

## GREENHILL PARK RESIDENTIAL SUBDIVISION

### STAGE 18 (Lots 536-580)

Area LUK, Greenhill Park, Hamilton

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



Our Ref: CR171738-S18-01

Prepared for: Chedworth Properties Limited

Date: January 2023 V2

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## **1.0 Subdivision Development Earthworks**

### **1.1 Introduction**

Stage 18 of Greenhill Park is currently accessible from Chilman Terrace (Road 1), Earp Crescent (Road 2) and Mussel White Terrace (Road 3). Stage 18 comprises 45 residential lots (numbered 536 to 580) located on Joint Avenue (Road 5) and Earp Crescent (Road 2). The locations of these lots are shown on attached subdivision plan 19-30410-18-RC1 Rev. 9 included in Appendix A.

Bulk earthworks have been completed to re-contour the previously agricultural landscape for Stage 18 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 18. The included earthworks plan shows the cut/fill extent of the earthworks undertaken, road and lot locations.

## 1.2 Earthworks in the Subdivision

The majority of the earthworks for Stage 18 of the subdivision development were largely undertaken between October and December 2020, with additional earthworks undertaken in November and December 2022 and January 2023.

These earthworks comprised:

1. The stripping of surface topsoil to expose underlying natural soils.
2. Cut of up to 1.5m.
3. Placement of fill 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 18, 25 to 26 and the larger Greenhill Subdivision. A layer of coarse-grained rock fill was placed and compacted prior to cohesive fill when areas of very moist insitu Silty subgrade and shallow water table were encountered. Majority of filling works were undertaken during the summer of 2020 when drying back of the soils was possible to close to optimum moisture contents to achieve near maximum compaction densities and undrained shear strengths.

Additional earthworks undertaken immediately prior to completion reporting included filling of stormwater silt ponds, and undercutting localised zones of historic fill. These were generally carried out after than the majority of earthworks, and resulted in a selection of lots being completed later. We note some lots were excluded from initial interim reporting but have been included in this final version of the GCR.

Upon completion of the earthworks, approximately 100 to 500 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 300mm, no guarantee is implied or given that the topsoil on any part of any lot is 300mm 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 18, 25 to 26 and across the larger subdivision. A 200mm to 900mm hardfill layer was laid and compacted over areas with soft moist underlying SILT subgrade to provide a stable base layer to place and compact cohesive fill. The standards for the placement of filling completed in 2020, 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”. Earth fill placed after May 2022 will comply with the updated NZS4431:2022.

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 and a clegg hammer in coarse-grained bulk fill. 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. (Updated to 150kpa for fill placed after May 2022).
- Undrained shear strength minimum single value 110 kPa.
- Compaction percentage average value not less than 95%.
- Compaction percentage minimum single value 90%.
- Clegg hammer test value greater than CIV25.

### 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 sheepfoot drum rollers on cohesive fill and smooth drum rollers for coarse-grained fill.

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 ( $2800\text{kg/m}^3$ ) for tests done on prior to May 2022. This is a higher value that would typically be used but provides a conservative result so has been adopted without further question or testing. The results indicate that the construction filling standards have been met.

## **1.5 Areas of Cut**

Areas partly developed in 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 and the same Clayey SILT and Silty CLAY Hamilton Ash material that had been used for filling elsewhere in stages 16 to 18a and as identified by pre subdivision tests.

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

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

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

## **1.7 Test Results in Areas of Cut and Natural Ground**

Lots 564 to 565 were predominately reshaped in cut only areas. The natural ground under the respread topsoil comprised of variable thin layer of Hinuera deposits overlying Hamilton Ash as had been identified in the pre-subdivision investigation boreholes.

The results of the tests undertaken indicate that good ground strength is present, but with the likelihood of moderately expansive soils for Lot 565.

## **1.8 Land Hazards**

### **1.8.1 Land Stability**

All lots across Stage 18 have been graded as flat as possible with a desirable gradient of 0.5%. Based on the competency of the inherent soils, there is a building limitation zone of 5m from the top of batter or any swale. Any lot bordering a stormwater swale has been identified as a Specific Engineering Design zone for foundations. The foundation design for these lots will also need to allow for appropriate setback or alternative design options (i.e. underpinning piles) where adjacent to the swales.

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.

### 1.8.2 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 18 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. On site stormwater runoff reduction measures such as re-use tanks, filters and catchpits are encouraged.

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.

### 1.8.3 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 18 is largely located on Hinuera deposits and is considered liquefaction prone, subject to a seismic event coupled with a high groundwater table. There is a transition zone between the younger Hinuera deposits and older Walton Subgroup on the Northern corner of Stage 18 at lots 563 to 565.

Zones of the subdivision that are in the low-lying Hinuera deposit areas will typically be subject to liquefaction effects during the ULS earthquake. Modelling using Cliq and updated liquefaction parameters (0.25g and M=5.9) indicates all lots within Stage 18 except for Lot 565, are considered "TC2 – Like" unless further assessment is carried out.

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:

1. 0m – 1.5m no habitable dwellings to be built within 1.5 m of the swale crest.
2. Lots immediately adjacent to storm water swales to have specific engineered foundation designs, i.e., Lots 537 to 539.
3. No specific engineer design required >3m from top of slope. There is currently a 5.9m wide reserve between Swale 2 and Lots 548 to 565 and therefore SED is not expected for these lots. The set back requirement remains for these lots, but is unlikely to be triggered unless the swale batters are changed over time.

#### **1.8.4 Expansive Soils**

Underlying soils within Stage 18 are largely Hinuera Formation based deposits, with a transition zone to Hamilton Ash at the northern corner of the stage. 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., 20-39mm.

#### **1.8.5 Subsidence (Consolidation Settlement)**

The DBCE Preliminary Geotechnical Report has identified areas within Stage 18 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 all lots within Stage 18. Completion of the bulk earthworks has been primarily completed by December 2020, with exception of Lots 539, and 545-546 being completed in January 2023. At time of this report, no further building works have taken place. We consider this has provided sufficient time for settlement to have occurred for the majority of the lots. Excluding Lots 539 and 545-546, residential development can proceed without further consolidation periods required.

## ***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**

There are no retaining wall structures that were constructed by the developer within Stage 18.

### **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 either TC2, M Class, or Specific Engineering Design (SED).

The Geotechnical Summary and Foundation Recommendations 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 summarizes 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 18 as shown for Lots 536-580 of Area LUK, Stage 18 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: 24<sup>th</sup> January 2023

.....

Aaron Kennedy

Civil Engineer

Report Reviewed By:

Date: 24<sup>th</sup> January 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

Stage 18 Plan: 19-30410-18-RC1 Rev. 9

Cut/Fill Plan: 30410-01-S18-EW1 Rev. AB2

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

SCHEDULE OF EXISTING EASEMENTS IN GROSS

PURPOSE	SHOWN	BURDENED LAND	GRANTEE	DOCUMENT NUMBER
RIGHT TO CONVEY TELECOMMUNICATIONS AND COMPUTER MEDIA	B	LOT 2 DP 534384	TRANSPOWER NEW ZEALAND LIMITED	EI 11070524.10
RIGHT TO CONVEY, DISCHARGE AND EARTH ELECTRICITY	M			EI 11070524.13
RIGHT TO CONVEY ELECTRICITY AND TELECOMMUNICATIONS	B, C			EI 11070524.14
RIGHT TO CONVEY ELECTRICITY FOR EARTHING PURPOSES	B			EI 11070524.15
RIGHT OF WAY	B			EI 11070524.16

SCHEDULE OF EXISTING EASEMENTS

PURPOSE	SHOWN	BURDENED LAND	DOCUMENT NUMBER
RIGHT OF WAY	B	LOT 2 DP 534384	EI 11070524.17

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



**SHRIMPTON & LIPINSKI**  
LAND DEVELOPMENT & DESIGN SPECIALISTS  
Ph. 07 577 6069  
Email: info@slga.co.nz  
P.O. Box 231, Tauranga 3140  
www.slga.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**  
08 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
3	LAYOUT AMENDED	NW	NF	NF	04/20
4	LAYOUT AMENDED	NF	NF	NF	09/20
5	STAGE BODY UPDATED	NW	BP	BP	08/21
6	LAYOUT AMENDED	NF	BP	BP	10/21
7	STAGE BODY'S UPDATED	NF	BP	GC	10/21
8	RESERVES AMENDED	NF	GC	GC	11/21
9	LOT 308 AMENDED	NF	GC	GC	11/21

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

**AREAS LU & K  
SCHEME PLAN  
STAGE 18**

PREPARED FOR  
**Chedworth Properties Limited** **GREENHILL**

**AREAS LU & K**  
ORIGINAL SCALES @ A3 STATUS  
1:1500  
FOR APPROVAL  
DRAWING NO: 19-30410-18-RC1  
REVISION: 9

H:\10300 - H Div\pmp\resman\Auto\1919-30410-18-RC1 - Scheme Plan - Stage 18.dwg - Plotfile: 5/11/2021



R:\Project Files\30410-01-1901 Drawing Presentation Files\30410-01 - Stage 18 Asbuilt EW and Geotech Plan.dwg - Plotted: 20/01/2023



  
**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

**Depth of Rock Plan**  
Scale 1:1500

**Rock Cover Plan**  
Scale 1:1500

**Depth of Rock Plan**  
Scale 1:1000

**Depth of Rock Plan**  
Scale 1:500

**Rock Cover Plan**  
Scale 1:500

**Rock Cover Plan**  
Scale 1:1000

**Cut Fill Plan**  
Scale 1:1250

**Depth of Rock Plan**  
Scale 1:500

**Rock Cover Plan**  
Scale 1:500

Rev	DESCRIPTION	DRN	CKD	APP	DATE
0	PRELIMINARY	NP	BP	PH	12/22
1	FOR REVIEW	NP	BP	PH	12/22
2	EW TO BE COMPLETED	NP	BP	PH	12/01/23
AB1	AS-BUILT	NP	BP	PH	12/01/23
AB2	EW COMPLETED	NP	BP	PH	20/01/23

NAME	DATE	NAME	DATE
SURVEYED		DESIGNED	

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

**STAGE 18**  
**CUT FILL PLAN**

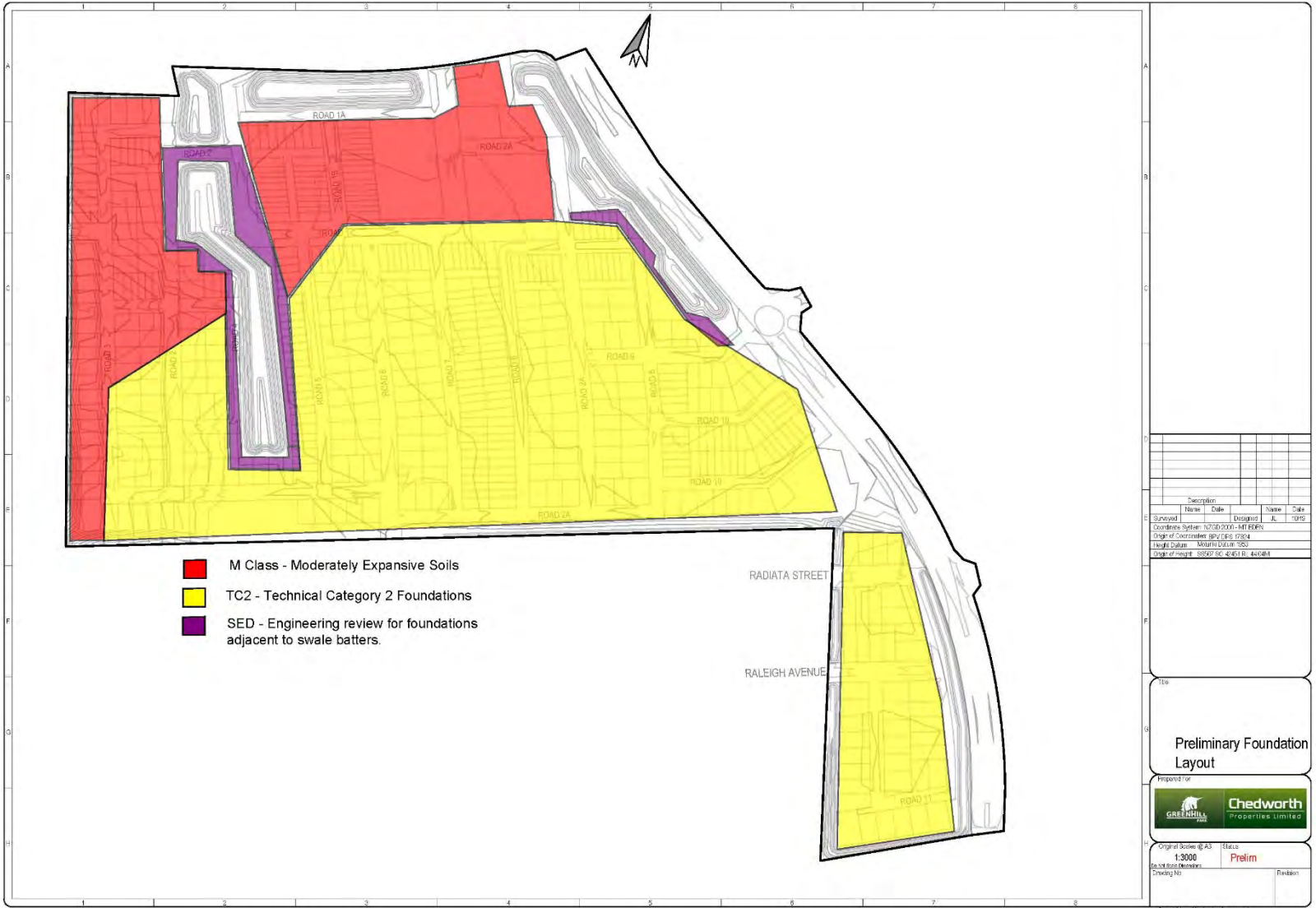
PREPARED FOR



STAGE 18

ORIGINAL SCALES @ A3	STATUS
AS SHOWN	AS-BUILT

DO NOT SCALE DIMENSIONS  
DRAWING NO: **30410-01-S18-EW1** REVISION: **AB2**



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 18 **Developer:** Chedworth Properties Limited

**At** Earp Crescent and Joint Avenue, Chartwell, Hamilton

**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 18 dated January 2023 (reference CR171738-S18-01)**
- 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 536-564 and 566-580, are subject to specific engineering review of foundations addressing TC2 liquefaction ground damage for the ULS design case.**
    - ii. Lot 565 is subject to engineering review of foundations addressing M Class foundation requirements.**
    - 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.**
- 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: 24<sup>th</sup> January 2023**

**Michael Richardson**  
**Chartered Professional Engineer (Geotechnical)**  
**CPEng 1005467**

## Site Specific Geotechnical Summary and Foundation Recommendations Table

		Job Ref	CR171738-S18-01		Date	24/01/2023	Client	Chedworth Properties Limited			Project Address	Stage 18, 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														
536	394m <sup>2</sup>	400	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	0.8-1.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	BRZ & ERZ, RW's.
537	375m <sup>2</sup>	NE	Engineered Fill, Silts and Sands (Hinuera Formation).	1500	0.3	0.6-1.4	S	N	Y <sup>3</sup>	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	SED - Lot adjacent to Swale.
538	375m <sup>2</sup>	NE	Silts and Sands (Hinuera Formation).	1400	0.3	0.4-0.9	S	N	Y <sup>3</sup>	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	SED - Lot adjacent to Swale.
539	300m <sup>2</sup>	400	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.8-2.0	0.2-2.5	S	N	Y <sup>3</sup>	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Lot used for SRP. 6 month holding period starting January 2023. Lot adjacent to Swale.
540	306m <sup>2</sup>	400	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	0.2-0.5	S	N	Y <sup>3</sup>	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	SED - Lot adjacent to Swale.
541	309m <sup>2</sup>	400	Silts and Sands (Hinuera Formation).	NE	0.3	0.3	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Minor organic material at 1900mm depth.
542	367m <sup>2</sup>	300	Non-Engineered Fill, Stiff to very stiff Silts and Clays, Hamilton Ash & Engineered Fill.	NE	0.3	0.3	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Non-Engineered Fill encountered.
543	367m <sup>2</sup>	500	Silts and Sands (Hinuera Formation).	1700	0.3	0.3	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
544	294m <sup>2</sup>	400	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.2	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>	-
545	294m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.2	0.2-1.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Excavated Unsuitable material to ≈1.0m and replaced with Engineered Fill. 6 month holding period starting January 2023.
546	404m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.2	0.2-1.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Excavated Unsuitable material to ≈1.0m and replaced with Engineered Fill. 6 month holding period starting January 2023.
547	270m <sup>2</sup>	NE	Silts and Sands (Hinuera Formation).	2000	0.3	0.2-0.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
548	210m <sup>2</sup>	200	Non-Engineered Fill, Stiff to very stiff Silts and Clays, Hamilton Ash & Engineered Fill.	NE	0.3	0.2-0.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Non-Engineered Fill encountered.
549	210m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	0.2-0.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
550	300m <sup>2</sup>	400	Engineered Fill, Silts, Sands, Gravels (Hinuera Formation).	NE	0.3	0.4-1.2	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
551	228m <sup>2</sup>	300	Non-Engineered and Engineered Fill, Silts Sands and Gravels (Hinuera Formation).	2100	0.3	0.4-1.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	Non-Engineered Fill encountered.
552	210m <sup>2</sup>	200	Engineered Fill, Silts, Sands, Gravels (Hinuera Formation).	NE	0.3	0.4-0.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
553	210m <sup>2</sup>	200	Engineered Fill, Silts, Sands, Gravels (Hinuera Formation).	NE	0.3	0.4-0.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
554	210m <sup>2</sup>	400	Engineered Fill, Silts, Sands, Gravels (Hinuera Formation).	NE	0.3	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>	-
555	210m <sup>2</sup>	200	Engineered Fill, Silts, Sands, Gravels (Hinuera Formation).	NE	0.3	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>	-
556	210m <sup>2</sup>	300	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	0.4-0.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
557	230m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3	0.2-0.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
558	210m <sup>2</sup>	400	Silts and Sands (Hinuera Formation).	NE	0.3	0.2-0.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
559	210m <sup>2</sup>	400	Silts and Sands (Hinuera Formation).	NE	0.3	0.2-0.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
560	300m <sup>2</sup>	200	Silts and Sands (Hinuera Formation).	NE	0.3	0.2-0.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
561	210m <sup>2</sup>	200	Silts and Sands (Hinuera Formation).	NE	0.3	0.2-0.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
562	210m <sup>2</sup>	200	Silts and Sands (Hinuera Formation).	NE	0.3	0.2-0.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
563	210m <sup>2</sup>	200	Silts and Sands (Hinuera Formation).	NE	0.3	0.2-0.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
564	210m <sup>2</sup>	300	Silts and Sands (Hinuera Formation), Silts and Clays, (Hamilton Ash)	NE	0.3	0.3	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
565	255m <sup>2</sup>	400	Silts and Sands (Hinuera Formation), Silts and Clays, (Hamilton Ash)	NE	0.3-0.6	0.3	M	N	N	N <sup>4</sup>	N <sup>6</sup>	TC1 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
566	368m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.0	0.4-1.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
567	368m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.0	0.4-1.6	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

		Job Ref	CR171738-S18-01	Date	23/01/2023	Client	Chedworth Properties Limited		Project Address	Stage 18, 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														
568	368m <sup>2</sup>	100	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	0.9-2.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	400-600 Rock Fill underlying Cohesive Fill.
569	300m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	1.2-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	400-900 Rock Fill underlying Cohesive Fill.
570	300m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	1.4-2.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	400-900 Rock Fill underlying Cohesive Fill.
571	300m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	1.4-2.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	400-900 Rock Fill underlying Cohesive Fill.
572	300m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	2800	0.3-1.5	1.4-2.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	400-900 Rock Fill underlying Cohesive Fill.
573	368m <sup>2</sup>	100	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	1.4-1.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	400-600 Rock Fill underlying Cohesive Fill.
574	437m <sup>2</sup>	100	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	0.9-1.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	400-600 Rock Fill underlying Cohesive Fill.
575	384m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	0.9-1.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
576	396m <sup>2</sup>	100	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	0.6-1.6	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
577	284m <sup>2</sup>	NE	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	0.2-0.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
578	221m <sup>2</sup>	200	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	0.6-1.4	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	-
579	221m <sup>2</sup>	NE	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	0.6-1.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	400-600 Rock Fill underlying Cohesive Fill.
580	283m <sup>2</sup>	NE	Engineered Fill, Silts and Sands (Hinuera Formation).	NE	0.3-1.5	0.6-1.9	S	N	N	N <sup>4</sup>	N <sup>5</sup>	TC2 - Like	Y <sup>8</sup>	Y <sup>7</sup>	400-600 Rock Fill underlying Cohesive Fill.

**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

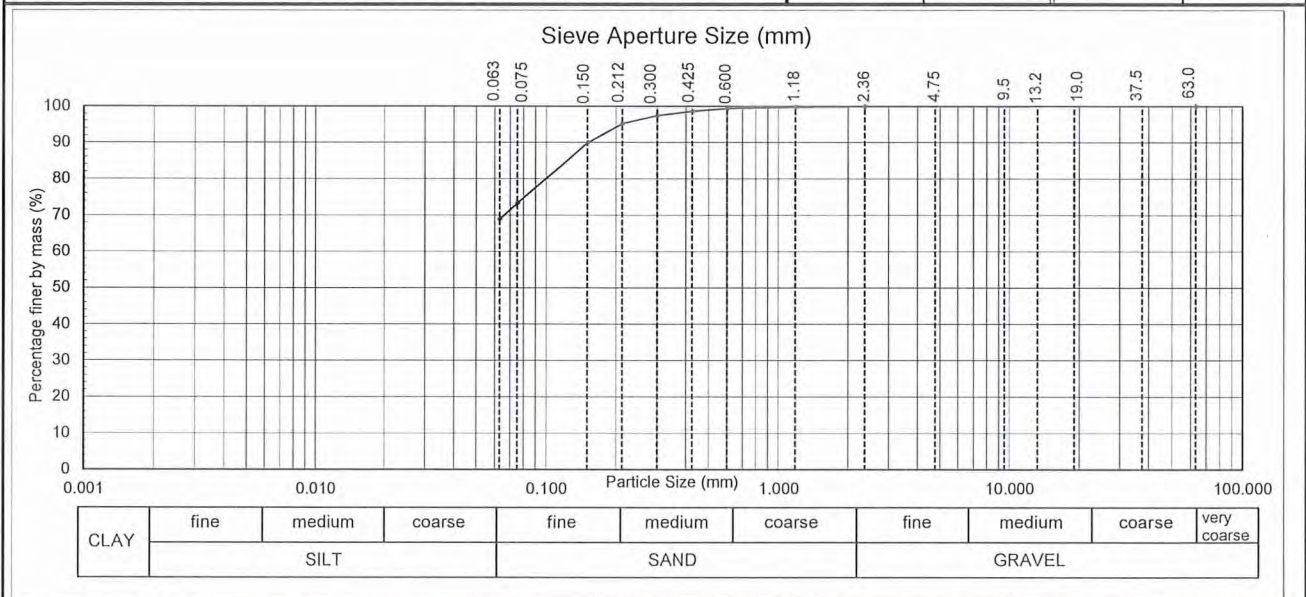


Project : Greenhill Park  
 Location : Greenhill Park  
 Client : DB Consulting Limited  
 Client/Sample Ref : Not Stated  
 Contractor : -  
 Borehole No: Not Stated      Depth: Not Stated  
 Sampled by : Client  
 Date received : 12/10/20  
 Sampling method : Bulk Sample  
 Sample condition : As received  
 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 *DeVHer*  
 Designation : Senior Civil Engineering Technician  
 Date : 21/10/20



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PARTICLE SIZE ANALYSIS (HYDROMETER METHOD)

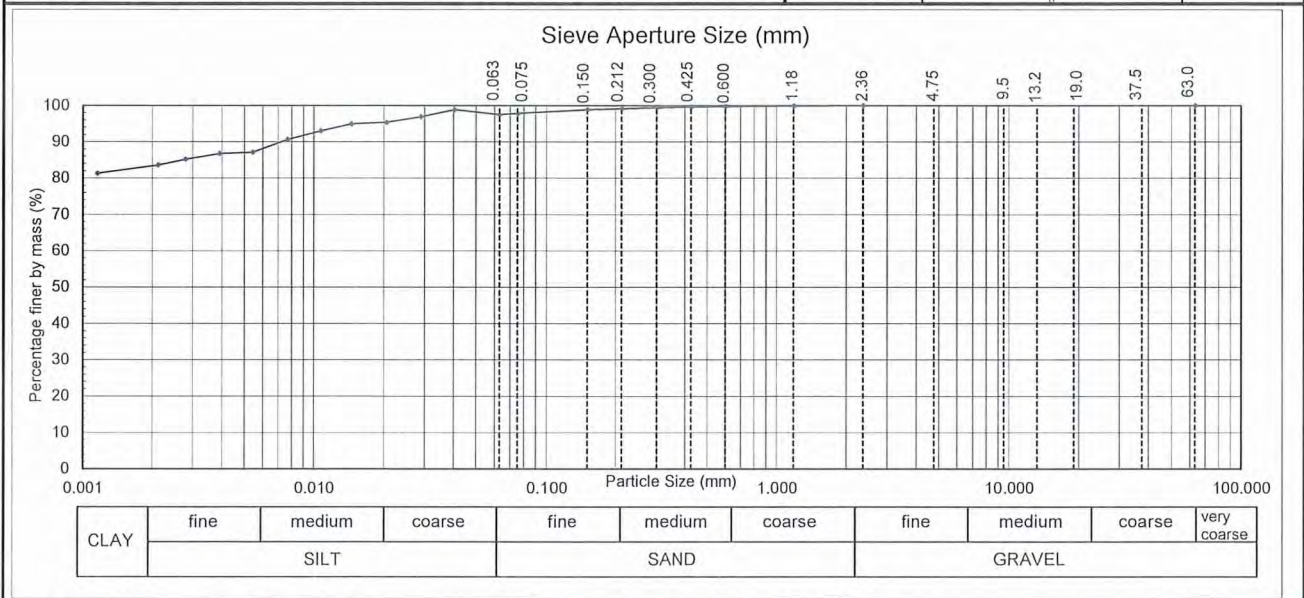
TEST REPORT



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



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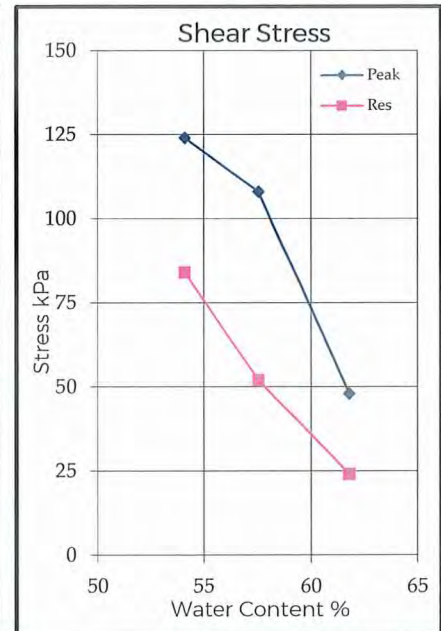
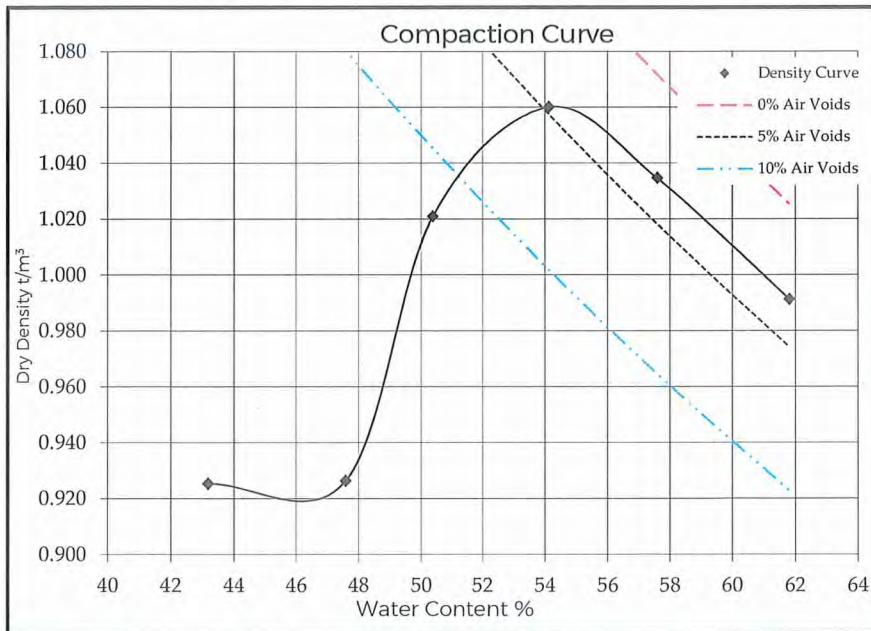
**DRY DENSITY / WATER CONTENT RELATIONSHIP  
STANDARD COMPACTION**



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



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



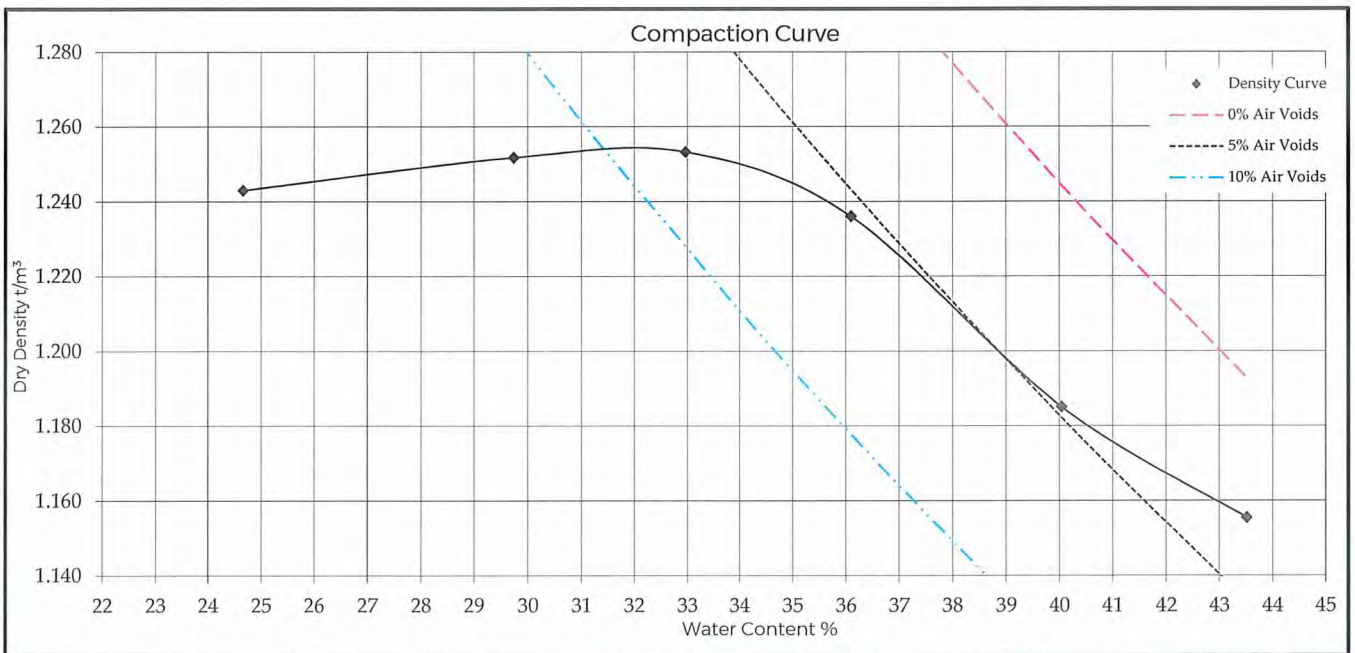
**DRY DENSITY / WATER CONTENT RELATIONSHIP  
STANDARD COMPACTION**



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

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

IANZ Approved Signatory

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



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



PARTICLE SIZE ANALYSIS (HYDROMETER METHOD)

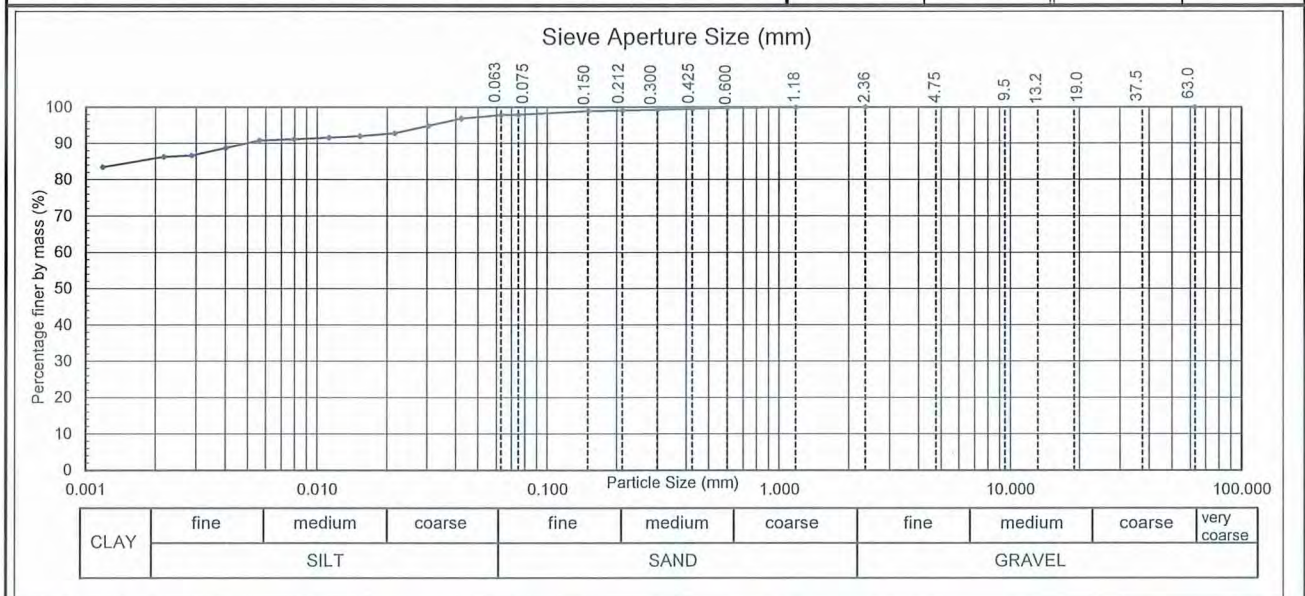
TEST REPORT



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: #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)

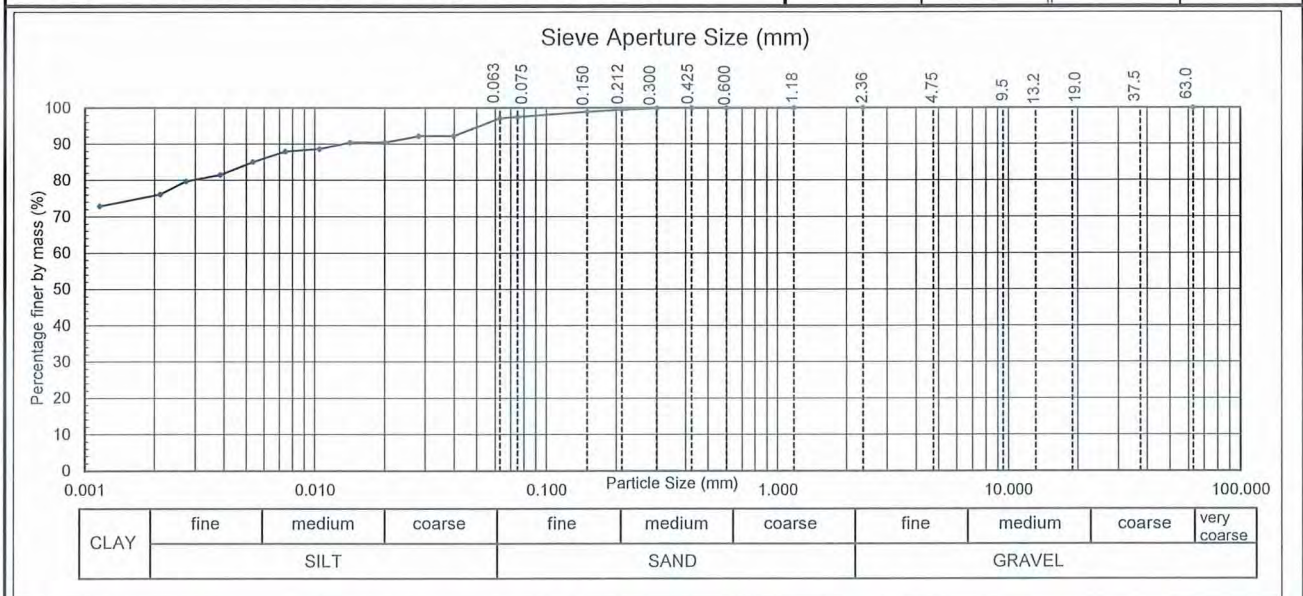
TEST REPORT



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



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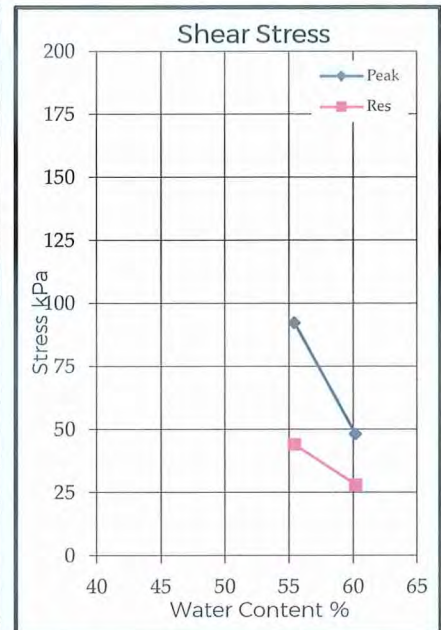
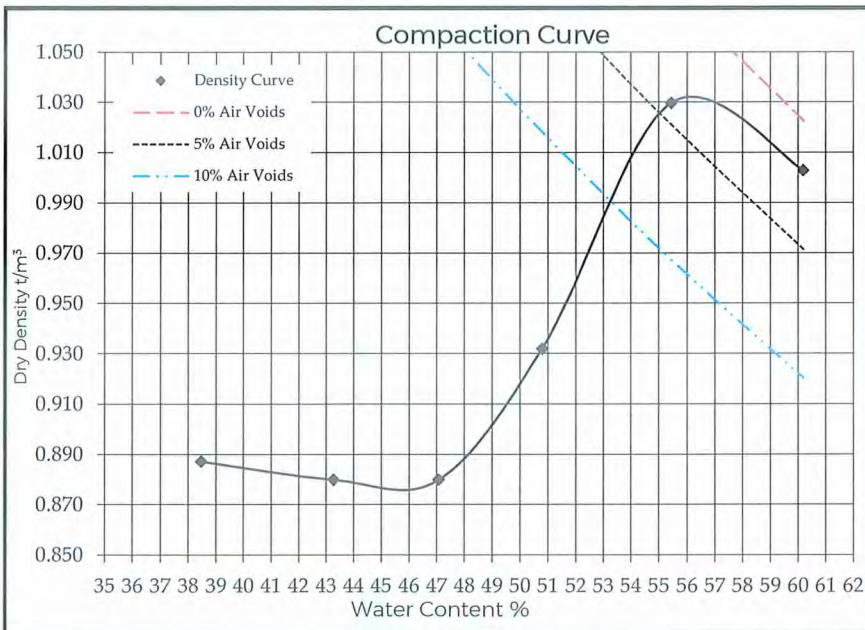
**DRY DENSITY / WATER CONTENT RELATIONSHIP  
STANDARD COMPACTION**



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  
 Date reported : 29/03/22

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

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



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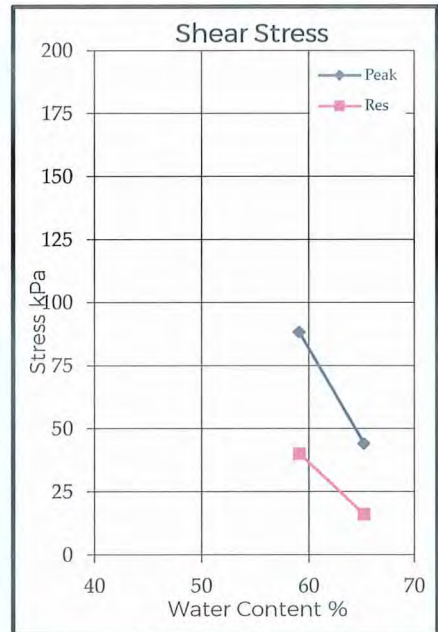
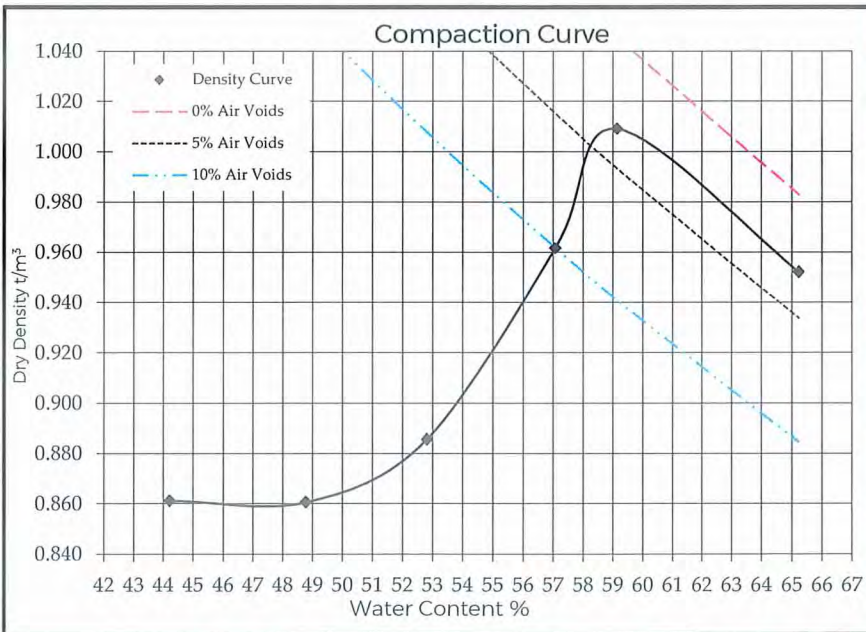
**DRY DENSITY / WATER CONTENT RELATIONSHIP  
STANDARD COMPACTION**



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 : 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  
NDM Testing

SCHEDULE OF EXISTING EASEMENTS IN GROSS

PURPOSE	SHOWN	BURDENED LAND	GRANTEE	DOCUMENT NUMBER
RIGHT TO CONVEY TELECOMMUNICATIONS AND COMPUTER MEDIA	B	LOT 2 DP 534384	TRANSPOWER NEW ZEALAND LIMITED	EI 11070524.10
RIGHT TO CONVEY, DISCHARGE AND EARTH ELECTRICITY	M			EI 11070524.13
RIGHT TO CONVEY ELECTRICITY AND TELECOMMUNICATIONS	B, C			EI 11070524.14
RIGHT TO CONVEY ELECTRICITY FOR EARTHING PURPOSES	B			EI 11070524.15
RIGHT OF WAY	B			EI 11070524.16

SCHEDULE OF EXISTING EASEMENTS

PURPOSE	SHOWN	BURDENED LAND	DOCUMENT NUMBER
RIGHT OF WAY	B	LOT 2 DP 534384	EI 11070524.17



**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
3	LAYOUT AMENDED	NW	NF	NF	04/20
4	LAYOUT AMENDED	NF	NF	NF	09/20
5	STAGE BODY UPDATED	NW	BP	BP	08/21
6	LAYOUT AMENDED	NF	BP	BP	10/21
7	STAGE BODY'S UPDATED	NF	BP	GC	10/21
8	RESERVES AMENDED	NF	GC	GC	11/21
9	LOT 308 AMENDED	NF	GC	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 18**

PREPARED FOR  
  
**Chedworth Properties Limited**

ORIGINAL SCALES @ A3 STATUS  
 1:1500  
 FOR APPROVAL  
 DRAWING NO: 19-30410-18-RC1  
 REVISION: 9

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**2.0m Borehole + Strength Testing**



**4.0m Borehole + Strength Testing**

H:\10000 - H Div\pmp\man\sub\19-30410-18-RC1 - Scheme Plan - Stage 18.dwg - Plotfile: 5/11/2021



Project Name		Job Ref.	
GCR Stage 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	2/12/2022	536	HA536

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					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	>193/					
600						
700						
800	>193/				800mm: Some fine gravels.	
900						
1000					SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff, medium dense; low moisture; low plasticity; sensitive; high dilatancy.	
1100	135/34					
1200						
1300						
1400	>193/				EOB at 2.0m, Target Borehole Depth.	
1500	3					
1600	3					
1700	3					
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    UTP = Unable To Penetrate    UTE = Unable To Extract</b>
1	Weather leading up to testing was: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	2/12/2022	537	HA537

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					(No Topsoil at time of PCHA) ENGINEERED FILL: CLAY SILT; brown mix; low moisture; very stiff to hard; high plasticity; low dilatancy.	
200	>193/					
300					400mm: Becoming Fine to coarse SAND; brown; low moisture.	
400						
500					SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff; low moisture; low plasticity; extra sensitive; high dilatancy.	
600	UTP					
700					1000mm: Becoming moist.	
800						
900	138/18					
1000						
1100					1400mm: Becoming saturated.	
1200	UTP					
1300					1500mm: Groundwater Table.	▼
1400						
1500					EOB at 2.0m, Target Borehole Depth.	
1600						
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</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: ≤20mm of rain over past 3 days.		
2	Ground water was at 1500mm 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	Rev3.7



Project Name		Job Ref.	
GCR Stage 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	2/12/2022	538	HA538

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				<p>(No Topsoil at time of PCHA)</p> <p>SILT, minor fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff; low moisture; low plasticity; extra sensitive; high dilatancy.</p>		
200						
300						
400						
500	155/18					
600						
700	UTP					
800						
900						
1000	164/25					1000mm: Becoming SILT; trace clay; sensitive.
1100		2				
1200		2				
1300		3				1300mm: Becoming very moist.
1400		3				1400mm: Groundwater Table.
1500		3				1500mm: Becoming minor fine Sands.
1600		3				
1700		3				
1800		2				
1900		2				1900mm: Becoming low sample retention.
2000		2				
2100		3				2100mm: Becoming medium dense; Sandy SILT.
2200		6				2200mm: No Sample Retention.
2300		5				EOB at 2.2m, Unable to Extract.
2400		4				
2500		6				
2600		6				
2700		7				
2800		6				
2900		6				
3000		6				
3100		7				3100mm: Becoming dense.
3200		9				
3300		8				
3400		8				
3500		8				
3600		8				
3700						
3800						
3900						
4000						

<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: ≤20mm of rain over past 3 days.			
2	Ground water was at 1400mm 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	19/01/2023	539	HA539

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			Result	Good Ground		
100		2	2		Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		1	1			
300		2	2			
400		3	3		400mm: Becoming Clayey.	
500		6	6		ENGINEERED FILL: Fine to coarse SAND with minor fine to medium gravels; grey brown; dense; dry; well graded.	
600		11	11			
700		10	10			
800		10	10			
900		10	10			
1000		12	12			
1100		13	13			
1200		13	13			
1300		14	14			
1400		15	15			
1500		15	15			
1600		15	15			
1700		UTP	UTP		ENGINEERED FILL: Fine to coarse GRAVEL; grey brown; very dense. CIV>25	
1800					EOB at 1.7m, Unable to Penetrate.	
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	19/01/2023	540	HA540

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			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.			
300		2						
400		3			400mm: Becoming Clayey Silt mix.			
500		8			Fine to coarse SAND with minor Silt and fine Gravel; brown; dense; low moisture; well graded.			
600		9						
700		9						
800		10						
900		10						
1000		8						
1100		12						
1200		11						
1300		7						
1400		5				1400mm: Becoming fine to medium SAND; dark grey; moist.		
1500		5						
1600		4						
1700		5						
1800		4						
1900		4			1900mm: Becoming very 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</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	541	MA541

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		4						
200		2			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.			
300		1						
400		2						
500		3			Fine to coarse SAND minor Silt and traces of fine to medium pumice; light grey brown; medium dense; low moisture; well graded.			
600		5						
700		5			600mm: Becoming some fine rounded Gravels.			
800		5						
900		5						
1000		3			1000mm: Minor iron staining.			
1100		3						
1200		3						
1300		4						
1400		4						
1500		4						
1600		4			1600mm: Becoming light grey fine sandy SILT.			
1700		5			1700mm: Becoming greenish grey.			
1800		7						
1900		1			1900mm: Minor organic material; soft; moist; dark brown; odorous.			
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	542	MA542

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		1				Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.		
200		2						
300		6						
400		11				NON-ENGINEERED FILL: Gravelly SILT, minor Clay; dark brown grey mix; dense; low moisture; moderately sensitive; low plasticity.		
500		11						
600		7				600mm: Becoming SILT minor fine sands; light grey brown mix.		
700		7						
800		5				1000mm: Becoming some gravels.		
900		6						
1000		4				1100mm: Buried organic material; dark brown; moist.		
1100		3						
1200		7				Fine Sandy SILT with traces of fine pumiceous material; light grey mottled orange/yellow; medium dense; low moisture; low plasticity; extra sensitive; high dilatancy.		
1300		6						
1400		0.5				1400mm: SILT trace Clay.		
1500		0.5						
1600		4				EOB at 2.0m, Target Borehole Depth.		
1700		4						
1800		5						
1900		4						
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
GetGeo	5/12/2022	543	MA543

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.	▼
200		3				
300		5				
400		4				
500		3			SILT, trace clay, trace fine sand, brown, moist becoming creamy light-brown, trace orange mottling	
600		2				
700		2				
800		2				
900		4				
1000		2				
1100		2				
1200		2				
1300		4				
1400		3				
1500		3			some fine sand, very moist to wet	
1600		3				
1700		3				
1800		4				
1900		6				
2000		5				
2100		5				
2200		4				
2300		1			minor organics -fine tree root	
2400		2				
2500		6			Silty SAND, minor fine pumiceous material	
2600		1			light grey-brown, wet	
2700		2			Organic SILT, trace organics, dark brown, very moist minor odour	
2800		1				
2900		2				
3000		2			SILT, some clay, dark grey-brown, wet High dilatancy	
3100		2				
3200		2				
3300		1			Interbedded silty SAND some fine pumice gravels and sandy SILT, light blue grey, wet	
3400		2				
3500		3				
3600		4				
3700		6				
3800		5				
3900		6				
4000		4				

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

- Weather leading up to testing was: ≤20mm of rain over past 3 days.
- Ground water was at 1700mm 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	19/01/2023	544	HA544

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		1			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.			
200		1						
300		2						
400		2						
500		3			500mm: Becoming Silty mix. Minor organic material.			
600		2			SILT with trace Clay and traces of rootlets; cream brown; low moisture; very stiff; low moisture; low plasticity; high dilatancy.			
700		2						
800	190/21	2						
900		2			SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff; moist; low plasticity; extra sensitive; high dilatancy.			
1000		1						
1100	152/25	1						
1200		3			Fine Silty SAND and traces of fine pumice; light grey; very moist; medium dense; high dilatancy; low sample retention.			
1300		1						
1400		3						
1500		3						
1600		3						
1700		4						
1800	UTP	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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	14/12/2022 & 19/01/2023	545	HA545

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		3			ENGINEERED FILL: Fine to coarse SAND with minor fine to medium gravels; grey brown; medium dense; dry; well graded.	
400		4				
500		3			600mm: Engineered Cohesive Fill: CLAY SILT; light brown and brown mixture; very stiff; low moisture.	
600	152/60	2				
700		7			800mm: Engineered Coarse Grained Fill: Fine to coarse GRAVEL; grey brown; very dense; CIV>25.	
800		UTP				
900					Depth 1200mm to 2000mm HA Completed 14/12/2022.	
1000						
1100					SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff; moist; low plasticity; extra sensitive; high dilatancy.	
1200		1				
1300	164/21	0.5			Fine Silty SAND and traces of fine pumice; light grey ; very moist; medium dense; high dilatancy; low sample retention.	
1400		0.5				
1500		3			EOB at 2.0m, Target Borehole Depth.	
1600		4				
1700		3				
1800	UTP	4				
1900		3				
2000		4				
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	14/12/2022 & 19/01/2023	546	HA546

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								
300		2			ENGINEERED FILL: Fine to coarse SAND with minor fine to medium gravels; grey brown; medium dense; dry; well graded.			
400		2						
500		3			600mm: Engineered Cohesive Fill: CLAY SILT; light brown and brown mixture; very stiff; low moisture.			
600	164/57	2						
700		2			800mm: Engineered Coarse Grained Fill: Fine to coarse GRAVEL; grey brown; very dense; CIV>25.			
800		UTP						
900					<i>Depth 1200mm to 2000mm HA Completed 14/12/2022.</i>			
1000								
1100					SILT, minor fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff; moist; low plasticity; extra sensitive; high dilatancy.			
1200		1						
1300		1			Fine Silty SAND and traces of fine pumice; light grey ; very moist; medium dense; high dilatancy; low sample retention.			
1400	107/31	1						
1500		1			EOB at 2.0m, Target Borehole Depth.			
1600		1						
1700		1						
1800		3						
1900		3						
2000		3						
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	547	MA547

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		5						
200		7						
300		6						
400		7						
500		6						
600		7						
700		7						
800		1						
900		2						
1000		5						
1100		4						
1200		3						
1300		4						
1400		3						
1500		4						
1600		5						
1700		4						
1800		3						
1900		1						
2000								
2100								
2200								
2300								
2400								
2500								
2600								
2700								
2800								
2900								
3000								
3100								
3200								
3300								
3400								
3500								

(No Topsoil at time of PCHA)  
 SILT, minor fine Sand with traces of fine pumiceous material; light grey mottled orange; very stiff; low moisture; low plasticity; extra sensitive; high dilatancy.

800mm: SILT trace Clay.

Fine to coarse SAND minor Silt and traces of fine pumice; interbedded grey brown; medium dense; low moisture; poorly graded.

1400mm: Iron staining.  
 1500mm: Becoming moist.

1800mm: Becoming very moist.  
 1900mm: Becoming loose.

EOB at 2.0m, Target Borehole 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: ≤20mm of rain over past 3 days.		
2	Ground water was at 2000mm 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	Rev3.7



Project Name		Job Ref.	
GCR Stage 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	548	MA548

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>NON-ENGINEERED FILL: SILT, minor Clay; grey mix; very stiff; low moisture; moderately sensitive; low plasticity.</p> <p>Fine to medium SAND with minor Silt and traces of fine pumice; light grey brown; low moisture; medium dense.</p> <p>900mm: Iron staining.</p> <p>1000mm: Traces of fine subrounded Gravels.</p> <p>1800mm: Becoming moist.</p> <p>EOB at 2.0m, Target Borehole Depth.</p>		
200		1						
300		3						
400	107/34	3						
500		5						
600		4						
700		4						
800		5						
900		5						
1000		5						
1100		4						
1200		3						
1300		4						
1400		4						
1500		4						
1600		4						
1700		5						
1800		5						
1900		4						
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	6/12/2022	549	MA549

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			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.			
300		1						
400		2						
500		2			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.			
600		5						
700		2			SILT, minor fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; medium dense; low moisture; low plasticity; high dilatancy.			
800		3						
900		5						
1000		3			Fine to medium SAND with minor Silt and traces of fine pumice; light grey to grey; moist; medium dense.			
1100		4						
1200		5						
1300		7			1300mm: Becoming grey brown; dense.			
1400		15			1400mm: Minor fine to medium sub-rounded Gravels.			
1500		19						
1600		8						
1700		14						
1800		9						
1900		10						
2000					2000mm: Becoming SAND; dark grey; very moist.			
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	6/12/2022	550	MA550

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		0.5				<p>Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.</p> <p>400mm: Becoming Silty; light grey.</p> <p>ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumice; light brown and brown mixture; very stiff to hard; low moisture; high plasticity; low dilatancy.</p> <p>SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; medium dense; low moisture; low plasticity; extra sensitive; high dilatancy.</p> <p>1400mm: Becoming dense.</p> <p>1500mm: Becoming mottled orange.</p> <p>Fine to coarse SAND minor silt and fine to medium subangular gravels; brown; very dense; low moisture; poorly graded.</p> <p>1800mm: Scala refusal, &gt;30 blows per 100mm.</p> <p>2000mm: Becoming SAND; dark grey; very moist.</p> <p>EOB at 2.0m, Target Borehole Depth.</p>		
200		0.5						
300		0.5						
400		0.5						
500		1						
600	>193/	1						
700		1						
800		3						
900		5						
1000		4						
1100		4						
1200		5						
1300		6						
1400		9						
1500		8						
1600		20						
1700		34						
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
GetGeo	5/12/2022	551	MA551

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		
200		2				
300		7				
400		5				NON-ENGINEERED FILL, SILT ,some sand and clay, minor gravels (subangular), mixed grey brown, moist
500		3				
600		3				
700		3				
800		3				ENGINEERED FILL: CLAY SILT, minor sand, orange-brown, moist
900		2				
1000		3				
1100		4				
1200		13				
1300		17				SAND some fine to medium gravels, minor silt, dark-brown, moist
1400		13				
1500		10				dark orange-brown
1600		3				
1700		4				
1800		5				SAND, minor silt, minor fine pumiceous materials
1900		9				dark grey, very moist
2000		6				
2100		6				wet
2200		7				
2300		6				
2400		5				interbedding of Sand, some fine pumice, minor silt, grey and silty Sand, minor fine pumice, dark grey
2500		4				
2600		5				
2700		8				
2800		8				
2900		5				
3000		4				
3100		4				
3200		4				
3300		4				
3400		4				
3500		5				dark blue-grey
3600		7				
3700		8				
3800		8				
3900		7				
4000						EOB @ 4000mm, Target Depth

<b>Notes:</b>		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: ≤20mm of rain over past 3 days.			
2	Ground water was at 2100mm 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		Rev3.7



Project Name		Job Ref.	
GCR Stage 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	552	MA552

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		3				
400		4			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; grey brown and brown mixture; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy.	
500	>193/	5				
600		5				
700		4				
800		5			SAND minor Gravels, fine to medium subrounded gravels, fine to coarse sands, minor silt; dark grey brown; dense; moist; poorly graded.	
900		10				
1000		10				
1100		10				
1200		12			1400mm: Becoming medium dense; minor fine gravels.	
1300		12				
1400		6			EOB at 2.0m, Target Borehole Depth.	
1500		4				
1600		3				
1700		3				
1800		4				
1900		4				
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	553	MA553

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		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; moderately sensitive; low dilatancy.	
400	>193/	3				
500		3				
600		3				
700		3				
800	>193/	5				
900		6			SAND some Gravels, fine subrounded gravels, fine to coarse sands, minor silt; dark grey brown; dense; moist; poorly graded.	
1000		4				
1100		18				
1200		16				
1300		12			1500mm: Scala refusal, >30 blows per 100mm.	
1400		18				
1500		UTP			1700mm: Machine Auger struggled to auger through and extract sample.	
1600						
1700					EOB at 2.0m, Target Borehole Depth.	
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: ≤20mm of rain over past 3 days.		
2	Ground water was not encountered during testing		
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5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	554	MA554

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		2				
400	>193/	5			400mm: Becoming Silty.	
500		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.	
600		4				
700		3				
800	>193/	5				
900		6				
1000		4			SAND some Gravels, fine subrounded gravels, fine to coarse sands, minor silt; dark grey brown; dense; moist; poorly graded.	
1100		5				
1200		12				
1300		21			1400mm: Scala refusal, >30 blows per 100mm.	
1400		UTP			1800mm: Machine auger struggled to extract sample.	
1500						
1600						
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</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: ≤20mm of rain over past 3 days.		
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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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	555	MA555

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		5				
400		5				
500	>193/	5				
600		3				
700		3				
800		4				
900	>193/	3				
1000		3				
1100		3				
1200		8				
1300		10				
1400		18				
1500		22				
1600		UTP				
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</b>	<b>UTP = Unable To Penetrate</b>	<b>UTE = Unable To Extract</b>
1	Weather leading up to testing was: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	556	MA556

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		0.5			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		0.5				
300		1				
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; moderately sensitive; low dilatancy.	
500	>193/	9				
600		11				
700		10				
800		10				
900		9				
1000		5			SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff, medium dense; low moisture; low plasticity; extra sensitive; high dilatancy.	
1100		5				
1200		7				
1300		6			1300mm: Mottled orange.	
1400		3				
1500		5				
1600		7			1600mm: Becoming light yellow grey mottled orange.	
1700		6				
1800		5			1800mm: Becoming light grey.	
1900		5				
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	557	MA557

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		5			ENGINEERED FILL: CLAY SILT with minor fine gravels, 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.	
400	>193/	8				
500		10			SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff, medium dense; low moisture; low plasticity; extra sensitive; high dilatancy.	
600		5				
700		3				
800		3				
900		4				
1000		3				
1100		3				
1200		3				
1300		5				
1400		4				
1500		2			SILT with minor organic staining; soft to firm; moist; low plasticity; odorous.	
1600		1				
1700		1			SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff; low moisture; low plasticity; extra sensitive; high dilatancy.	
1800		4				
1900		5				
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: ≤20mm of rain over past 3 days.		
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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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	558	MA558

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 (dashed orange line) Result (solid blue line)		
100		0.5			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		0.5				
300		1				
400		3			300mm: Becoming Silty mix; light grey brown mix.	
500		4				
600		3			SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff, medium dense; low moisture; low plasticity; extra sensitive; high dilatancy.	
700		3				
800		3				
900		2				
1000		3				
1100		4				
1200		5				
1300		7				
1400		3				
1500		3				
1600		3			1700mm: Becoming very moist.	
1700		4				
1800		4				
1900		4			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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	559	MA559

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	Result Good Ground		
100		0.5				
200		0.5				
300		1	300mm: Becoming Silty some gravel; light grey dark brown mix.			
400		3				
500		6				
600		3				
700	>193/	3	SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff, medium dense; low moisture; low plasticity; extra sensitive; high dilatancy.			
800		6				
900		6				
1000		4				
1100		4				
1200		4				
1300		4	1300mm: Becoming moist.			
1400		3				
1500		4	1500mm: Becoming SILT, traces of fine sands.			
1600		4				
1700		4				
1800		4				
1900		4				
2000						
2100			EOB at 2.0m, Target Borehole Depth.			
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

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1	Weather leading up to testing was: ≤20mm of rain over past 3 days.		
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5	Shear Vane Serial No.: 1471	Exp. Date: 28/11/2023	Rev3.7



Project Name		Job Ref.	
GCR Stage 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
GetGeo	5/12/2022	560	HA560

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		0.5			Respread TOPSOIL	
200		0.5				
300		3			SILT, minor fine sand, trace fine pumiceous material light grey-brown, minor orange mottling, low moisture	
400		8				
500		7				
600		8			Silty SAND, some orange mottling, creamy light-brown moist	
700		6				
800		5			Sand, some fine pumice to 1mm, , minor silt	
900		5			creamy light orange-brown, moist	
1000		5				
1100		3				
1200		4			minor pumiceous materials, light grey	
1300		4				
1400		5				
1500		6				
1600		6				
1700		6			1700-1800mm interbedded pumice Sand 1-2mm, minor silt	
1800		6			creamy light orange-brown, very moist	
1900		6				
2000		7				
2100		5				
2200		6				
2300		7			minor pumice, grey, wet	
2400		8				
2500		9				
2600		8				
2700		8				
2800		6				
2900		8				
3000		6				
3100		5				
3200		5				
3300		6				
3400		8				
3500		11				
3600		9			becoming some fine gravel, some fine pumice 1-2mm	
3700		12			minor silt, dark grey, wet	
3800		7				
3900		6				
4000					EOB @ 4000mm, 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: ≤20mm of rain over past 3 days.			
2	Ground water was at 2200mm 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		Rev3.7





Project Name		Job Ref.	
GCR Stage 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	561	MA561

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		0.5				Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.		
200		0.5						
300		6				SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff; low moisture; low plasticity; extra sensitive; high dilatancy.		
400		8						
500		7				Fine to medium SAND with minor Silt and traces of fine pumice; light grey brown; low moisture; medium dense.		
600		6						
700		7				1100mm: Becoming mottled orange.		
800		5						
900		4				EOB at 2.0m, Target Borehole Depth.		
1000		5						
1100		5						
1200		7						
1300		6						
1400		8						
1500		9						
1600		6						
1700		8						
1800		9						
1900		7						
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	562	MA562

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		0.5			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		0.5				
300		5				
400	>193/28	5			SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff, medium dense; low moisture; low plasticity; extra sensitive; high dilatancy.	
500		4				
600		4				
700		4				
800		3			Fine to medium SAND with minor Silt and traces of fine pumice; light grey brown; low moisture; medium dense.	
900		3				
1000		4				
1100		4			1100mm: Mottled orange.	
1200		4			1200mm: Becoming light grey.	
1300		5				
1400		5				
1500		5			1500mm: Becoming grey.	
1600		4				
1700		5				
1800		6				
1900		7				
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	563	MA563

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		2				
400		3			SILT, traces of clay and fine pumice; grey mottled orange/yellow; very stiff; low moisture; low plasticity; extra sensitive; high dilatancy.	
500	>193/	4				
600		5			600mm: Becoming SILT minor fine sands.	
700		5				
800		4				
900		4			Fine to medium SAND with minor Silt and traces of fine pumice; light grey brown; low moisture; medium dense.	
1000		4				
1100		4				
1200		5			1200mm: Becoming grey.	
1300		6				
1400		6				
1500		6				
1600		9			1600mm: Becoming dark grey brown; dense; moist.	
1700		10				
1800		10			1800mm: Becoming fine to coarse SAND.	
1900		9				
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	564	MA564

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		2				
400		4			SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff; low moisture; low plasticity; extra sensitive; high dilatancy.	
500		4				
600		4				
700		6				
800		6				
900		7			900mm: Becoming fine Sandy SILT.	
1000		4			Fine silty SAND; light grey yellow mottled orange; medium dense; low moisture; low plasticity; high dilatancy.	
1100		4				
1200		4				
1300		3				
1400		4				
1500		5				
1600		10			CLAY SILT with traces of fine pumiceous material and mica; orange brown; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy. <i>Hamilton Ash</i>	
1700		10				
1800		10				
1900		10				
2000	>193/				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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK & AM	5/12/2022	565	MA565

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		0.5			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.			
200		0.5						
300		0.5						
400		0.5						
500		2			SILT with traces of fine sand and pumice; light grey; very stiff; low moisture; low plasticity; sensitive; low dilatancy.			
600	182/48	3						
700		4			CLAY SILT with traces of fine pumiceous material and mica; orange brown; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy.			
800		4						
900	>193/	4						
1000		4			1000mm: Becoming yellow brown.			
1100		3			<i>Hamilton Ash</i>			
1200		2			EOB at 2.0m, Target Borehole Depth.			
1300		2						
1400		3						
1500		4						
1600		4						
1700		4						
1800		5						
1900		5						
2000	177/66							
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	566	MA566

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		9				Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.		
200		5						
300	UTP	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.		
400		3						
500		3						
600	155/42	3						
700		3				Fine to medium SAND with minor Silt and traces of fine pumice; light grey brown mottled yellow; low moisture; loose to medium dense.		
800		2						
900		3						
1000		2						
1100		6				1800mm: Becoming grey brown.		
1200		7						
1300		8						
1400		5						
1500		2				EOB at 2.0m, Target Borehole Depth.		
1600		2						
1700		3						
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	567	MA567

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		4		Good Ground	Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		4				
300	>193/	2		Result	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.	
400		2				
500		4				
600		5				
700	177/48	4				
800		4				
900		4				
1000		4				
1100		3				
1200		2				
1300		3				
1400		3			Fine to medium SAND with minor Silt and traces of fine pumice; light grey mottled orange; low moisture; medium dense.	
1500		9				
1600		10			1500mm: Becoming some fine sub-angular Gravels; dense.	
1700		5				
1800		5				
1900		5				
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	568	MA568

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		1			Respread TOPSOIL; dark brown; dry.			
200	>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.			
300		2						
400		2						
500	152/63	2						
600		2						
700		2						
800		2						
900	>193/	1						
1000		2						
1100		3						
1200		2						
1300		3						
1400		3						
1500		7			Fine to medium SAND with minor Silt and traces of fine pumice; light grey brown; low moisture; dense.			
1600		7						
1700		7						
1800		7			1800mm: Becoming moist.			
1900		5			1900mm: Becoming medium dense.			
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	569	MA569

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		4				
300		3				
400	144/34	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		4				
700		5				
800	152/77	3			800mm: Becoming orange brown; moderately sensitive.	
900		3				
1000		9				
1100		6			1100mm: Becoming yellow brown.	
1200		7				
1300	152/74	4				
1400		4				
1500		6				
1600		3				
1700		4				
1800	141/63	5				
1900		6				
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	570	MA570

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		1				Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.		
200		1						
300	188/36	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; sensitive; low dilatancy.		
400		3						
500		3						
600	>193/	2						
700		3						
800		2						
900	>193/	3						
1000		3						
1100		3						
1200		2						
1300		3				1300mm: Becoming light grey brown mix.		
1400		2				1400mm: Minor fine sands.		
1500		3						
1600		6				1600mm: Becoming Gravelly, fine to medium.		
1700		6						
1800		6						
1900		6						
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	571	MA571

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100		5				Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.		
200		4						
300		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.		
400	177/63	4						
500		5						
600		4						
700		3						
800	179/57	4						
900		5						
1000		3						
1100		3						
1200		4					1200mm: Becoming Light grey SAND minor silt.	
1300		7				1500mm: Becoming Gravelly; fine to coarse sub angular gravels.		
1400		9						
1500		10						
1600		11						
1700		10						
1800		11						
1900		11						
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
GetGeo	5/12/2022	572	MA572

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	
200		3			Engineer controlled FILL, CLAY SILT, trace fine sand high plasticity, low dilatancy, hard, orange-brown, moist	
300		4				
400		3				
500		2				
600		1				
700		2				
800		3				
900	>193/	4				
1000		3				
1100		3				
1200		4				
1300		2				
1400		5				
1500		7				
1600		8				
1700		16				
1800		15				
1900		10				
2000		9			Silty SAND, minor fine pumiceous materials light grey-brown, minor orange mottling, very moist	
2100		9				
2200		9			Gravelly SAND, some silt dark brown, moist	
2300		8				
2400		9			SAND, minor silt, some fine gravels, trace fine pumice dark blue black , wet	
2500		8				
2600		7				
2700		7				
2800		10				
2900		7				
3000		5				
3100		4				
3200		5				
3300		4				
3400		4			becoming some fine pumiceous materials to 1mm grey to light grey, wet	
3500		4			EOB @ 4000mm, Target Depth	
3600		5				
3700		5				
3800		6				
3900						
4000						

<b>Notes:</b>		<b>EOB = End Of Borehole    UTP = Unable To Penetrate    UTE = Unable To Extract</b>	
1	Weather leading up to testing was: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	573	MA573

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; dark brown; dry.	
200	UTP	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.	
300		4				
400		4				
500	>193/	3				
600		3				
700		2			700mm: Becoming moist.	
800		2				
900	152/48	2				
1000		3				
1100		3			1100: Becoming SILT some fine sand; light grey.	
1200		17			1200mm: Becoming Gravelly, fine to coarse Gravels.	
1300		30				
1400		UTP			1400mm: Scala refusal, >30 blows per 100mm.	
1500						
1600						
1700						
1800					SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff; low moisture; low plasticity; extra sensitive; high dilatancy.	
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	574	MA574

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; dark brown; dry.			
200	UTP	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; sensitive; low dilatancy.			
300		4						
400		4						
500	>193/	3						
600		4			SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; medium dense to dense; low moisture; low plasticity; extra sensitive; high dilatancy.			
700		4						
800	>193/	3						
900		3						
1000		5			1200mm: Becoming minor fine to medium Gravels.			
1100		4						
1200		12			Fine to medium SAND with minor Silt and traces of fine pumice; light grey; moist; medium dense.			
1300		12						
1400		9						
1500		7						
1600		6			EOB at 2.0m, Target Borehole Depth.			
1700		6						
1800		6						
1900		6						
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	575	MA575

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				
300	>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.		
400		3				
500		3				
600		3				
700	>193/	3				
800		4				
900		3				
1000		4		SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff; low moisture; low plasticity; extra sensitive; high dilatancy.		
1100		4				
1200		5				
1300		10		1300mm: Becoming dense. Sandy SILT.		
1400		10				
1500		14				
1600		10				
1700		8		1700mm: Becoming moist.		
1800		8				
1900		8				
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	576	MA576

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		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.	
300	>193/	3				
400		3				
500		4				
600	>193/48	3				
700		4				
800		3			SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff, medium dense; low moisture; low plasticity; extra sensitive; high dilatancy.	
900		3				
1000		5				
1100		3				
1200		9			1200mm: Becoming dense.	
1300		10				
1400		12				
1500		10				
1600		9				
1700		8				
1800		9				
1900		9				
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	577	MA577

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	UTP	4			(No Topsoil at time of PCHA) 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.	
200		3				
300		3			SILT, some fine Sand with traces of fine pumiceous material; light grey mottled yellow; very stiff medium dense; low moisture; low plasticity; sensitive; high dilatancy.	
400	164/63	3				
500		5			1500mm: Becoming moist.	
600		4				
700	152/57	3			EOB at 2.0m, Target Borehole Depth.	
800		4				
900		3				
1000	138/36	4				
1100		2				
1200		5				
1300		6				
1400		6				
1500		6				
1600		6				
1700		6				
1800		7				
1900		7				
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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	578	MA578

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			Good ground	Result		
100		2			Respread TOPSOIL with minor clay silt and traces of sand and gravels; dark brown; dry.	
200		2				
300	UTP	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; sensitive; low dilatancy.	
400		4				
500		3				
600	193/48	2				
700		2			SILT, some fine Sand with traces of fine pumiceous material; light grey mottled orange/yellow; very stiff medium dense; moist; low plasticity; extra sensitive; high dilatancy. 1600mm: Becoming fine Sandy SILT; dense.	
800		3				
900		3				
1000	190/45	4				
1100		4				
1200		5				
1300		6				
1400		5				
1500		5				
1600		11				
1700		9			EOB at 2.0m, Target Borehole Depth.	
1800		8				
1900		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: ≤20mm of rain over past 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 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	579	MA579

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table		
			0	2			4	6
100	UTP	3						
200		3						
300		2						
400	152/63	3						
500		3						
600		6						
700		5						
800	177/92	3						
900		3						
1000		4						
1100		3						
1200	123/25	4						
1300		4						
1400		4						
1500		3						
1600		4						
1700		5						
1800		6						
1900		7						
2000								
2100								
2200								
2300								
2400								
2500								
2600								
2700								
2800								
2900								
3000								
3100								
3200								
3300								
3400								
3500								

(No Topsoil at time of PCHA)

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.

500mm: Light grey mix.

SILT, some fine Sand, traces of Clay and fine pumiceous material; light grey mottled orange/yellow; very stiff, medium dense; low moisture; low plasticity; sensitive; high dilatancy.

1600mm: Becoming SILT some fine Sand; moist.

EOB at 2.0m, Target Borehole 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: ≤20mm of rain over past 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



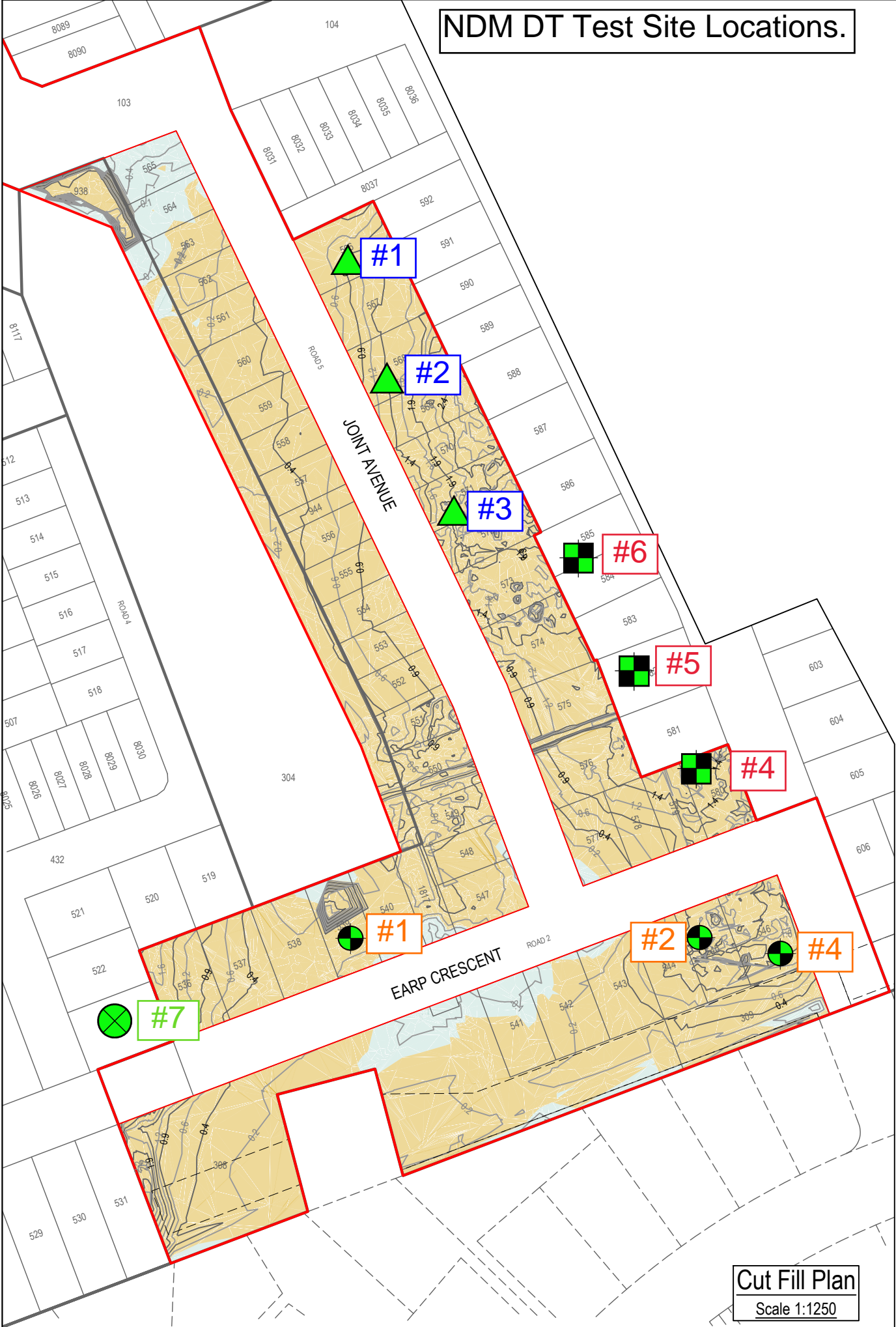


Project Name		Job Ref.	
GCR Stage 18, Greenhill Park, Hamilton		171738-S18-01	
Tested by	Date	Lot No.	Test Site
AK	7/12/2022	580	MA580

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			Good Ground	Result		
100		1			Respread TOPSOIL; dark brown; dry.	
200		1			ENGINEERED FILL: CLAY SILT with traces of fine Sand, fine pumiceous material and mica; light brown and light grey mixture; very stiff to hard; low moisture; high plasticity; moderately sensitive; low dilatancy.	
300	>193/	2				
400		3			500mm: Light grey mix.	
500		4				
600	>193/	4				
700		4				
800		4				
900		5				
1000	>193/	4				
1100		3				
1200		4				
1300		4				
1400		22			1400mm: Becoming Fine to Coarse Gravels. Subangular.	
1500		30				
1600		UTP			1600mm: Scala refusal, >30 blows per 100mm.	
1700						
1800	123/28				SILT, traces of clay and fine pumiceous material; light grey mottled yellow; very stiff; low moisture; low plasticity; sensitive; high dilatancy.	
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: ≤20mm of rain over past 3 days.		
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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

NDM DT Test Site Locations.



▲ 24/11/2020: Schick Testing

■ 15/12/2020: Coffey Testing

⊗ 04/05/2022: CORE50 Testing

⊗ CORE50 Testing:  
14/12/2022: Test #1  
20/12/2022: Test #3  
13/01/2023: Test #4

Cut Fill Plan  
Scale 1:1250



Field Density Report - NDM

<b>Contract:</b>	DB Con	<b>Report No:</b>	SH20112410
<b>Address:</b>	Greenhill Park	<b>Job No:</b>	8926
<b>Site:</b>	Greenhill Park area: LUK	<b>Lot No.:</b>	-
<b>Material Type:</b>	Subgrade	<b>Date Placed:</b>	24-Nov-2020
<b>Limits:</b>	-	<b>Date Tested:</b>	24-Nov-2020
<b>Comments:</b>	As per clients locations. Jn: 171738-Area LUK/SI. Unable to prob deeper than 150mm.	<b>Tested by:</b>	EA
<b>R/L:</b>	-	<b>Reported by:</b>	Euan Acket

**Test Procedures:**

- QNZS4407:2015 Test 4.2 Field W/C and Dry Density of Compacted Materials D/T.
- (X)NZS4407:2015 Test 4.3 Field W/C and Dry Density of Compacted Materials B/S.
- QNZS4402:1986 Test 4.1.1 Standard Compaction.
- (X)NZS4402:1986 Test 4.1.3 Vibratory Compaction.
- QNZS4407:2015 Test 3.7.1 Solid Density of Aggregate Particles.
- QNZS4402:1986 Test 2.7.2 Solid Density of Soil Particles.
- QNZS4407:2015 Test 4.3.6 Moisture Correction.
- QNZS4402:1986 Test 2.1 Water Content.
- QNZS4407:2015 Test 3.1 Water content
- QNZS4407:2015 Test 4.3.7 (e) Degree of Saturation.

Test Site Location	CHN	Nominal Layer Thickness mm	Probe Depth mm	Bulk Density Kg/m³	Dry Density Kg/m³	Reported W/C %	Field W/C %	Degree of Saturation %	Air Voids %	Compaction %
1		1.0m	150	1709	1131.04	51.1	51.1	97	2	107
2		1.0m	150	1689	1147.42	47.2	47.2	92	5	108
3	A	0.5m	150	1585	941.21	68.4	68.4	97	2	90
3	B	0.65m	150	1541	954.77	61.4	61.4	89	7	90
3	C	1.0m	150	1602	1060.23	51.1	51.1	87	8	100
4		1.0m	150	1493	924.46	61.5	61.5	85	10	87
5		1.0m	150	1681	1078.95	55.8	55.8	98	1	102
6		1.0m	150	1690	1061.56	59.2	59.2	101	-1	100

**Gauge Used**

Humboldt: HS-5001EZ () S/N:5586 Calibration Expiry Date - 02/03/2022  
 Humboldt: HS-5001SD (X) S/N:8894 Calibration Expiry date -10/07/2022

Average Air Voids %: 4  
 Average Compaction %: 98  
 MDD kg/M³: 1060  
 OMC %: 54  
 Average Reported W/C %: 57  
 Average Field W/C %: 57  
 Average DOS%: 93  
 Refer Lab Report No: -  
 Refer Lab Report No: -  
 Refer Lab Report No: -  
 Refer Lab Report No: -  
 Refer Lab Report No: -  
 Measured or Assumed: Assumed

Note 1: Maximum Dry Density determined in accordance with NZS4402:1986 Test 4.1.1(Standard)  
 Note 2: Maximum Dry Density determined in accordance with NZS4402:1986 Test 4.1.3(Vibe)  
 Note 3: Water content determined with accordance with NZS4402:1986 Test 2.1  
 Note 4: Solid Density of aggregate tested in accordance with NZS4407:2015 Test 3.7.1  
 Note 5: Solid Density of soil tested in accordance with NZS4407:2015 Test 2.7.2  
 Note 6: Solid Density used: 2800  
 Note 7: Offsets Measured From: -

Signatory: *EA*

Date: 16-Jan-2023

Euan Acket-QA Technician





Figure 1.





Figure 2.



### EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); Water Content Testing (in accordance with NZS 4402:1986 Test 2.1); Density Calculations (in accordance with NZS 4402:1986 Tests 4.1.1.5(b))

**Project No:** 773-TAUR00030

**Page:** 1 of 1

**Client:** D B Consulting Engineers  
42 Tawn Place  
Pukete, Hamilton

**Principal:** Jamie Masters

**c.o. to:** -


**Project:** Green Hill Park

**Project Location:** Carrs Road



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

Approved Signatory: Eric Palon

Approved Signatory Signature: 

Date of Issue: 16/12/2020

IANZ Accredited Laboratory Number: 1352

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
									1	2	3	4						
15/12/2020	TAUR20W00631	EP	1	1.72	42.5	1.21	2.8	5.4	NT	NT	NT	NT	Ref to Plan	-	-	-	Silty CLAY	-
15/12/2020	TAUR20W00631	EP	2	1.69	46.3	1.15	2.8	5.5	NT	NT	NT	NT	Ref to Plan	-	-	-	Silty CLAY	-
15/12/2020	TAUR20W00631	EP	3	1.65	54.3	1.07	2.8	3.8	NT	NT	NT	NT	Ref to Plan	-	-	-	Silty CLAY	-
15/12/2020	TAUR20W00631	EP	4	1.64	57.5	1.04	2.8	3.1	NT	NT	NT	NT	Ref to Plan	-	-	-	Silty CLAY	-
15/12/2020	TAUR20W00631	EP	5	1.68	50.1	1.12	2.8	3.9	NT	NT	NT	NT	Ref to Plan	-	-	-	Silty CLAY	-
15/12/2020	TAUR20W00631	EP	6	1.68	46.7	1.15	2.8	5.4	NT	NT	NT	NT	Ref to Plan	-	-	-	Silty CLAY	-

**Project:** Greenhill Park

**Location:** Carrs Road Hamilton

**Tested by:**

EP

**Date tested:**

15.12.20



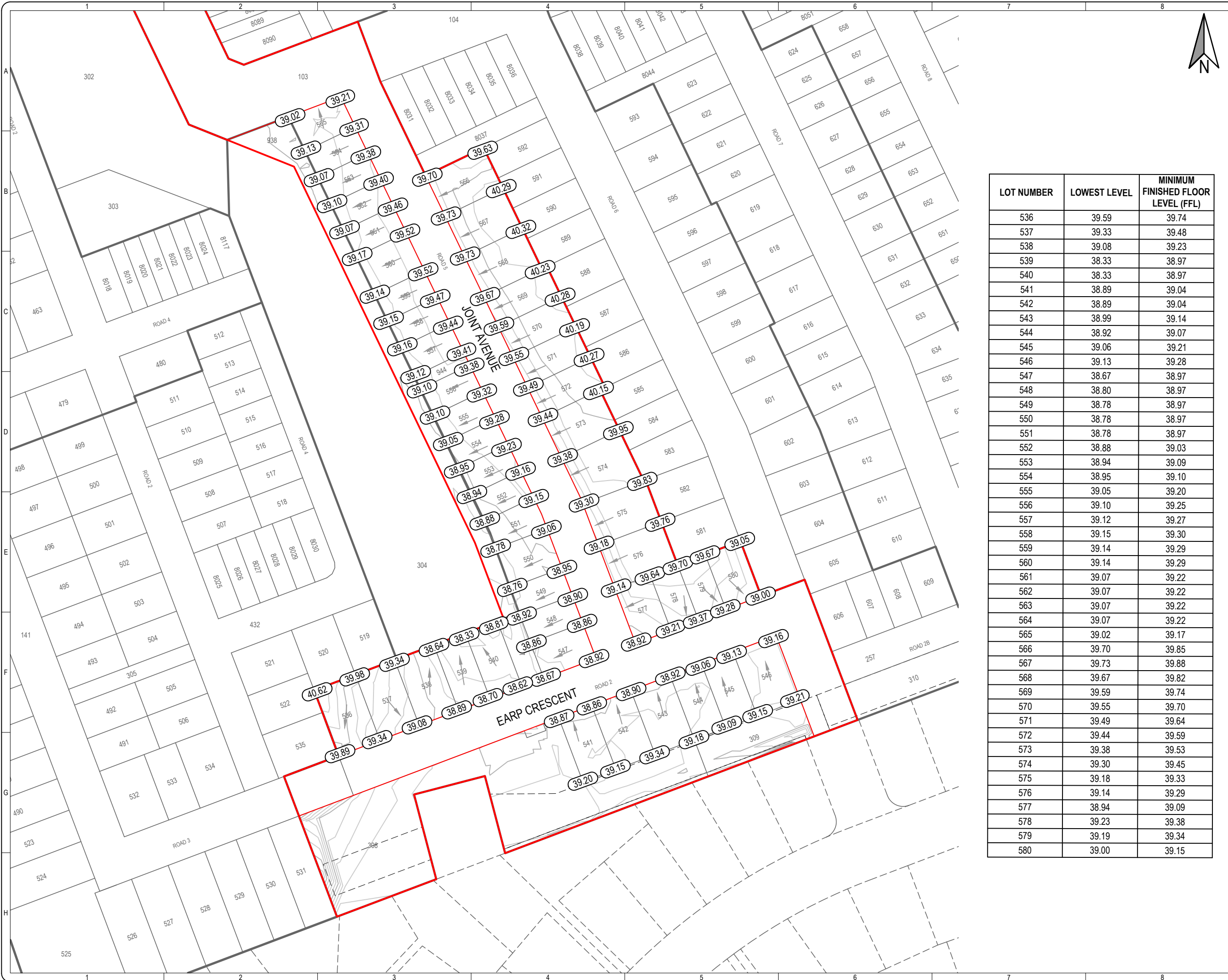




Appendix E     Stormwater Management  
Minimum Lot Levels: 30410-01-S18-G1 Rev. AB3






R:\Project Files\30410-01-1901 Drawing Presentation Files\30410-01 - Stage 18 Asbuilt EW and Geotech Plan.dwg - Plotted: 23/01/2023



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

**LEGEND:**

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

Contour Interval = 0.20m

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

LOT NUMBER	LOWEST LEVEL	MINIMUM FINISHED FLOOR LEVEL (FFL)
536	39.59	39.74
537	39.33	39.48
538	39.08	39.23
539	38.33	38.97
540	38.33	38.97
541	38.89	39.04
542	38.89	39.04
543	38.99	39.14
544	38.92	39.07
545	39.06	39.21
546	39.13	39.28
547	38.67	38.97
548	38.80	38.97
549	38.78	38.97
550	38.78	38.97
551	38.78	38.97
552	38.88	39.03
553	38.94	39.09
554	38.95	39.10
555	39.05	39.20
556	39.10	39.25
557	39.12	39.27
558	39.15	39.30
559	39.14	39.29
560	39.14	39.29
561	39.07	39.22
562	39.07	39.22
563	39.07	39.22
564	39.07	39.22
565	39.02	39.17
566	39.70	39.85
567	39.73	39.88
568	39.67	39.82
569	39.59	39.74
570	39.55	39.70
571	39.49	39.64
572	39.44	39.59
573	39.38	39.53
574	39.30	39.45
575	39.18	39.33
576	39.14	39.29
577	38.94	39.09
578	39.23	39.38
579	39.19	39.34
580	39.00	39.15



Rev	DESCRIPTION	DRN	CKD	APP	DATE
0	PRELIMINARY	NP	BP	PH	12/22
1	FOR REVIEW	NP	BP	PH	12/22
2	EW TO BE COMPLETED	NP	BP	PH	11/01/23
AB2	AS-BUILT	NP	BP	PH	12/01/23
AB3	EW COMPLETED	NP	BP	PH	20/01/23

NAME	DATE	NAME	DATE
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 18**

ORIGINAL SCALES @ A3	STATUS
1:1250	AS-BUILT
DO NOT SCALE DIMENSIONS	
DRAWING NO	REVISION
<b>30410-01-S18-G1</b>	<b>AB3</b>