CORE50
SOLUTIONS ENGINEERED

GREENHILL PARK RESIDENTIAL SUBDIVISION

Stage 16
Area LUK, Greenhill Park, Hamilton

GEOTECHNICAL COMPLETION REPORT ON SUBDIVISION EARTHWORKS AND RECOMMENDATIONS FOR BUILDING DEVELOPMENT

Our Ref: CR171738-AREA-LUK-S16-01 v2 (FFL plan updated)

Prepared for: Chedworth Properties Limited

Date: March 2022

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1.0 Subdivision Development Earthworks

1.1 Introduction

Stage 16 of Greenhill Park is currently accessible from Webb Drive and Watkins Street. Stage 16 comprises 56 residential lots (numbered 450 to 480, 8001 to 8024 and 8117.). The locations of these lots are shown on attached subdivision plan 19-30410-16-RC1 included in Appendix A.

Bulk earthworks have been completed to re- contour the previously agricultural landscape for Stage 16 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 Geotechnical Report for L&K&Eldone (December 2019).

HCC's Infrastructure Technical Specifications (ITS) set out the minimum standards for design and construction of public infrastructure within Hamilton City. Section 2.1.5 of the *Earthworks and Geotechnical Requirements* of the ITS states that the developer shall appoint a geo-professional to carry out functions as described in NZS 4404[5] Section 2.2.4. ITS Section 2.3.3.1 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 ITS 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 16. The included earthworks plan shows the cut/fill extent of the earthworks undertaken, test positions, and road and lot locations.

1.2 Earthworks in the Subdivision

The earthworks for stage 16 of the subdivision development were undertaken between October 2020 and February 2022.

These earthworks comprised:

1. The stripping of surface topsoil to expose underlying natural soils.
2. The placement of filling within majority of the stage.
3. Backfilling and raising the ground level with new fill to create uniform fill platforms.
4. 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 clay and clayey silt, typical of Walton group deposits in this area of Hamilton. 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 these site soils gained from areas of cut within stage 16 and the larger Greenhill Subdivision. Filling was undertaken during summer seasons of 2020 to 2022, when drying back of the soils was possible to close to optimum moisture contents to achieve near maximum compaction densities.

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

1.3 Earthworks Standards

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

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

- Air voids percentage average value less than 10 %.
- Air voids percentage maximum single value 12 %.
- Undrained shear strength average value not less than 140 kPa.
- Undrained shear strength minimum single value 100 kPa.
- Compaction percentage average value not less than 95%.
- Compaction percentage minimum single value 90%.

1.4 Filled Ground

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

As most of the filling placed comprised clayey SILT and Silty CLAY identified in the pre subdivision boreholes, testing of the compaction achieved was mostly undertaken with a handheld shear vane and NDM testing (Nuclear Density Meter).

The results indicate that the construction filling standards have been met. However due to the expansive nature of the fill material, shallow or waffle foundations on all stage 16 lots must be designed to mitigate "M Class" expansive soils, i.e. NZS 3604:2011 foundations modified as per NZ Building Code B1/AS1 (28th November 2019) Section 7 or engineered waffle slabs constructed in compliance with AS2870-2011 Residential Slabs and Footings.

1.5 Areas of Cut

Areas partly developed in cut are shown on 19-30410-16-RC1 (Appendix A). Lots 472-477 had between 100mm–4500mm of cut material. In these areas, the ground at formation levels was observed to comprise the same Clayey SILT and Silty CLAY that had been used for filling elsewhere in stage 16 and as identified by pre subdivision tests.

1.6 Test Results in Filling Placed

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

The shear vane and nuclear densometer test results show that acceptable soil strengths had been developed in all fill areas tested.

1.7 Test Results in Areas of Cut and Natural Ground

Lots 472 to 477 were predominately reshaped in cut only areas. The natural ground under the respread topsoil comprised of silty clay and clayey silts as had been identified in the pre-subdivision investigation boreholes.

The results of the tests undertaken indicate that "good ground" as defined in NZS3604:2011 is present. No areas that were tested will require any future ground improvement work for buildings supported.

1.8 Land Hazards

1.8.1 Land Stability

All lots across stage 16 have been graded as flat as possible with a desirable gradient of 0.5%. However, boundaries of various lots were battered to optimize use of fill material. Based on the competency of the inherent soils, building restriction zones of 3m from the top or any swale. Any lot bordering a stormwater swale has been identified as a TC2 zone for foundations. The foundation design for these lots will also need to allow for appropriate setback or alternative design options (i.e. underpinning) where adjacent to the swales.

Standard good practice around small slopes on the western and central sections of stage 16 will be required. Buildings should be set back from the slopes and avoid either surcharging the slopes or undermining the slopes. All foundations in this area are subject to specific 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 this stage 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 16 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.

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. Foundations near the top of the swales are classed as TC2 like foundations. The liquefaction summary plan is appended to this Completion report. Specifically, the requirements are:

- 0m – 1.5m no habitable dwellings to be built within 1.5 m of the swale crest.
- Lots adjacent to swales to have TC2 foundation designs.

1.8.4 Expansive Soils

Underlying soils within stage 16 are typically either Hinuera Formation based deposits, or Walton Subgroup. 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. Majority of stage 16 consists of soil material from the Walton subgroup.

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 per lot) 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 with 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 permited will require site specific stormwater management to offset the effects of added runoff volume.

3.0 Retaining Walls

There are no retaining walls that were constructed by the developer within stage 16.

4.0 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 ITS 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 ITS Section 2.3.3.1, 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.

5.0 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 16 as shown for Lots: 450 to 480, 8001 to 8024 and 8117 of Area LUK Stage 16 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: 11th March 2022

……

Aaron Kennedy

Civil Engineer

Report Reviewed By: Date: 18th March 2022

……

Michael Richardson

Geotechnical Engineer

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 *Infrastructure Technical Specifications*, Hamilton, New Zealand, Hamilton City Council, 2013.

[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] "Section 4 Stormwater," in *Infrastructure Technical Specifications*, Hamilton, New Zealand, Hamilton City Council, 2015.

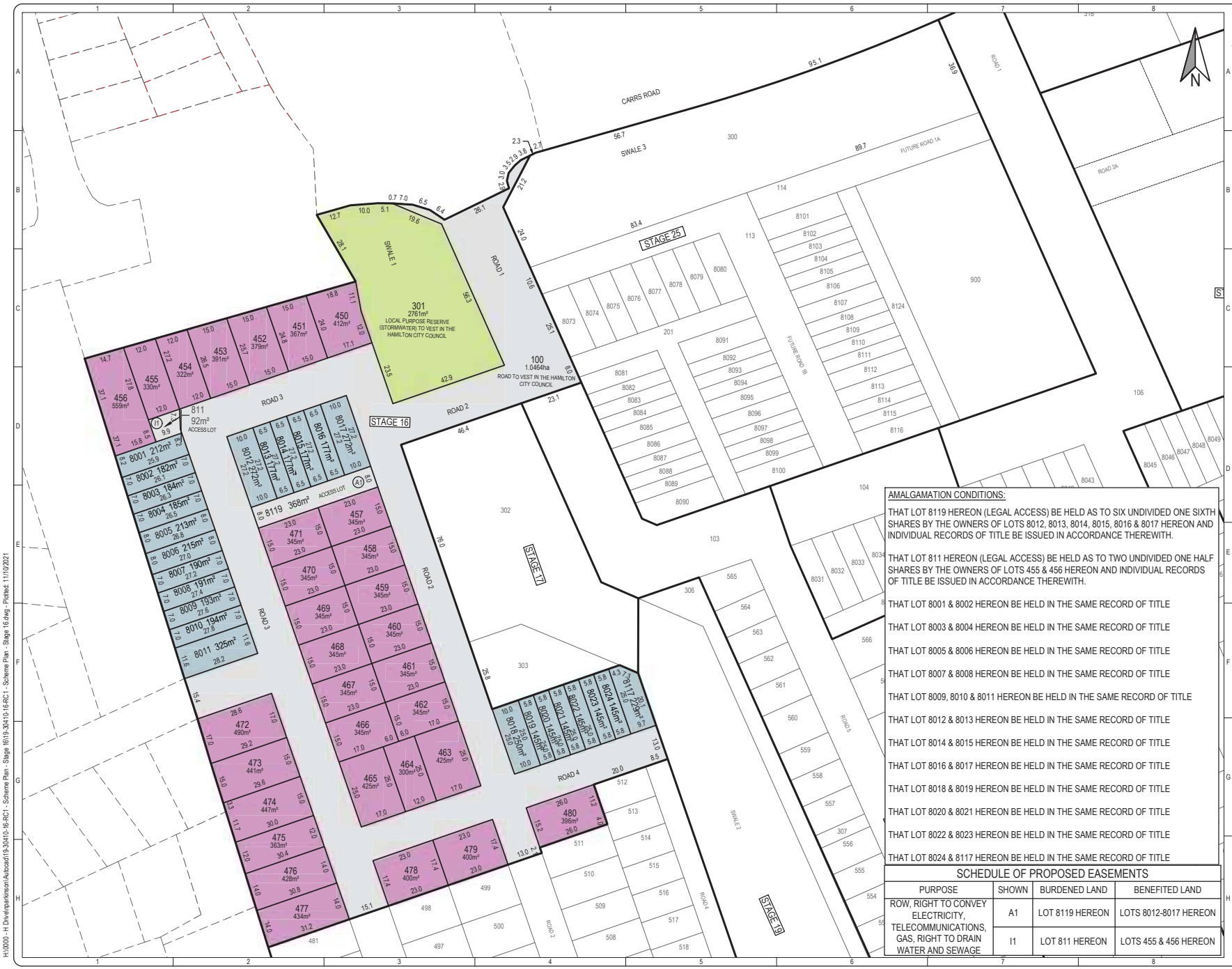
[13] "Preliminary Geotechnical Report for L&K&Eldone" by DBCE December 2019.

Appendix A *Reference Drawings*

Subdivision plan 19-30410-16-RC1

Cut/Fill Plan

Preliminary Subdivision Foundation Plan



AMALGAMATION CONDITIONS:

THAT LOT 8119 HEREON (LEGAL ACCESS) BE HELD AS TO SIX UNDIVIDED ONE SIXTH SHARES BY THE OWNERS OF LOTS 8012, 8013, 8014, 8015, 8016 & 8017 HEREON AND INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.

THAT LOT 811 HEREON (LEGAL ACCESS) BE HELD AS TO TWO UNDIVIDED ONE HALF SHARES BY THE OWNERS OF LOTS 455 & 456 HEREON AND INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.

THAT LOT 8001 & 8002 HEREON BE HELD IN THE SAME RECORD OF TITLE

THAT LOT 8003 & 8004 HEREON BE HELD IN THE SAME RECORD OF TITLE

THAT LOT 8005 & 8006 HEREON BE HELD IN THE SAME RECORD OF TITLE

THAT LOT 8007 & 8008 HEREON BE HELD IN THE SAME RECORD OF TITLE

THAT LOT 8009, 8010 & 8011 HEREON BE HELD IN THE SAME RECORD OF TITLE

THAT LOT 8012 & 8013 HEREON BE HELD IN THE SAME RECORD OF TITLE

THAT LOT 8014 & 8015 HEREON BE HELD IN THE SAME RECORD OF TITLE

THAT LOT 8016 & 8017 HEREON BE HELD IN THE SAME RECORD OF TITLE

THAT LOT 8018 & 8019 HEREON BE HELD IN THE SAME RECORD OF TITLE

THAT LOT 8020 & 8021 HEREON BE HELD IN THE SAME RECORD OF TITLE

THAT LOT 8022 & 8023 HEREON BE HELD IN THE SAME RECORD OF TITLE

THAT LOT 8024 & 8117 HEREON BE HELD IN THE SAME RECORD OF TITLE

SCHEDULE OF PROPOSED EASEMENTS

PURPOSE	SHOWN	BURDENED LAND	BENEFITED LAND
ROW, RIGHT TO CONVEY ELECTRICITY, TELECOMMUNICATIONS, GAS, RIGHT TO DRAIN WATER AND SEWAGE	A1	LOT 8119 HEREON	LOTS 8012-8017 HEREON
	I1	LOT 811 HEREON	LOTS 455 & 456 HEREON

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

NOTES:

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

LEGEND:

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

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

	NAME	DATE		NAME	DATE
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 16

PREPARED FOR

Oneworth

AREAS LU & K

ORIGINAL SCALES @ A3	STATUS
1:1250 DO NOT SCALE DIMENSIONS	FOR APPROVAL

DRAWING NO	REVISION
19-30410-16-RC1	6

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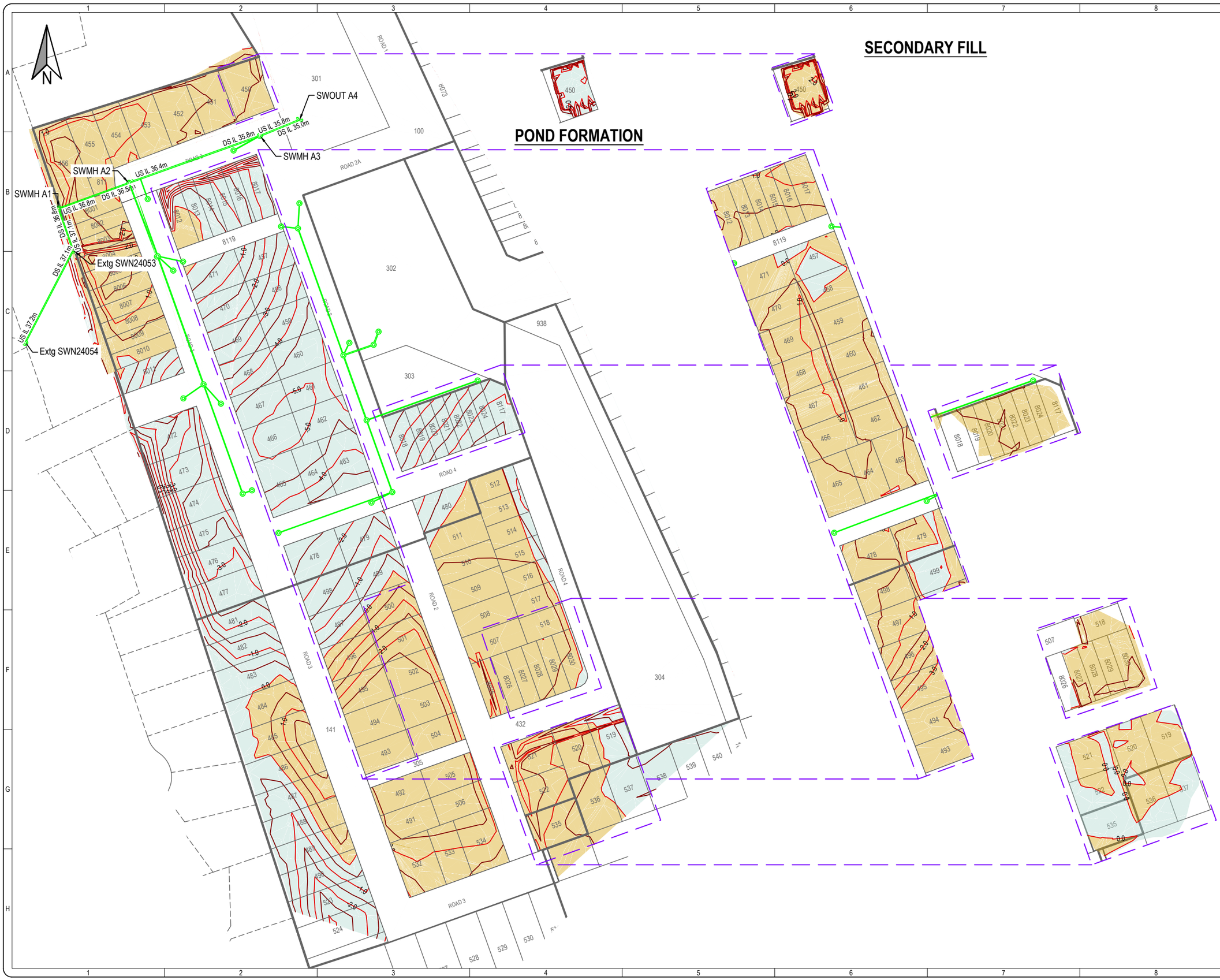

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P.O. Box 231, Tauranga 3140
www.sltga.co.nz

LEGEND:

- CUT
- FILL
- MAJOR CONTOUR
- MINOR CONTOUR

CONTOURS SHOWN ARE AT 0.5m INTERVAL.

Rev	DESCRIPTION	DRN	CKD	APP	DATE
0	PRELIMINARY	NW	SRC	GC	08/21
1	AREAS ADDED	NW	GC	GC	02/22
2	GENERAL UPDATE	NW	SC	GC	02/22

	NAME	DATE		NAME	DATE
SURVEYED			DESIGNED		

COORDINATE SYSTEM: NZGD 2000 - MOUNT EDEN
ORIGIN OF COORDINATES:
HEIGHT DATUM: MOTURIKI LVD 1953
ORIGIN OF HEIGHT:

TITLE

STAGES 16 & 17 CUT FILL PLAN

PREPARED FOR

Greenhill Chedworth Properties Limited

STAGE 16 AND 17

ORIGINAL SCALES @ A3: 1:1500 (DO NOT SCALE DIMENSIONS)
STATUS: AS-BUILT

DRAWING NO: 30410-S16-17-EW1
REVISION: 2

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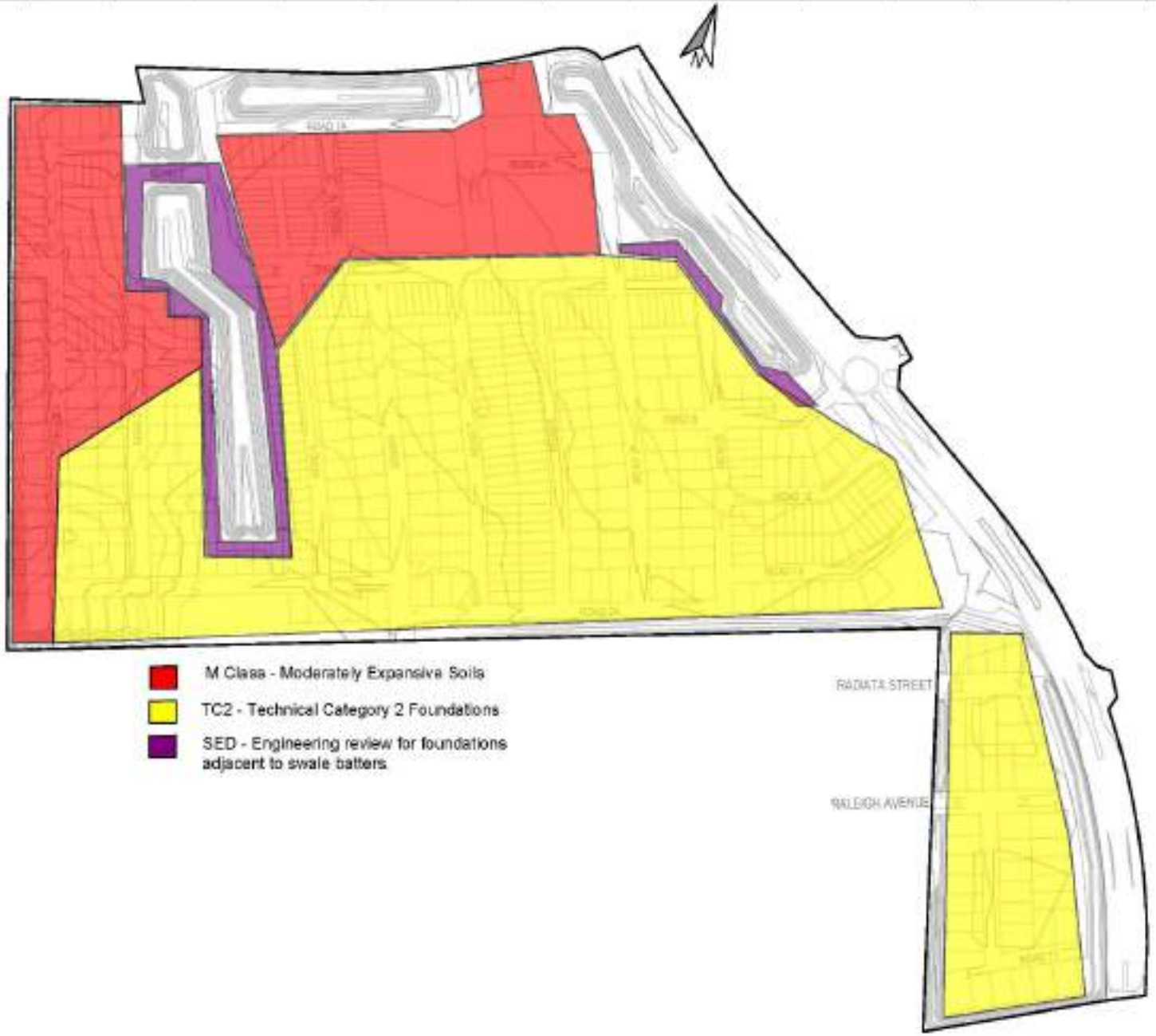

Preliminary Foundation Layout

Chedworth Properties Limited

1:3000

Print

Appendix B *Geotechnical Completion Forms*

Checklist 2.2 - Statement of Professional Opinion

Summary of Geotechnical Data for Individual Lots

NZS 4404: 2010 SCHEDULE2A (Checklist 2.2)

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

Development: Greenhill Park LUK Stage 16 **Developer:** Chedworth Properties Limited

At Pardoa Boulevard, Chartwell, Hamilton (Mussel White Street and Earp Crescent)

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

Hereby confirm that:

1.0 I am a geo-professional as defined in clause 1.2.2 of NZS 4404:2010 and was retained by the developer as the geo- professional on the above development.

2.0 The extent of my inspections during construction, and the results of all tests carried out are described in my geotechnical completion report for Greenhill Park Area LUK Stage 16 dated March 2022 (reference 171738-AREA-LUK-S16-01).

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 450 and 8117 are subject to engineering review of foundations addressing TC2 liquefaction ground damage for the ULS design case.

ii. Remainder of Lots are 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: 11 March 2022**

Michael Richardson

Chartered Professional Engineer (Geotechnical)

CPEng 1005467

Summary of Geotechnical Data for Individual Lots

DP No:		Property Address	Greenhill Park, Stage 16, Hamilton	RC No:	11/2019/7140/003

Lot No:	Area (m^2)	Subsurface Data						Foundations		Building Restriction Line	S/W Specific Design	S/W Soakage	S/W Reticulated	Designated Building Platform	Minimum Building Platform	Compressible Soils	On-site Effluent Disposal	Consent Notice	Comment
		Shear Strength (kPa)	Subdivision Filling		Natural Topography Unworked	Natural Topography Earth worked		Conventional Shallow Foundation to NZS 3604:2011	Specific Design										
			Y/N	Depth (m)	Y/N	Y/N	Depth (mm)	Y/N/NA	Y/N/NA										
450	412	140 - 205+	Y	0.2-2.0[2]	N	Y	200[2]	N	Y[3]	Y	N[4]	N	N	N	Y	N	N	Y	SED – Engineering review for foundations adjacent to swale batters.
451	367	205+	Y	0.2-0.6[2]	N	Y	200[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
452	379	186 - 205+	Y	0.2-0.8[2]	N	Y	200[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	Ground water at 1800mm.
453	391	179 – 205+	Y	0.2-1.2[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
454	322	127 – 205+	Y	0.2-1.2[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
455	330	205+	Y	0.2-1.4[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
456	559	90 – 205+	Y	0.2-1.5[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
457	345	107 – 205+	Y	0.2-0.3[2]	N	Y	3000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
458	345	167 – 205+	Y	0.2-0.3[2]	N	Y	4000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
459	345	107 – 205+	Y	0.2-0.5[2]	N	Y	4500[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
460	345	149 – 205+	Y	0.2-0.5[2]	N	Y	5000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
461	345	129 – 205+	Y	0.2-0.5[2]	N	Y	5000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
462	345	107 – 162	Y	0.2-0.5[2]	N	Y	5000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
463	425	114 – 205+	Y	0.2-0.5[2]	N	Y	4500[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
464	300	140 – 205+	Y	0.2-0.5[2]	N	Y	4500	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
465	425	156 – 205+	Y	0.2-0.5[2]	N	Y	4500	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
466	345	96 – 205+	Y	0.2-0.8[2]	N	Y	5000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
467	345	84 – 205+	Y	0.2-1.0[2]	N	Y	5000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
468	345	159 – 205+	Y	0.2-1.0[2]	N	Y	4500[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
469	345	96 – 205+	Y	0.2-1.0[2]	N	Y	3500[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
470	345	114 – 205+	Y	0.2-1.0[2]	N	Y	2000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
471	345	146 – 205+	Y	0.2-0.4[2]	N	Y	1200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
472	490	117 – 161	Y	0.2[2]	N	Y	4000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
473	441	111 – 205+	Y	0.2[2]	N	Y	4000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
474	447	96 – 186	Y	0.2[2]	N	Y	4000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
475	363	107 – 205+	Y	0.2[2]	N	Y	4000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
476	428	205+	Y	0.2[2]	N	Y	3500[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
477	434	140 – 205+	Y	0.2[2]	N	Y	3000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
478	400	104 – 159	Y	0.2-0.8[2]	N	Y	2000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
479	400	84 – 205+	Y	0.2-0.5[2]	N	Y	2000[2]	N	Y	Y	N[4]	N	N	N	Y	N	N	Y	

Summary of Geotechnical Data for Individual Lots

DP No:		Property Address	Greenhill Park, Stage 16, Hamilton	RC No:	11/2019/7140/003

Lot No:	Area (m^2)	Subsurface Data						Foundations		Building Restriction Line	S/W Specific Design	S/W Soakage	S/W Reticulated	Designated Building Platform	Minimum Building Platform	Compressible Soils	On-site Effluent Disposal	Consent Notice	Comment
		Shear Strength (kPa)	Subdivision Filling Y/N	Subdivision Filling Depth (m)	Natural Topography Unworked Y/N	Natural Topography Earth worked Y/N	Natural Topography Earth worked Depth (mm)	Conventional Shallow Foundation to NZS 3604:2011 Y/N/NA	Specific Design Y/N/NA										
480	396	143 – 205+	Y	0.2[2]	N	Y	1000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8001	212	156 – 205+	Y	0.2-1.5[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8002	182	156 – 205+	Y	0.2-1.5[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8003	184	134 – 205+	Y	0.2-2.0[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8004	185	134 – 205+	Y	0.2-2.0[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8005	213	161 – 205+	Y	0.2-1.5[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8006	215	161 – 205+	Y	0.2-1.5[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8007	190	114 – 205+	Y	0.2-1.2[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8008	191	114 – 205+	Y	0.2-1.0[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8009	193	167 – 205+	Y	0.2-0.6[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8010	194	167 – 205+	Y	0.2-0.4[2]	N	Y	1500[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8011	325	137 – 205+	Y	0.2[2]	N	Y	2000[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8012	272	130 – 205+	Y	0.2-0.5[2]	N	Y	2000[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
8013	177	130 – 205+	Y	0.2-0.5[2]	N	Y	2000[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
8014	177	104 – 205+	Y	0.2-0.8[2]	N	Y	2000[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
8015	177	104 – 205+	Y	0.2-1.0[2]	N	Y	2000[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
8016	177	111 – 205+	Y	0.2-1.0[2]	N	Y	2000[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
8017	212	111 – 205+	Y	0.2-1.0[2]	N	Y	2000[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
8018	250	96 – 205+	Y	0.2-0.5[2]	N	Y	200[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
8019	145	96 – 205+	Y	0.2-0.5[2]	N	Y	200[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
8020	145	96 – 205+	Y	0.2-0.5[2]	N	Y	200[2]	N	Y[1]	N	N[4]	N	N	N	Y	N	N	Y	
8021	145	96 – 205+	Y	0.2-0.5[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8022	145	75 – 202	Y	0.2-0.5[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8023	145	75 – 202	Y	0.2-0.5[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8024	145	159 – 205+	Y	0.2-0.5[2]	N	Y	200[2]	N	Y[1]	Y	N[4]	N	N	N	Y	N	N	Y	
8117	229	159 – 205+	Y	0.2-0.5[2]	N	Y	200[2]	N	Y[3]	Y	N[4]	N	N	N	Y	N	N	Y	SED – Engineering review for foundations adjacent to swale batters.

NOTES:
1) M Class Foundations required.
2) This considers approximately 200mm of topsoil removal across all lots prior to subdivision filling.
3) Setback required for properties adjacent swales. TC2 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.

Appendix C *Laboratory Testing*
Summary Plan
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

ACCREDITED IANZ TESTING LABORATORY

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

WSP
Hamilton (Fox St)
Quality Management Systems Certified to ISO 9001

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Hamilton, New Zealand

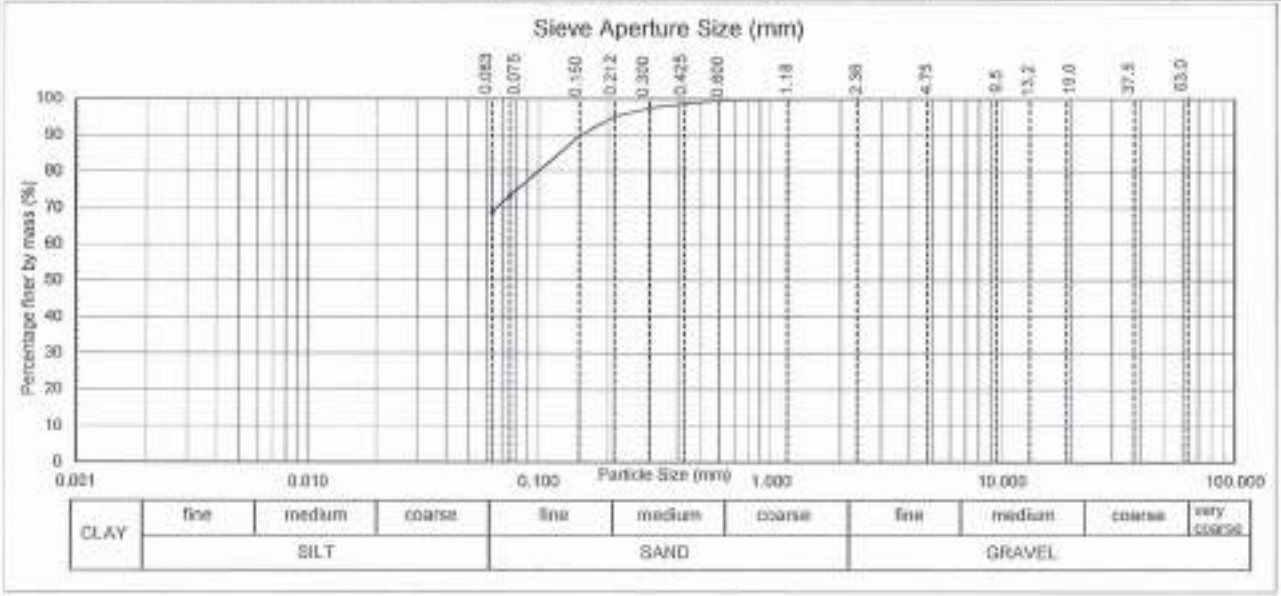
Telephone +64 7 856 2870
Website www.wsp.com/nz

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^3):	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

Date Reported: 21/10/20

IANZ Approved Signatory

Designation : Senior Civil Engineering Technician

Date : 21/10/20

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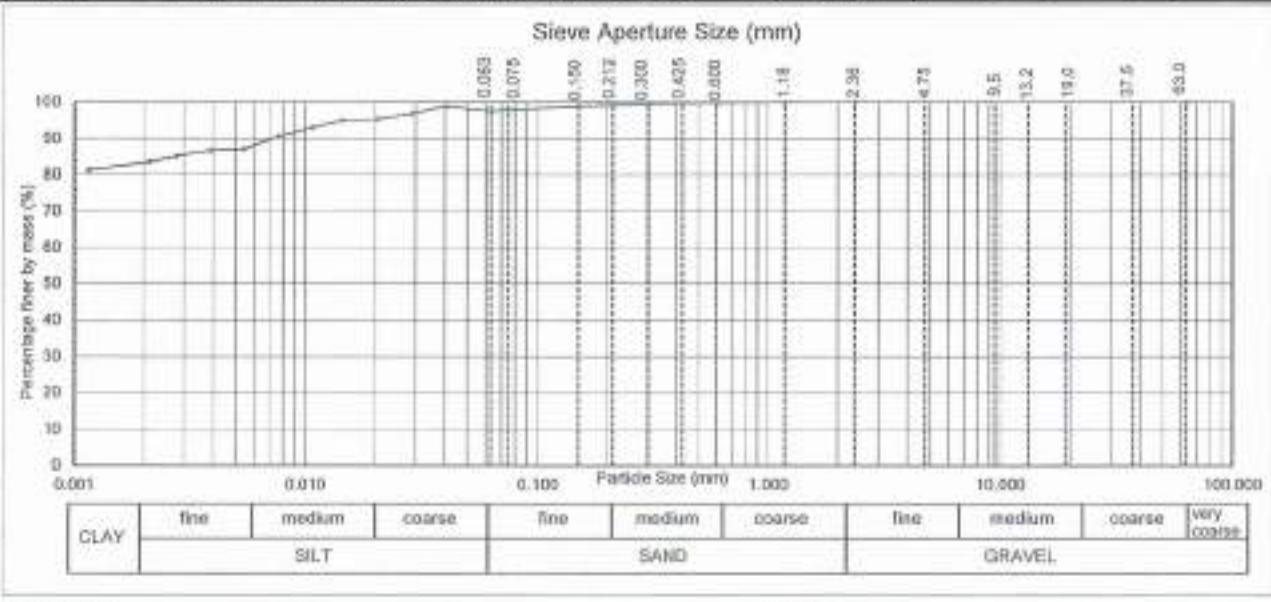
PARTICLE SIZE ANALYSIS (HYDROMETER METHOD)
TEST REPORT

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^3):	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

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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

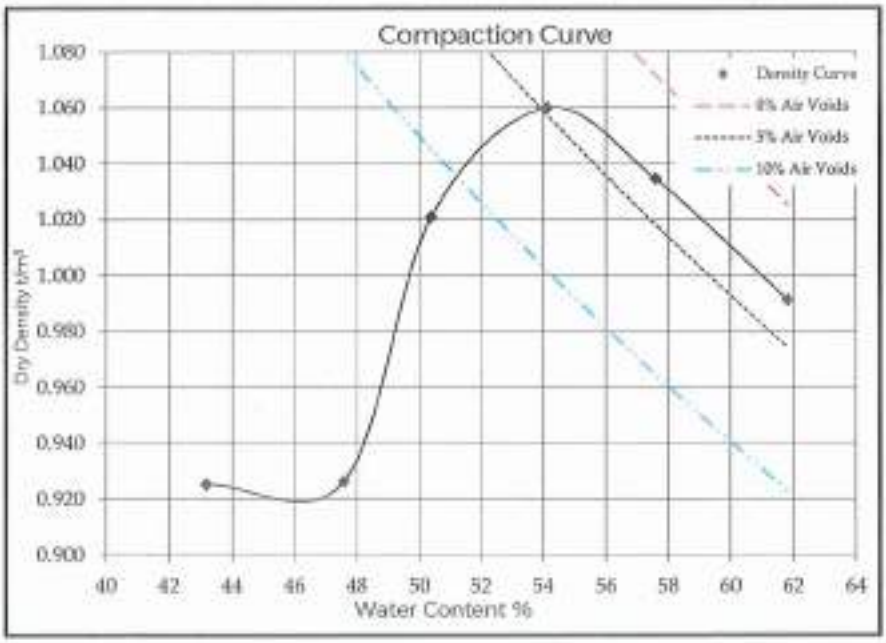
Project :	Greenhill Park
Location :	Greenhill Park
Client :	DB Consulting Engineers Ltd
Contractor :	-
Sampled by :	Client
Date sampled :	9/10/20
Sampling method :	Bulk Sample
Sample description :	CLAY with some silt and trace sand. Reddish brown
Sample condition :	As received
Solid density :	2.80 t/m³ (Assumed)
Source:	Not Stated

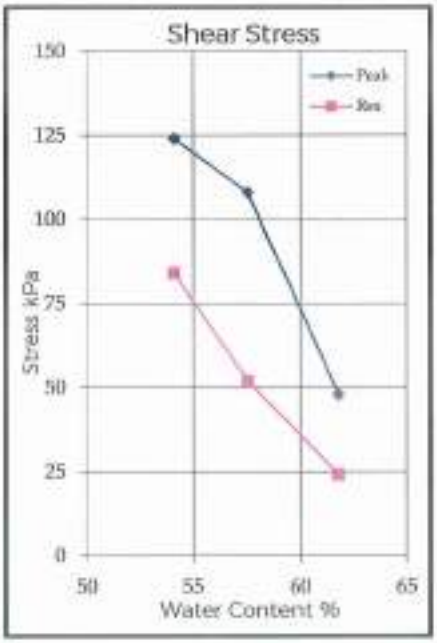
Project No :	2-68165.00
Lab Ref No :	HA6441/2_MDD
Client Ref No :	

Test Results

Maximum dry density	1.06 t/m³		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/m³	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/m³	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
Date reported : 27/10/20

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IANZ Approved Signatory

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

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Appendix D *Post Construction Test Results*
Soil Tests by CORE50
NDMs

CORE50
SOLUTIONS ENGINEERED

Soil Testing

Hand Auger

CORE50
SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**3/02/2022**	**1**	**450**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground Result	TOPSOIL.	
200					
300					
400	UTP			ENGINEERED FILL: CLAY SILT, mix of brown and light grey, very stiff to hard, low moisture, high plasticity, moderately sensitive.	
500					
600					
700	167/33				
800					
900					
1000	>205/			1000mm: Becoming moist.	
1100				1100mm: Becoming brown streaked light grey.	
1200					
1300	143/53			1300mm: Becoming very stiff.	
1400					
1500					
1600	134/53				
1700					
1800					
1900	>205/			1900mm: Becoming hard.	
2000				Clayey SILT, dark brown, hard, low moisture.	
2100	>205/			EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

CORE50
SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Greenhill Park Stage 16 Subdivision and Test Report		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
Jessel Ladwa	**23/06/2021**	**2**	**451**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	Topsoil	
200					
300	>205/			ENGINEERED FILL: Clayey SILT, brown, streaked orange, very stiff	
400					
500					
600	>205/				
700					
800				Clayey SILT, brown, streaked orange, very stiff, moist	
900	>205/				
1000					
1100					
1200	>205/				
1300					
1400				Clayey SILT, brown, streaked orange and white, very stiff, moist	
1500	>205/				
1600					
1700					
1800					
1900	>205/				
2000				**EOB @ 2m**	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to test was: Fine
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: 15/11/2022

CORE50
SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**23/06/2021**	**3**	**452**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200					
300				ENGINEERED FILL: SILT with some clay and traces of fine pumiceous material and mica, orange brown grey streaks mottled orange, very stiff to hard, low moisture, high plasticity, sensitive.	
400	186/36				
500					
600					
700	>205				
800				SILT with some fine sand, grey mottled yellow, hard, low moisture, low moisture.	
900					
1000	>205	3			
1100		4			
1200		3		1200mm: Becoming moist.	
1300		3		1300mm: Becoming sandy. Fine sand.	
1400		3			
1500		2		1500mm: Becoming traces of fine sand.	
1600		4			
1700		3		1800mm: Becoming wet.	
1800		3			
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					

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

1. Weather leading up to testing was: Fine
2. Ground water was at 1800mm 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: 15/11/2022

CORE50
SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Greenhill Park Stage 16 Subdivision and Test Report		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
Jessel Ladwa	**23/06/2021**	**4**	**453**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Result / Good Ground	Topsoil	
200					
300	>205/			ENGINEERED FILL: Clayey SILT, brown, streaked white, very stiff	
400					
500					
600	>205/			ENGINEERED FILL: Clayey SILT, brownish orange, streaked white	
700					
800				Clayey SILT, streaked white, greyish brown, very stiff	
900	>205/				
1000					
1100					
1200	186/67				
1300					
1400				Clayey SILT, grey, streaked orange, very stiff	
1500					
1600	>205/				
1700					
1800					
1900	179/51				
2000				**EOB @ 2m**	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to test was: Fine
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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**23/06/2021**	**5**	**454**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Results	TOPSOIL.	
200					
300	>205/			ENGINEERED FILL: CLAY SILT with traces of clay and fine sand, light grey mottled orange, very stiff, low moisture, low plasticity, moderately sensitive.	
400					
500	186/47				
600					
700	>205/				
800					
900	>205/				
1000				Silty CLAY with traces of mica and fine pumiceous material, orange brown streaked light brown, very stiff to hard, low moisture, high plasticity, moderately sensitive.	
1100	>205/				
1200					
1300	127/36				
1400					
1500					
1600	130/36				
1700					
1800					
1900	127/33				
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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4. Shear Vane records include Re-moulded values where possible
5. Shear Vane Serial No.: 1471 Exp. Date: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Greenhill Park Stage 16 Subdivision and Test Report		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
Jessel Ladwa	**23/06/2021**	**6**	**455**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	Topsoil	
200					
300	>205/			ENGINEERED FILL: Clayey SILT, brownish orange	
400					
500					
600	>205/			ENGINEERED FILL: Clayey SILT, greyish brown, streaked orange	
700					
800					
900	>205/				
1000					
1100					
1200	>205/			Clayey SILT, greyish brown, streaked orange, little moist	
1300					
1400					
1500					
1600	>205/				
1700					
1800					
1900	>205/			**EOB @ 2m**	
2000					
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

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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: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**23/06/2021**	**7**	**456**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good ground / Result	TOPSOIL.	
200	>205/			Silty CLAY with some sand, brown, hard, low moist.	
300				ENGINEERED FILL: CLAY SILT with traces of fine sand and fine pumiceous material, orange brown, very stiff, low moisture, high plasticity, moderately sensitive.	
400	146/66				
500					
600					
700	124/39			ENGINEERED FILL: SILT with traces of clay and fine sand, light grey mottled orange, very stiff, low moisture, low plasticity, moderately sensitive.	
800					
900					
1000	202/72				
1100					
1200				ENGINEERED FILL: Silty CLAY with traces of fine pumiceous and carbonaceous material, orange brown streaked pink, very stiff, low moisture, high plasticity, moderately sensitive.	
1300	186/79				
1400					
1500	>205/				
1600				SILT with some clay and traces of fine pumiceous material, grey mottled yellow, stiff, moist, low plasticity, sensitive.	
1700	96/12				
1800					
1900				SILT with some fine sand, light grey, stiff, moist, low plasticity, sensitive.	
2000	90/12				
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**3/02/2022**	**8**	**457**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200					
300					
400					
500	111/47			SILT with some clay, yellow cream brown, very stiff, low moisture, high plasticity, moderately sensitive.	
600					
700					
800	107/36				
900				900mm: Becoming light creamy brown.	
1000					
1100	114/42				
1200					
1300				1300mm: Becoming yellow cream.	
1400	156/53				
1500				SILT with minor clay and traces of mica, light grey speckled black, hard, low moisture, low plasticity.	
1600					
1700	>205/				
1800					
1900	>205/			Fine to coarse sand with some silt and carbonaceous.	
2000				CLAY SILT, reddish brown, very stiff, low moisture.	
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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2. Ground water was not encountered during testing
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5. Shear Vane Serial No.: 1471 Exp. Date: 15/11/2022

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Project Name		Job Ref.	
Greenhill Park Stage 16 Subdivision and Test Report		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
Jessel Ladwa	**23/06/2021**	**9**	**458**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	Topsoil	
200					
300	182/84			ENGINEERED FILL: CLAY, some silt, brown,	
400					
500				CLAY, some silt, streaked orange	
600	>205/				
700					
800				Clayey SILT, reddish brown, streaked orange	
900	>205/				
1000					
1100					
1200	>205/				
1300					
1400				Clayey SILT, reddish brown, streaked white, moist	
1500	167/44				
1600					
1700					
1800					
1900	184/48				
2000				**EOB @ 2m**	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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5. Shear Vane Serial No.: 1471 Exp. Date: 15/11/2022

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Project Name		Job Ref.	
Greenhill Park Stage 16 Subdivision and Test Report		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
Jessel Ladwa	**23/06/2021**	**10**	**459**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Results	Topsoil	
200					
300	>205/			ENGINEERED FILL: CLAY some silt, brown	
400					
500					
600	>205/			Clayey SILT, brown, streaked orange	
700					
800				Clayey SILT, brown, streaked orange and white	
900	181/72				
1000					
1100					
1200	124/50			Clayey SILT, reddish brown, streaked greyish white, moist	
1300					
1400					
1500	113/36				
1600					
1700					
1800					
1900	107/52				
2000				**EOB @ 2m**	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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Project Name		Job Ref.	
Greenhill Park Stage 16 Subdivision and Test Report		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
Jessel Ladwa	**23/06/2021**	**11**	460

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good ground / Result	Topsoil	
200					
300	172/60			ENGINEERED FILL: CLAY, some silt, brown, little moist	
400					
500					
600	184/69			CLAY, some silt, streaked white and orange	
700					
800					
900	179/42			CLAY, some silt, reddish brown, streaked white, moist	
1000					
1100					
1200	>205/				
1300					
1400				Clayey SILT, reddish brown, moist	
1500	149/39				
1600					
1700					
1800				Clayey, SILT, reddish brown, moist, streaked greyish white	
1900	>205/				
2000				**EOB @ 2m**	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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Project Name		Job Ref.	
Greenhill Park Stage 16 Subdivision and Test Report		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
Jessel Ladwa	**23/06/2021**	**12**	**461**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Result / Good Ground	Topsoil	
200					
300	>205/			ENGINEERED FILL: CLAY, some silt, greyish brown, little moist	
400					
500					
600	154/22				
700				CLAY, some silt, greyish brown, streaked orange, moist	
800					
900	>205/				
1000					
1100					
1200	185/48			Clayey SILT, greyish brown, wet	
1300					
1400					
1500	>205/				
1600				Clayey SILT, greyish brown, streaked oange, wet	
1700					
1800					
1900	129/38				
2000				**EOB @ 2m**	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Greenhill Park Stage 16 Subdivision and Test Report		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
Jessel Ladwa	**23/06/2021**	**13**	**462**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	Topsoil	
200					
300	122/38			ENGINEERED FILL: CLAY, some silt, brown, little moist	
400					
500					
600	146/62				
700				CLAY, some silt, light brown, streaked white, wet	
800					
900	137/33				
1000					
1100				Clayey SILT, greyish brown, wet	
1200	107/26				
1300					
1400					
1500	139/35				
1600				Clayey SILT, greyish brown, streaked orange, wet	
1700					
1800					
1900	162/32				
2000				**EOB @ 2m**	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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5. Shear Vane Serial No.: 1471 Exp. Date: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**1/06/2021**	**14**	**463**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200	210+			ENGINEERED FILL: Silt CLAY with traces of fine pumiceous material, brown, hard, low moisture, high plasticity.	
300					
400					
500	210+			SILT with minor clay and traces of fine sand, mica and pumiceous material, light grey streaked pink, hard, low moisture, low plasticity.	
600					
700					
800	210+				
900					
1000					
1100	210+				
1200					
1300	210+				
1400				1400mm: Traces of carbonaceous material.	
1500					
1600	210+				
1700					
1800				1800mm: Becoming moist.	
1900	143/20			1900mm: Becoming very stiff.	
2000					
2100	114/20			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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5. Shear Vane Serial No.: 1471 Exp. Date: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**1/06/2021**	**15**	**464**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Results	TOPSOIL.	
200	210+			ENGINEERED FILL: Silty CLAY with traces of fine pumiceous material, brown, hard, low moisture.	
300					
400				SILT with some of clay and fine sand and pumiceous material, creamy white streaked pink, hard, low moisture, low plasticity.	
500	210+				
600					
700					
800	210+				
900					
1000				1000mm: Becoming moist.	
1100	202/28			1100mm: Becoming sensitive.	
1200					
1300				1300mm: Becoming SILT.	
1400	159/24			1400mm: Becoming very stiff.	
1500				1500mm: Becoming very moist.	
1600					
1700	140/24				
1800					
1900	172/24				
2000	156/20				
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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2. Ground water was not encountered during testing
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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**1/06/2021**	**16**	**465**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good ground / Result	TOPSOIL.	
200	210+			ENGINEERED FILL: Silty CLAY with traces of mica and fine pumiceous material, brown streaked creamy white, very stiff to hard, low moisture, high plasticity, moderately sensitive.	
300					
400					
500	199/63				
600				SILT with traces of clay and fine sand, creamy white mottled orange and brown, very stiff to hard, low moisture, low plasticity, extra sensitive.	
700					
800	202/28				
900					
1000				1000mm: Becoming moist.	
1100	202/24			1100mm: Becoming low sample retention.	
1200					
1300					
1400	199/28				
1500					
1600				1600mm: Becoming very moist.	
1700	172/24				
1800					
1900					
2000	156/20				
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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2. Ground water was not encountered during testing
3. Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**12/06/2021**	**17**	**466**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200					
300	156/39			ENGINEERED FILL: SILT with some clay and traces of fine pumiceous material, creamy light brown, very stiff, low moisture, high plasticity, moderately sensitive.	
400					
500	161/36				
600					
700				SILT with traces of clay, fine sand and pumiceous material, interbedded pink and creamy white, hard, low moisture, low plasticity, moderately sensitive.	
800	>205/50				
900					
1000					
1100	>205/42			1100mm: Becoming light brown.	
1200				1200mm: Becoming moist to very moist.	
1300				1300mm: Low sample retention.	
1400	96/20			1400mm: Becoming stiff.	
1500					
1600					
1700	124/29			1700mm: Becoming very stiff.	
1800					
1900	143/31				
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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2. Ground water was not encountered during testing
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5. Shear Vane Serial No.: 1471 Exp. Date: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**12/06/2021**	**18**	**467**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Results	TOPSOIL.	
200					
300					
400	167/47			ENGINEERED FILL: SILT with some clay, creamy light brown mottled orange, very stiff, low moisture, high plasticity, moderately sensitive.	
500					
600	124/33				
700					
800	146/47				
900				SILT with some fine sand traces of carbonaceous material.	
1000				SILT with some clay, light brown mottled orange, very stiff, low moisture, high plasticity, moderately sensitive.	
1100	146/36				
1200				SILT with traces of clay and fine pumiceous material, creamy white mottled orange, hard, moist, high plasticity.	
1300	>205/81				
1400				1400mm: Becoming light creamy orange brown.	
1500	84/24			1500mm: Becoming stiff, moist.	
1600					
1700	96/20			1700mm: Low sample retention.	
1800					
1900	96/24				
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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2. Ground water was not encountered during testing
3. Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
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5. Shear Vane Serial No.: 1471 Exp. Date: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**12/06/2021**	**19**	**468**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good ground / Result	TOPSOIL.	
200					
300	167/50			ENGINEERED FILL: SILT with some clay and traces of carbonaceous material and mica, light brown streaked light grey mottled orange, very stiff, low moisture, high plasticity, moderately sensitive.	
400					
500	159/81				
600					
700					
800	>205/81				
900				CLAY SILT with minor carbonaceous material and traces of mica and fine sands, dark reddish brown speckled black, hard, low moisture, high plasticity, moderately sensitive.	
1000	>205/81				
1100					
1200					
1300	>205/69				
1400				SILT with some clay and traces of fine pumiceous material, creamy light brown mottled red, very stiff to hard, low moisture, high plasticity.	
1500	>205/				
1600					
1700					
1800	186/50				
1900					
2000	159/50				
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**12/06/2021**	**20**	**469**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Result / Good Ground	TOPSOIL.	
200					
300					
400	127/50			ENGINEERED FILL: SILT with some clay and traces of mica and carbonaceous material, creamy light brown streaked white, stiff to very stiff, low moisture, high plasticity, moderately sensitive.	
500					
600					
700	96/36				
800					
900	127/47			900mm: Orange mottling.	
1000					
1100	134/53			CLAY SILT with traces of mica and fine pumiceous material, creamy light brown, very stiff, low moisture, high plasticity, moderately sensitive.	
1200					
1300					
1400	183/66				
1500					
1600					
1700	>205/				
1800				SILT with some clay and traces of fine pumiceous material, creamy white mottled orange, hard, low moisture, high plasticity.	
1900					
2000	>205/				
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

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4. Shear Vane records include Re-moulded values where possible
5. Shear Vane Serial No.: 1471 Exp. Date: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**12/06/2021**	**21**	**470**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200	167/79			ENGINEERED FILL: Clayey SILT with traces of mica and fine pumiceous material, creamy light brown mottled orange, very stiff, low moisture, high plasticity, moderately sensitive.	
300					
400	193/79				
500					
600					
700	183/63				
800					
900					
1000	202/66			1000mm: Becoming hard.	
1100				1100mm: Streaked red.	
1200	>205/				
1300					
1400				SILT with some clay and traces of mica and fine pumiceous material, creamy light brown streaked red, very stiff, low moisture, high plasticity, moderately sensitive.	
1500	150/53				
1600					
1700					
1800	114/24			1800mm: Becoming moist.	
1900				1900mm: Low sample retention.	
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

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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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**12/06/2021**	**22**	**471**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200	172/50			ENGINEERED FILL: Silty CLAY with traces of mica and fine pumiceous material, brown streaked creamy white, very stiff, low moisture, high plasticity, moderately sensitive.	
300					
400	161/53				
500				ENGINEERED FILL: Clayey SILT with traces of mica and fine pumiceous material, yellow brown streaked red and white, hard, low moisture, high plasticity, moderately sensitive.	
600					
700	205/53				
800					
900					
1000	>205/81				
1100				SILT with some clay and traces of fine pumiceous material, light brown mottled orange, very stiff to hard, low moisture, high plasticity, moderately sensitive.	
1200	205/66				
1300					
1400					
1500	170/50				
1600					
1700					
1800	159/50				
1900					
2000	146/36				
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**20/05/2021**	**23**	**472**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200					
300	161/39			Silty CLAY with traces of fine sand, brown mottled orange, very stiff, low moisture, high plasticity, moderately sensitive.	
400					
500					
600	143/39				
700				Clayey SILT with traces of mica, interbedded white pinkish brown, very stiff, low moisture, low plasticity, moderately sensitive.	
800					
900	143/36				
1000					
1100					
1200	124/36				
1300					
1400					
1500	127/24			1500mm: Becoming sensitive.	
1600					
1700				SILT with some clay, interbedded pink white and brown, very stiff, low moisture to moist, low plasticity, sensitive.	
1800	117/31				
1900					
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**20/05/2021**	**24**	**473**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Results	TOPSOIL.	
200					
300					
400					
500	183/53			Silty CLAY with some mica, creamy white, very stiff, low moisture, high plasticity, moderately sensitive.	
600					
700					
800	210+			SILT with some fine sands and traces of clay, creamy light brown, hard, low moisture, low plasticity.	
900					
1000				CLAY SILT with traces of mica and carbonaceous material, dark brown, very stiff, low moisture, high plasticity, moderately sensitive.	
1100	199/50				
1200					
1300	172/60			Silty CLAY with traces of mica and fine sand and pumiceous material, creamy light brown, very stiff, low moisture, high plasticity, moderately sensitive.	
1400					
1500					
1600	143/47				
1700					
1800					
1900	161/50				
2000					
2100	111/39			EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

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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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**20/05/2021**	**25**	**474**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good ground / Result	TOPSOIL.	
200					
300	140/63			Silty CLAY with traces of mica and fine pumiceous material, light brown mottled pink, very stiff, low moisture, high plasticity, moderately sensitive.	
400					
500					
600	114/45				
700					
800					
900	186/63				
1000					
1100					
1200	96/28			CLAY SILT, white mottled pink and yellow, stiff to very stiff, low moisture to moist, high plasticity, moderately sensitive.	
1300					
1400					
1500	127/33			1600mm: Some yellow mottling.	
1600					
1700					
1800	167/60				
1900					
2000					
2100	170/69			EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

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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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**20/05/2021**	**26**	**475**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Result / Good Ground	TOPSOIL.	
200					
300					
400	210+			CLAY SILT with traces of mica and carbonaceous material and fine pumiceous material, dark brown speckled black, hard, low moisture, high plasticity.	
500					
600					
700	210+				
800					
900					
1000	210+			Clayey SILT with traces of mica and fine pumiceous material, creamy light brown, hard, low moisture, high plasticity, moderately sensitive.	
1100					
1200	202/79				
1300					
1400					
1500	107/33				
1600				SILT with some clay, pink brown streaked white, very stiff, moist to very moist, low plasticity, moderately sensitive.	
1700					
1800	172/53				
1900					
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

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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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**20/05/2021**	**27**	**476**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200					
300	210+			CLAY with some silt, dark brown, hard, low moisture, high plasticity.	
400					
500					
600	210+				
700				Silty CLAY with traces of fine pumiceous material and carbonaceous material, very stiff to hard, low moisture, high plasticity.	
800					
900	210+				
1000					
1100				1100mm: Becoming pinkish brown.	
1200	210+				
1300					
1400					
1500	210+				
1600					
1700				CLAY SILT with traces of mica and carbonaceous material, white mottled pink and orange, very stiff to hard, low moisture, high plasticity.	
1800	210+				
1900					
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

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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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**20/05/2021**	**28**	**477**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200					
300					
400	186/50			CLAY SILT, light brown mottled orange, very stiff, low moisture, high plasticity, moderately sensitive.	
500					
600					
700	180/53				
800					
900					
1000	210+			Clayey SILT with traces of fine pumiceous material, pinkish light brown mottled orange, hard, low moisture, high plasticity.	
1100					
1200					
1300	210+				
1400				SILT with some fine sand and traces of clay, Interbedded creamy white and light brown, very stiff, low moisture, high plasticity, moderately sensitive.	
1500					
1600	146/36				
1700					
1800	140/39				
1900					
2000					
2100	153/39			EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

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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: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**20/05/2021**	**29**	**478**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground Result	TOPSOIL.	
200					
300					
400	159/63			ENGINEERED FILL: CLAY with some silt and traces of mica and fine pumiceous material, light brown streaked yellow, very stiff, low moisture, high plasticity, moderately sensitive.	
500					
600					
700	107/36				
800					
900					
1000	114/39			Silty CLAY with traces of mica, light brown mottled yellow, very stiff, low moisture, high plasticity, moderately sensitive.	
1100					
1200					
1300	104/36				
1400					
1500					
1600	111/42				
1700					
1800				1800mm: Becoming moist to very moist.	
1900	104/42				
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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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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**20/05/2021**	**30**	**479**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Results	TOPSOIL.	
200					
300	UTP			ENGINEERED FILL: CLAY with some silt and traces of mica, yellow brown, hard, low moisture, high plasticity.	
400					
500					
600	84/24			600mm: Moist, stiff.	
700					
800				Silty CLAY with traces of mica, light brown mottled yellow, very stiff, low moisture, high plasticity, moderately sensitive.	
900	146/66				
1000					
1100					
1200	111/39				
1300					
1400					
1500	137/66				
1600					
1700					
1800	130/60				
1900					
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

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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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**20/05/2021**	**31**	**480**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good ground / Result	TOPSOIL.	
200					
300	210+			ENGINEERED FILL: CLAY with some silt and carbonaceous material, dark brown speckled black, hard, low moisture, high plasticity.	
400					
500					
600	159/66			Silty CLAY with some mica and traces of carbonaceous material, light brown mottled orange, very stiff, low moisture, high plasticity, moderately sensitive.	
700					
800					
900	175/107				
1000				CLAY SILT with traces of carbonaceous and pumiceous material, dark brown, very stiff, low moisture, high plasticity, moderately sensitive.	
1100					
1200	159/63				
1300					
1400					
1500	172/81				
1600				Clayey SILT with traces of pumiceous material, light brown mottled orange, very stiff, low moisture, high plasticity.	
1700					
1800	143/50				
1900					
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

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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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**19/05/2021**	**32**	**8001-8002**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200					
300				ENGINEERED FILL: Silty CLAY, Interbedded reddish brown and light brown, very stiff, low moisture, low plasticity, moderately sensitive.	
400	156/50				
500					
600					
700	202/47				
800					
900					
1000	202/53				
1100				1100mm: Becoming yellow brown.	
1200					
1300	202/47				
1400				1400mm: Traces of iron staining, yellow orange mottling.	
1500					
1600	210+				
1700				SILT with traces of clay, white light grey, hard, low moisture, low plasticity.	
1800					
1900	210+				
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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2. Ground water was not encountered during testing
3. Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
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5. Shear Vane Serial No.: 1471 Exp. Date: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**19/05/2021**	**33**	**8003-8004**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Results	TOPSOIL.	
200					
300	156/47			ENGINEERED FILL: Silty CLAY, brown, very stiff, low moisture, high plasticity, moderately sensitive.	
400					
500					
600	170/50			600mm: Interbedded white and yellow brown.	
700					
800					
900	210+			900mm: Becoming clayey SILT, interbedded yellow brown.	
1000					
1100					
1200	210+			SILT with traces of fine sand, light grey with yellow mottling, very stiff to hard, low moisture, low plasticity.	
1300					
1400					
1500	210+				
1600					
1700					
1800	134/42				
1900				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					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

CORE50
SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**31/08/2021**	**34**	**8005-8006**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good ground / Result	TOPSOIL.	
200					
300					
400	161/60			ENGINEERED FILL: Silty CLAY, interbedded white and brown, very stiff, low moisture, low plasticity, moderately sensitive.	
500					
600					
700	193/50				
800				800mm: Traces of mica.	
900				900mm: Becoming brown.	
1000	210+			1000mm: Becoming hard.	
1100					
1200				12000mm: Moderate orange mottling.	
1300	210+				
1400					
1500				1500mm: Becoming light brown.	
1600	210+				
1700				SILT with traces of fine sand, light grey with yellow mottling, very stiff to hard, low moisture, low plasticity.	
1800					
1900	210+				
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**19/05/2021**	**35**	**8007-8008**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Result / Good Ground	TOPSOIL.	
200					
300				ENGINEERED FILL: Silty CLAY, interbedded white yellow and light brown, very stiff, low moisture, high plasticity, moderately sensitive.	
400	167/50				
500					
600					
700	202/47			700mm: Becoming brown.	
800				800mm: Traces of mica.	
900					
1000	114/36				
1100				CLAY SILT with traces of find sand, traces of rootlets, light grey streaked brown, very stiff to hard, low moisture.	
1200					
1300	210+				
1400					
1500					
1600	210+				
1700					
1800					
1900	210+				
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**19/05/2021**	**36**	**8009-8010**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200					
300	210+			ENGINEERED FILL: CLAY SILT, interbedded white orange and brown, very stiff to hard, low moisture, high plasticity.	
400					
500					
600	167/79			700mm: Minor orange mottling.	
700					
800				800mm: Traces of mica.	
900	210+				
1000					
1100				1100mm: Becoming brown.	
1200	210+				
1300				1300mm: Becoming some clay.	
1400					
1500	210+			Clayey SILT with traces of mica, white light grey, very stiff, low moisture, low plasticity, moderately sensitive.	
1600					
1700				Silty CLAY, dark brown with some iron staining, hard, low moisture, high plasticity.	
1800	210+				
1900					
2000				EOB at 2.0m, Target Borehole Depth	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**19/05/2021**	**37**	**8011**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200					
300	210+			ENGINEERED FILL: Silty CLAY, interbedded white light brown and orange brown, very stiff to hard, low moisture, high plasticity, moderately sensitive.	
400					
500					
600	172/81			700mm: Some orange mottling.	
700					
800				800mm: Becoming brown.	
900	153/69				
1000					
1100					
1200	137/36				
1300				Clayey SILT with traces of mica, white light grey, very stiff, low moisture, low plasticity, moderately sensitive.	
1400					
1500	140/47				
1600					
1700					
1800	210+			Silty CLAY, dark brown with some iron staining, hard, low moisture, high plasticity.	
1900					
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**3/02/2022**	**38**	**8012-8013**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Result / Good Ground	TOPSOIL.	
200					
300	>205/			ENGINEERED FILL: CLAY SILT, yellow brown mottled orange, hard, low moisture, high plasticity.	
400					
500					
600	>205/			ENGINEERED FILL: Silty CLAY, yellow brown mottled orange, very stiff to hard, low moisture, high plasticity, moderately sensitive. 800mm: Becoming orange brown.	
700					
800					
900	150/87				
1000					
1100				1100mm: Carbonaceous material.	
1200	186/53				
1300				SILT with minor clay, light grey mottled orange, very stiff, moist, high plasticity, moderately sensitive.	
1400					
1500	172/45				
1600				1600mm: Some carbonaceous material.	
1700	130/36				
1800					
1900					
2000	143/36				
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**3/02/2022**	**39**	**8014-8015**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good ground / Result	TOPSOIL.	
200	UTP			ENGINEERED FILL: CLAY SILT, mix of brown and light grey, very stiff to hard, low moisture, high plasticity, moderately sensitive.	
300					
400				ENGINEERED FILL: CLAY minor silt, yellow brown, very stiff, low moisture, high plasticity, moderately sensitive.	
500	146/63				
600					
700				700mm: Becoming dark brown mottled orange.	
800	184/39			800mm: Becoming some carbonaceous material.	
900					
1000					
1100	156/66			1100mm:: Becoming orange brown.	
1200					
1300				1300mm: Carbonaceous material.	
1400	202/53			SILT with some clay, yellow brown mottled orange, very stiff, low moisture, high plasticity, moderately sensitive.	
1500					
1600					
1700	104/36				
1800					
1900					
2000	143/36				
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**3/02/2022**	**40**	**8016-8017**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Results	TOPSOIL.	
200					
300	143/50			ENGINEERED FILL: CLAY minor silt, orange brown mottled red, very stiff to hard, low moisture, high plasticity, moderately sensitive.	
400					
500					
600	UTP				
700					
800				800mm: Becoming yellow brown mottled orange.	
900	186/84			900mm: Becoming CLAY SILT.	
1000					
1100					
1200	199/79			SILT with some clay, creamy yellow brown mottled orange, very stiff, low moisture, high plasticity, moderately sensitive.	
1300					
1400	143/45				
1500					
1600					
1700	111/39				
1800					
1900					
2000	140/47				
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**23/06/2021**	**41**	**8018**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Result	TOPSOIL.	
200					
300	114/42			ENGINEERED FILL: Silty CLAY traces of mica and carbonaceous material, dark brown speckled black, very stiff, low moisture.	
400					
500	98/31			Clayey SILT with minor fine pumiceous material and traces of mica, light brown mottled orange, stiff, low moisture, high plasticity, moderately sensitive.	
600					
700	96/24				
800					
900	98/33			800mm: Becoming moist, low plasticity.	
1000					
1100	205/69			1100mm: Becoming hard.	
1200				1200mm: Streaked light brown.	
1300	>205/				
1400					
1500	202/45			1500mm: Becoming moist.	
1600					
1700					
1800	>205/			SILT with some fine to medium sand, moist.	
1900				Clayey SILT with traces of mica and carbonaceous material, dark reddish brown, hard, low moisture.	
2000	>205/				
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

CORE50
SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**23/06/2021**	**42**	**8020**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good Ground / Results	TOPSOIL.	
200					
300	>205/			ENGINEERED FILL: CLAY SILT with traces of mica and fine pumiceous material, light brown, very stiff to hard, low moisture, high plasticity, moderately sensitive.	
400					
500					
600	130/47				
700					
800	111/39			800mm: Becoming moist.	
900				900mm: Becoming creamy light brown.	
1000	114/36				
1100				CLAY with some silt and traces of mica and fine pumiceous material, grey mottled yellow, very stiff, low moisture, high plasticity, moderately sensitive.	
1200	111/24				
1300					
1400	96/24				
1500					
1600					
1700	96/33				
1800					
1900	111/36				
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**23/06/2021**	**43**	**8022-8023**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Good ground / Result	TOPSOIL.	
200					
300	202/50			ENGINEERED FILL: CLAY SILT with traces of mica, light grey and yellow brown, hard, dry, high plasticity, moderately sensitive.	
400					
500	107/47			SILT with traces of clay, mica and carbonaceous material, grey brown speckled black, stiff to very stiff, low moisture, low plasticity, moderately sensitive.	
600					
700	75/31				
800					
900	84/20				
1000					
1100	134/31			Silty CLAY, yellow brown, very stiff, moist.	
1200				Clayey SILT with traces of fine pumiceous material and carbonaceous material, yellow brown, stiff, low moisture, high plasticity, sensitive.	
1300	98/20				
1400					
1500	96/20				
1600				1600mm: Becoming moist.	
1700				1700mm: Becoming some clay.	
1800	81/20			1800mm: Becoming very moist.	
1900					
2000					
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

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SOLUTIONS ENGINEERED

Project Name		Job Ref.	
Subdivision Test & Report Area LUK; Stage 16, Greenhill Park, Hamilton		**171738-AREA-LUK-S16-01**	
Tested by	Date	Sheet No.	Test Site
AK	**23/06/2021**	**44**	**8024-8117**

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm) 0 2 4 6 8 10 12 14 16	Soil Description	Water Table
100			Result / Good Ground	TOPSOIL.	
200					
300				ENGINEERED FILL: SILT with some fine sand, interbedded light grey brown, very stiff to hard, low moisture, low plasticity.	
400	>205/				
500					
600				Silty CLAY with some carbonaceous material, traces of mica and fine pumiceous material, dark reddish brown, very stiff, low moisture, high plasticity, moderately sensitive.	
700	159/53				
800					
900	180/63				
1000					
1100	190/53			CLAY SILT with traces of fine pumiceous material, yellow brown, very stiff to hard, low moisture, high plasticity, moderately sensitive.	
1200					
1300					
1400	>205/				
1500					
1600					
1700	186/36				
1800				1800mm: Becoming some clay.	
1900				1900mm: Low sample retention.	
2000	>205/				
2100				EOB at 2.0m, Target Borehole Depth	
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

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

1. Weather leading up to testing was: Fine
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: 15/11/2022

NDM Direct Transmission

CORE50 SOLUTIONS ENGINEERED

Earth Fill at Greenhill Park, Stage 16. Lot 450 SRP Backfill.

Soil Material: Silty Clay
Solid Density kg/m^3: 2800 (Assumed)
Maximum Dry Density kg/m^3: 1060 Report# HA6441/2
Optimum Moisture Content: 54.0 %
Average Field Moisture Content: 44.9 %
Date: 17/01/2022
Site Tech: AK

Targets	Average	Min	Max
Compaction PR%:	≥ 95	90	-
Air Voids AV%:	≤ 10	-	12
Shear Strength kPa:	≥ 140	100	-
Degree of Saturation:	-	-	-

Test Average	
Compaction PR%	107
Air Voids AV%	8
Shear Strength kPa	200
Degree of Saturation	86

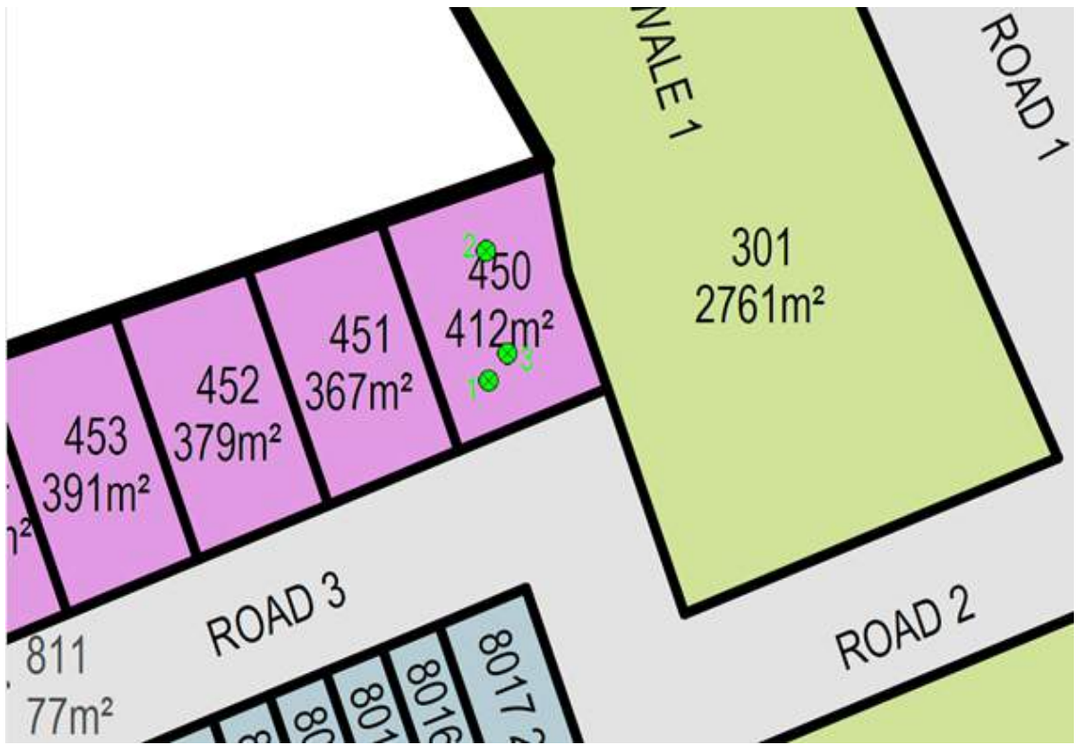
Test Methods : Shear Strength (Shear vane NZGS 2001): Nuclear Densometer Testing (NZS 4407:2015 Test 4.2)

Test#	Test Location: Refer Sketch RL			Layer Thickness mm	Probe Depth mm	Wet Density kg/m^3	Moisture Content MC%	Dry Density kg/m^3	Degree of Saturation DOS	Air Voids AV%	Compaction PR%	Field Shear Strength (kPa). Shear Vane S/N: 1471 Test A	Test B	Test C	Test D (probe hole)	Average kPa
1	37.900			500	300	1655	44.6	1145	86	8	108	210+	210+	210+	210+	210
2	37.800			500	300	1591	45.0	1097	81	11	104	210+	210+	210+	210+	210
3	37.300			500	300	1699	45.0	1172	91	5	111	150	207	210+	153	180

NDM Direct Transmission

Earth Fill at Greenhill Park, Stage 16. Lot 450 SRP Backfill.

Date: 17/01/2022



NDM Direct Transmission

CORE50 SOLUTIONS ENGINEERED

Earth Fill at Greenhill Park, Stage 16.

Soil Material: Silty Clay
Solid Density kg/m^3: 2800 (Assumed)
Maximum Dry Density kg/m^3: 1060 Report# HA6441/2
Optimum Moisture Content: 54.0 %
Average Field Moisture Content: 52.3 %
Date: 22&23/01/2022
Site Tech: AK

Targets	Average	Min	Max
Compaction PR%:	≥ 95	90	-
Air Voids AV%:	≤ 10	-	12
Shear Strength kPa:	≥ 140	100	-
Degree of Saturation:	-	-	-

Test Average	
Compaction PR%	102
Air Voids AV%	5
Shear Strength kPa	169
Degree of Saturation	92

Test Methods : Shear Strength (Shear vane NZGS 2001): Nuclear Densometer Testing (NZS 4407:2015 Test 4.2)

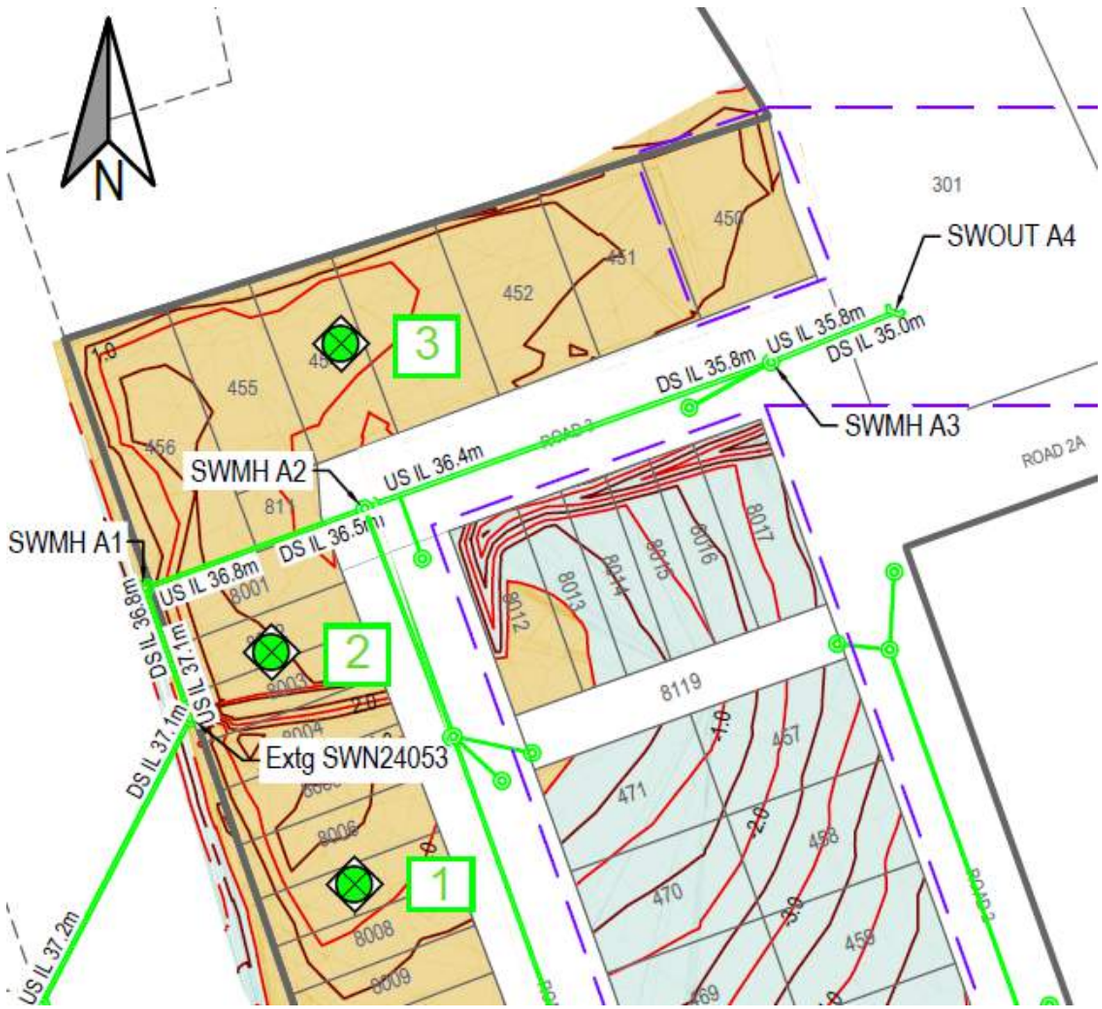
Test#	Test Location: Refer Sketch RL			Layer Thickness mm	Probe Depth mm	Wet Density kg/m^3	Moisture Content MC%	Dry Density kg/m^3	Degree of Saturation DOS	Air Voids AV%	Compaction PR%	Field Shear Strength (kPa). Shear Vane S/N: 1471 Test A	Test B	Test C	Test D (inside probe hole)	Average kPa
1	39.900			500	300	1676	50.0	1117	93	4	105	150	150	132	180	153
2	38.800			500	300	1652	49.8	1103	91	6	104	159	195	186	150	173
3	38.520			500	300	1607	50.0	1071	87	8	101	210+	135	180	162	168
4	38.000			500	300	1663	51.7	1096	93	4	103	204	174	150	198	182
5	40.000			500	300	1642	51.4	1085	91	6	102	156	156	210+	183	167
6	41.700			500	300	1656	52.3	1087	93	4	103	165	165	135	141	152
7	39.000			500	300	1617	57.1	1029	93	4	97	165	150	180	165	165
8	39.600			500	300	1690	56.4	1081	99	0	102	210+	210+	150	195	191

NDM Direct Transmission

CORE50
SOLUTIONS ENGINEERED

Earth Fill at Greenhill Park, Stage 16. Lot 450 SRP Backfill.

Date: 22&23/01/2022



NDM Direct Transmission

Earth Fill at Greenhill Park, Stage 16. Lot 450 SRP Backfill.

Date: 22&23/01/2022

Appendix E *Stormwater Management*
(Minimum Lot Levels)

LOT NUMBER	LOWEST LEVEL	MINIMUM FINISHED FLOOR LEVEL (FFL)
450	38.20	38.60
451	38.39	38.60
452	38.43	38.60
453	38.54	38.69
454	38.65	38.80
455	38.85	39.00
456	38.96	39.11
457	38.89	39.04
458	39.18	39.33
459	39.31	39.46
460	39.38	39.53
461	39.52	39.67
462	40.04	40.19
463	41.00	41.15
464	42.10	42.25
465	42.40	42.55
466	42.00	42.15
467	41.53	41.68
468	41.50	41.65
469	40.88	41.03
470	40.30	40.45
471	39.50	39.65
472	41.50	41.65
473	42.20	42.35
474	42.60	42.75
475	42.90	43.05
476	43.20	43.35
477	43.50	43.65
478	42.42	42.57
479	41.50	41.65
480	40.40	40.55
8001	38.75	38.90
8002	38.93	39.08
8003	39.15	39.30
8004	39.30	39.45
8005	39.45	39.60
8006	39.80	39.95
8007	40.10	40.25
8008	40.35	40.50
8009	40.60	40.75
8010	40.77	40.92
8011	41.00	41.15
8012	38.40	38.60
8013	38.38	38.60
8014	38.33	38.60
8015	38.30	38.60
8016	38.30	38.60
8017	38.30	38.60
8018	39.50	39.65
8019	39.55	39.70
8020	39.57	39.72
8021	39.52	39.67
8022	39.60	39.75
8023	39.60	39.75
8024	39.60	39.75
8117	39.25	39.40

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LEGEND:

- 38.2 — SPOT HEIGHT GROUND LEVEL*
- SLOPE ARROW
- TOP OF BANK
- BOTTOM OF BANK

*GROUND LEVELS ARE NOT TO BE USED FOR BUILDING DESIGN.

Rev	DESCRIPTION	DRN	CKD	APP	DATE
0	PRELIMINARY	NW	BP	BP	03/22
1	ISSUED TO GEOTECH	NW	BP	GDC	03/22
2	TABLE UPDATED LOT 450	NP	BP	GC	03/22
3	FFL UPDATED	NP	BP	GC	03/22
4	FFL UPDATED	NP	BP	GC	03/22

	NAME	DATE		NAME	DATE
SURVEYED			DESIGNED		

COORDINATE SYSTEM: NZGD 2000 - MOUNT EDEN
ORIGIN OF COORDINATES:
HEIGHT DATUM: MOTURIKI LVD 1953
ORIGIN OF HEIGHT:

TITLE

SECTIONS LEVELS AND FLOW - GEOTECHNICAL REQUIREMENT

PREPARED FOR

Greenhill Chedworth Properties Limited

STAGE 16

ORIGINAL SCALES @ A3: 1:1000 DO NOT SCALE DIMENSIONS
STATUS: AS-BUILT
DRAWING NO: 30410-01-S16-G1
REVISION: 4

R:\Project Files\30410-01-19\01 Drawing Presentation Files\19-30410-01 - Stage 16 Geotech Requirement Levels and Flow.dwg - Plotted: 16/03/2022