

## **APPENDIX 1**

### **Earthworks QA Documentation**

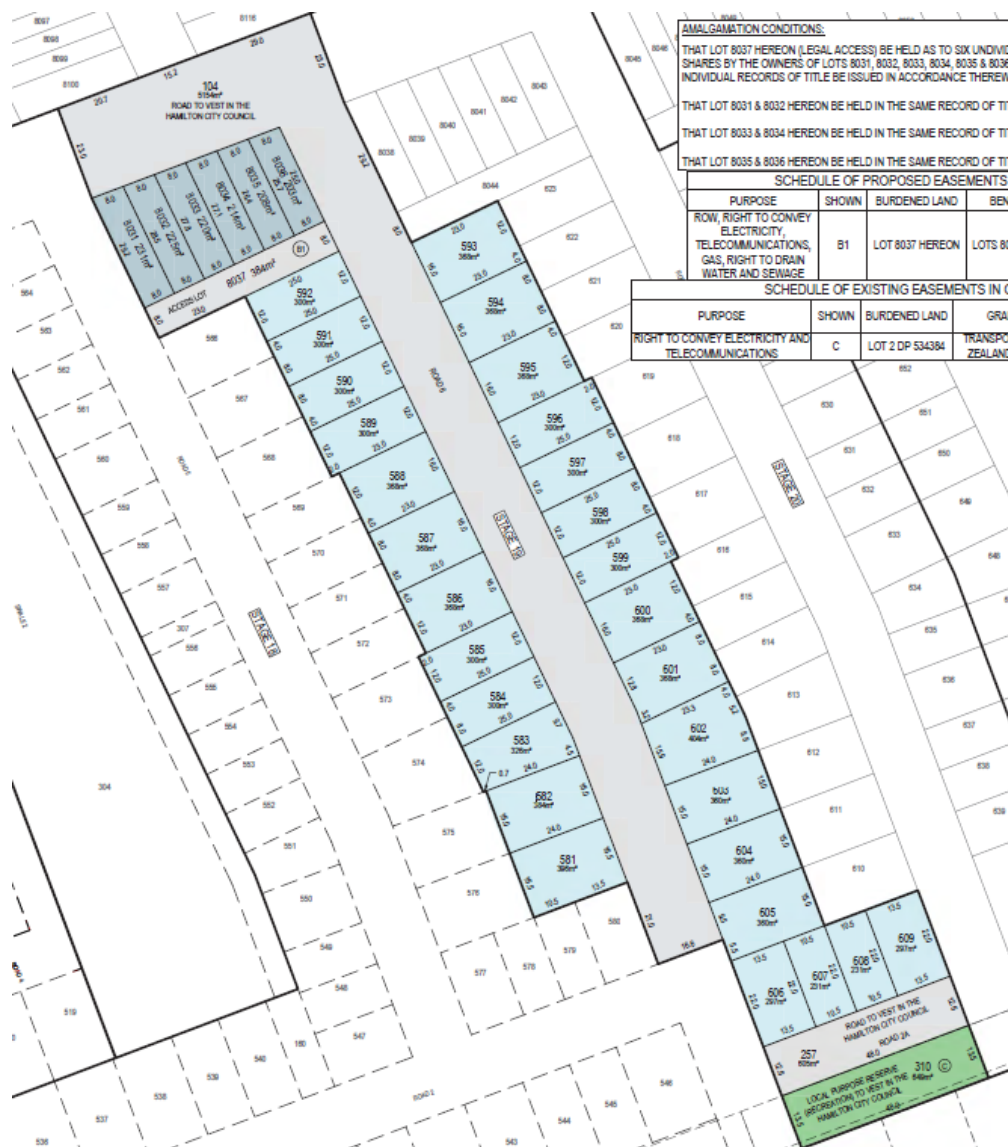
- Core50 Engineers Report on Subdivision Earthworks & Recommendations for Building Development



## GREENHILL PARK RESIDENTIAL SUBDIVISION

STAGE 19 (Lots 581-609 & 8031-8036)  
Area LUK, Greenhill Park, Hamilton

### GEOTECHNICAL COMPLETION REPORT ON SUBDIVISION EARTHWORKS AND RECOMMENDATIONS FOR BUILDING DEVELOPMENT



Our Ref: CR171738-S19-01

Prepared for: Chedworth Properties Limited

Date: March 2023

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## **1.0 Subdivision Development Earthworks**

### **1.1 Introduction**

Stage 19 of Greenhill Park is currently accessible from Webb Drive and Watkins Street. Stage 19 comprises 35 residential lots (numbered 581-609 & 8031-8036). The locations of these lots are shown on attached subdivision plan 19-30410-19-RC1 Rev. 6 included in Appendix A.

Bulk earthworks have been completed to re-contour the previously agricultural landscape for Stage 19 of the Greenhill Park Residential Subdivision in Hamilton. Works have been carried out in accordance with Hamilton City Council's (HCC) Subdivision Resource Consent: 0011.2019.7140.003. Prior to commencement of earthworks, geotechnical investigations were carried out by Beca Ltd (Beca) in 2016 [1] and summaries in DBCE Preliminary Report for L&K&Eldone (December 2019).

The Regional Infrastructure Technical Specifications (RITS) for Waikato set out the minimum standards for design and construction of public infrastructure within Hamilton City. Section 2.1.6 of the *Earthworks and Geotechnical Requirements* of the RITS states that the developer shall appoint a geo-professional to carry out functions as described in NZS 4404[5] Section 2.2.4. RITS Section 2.3.4.1 states that a geotechnical completion report shall be submitted as per NZS 4404 Section 2.6 including a statement of professional opinion on the suitability of land for building construction [4]. The developer has appointed CORE50 Ltd as the geo-professional.

To satisfy the requirements of HCC's Resource Consent, the RITS and NZS 4404, this report summarizes the observations and testing undertaken during the development of the stage, discusses the suitability of the ground for the support of the proposed residential buildings and contains recommendations for the disposal of stormwater runoff generated on individual sites.

Included in Appendix A of this report is the proposed subdivision plan comprising the proposed new lots for Area LUK Stage 19. The included earthworks plan shows the cut/fill extent of the earthworks undertaken, test positions, road and lot locations.



## 1.2 Earthworks in the Subdivision

The earthworks for Stage 19 of the subdivision development were undertaken between October 2020 and May 2022 with minor earthworks completed in March 2023.

These earthworks comprised:

1. The stripping of surface topsoil to expose underlying natural soils.
2. Cut of up to 1.0m.
3. The placement of filling within majority of the stage.
4. Backfilling and raising the ground level with new fill to create uniform fill platforms.
5. The reinstatement of the surface topsoil cover and subsequent grassing.

The soils encountered during the formation of the site and road subgrades were a mixture of silty sands and sandy silts, typical of younger Hinuera deposits, overlying clayey silt and silty clay, typical of Walton group deposits. The Walton Subgroup rises out of the Hinuera deposits that formed a ridge line running through the greater LUK area. These soils were those that had been identified in pre-construction site investigations by the Beca Report 2016. The published geology indicates that Area LUK soils comprise Hinuera Formation alluvium at surface with Walton Subgroup overlain by Hamilton Ash in the gently sloping hill within the LUK area.

The filling work was undertaken using the Walton Subgroup soils gained from areas of cut within stages 16 to 18a and the larger Greenhill Subdivision. Filling was undertaken during the summers of 2020 to 2023 when drying back of the soils was possible to close to optimum moisture contents to achieve near maximum compaction densities and undrained shear strengths.

Upon completion of the earthworks, approximately 100 to 300 mm of topsoil was placed across the sites and the finished surfaces were grassed in accordance with Conditions of the Resource Consent. Areas where an initial grass strike did not take place were re-grassed. While the target topsoil depths after the earthworks were to be around 300 mm, no guarantee is implied or given that the topsoil on any part of any lot is 300 mm or less and it is recommended that future owners or designers or builders check topsoil depths when preparing site development plans and cost schedules.

### 1.3 Earthworks Standards

The earthworks in filling were undertaken using in situ Silty CLAY and Clayey SILT mixtures gained from areas of cut within stages 16 to 18a and across the larger subdivision. The standards for the placement of filling, as stated in the earthworks contract documents, were to comply with NZS 4431:1989 “Code of Practice for Earth fill for Residential Development” and the Council RITS. Filling placed to these standards may be considered as good ground in terms of NZS 3604:2011 “Timber Framed Structures”.

The compaction of the filling placed was monitored and tested for compaction density using a hand-held shear vane and nuclear densometer in finer grained Clayey SILT and Silty CLAY. The compaction control criteria adopted for engineered fill on site were as follows:

- Air voids percentage average value less than 10 %.
- Air voids percentage maximum single value 12 %.
- Undrained shear strength average value not less than 140 kPa.
- Undrained shear strength minimum single value 110 kPa.
- Compaction percentage average value not less than 95%.
- Compaction percentage minimum single value 90%.

### 1.4 Filled Ground

During the placement of filling on the road subgrades and on areas intended for residential development, the contractor, OLC, stripped and removed all topsoil and other surface organic soils. Post construction testing was carried out to confirm the interface between the cut and fill. Filling was placed in discrete layers with compaction applied through sheepsfoot drum rollers.

Subgrade inspections were carried out by the contractor and by CORE50 for verification purposes. The CORE50 subgrade and fill testing included a site walkover by the geotechnical engineer and site testing by a Geo-technician. As most of the filling placed comprised Clayey SILT and Silty CLAY identified in the pre-subdivision boreholes, testing of the compaction achieved was undertaken with a handheld shear vane and NDM testing (Nuclear Density Meter). Testing was based on the required air voids ratio (averaging 10% and no individual value of over 12%). In our experience, oven tests for air void correction can vary the air void result in this material by up to 3%. Oven tests were typically used for any on field air void result  $\geq 6\%$ . Solid density values were based on the same value used in the lab testing ( $2800\text{kg/m}^3$ ). This is a higher value that would typically be used but provides a conservative result so has been adopted without further question or testing.

## **1.5 Areas of Cut**

Areas partly developed or cut are shown on the cut fill plan (Appendix A). In these areas, the ground at formation levels was observed to comprise of Silty and Sandy Hinuera deposits.

## **1.6 Test Results in Filling Placed**

A summary of the tests undertaken by CORE50 is present in Appendix D.

The shear vane and nuclear densometer test results show that acceptable soil strengths had been developed in all fill areas tested. Any areas with test results that did not meet the compaction control criteria was reworked.

## **1.7 Land Hazards**

### **1.7.1 Land Stability**

All lots across stage 19 have been graded as flat as possible with a desirable gradient of 0.5%. Standard good practice around small slopes of the site will be required. Buildings should be set back from the slopes and avoid either surcharging the slopes or undermining the slopes. All foundations within this area are subject to specific engineering design, and an assessment of the building location and earthworks should be carried out as a part of the engineering design/review of any section adjacent to a slope.

### **1.7.2 Flooding**

The final lot levels have been set based on infrastructure requirements and freeboard from flood levels developed as part of the stormwater design for the larger subdivision. The means of disposal of stormwater runoff from lots in these stages of the subdivision are described in the catchment and overland flow assessments by Beca (interpretive Report Lot Levels Area LUK). In the report for area LUK, a 1% AEP flood event is identified for each swale system. A list of Minimum Lot Levels for Stage 19 is included in Appendix E.

Site grading during house construction must not lower finished levels below the minimum finished ground levels identified by S&L without further review of the impacts on flooding. Earthworks must not direct stormwater runoff to adjacent properties, or towards buildings, or create areas of localized ponding. All overland flow is to be towards the road frontage on each section, where falls will direct surface flow towards the swale system. Special note is given to Lots 588-592. These lots fall to the rear of the section on completion of earthworks. Final development will need to raise the rear of these lots to direct flow to the front of the lots.

It is the responsibility of the building design professional to ensure that the requirements for mitigation for the hazard of flooding are met by the design prior to submitting to Council for consent. Confirmation of the swale construction and flood levels are excluded from the scope of this report and are to be covered separately with sign-off of infrastructure works.

### 1.7.3 Liquefaction

The potential for the hazard of liquefaction for Area LUK of the Greenhill Park Subdivision is discussed in the DBCE Preliminary Geotechnical Report. Geologically, stage 19 is a transition zone between younger Hinuera Deposits and older Walton Subgroup. The Hinuera deposits are considered liquefaction prone is subject to a seismic event coupled with a high groundwater. Zones of the subdivision that are in the low lying area will typically be subject to liquefaction effects during the ULS earthquake. Modelling using CLiq indicates that zones with less than 2m of additional raising fill over original ground levels are considered TC2 unless further assessment is carried out.

For lots with greater than 2m of fill added or sites on cohesive (i.e. Walton Group) deposits the risk is reduced and TC1 foundations are appropriate. The foundation summary has provided a recommendation for the site class based on the net additional fill added to this area. At time of completion, all lots are deemed TC2 and have less than 2m of raised platforms. Modifications to subgrades and building levels may be carried out to reduce the liquefaction risk to a lower category as a part of building development works.

Note that updated liquefaction parameters (0.25g and M=5.9) have been used for checking the threshold as a part of the adjacent Stage 18 review, with LSN = 10 indicated for sites with 2m of fill added during subdivision earthworks. Additional fill/ground raising will reduce the risk of liquefaction triggering by increasing the non-liquefiable rafting layer.

Foundations near the top of the swales are subject to Specific Engineering Designs. The liquefaction summary plan is appended to this Completion report (Appendix A). Specifically, the requirements are:

- 0m – 1.5m no habitable dwellings to be built within 1.5 m of the swale crest.
- No lots are adjacent to storm water swales in Stage 19.

#### **1.7.4 Expansive Soils**

Underlying soils within stage 19 are typically either Hinuera Formation based deposits, or Walton Subgroup (insitu or used as fill). The Hinuera Formation is predominantly sand, and silt based and considered non expansive or slightly expansive. The Walton Subgroup has a much higher clay content and is considered slightly to moderately expansive. Given the volcanic origins, the expansive nature of the soils is generally non-recoverable i.e., shrinkage only. However, the relatively high shrinkage potential of the Walton Subgroup means it would be normal to classify this as moderately expansive in its in-situ state i.e.,  $Y_s = 20-39\text{mm}$ .

#### **1.7.5 Subsidence (Consolidation Settlement)**

The DBCE Preliminary Geotechnical Report has identified areas within stage 19 may experience settlement of fill through consolidation of underlying Hinuera deposits. A minimum 6 month holding period between completion of bulk filling and foundation construction should be observed for Lots 581-609, and 8031-8036. Completion of the bulk earthworks has been completed early 2022. At time of reporting March 2023, no building works have taken place. We consider this has provided sufficient time for settlement to have occurred for the bulk earthworks carried out. Residential development can proceed without further consolidation periods required unless more fill is added. As a rule of thumb (for and future filling), one week of settlement period for every 100mm of new fill placed should be observed before building works take place.

## ***2.0 Disposal of Stormwater***

Greenhill Park has been designed with a swale network to limit peak flows from the subdivision to 80 % of the 1 % AEP pre-development rate. S&L have provided the stormwater design for the current stage of the subdivision. As a part of this design, 100% of the onsite stormwater (up to the allowable impermeable area) has been allowed for in the system design. As such, no at source on site stormwater measures are required as a part of the overall stormwater design. This allows for a centralized stormwater system which has been stated as preferred for long term maintenance by Council. The piped drainage network has been designed to convey the 10% AEP flows from roads and lots to the swale network, with each lot to be provided with a piped service connection. Flow volumes over this design event may run overland into the swale network as secondary flow.

We recommend that reduced onsite water efficiency measures such as catchpit filters and reuse tanks be encouraged to improve water efficiency and reduce the sediment load downstream. Such measures should be at the discretion of the end user on a case-by-case basis.

The above recommendations do not supersede any additional measures that Council may require of each individual lot. Any council requirements in addition to the subdivision design should be followed. Any such requirements should be confirmed from council for this area. Any lot coverage over the maximum permitted will require site specific stormwater management to offset the effects of added runoff volume.

### **3.0 Retaining Walls**

No retaining walls have been carried out as a part of subdivision works. Small retaining walls may be required on Lots 588-592 as a part of site recontouring to modify the slopes on these lots. Such walls would be in the order of 0.5m high and would be considered a landscaping wall (alternatively small batters can be used).

### **4.0 Preliminary Foundation Recommendations**

Based on our post-completion investigations, observations during construction and understanding of the site's geology and geotechnical hazards, we believe suitable foundations will generally be typically TC2, or modified ground subgrade allowing for a Ribraft type foundation.

The lot summary table in Appendix B provides a summary of the anticipated ground conditions and preliminary foundation recommendations for each lot. Further lot-specific testing will be required to confirm foundation requirements. This may include testing prior to consent applications or during foundation excavations. The timing of the testing will be subject to Council requirements.

### **5.0 Professional Opinion**

It has been demonstrated in this Geotechnical Completion Report, that earthworks have been completed and building platforms have been constructed to comply with Council's RITS specifications and the New Zealand Building Code. Recommendations have been provided within the report for the disposal of stormwater from individual lots, for the ongoing development of the lots and for the mitigation of liquefaction risk where applicable.

In accordance with RITS Section 2.3.4.1, a statement of professional opinion is enclosed in Appendix II of this document. This statement is presented in the form of Checklist 2.2 of Council's Development Manual, Volume 4: Quality Systems for Land Development, and is accompanied by a *Summary of Geotechnical Data for Individual Lots* which summarises the information and recommendations contained in this report.

## 6.0 Applicability

Recommendations contained in this document are based on data from observations of site earthworks, boreholes, and test results. Inferences about the nature and continuity of subsoils away from these locations are made but cannot be guaranteed.

In all circumstances, if variations in the subsoils occur which differ from those described or are assumed to exist, the site should be inspected by an engineer suitably qualified to make an informed judgement and provide advice on appropriate improvement measures.

This report has been prepared specifically for Stage 19 as shown for Lots: Lots 581-609, and 8031-8036 of Area LUK, Stage 19 within the Greenhill Park Residential Subdivision. No responsibility is accepted by CORE50 Ltd for the use of any part of this report for other development sites without their written approval.

Report Prepared By:

Date: 29<sup>th</sup> March 2023

.....

Aaron Kennedy

Civil Engineer

Report Reviewed By:

Date: 29<sup>th</sup> March 2023

.....

Michael Richardson

Geotechnical Engineer CPEng

## References

- [1] Ruakura Land Development - LDP Geotechnical Factual Report by Beca, 15 April 2016.
- [2] C. Hughes and K. Read, "Ruakura Development - Stage 1 Geotechnical Investigation – Liquefaction Potential Detailed Assessment," Opus International Consultants, Ltd., Hamilton, New Zealand, 2014.
- [3] M. Hughes and L. Shuler, "Report on Preliminary Geotechnical Investigation, Ruakura Development, Hamilton," S&L Consultants, Ltd., Tauranga, New Zealand, 2015.
- [4] "Section 2 Earthworks and Geotechnical Requirements," in *Regional Infrastructure Technical Specifications*, Waikato Local Authority Shared Services, May 2018.
- [5] "NZS 4404 Land Development and Subdivision Infrastructure," in *New Zealand Standards*, Wellington, New Zealand, Standards New Zealand, 2010.
- [6] "Greenhill Park - Geotechnical Interpretation and Design-Area 1" by Beca 28 October 2016.
- [7] "Part 5: Earthquake Actions - New Zealand," in *NZS 1170.5:2004 Structural Design Actions*, Standards New Zealand, 2004.
- [8] "Greenhill Park Design Report - Area I (Stage 5, 6, 7 & 8) by Beca 20 December 2016
- [9] "Clause B1: Structure," in *Acceptable Solutions and Verification Methods For New Zealand Building Code*, Wellington, Ministry of Business, Innovation and Employment, 2014.
- [10] "Part A: Technical Guidance," in *Repairing and rebuilding houses affected by the Canterbury earthquakes*, Wellington, Ministry of Business, Innovation and Employment, 2012.
- [11] "Clause E1: Surface Water," in *Acceptable Solutions and Verification Methods For New Zealand Building Code*, Wellington, Ministry of Business, Innovation and Employment, 2014.
- [12] *Regional Infrastructure Technical Specifications*, Waikato Local Authority Shared Services, May 2018.
- [13] "Preliminary Geotechnical Report Area K, L & Eldone," DB Consulting Engineers, December 2019.



Appendix A Reference Drawings

Subdivision Plan: 19-30410-19-RC1 Rev. 6

Cut/Fill Plan: 30410-01-S19-EW1 Rev. AB1

Preliminary Subdivision Foundation Plan: DB 171738-AREA-K&L&Eldone-01

H:\10300 - H Development\Subdivision\19-30410-19-RC1 - Scheme Plan - Stage 19.dwg - PlotNo: 4/11/2021



**FINAL APPROVED  
RESOURCE CONSENT PLANS  
File #: 011.2019.7140.003  
Date of Consent: 12 November 2021**

**AMALGAMATION CONDITIONS:**  
 THAT LOT 8037 HEREON (LEGAL ACCESS) BE HELD AS TO SIX UNDIVIDED ONE SIXTH SHARES BY THE OWNERS OF LOTS 8031, 8032, 8033, 8034, 8035 & 8036 HEREON AND INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.  
 THAT LOT 8031 & 8032 HEREON BE HELD IN THE SAME RECORD OF TITLE  
 THAT LOT 8033 & 8034 HEREON BE HELD IN THE SAME RECORD OF TITLE  
 THAT LOT 8035 & 8036 HEREON BE HELD IN THE SAME RECORD OF TITLE

SCHEDULE OF PROPOSED EASEMENTS			
PURPOSE	SHOWN	BURDENED LAND	BENEFITED LAND
ROW, RIGHT TO CONVEY ELECTRICITY, TELECOMMUNICATIONS, GAS, RIGHT TO DRAIN WATER AND SEWAGE	B1	LOT 8037 HEREON	LOTS 8031-8036 HEREON

SCHEDULE OF EXISTING EASEMENTS IN GROSS				
PURPOSE	SHOWN	BURDENED LAND	GRANTEE	DOCUMENT NUMBER
RIGHT TO CONVEY ELECTRICITY AND TELECOMMUNICATIONS	C	LOT 2 DP 534384	TRANPOWER NEW ZEALAND LIMITED	EI 11070524.14



**SHRIMPTON & LIPINSKI**  
 LAND DEVELOPMENT &  
 DESIGN SPECIALISTS  
 Ph. 07 577 6069  
 Email: info@sltd.co.nz  
 P.O. Box 231, Tauranga 3140  
 www.sltd.co.nz

**NOTES:**  
 1. THIS PLAN HAS BEEN PREPARED FOR THE PURPOSES OF SECTION 88 OF THE RESOURCE MANAGEMENT ACT 1991 AND SHOULD NOT BE RELIED ON FOR ANY OTHER PURPOSE.  
 2. AREAS AND DIMENSIONS ARE APPROXIMATE ONLY AND SUBJECT TO SURVEY.

**Received  
PLANNING GUIDANCE  
05 November 2021**

- LEGEND:**
- LOT BOUNDARY
  - PROPOSED CADASTRAL LAYOUT
  - CONCEPT BOUNDARY
  - STAGE BOUNDARY
  - ABUTTALS
  - FUTURE STAGES
  - HIGHER DENSITY LOTS
  - RECREATION RESERVE
  - STORMWATER RESERVE
  - ROAD RESERVE

Rev	DESCRIPTION	DRN	CKD	APP	DATE
0	INTERNAL ISSUE	NW	JL	NF	12/19
1	ISSUED FOR APPROVAL	NW	JL	NF	12/19
2	HCC REQUIREMENTS	NW	JL	NF	02/20
3	LAYOUT AMENDED	NW	NF	NF	04/20
4	LAYOUT AMENDED	NW	NF	NF	09/20
5	STAGE BDY'S UPDATED	NW	BP	GC	10/21
6	RESERVES CHANGED	NW	BP	GC	11/21

SURVEYED: \_\_\_\_\_ DESIGNED: \_\_\_\_\_  
 COORDINATE SYSTEM: NZGD 2000 (MOUNT EDEN CIRCUIT)  
 ORIGIN OF COORDINATES:  
 HEIGHT DATUM: MOTURIKI LVD 1953  
 ORIGIN OF HEIGHT: \_\_\_\_\_

**TITLE**

**AREAS LU & K  
SCHEME PLAN  
STAGE 19**

PREPARED FOR  
**Chedworth**  
 Properties Limited

**AREAS LU & K**

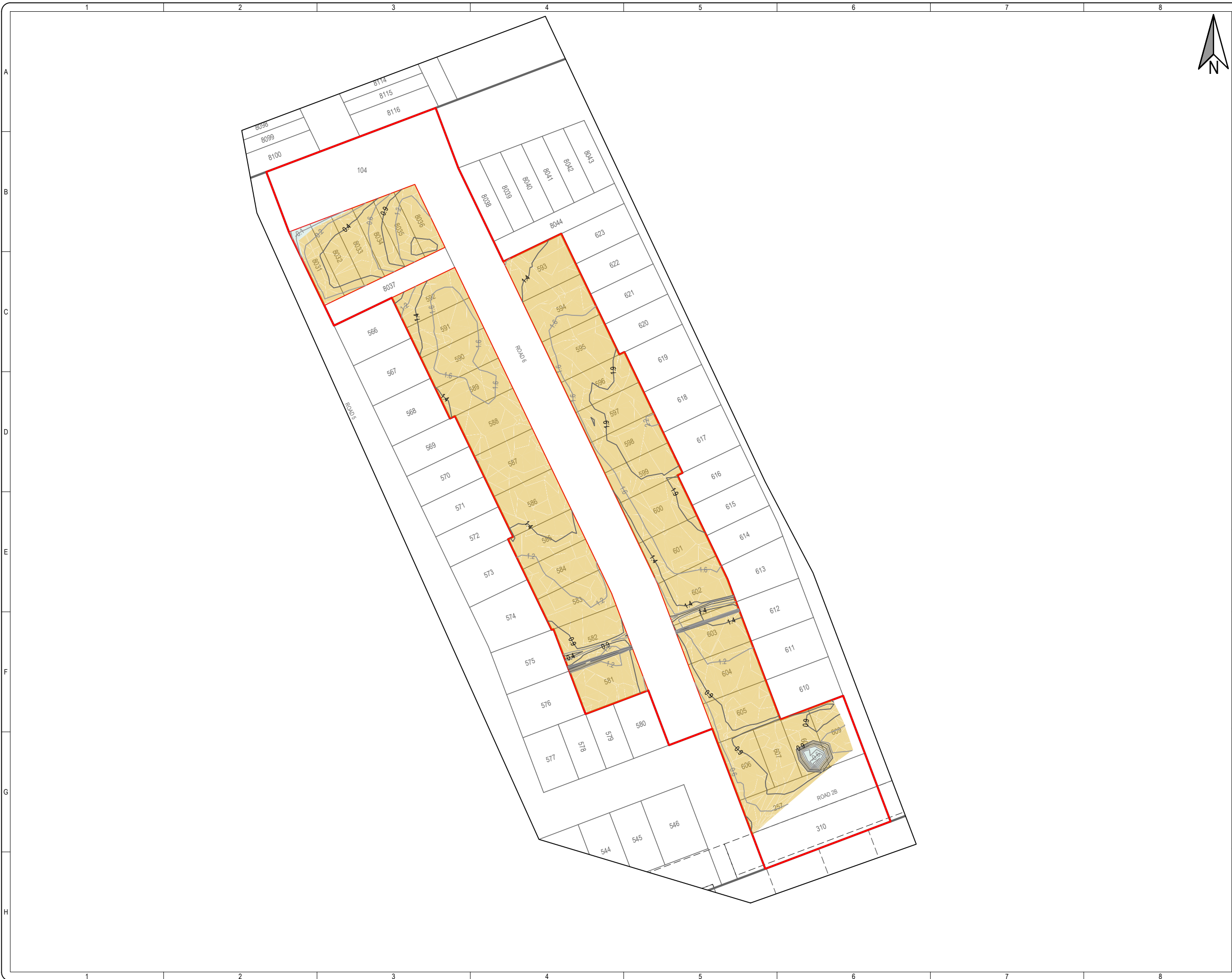
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 FOR APPROVAL

DRAWING NO: **19-30410-19-RC1** REVISION: **6**









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**SHRIMPTON & LIPINSKI**  
 LAND SPECIALISTS  
 Ph. 07 577 6069  
 Email: info@sltga.co.nz  
 P.O. Box 231, Tauranga 3140  
 www.sltga.co.nz

**Legend:**

-  Major Contour
-  Minor Contour
-  Cut Area
-  Fill Area

Contour Interval 0.25m

Rev	DESCRIPTION	DRN	CKD	APP	DATE
0	PRELIMINARY	NP	BP	PH	27-03-23
AB1	AS-BUILT	NP	BP	PH	27-03-23

SURVEYED	DESIGNED	NAME	DATE	NAME	DATE

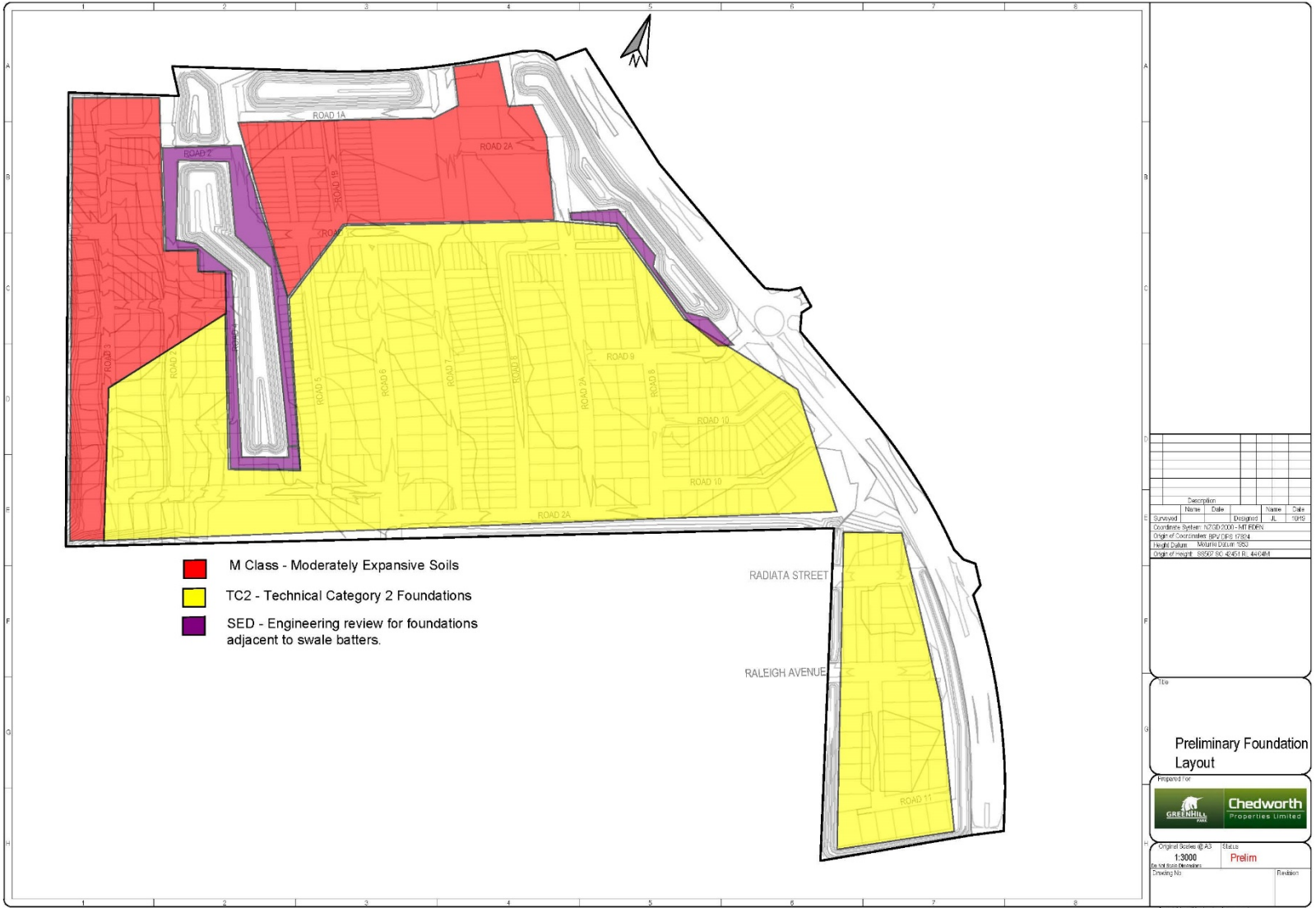
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 ORIGIN OF COORDINATES:  
 HEIGHT DATUM:  
 ORIGIN OF HEIGHT:

**STAGE 19**  
**CUT FILL PLAN**  
**ORIGINAL TO AS-BUILT**

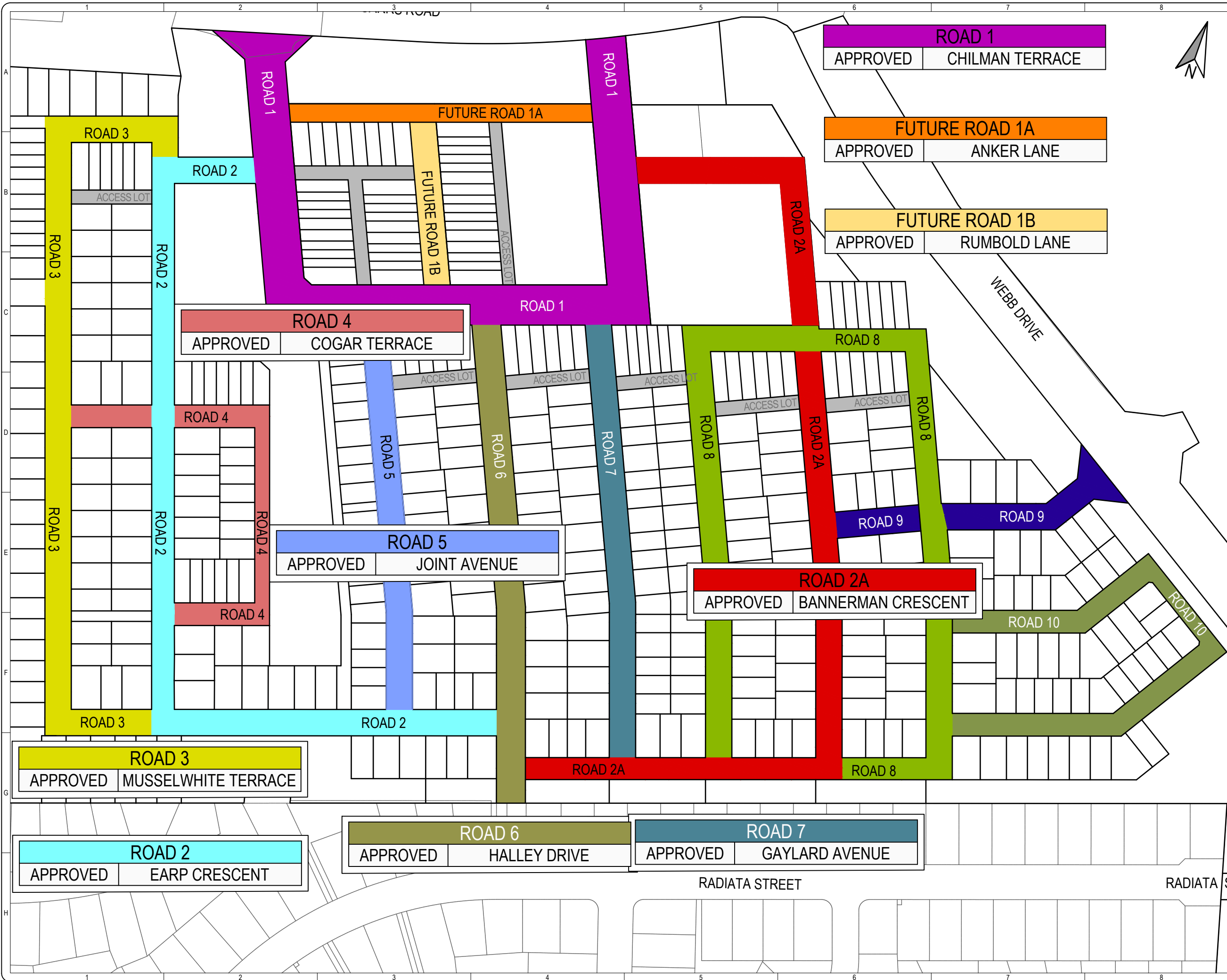
PREPARED FOR



ORIGINAL SCALES @ A3	STATUS
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DO NOT SCALE DIMENSIONS	
DRAWING NO	REVISION
<b>30410-01-S19-EW2</b>	<b>AB1</b>



H:\0000 - H Drive\parker\Autocad\21338-ADD - LUK - Road Names Plan.dwg - Plotted: 26/02/2021



  
**SHRIMPTON & LIPINSKI**  
 LAND DEVELOPMENT &  
 DESIGN SPECIALISTS  
 Ph. 07 577 6069  
 Email: info@sltga.co.nz  
 P.O. Box 231, Tauranga 3140  
 www.sltga.co.nz

Rev	DESCRIPTION	DRN	CKD	APP	DATE
0	PRELIMINARY	NP	NF	NF	
1	APPROVED	NP	NF	NF	02/21

SURVEYED	NAME	DATE	DESIGNED	NAME	DATE

COORDINATE SYSTEM:  
 ORIGIN OF COORDINATES:  
 HEIGHT DATUM:  
 ORIGIN OF HEIGHT:

TITLE

**APPROVED ROAD  
 NAMES  
 GREENHILL PARK  
 AREA L, U & K**

PREPARED FOR



ORIGINAL SCALES @ A3	STATUS
1:2000	APPROVED
DO NOT SCALE DIMENSIONS	
DRAWING NO	REVISION
21338-ADD-LUK-SN1	1

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Appendix B    Geotechnical Completion Forms  
Checklist 2.2 - Statement of Professional Opinion  
Summary of Geotechnical Data for Individual Lots

STATEMENT OF PROFESSIONAL OPINION AS TO SUITABILITY OF LAND FOR BUILDING CONSTRUCTION

**Development:** Greenhill Park LUK Stage 19

**Developer:** Chedworth Properties Limited

**At** Pardoia Boulevard, Chartwell, Hamilton (Chilman Terrace, Halley Drive and Bannerman Crescent)

I, Michael Richardson of CORE50 Ltd, PO Box 1123, Taupo

Hereby confirm that:

- 1.0 I am a geo-professional as defined in clause 1.2.2 of NZS 4404:2010 and was retained by the developer as the geo- professional on the above development.
- 2.0 The extent of my inspections during construction, and the results of all tests carried out are described in my geotechnical completion report for Greenhill Park Area LUK Stage 19 dated March 2023 (reference 171738-S19-01)
- 3.0 In my professional opinion, not to be construed as a guarantee, I consider that:
  - a. The completed works give due regard to land slope and foundation stability considerations.
  - b. The site ground affected by engineered certified filling is suitable for the erection thereon of buildings designed according to the report recommendations provided that:
    - i. Lots 581-609, and 8031-8036 are subject to specific engineering review of foundations addressing TC2 liquefaction ground damage for the ULS design case.
    - ii. Lots may be modified for subgrade improvement to reduce the TC2 requirement down to TC1 under supervision on an engineer.
    - iii. All lots are subject to an engineering inspection during foundation excavations in lieu of further soils testing. Construction supervision from an engineer shall be carried out to confirm the shallow ground conditions are in accordance with this report and suitable for NZS3604 foundations for bearing strength.
    - iv. All lots need to observe minimum floor levels and require surface falls from the rear of the lot to the front. Specifically, Lots 588 to 592 will require modification of the ground levels to achieve this surface fall towards the road frontage.
- 4.0 This professional opinion is furnished to Hamilton City Council and the developer for their purposes alone on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any dwelling.
- 5.0 This certificate shall be read in conjunction with my geotechnical completion report referred to in clause 2 above and shall not be copied or reproduced except in conjunction with the full geotechnical completion report.

Signed .....

Date: 29 March 2023


Michael Richardson

Chartered Professional Engineer (Geotechnical)

CPEng 1005467



## Site Specific Geotechnical Summary and Foundation Recommendations Table

		Job Ref	CR171738-S19-01		Date	28/03/2023	Client	@hedworth Properties Limited			Project Address	Stage 19, Greenhill Park, Hamilton			
		RC No:	11/2019/7140/003		DP No:	TB210C400									
Lot #	Area (m <sup>2</sup> )	Topsoil Depth Encountered (mm) <small>Note 1</small>	Site Soils Characteristics					Foundation Recommendations							Notes
			Encountered Soils	GWT (mm)	Asbuilt Cut/Fill Depths (m) <small>Note 2</small>		Expansivity Class (AS2870)	Conventional Shallow Foundation to NZS3604:2011	Building Setback Zones (Y/N) <small>Note 3</small>	Storm Water Specific Design (Y/N) <small>Note 4</small>	Codemark Ribraft (Y/N) <small>Note 5 &amp; 6</small>	Liquefaction Technical Category	Minimum Building Platform (Y/N) <small>Note 8</small>	Consent Notice (Y/N) <small>Note 7</small>	
					Cut	Fill									
581	396m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.3-2.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
582	384m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	0.9-2.2	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
583	326m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.6-2.0	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
584	300m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	3400	0.8-2.0	1.6-2.2	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
585	300m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.9-2.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
586	368m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.9-2.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
587	368m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	2.2-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
588	368m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	2.2-2.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Final developed ground levels to be modified to fall from rear to front of site for water runoff
589	300m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.2	2.2-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Final developed ground levels to be modified to fall from rear to front of site for water runoff
590	300m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.2	1.9-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Final developed ground levels to be modified to fall from rear to front of site for water runoff
591	300m <sup>2</sup>	100	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.2	1.9-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Final developed ground levels to be modified to fall from rear to front of site for water runoff
592	300m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.2-2.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Final developed ground levels to be modified to fall from rear to front of site for water runoff
593	368m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.6-1.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
594	368m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.9-2.2	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
595	368m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.9-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
596	300m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	2.4-2.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
597	300m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	2.4-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
598	300m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.9-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
599	300m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	2.4-2.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
600	368m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.9-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
601	368m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.9-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
602	404m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.9-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
603	360m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.9-2.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
604	360m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.9-2.2	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
605	360m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	2800	0.3	1.6-2.2	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
606	297m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.6-2.0	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
607	231m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.6-1.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
608	231m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.6-2.0	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
609	297m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	1.9-2.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-

## Site Specific Geotechnical Summary and Foundation Recommendations Table

Lot #	Area (m <sup>2</sup> )	Site Soils Characteristics						Foundation Recommendations						Notes	
		Topsoil Depth Encountered (mm) <small>Note 1</small>	Encountered Soils	GWT (mm)	Asbuilt Cut/Fill Depths (m) <small>Note 2</small>		Expansivity Class (AS2870)	Conventional Shallow Foundation to NZS3604:2011	Building Setback Zones (Y/N) <small>Note 3</small>	Storm Water Specific Design (Y/N) <small>Note 4</small>	Codemark Ribraft (Y/N) <small>Note 5 &amp; 6</small>	Liquefaction Technical Category	Minimum Building Platform (Y/N) <small>Note 8</small>		Consent Notice (Y/N) <small>Note 7</small>
					Cut	Fill									
8031	231m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	0.2-1.0	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
8032	225m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	0.2-1.0	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
8033	220m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	3400	0.3-1.5	0.4-1.0	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
8034	214m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	3400	0.3-1.5	0.6-1.5	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
8035	208m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	0.7-2.0	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
8036	203m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	1.2-2.2	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-

**Notes:**

- 1) Respread Topsoil depths approximate only as Topsoiling works were still in progress at time of Post Construction Soil Testing.
- 2) Depths are taken from Asbuilt Cut/Fill Plans supplied by S&L. This considers approximately 300mm of topsoil removal across all lots prior to subdivision filling.
- 3) Setback required for properties adjacent swales. SED type foundation to be adopted for all lots adjacent to swales. No foundations to be constructed <1.5m from top of slope. No specific engineer design required >3m from top of slope.
- 4) Soakage Testing is not required on individual lots. On site stormwater runoff reduction measures encouraged, i.e.; Re-use tanks, filters and catchpits.
- 5) TC2 Foundations Recommended. Ministry of Business, Innovation and Employment (MBIE) and New Zealand Geotechnical Society (NZGS) Repairing and rebuilding houses affected by the Canterbury earthquakes, Part A: Technical Guidance – Section 5.
- 6) M Class Foundations Recommended.
- 7) Consent Notice relation to Stormwater Controls required on all lots.
- 8) Refer appendix E for minimum Finished Floor levels per Lot.

NE = Not Encountered, GWT = Ground Water Table, SRP = Sediment Retention Pond, e.g.l. = existing ground level.

Appendix C Laboratory Testing  
Fill Material Lab Testing.

PLASTICITY INDEX FOR SOILS  
TEST REPORT



Project : Greenhill Park  
 Location : Greenhill Park  
 Client : DB Consulting Limited  
 Contractor : -  
 Sampled by : Client  
 Date sampled : 9/10/2020  
 Date received : 12/10/2020  
 Sampling method : Bulk Sample  
 Sample condition : As received

Project No : 2-68165.00  
 Lab Ref No : HA6441\_PI  
 Client Ref No :

Test Results	
Sample Lab Ref No :	HA6441
Sample Location ID :	Not Stated
Sample Depth (m) :	Not Stated
Soil Fraction Tested :	-425µm
Natural Water Content (%) :	50.8
Liquid Limit :	111
Plastic Limit :	50
Plasticity Index :	61
Sample Description :	HA6441_PI CLAY with some silt and trace sand
Test Methods	Notes
Water Content NZS 4402 : 1986, Test 2.1	Soil fraction tested as shown.
Liquid Limit NZS 4402 : 1986, Test 2.2	
Plastic Limit NZS 4402 : 1986, Test 2.3	
Plasticity Index NZS 4402 : 1986, Test 2.4	

Date tested : 16/10/20  
 Date reported : 21/10/20

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.  
 This report may only be reproduced in full  
 All information supplied by Client

IANZ Approved Signatory

Designation : Senior Civil Engineering Technician  
 Date : 21/10/20



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

PARTICLE SIZE ANALYSIS (WET SIEVE METHOD)

TEST REPORT

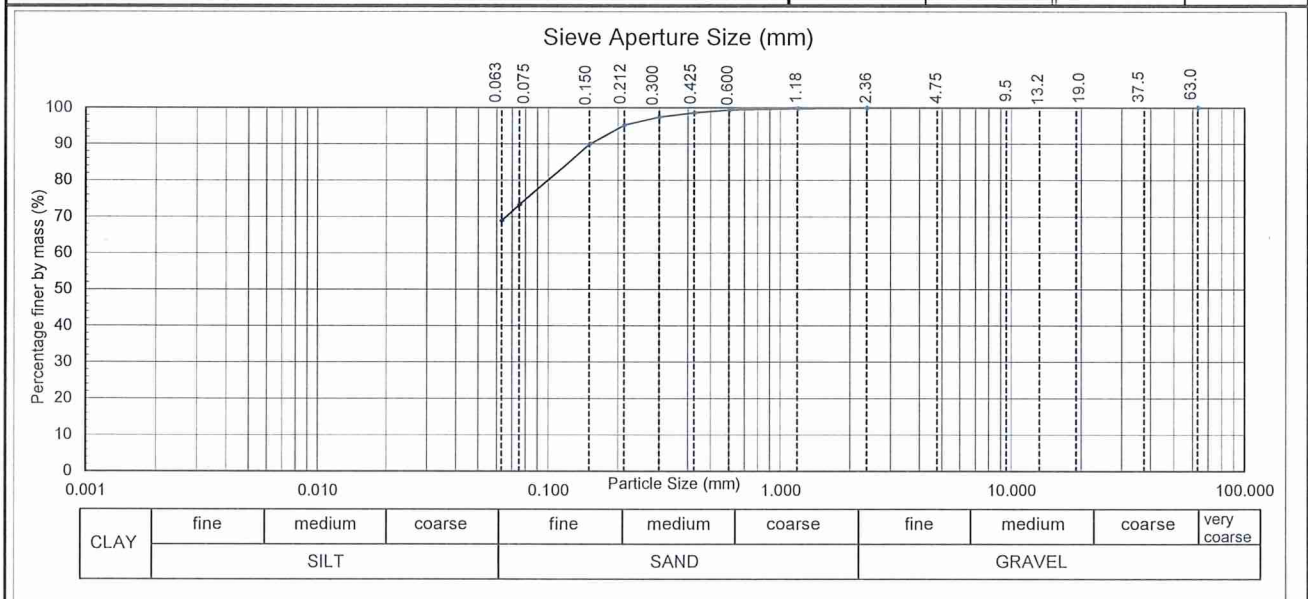


Project : Greenhill Park  
 Location : Greenhill Park  
 Client : DB Consulting Limited  
 Client/Sample Ref : Not Stated  
 Contractor : -  
 Borehole No: Not Stated      Depth: Not Stated  
 Sampled by : Client  
 Date received : 12/10/20  
 Sampling method : Bulk Sample  
 Sample condition : As received  
 Sample description : Sandy CLAY/SILT  
 Solid Particle Density (t/m<sup>3</sup>): N/A  
 Water Content (as received): 38.8 %

Project No: 2-68165.00  
 Lab Ref No: HA6441\_PSD  
 Client Ref:

Sieve Analysis						Hydrometer Analysis			
Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)
63.0	--	4.75	--	0.300	97	--	--	--	--
37.5	--	2.36	100	0.212	95	--	--	--	--
19.0	--	1.18	100	0.150	90	--	--	--	--
13.2	--	0.600	99	0.075	73	--	--	--	--
9.5	--	0.425	99	0.063	69	--	--	--	--

Note: "--" denotes sieve not used and/or hydrometer analysis not tested



Test Methods	Notes
Particle Size Analysis: NZS 4402:1986: Test 2.8.1 (Wet Sieve Method)	

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

Date Tested: 19/10/20      This report may only be reproduced in full

Date Reported: 21/10/20

IANZ Approved Signatory  
 Designation : Senior Civil Engineering Technician  
 Date : 21/10/20

*DeVries*



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PARTICLE SIZE ANALYSIS (HYDROMETER METHOD)

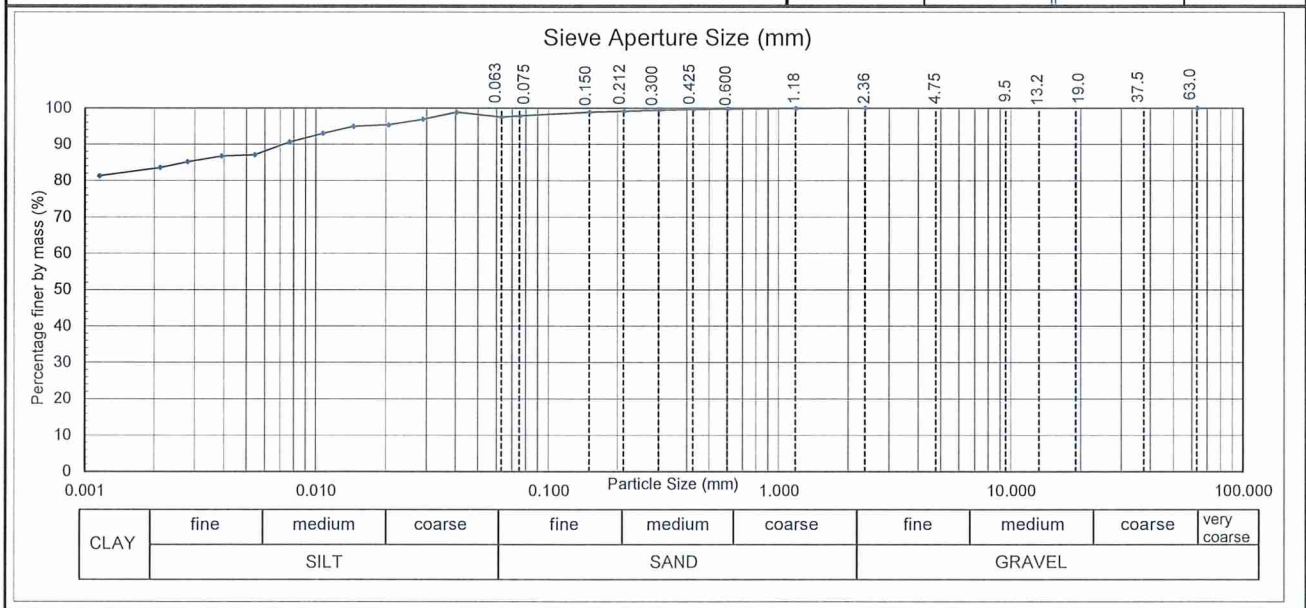
TEST REPORT



Project : Greenhill Park  
 Location : Greenhill Park  
 Client : DB Consulting Limited  
 Client/Sample Ref : Not Stated  
 Contractor : -  
 Borehole No: Not Stated      Depth: Not Stated  
 Sampled by : Client  
 Date received : 12/10/20  
 Sampling method : Bulk Sample  
 Sample condition : As received  
 Sample description : CLAY with some silt and trace sand  
 Solid Particle Density (t/m<sup>3</sup>): 2.80      Assumed  
 Water Content (as received): 50.8      %

Project No: 2-68165.00  
 Lab Ref No: HA6441\_PSA  
 Client Ref:

Sieve Analysis						Hydrometer Analysis			
Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)
63.0	--	4.75	--	0.300	99	0.0403	99	0.0054	87
37.5	--	2.36	100	0.212	99	0.0288	97	0.0039	87
19.0	--	1.18	100	0.150	99	0.0205	95	0.0028	85
13.2	--	0.600	100	0.075	98	0.0145	95	0.0021	84
9.5	--	0.425	100	0.063	98	0.0107	93	0.0012	81
Note: "--" denotes sieve not used and/or hydrometer analysis not tested						0.0077	91		



Test Methods	Notes
Particle Size Analysis: NZS 4402:1986: Test 2.8.4 (Washed Grading & Hydrometer Method)	pH of suspension : 8.0 (Whatmans Full Range pH Indicator paper) All information supplied by Client

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

Date Tested: 20/10/20      This report may only be reproduced in full  
 Date Reported: 21/10/20  
 IANZ Approved Signatory: *[Signature]*  
 Designation : Senior Civil Engineering Technician  
 Date : 21/10/20



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

LINEAR SHRINKAGE FOR SOILS  
TEST REPORT



Project : Greenhill Park  
 Location : Greenhill Park  
 Client : DB Consulting Engineers Ltd  
 Contractor : -  
 Sampled by : Client  
 Date sampled : 09/10/20  
 Date received : 12/10/20  
 Sampling method : Bulk Sample  
 Sample condition : As received

Project No : 2-68165.00  
 Lab Ref No : HA6441\_LS  
 Client Ref No :

Test Results	
Sample Lab Ref No :	HA6441
Location ID :	Not Stated
Sample Depth (m) :	Not Stated
Soil Fraction Tested :	-425µm
Sample History :	Natural
Water Content as Rec'd (%) :	50.8
Water Content at LS test (%) :	110.4
Linear Shrinkage (%) :	24
Sample Description :	HA6441 CLAY with some silt and trace sand
Test Methods	Notes
Water Content NZS 4402 : 1986, Test 2.1 Linear Shrinkage NZS 4402 : 1986, Test 2.6	

Date tested : 20/10/20

Date reported : 21/10/20

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

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All information supplied by Client

IANZ Approved Signatory

Designation : Senior Civil Engineering Technician

Date : 21/10/20



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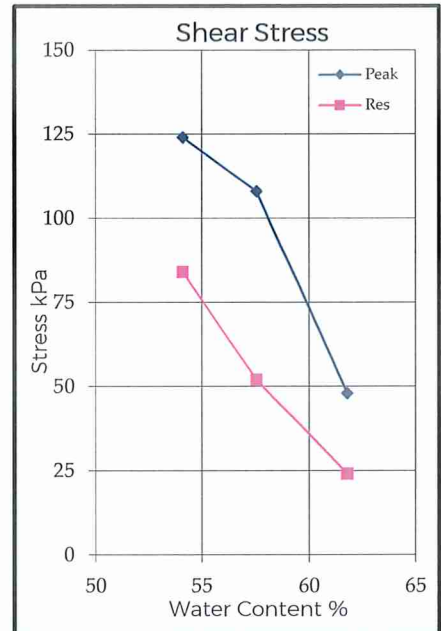
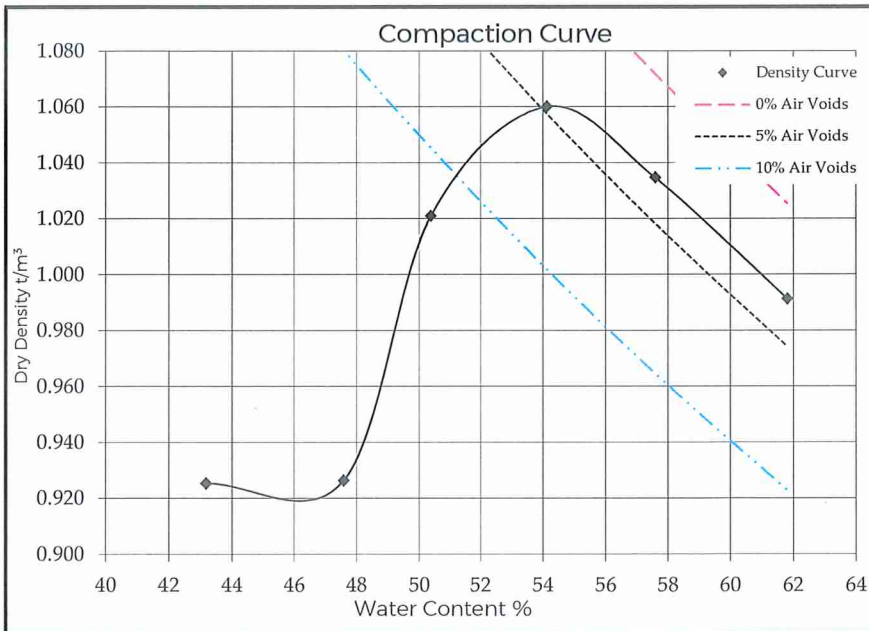
**DRY DENSITY / WATER CONTENT RELATIONSHIP  
STANDARD COMPACTION**



Project : Greenhill Park  
 Location : Greenhill Park  
 Client : DB Consulting Engineers Ltd  
 Contractor : -  
 Sampled by : Client  
 Date sampled : 9/10/20  
 Sampling method : Bulk Sample  
 Sample description : CLAY with some silt and trace sand. Reddish brown  
 Sample condition : As received  
 Solid density : 2.80 t/m<sup>3</sup> (Assumed)  
 Source: Not Stated

Project No : 2-68165.00  
 Lab Ref No : HA6441/2\_MDD  
 Client Ref No :

Test Results							
Maximum dry density	1.06	t/m <sup>3</sup>	Natural water content	50.4	%		
Optimum water content	54	%	Fraction tested	100%	Passing 19mm sieve		
Sample ID	-120	-60	Nat	60	120	180	
Bulk density t/m <sup>3</sup>	1.325	1.367	1.535	1.634	1.631	1.604	
Water content %	43.2	47.6	50.4	54.1	57.6	61.8	
Dry density t/m <sup>3</sup>	0.925	0.926	1.021	1.060	1.035	0.991	
Sample condition	Hard Dry	Hard Moist	V.Stiff Moist	Stiff Moist	Firm Moist-wet	Soft Wet	
Peak stress kPa	U.T.P	U.T.P	>192	124	108	48	
Remoulded stress kPa	-	-	>192	84	52	24	



Test Methods	Notes
Compaction NZS 4402 : 1986 Test 4.1.1 (Standard)	All information supplied by Client
Shear Strength using a Hand Held Shear Vane, NZ Geotechnical Soc Inc 8/2001	

Date tested : 21/10/20      Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.  
 Date reported : 27/10/20      This report may only be reproduced in full

IANZ Approved Signatory *[Signature]*  
 Designation : Senior Civil Engineering Technician  
 Date : 27/10/20



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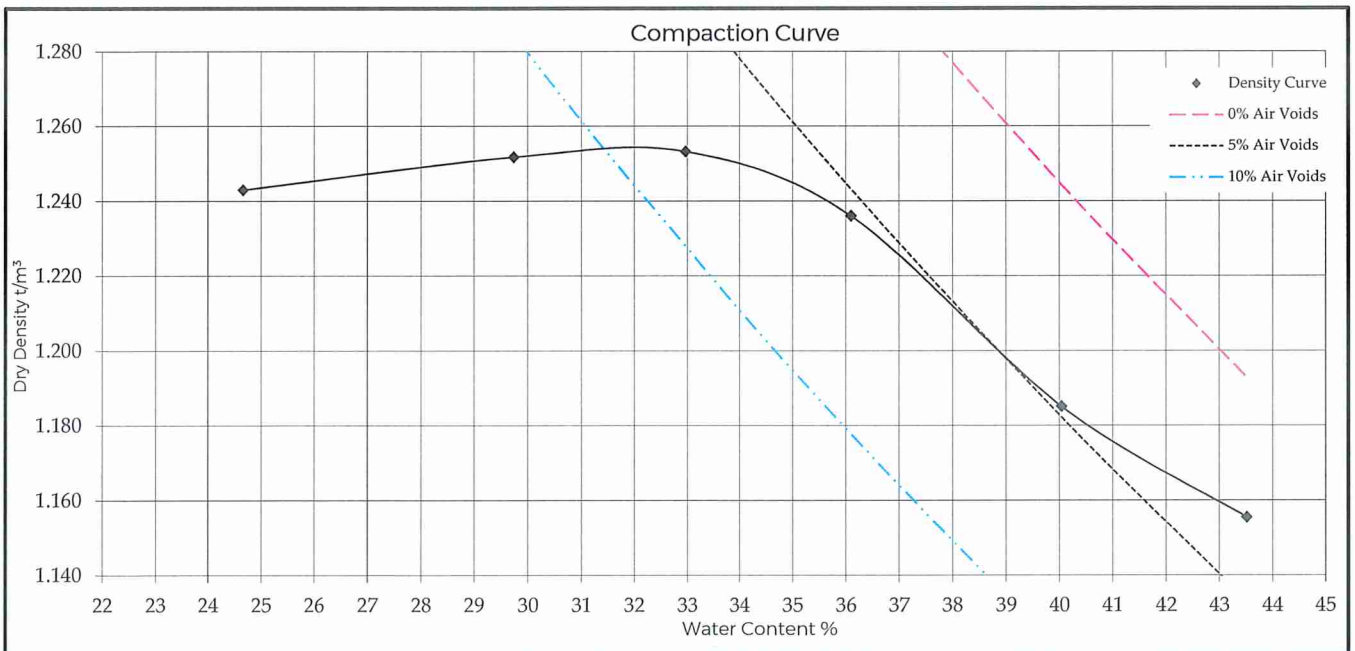
**DRY DENSITY / WATER CONTENT RELATIONSHIP  
STANDARD COMPACTION**



Project : Greenhill Park  
 Location : Greenhill Park  
 Client : DB Consulting Engineers Ltd  
 Contractor : -  
 Sampled by : Client  
 Date sampled : 09/10/20  
 Sampling method : Bulk Sample  
 Sample description : Sandy CLAY/SILT, grey  
 Sample condition : As received  
 Solid density : 2.48 t/m<sup>3</sup> (Assumed)  
 Source : Not Stated

Project No : 2-68165.00  
 Lab Ref No : HA6441/1\_MDD  
 Client Ref No :

Test Results							
Maximum dry density	1.25	t/m <sup>3</sup>	Natural water content		40.0	%	
Optimum water content	32	%	Fraction tested		100%	Passing 19mm	
Sample ID	-240	-180	-120	-60	Nat	60	
Bulk density t/m <sup>3</sup>	1.550	1.624	1.666	1.682	1.660	1.658	
Water content %	24.7	29.7	33.0	36.1	40.0	43.5	
Dry density t/m <sup>3</sup>	1.243	1.252	1.253	1.236	1.185	1.155	
Sample condition	V.Dense Moist	V.Dense Moist	V.Dense Moist	Dense Moist	M.Dense Moist-Wet	Loose Wet-Sat'	



Test Methods	Notes
Compaction NZS 4402 : 1986 Test 4.1.1 (Standard)	

Date tested : 21/10/20  
 Date reported : 27/10/20

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Designation : Senior Civil Engineering Technician  
 Date : 27/10/20



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PARTICLE SIZE ANALYSIS (HYDROMETER METHOD)

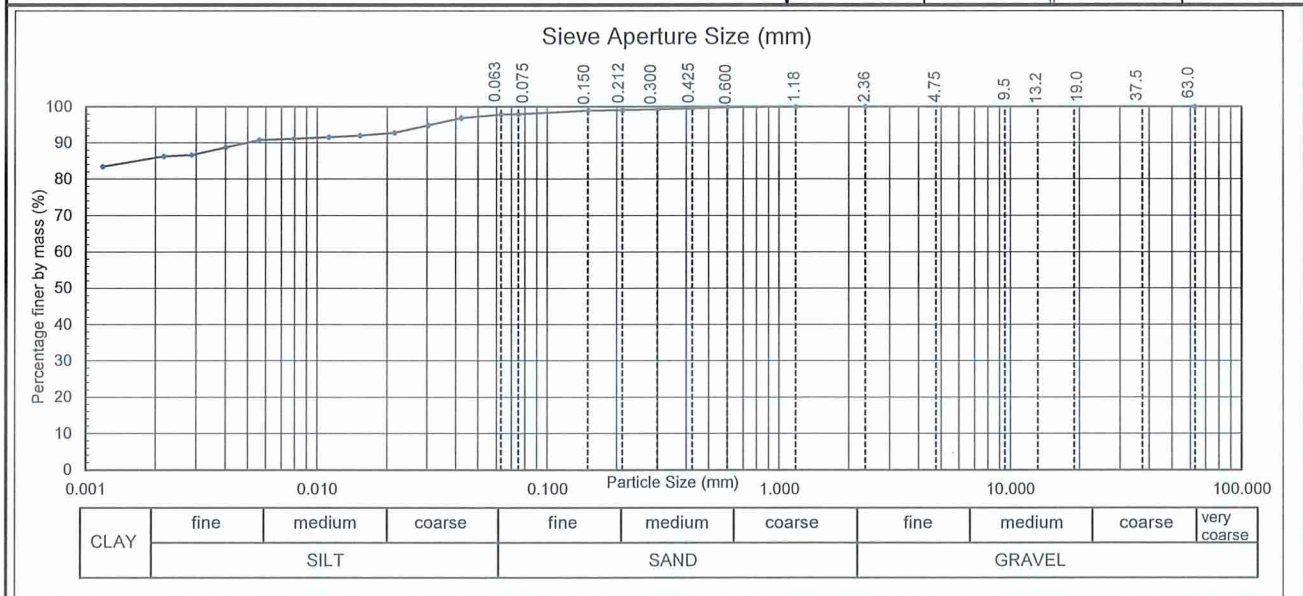
TEST REPORT



Project : Greenhill Park Area LUK  
 Location : Greenhill Park Area LUK EW.S2  
 Client : Chedworth Properties c/o CORE50 Ltd  
 Contractor : ONLINE Contractors  
 Sample Ref No: #1  
 Sampled by : Client (Aaron Kennedy)  
 Date sampled : 11/03/22  
 Sampling method : Bulk Sample  
 Sample condition : As received  
 Sample description : CLAY, some silt, trace sand  
 Solid Particle Density (t/m<sup>3</sup>): 2.66 Tested  
 Water Content (as received): 55.7 %

Project No: 2-68311.00  
 Lab Ref No: HA8743/1\_HYD  
 Client Ref: 171738-LUK-SI

Sieve Analysis					Hydrometer Analysis				
Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)
63.0	--	4.75	--	0.300	99	0.0424	97	0.0056	91
37.5	--	2.36	100	0.212	99	0.0303	95	0.0040	89
19.0	--	1.18	100	0.150	99	0.0216	93	0.0029	87
13.2	--	0.600	100	0.075	98	0.0153	92	0.0022	86
9.5	--	0.425	100	0.063	98	0.0112	92	0.0012	83
<b>Note:</b> "--" denotes sieve not used and/or hydrometer analysis not tested						0.0080	91		



Test Methods	Notes
Particle Size Analysis: NZS 4402:1986: Test 2.8.4 (Washed Grading & Hydrometer Method)	pH of suspension : 8.0 (Whatmans Full Range pH Indicator paper) All information supplied by Client

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

Date Tested: 28/03/22 This report may only be reproduced in full  
 Date Reported: 29/03/22  
 IANZ Approved Signatory  
 Designation : Senior Civil Engineering Technician  
 Date : 29/03/22



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

PARTICLE SIZE ANALYSIS (HYDROMETER METHOD)

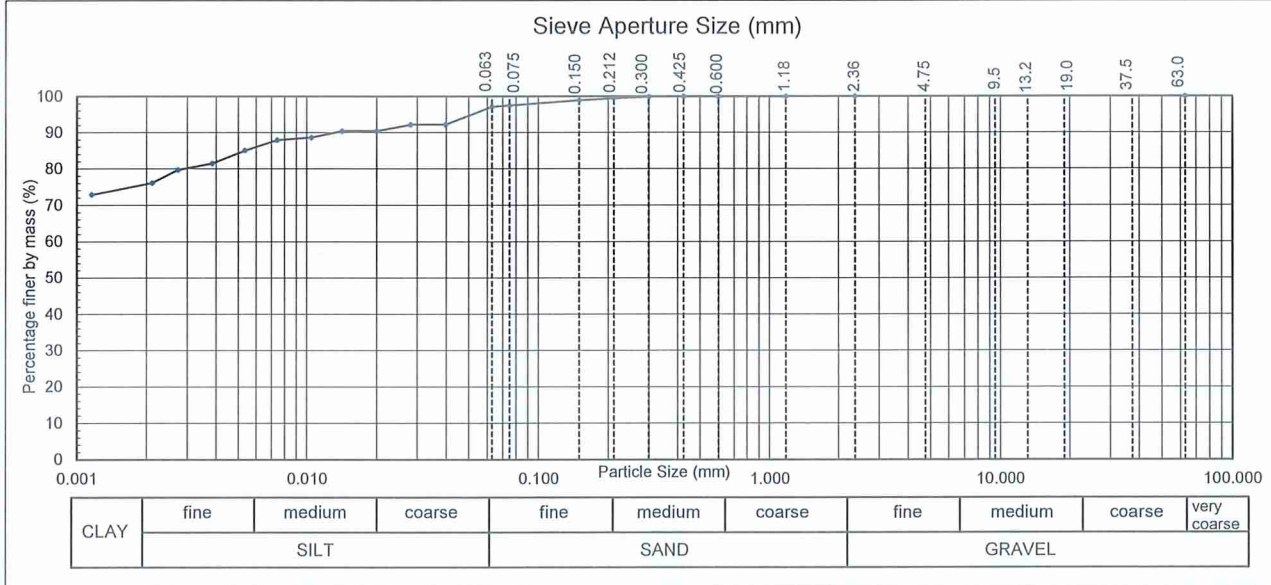
TEST REPORT



Project : Greenhill Park Area LUK  
 Location : Greenhill Park Area LUK EW.S2  
 Client : Chedworth Properties c/o CORE50 Ltd  
 Contractor : ONLINE Contractors  
 Sample Ref No: #2  
 Sampled by : Client (Aaron Kennedy)  
 Date sampled : 11/03/22  
 Sampling method : Bulk Sample  
 Sample condition : As received  
 Sample description : Silty CLAY, trace sand  
 Solid Particle Density (t/m<sup>3</sup>): 2.74 Tested  
 Water Content (as received): 62.0 %

Project No: 2-68311.00  
 Lab Ref No: HA8743/2\_HYD  
 Client Ref: 171738-LUK-SI

Sieve Analysis						Hydrometer Analysis			
Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)
63.0	--	4.75	--	0.300	100	0.0398	92	0.0054	85
37.5	--	2.36	100	0.212	100	0.0282	92	0.0039	82
19.0	--	1.18	100	0.150	99	0.0201	90	0.0028	80
13.2	--	0.600	100	0.075	98	0.0142	90	0.0021	76
9.5	--	0.425	100	0.063	97	0.0105	89	0.0012	73
<b>Note:</b> "--" denotes sieve not used and/or hydrometer analysis not tested						0.0074	88		



Test Methods	Notes
Particle Size Analysis: NZS 4402:1986: Test 2.8.4 (Washed Grading & Hydrometer Method)	pH of suspension : 8.0 (Whatmans Full Range pH Indicator paper) All information supplied by Client

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

Date Tested: 28/03/22 This report may only be reproduced in full  
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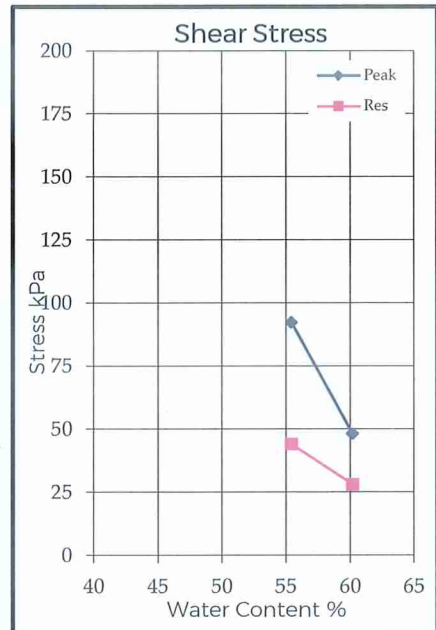
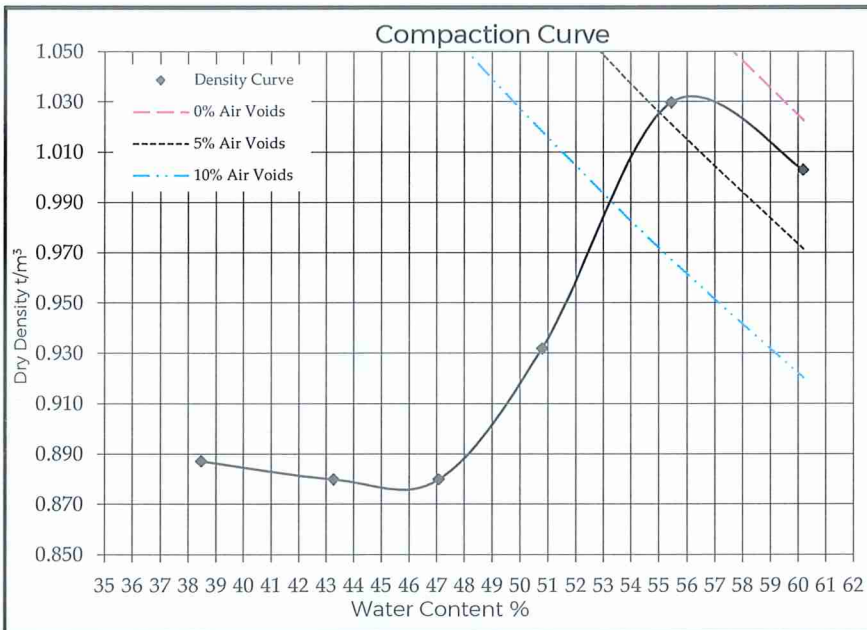
**DRY DENSITY / WATER CONTENT RELATIONSHIP  
STANDARD COMPACTION**



Project : Greenhill Park Area LUK  
 Location : Greenhill Park Area LUK EW.S2  
 Client : Chedworth Properties c/o CORE50 Ltd  
 Contractor : ONLINE Contractors  
 Sampled by : Client (Aaron Kennedy)  
 Date sampled : 11/03/22  
 Sampling method : Bulk Sample  
 Sample description : CLAY, some silt, trace sand  
 Sample condition : As received  
 Solid density : 2.66 t/m<sup>3</sup> (Tested)  
 Source : #2

Project No : 2-68311.00  
 Lab Ref No : HA8743/1\_MDD  
 Client Ref No : 171738-LUK-SI

Test Results							
Maximum dry density	1.03	t/m <sup>3</sup>	Natural water content	55.4	%		
Optimum water content	56	%	Fraction tested	100%	Passing 19mm		
Sample ID	-240	-180	-120	-60	Nat	60	
Bulk density t/m <sup>3</sup>	1.228	1.261	1.294	1.405	1.601	1.606	
Water content %	38.5	43.3	47.1	50.8	55.4	60.2	
Dry density t/m <sup>3</sup>	0.887	0.880	0.880	0.932	1.030	1.003	
Sample condition	Hard Moist	Hard Moist	Hard Moist	Hard Moist-Wet	V. Stiff Wet	Stiff Wet	
Peak stress kPa	UTP	UTP	UTP	>209	92	48	
Remoulded stress kPa	-	-	-	-	44	28	



Test Methods	Notes
Compaction NZS 4402 : 1986 Test 4.1.1 (Standard)	All information supplied by Client
Shear Strength using a Hand Held Shear Vane, NZ Geotechnical Soc Inc 8/2001	

Date tested : 22/03/22      Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.  
 Date reported : 29/03/22      This report may only be reproduced in full

IANZ Approved Signatory

Designation : Senior Civil Engineering Technician  
 Date : 29/03/22



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

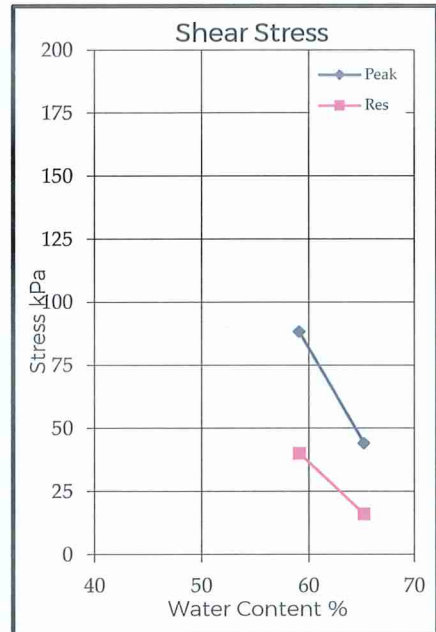
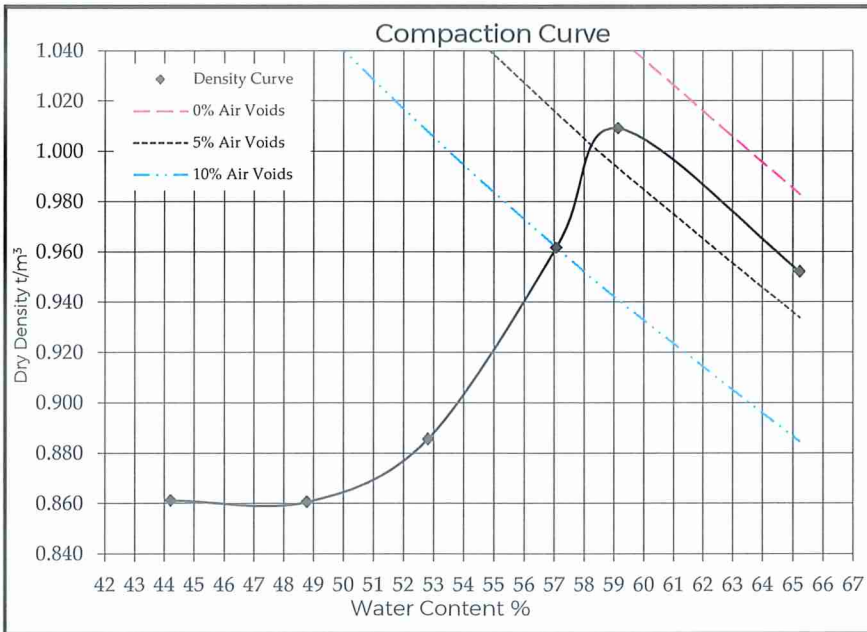
**DRY DENSITY / WATER CONTENT RELATIONSHIP  
STANDARD COMPACTION**



Project : Greenhill Park Area LUK  
 Location : Greenhill Park Area LUK EW.S2  
 Client : Chedworth Properties c/o CORE50 Ltd  
 Contractor : ONLINE Contractors  
 Sampled by : Client (Aaron Kennedy)  
 Date sampled : 11/03/22  
 Sampling method : Bulk Sample  
 Sample description : Silty CLAY, trace sand  
 Sample condition : As received  
 Solid density : 2.74 t/m<sup>3</sup> (Tested)  
 Source: #2


Project No :	2-68311.00
Lab Ref No :	HA8743/2_MDD
Client Ref No :	171738-LUK-SI

Test Results							
Maximum dry density	1.01	t/m <sup>3</sup>	Natural water content	59.1	%		
Optimum water content	59	%	Fraction tested	100%	Passing 19mm		
Sample ID	-240	-180	-120	-60	Nat	60	
Bulk density t/m <sup>3</sup>	1.242	1.280	1.353	1.511	1.606	1.573	
Water content %	44.2	48.8	52.8	57.1	59.1	65.2	
Dry density t/m <sup>3</sup>	0.861	0.861	0.886	0.962	1.009	0.952	
Sample condition	Hard Moist	Hard Moist	Hard Moist	Hard Moist-Wet	V. Stiff Wet	Firm Wet	
Peak stress kPa	UTP	UTP	UTP	>209	88	44	
Remoulded stress kPa	-	-	-	-	40	16	



Test Methods	Notes
Compaction NZS 4402 : 1986 Test 4.1.1 (Standard)	All information supplied by Client
Shear Strength using a Hand Held Shear Vane, NZ Geotechnical Soc Inc 8/2001	

Date tested : 22/03/22      Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.  
 Date reported : 29/03/22      This report may only be reproduced in full

IANZ Approved Signatory   
 Designation : Senior Civil Engineering Technician  
 Date : 29/03/22



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

PLASTICITY INDEX FOR SOILS  
TEST REPORT



Project : Greenhill Park Area LUK  
 Location : Greenhill Park Area LUK EW.S2  
 Client : Chedworth Properties c/o CORE50 Ltd  
 Contractor : ONLINE Contractors  
 Sampled by : Client (Aaron Kennedy)  
 Date sampled : 11/03/2022  
 Date received : 14/03/2022  
 Sampling method : Bulk Sample  
 Sample condition : As received

Project No : 2-68311.00  
 Lab Ref No : HA8743\_PI  
 Client Ref No : 171738-LUK\_SI

Test Results

Sample Lab Ref No :	HA8743/1_PI	HA8743/2_PI
Sample Location ID :	#1	#2
Sample Depth (m) :	-	-
Soil Fraction Tested :	-425µm	-425µm
Natural Water Content (%) :	55.7	62.0
Liquid Limit :	120	101
Plastic Limit :	47	50
Plasticity Index :	73	51
Sample Description :	HA8743/1_PI HA8743/2_PI	CLAY, some silt, trace sand Silty CLAY, trace sand

Test Methods	Notes
Water Content NZS 4402 : 1986, Test 2.1	Soil fraction tested as shown.
Liquid Limit NZS 4402 : 1986, Test 2.2	
Plastic Limit NZS 4402 : 1986, Test 2.3	
Plasticity Index NZS 4402 : 1986, Test 2.4	

Date tested : 28/03/22  
 Date reported : 04/04/22

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.  
 This report may only be reproduced in full  
 All information supplied by Client

IANZ Approved Signatory

Designation : Senior Civil Engineering Technician  
 Date : 04/04/22



Test results indicated as not accredited are outside the scope of the laboratory's accreditation



**LINEAR SHRINKAGE FOR SOILS  
TEST REPORT**



Project : Greenhill Park Area LUK  
 Location : Greenhill Park Area LUK EW.S2  
 Client : Chedworth Properties c/o CORE50 Ltd  
 Contractor : ONLINE Contractors  
 Sampled by : Client  
 Date sampled : 11/03/22  
 Date received : 14/03/22  
 Sampling method : Bulk Sample  
 Sample condition : As received

Project No :	2-68311.00
Lab Ref No :	HA8743_LS
Client Ref No :	171738-LUK-SI

Test Results		
Sample Lab Ref No :	HA8743/1_LS	HA8743/2_LS
Location ID :	#1	#2
Sample Depth (m) :	-	-
Soil Fraction Tested :	-425µm	-425µm
Sample History :	Natural	Natural
Water Content as Rec'd (%) :	55.7	62.0
Water Content at LS test (%) :	120.7	100.6
Linear Shrinkage (%) :	22	19
Sample Description :	HA8743/1_LS HA8743/2_LS	CLAY, some silt, trace sand Silty CLAY, trace sand
Test Methods	Notes	
Water Content NZS 4402 : 1986, Test 2.1 Linear Shrinkage NZS 4402 : 1986, Test 2.6	Sample description is not IANZ endorsed.	

Date tested : 01/04/22  
 Date reported : 04/04/22

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.  
 This report may only be reproduced in full  
 All information supplied by Client

IANZ Approved Signatory

Designation : Senior Civil Engineering Technician  
 Date : 04/04/22



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

**SOLID DENSITY OF SOIL PARTICLES  
TEST REPORT**



Project : Greenhill Park Area LUK  
 Location : Greenhill Park Area LUK EW.S2  
 Client : Chedworth Properties c/o CORE50 Ltd  
 Contractor : ONLINE Contractors  
 Sampled by : Client (Aaron Kennedy)  
 Date sampled : 11/03/2022  
 Date received : 14/03/2022  
 Sampling method : Bulk sample  
 Sample condition : As received

Project No :	2-68311.00
Lab Ref No :	HA8743_SD
Client Ref No :	171738-LUK_SI

Test Results		
Sample Lab Ref No :	HA8743/1_SD	HA8743/2_SD
Location :	#1	#2
Sample Depth (m) :	-	-
Soil Fraction Tested :	Whole	Whole
Sample History :	Natural	Natural
Solid Density (t/m <sup>3</sup> ) :	2.66	2.74
Sample Description :	HA8743/1_SD HA8743/2_SD	CLAY, some silt, trace sand Silty CLAY, trace sand
Test Methods	Notes	
Solid Density : NZS 4402 : 1986 Test 2.7.2		

Date tested : 22/03/22  
 Date reported : 29/03/22

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.  
 This report may only be reproduced in full  
 All information supplied by Client

IANZ Approved Signatory

Designation : Senior Civil Engineering Technician  
 Date : 29/03/22

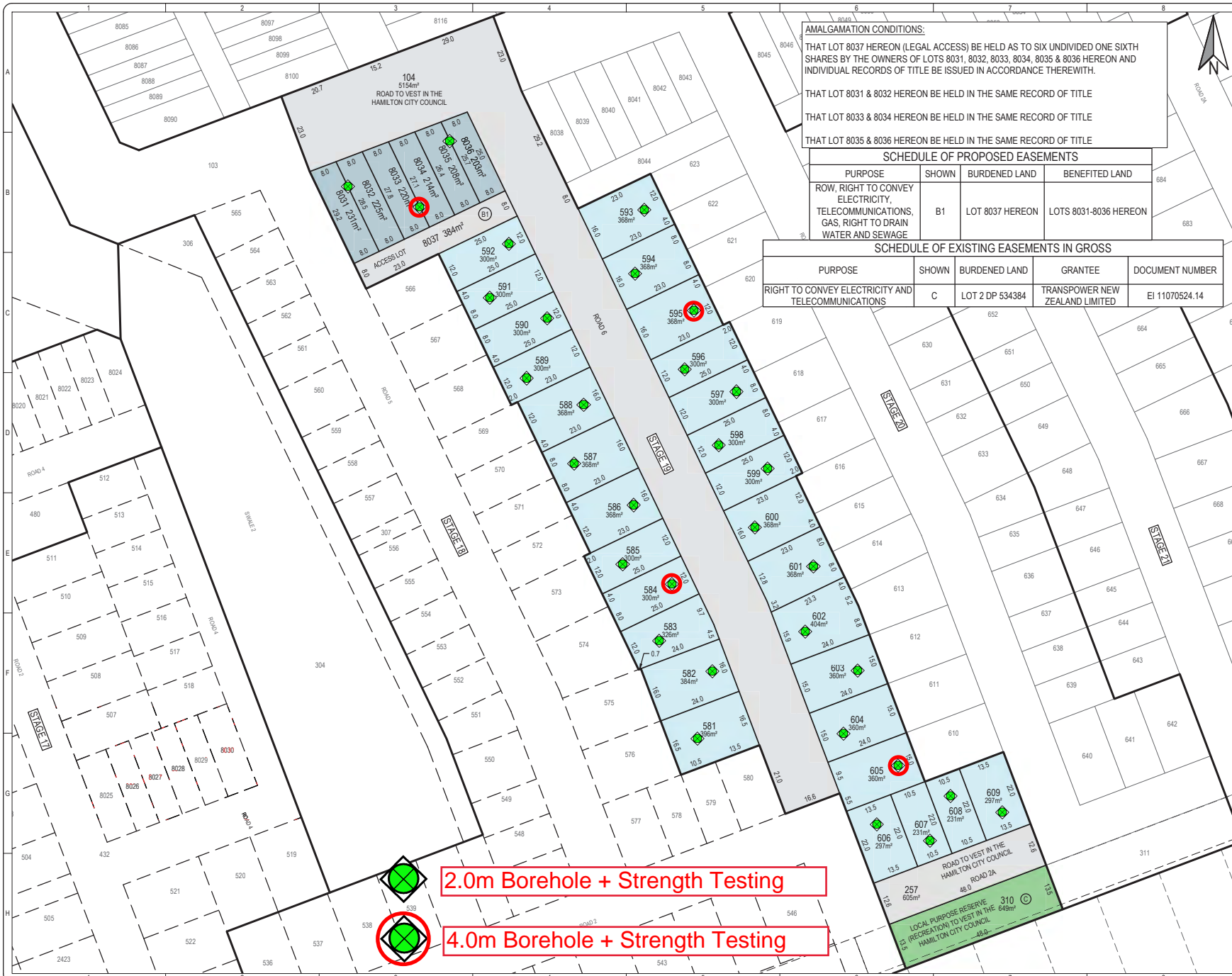


Test results indicated as not accredited are outside the scope of the laboratory's accreditation



Appendix D Post Construction Test Results  
Soil Tests by CORE50  
NDMs

H:\10300 - H Div\Imp\main\Sub\1915-30410-19-RC1 - Scheme Plan - Stage 19.dwg - PlotNo: 4/11/2021



**AMALGAMATION CONDITIONS:**  
 THAT LOT 8037 HEREON (LEGAL ACCESS) BE HELD AS TO SIX UNDIVIDED ONE SIXTH SHARES BY THE OWNERS OF LOTS 8031, 8032, 8033, 8034, 8035 & 8036 HEREON AND INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.  
 THAT LOT 8031 & 8032 HEREON BE HELD IN THE SAME RECORD OF TITLE  
 THAT LOT 8033 & 8034 HEREON BE HELD IN THE SAME RECORD OF TITLE  
 THAT LOT 8035 & 8036 HEREON BE HELD IN THE SAME RECORD OF TITLE

SCHEDULE OF PROPOSED EASEMENTS			
PURPOSE	SHOWN	BURDENED LAND	BENEFITED LAND
ROW, RIGHT TO CONVEY ELECTRICITY, TELECOMMUNICATIONS, GAS, RIGHT TO DRAIN WATER AND SEWAGE	B1	LOT 8037 HEREON	LOTS 8031-8036 HEREON

SCHEDULE OF EXISTING EASEMENTS IN GROSS				
PURPOSE	SHOWN	BURDENED LAND	GRANTEE	DOCUMENT NUMBER
RIGHT TO CONVEY ELECTRICITY AND TELECOMMUNICATIONS	C	LOT 2 DP 534384	TRANPOWER NEW ZEALAND LIMITED	EI 11070524.14

**SHRIMPTON & LIPINSKI**  
 LAND DEVELOPMENT & DESIGN SPECIALISTS  
 Ph. 07 577 6069  
 Email: info@sltd.co.nz  
 P.O. Box 231, Tauranga 3140  
 www.sltd.co.nz

- NOTES:**
1. THIS PLAN HAS BEEN PREPARED FOR THE PURPOSES OF SECTION 88 OF THE RESOURCE MANAGEMENT ACT 1991 AND SHOULD NOT BE RELIED ON FOR ANY OTHER PURPOSE.
  2. AREAS AND DIMENSIONS ARE APPROXIMATE ONLY AND SUBJECT TO SURVEY.

- LEGEND:**
- LOT BOUNDARY
  - PROPOSED CADASTRAL LAYOUT
  - CONCEPT BOUNDARY
  - STAGE BOUNDARY
  - ABUTTALS
  - FUTURE STAGES
  - HIGHER DENSITY LOTS
  - RECREATION RESERVE
  - STORMWATER RESERVE
  - ROAD RESERVE

Rev	DESCRIPTION	DRN	CKD	APP	DATE
0	INTERNAL ISSUE	NW	JL	NF	12/19
1	ISSUED FOR APPROVAL	NW	JL	NF	12/19
2	HCC REQUIREMENTS	NW	JL	NF	02/20
3	LAYOUT AMENDED	NW	NF	NF	04/20
4	LAYOUT AMENDED	NF	NF	GC	09/20
5	STAGE BDY'S UPDATED	NF	BP	GC	10/21
6	RESERVES CHANGED	NF	BP	GC	11/21

SURVEYED: [ ] DESIGNED: [ ]  
 COORDINATE SYSTEM: NZGD 2000 (MOUNT EDEN CIRCUIT)  
 ORIGIN OF COORDINATES:  
 HEIGHT DATUM: MOTURIKI LVD 1953  
 ORIGIN OF HEIGHT:

**TITLE**

**AREAS LU & K  
SCHEME PLAN  
STAGE 19**

PREPARED FOR

**AREAS LU & K**

ORIGINAL SCALES @ A3 STATUS: 1:1000  
 FOR APPROVAL  
 DRAWING NO: 19-30410-19-RC1  
 REVISION: 6



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	9/02/2023	581	MA581

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		1			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		2				
300		2				
400		3			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown, grey and brown mixture; very stiff; low moisture to moist; high plasticity; moderately sensitive; low dilatancy.	
500	179/77	4				
600		4				
700		4			ENGINEERED FILL: Fine to medium Sandy SILT, traces of Clay, fine Gravel and pumice; light grey; medium dense to dense; low moisture; low plasticity; high dilatancy.	
800		4				
900	138/48	6				
1000		8			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown, grey and brown mixture; very stiff; low moisture to moist; high plasticity; moderately sensitive; low dilatancy.	
1100		6				
1200		5				
1300		5			ENGINEERED FILL: Fine to coarse angular GRAVEL with some Sand and minor Silt; blue grey brown; low moisture; hard.	
1400		5				
1500		5				
1600		12			EOB at 2.0m, Target Borehole Depth.	
1700		UTP				
1800						
1900						
2000						
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	9/02/2023	582	MA582

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		1			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		1				
300		4				
400	>193/	3			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; sensitive.	
500		3				
600		3				
700	177/34	4			ENGINEERED FILL: Fine to medium Sandy SILT, traces of fine Gravel and pumice; light grey; medium dense to dense; low moisture; low plasticity; high dilatancy.	
800		5				
900		8				
1000		6				
1100		6				
1200		6				
1300		10			1300mm: Becoming fine to coarse SAND; brown.	
1400		7			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
1500		5				
1600		5				
1700		8			ENGINEERED FILL: Fine to coarse angular GRAVEL with some Sand and minor Silt; blue grey brown; low moisture; hard.	
1800		8				
1900		UTP			EOB at 2.0m, Target Borehole Depth.	
2000						
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	9/02/2023	583	MA583

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0 2 4 6 8 10 12 14 16	Good ground Result		
100		1			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		1			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy.	
300	>193/	2			ENGINEERED FILL: Fine to medium Sandy SILT, traces of fine Gravel and pumice; light grey; medium dense to dense; low moisture; low plasticity; high dilatancy.	
400		3				
500		6				
600		7				
700		7				
800		7				
900		9				
1000		8				
1100	>193/				ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy.	
1200						
1300	>193/					
1400	>193/					
1500						
1600	>193/					
1700		UTP			ENGINEERED FILL: Fine to coarse angular GRAVEL with some Sand and minor Silt; blue grey brown; low moisture; hard.	
1800						
1900						
2000						
2100					EOB at 2.0m, Target Borehole Depth.	
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7

Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
GetGeo	26/01/2023	584	MA584

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		1			FILL, respread topsoil, gravels	
200		1				
300		2				
400	>193/	4			(Engineered) FILL, silt, some clay, mixed orange-brown moist	
500		5				
600		6				
700		6			(Engineered) FILL, silt, sand, angular gravels, minor clay mixed grey-brown, moist	
800		7				
900		7				
1000		9				
1100						
1200						
1300	>193/				(Engineered) FILL, silt, clay, orange-brown, moist	
1400						
1500						
1600						
1700	>193/					
1800						
1900						
2000		UTP			(Engineered) FILL, silt, gravels, minor pumice, minor clay mixed greys and browns, moist	
2100						
2200						
2300						
2400						
2500					SILT, minor fine sand, light grey-brown moderate dilatancy	
2600						
2700					becoming wet, high dilatancy, moderate plasticity	
2800						
2900						
3000						
3100						
3200					3200-3300mm interbedded silty Sand, blue-grey, wet	
3300						
3400						
3500						
3600						
3700						
3800					Organic SILT, dark grey-brown, moist to wet	
3900					SILT, minor fine sand, light grey-brown, wet	
4000					EOB @ 4.0m, Target Depth	

**Notes:** EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- Weather leading up to testing was: Fine for the previous 3 days.
- Ground water was at 3400mm below ground level during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	9/02/2023	585	MA585

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		4			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		3				
300		4				
400	179/63	4			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
500		4				
600		3				
700		4			500mm: Fine Sandy SILT; light grey; low moisture.	
800		7				
900		8				
1000					ENGINEERED FILL: Fine to coarse angular GRAVEL with some Sand and minor Silt; blue grey brown; low moisture; hard.	
1100	>193/					
1200						
1300						
1400	>193/					
1500					EOB at 2.0m, Target Borehole Depth.	
1600	>193/					
1700						
1800						
1900						
2000						
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole    UTP = Unable To Penetrate    UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.
2	Ground water was not encountered during testing
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
4	Shear Vane records include Re-moulded values where possible
5	Shear Vane Serial No.: 1471      Exp. Date: 28/11/2023



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	9/02/2023	586	MA586

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		2			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		2				
300		3				
400	190/63	3			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
500		3				
600		3				
700	>193/	3			ENGINEERED FILL: Fine to medium Sandy SILT, traces of fine Gravel and pumice; light grey; medium dense to dense; low moisture; low plasticity; high dilatancy.	
800		4				
900		5				
1000		5			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
1100		5				
1200	>193/	5				
1300		6			1400mm: Cream streaks.	
1400		6				
1500	>193/	6				
1600		6			EOB at 2.0m, Target Borehole Depth.	
1700		6				
1800		9				
1900	>193/	8				
2000						
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	





Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	9/02/2023	587	MA587

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100					Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200						
300						
400	>193/				ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
500						
600						
700	>193/					
800						
900						
1000						
1100	164/74					
1200						
1300						
1400					1400mm: Orange streaks.	
1500	141/63				2000mm: Becoming GRAVEL. EOB at 2.0m, Target Borehole Depth.	
1600						
1700						
1800	138/63					
1900						
2000	UTP					
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	9/02/2023	588	MA588

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		2			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		2				
300		2				
400	164/60	3			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
500		3				
600		3				
700		4				
800	>193/	4				
900		4				
1000						
1100	141/51				1200mm: Cream streaks, minor mica.	
1200						
1300						
1400	164/63					
1500						
1600						
1700	>193/					
1800						
1900						
2000	177/57				EOB at 2.0m, Target Borehole Depth.	
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	9/02/2023	589	MA589

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100					Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200						
300						
400	>193/				ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
500						
600						
700						
800	>193/					
900						
1000						
1100	138/57					
1200						
1300						
1400						
1500	>193/					
1600						
1700						
1800	>193/				1800mm: Streaks light grey.	
1900					1900mm: Becoming sandy SILT; grey; moist.	
2000						
2100					EOB at 2.0m, Target Borehole Depth.	
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole    UTP = Unable To Penetrate    UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.
2	Ground water was not encountered during testing
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
4	Shear Vane records include Re-moulded values where possible
5	Shear Vane Serial No.: 1471      Exp. Date: 28/11/2023



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	9/02/2023	590	MA590

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100					Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.			
200					ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.  600mm: Light brown mix.			
300								
400								
500								
600								
700								
800								
900								
1000								
1100								
1200								
1300								
1400								
1500								
1600								
1700								
1800								
1900					ENGINEERED FILL: Fine to coarse angular Silty GRAVEL with some Sand; blue grey brown; low moisture.			
2000					EOB at 2.0m, Target Borehole Depth.			
2100								
2200								
2300								
2400								
2500								
2600								
2700								
2800								
2900								
3000								
3100								
3200								
3300								
3400								
3500								

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	9/02/2023	591	MA591

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table	
			0	2 4 6 8 10 12 14 16			
100		1			Respread TOPSOIL ; dark brown; dry.		
200	>193/	4			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.		
300		4					
400	>193/	4					
500		3					
600		3					
700	>193/	3					
800		4					
900		5					
1000		5					ENGINEERED FILL: Fine to medium Sandy SILT with some Clay; brown grey mix; moist; low plasticity; low dilatancy.
1100		9					
1200		6					
1300		5					
1400		5					
1500		5					
1600		6					
1700		9					
1800		10					
1900		10					
2000					EOB at 2.0m, Target Borehole Depth.		
2100							
2200							
2300							
2400							
2500							
2600							
2700							
2800							
2900							
3000							
3100							
3200							
3300							
3400							
3500							

<b>Notes:</b>	<b>EOB = End Of Borehole    UTP = Unable To Penetrate    UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.
2	Ground water was not encountered during testing
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
4	Shear Vane records include Re-moulded values where possible
5	Shear Vane Serial No.: 1471      Exp. Date: 28/11/2023





Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	7/03/2023	592	MA592

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0 2 4 6 8 10 12 14 16	Good Ground Result		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		1				
300	164/39	2				
400		3				
500		3				
600	179/83	3				
700		4				
800		3				
900				900mm: Moist.		
1000	141/66					
1100						
1200				1200mm: Traces of fine to medium gravel.		
1300	>193/					
1400						
1500				1500mm: Moist.		
1600				1600mm: Becoming fine to medium Silty SAND and minor fine angular Gravels; light grey brown.		
1700						
1800						
1900	132/48			1900mm: Becoming CLAY SILT; orange brown; very stiff; low moisture.		
2000						
2100				EOB at 2.0m, Target Borehole Depth.		
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole    UTP = Unable To Penetrate    UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.
2	Ground water was not encountered during testing
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
4	Shear Vane records include Re-moulded values where possible
5	Shear Vane Serial No.: 1471      Exp. Date: 28/11/2023



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	26/01/2023	593	MA593

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		4				
300		4				
400	193/63	3			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy.	
500		3				
600		2				
700		6				
800	>193/	5				
900		5				
1000						
1100						
1200	>193/					
1300						
1400						
1500					1500mm: 100mm of fine Sandy SILT; light grey.	
1600	>193/					
1700						
1800						
1900	UTP				Fine Silty SAND, traces of fine pumice; light grey; low moisture; medium dense; high dilatancy.	
2000					EOB at 2.0m, Target Borehole Depth.	
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	26/01/2023	594	MA594

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		4				
300		3				
400	>193/	2			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; sensitive; low dilatancy.	
500		2				
600		1				
700		3				
800	>193/	6			Fine Silty SAND, traces of fine pumice; light grey brown; low moisture; medium dense; high dilatancy.	
900		5				
1000						
1100						
1200	>193/					
1300						
1400						
1500						
1600						
1700					1700mm: Becoming fine to medium SAND, some Silt.	
1800					1800mm: Becoming grey brown.	
1900						
2000					2000mm: Becoming fine Sandy SILT.	
2100					EOB at 2.0m, Target Borehole Depth.	
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7

Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
GetGeo	26/01/2023	595	MA595

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
100		3		Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		3		(Engineered) FILL, clay silt mix, orange-brown, moist, moderately sensitive.	
300	182/66	3			
400		2			
500		3			
600		3			
700		3			
800		5			
900		7			
1000				consistent composition through augered depth	
1100				hard	
1200					
1300					
1400					
1500	177/68				
1600					
1700					
1800					
1900					
2000	182/74				
2100					
2200					
2300				(Engineered) FILL, gravel, silt, sand	
2400				mixed brown, dry to moist	
2500					
2600		7		Silty fine SAND, trace fine pumiceous material to 1mm	
2700		6		creamy light-brown, moist	
2800		7		SILT, minor fine sand, trace clay creamy light-brown, trace orange-mottling, moist	
2900		5			
3000		8			
3100		7			
3200		12		Silt, some sand, grey-brown, some orange-mottling wet	
3300		13			
3400		11			
3500		11			
3600		8		EOB @ 4.0m, Target Depth	
3700		5			
3800		7			
3900		5			
4000		7			

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1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023		



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	26/01/2023	596	MA596

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		1			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		1				
300		1				
400	>193/	2			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy.	
500		2				
600		4				
700		5				
800	>193/	5				
900		4				
1000						
1100						
1200	>193/					
1300						
1400						
1500	>193/					
1600						
1700						
1800						
1900						
2000	>193/					
2100					EOB at 2.0m, Target Borehole Depth.	
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	





Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	26/01/2023	597	MA597

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		4			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.			
200		4						
300		4						
400	167/48	4			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy.			
500		4						
600		4						
700	>193/	4						
800		4						
900		5						
1000	>193/							
1100								
1200								
1300								
1400	>193/							
1500								
1600								
1700								
1800	>193/							
1900								
2000								
2100					EOB at 2.0m, Target Borehole Depth.			
2200								
2300								
2400								
2500								
2600								
2700								
2800								
2900								
3000								
3100								
3200								
3300								
3400								
3500								

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	26/01/2023	598	MA598

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		1			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		1				
300		1				
400	>193/	4			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy.	
500		6				
600		5				
700		5				
800	>193/	4				
900		4				
1000						
1100	155/60					
1200						
1300						
1400						
1500	>193/					
1600						
1700						
1800						
1900	>193/					
2000						
2100					EOB at 2.0m, Target Borehole Depth.	
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	26/01/2023	599	MA599

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		4			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry. 300mm: Minor sand and clay.	
200		3				
300		2				
400	>193/	3			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy.	
500		4				
600		5				
700	>193/	4				
800		4				
900		5				
1000						
1100	138/51					
1200						
1300						
1400						
1500	160/89					
1600						
1700						
1800						
1900						
2000	>193/					
2100					EOB at 2.0m, Target Borehole Depth.	
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	26/01/2023	600	MA600

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry. 300mm: Becoming clayey.	
200		4				
300		3				
400		6			ENGINEERED FILL: Fine to medium Sandy SILT, traces of fine pumice; light grey; medium dense to dense; low moisture; low plasticity; high dilatancy.	
500		5				
600		5				
700		5				
800		9			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy.	
900		6				
1000	155/42					
1100						
1200						
1300						
1400						
1500	>193/					
1600						
1700						
1800						
1900	138/95				1900mm: Becoming insensitive.	
2000						
2100					EOB at 2.0m, Target Borehole Depth.	
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole    UTP = Unable To Penetrate    UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.
2	Ground water was not encountered during testing
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
4	Shear Vane records include Re-moulded values where possible
5	Shear Vane Serial No.: 1471      Exp. Date: 28/11/2023



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	26/01/2023	601	MA601

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		4				
300		3				
400		3			ENGINEERED FILL: Fine to medium Sandy SILT, traces of fine Gravel and pumice; light grey; medium dense to dense; low moisture; low plasticity; high dilatancy.	
500		8				
600		9				
700		11				
800		12				
900		8				
1000					ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and orange brown mixture; very stiff; low moisture; high plasticity; moderately sensitive; low dilatancy.	
1100						
1200						
1300	152/63					
1400						
1500						
1600					EOB at 2.0m, Target Borehole Depth.	
1700						
1800	135/60					
1900						
2000						
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole    UTP = Unable To Penetrate    UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.
2	Ground water was not encountered during testing
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
4	Shear Vane records include Re-moulded values where possible
5	Shear Vane Serial No.: 1471      Exp. Date: 28/11/2023





Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	26/01/2023	602	MA602

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		4				
300		7				
400		8			ENGINEERED FILL: Fine to medium Sandy SILT, traces of fine Gravel and pumice; light grey; medium dense to dense; low moisture to dry; low plasticity; high dilatancy.	
500		9				
600		9				
700		8				
800		9				
900		11				
1000					ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and orange brown mixture; very stiff; low moisture; high plasticity; moderately sensitive; low dilatancy.	
1100						
1200	167/57					
1300						
1400						
1500	149/66					
1600					EOB at 2.0m, Target Borehole Depth.	
1700						
1800						
1900						
2000	138/63					
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	26/01/2023	603	MA603

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		4			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		5				
300		7				
400		8			ENGINEERED FILL: Fine to medium Sandy SILT, traces of fine Gravel and pumice; light grey; medium dense to dense; low moisture; low plasticity; high dilatancy.	
500		9				
600		6				
700		7				
800		9				
900		12			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff; low moisture; high plasticity; moderately sensitive; low dilatancy.	
1000						
1100						
1200	162/48					
1300						
1400					ENGINEERED FILL: Fine to coarse angular GRAVEL with some Sand and minor Silt; blue grey brown; low moisture; hard; difficult augering.	
1500						
1600	164/63					
1700						
1800						
1900					EOB at 2.0m, Target Borehole Depth.	
2000						
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole    UTP = Unable To Penetrate    UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.
2	Ground water was not encountered during testing
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
4	Shear Vane records include Re-moulded values where possible
5	Shear Vane Serial No.: 1471      Exp. Date: 28/11/2023



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	26/01/2023	604	MA604

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		3				
300		6				
400		6			ENGINEERED FILL: Fine to medium Sandy SILT, traces of fine Gravel and pumice; light grey; medium dense to dense; low moisture; low plasticity; high dilatancy.	
500		8				
600		6				
700		7				
800		8			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy.	
900		8				
1000					ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy.	
1100	>193/					
1200						
1300					ENGINEERED FILL: Fine to coarse angular GRAVEL with some Sand and minor Silt; blue grey brown; low moisture; hard; difficult augering.	
1400						
1500	152/57					
1600						
1700					SILT, trace Clay; light grey; low moisture; low plasticity.	
1800						
1900					EOB at 2.0m, Target Borehole Depth.	
2000						
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole    UTP = Unable To Penetrate    UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.
2	Ground water was not encountered during testing
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
4	Shear Vane records include Re-moulded values where possible
5	Shear Vane Serial No.: 1471      Exp. Date: 28/11/2023



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
GetGeo	26/01/2023	605	MA605

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		3			FILL, respread Topsoil, some gravels	
200		4				
300		5				
400		5			(Engineered) FILL, Silt, fine sand	
500		6			trace fine pumiceous material to 1mm	
600		5			light grey-brown, trace orange mottling, moist	
700		3			hard	
800		6				
900		5				
1000						
1100					(Engineered) FILL, Silt, orange-brown, moist	
1200	182/42				hard	
1300						
1400						
1500						
1600	169/104					
1700						
1800						
1900					(Engineered) FILL, silt, sand, some angular gravels	
2000					mixed browns, dry to moist	
2100						
2200					SILT, trace fine sand, creamy light-brown, moist	
2300						
2400						
2500					Organic SILT, minor organic fibres to 1mm diameter, brown.	
2600					Organic SILT, grey-brown, very moist	
2700						
2800						
2900					Fine sandy SILT, light blue-grey, very moist	
3000					high dilatancy	
3100						
3200						
3300					Fine SAND, some silt, grey, wet	
3400					becoming trace fine to medium pumiceous sand	
3500						
3600						
3700					SILT, trace fine sand, light grey-brown, wet	
3800						
3900						
4000					EOB @ 4.0m, Target Depth	

<b>Notes:</b>		<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was at 2800mm below ground level during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	7/03/2023	606	MA606

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		4				
300		2				
400	164/63	2			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; orange brown mixture; very stiff; moist; high plasticity; low dilatancy; moderately sensitive.	
500		2				
600		2				
700	149/48	2			ENGINEERED FILL: Fine to medium Sandy SILT, traces of Clay, fine Gravel and pumice; light grey mottled orange; medium dense; low moisture; low plasticity; high dilatancy.	
800		5				
900		5				
1000		5				
1100		6				
1200		5			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; orange brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
1300	>193/	5				
1400		6				
1500		5				
1600		UTP			ENGINEERED FILL: Fine to coarse angular GRAVEL with some Sand and minor Silt; blue grey brown; low moisture; hard.	
1700						
1800					EOB at 2.0m, Target Borehole Depth.	
1900						
2000						
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	7/03/2023	607	MA607

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		2			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		2				
300		2				
400	147/45	1			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff; low moisture; high plasticity; low dilatancy; moderately sensitive.	
500		2				
600		8				
700		16				
800		10			ENGINEERED FILL: Fine to medium Sandy SILT, traces of Clay, fine Gravel and pumice; light grey mottled orange; medium dense to dense; low moisture; low plasticity; high dilatancy.	
900		10				
1000		8				
1100		6				
1200		6				
1300		7				
1400		6			ENGINEERED FILL: CLAY SILT with traces of fine Sand; light brown and brown mixture; very stiff; low moisture; high plasticity; low dilatancy;.	
1500		5				
1600		11				
1700		UTP			ENGINEERED FILL: Fine to coarse angular GRAVEL with some Sand and minor Silt; blue grey brown; low moisture; hard.	
1800						
1900						
2000						
2100					EOB at 2.0m, Target Borehole Depth.	
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7





Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	7/03/2023	608	MA608

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		2				
300		2				
400	>193/	2			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
500		2				
600		1				
700	164/63	2			ENGINEERED FILL: Fine to medium Sandy SILT, traces of fine Gravel and pumice; light grey mottled orange; medium dense to dense; low moisture; low plasticity; high dilatancy.	
800		2				
900		3				
1000		6			ENGINEERED FILL: CLAY SILT with traces of fine pumice; brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy.	
1100		5				
1200		6				
1300		6			ENGINEERED FILL: Fine to coarse angular GRAVEL with some Sand and minor Silt; brown grey mix; low moisture to dry; hard.	
1400		5				
1500						
1600	>193/				EOB at 2.0m, Target Borehole Depth.	
1700						
1800		UTP				
1900						
2000						
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
AK	7/03/2023	609	MA609

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0 2 4 6 8 10 12 14 16	Good Ground Result		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		2			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
300		1		700mm: Moist.		
400	147/63	6		ENGINEERED FILL: Fine to medium Sandy SILT, traces of fine Gravel and pumice; light grey mottled orange; medium dense to dense; low moisture; low plasticity; high dilatancy.		
500		4		ENGINEERED FILL: CLAY SILT with traces of fine Sand; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy.		
600		2				
700		1				
800		3				
900		4				
1000		5				
1100		5				
1200		6				
1300		7				
1400		5				
1500		5				
1600	>193/	5				
1700		UTP				
1800					ENGINEERED FILL: Fine to coarse angular GRAVEL with some Sand and minor Silt; grey brown; low moisture; hard.	
1900						
2000						
2100					EOB at 2.0m, Target Borehole Depth.	
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole    UTP = Unable To Penetrate    UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.
2	Ground water was not encountered during testing
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
4	Shear Vane records include Re-moulded values where possible
5	Shear Vane Serial No.: 1471      Exp. Date: 28/11/2023



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
RG	9/02/2023	8031	HA8031

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		1						
200		1						
300		3						
400	141/63	3						
500		4						
600		3						
700	132/77	5						
800		2						
900		2						
1000	138/45	2						
1100		2						
1200		2						
1300		2						
1400		2						
1500		3						
1600		2						
1700		4						
1800		3						
1900		3						
2000								
2100					EOB at 2.0m, Target Borehole Depth.			
2200								
2300								
2400								
2500								
2600								
2700								
2800								
2900								
3000								
3100								
3200								
3300								
3400								
3500								

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
RG	9/02/2023	8032	HA8032

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		1				<p>Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.</p> <p>ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.</p> <p>800mm: Becoming mixed with light grey sandy silt.</p> <p>Fine sandy SILT with traces of clay; light grey mottled orange; loose to medium dense; moist; low plasticity; high dilatancy.</p> <p>EOB at 2.0m, Target Borehole Depth.</p>		
200		1						
300		3						
400	141/63	3						
500		4						
600		3						
700	132/77	5						
800		2						
900		2						
1000	138/45	2						
1100		2						
1200		2						
1300		2						
1400		2						
1500		3						
1600		2						
1700		4						
1800		3						
1900		3						
2000								
2100								
2200								
2300								
2400								
2500								
2600								
2700								
2800								
2900								
3000								
3100								
3200								
3300								
3400								
3500								

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
GetGeo	26/01/2023	8033	MA8033

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
100		1		FILL, respread topsoil, some gravels varied from 200mm to 500mm, heavily tracked by machinery	
200	2	(Engineered) FILL, silt, some clay, orange-brown, moist			
300	2				
400	2				
500	3				
600	8				
700	9				
800	5				
900	6				
1000	2				
1100	3				
1200	3				
1300	4				
1400	4				
1500	3				
1600	2				
1700	2				
1800	3				
1900	2				
2000	3				
2100	3				
2200	3				
2300	4				
2400	3				
2500	4				
2600	6				
2700	7				
2800	7				
2900	5				
3000	5				
3100	5				
3200	4				
3300	5				
3400	7				
3500	6				
3600	5				
3700	5				
3800	4				
3900	5				
4000	6			EOB @ 4m, Target Depth	

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was at 3400mm below ground level during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	

Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
GetGeo	26/01/2023	8034	MA8034

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
100		1		FILL, respread topsoil, some gravels varied from 200mm to 500mm, heavily tracked by machinery	
200		2		(Engineered) FILL, silt, some clay, orange-brown, moist	
300		2			
400		2			
500		3			
600		8			
700		9		(Engineered) FILL, silt, minor gravels, minor pumice	
800		5		minor sand, mixed brown, dry to moist	
900		6		900mm trace topsoil	
1000		2			
1100		3			
1200		3		SILT, some sand, creamy light-brown	
1300		4		minor orange mottling, moist	
1400		4			
1500		3		becoming some clay	
1600		2			
1700		2			
1800		3		sandy Silt, some clay, light orange-brown, wet	
1900		2			
2000		3			
2100		3			
2200		3			
2300		4			
2400		3		SAND, some pumiceous material to 3mm	
2500		4		minor silt, mixed brown and orange-brown layering	
2600		6		moist to very moist	
2700		7			
2800		7		some rounded gravels to 10mm	
2900		5			
3000		5			
3100		5		becoming interbedded pumice Sand with some coarse pumice	
3200		4		and Sand, some silt, minor pumice, grey, wet	
3300		5			
3400		7			
3500		6		Sand, some silt, grey, wet	
3600		5			
3700		5			
3800		4			
3900		5			
4000		6		EOB @ 4m, Target Depth	

**Notes:**      EOB = End Of Borehole      UTP = Unable To Penetrate      UTE = Unable To Extract

- Weather leading up to testing was: Fine for the previous 3 days.
- Ground water was at 3400mm below ground level during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: 1471      Exp. Date: 28/11/2023





Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
RG	9/02/2023	8035	HA8035

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		6				
300	135/92	4				
400		3			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
500		2				
600		2				
700	>193/	2				
800		5			800mm: Becoming Silty SAND with some gravel clay.	
900		9				
1000		7				
1100		15				
1200		8				
1300		4				
1400	86/45	4			Fine to coarse SAND with traces of fine Gravel; grey brown; dense to very dense; moist; well graded.	
1500		4				
1600		9				
1700		14				
1800		17				
1900		12				
2000					EOB at 2.0m, Target Borehole Depth.	
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	



Project Name		Job Ref.	
GCR Stage 19, Greenhill Park, Hamilton		171738-S19-01	
Tested by	Date	Lot No.	Test Site
RG	9/02/2023	8036	HA8036

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		3			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		6				
300	135/92	4				
400		3			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy; moderately sensitive.	
500		2				
600		2				
700	>193/	2			800mm: Becoming Silty SAND with some gravel clay.	
800		5				
900		9				
1000		7				
1100		15				
1200		8				
1300		4			Fine to coarse SAND with traces of fine Gravel; grey brown; dense to very dense; moist; well graded.	
1400	86/45	4				
1500		4				
1600		9				
1700		14				
1800		17				
1900		12				
2000					EOB at 2.0m, Target Borehole Depth.	
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

<b>Notes:</b>	<b>EOB = End Of Borehole</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: Fine for the previous 3 days.		
2	Ground water was not encountered during testing		
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)		
4	Shear Vane records include Re-moulded values where possible		
5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7

Project Address: Area LUK of Greenhill Park, Hamilton  
Job Ref: 171738-LUK-SI  
Client: Chedworth Properties Limited  
Contractor: ONLINE Contractors Limited  
Date Started: 1/10/2020  
Last Updated: 3/03/2023  
Last Updated By: AK

Test Methods:  
NZS 4402 1986 Test 2.1  
NZS 4407 2015 Test 4.2  
NZS 4407 2015 Test 4.3  
CETANZ TG1 2011  
ASTM D5874 - 16 2007  
NZGS: August 2001

Notes:  
Water Content done by External Laboratory  
NDM Direct Transmission  
NDM Back Scatter  
Scala Dynamic Cone Penetrometer  
Clegg Hammer  
Hand Held Shear Vane

Test Site Location: (Refer to test site location plan)							In-situ Soil Strength Testing Undrained Shear Strength (kPa) UTP = Unable to Penetrate					Soil Density NDM Testing Data												Result			
Test Date	Test No. N: (NDM) D: (DCP) S: (Shear Vane) C: (Clegg)	RL (Ref Datum: Moturiki 1953)	Co-ordinates Ref Datum: Northings Eastings	Compacted Lift Thickness (mm)	Soil Description	Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 at 500mm BGL (kPa)	Average (kPa)	SD: Solid Density (kg/m <sup>3</sup> ) (Measured)	MDD: Max Dry Density (kg/m <sup>3</sup> ) (Measured)	OMC: Optimum Water Content. (%)	Gauge NDM Serial No.	Gauge Probe Depth (mm)	Gauge Wet Density (kg/m <sup>3</sup> )	Gauge Moisture Content (%)	Gauge Dry Density (kg/m <sup>3</sup> )	Gauge Proctor Ratio (PR%)	Gauge Air Voids (%)	Moisture Content (%)	Dry Density (kg/m <sup>3</sup> )	Proctor Ratio (PR%)	Air Voids (%)	PASS/FAIL	Comments	
																											21/02/2023
21/02/2023	N: 2	39.050	Stage 23	OCL ID#L2T2	500	CLAY SILT	209+	UTP	209+	209+	209	2700	1020	57.5	79159	300	1752	51.1	1159	114	-2	44.6	1212	119	1	PASS	
21/02/2023	N: 3	39.160	Stage 23	OCL ID#L2T3	500	CLAY SILT	209+	UTP	206	208	208	2700	1020	57.5	79159	300	1681	50.5	1117	110	2	49.1	1127	111	3	PASS	
21/02/2023	N: 4	39.200	Stage 23	OCL ID#L2T4	500	CLAY SILT	209+	209+	209+	179	201	2700	1020	57.5	79159	300	1679	49.8	1121	110	3	47.9	1135	111	4	PASS	
21/02/2023	N: 5	38.890	Stage 23	OCL ID#L2T5	500	CLAY SILT	UTP	209+	209+	209+	209	2700	1020	57.5	79159	300	1701	49.1	1141	112	2	48.6	1145	112	2	PASS	
21/02/2023	N: 6	38.800	Stage 23	OCL ID#L2T6	500	CLAY SILT	209+	209+	209+	194	205	2700	1020	57.5	79159	300	1714	55.5	1102	108	-2	48.6	1153	113	1	PASS	
21/02/2023	N: 7	38.910	Stage 23	OCL ID#L2T7	500	CLAY SILT	209+	209+	209+	209+	209	2700	1020	57.5	79159	300	1700	54.1	1103	108	-1	49.8	1135	111	1	PASS	
21/02/2023	N: 8	38.550	Stage 21	OCL ID#L2T8	500	CLAY SILT	UTP	209+	209+	209+	209	2700	1020	57.5	79159	300	1727	51.0	1144	112	-1	44.3	1197	117	3	PASS	
21/02/2023	N: 9	38.495	Stage 21	OCL ID#L2T9	500	CLAY SILT	209+	209+	209+	179	201	2700	1020	57.5	79159	300	1711	49.7	1143	112	1	57.1	1089	107	-3	PASS	
21/02/2023	N: 10	38.400	Stage 21	OCL ID#L2T10	500	CLAY SILT	209+	209+	209+	209+	209	2700	1020	57.5	79159	300	1689	59.0	1062	104	-2	54.1	1096	107	0	PASS	
21/02/2023	N: 11	38.473	Stage 21	OCL ID#L2T11	500	CLAY SILT	209+	209+	209+	209+	209	2700	1020	57.5	79159	300	1784	30.1	1371	134	8	36.1	1311	129	4	PASS	
21/02/2023	N: 12	38.620	Stage 21	OCL ID#L2T12	500	CLAY SILT	UTP	209+	209+	209+	209	2700	1020	57.5	79159	300	1715	43.3	1197	117	4	44.7	1185	116	3	PASS	
21/02/2023	N: 13	37.990	Stage 21	OCL ID#L2T13	500	CLAY SILT	UTP	209+	209+	209+	209	2700	1020	57.5	79159	300	1710	49.5	1144	112	1	50.1	1139	112	1	PASS	
21/02/2023	N: 14	33.390	Stage 22	OCL ID#L2T14	500	CLAY SILT	209+	209+	209+	UTP	209	2700	1020	57.5	79159	300	1739	46.9	1184	116	1	46.0	1191	117	1	PASS	
21/02/2023	N: 15	39.070	Stage 22	OCL ID#L2T15	500	CLAY SILT	164	209+	134	206	178	2700	1020	57.5	79159	300	1751	46.6	1194	117	0	52.8	1146	112	-3	PASS	
21/02/2023	N: 16	39.270	Stage 22	OCL ID#L2T16	500	CLAY SILT	UTP	209+	209+	209+	209	2700	1020	57.5	79159	300	1654	48.0	1118	110	5	54.4	1071	105	2	PASS	
21/02/2023	N: 17	39.230	Stage 22	OCL ID#L2T17	500	CLAY SILT	UTP	209+	209+	209+	209	2700	1020	57.5	79159	300	1730	53.0	1131	111	-2	47.4	1174	115	1	PASS	
21/02/2023	N: 18	39.150	Stage 22	OCL ID#L2T18	500	Sandy CLAY SILT	UTP	UTP	UTP	UTP	209	2700	1020	57.5	79159	300	1692	35.1	1252	123	10	31.7	1285	126	12	PASS	Isolated area mixed with Sandy SILT material.
21/02/2023	N: 19	39.160	Stage 22	OCL ID#L2T19	500	CLAY SILT	UTP	UTP	UTP	209+	209	2700	1020	57.5	79159	300	1800	46.2	1231	121	-2	49.6	1203	118	-4	PASS	Shear vane test #4 at 500mm Depth.
21/02/2023	N: 20	39.174	Stage 22	OCL ID#L2T20	500	CLAY SILT	209+	209+	209+	179	201	2700	1020	57.5	79159	300	1692	56.5	1081	106	-1	64.1	1031	101	-4	PASS	Shear vane test #4 at 500mm Depth.
3/03/2023	N: 7	39.320	Stage 19		500	CLAY SILT	164	161	164	176	166	2700	1020	57.5	79159	250	1673	59.4	1050	103	-1					Provisional PASS	Awaiting moisture correction results.
3/03/2023	N: 8	39.330	Stage 19		500	CLAY SILT	146	209	152	179	171	2700	1020	57.5	79159	300	1674	58.5	1056	104	-1					Provisional PASS	Awaiting moisture correction results.



Appendix E     Stormwater Management  
Minimum Lot Levels: 30410-01-S9-G1 Rev. AB1

R:\Project Files\30410-01-1901 Drawing Presentation Files\30410-01-19-25A - Earthworks\30410-01 - Stage 19 Asbuilt EW and Geotech Plan.dwg - Plotted: 27/03/2023



  
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 LAND SPECIALISTS  
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 P.O. Box 231, Tauranga 3140  
 www.sltga.co.nz

- LEGEND:**
- 38.2 Spot Height Ground Level\*
  - Slope Arrow
  - Major Contour
  - - - Minor Contour

LOT NUMBER	LOWEST LEVEL	MINIMUM FINISHED FLOOR LEVEL (FFL)
581	39.06	39.21
582	39.26	39.41
583	39.49	39.64
584	39.63	39.78
585	39.80	39.95
586	39.98	40.13
587	40.18	40.33
588	40.24	40.53
589	40.24	40.75
590	40.31	40.75
591	40.18	40.70
592	40.12	40.57
593	40.44	40.59
594	40.62	40.77
595	40.43	40.58
596	40.29	40.44
597	40.23	40.38
598	40.04	40.19
599	39.85	40.00
600	39.72	39.87
601	39.52	39.67
602	39.30	39.45
603	39.14	39.29
604	38.99	39.14
605	39.06	39.21
606	39.06	39.21
607	39.25	39.55
608	39.25	39.59
609	39.30	39.71
8031	39.40	39.55
8032	39.42	39.57
8033	39.48	39.63
8034	39.48	39.63
8035	39.59	39.74
8036	39.81	39.96

Contour Interval = 0.20m

\*Ground Levels are NOT to be used for Building Design.

Rev	DESCRIPTION	DRN	CKD	APP	DATE
0	PRELIMINARY	NP	BP	PH	27-03-23
AB1	AS-BUILT	NP	BP	PH	27-03-23

SURVEYED: \_\_\_\_\_ DESIGNED: \_\_\_\_\_  
 COORDINATE SYSTEM: NZGD 2000 - MT EDEN CIRCUIT  
 ORIGIN OF COORDINATES:  
 HEIGHT DATUM: MOTURIKI DATUM 1953  
 ORIGIN OF HEIGHT: \_\_\_\_\_

## SECTION LEVELS AND FLOW-GEOTECHNICAL REQUIREMENT

PREPARED FOR




**STAGE 19**

ORIGINAL SCALES @ A3	STATUS
1:1250	AS-BUILT
DO NOT SCALE DIMENSIONS	
DRAWING NO	REVISION
<b>30410-01-S19-G1</b>	<b>AB1</b>