RL: 369.623

Contour interval = Major 1.25m
Minor 0.250m

SEVEN OAKS

Rev	Date	Amendment	By	Chk	App
A	20/04/23	Asbuilt First Issue	PH	MR	DGF

Project Title
Seven Oaks Kinloch Ltd
Seven Oaks Subdivision, Kinloch
Stages 4 to 6

Drawing Title
Earthworks Asbuilt
Finished Ground Contours

Surveyed	K.Larsen	01/03/23	KL
Designed			
Drawn	P.Harris	13/04/23	KL
Checked	M.Ryder	28/03/23	MR
Approved	D.Forsyth	30/03/23	DGF

Status **ASBUILT**

Scale A1 1:750
A3 1:1500
A1

Drawing Number 220223-AB201
Rev A

AutoCAD

C:\Workspace\data\CHEALSVR\220223 - Seven Oaks Kinloch Limited_31575\CAD\ACAD\Engineering\Asbuilt Drawings\220223-AB201 Earthworks Asbuilt Contour Plan.dwg 21/Apr/2023 8:28 am



Surface Analysis: Elevation Ranges			
Number	Color	Minimum Elevation (m)	Maximum Elevation (m)
1		0.000	0.300
2		0.300	0.500
3		0.500	1.000
4		1.000	2.000
5		2.000	3.000
6		3.000	4.000
7		4.000	5.400

7.5 0 15.0 30.0 45.0 60.0 75.0 1:750 @A1
metres

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NOTES:

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Please identify existing utility locations and depths with Taupo District Council GIS before any field investigation or construction.

Underground services shown are indicative only. It is the contractors responsibility to identify existing utility locations and depths prior to construction.

Coordinates are in terms of New Zealand Geodetic Datum 2000, Mt Eden Circuit.
Reduced Levels are in terms of Moturiki Vertical Datum 1953
Level Origin : DT8J
RL: 369.623

134 Scala Penetrometer Test Number & Location by Cheal

C1 Scala Penetrometer Test Number & Location by Contractor

SEVEN OAKS

Rev	Date	Amendment	By	Chk	App
A	20/04/23	Asbuilt First Issue	PH	MR	DGF

Project Title
Seven Oaks Kinloch Ltd
Seven Oaks Subdivision, Kinloch
Stages 4 to 6

Drawing Title
Earthworks Asbuilt
Fill Depth Plan

Surveyed	K.Larsen	01/03/23	KL
Designed			
Drawn	P.Harris	14/04/23	KL
Checked	M.Ryder	28/03/23	MR
Approved	D.Forsyth	30/03/23	DGF

Status ASBUILT

Scale A1 1:750 | A1
A3 1:1500

Drawing Number 220223-AB202 | Rev A

Appendix 2

Seay Earthmovers
Scala Penetrometer
Tests Results

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SCALA PENETROMETER TEST SHEET

CLIENT: Seven Oaks Kinloch Ltd
JOB LOCATION: Seven Oaks Subdivision - Stages 4 to 6
JOB DESCRIPTION: Stages 4 to 6 - Fill Testing

JOB No: 220223
DATE: Nov-21/ April 2023
TEST BY: Seay Earthmovers

DEPTH: Millimetres Below Ground Level (BGL)		TEST No. / Approximate surface RL											
		Lot 111		Lot 110		Lot 109		Lot 108		Lot 78		Lot 79	
		1	2	3	4	5	6	7	8	9	10	11	12
0	100	7	11	7	7	7	8	5	4	10	8	6	8
100	200	8	9	8	7	6	6	6	7	11	9	9	7
200	300	9	17	9	6	5	5	11	7	10	8	6	8
300	400	11	15	8	6	4	5	20	9	12	7	6	10
400	500	9	19	8	7	4	5		15	13	6	8	9
500	600	7	11	6		5			13		9		
600	700	8	10	5		6			9		8		
700	800	9	9	4		5			14		8		
800	900	11	8	5		7			10		10		
900	1000	9	7	5		5			11		9		
1000	1100	10	9	6							11		
1100	1200	11	11	7							8		
1200	1300	10	7	7							12		
1300	1400	12	10	7							10		
1400	1500	12	11	5									
1500	1600	12	12	6									
1600	1700	10	11	7									
1700	1800	11	9	6									
1800	1900	10	10	9									
1900	2000	9	15	11									
2000	2100	9	10	9									
2100	2200	11	17										
2200	2300	12	15										
2300	2400	13	10										
2400	2500	10	12										
2500	2600	14	11										
2600	2700	8	10										
2700	2800	9	9										
2800	2900	11	11										
2900	3000	3	10										
3000	3100	12											
3100	3200	16											
3200	3300	9											
3300	3400	6											
3400	3500	12											
3500	3600	9											
3600	3700	11											
3700	3800	10											
3800	3900	8											
3900	4000												

Notes:

Minimum Test Depth as per NZS 3604.....1.0m (1000mm) or 2x width of footing below bottom of footing
Blow count for Good Ground as per NZS 3604.....5 blows/100mm to a depth of 1.0m or 2x width of footing (whichever is the greater)
Blow count for Good Ground as per NZS 3604.....3 blows/100mm below the above depths
Blow count for 100kPa Allowable Bearing Pressure.....4 blows/100mm

SCALA PENETROMET

CLIENT: Seven Oaks
JOB LOCATION: Seven Oaks
JOB DESCRIPTION: Stages 4 to 6

DEPTH: Millimetres Below Ground Level (BGL)		TEST No. / Approximate surface RL										
		Lot 80		Lot 81		Lot 84	Lot 85		Lot 101			Lot 100
		13	14	15	16	17	18	19	20	21	22	23
0	100	11	10	8	7	11	8	10	6	5	7	6
100	200	10	9	14	11	12	10	12	10	9	10	6
200	300	10	8	17	9	10	11	10	11	13	11	12
300	400	9	11	10	7	11	9	8	10	10	9	9
400	500	10	10	8	9	11	8	9	12	11	9	10
500	600	9	8		10				14	10	10	11
600	700	11	7		9				15	13	14	11
700	800	12	8		11				13	15	16	13
800	900	9	7		9				10	12	14	10
900	1000	8	9		8				11	13	12	12
1000	1100											
1100	1200											
1200	1300											
1300	1400											
1400	1500											
1500	1600											
1600	1700											
1700	1800											
1800	1900											
1900	2000											
2000	2100											
2100	2200											
2200	2300											
2300	2400											
2400	2500											
2500	2600											
2600	2700											
2700	2800											
2800	2900											
2900	3000											
3000	3100											
3100	3200											
3200	3300											
3300	3400											
3400	3500											
3500	3600											
3600	3700											
3700	3800											
3800	3900											
3900	4000											

Notes:

Minimum Test Depth as per NZS 3604.....

Blow count for Good Ground as per NZS 360

Blow count for Good Ground as per NZS 360

Blow count for 100kPa Allowable Bearing Pr

Appendix 3

Cheal Consultants
Scala Penetrometer
Tests Results

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SCALA PENETROMETER TEST SHEET

CLIENT: Seven Oaks Kinloch Limited
JOB LOCATION: Seven Oaks Subdivision, Kinloch
JOB DESCRIPTION: Stages 4 to 6 Lot Compaction Testing

JOB No: 220223
DATE: July / August / September 2022; Jan/April 2023
TEST BY: MS / AT / LU

DEPTH: Millimetres Below Ground Level (BGL)			TEST No. / Approximate surface RL															
			1	2	3	65	4	5	6	64	7	8	9	63	10	11	12	62
Topsoil considered as top 300mm (shaded)			Lot 111				Lot 110				Lot 109				Lot 108			
0	-	100	3	3	3	1	0.5	3	3	1	2	1	2	1	1	2	2	2
100	-	200	3	3	3	2	0.5	3	3	2	3	9	1	5	1	3	3	5
200	-	300	2	6	2	2	1	5	4	2	3	7	2	5	2	7	5	6
300	-	400	8	12	6	18	4	8	10	1	4	9	7	10	6	11	20	8
400	-	500	7	22	16	30	8	6	11	12	5	7	7	8	7	11		7
500	-	600	6		20	30	9	8	9	10	5	5	5	12	11	14		10
600	-	700	5				8	9	6	11	8	4	6	7	20	11		16
700	-	800	8				8	5	5	10	6	8	4	11		20		19
800	-	900	14				6	5	8	9	5	6	4	9				19
900	-	1000	15				14	4		9				5				21
1000	-	1100	22				10	4		9				6				16
1100	-	1200					14	9		7				10				15
1200	-	1300					14	4		5				10				19
1300	-	1400					18	5		7				15				17
1400	-	1500					20	7		4				12				16
1500	-	1600						5		15								
1600	-	1700						6										
1700	-	1800						5										
1800	-	1900						5										
1900	-	2000																
2000	-	2100																
2100	-	2200																
2200	-	2300																
2300	-	2400																
2400	-	2500																
2500	-	2600																
2600	-	2700																
2700	-	2800																
2800	-	2900																
2900	-	3000																
3000	-	3100																
3100	-	3200																
3200	-	3300																
Notes:			Consistent				Consistent				Consistent				Consistent			

Minimum Test Depth as per NZS 3604.....1.0m (1000mm) or 2x width of footing below bottom of footing
Blow count for Good Ground as per NZS 3604.....5 blows/100mm to a depth of 1.0m or 2x width of footing (whichever is the greater)
Blow count for Good Ground as per NZS 3604.....3 blows/100mm below the above depths
Blow count for 100kPa Allowable Bearing Pressure.....4 blows/100mm

SCALA PENETROMETER TEST

CLIENT: Seven Oaks Kinloch Li
JOB LOCATION: Seven Oaks Subdivisic
JOB DESCRIPTION: Stages 4 to 6 Lot Com

DEPTH: Millimetres Below Ground Level (BGL)																		
	13	14	15	16	61	17	18	19	60	20	21	22	23	24	25	26	27
Topsoil considered as top 300mm (shaded)	Lot 107					Lot 106				Lot 101				Lot 100			
0 - 100	5	2	7	2	2	9	5	4	12	4	1	4	6	1	1	1	1
100 - 200	12	4	20	3	8	13	12	10	19	17	6	12	21	2	2	2	1
200 - 300	22	10		6	10	9	10	11	24	14	16	13	17	2	2	1	7
300 - 400		11		8	19	9	13	8	16	14	12	21	22	9	2	14	12
400 - 500		7		10	12	8	19	5	8	11	13	16	13	16	1	14	10
500 - 600		9		10	17	6	12	7	5	8	14	19	11	6	3	12	6
600 - 700		7		11	15	1	12	5	6	7	8	16	14	6	7	11	4
700 - 800		6		10	12	1	12	6	12	7	7	14	10	5	7	7	3
800 - 900		6		9	14	5	16	10	13	4	9	14	5	5	4	7	3
900 - 1000		8		10	16	10	16	10	6	3	7	16	7	4	5	3	7
1000 - 1100		10		11	25	10	22	21	5	3	7	19	7	6	6	6	13
1100 - 1200		9		11		9	25	25	7	6	7	20	8	6	5	6	15
1200 - 1300		12		12		8			16	6	7	23	7	6	6	6	18
1300 - 1400		14		12		10			16	9	5		8	6	6	6	18
1400 - 1500						12			18	7	3		7	6	6	6	20
1500 - 1600											8		6				
1600 - 1700											10		5				
1700 - 1800											16		3				
1800 - 1900											20		4				
1900 - 2000											20		4				
2000 - 2100																	
2100 - 2200																	
2200 - 2300																	
2300 - 2400																	
2400 - 2500																	
2500 - 2600																	
2600 - 2700																	
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3000 - 3100																	
3100 - 3200																	
3200 - 3300																	
Notes:	Consistent					Further Geotech Assessment /			SED req'd [3]	Consistent				Further Geotech Assessment /			SED req'd [3]

Minimum Test Depth as per NZS 3604.....1.0r
Blow count for Good Ground as per NZS 3604.....5 bl
Blow count for Good Ground as per NZS 3604.....3 bl
Blow count for 100kPa Allowable Bearing Pressure.....4 b

SCALA PENETROMETER TEST

CLIENT: Seven Oaks Kinloch Li
JOB LOCATION: Seven Oaks Subdivisic
JOB DESCRIPTION: Stages 4 to 6 Lot Com

DEPTH: Millimetres Below Ground Level (BGL)																			
			28	29	30	59	31	32	33	58	34	35	36	57	37	38	39	40	56
Topsoil considered as top 300mm (shaded)			Lot 84				Lot 83				Lot 82				Lot 81				
0	-	100	1	1	1	1	4	4	1	2	3	2	3	2	1	1	2	4	2
100	-	200	3	3	2	3	5	4	4	6	12	4	8	4	2	3	7	6	3
200	-	300	2	6	3	4	5	8	4	7	11	4	22	7	3	5	8	7	5
300	-	400	3	12	14	7	12	7	4	5	16	7	26	22	5	17	12	10	10
400	-	500	7	20	25	9	22	10	22	7	12	5		22	7	20	12	10	17
500	-	600	6			9	25	9	23	11	25	7			15	20	11	9	15
600	-	700	5			6		8		15	24	17			19	15	11	13	16
700	-	800	15			5		7		12		22			19	15	12	20	22
800	-	900	20			4		10		7		23			17	10	13	20	16
900	-	1000				7		10		22					22	8	25	25	11
1000	-	1100				10		22		23					18	10	24		16
1100	-	1200				9		25							8	16			20
1200	-	1300				9									14	18			20
1300	-	1400				12									16	22			16
1400	-	1500				20									15				22
1500	-	1600																	
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2700	-	2800																	
2800	-	2900																	
2900	-	3000																	
3000	-	3100																	
3100	-	3200																	
3200	-	3300																	
Notes:			Consistent				Consistent				Consistent				Consistent				

Minimum Test Depth as per NZS 3604.....1.0r
Blow count for Good Ground as per NZS 3604.....5 bl
Blow count for Good Ground as per NZS 3604.....3 bl
Blow count for 100kPa Allowable Bearing Pressure.....4 b

SCALA PENETROMETER TEST

CLIENT: Seven Oaks Kinloch Li
JOB LOCATION: Seven Oaks Subdivisic
JOB DESCRIPTION: Stages 4 to 6 Lot Con

DEPTH: Millimetres Below Ground Level (BGL)			41	42	43	55	44	45	46	47	54	48	49	50	51	53	52	66	67	68	69
Topsoil considered as top 300mm (shaded)			Lot 80				Lot 79					Lot 78					Lot 105				
0	-	100	2	1	2	2	1	1	2	3	4	1	1	2	1	1	2	1	1	1	1
100	-	200	3	4	4	5	3	2	4	6	9	2	2	4	7	3	3	1	2	1	1
200	-	300	3	7	3	12	4	1	3	9	7	1	2	4	6	3	4	4	5	5	5
300	-	400	14	10	18	22	3	4	4	13	18	1	9	5	6	4	4	9	8	10	10
400	-	500	20	22	20	17	9	6	9	17	22	6	10	15	13	11	3	8	6	5	8
500	-	600	11	25	20	14	14	3	12	13	25	8	13	13	16	12	4	5	6	5	7
600	-	700	5		13	22	14	4	10	14		6	11	15	14	9	4	5	4	4	6
700	-	800	6		16	20	10	10	10	10		5	9	12	15	7	7	3	8	3	2
800	-	900	6		17	14	10	11	10	7		10	10	16	15	8	8	3	8	3	4
900	-	1000	6		25	11	10	22	14	8		13	11	22	16	12	8	3	8	3	2
1000	-	1100	7		26	12	9	21	12	8		16	13	25	12	13	3	3	5		
1100	-	1200	10			14	7	21	12	13		8	21		13	18	3	3	3		
1200	-	1300	17			16	15		14	12		8	20		13	22			3		
1300	-	1400	14			16	18		8	17		9	18		10						
1400	-	1500	13			15	22		11	14		9	19		10						
1500	-	1600																			
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3000	-	3100																			
3100	-	3200																			
3200	-	3300																			

Notes: Consistent — Further Geotech Assessment / SED req'd [3] — Consistent — Further Geotech Assessment / SED req'd [3]

Minimum Test Depth as per NZS 3604.....1.0r
Blow count for Good Ground as per NZS 3604.....5 bl
Blow count for Good Ground as per NZS 3604.....3 bl
Blow count for 100kPa Allowable Bearing Pressure.....4 b

SCALA PENETROMETER TEST

CLIENT: Seven Oaks Kinloch L
JOB LOCATION: Seven Oaks Subdivisi
JOB DESCRIPTION: Stages 4 to 6 Lot Con

DEPTH: Millimetres Below Ground Level (BGL)			TEST No. / Approximate surface RL															
			70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
Topsoil considered as top 300mm (shaded)			Lot 104				Lot 103				Lot 102				Lot 99			
0	-	100	1	1	1	2	6	5	5	6	5	6	4	7	4	2	3	1
100	-	200	1	1	2	2	5	6	6	6	5	5	6	11	3	1	7	3
200	-	300	1	1	2	3	5	10	4	5	9	6	7	11	3	4	8	3
300	-	400	2	1	1	2	8	5	5	8	8	10	9	17	2	6	11	5
400	-	500	1	1	3	2	11	10	7	7	10	9	17	19	1	8	9	5
500	-	600	5	2	4	4	9	11	9	8	11	11	15	16	2	5	4	6
600	-	700	5	3	3	4	8	11	11	10	12	9	16	15	1	3	3	3
700	-	800	5	4	3	13	11	10	9	11	11	10	14	8	1	3	2	4
800	-	900	4	4	6	10	12	13	12	10	12	10	11	17	2	2	3	3
900	-	1000	5	6	5	10	5	6	10	7	6	8	15	15	1	3	2	3
1000	-	1100	4	5	6	12	5	7	10	8	6	7	20	10	1	2	1	2
1100	-	1200	5	6	7	11	10	12	8	7	8	6		10			2	
1200	-	1300	4	6	6	12	9	11	7	9	9	8		7				
1300	-	1400	7	6	5	12	8	9	9	11	11	10		10				
1400	-	1500	7	6	5	12	11	10	12	10	9	12		15				
1500	-	1600					9	10	12	10	9	13		10				
1600	-	1700					11	10	10	13	14	12						
1700	-	1800					13	13	13	11	13	13						
1800	-	1900					16	12	12	12	13	12						
1900	-	2000					11	11	10	10	12	11						
2000	-	2100					7	8	6	6								
2100	-	2200					5	5	4	3								
2200	-	2300					5	5	3	4								
2300	-	2400					5	5	5	5								
2400	-	2500					5	4	5	5								
2500	-	2600					5	5	4	4								
2600	-	2700					5	5	3	3								
2700	-	2800					5	5	3	3								
2800	-	2900					5	3	3	3								
2900	-	3000						3	3	3								
3000	-	3100																
3100	-	3200																
3200	-	3300																

Notes: Further Geotech Assessment / SED req'd [3] Consistent Consistent

Minimum Test Depth as per NZS 3604.....1.0
Blow count for Good Ground as per NZS 3604.....5 b
Blow count for Good Ground as per NZS 3604.....3 b
Blow count for 100kPa Allowable Bearing Pressure.....4 b

SCALA PENETROMETER TEST

CLIENT: Seven Oaks Kinloch L
JOB LOCATION: Seven Oaks Subdivisi
JOB DESCRIPTION: Stages 4 to 6 Lot Con

DEPTH: Millimetres Below Ground Level (BGL)																	
		86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101
Topsoil considered as top 300mm (shaded)		Lot 98				Lot 97				Lot 86				Lot 87			
0 - 100		2	1	2	1	1	1	1	2	2	1	1	2	1	1	1	3
100 - 200		1	2	4	6	1	1	2	2	2	4	7	5	3	2	4	5
200 - 300		4	3	4	3	1	1	1	5	9	12	17	12	2	3	3	2
300 - 400		5	3	5	6	1	1	3	8	7	12	20	16	4	4	4	10
400 - 500		6	3	6	4	2	3	3	7	6	21		16	10	12	18	22
500 - 600		3	6	4	5	3	2	2	10	8			21	18	16	22	20
600 - 700		5	5	4	3	5	2	3	6	9				22	22	25	19
700 - 800		5	4	5	3	4	2	3	12	16				23	22		17
800 - 900		5	5	4	4	5	2	3	11	21							20
900 - 1000		7	5	4	3	6	5	4	11								22
1000 - 1100		6	7	4	3	6	5	5	13								
1100 - 1200		3	5	3	2	9	5	5	15								
1200 - 1300		4	6	4	4	10	5	5	12								
1300 - 1400		5	6	11	6	10	5	6	16								
1400 - 1500		5	6	7	6	10	5	6	16								
1500 - 1600																	
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3000 - 3100																	
3100 - 3200																	
3200 - 3300																	

Notes:

Further Geotech Assessment / SED req'd [3] | Further Geotech Assessment / SED req'd [3] | Consistent | Further Geotech Assessment / SED req'd [3]

Minimum Test Depth as per NZS 3604.....1.0
Blow count for Good Ground as per NZS 3604.....5 b
Blow count for Good Ground as per NZS 3604.....3 b
Blow count for 100kPa Allowable Bearing Pressure.....4 b

SCALA PENETROMETER TEST

CLIENT: Seven Oaks Kinloch L
JOB LOCATION: Seven Oaks Subdivisi
JOB DESCRIPTION: Stages 4 to 6 Lot Con

DEPTH: Millimetres Below Ground Level (BGL)																	
		102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117
Topsoil considered as top 300mm (shaded)		Lot 88				Lot 89				Lot 90				Lot 91			
0 - 100		2	1	2	2	2	2	2	2	1	1	2	2	2	1	1	2
100 - 200		3	3	3	3	2	2	2	3	2	2	2	2	2	3	2	2
200 - 300		2	3	4	4	2	2	2	3	2	2	4	8	2	3	2	2
300 - 400		3	3	4	4	3	3	2	4	4	3	4	7	3	5	3	3
400 - 500		3	4	4	5	6	6	4	4	4	3	5	6	4	7	5	2
500 - 600		3	5	6	6	9	9	5	4	5	3	4	8	4	7	5	6
600 - 700		7	11	7	9	8	8	6	7	4	7	6	11	4	6	5	6
700 - 800		7	12	8	8	8	8	7	7	5	8	6	21	4	8	7	8
800 - 900		10	16	10	5	12	12	8	9	8	3	7		6	9	7	7
900 - 1000		11	9	11	8	21	21	8	7	4	2	7		6	8	9	6
1000 - 1100		15	10	12	9			12	7	2	2	9		9	8	9	3
1100 - 1200		22	10	14	15			12	10	2	21	8		9	7	10	2
1200 - 1300		22	16	16	13			21	9	2		9		9	5	9	3
1300 - 1400			17	12	12				12	7		10		12	3	7	3
1400 - 1500			18	12	14				12	7		10		12	4	7	3
1500 - 1600																	
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2900 - 3000																	
3000 - 3100																	
3100 - 3200																	
3200 - 3300																	

Notes:

Further Geotech Assessment / SED req'd [3]

Further Geotech Assessment / SED req'd [3]

Further Geotech Assessment / SED req'd [3]

Further Geotech Assessment / SED req'd [3]

Minimum Test Depth as per NZS 3604.....1.0
Blow count for Good Ground as per NZS 3604.....5 b
Blow count for Good Ground as per NZS 3604.....3 b
Blow count for 100kPa Allowable Bearing Pressure.....4 b

SCALA PENETROMETER TEST

CLIENT: Seven Oaks Kinloch L
JOB LOCATION: Seven Oaks Subdivisi
JOB DESCRIPTION: Stages 4 to 6 Lot Con

DEPTH: Millimetres Below Ground Level (BGL)					TEST No. / Approximate surface RL											
	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133
Topsoil considered as top 300mm (shaded)	Lot 92				Lot 93				Lot 94				Lot 95			
0 - 100	2	1	8	4	2	1	2	1	1	2	1	1	1	1	1	1
100 - 200	2	2	2	11	4	2	1	2	1	2	1	1	1	1	1	5
200 - 300	1	10	1	3	2	3	2	17	2	8	1	2	1	2	1	5
300 - 400	12	7	2	2	4	2	2	20	3	13	3	1	3	3	2	6
400 - 500	20	4	6	5	4	3	3		4	18	7	3	5	4	13	8
500 - 600		3	8	6	4	3	12		5	15	11	4	4	5	21	15
600 - 700		2	11	10	7	6	13		5	21	10	14	4	6		11
700 - 800		6	21	6	8	12	14		21		12	6	3	5		12
800 - 900		21		5	12	10	21				16	8	4	13		9
900 - 1000				6	11	6					10	12	7	13		8
1000 - 1100				20	21	1					15	10	10	19		10
1100 - 1200						18					21	9	21	21		8
1200 - 1300						21						14				11
1300 - 1400						7						12				12
1400 - 1500												12				12
1500 - 1600																
1600 - 1700																
1700 - 1800																
1800 - 1900																
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2900 - 3000																
3000 - 3100																
3100 - 3200																
3200 - 3300																
Notes:	Further Geotech Assessment / SED req'd [3]				Further Geotech Assessment / SED req'd [3]				Further Geotech Assessment / SED req'd [3]				Further Geotech Assessment / SED req'd [3]			

Minimum Test Depth as per NZS 3604.....1.0
Blow count for Good Ground as per NZS 3604.....5 b
Blow count for Good Ground as per NZS 3604.....3 b
Blow count for 100kPa Allowable Bearing Pressure.....4 b

SCALA PENETROMETER TEST

CLIENT: Seven Oaks Kinloch Li
JOB LOCATION: Seven Oaks Subdivisic
JOB DESCRIPTION: Stages 4 to 6 Lot Cor

DEPTH: Millimetres Below Ground Level (BGL)									
			134	135	136	137	138	139	140	141
Topsoil considered as top 300mm (shaded)			Lot 96				Lot 85			
0	-	100	1	1	1	1	3	2	2	5
100	-	200	1	1	3	10	2	13	2	5
200	-	300	2	2	3	10	3	19	10	13
300	-	400	4	8	5	12	11	17	12	20
400	-	500	6	10	4	8	16	14	9	20
500	-	600	6	12	5	11	16	12	14	
600	-	700	7	12	6	15	17	12	16	
700	-	800	15	12	6	16	8	12	21	
800	-	900	21	9	4	12	9	11		
900	-	1000		9	7	10	9	20		
1000	-	1100		11	7	9	8			
1100	-	1200		12	7	9	5			
1200	-	1300		10	7	8	3			
1300	-	1400		10	7	8	3			
1400	-	1500		10	7	8	3			
1500	-	1600								
1600	-	1700								
1700	-	1800								
1800	-	1900								
1900	-	2000								
2000	-	2100								
2100	-	2200								
2200	-	2300								
2300	-	2400								
2400	-	2500								
2500	-	2600								
2600	-	2700								
2700	-	2800								
2800	-	2900								
2900	-	3000								
3000	-	3100								
3100	-	3200								
3200	-	3300								
			Consistent				Consistent			

Notes:

Minimum Test Depth as per NZS 3604.....1.0r
Blow count for Good Ground as per NZS 3604.....5 bl
Blow count for Good Ground as per NZS 3604.....3 bl
Blow count for 100kPa Allowable Bearing Pressure.....4 b

Appendix 4

Lot 111 Slope Stability
by Sigma Prima
Geoengineering
Email Report dated
20 April 2023

Mary Chappel

From: Sigma Prima Geoengineering <info@spgeotec.com>
Sent: Thursday, April 20, 2023 5:59 PM
To: Lourdes Uriarte <LourdesU@cheal.co.nz>; Thomas Brand <ThomasB@cheal.co.nz>
Subject: RE: [#220223] Geotech for Seven Oaks - reviewed

Good day Lourdes

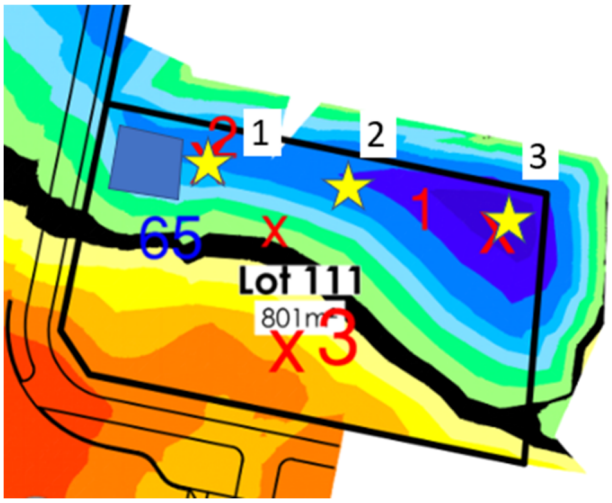
I attended the site on March 20, 2023 to assess the condition of the slope at Lot 111.

Results from 3 Scala tests, carried out down to 1.7 m - 3.4 m depth, showed values above the required strength from NZS 4431:2022; however, from a visual description of the fill materials used I noticed that the high values are a consequence of the lithic and quartzitic content, rather than the packing. That is not necessarily a bad thing, but definitely is an indication of the highly erodible condition of these man made deposits, as noticed on the batters of lot 139 and 140 (see photo below). The lower values were recorded at the northeastern corner of the platform (Scala test 3).

The slope is already 1V:2H (the plans do not match what I saw on site), so I do not consider it necessary to reshape the slope.

In conclusion:

1) Fill materials shaping the platform/batter are highly erodible.
2) Adequate vegetative coverage, including topsoil and grass, shall be provided as soon as possible to avoid rill / gully erosion affecting the batter.
3) Ponding of water on top of the batter, particularly close the the northeastern corner, shall be avoided.
4) We do not consider reshaping the batters necessary; but, a minimum 3 m buffer from the base of the slope is recommended for the construction of structures on Lots 139 and 140.



DYNAMIC PENETROMETER TEST (SCALA)										
Project	P23011			Date	20 March 20223					
Client	Cheal Cousultants									
Location	Seven Oaks, Kinloch									

Depth (mm)	1	2	3	4	5	6	7	8	9	10
100	4	3.0	3							
200	3	4	2							
300	4	6	3							
400	12	5	5							
500	15	7	7							
600	12	15	4							
700	9	11	5							
800	12	18	7							
900	14	20	19							
1000	14	20+	12							
1100	17	20+	8							
1200	18	20+	11							
1300	14	20+	17							
1400	9	20+	14							
1500	10	20+	14							
1600	10	20	11							
1700	10	15	12							
1800			14							
1900			16							
2000			13							
2100			15							
2200			20+							
2300			20+							
2400			19							
2500			20							
2600			19							
2700			20							
2800			18							
2900			22							
3000			20+							
3100			20							
3200			16							
3300			18							
3400			ref							



1V:2H batter



Suspected additional fill on the slope batter. Note the discontinuity of materials alongside the top of the batter (base of earthbund)

I hope this report fulfills your requirements, please let me know if you have any questions.

Kind regards / Cordialmente,

Andres Martinez
Senior Geotechnical Engineer

Ph: +64224119963 / +64276703628
Taupo, New Zealand

Visit us: https://www.spgeotec.com/
Email: info@spgeotec.com

Appendix 5

NZS 4431:2022 Statement of Suitability of Earth Fill (Fill Certificate)

STATEMENT OF SUITABILITY OF EARTH FILL FOR RESIDENTIAL DEVELOPMENT

NZS 4431:2022 – APPENDIX A

To: **Roger Stokes – Development Engineer** *(name and*
Taupō District Council *address of*
30 Tongariro Street, Taupō *Local Authority)*

Subdivision: **220223 : Seven Oaks Subdivision – Stages 4 to 6**

Owner/Developer: **Seven Oaks Kinloch Limited**

Location: **Seven Oaks Drive, Kinloch**

The earth fills shown on the attached plan numbers **220223-AB201 and AB202** have been placed in compliance with the terms of NZS 4431.

While work was in progress I retained as my inspecting engineer the engineer named below who is registered in terms of the Engineers Registration Act 1924 or the Chartered Professional Engineers of New Zealand Act 2002:

Engineer's Name: **Thomas Brand | Registration No. 1013712**

Address: **Cheal Consultants Limited, PO Box 165, Taupō 3351**

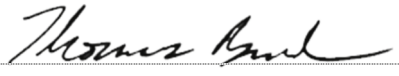
During the work the inspecting engineer and their staff made periodic visits of inspection to the site. Details of the soil testing carried out to check the quality of the fill by the inspecting engineer and their testing agency are included in the Geotechnical Completion Report.

The attached plan number **220223-AB202** shows Lot numbers 78 to 82, 100 to 106, and 108 to 111 to be affected by filling deeper than 300mm, and the extent of the fill.

In the opinion of the inspecting engineer the following special limitations should be observed:

- **Recommendations outlined in Geotechnical Completion Report (dated 20 April 2023)**

This certification, that the earth fills have been placed in compliance with the terms of NZS 4431 does not remove the necessity for the normal inspection and design of foundations as would be made in natural ground.

Signature: 

Position: Chartered Professional Engineer (Civil)

Date: 20 April 2023

On behalf of: Cheal Consultants Ltd

Name of Owner/Developer: Seven Oaks Kinloch Limited