30 November 2023

PROPOSED PRIVATE PLAN CHANGE

100 HOBSONVILLE ROAD, HOBSONVILLE

GEOTECHNICAL ASSESSMENT REPORT

Austino Property Group

AKS2023-0062AB Rev 0

AKS2023-0062AB		
Date	**Revision**	**Comments**
29 November 2023	A	Initial draft for client consultant review
30 November 2023	0	Final issue

	Name	Signature	Position
Prepared by	Eugene Crestanello		Principal Engineering Geologist
Reviewed and Authorised by	Sam Gibb		Principal Geotechnical Engineer CMEngNZ, CPEng

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Appendices

1 INTRODUCTION

CMW Geosciences (CMW) was engaged by Austino Property Group to carry out a geotechnical assessment of a site located at 100 Hobsonville Road, Hobsonville,. This report is to provide geotechnical input to support a Private Plan Change (PPC) Application to rezone 2 property blocks as follows:

Proposed re-Zoning			
Precinct	**Size (Ha)**	**Current Zone**	**Plan Change Zone**
1A	0.3851	Open Space	Light Industrial
1B	0.7880	Light Industrial	Light Industrial
1C	0.9480	Future Urban	Light Industrial
2	9.3413	Future Urban	Mixed Housing Urban / Terraced Housing & Apartment Building Zone

The purpose of this report is to summarise the existing geotechnical information, provide preliminary ground conditions expected, and to identify and quantify geotechnical risks to future development within the proposed plan change zones.

1.1 Scope of Work

The scope of work and associated terms and conditions of our engagement were detailed in our services proposal letter referenced AKS2023-0062AA, Rev 0 dated 20 July 2023, and is defined as follows:

- Desktop study of available information, including review of available existing reports and hand auger borehole investigations, historic aerial photographs, and published geology;
- Preparation of a high-level Geotechnical Assessment Report which describes potential constraints as well as Geohazards which could affect future light industrial development across Precinct 1 and urban residential housing in Precinct 2.

2 SITE LOCATION AND LANDFORM

The site comprises 2 parcels referred to as Precinct 1 to the south and Precinct 2 to the north.

The current general landform is presented on ***Figure 2***.

Precinct 1 was subject to land disturbance earthworks in recent years with the contours shown in Figure 2 having been altered to some degree. Specifically, the lower-lying landform to the north, was filled as part of subdivisional earthworks the bulk of which was undertaken to the north-east of the site. Attached in Appendix C is a topographic survey showing the modified landform. The northern portion of the landform is now mostly very gently sloping apart from an approximately 8m high batter slope to the north-west, the gradient of which averages around 1V:3H. There is also a large soil stockpile which sits on the modified plateau. as well as a fill batter. The amphitheatre shaped slope in the southern portion of site is believed to be unaltered and comprises gradients of 1V:6H.

Precinct 2 is formed over a ridgeline trending from south to north and constrained by natural gullies to the east and west. The ridgeline is, for the most part, very gently sloping becoming more moderately sloping where the flanks of the ridgeline slope down to the gullies. The eastern gully is heavily vegetated whilst the western gully is predominantly denuded. Whilst the gradients of the sloping flanks are typically no steeper than 1V:3H there are signs of surface terracettes (i.e. soil creep) and possibly larger slow-moving landslides. We discuss the geomorphological features in section 4.2 below.

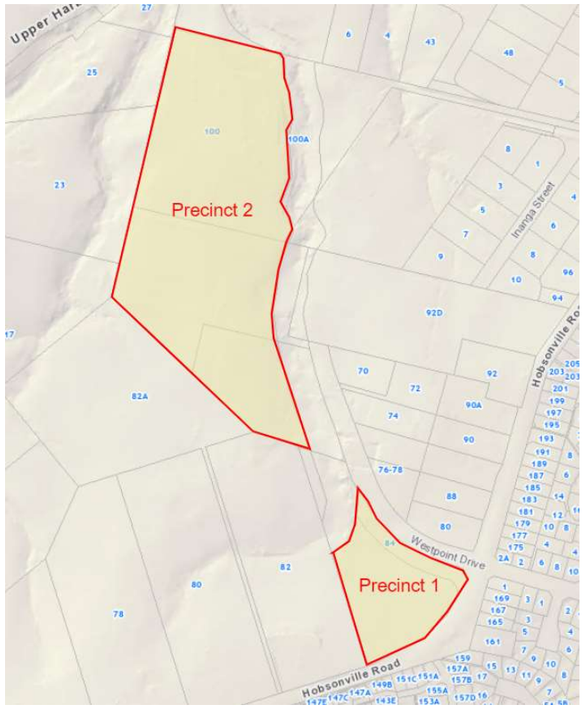


Figure 1: Site Location Plan (Source: Auckland Council Geomaps)

Figure 2: Site Aerial & Contours circa 2016 (Source: Auckland Council Geomaps)

FACTUAL

3 DESKTOP STUDY

3.1 Historic Aerial Photographs

Historical Aerial Photographs		
Source	**Date**	**Notes/Observations**
Auckland Council Geomaps	1959	Both Precinct 1 & 2 appear to be grazed paddocks with no obvious evidence of land disturbance or instability.
	1996	The grazed paddocks have been converted to ploughed fields as well as a dwelling and associated buildings appearing in Precinct
	2007	No major or obvious changes since 1996

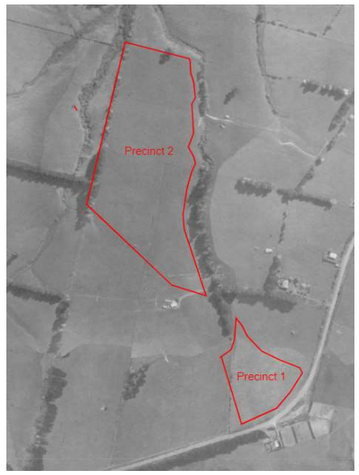


Figure 3: 1940

Figure 4: 1996

Figure 5: 2017

3.2 Existing Geotechnical Investigations

Related Documents
Hand auger boreholes records and site plan for investigations across 86, 88, 19 & 100 Hobsonville Road by Geotek Solutions on 18 and 19 March 2019
Geotechnical Investigation Report (GIR) for Proposed 10-Lot Light Industrial Subdivision at 86-88 Hobsonville Road prepared by Geotek Solutions dated 27 May 2019 (Reference 7273, Resource Consent Issue)
Geotechnical Completion Report (GCR) for Proposed 10-Lot Light Industrial Subdivision at 86-88 Hobsonville Road prepared by Geotek Solutions dated 11 November 2021 (Reference 94185.1 GCR)

3.2.1 Hand Auger Borehole Investigations

Figure 7 below shows the extent of 5m deep hand auger borehole investigations undertaken by a previous consultant which we discuss in section 4.3 below.

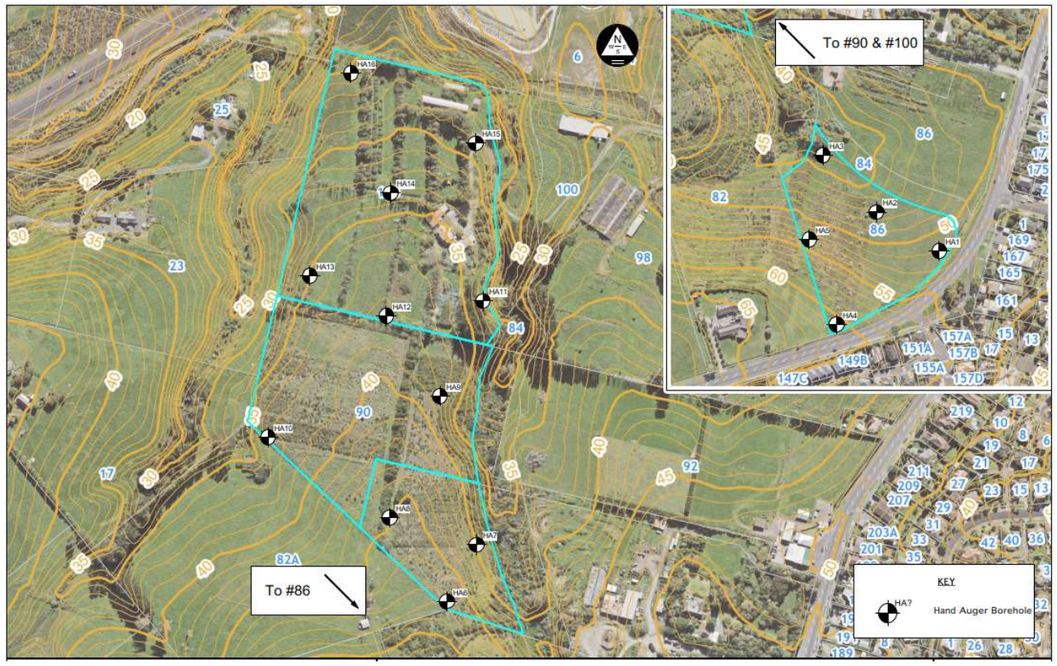


Figure 6: Geotek Solutions Hand Auger Borehole Site Investigation Plan

3.2.2 GIR & GCR for Neighbouring Subdivision

Site investigations were undertaken by a consultant on the block of land to the east with subsequent earthworks development for a 10-Lot light-industrial subdivision. We discuss the ground conditions and report findings in section 4.4 below.

FACTUAL

4 GROUND MODEL

4.1 Published Geology

Published geological maps[1] for the area depict the regional geology as comprising Late Pliocene to Mid Pleistocene alluvial deposits belonging to the Tauranga Group of the Puketoka Formation (Pup) as illustrated in ***Figure 9***.

These alluvial deposits include pumiceous mud, sand and gravel with muddy peat and lignite, rhyolitic pumice (including non-welded ignimbrite, tephra and alluvial pumice deposits) and massive micaceous sand beds. Below these upper soil layers, the deeper geological formation is reported to comprise, interbedded muddy sandstones and siltstones of the East Cast Bays Formation (Mwe) within the Waitemata Group.

The main geotechnical hazards within the Puketoka Formation strata are the potential for low bearing capacity and settlement from soft/organic/ compressible soils when surcharge loads such as earthworks fill and /or building loads are applied.

4.2 Geomorphology

The geomorphology of Precinct 2 was mapped by examination of aerial photographs and the site contours ***(See Figure 10)***. The geomorphology of Precinct 1 was not considered to be of any significant influence on future development given the previous land modification.

As noted above, site gradients are typically relatively gentle, although they do steepen adjacent to the gully flanks, above the gully watercourses that run adjacent to the eastern and western margins of the site before merging into one another north of the landform. We consider that there may be the presence of soil creep headscarps which extend up from the watercourses likely as a result of gully toe erosion and long-term seasonal shrink/swell cycles.

4.3 Investigation Findings

In general, the hand auger investigations undertaken across the proposed Precinct 1 and 2 have confirmed the expected geology and ground conditions comprising Tauranga Group Alluvium. The landform is predominantly underlain with stiff to very stiff, slightly to moderately plastic, clayey SILTS and silty CLAYS. There are sometimes seemingly isolated pockets of organic materials intermixed with the alluvial soils but no obvious evidence of soft soils, fibrous peat nor amorphous peat. There was also a seemingly isolated location where pre-existing fill was encountered at the ground surface which is not unexpected given the rural setting.

4.4 Groundwater

Groundwater was rarely encountered at the time the hand augers were drilled in March 2019. However, we would expect that during periods of prolonged rainfall such as during winter, groundwater levels may be present at shallower depths across the landform.

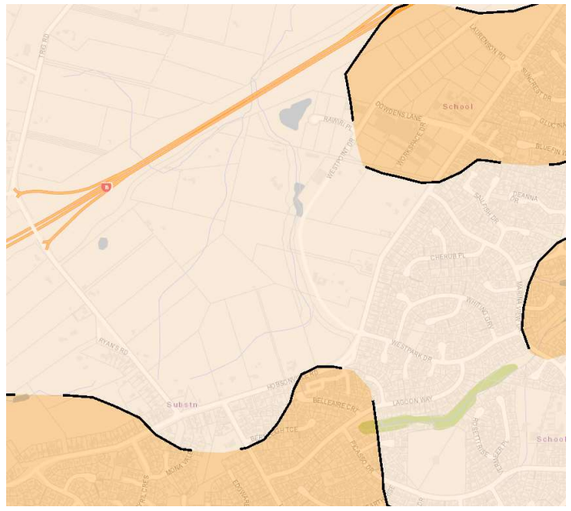


Figure 7: Regional Geology (GNS Science Web Geology Map)

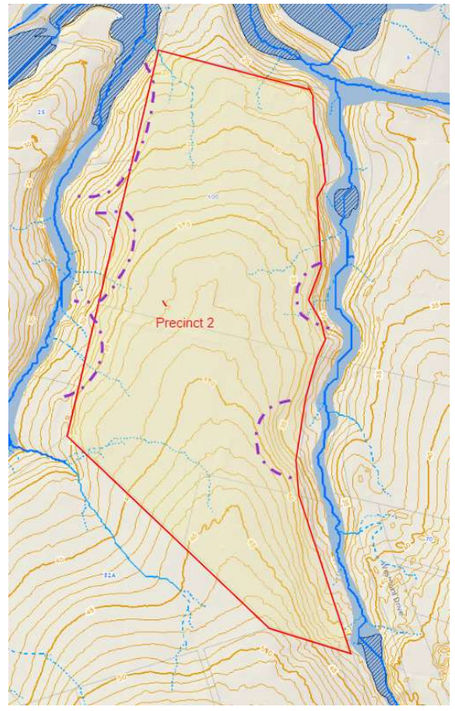


Figure 8: Precinct 2 Geomorphology Plan with possible soil creep headscarps delineated by purple dot-dash lines . Watercourses in dark blue and overland flow paths in light blue.

INTERPRETIVE

4.5 Precinct 1 Earthworks

Precinct 1 was subject to earthworks modification between January 2020 and August 2021. In ***Figure 9*** we have reproduced an as-built earthworks fill plan which shows the presence of up to 7.5m of fill above an underfill subsoil drainage network following the removal of topsoil, gully mullock and other unsuitables. The site also contains a stockpile of spoil as shown in ***Figure 10.***

4.6 86 & 88 Hobsonville Subdivision Development

The ground conditions encountered under the neighbouring landform to the east are very similar to the subject site and we would also expect that East Coast Bays Formation to underlying the alluvial soils. There were no reports of weak and/or compressible deposits and earthworks development for the 10-lot, light residential subdivision appear to have been completed as anticipated.

In reading the GCR, the development included the following restrictions relating to Geohazards:

- Class H (Highly) expansive soils;
- Future fills limited to 0.5m (10 kPa) and Future floor loads limited to 15 kPa to mitigate the risk of consolidation of the underlying subsoils;
- Class C shallow soil stratigraphy (NZS1170.5);
- No onsite soakage of stormwater.

DRAWING CERTIFICATION

CUT/FILL DEPTH TABLE

Number	Minimum Elevation	Maximum Elevation	Colour
1	-6.000	-5.000	
2	-5.000	-4.000	
3	-4.000	-3.000	
4	-3.000	-2.000	
5	-2.000	-1.000	
6	-1.000	0.000	
7	0.000	1.000	
8	1.000	2.000	
9	2.000	3.000	
10	3.000	4.000	
11	4.000	5.000	
12	5.000	6.000	
13	6.000	7.000	
14	7.000	8.000	

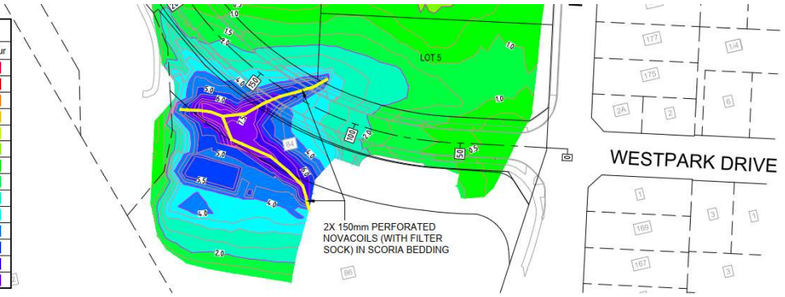


Figure 9: Cut/Fill as-built plan from Geotek Solutions GCR

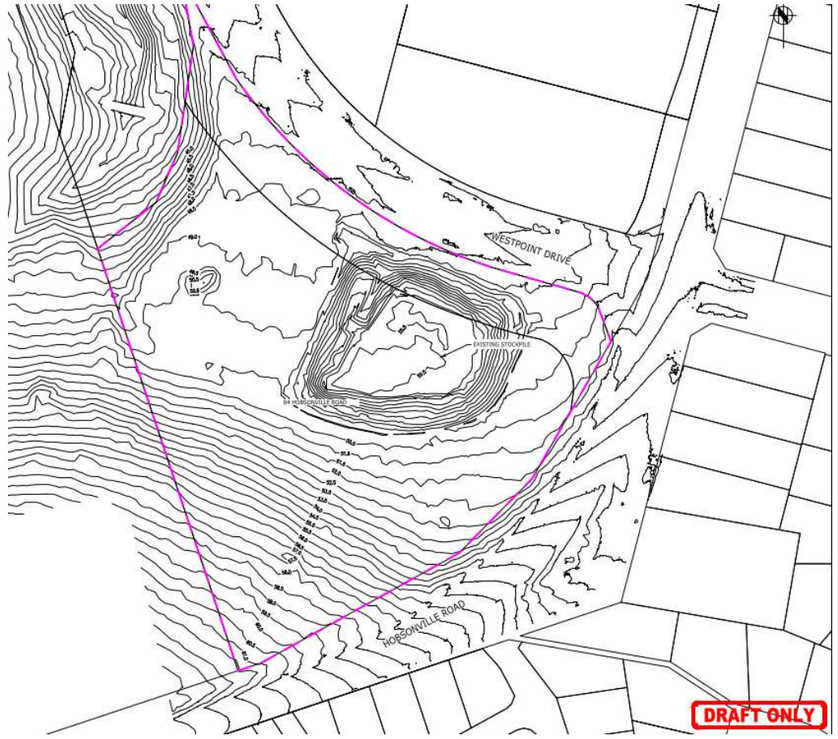


Figure 10: Topographic survey plan of Precinct 1 dating from October 2022 by HG

5 GEOHAZARDS ASSESSMENT & MITIGATION

Geotechnical Assessment and Mitigation			
Geotechnical Hazard	**Description**	**Area Affected**	**Comments and Geotechnical Control / Mitigation Measures**
Water/Groundwater	Surface Water	Margins of Precinct 2	Whilst there are no watercourses defined with the site, nor are there any overland flow paths entering into the site, we do note that, from Auckland Council Geomaps, the potential for overland flow paths developing along the margins and flowing into the defined watercourses to the east, west and north of the landform. For the purposes of this report, we have assumed that the overland flowpath extents can be filled. It can be assumed that any filling will have underfill drainage placed beneath it to allow the flow of any occasional water flows to continue and to prevent the build-up of groundwater pressures from developing beneath the fill.
	Stormwater Disposal	Entire Site	Stormwater soakage to ground is typically not feasible and will need to be reticulated and discharged away from the site.
Erosion	Cut Batters	Unknown (future cut areas)	Mitigated by designing for maximum 1V:3H gradient, or steeper with surface stabilisation / treatment included in design (such as undercuts, by over excavation and replacement) as well as support with retaining walls.
	Fill Batters	Unknown (future fill areas)	Mitigated by designing for maximum 1V:3H gradient, stormwater control and/ or steeper with surface stabilisation / treatment in design (such as reinforced earth slopes / retaining walls).
Landslip	Global Slope Instability	Elevated areas and slopes.	Most of the site is relatively gently sloping and not considered subject to instability risk. The western and eastern margins of Precinct 2, adjacent to the watercourses may require slope stability remedial works comprising undercuts and/or small shear keys. Installation of retaining walls, palisade piles, or set-backs from the steeper slopes, may be required. This would be subject to detailed investigation and stability analysis, dependant on the earthworks and/or future development proposed.
	Soil Creep	Elevated areas and slopes.	A function of slope gradient and the expansive nature of the materials, movement is likely to be limited to approximately 1m to 1.5m depth, where present. Creep is limited to the sloped areas partially along ridge flanks. To be mitigated by design of slope gradients, including use of retaining walls, subsoil drainage and by design of footings.
	Cut & Fill Batter Instability	Future cut, and fill areas	Both temporary and permanent batters need to be considered. Mitigated smart construction staging as well as controls on gradient, stormwater and surface stabilisation.
Expansive Soils	Expansive Soils	Entire site	Expansive soils are classified in NZS 3604 as those soils having a liquid limit of more than 50% and linear shrinkage of more than 15%. Alluvial soils are typically highly expansive. Mitigation of the expansive soil hazard is by foundation design at Building Consent stage and will be addressed on a lot-by-lot basis in the Geotechnical Completion Report(s) at the conclusion of the development works.
Subsidence	Soft Soils/ Load Induced Settlement	Entire Site	The topography and existing information indicate that there are no significant concerns across Precinct 1 as well as within the upper 5m of the soil profile across Precinct 2. Further geotechnical investigation using deeper investigation techniques such as Cone Penetrometer Testing (CPT) is recommended once landform modifications (i.e. cut and filling) are defined. In areas where fills and/ or significant building construction or storage loads are placed over soft deposits, allowance needs to be made for post-construction settlement of the fills and the underlying ground that could cause damage to structures. Consideration in the design needs to be given to the quantum of settlement that is likely to occur (i.e. ensuring it is insufficient to influence the cut/ fill volumes and balance during earthworks and/ or damage structures) and the time taken for the settlement to occur (i.e. ensuring it will be largely completed by the time a normal civil works programme would likely be commencing). The most appropriate mitigation is to avoid the potential for highly loaded structures in areas of weak/compressible materials during Master Planning, or to allow for ground improvement / piled foundations. However another remedial option for accelerating settlements in areas of deep alluvium / peat soils involve preloading. Locations and heights of surcharge must be subject to geotechnical review to avoid causing bearing capacity failure in the underlying alluvium.

Geotechnical Assessment and Mitigation			
Geotechnical Hazard	**Description**	**Area Affected**	**Comments and Geotechnical Control / Mitigation Measures**
Existing Fill	Uncontrolled Fill overlying Engineered Fill	Precinct 1	The stockpile across Precinct 1 will need to be removed and the underlying engineered fill exposed and confirmed before any future earthworks are to proceed.
	Uncontrolled Fill	Precinct 2	Existing uncontrolled fill has been identified in an isolated location. Re-engineering of existing fill may be required in some areas. Following environmental testing (by others) material reworking may be considered appropriate.
Seismicity	Liquefaction	Entire Site	Liquefaction is a process where typically saturated, granular soils develop excess pore water pressures during cyclic (earthquake) loading that exceed the effective stress of the soil. Liquefaction potential will be largely dependent on material characteristics of the underlying soils. A region-wide liquefaction assessment has been undertaken by Auckland Council in accordance with MBIE document "Planning and engineering guidance for potential liquefaction-prone land Resource Management Act and Building Act aspects" (2017). The liquefaction potential has been assessed to be unlikely. However additional investigations will be required to determine the potential for the recently identified peat soils to be subject to liquefaction.

6 CONCLUSION

Based on our hazard assessment, we consider that the land is generally suitable for creating stable building platforms and infrastructure, having acceptable levels of post-development residual risk from natural hazards. Consideration of the key geotechnical hazards should be incorporated into Master Planning once more detailed investigations are undertaken.

Development may require earthworks and drainage to provide improved stability around the margins of Precinct 2. This is achievable given appropriate design, and construction using conventional earthworks remediation methods. Any proposed earthworks are to be undertaken in accordance with all relevant standards and documents. The engineering controls required to control existing, latent risks are commonplace works in this terrain that are consistent with those being adopted on adjacent land. Further site investigation and design will need to be undertaken to quantify the geotechnical controls prior to resource consent application and the commencement of any works.

7 CLOSURE

Additional important information regarding the use of your CMW report is provided in the '*Using your CMW Report*' document attached to this report.

This report has been prepared for use by Austino Property Group in relation to the 100 Hobsonville Road Private Plan Change project in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Austino Property Group seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.

USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site.

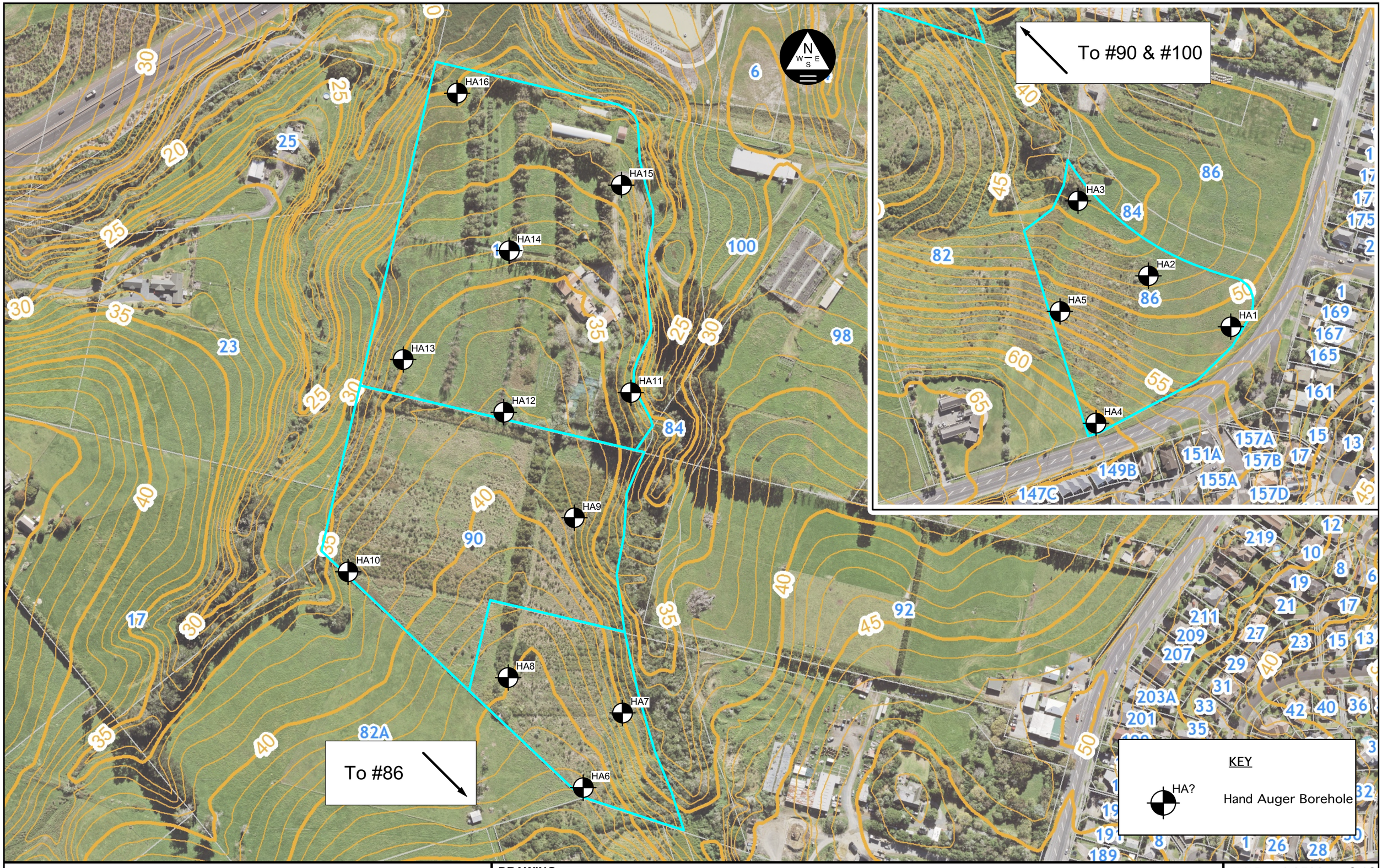
A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

Environmental Matters Are Not Covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.

Appendix A: Site Investigation Plan



GEOTEK solutions
THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

DRAWING TITLE:	SITE PLAN with Hand Auger Borehole Locations
LOCATION :	86, 88, 90 & 100 Hobsonville Road, Hobsonville
CLIENT:	Austino Property Group

SCALE	1:2500 @ A3
JOB No.	7274
DRAWN BY	CB
DATE	MAR 2019
SHEET	1 OF 1

CMW Geosciences
Great People | Practical Solutions

Appendix B: Hand Auger Borehole Records

CLIENT: Austino Hobsonville 1 Ltd		LOGGED: LC	SHEET: 1 of 19	JOB REF: 7274	
LOCATION : 86, 88, 90 + 100 Hobsonville Road		CHECKED:			
Hobsonville		DIAMETER: 50mm	DATE: 18/03/19	HAND AUGER No: HA1	
		SV DIAL: DR 4802			

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil						
NATURAL: Stiff, very slightly plastic, orange with grey streaks, clayey SILT: moist						
	0.5		110+			
Stiff, very slightly plastic, orange with grey streaks, silty CLAY: moist						
- becoming light grey with orange streaks			110+			
	1.0					
			109	46	2.4	
	1.5					
			106	63	1.7	
	2.0		102	74	1.4	
Stiff, very slightly plastic, light grey with orange streaks, sandy silty CLAY: moist						
	2.5		103	78	1.3	
- becoming slightly plastic			102	77	1.3	
	3.0					
Stiff, slightly plastic, light grey with orange streaks, silty CLAY: moist			99	86	1.2	
	3.5		91	74	1.2	
Stiff, very slightly plastic, light grey, clayey SILT: moist	4.0		90	66	1.4	
			86	77	1.1	
Stiff, very slightly plastic, medium grey, sandy clayey SILT: moist	4.5		82	69	1.2	
			92	81	1.1	
	5.0					
End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion						

Tauranga Group Materials

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT:	Austino Hobsonville 1 Ltd	LOGGED: LC CHECKED:	SHEET: 2 of 19	JOB REF:	7274
LOCATION :	86, 88, 90 + 100 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4802	DATE: 18/03/19	HAND AUGER No:	HA2

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Tauranga Group Materials

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					
	NATURAL: Very stiff, non-plastic, light grey, sandy SILT, damp					Piezometer installed to 5.0m depth
0.5			UTP			
	Stiff, very slightly plastic, light grey with orange streaks, silty CLAY: moist		110+			
1.0						
	- becoming stiff		82	30	2.8	
1.5			102	56	1.8	
2.0			91	56	1.6	
2.5			89	53	1.7	
	Stiff, very slightly plastic, light grey with orange streaks, clayey SILT: moist		104	59	1.7	
3.0	Stiff, very slightly plastic, grey, silty CLAY: moist - becoming dark grey					
	Firm, very slightly plastic, grey with orange mottles, silty SAND: moist		54	66	0.8	
3.5	- becoming dark grey					
	- becoming Stiff		110+			
4.0		13/03/19	107	104	1.0	
	- becoming wet					
4.5			110+			
			110+			
5.0			110+			
	End of borehole @ 5.0 m (Target Depth) Groundwater encountered @ 4.2m during drilling Standing groundwater on completion measured @ 4.2m					

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: LC	SHEET: 3 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 18/03/19	HAND AUGER
	SV DIAL: DR4802		No: HA3

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Depth (m)	Legend	Soil Description	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
		Topsoil					
		Tauranga Group Materials					
		NATURAL: Stiff, very slightly plastic, light grey, clayey SILT: moist					
		Stiff, very slightly plastic, light grey with orange streaks, silty CLAY: moist		110+			
0.5							
				110+			
1.0							
				110+			
1.5							
		Stiff, very slightly plastic, light grey with orange streaks, sandy silty CLAY: moist		100	66	1.5	
2.0				102	59	1.7	
2.5				110+			
				110+			
3.0							
		- becoming medium grey		110+			
3.5							
		Stiff, non-plastic, dark grey, sandy clayey SILT: moist		110+			
4.0				UTP			
		- becoming Very stiff					
4.5				UTP			
				UTP			
		- becoming wet					
5.0				UTP			
		End of borehole @ 5.0 m (Target Depth)					
		Groundwater encountered @ 4.9m during drilling					
		Standing groundwater on completion measured @ 5.0m					

18/03/19

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: MK	SHEET: 4 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 19/03/19	HAND AUGER No: HA4
	SV DIAL: DR4814		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:						
Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil						
NATURAL: Stiff, very slightly plastic, light brownish orange with grey streaks, silty clay: moist						Peizometer installed to 5.0 metres depth
	0.5		104	31	3.4	
- becoming light grey with orange streaks			128	55	2.3	
	1.0					
			134	79	1.7	
	1.5					
			137	104	1.3	
	2.0		116	85	1.4	
	2.5		85	73	1.2	
- becoming light grey with pinkish red streaks,			92	55	1.7	
	3.0					
- becoming brownish yellow, slightly plastic			98	73	1.3	
	3.5		98	61	1.6	
- becoming moderately plastic	4.0		104	73	1.4	
	4.5		104	79	1.3	
End of borehole @ 4.6 m (UTP taking too long to finish hole) No groundwater encountered during drilling or on completion			104	73	1.4	
	5.0					

Tauranga Group Materials

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd		LOGGED: LC	SHEET: 5 of 19	JOB REF: 7274	
LOCATION : 86, 88, 90 + 100 Hobsonville Road		CHECKED:			
Hobsonville		DIAMETER: 50mm	DATE: 18/03/19	HAND AUGER No: HA5	
		SV DIAL: DR4802			

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Tauranga Group Materials

Depth (m)	Soil Description	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity
	Topsoil			
	NATURAL: Stiff, non-plastic, light grey with orange specks, sandy SILT: moist			
0.5		110+		
	- becoming very slightly plastic			
		110+		
	Stiff, very slightly plastic, light grey with orange streaks, silty CLAY: moist			
1.0				
		110+		
	- becoming medium grey			
1.5				
		110+		
	- becoming light grey			
2.0				
		110+		
	- becoming stiff			
2.5		102	67	1.5
		99	76	1.3
3.0				
		87	74	1.2
	Stiff, slightly plastic, light grey with orange streaks, sandy silty CLAY: moist			
3.5		97	74	1.3
4.0		110+		
4.5		110+		
	Stiff, very slightly plastic, dark grey, sandy clayey SILT: moist	110+		
5.0		110+		
	End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion			

Water Level

Comments / Samples / Other Test

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: LC	SHEET: 16 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 19/03/19	HAND AUGER
	SV DIAL: DR4802		No: HA6

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					
	NATURAL: Stiff, very slightly plastic, orange, sandy silty CLAY: damp					
	- becoming grey with orange streaks		110+			
0.5			110+			
1.0	Stiff, very slightly plastic, medium grey, silty CLAY: moist		110+			
1.5			110+			
2.0			110+			
2.5	- becoming slightly plastic		110+			
			110+			
3.0	Stiff, very slightly plastic, whitish grey, sandy silty CLAY: moist		109	84	1.3	
	- becoming whitish grey with red streaks		110+			
3.5						
4.0			110+			
	Stiff, moderately plastic, light grey with orange streaks, silty CLAY: moist		110+			
4.5						
	- becoming slightly plastic		110+			
5.0	End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion		99	74	1.3	

Tauranga Group Materials

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: LC	SHEET: 7 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 18/03/19	HAND AUGER No: HA7
	SV DIAL: DR4802		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					
	NATURAL: Stiff, very slightly plastic, orange with grey streaks, silty CLAY: moist					
0.5			110+			
1.0			110+			
	- becoming light grey with orange streaks		110+			
1.5			110+			
2.0			110+			
2.5			110+			
	- becoming orange		110+			
3.0	Stiff, slightly plastic, light grey with orange streaks, sandy clayey SILT: moist		110+			
3.5			102	82	1.2	
	- black organic streaks present					
4.0			79	58	1.4	
4.5			110+			
	- becoming light blueish grey		110+			
5.0			107	82	1.3	
	End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion					

Tauranga Group Materials

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: LC	SHEET: 8 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 19/03/19	HAND AUGER No: HA8
	SV DIAL: DR4802		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil							Peizometer Installed to 5.0m depth
Fill — **FILL(Non-engineered?):** Stiff, non-plastic, orange with brown mottles, sandy silty CLAY with topsoil: damp							
Tauranga Group Materials — **NATURAL:** Stiff, very slightly plastic, orange with light grey streaks, silty CLAY: moist							
- becoming grey with orange streaks		0.5		110+			
				110+			
		1.0					
				110+			
		1.5					
				109	49	2.2	
		2.0		110+			
		2.5		110+			
				110+			
		3.0					
				99	76	1.3	
		3.5		97	84	1.2	
		4.0		100	84	1.2	
- becoming orange							
		4.5		96	81	1.2	
				77	72	1.1	
		5.0		110+			
End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion							

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT:	Austino Hobsonville 1 Ltd	LOGGED: LC CHECKED:	SHEET: 9 of 19	JOB REF:	7274
LOCATION :	86, 88, 90 + 100 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4802	DATE: 18/03/19	HAND AUGER No:	HA9

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Tauranga Group Materials

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					
	NATURAL: Stiff, very slightly plastic, brownish orange, clayey SILT: damp		110+			
0.5						
	Stiff, very slightly plastic, orange with grey streaks, silty CLAY: moist		110+			
1.0	- becoming light grey with orange streaks, slightly plastic					
	- becoming stiff		86	31	2.7	
1.5			110+			
2.0			110+			
2.5			110+			
3.0			110+			
3.5			110+			
4.0			110+			
	Stiff, very slightly plastic, light grey, sandy clayey SILT: moist		110+			
4.5			110+			
5.0	End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion		110+			

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: LC	SHEET: 10 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 19/03/19	HAND AUGER No: HA10
	SV DIAL: DR4802		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil						
NATURAL: Very stiff, non-plastic, brown grey, sandy clayey SILT: damp	0.5		UTP			
Stiff, very slightly plastic, grey with orange streaks, silty CLAY: moist	1.0		110+			
	1.5		110	41	2.7	
	2.0		100	46	2.2	
Stiff, very slightly plastic, light grey, sandy clayey SILT: moist	2.5		72	59	1.2	
	3.0		92	76	1.2	
	3.5		92	84	1.1	
	4.0		99	56	1.8	
	4.5		86	48	1.8	
	5.0		79	49	1.6	
End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion			110+			
			110+			
			110+			

Tauranga Group Materials

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: LC	SHEET: 11 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 18/03/19	HAND AUGER No: HA11
	SV DIAL: DR4802		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Tauranga Group Materials	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil							
NATURAL: Stiff, very slightly plastic, light grey with orange and brown mottles, clayey SILT: moist		0.5		110+			
Stiff, very slightly plastic, light grey with orange streaks, silty CLAY: moist		1.0		110+			
				104	53	2.0	
Stiff, slightly plastic, light grey with orange streaks, sandy silty CLAY: moist		1.5					
- becoming wet		2.0	▽				
- becoming firm - rootlets present		2.5	18/03/19	54	39	1.4	
				91	48	1.9	
Stiff, slightly plastic, light blueish grey, silty CLAY: moist		3.0		110+			
		3.5		110+			
		4.0		110+			
- becoming Very stiff		4.5		UTP			
				UTP			
		5.0					

End of borehole @ 5.0 m (Target Depth)
Groundwater encountered @ 2.0m during drilling
Standing groundwater on completion measured @ 2.2m

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: MK	SHEET: 12 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 19/03/19	HAND AUGER No: HA12
	SV DIAL: DR4814		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					Peizometer installed to 5.0 metres depth
	NATURAL: Very stiff, non-plastic, grey, clayey SILT: dry					
0.5			138+			
	Stiff, very slightly plastic, orangey brown, silty CLAY: moist		104	49	2.1	
1.0						
			122	92	1.3	
1.5						
			116	79	1.5	
	- grey with orange streaks					
2.0	Stiff, very slightly plastic, grey with orange brown streaks, clayey SILT: moist		104	67	1.6	
2.5			104	55	1.9	
	Stiff, slightly plastic, yellowish brown, silty CLAY: moist		98	49	2.0	
3.0						
	Stiff, very slightly plastic, black, Organic sandy silty CLAY: moist		122	79	1.5	
3.5			98	73	1.3	
4.0	Stiff, moderately plastic, grey, silty CLAY: moist		104	67	1.6	
			138+			
4.5	- becoming very stiff					
			138+			
5.0			138+			
	End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion					

Tauranga Group Materials

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: MK	SHEET: 13 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 19/03/19	HAND AUGER No: HA13
	SV DIAL: DR4814		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
0.5			120	43	2.8	
			137	43	3.2	
1.0						
			134	100	1.3	
1.5						
			116	61	1.9	
2.0			98	67	1.5	
2.5			116	85	1.4	
			98	79	1.2	
3.0						
			110	73	1.5	
3.5						
			98	85	1.2	
4.0			122	98	1.2	
			110	73	1.5	
4.5						
			110	85	1.3	
5.0			110	85	1.3	

Topsoil

NATURAL: Stiff, non-plastic, light brown/grey, clayey SILT: dry

- becoming light brown grwy with orange streaks
- becoming very slightly plastic

- becoming slightly plastic

Stiff, very slightly plastic, grey, sandy clayey SILT: moist

- becoming light bluesh grey

End of borehole @ 5.0 m (Target Depth)
No groundwater encountered during drilling or on completion

Tauranga Group Materials

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: MK	SHEET: 14 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 18/03/19	HAND AUGER No: HA14
	SV DIAL: DR4814		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					Peizometer installed to 5.0 meters depth
	NATURAL: Very stiff, very slightly plastic, orangey brown with grey streaks, silty CLAY: moist		138+			
0.5						
	- becoming grey with orangey brown streaks		138+			
1.0						
			138+			
	- becoming grey					
1.5						
	- becoming grey with occasional orange streaks		138+			
2.0						
			138+			
	- becoming stiff		116	85	1.4	
2.5						
	- becoming dark grey - becoming slightly plastic		98	73	1.3	
3.0						
	Stiff, moderately plastic, dark grey/ black, organic sandy silty CLAY: moist		73	49	1.5	
3.5						
			73	43	1.7	
	- small wood peices					
4.0			79	37	2.1	
			138+			
4.5						
			138+			
5.0			138+			
	End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion					

Tauranga Group Materials

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: LC	SHEET: 15 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 18/03/19	HAND AUGER No: HA15
	SV DIAL: DR4802		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					Peizometer installed to 5.0m depth
	FILL(Non-engineered?): Very stiff, non-plastic, brown with grey streaks, sandy SILT with topsoil: dry		UTP			
0.5	Stiff, very slightly plastic, grey with brown mottles, silty CLAY with topsoil: dry		110+			
1.0			110+			
1.5	Stiff, slightly plastic, light grey with orange mottles, silty CLAY: moist		110+			
2.0			110+			
2.5	- becoming moderately plastic		110+			
3.0	- black organic mottles present - bands of course sand present		110+			
3.5			110+			
4.0			110+			
4.5	Stiff, very slightly plastic,greyish brown, silty CLAY with streaks of medium sand: moist		109	86	1.3	
	Stiff, very slightly plastic, yellowish grey, silty CLAY: moist		110+			
5.0	End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion		110+			

FILL

Tauranga Group Materials

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 1 Ltd	LOGGED: MK	SHEET: 16 of 19	JOB REF: 7274
LOCATION : 86, 88, 90 + 100 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 18/03/19	HAND AUGER
	SV DIAL: DR4814		No: HA16

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					Peizometer installed to 5.0m depth
	NATURAL: Stiff, non-plastic, grey, clayey SILT: dry					
0.5			134	55	2.4	
	- becoming very slightly plastic					
			122	43	2.8	
1.0						
			110	76	1.4	
	Stiff, slightly plastic, grey, silty CLAY: moist					
1.5			110	73	1.5	
	- becoming moderately plastic					
2.0			104	73	1.4	
	Stiff, very slightly plastic, grey, sandy clayey SILT: moist					
2.5			110	79	1.4	
			122	73	1.7	
3.0						
			98	73	1.3	
3.5						
	Stiff, moderately plastic, grey, silty CLAY: moist		98	73	1.3	
	- low retention					
4.0			92	73	1.3	
4.5			122	104	1.2	
			98	85	1.2	
5.0			104	85	1.2	
	End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion					

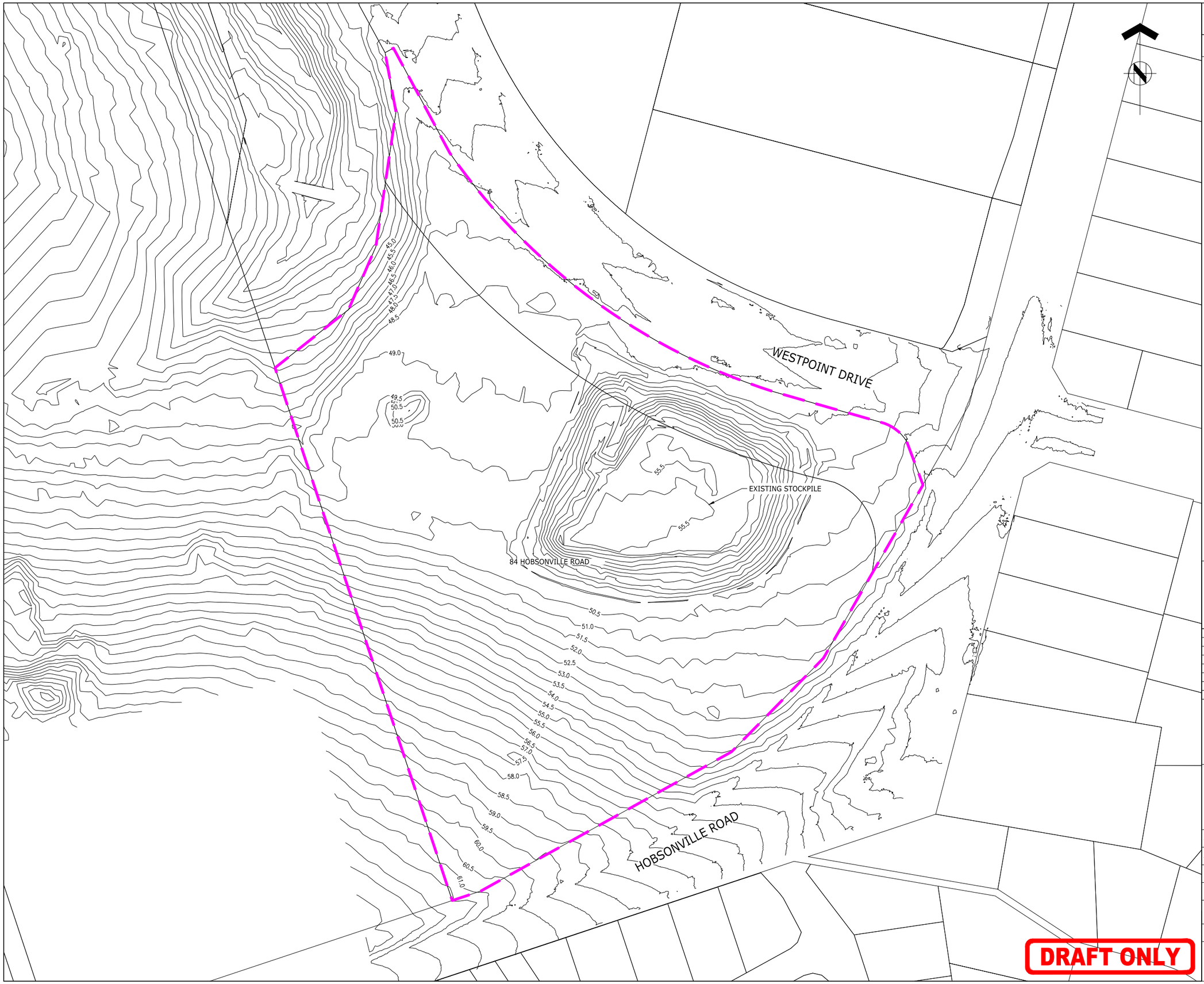
Tauranga Group Materials

GEOTEK solutions

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Appendix C: Topographic Survey Plan Precinct 1



ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

LEGEND:

EXISTING CONTOURS SHOWN AT 0.5m INVERVALS

SITE BOUNDARY

AUCKLAND OFFICE
LEVEL 4, 96 ST GEORGES BAY ROAD
PARNELL AUCKLAND 1052
T +64 9 917 5000
W www.harrisongrierson.com

REF	REVISIONS	BY	DATE
1	ISSUED FOR COUNCIL CONSENT	JHT	

PROJECT:

AUSTINO
BLOCK 1
84 HOBSONVILLE RD, HOBSONVILLE

TITLE:

EXISTING CONTOURS PLAN

ORIGINATOR: TXD	DATE:	SIGNED:	PLOT BY: TXD
DRAWN: TXD	DATE:	SIGNED:	PLOT DATE: 26.10.22
CHECKED: JHT	DATE:	SIGNED:	SURVEY BY: HG
APPROVED: SXS	DATE:	SIGNED:	SURVEY DATE: 30.09.22

ISSUE STATUS: COUNCIL CONSENT

PROJECT No: A2212330.00	SCALES: 1:500 - A1 1:1000 - A3	A3
DRAWING No: A2212330-150		REV R1