



GREENHILL PARK RESIDENTIAL SUBDIVISION

STAGE 10

Area M, Greenhill Park

HAMILTON

***REPORT ON SUBDIVISION EARTHWORKS
AND RECOMMENDATIONS FOR BUILDING
DEVELOPMENT***

Our Ref: DB 171738-AREA-M-S10-01

Prepared for: Chedworth Properties Limited

Date: March 2020

Location: Stage 10, Greenhill Park, Hamilton Subdivision Completion Report

Job No: DB 171738-AREA-M-S10-01

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1.0 Subdivision Development Earthworks

1.1 Introduction

In accordance with Hamilton City Council's (HCC) Subdivision Resource Consent "011.2018.00006632.001" covering Area M of the Greenhill Park Development. Bulk earthworks have been completed to re- contour the previously agricultural landscape for Stage 10 of the Greenhill Park Residential Subdivision in Hamilton. Prior to commencement of earthworks, geotechnical investigations were carried out by Beca Ltd (Beca) in 2016 [1].

Stage 10 of Greenhill Park is currently accessed from Pardoia Boulevard. Stage 10 comprises 44 residential lots (numbered 243 to 286). The locations of these lots are shown on attached *Cut/Fill Plan*, drawing 21879-EW4 included in Appendix I.

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 DB Consulting Engineers (DBCE) Ltd as a geo-professional for this project works.

To satisfy the requirements of HCC's Resource Consent, the ITS and NZS 4404, this report summarises 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 I of this report is the proposed subdivision plan comprising the original Lot 605 DP 516275 and the proposed new Lots 243-286 DP543207 for Area M Stage 10. 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 10 of the subdivision development were undertaken between January 2019 and January 2020.

These earthworks comprised

1. The stripping of surface topsoil to expose underlying natural soils
2. The placement of filling within all lot
3. Undertaking areas of net cut of up to 0.25m deep to reduce original ground levels within lot 264
4. Backfilling and raising the ground level with new fill to create uniform fill platforms

5. The reinstatement of the surface topsoil cover and subsequent grassing

The soils encountered during the formation of the site and road subgrades were a mixture of silts, sands and pumiceous gravels, typical of Hinuera Formation deposits in this area of Hamilton. These soils were those that had been identified in pre-construction site investigations by the Beca Report.

The filling work was undertaken using these site soils gained from areas of cut on other stages from within the larger Greenhill Subdivision. Filling was undertaken during summer 2019 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 200 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 actually 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 insitu silts and sands and silty sand mixtures gained from areas of cut across the larger subdivision and already used for the earlier stages of the development. 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 Scala penetrometer in sand filling and a hand-held shear vane in finer grained silts and clayey silts. Adequate strengths would be achieved when blow counts recorded with a Scala penetrometer were to be 5 or more per 100 mm of penetration in the sand filling or when an undrained shear strength of 100 kPa or more had been developed in silts and clays.

Materials used where the same basic strata as being used for the previous 9 Stages of works, with a high level of consistency based on previous test results.

1.4 Fill 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 and smooth drum rollers.

As most of the filling placed comprised the sands identified in the pre subdivision boreholes, testing of the compaction achieved was mostly undertaken with a Scala penetrometer.

OLC undertook their own Scala penetrometer testing throughout the contract works to verify that the filling had been placed with adequate compaction. The results indicate that the construction filling standards have been met. Foundations may therefore be detailed to NZS 3604:2011 where a timber framed subfloor containing shallow piles, bearers and joists is contemplated. Concrete floors designed to NZS3604 can be used on most lots where they are not immediately adjacent to a stormwater swale.

Notwithstanding the comments above, restriction from ground hazards (refer section 1.8.3) still apply to some lots.

1.5 Areas of Cut

Areas developed in cut are shown on 21879-EW4 (Appendix I). In these areas, the ground at formation levels was observed to comprise the same silts and sands that had been used for filling elsewhere and as identified by pre subdivision tests.

1.6 Test Results of Fill Materials

A summary of the tests undertaken by DBCE is present in Appendix IV. The test positions are shown on 21879-EW4 and the test results are in Appendix IV.

The Scala 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

The natural ground at the finished ground surface or under the filling comprised silty sands and sands 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

There are no land form stability issues within Stage 10 of the Greenhill Park Subdivision. The specification from the developer for the site earthworks was that the lots were to be graded as flat as possible with a desirable gradient of 0.5%.

1.8.2 Flooding

The final lot levels have been set based on infrastructure requirements and freeboard from
 Location: Stage 10, Greenhill Park, Hamilton Subdivision Completion Report
 Job No: DB 171738-AREA-M-S10-01

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 M). In the report for area M, a 1% AEP flood event is identified for each swale system. The two relevant swales for Stage 10 are Swale 3B and Swale 4A. Flood levels of 36.46 and 36.10 R.L. respectively have been used in assessing the flood risk in stage 10. This equates to minimum lot levels of 36.610m to 37.777m R.L. across the stage (with low being the north west corner and high being the south east corner). The list of Lot Levels for Stage 10 is included in Appendix V.

Site grading during house construction must not lower finished levels below the minimum finished ground levels identified by Beca without further review of the impacts on flooding. Earthworks must not direct stormwater runoff to adjacent properties, or towards buildings, or create areas of localised ponding. All overland flow is to be towards the road frontage on each section, where falls will direct surface flow towards 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 M of the Greenhill Park Subdivision is discussed in “Greenhill Park Geotechnical Interpretation and Design - Area M” by Beca and dated 13 July 2018. Foundations within 5m of the top of the swales are classed as TC2 like foundations. Lots affected include Lots 256-263. 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.
- 1.5 – 5m adopt an enhanced TC2 _like foundation
- Beyond 5m of swale crest no specific requirements to mitigate liquefaction effects.

The Beca report refers to zones adjacent to the swales being in a TC2 type area as is defined in guidelines published by the Ministry of Business, Innovation and Employment (MBIE). MBIE recommends that TC2 type foundations should typically include ‘an enhanced foundation slab’ as is currently being installed for new houses in Christchurch. Alternatively, MBIE advises that houses may be supported on timber piles and a timber framed subfloor as detailed in NZS 3604 to meet a Type A construction as described in their guidelines.

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, and 90 % of the 10 % and 50 %

AEP pre-development rates (Beca Ltd. [2016] Greenhill Park - Stormwater Design, for Chedworth Properties Ltd, 29 June 2016). Area M has been designed to include roadside swales flowing in an approximately east to west direction. Stage 10 includes part of swale 4A (Lot 501) – located adjacent to Pardo Boulevard and behind lots 256 to 263 – that will collect runoff from roads within Stage 10. The depth of the swales has been designed to accommodate the fall and cover depth required of the piped drainage system. The piped drainage network has been designed to convey the 50 % AEP flows from roads and lots to the swale network, with each lot to be provided with a piped service connection. The stormwater plan is presented in the S&L Stormwater As Built DWGs reported separately.

All lots will require on-site stormwater efficiency measures as per the District Plan requirements (Rule 25.13.4.5 Water Efficiency Measures). These include:

1. Detention of stormwater to 80% of pre-development runoff by an appropriate means. This has largely been achieved by the swale network for events greater than the 50 % AEP storm. For the 50 % AEP and smaller events, the stormwater efficiency measures are expected to provide sufficient additional mitigation to achieve this requirement.
2. Permeable surfaces protected to achieve at least 20% above the minimum standard of the zone (i.e. 40 % site permeability).
 - a. Sites within the Ruakura Medium Density Residential Zone require a minimum permeability of 20 % (Rule 4.6.5) and are limited to 50 % site coverage (Rule 4.6.6).
3. Rainwater tank for non-potable reuse system
4. Other equivalent features

Stormwater management must ensure that the rate of stormwater discharge offsite is at or below pre-development rates. Stormwater management measures shall be implemented, as appropriate, in accordance with the following drainage hierarchy:

1. Retention for reuse
2. Soakage techniques
3. Detention and gradual release to a watercourse
4. Detention and gradual release to stormwater reticulation.

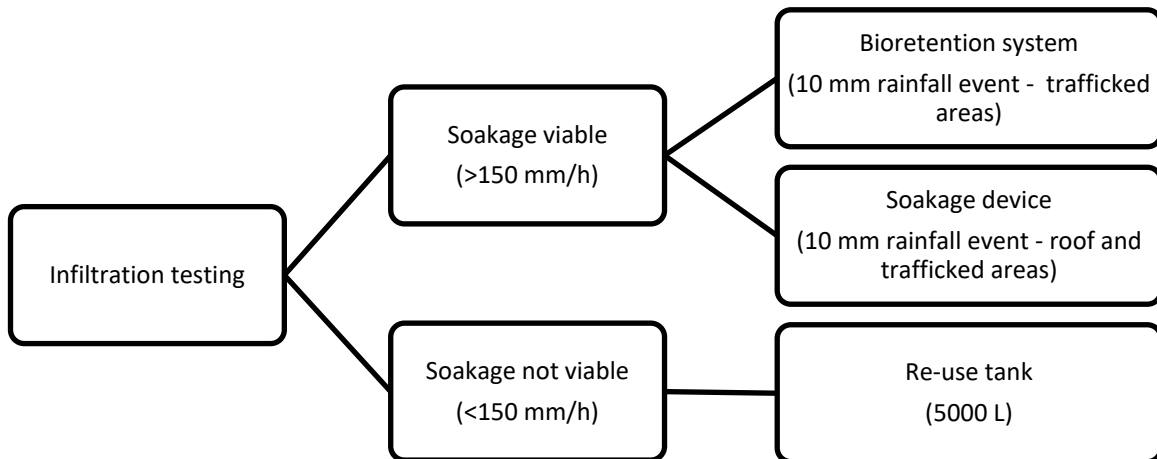
Section 42 of the Subdivision Resource Consent (SRC) relating to Stages 9-15 state that “Each residential lot shall be provided with a means for disposal of stormwater, with no private stormwater pipes or soakage systems crossing from one lot to another except where covered by an easement”

Section 43 of the SRC states that water efficiency measures for the individual residential lots are to be detailed for each subdivision stage. “Where retention for reuse tanks is proposed they shall be a minimum of 5,000L to ensure they are effective or where the lot is less than 300m² should be appropriately designed considering the specific site constraints. The required stormwater efficiency measure is to be implemented at the building consent stage and maintained on an on-going basis at the owners’ expense”.

Section 44 of the SRC requires a consent notice on each title advising of the required water efficiency measures to be implemented and maintained on an ongoing basis.

Section 55 of the SRC states the requirement for lot development to be undertaken in general accordance with the recommendations in the report: Greenhill Park Geotechnical Interpretation and Design – Area M, prepared by Beca Ltd., 13 July 2018.

In the Stage 10 development area, each site is to be tested for soakage capability by the property owners. For those sites that have a sufficient soakage capability, disposal of stormwater is to be undertaken onsite using soakage and/or bioretention systems with overflow to the lot stormwater service connection. Those sites that are not soakage viable are to retain stormwater for reuse by way of a Slimline Rain Tank or other similar type water tank. The size of the tank is to be 5000 litres and the tank is to be plumbed into the house for use as a non-potable water supply including for garden irrigation and in general accordance with the HCC guidelines for the Implementation of Water Efficiency Measures. The Slimline rain tank system is described in Appendix V. This requirement will be advised to purchasers and will be implemented through the building consent process by HCC. A consent notice is to be registered on the certificates of titles for each lot which describes these investigation and design requirements.



Details of the required stormwater measures are included in Appendix V, sourced from the Greenhill Park Design Guidelines.

3.0 Retaining Walls

There are no retaining walls that were constructed by the developer within stage 10.

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 10 as shown for Lots 243-286 DP543207 of Area M Stage 10 within the Greenhill Park Residential Subdivision. No responsibility is accepted by DB Consulting Engineers Ltd for the use of any part of this report for other development sites without their written approval.

DB Consulting Engineers Ltd

Report prepared by Michael Richardson
CPEng 1005467
Geotechnical Engineer

March 2020

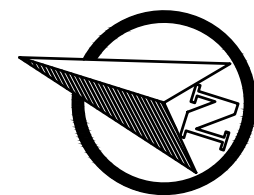
References

- [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.

Appendices

Appendix I	<u>Reference Drawings</u> Subdivision Plan Cut/Fill Plan 21879-EW6
Appendix II	<u>Geotechnical Completion Forms</u> Checklist 2.2 - Statement of Professional Opinion Summary of Geotechnical Data for Individual Lots
Appendix III	<u>Pre-Construction Assessment (exerts)</u> BECA Area M Liquefaction Assessment Summary Plan
Appendix IV	<u>Post-Construction Test Results</u> Tests by DCBE Ltd
Appendix V	<u>Stormwater Management</u> Slimline Rain Tank Installation Detail Lot Levels (Minimum Lot Levels)

Appendix I	<u>Reference Drawings</u>
	Subdivision Plan
	Cut/Fill Plan 21879-EW4
	Site Levels Plan



Areas and dimensions are approximate only and subject to survey.

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.

All Roads are to vest in the Hamilton City Council

- Stage 10 (44 Lots)
- Local Purpose (Amenity) Reserve
- Roads

checked by.	Rev. No.	Description	DATE
		NAME	SIGNED
Surveyed			
Designed			
Drawn	NP	03/18	
Checked	CR	03/18	
Approved	TMB	03/18	

REFERENCES



S & L CONSULTANTS LTD
SURVEYORS - ENGINEERS - PLANNERS

36 Kereiti Street, Mt Maunganui, New Zealand
P.O. Box 231 Ph.(07)577-6069
Fax(07)577-6065
Email: slconsultants@sltga.co.nz
Web Site: www.sltga.co.nz

Title
Proposed Subdivision
of Lot 605 DP 516275
CT 804519
Greenhill Park
Area M Scheme
Stage 10



Copyright on this drawing is reserved

Original Scales @ A1
1:1000
(Approx. 1:2000 @ A3)

Date
03/18

Do Not Scale Dimensions
Drawing No
21879 - M10

Revision:
10

517
DP 507312

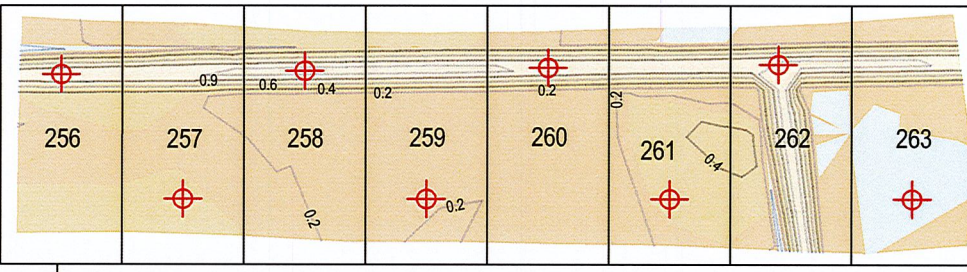
703
9.7257ha
Balance Lot

Total number of Lots: 44
Total Residential Land Area: 1.4953ha
Lot yield per ha: 29.4 (Average: 339m²)
Area M = 16.5680ha

DBCE Test location

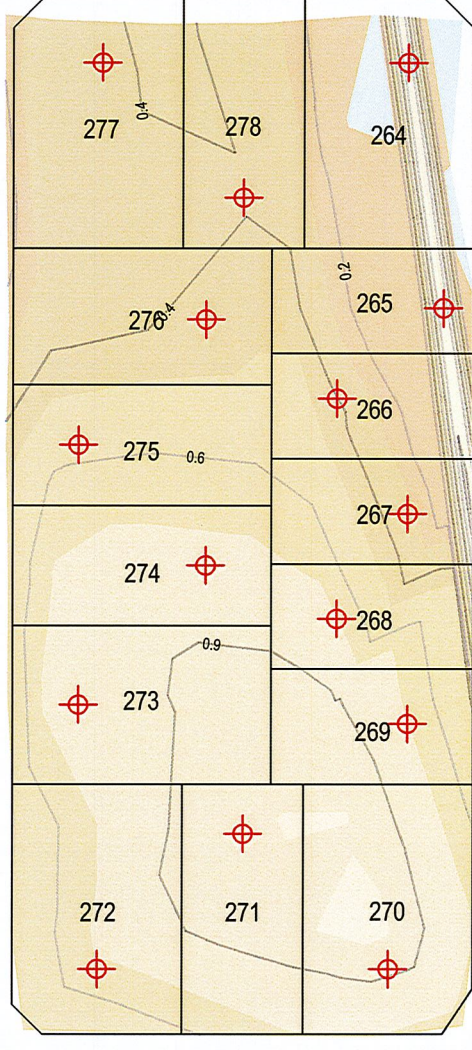
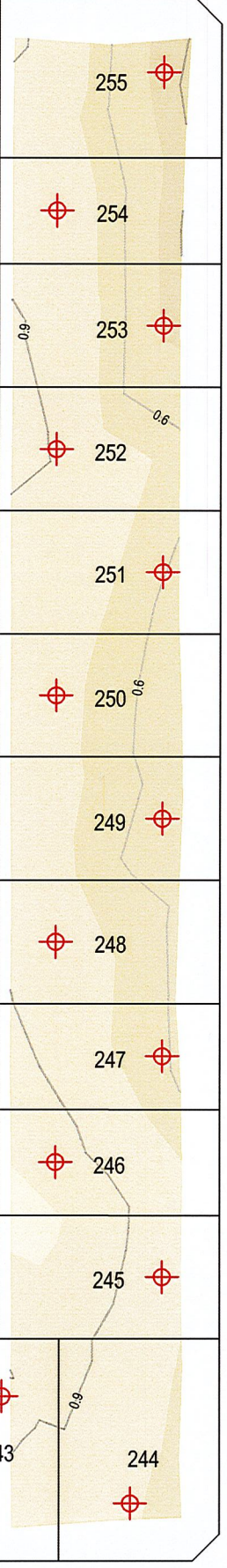
H:\21000 - 21999\21800 - 21899\21879 - Greenhill Park Area M - Pardo Boulevard Drawings\Scheme\21879 - M10 - Area M Stage 10 Scheme - R10.dwg - Plotted: 20/02/2018

501 DP 534481



TREWERN AVENUE

KEYES STREET

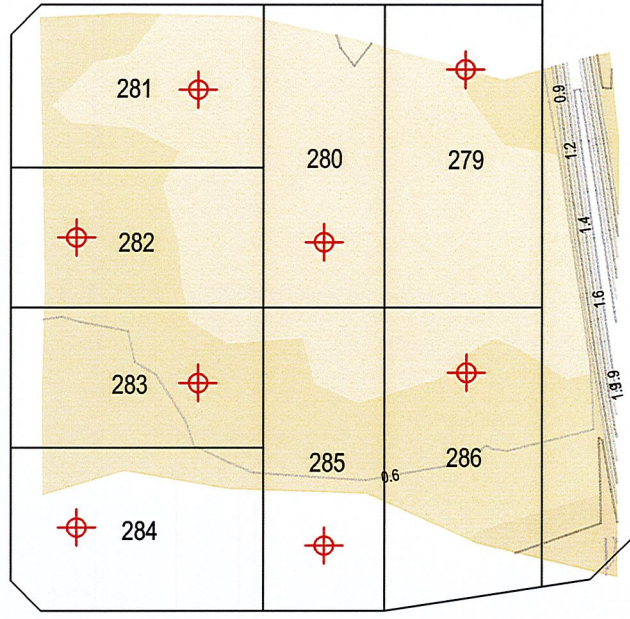


KEYES STREET

502

WEBB DRIVE

KEYES STREET



POPHAM ROAD

703

ELEVATIONS TABLE

NUMBER	MINIMUM ELEVATION	MAXIMUM ELEVATION	COLOUR
1	-0.26	0.00	
2	0.00	0.25	
3	0.25	0.50	
4	0.50	0.75	
5	0.75	1.00	
6	1.00	1.25	
7	1.25	1.50	
8	1.50	1.75	
9	1.75	2.03	

CUT
FILL

KEY

DBCON GEOTECH TEST LOCATIONS

CUT/FILL CONTOUR INTERVAL: 0.25M



Land Development
and Design Specialists

Ph. 07 577 6069
Email: info@sitga.co.nz
36 Kereiti Street, Mt Maunganui, Tauranga 3116
P.O. Box 231, Tauranga 3140
www.sitga.co.nz

Chedworth
Properties Limited



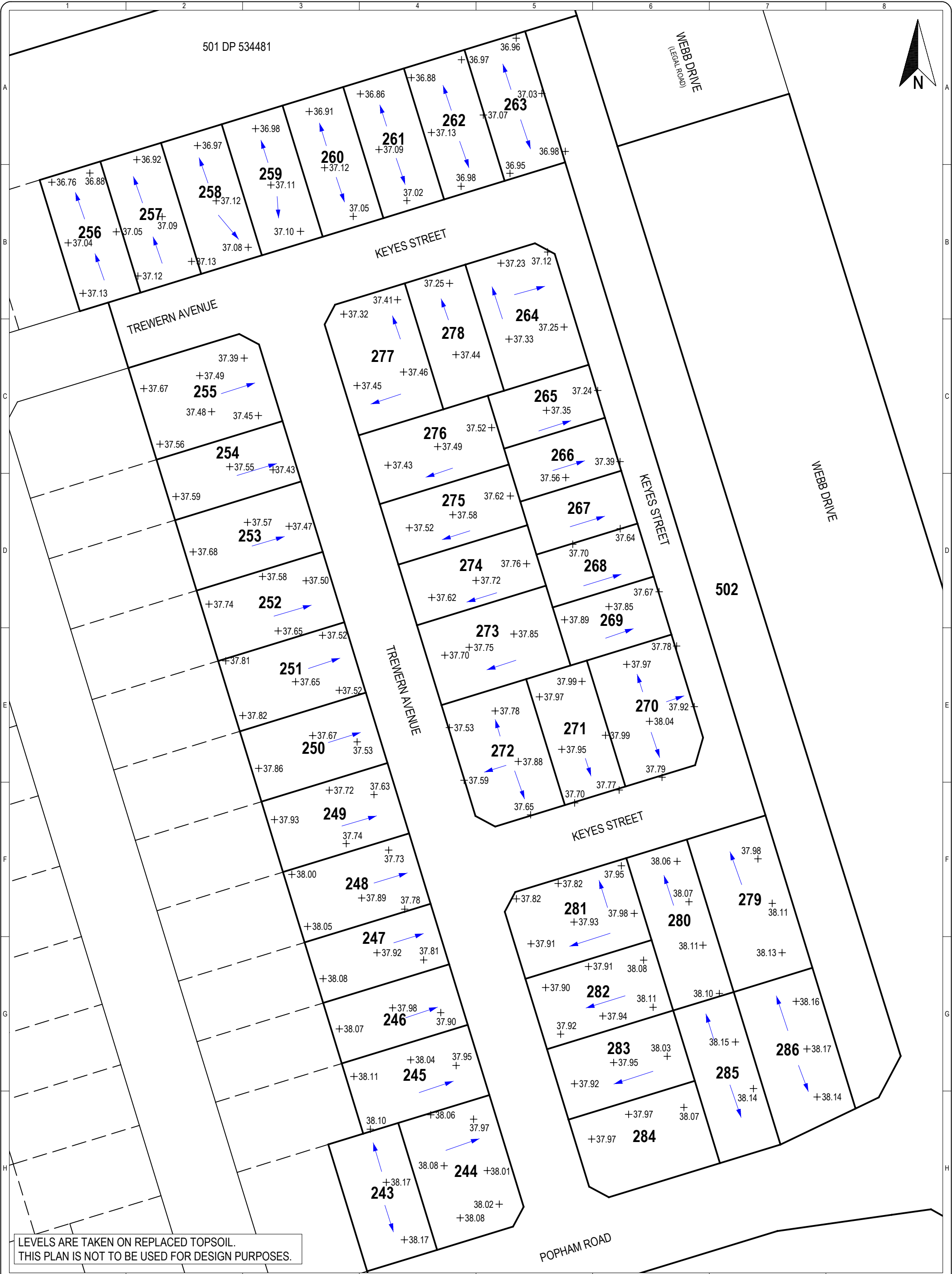
CHEDWORTH PROPERTIES LTD
GREENHILL PARK STAGE 10
CUT / FILL PLAN

Rev	Description	Drm	Ckd	App	Date
0	PRELIMINARY	NP	SC	SC	03/2020
	Name	Date		Name	Date

Coordinate System: MT EDEN 2000 CIRCUIT	
Origin of Coordinates: ALP3 DP 534481	
Height Datum: MOTURIKI VERTICAL DATUM	
Origin of Height: SS 507 SO 42451 RL = 44.043	
Original Scales @ A3	Status
1:750	PRELIMINARY
Do Not Scale Dimensions	
Drawing No	Revision
21879-EW4	0

Copyright on this drawing is reserved

I:\sic-tp\WorkingFiles\cheridson\unionsquare.sitga.co.nz\21879-S10-CF1 - Stage 10 Cut Fill Plan.dwg - Plotted: 23/03/2020



LEVELS ARE TAKEN ON REPLACED TOPSOIL.
THIS PLAN IS NOT TO BE USED FOR DESIGN PURPOSES.



S&L
Land Development
and Design Specialists
Ph. 07 577 6069
Email: info@sltga.co.nz
36 Kereiti Street, Mt Maunganui, Tauranga 3116
P.O. Box 231, Tauranga 3140
www.sltga.co.nz

Title

SECTION LEVELS & FLOW GEOTECHNICAL REQUIREMENT STAGE 10 AREA M



AB	ISSUE TO HCC	SRC	KU	NF	04/20
0	PRELIMINARY	SRC	KU	NF	04/20
Rev	Description	Drn	Ckd	App	Date
	Name	Date		Name	Date
Surveyed	HNC	03/2020	Designed		

Coordinate System: MT EDEN 2000 CIRCUIT	
Origin of Coordinates: ALP 3 DP 534481	
Height Datum: MOTURIKI VERTICAL DATUM 1953	
Origin of Height: SS 507 SO 42451 RL = 44.04m	
Original Scales @ A3	Status
1:650	AS-BUILT
Do Not Scale Dimensions	
Drawing No	Revision
21879-M-10-G1	AB

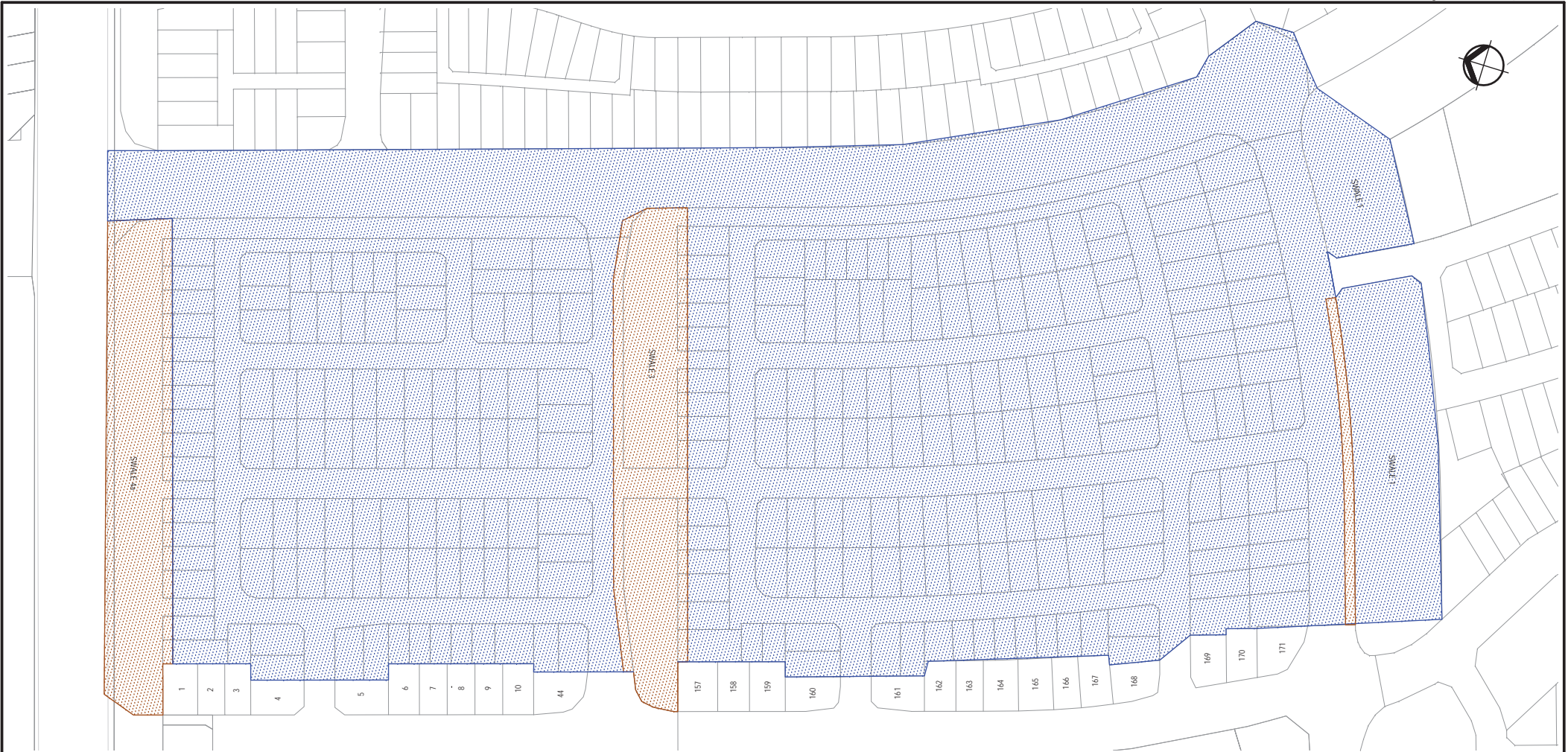
Copyright on this drawing is reserved

NZS 4404: 2010 SCHEDULE2A (Checklist 2.2)**STATEMENT OF PROFESSIONAL OPINION AS TO SUITABILITY OF LAND FOR BUILDING CONSTRUCTION****Development:** Greenhill Park Stage 10**Developer:** Chedworth Properties Limited**At** Pardoia Boulevard, Chartwell, Hamilton**I, Michael Richardson of DB Consulting Engineers, PO Box 1123, Taupo****Hereby confirm that:**

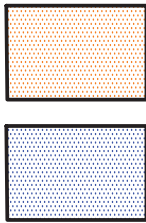
- 1.0** I am a geo-professional as defined in clause 1.2.2 of NZS 4404:2010 and was retained by the developer as the geo- professional on the above development.
- 2.0** The extent of my inspections during construction, and the results of all tests carried out are described in my geotechnical completion report for Greenhill Park Area M Stage 10 dated April 2020 (reference 171738-AREA-M-S10-01)
- 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 256-263 are subject to engineering review of foundations addressing liquefaction settlement for the ULS design case.
 - ii.** 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: 7 April 2020****Michael Richardson****Chartered Professional Engineer (Geotechnical)****CPEng 1005467**

Appendix III *Pre-Construction Assessment (exerts)*
BECA Area M Liquefaction Assessment Summary Plan



KEY



EXTENT OF AREA M

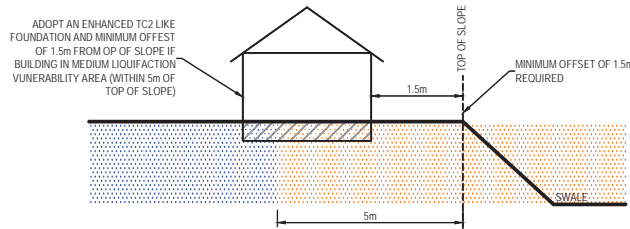
MEDIUM LIQUEFACTION VULNERABILITY

- MINOR TO MODERATE LIQUEFACTION-INDUCED GROUND DAMAGE IN 500 YEAR EARTHQUAKE
- TO MITIGATE LIQUEFACTION AND SEISMIC SLOPE INSTABILITY EFFECTS ADOPT LIQUEFACTION MITIGATION OPTION 1 OR 2.

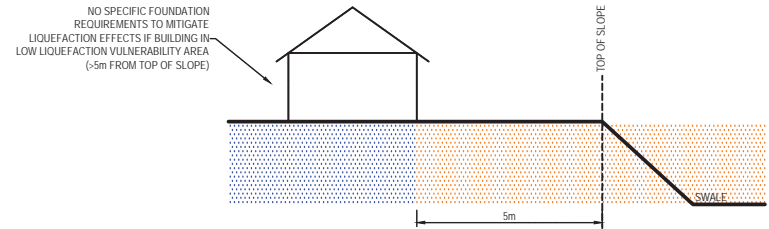
LOW LIQUEFACTION VULNERABILITY

- NONE TO MINOR LIQUEFACTION-INDUCED GROUND DAMAGE IN 500 YEAR EARTHQUAKE.
- NO SPECIFIC REQUIREMENTS TO MITIGATE LIQUEFACTION EFFECTS.

LIQUEFACTION MITIGATION OPTION 1:



LIQUEFACTION MITIGATION OPTION 2:



No.	Revision	SM	MP	PR	CHK	ASST	DATE
A	FOR INFORMATION						12.03.18

Drawing Originator

Original Scale (A1)	Design	MLP	27.09.16	Approved For Construction*
1:3000	Drawn	SM	12.03.18	
Reduced Scale (A3)	Design Checker	EAR	12.03.18	
1:6000				

*Refer to Revision 1 for Original Signature

Client



Project



File

AREA M LIQUEFACTION ASSESSMENT SUMMARY PLAN

**FOR INFORMATION
NOT FOR CONSTRUCTION**

Discipline	GEOTECHNICAL
Drawing No.	3411915-GC-K068
Rev.	A

Appendix IV Post-Construction Test Results

Completion Testing by DCBE Ltd

- See Appendix I for test locations on Cut/Fill Plan



DB CONSULTING ENGINEERS

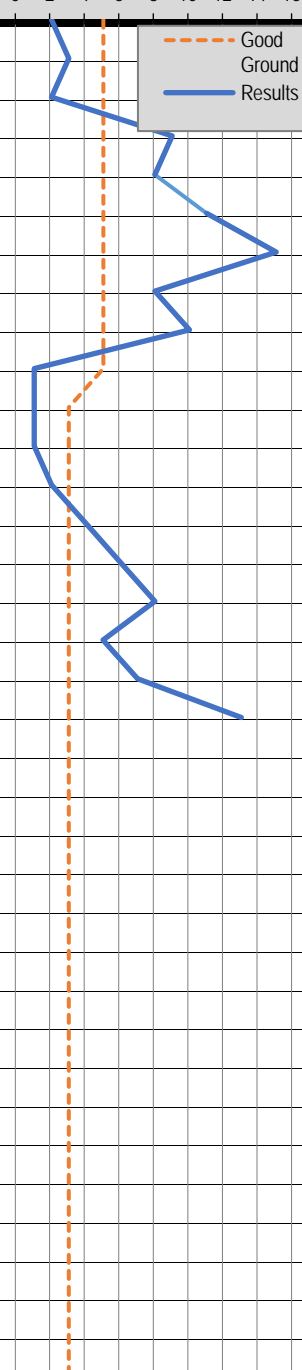
Project Name		Job Ref.	Test Site
Stage 10, Greenhill Park		171738.09	Lot 243
Tested by	Date	Sheet No.	Revision
RG	17/04/2019		A

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		9		Topsoil	
200		7			
300		4			
400		9		Silty SAND, grey, moist, fine, poorly graded.	
500		12			
600		15		SAND, some silt, light brown, moist, fine to medium, well graded.	
700		17			
800		8			
900	203+	13			
1000		12		Silty CLAY, trace sand, yellowish brown, moist.	
1100		9			
1200		8			
1300		11			
1400		8		Silty SAND grey, moist, fine to medium, well graded.	
1500		8			
1600		6			
1700		6		Sandy SILT, grey, moist to wet.	
1800		6			
1900		6			
2000				EOB at 2.0m	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

Notes:

- 1 Weather leading up to test was:
- 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.: C350a Exp. Date: 16/03/2019

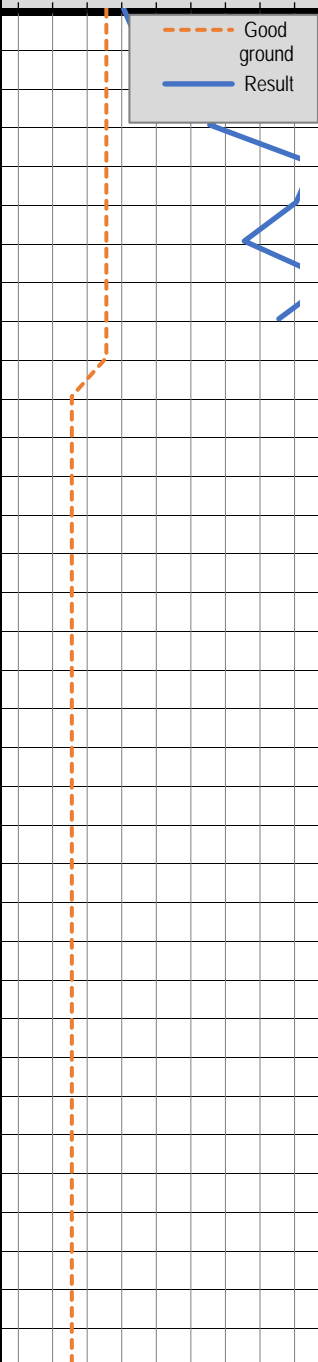
Project Name		Job Ref.	Test Site
Stage 10, Greenhill Park		171738.09	Lot 244
Tested by	Date	Sheet No.	Revision
RG	17/04/2019		A

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		2		Topsoil	
200		3			
300		2			
400		9			
500		8		Sandy SILT, grey brown, moist, fine, poorly graded.	
600		11			
700		15		Silty SAND, greyish brown, moist, fine, poorly graded.	
800		8			
900		10			
1000		1		SILT, some sand, greyish brown, moist.	
1100		1			
1200		1			
1300		2			
1400		4		Silty SAND, greyish brown, moist, fine to medium, well graded.	
1500		6			
1600		8			
1700		5			
1800		7		Sandy SILT, greyish brown, moist.	
1900		13			
2000				EOB at 2.0m	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

Notes:

- Weather leading up to test was:
- Ground water was not encountered during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: C350a Exp. Date: 16/03/2019

Project Name		Job Ref.	Test Site
Stage 10, Greenhill Park		171738.09	Lot 245
Tested by	Date	Sheet No.	Revision
RG	17/04/2019		A

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		6		Topsoil	
200		7			
300		14			
400		11		Silty SAND, some gravel, light brown, coarse gravel.	
500		17		EOB at 0.5m UTP due to rock blanket	
600		16			
700		13			
800		18			
900		15			
1000					
1100					
1200					
1300					
1400					
1500					
1600					
1700					
1800					
1900					
2000					
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

Notes:

- Weather leading up to test was:
- Ground water was not encountered during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: C350a Exp. Date: 16/03/2019



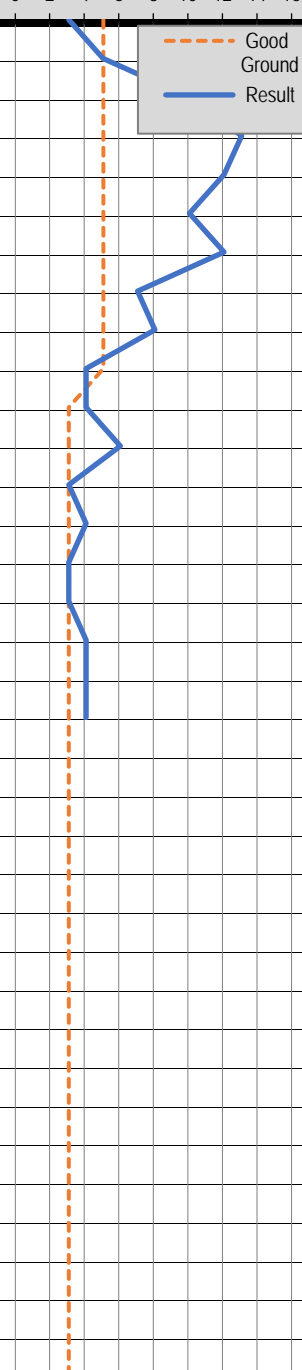
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Project Name		Job Ref.	Test Site
Stage 10, Greenhill Park		171738.09	Lot 246
Tested by	Date	Sheet No.	Revision
RG	17/04/2019		A

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		2			Topsoil	
200		3				
300		4				
400		4			Silty SAND, some gravel, light brown, fine gravel.	
500		11				
600	203+	12			Clayey SILT, greyish brown, moist.	
700		12				
800		7				
900		8			Sandy SILT, greyish brown, moist.	
1000		6				
1100		4				
1200		4			Silty SAND, greyish brown, moist, fine to medium, well graded.	
1300		4				
1400		4				
1500		3			Sandy SILT, greyish brown, moist.	
1600		1			SAND, trace silt, greyish brown, moist, fine to medium, well graded.	
1700		3				
1800		2			SILT, minor sand, greyish brown, moist.	
1900		3				
2000					EOB at 2.0m	
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

Notes:	
1	Weather leading up to test was:
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.: C350a Exp. Date: 16/03/2019

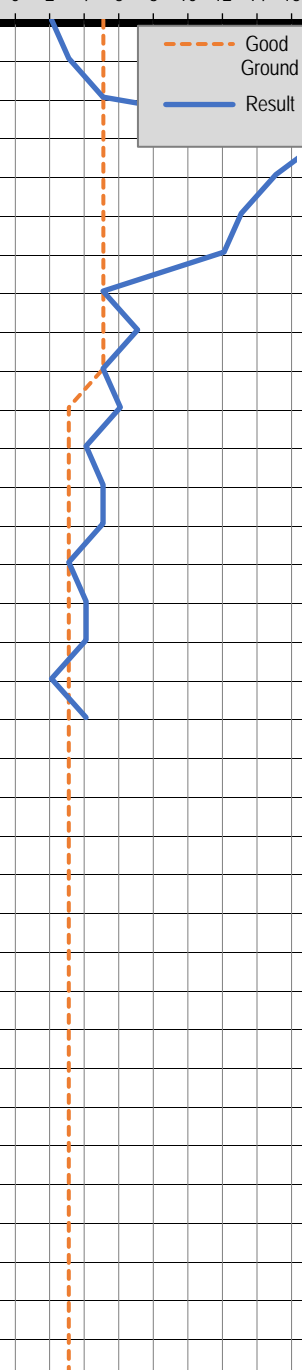
Project Name		Job Ref.	Test Site
Stage 10, Greenhill Park		171738.09	Lot 247
Tested by	Date	Sheet No.	Revision
RG	17/04/2019		A

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		3		Topsoil	
200		5			
300		10			
400		13		SAND, some silt, greyish brown, moist, fine, poorly graded.	
500		12			
600		10		Sandy SILT, greyish brown, moist.	
700		12			
800		7		SAND, trace silt, greyish brown, moist.	
900		8			
1000		4		Silty SAND, grey, moist.	
1100		4			
1200		6			
1300	51/22	3		SILT, grey, moist.	
1400		4			
1500		3			
1600		3		SAND, trace silt, grey, moist, fine to medium, well graded.	
1700		4			
1800		4			
1900		4			
2000				EOB at 2.0m	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

Notes:

- Weather leading up to test was:
- Ground water was not encountered during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: C350a Exp. Date: 16/03/2019

Project Name		Job Ref.	Test Site
Stage 10, Greenhill Park		171738.09	Lot 248
Tested by	Date	Sheet No.	Revision
RG	17/04/2019		A

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		2		Topsoil	
200		3			
300		5			
400		18		Silty SAND, greyish brown, moist, fine, poorly graded.	
500		15			
600	203+	13		SILT, trace sand, greyish brown, moist.	
700		12			
800		5		SILT, minor clay, trace sand, greyish brown, moist.	
900		7			
1000		5			
1100		6			
1200		4		Sandy SILT, greyish brown, moist.	
1300		5			
1400		5		SAND, trace silt, greyish brown, moist, fine to medium, poorly graded.	
1500		3			
1600		4		SAND, greyish brown, moist.	
1700		4			
1800		2			
1900	81/29	4		Clayey SILT, grey, moist to wet.	
2000				EOB at 2.0m	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

Notes:

- Weather leading up to test was:
- Ground water was not encountered during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: C350a Exp. Date: 16/03/2019

Project Name		Job Ref.	Test Site
Stage 10, Greenhill Park		171738.09	Lot 249
Tested by	Date	Sheet No.	Revision
RG	17/04/2019		A

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0 2 4 6 8 10 12 14 16			
100		5		<div><div>Result</div><div>Good Ground</div></div>	Topsoil	
200		5			Silty SAND, greyish brown, moist, fine, poorly graded.	
300		5				
400		14				
500		11			Sandy SILT, greyish brown, moist.	
600		15				
700		7				
800		5			SILT, trace sand, grey, moist.	
900		6				
1000		4				
1100		4			Sandy SILT, greyish brown, moist.	
1200		5				
1300		5				
1400		5			Silty SAND, light brown, moist, fine to medium, well graded.	
1500		6				
1600		5				
1700		5			SILT, some sand, grey, moist.	
1800		3				
1900		4				
2000					EOB at 2.0m	
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

Notes:

- Weather leading up to test was:
- Ground water was not encountered during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: C350a Exp. Date: 16/03/2019



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Project Name		Job Ref.	Test Site
Stage 10, Greenhill Park		171738.09	Lot 250
Tested by	Date	Sheet No.	Revision
RG	17/04/2019		A

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		1	<div><div>Good Ground</div><div>Result</div></div>	Topsoil	
200		4		Silty SAND, greyish brown, moist, fine, poorly graded.	
300		5			
400		14		SILT, some sand, grey, moist.	
500		17			
600		14		SAND, some silt, greyish brown, moist.	
700		13			
800		8		Silty SAND, grey, moist, fine to medium, poorly graded.	
900		8			
1000		5		Sandy SILT, greyish brown, moist.	
1100		5			
1200		5		SAND, minor silt, grey, moist.	
1300		4			
1400		4		EOB at 2.0m	
1500		4			
1600		4			
1700		3			
1800		3			
1900		3			
2000					
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

Notes:

- 1 Weather leading up to test was:
- 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.: C350a Exp. Date: 16/03/2019



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Project Name		Job Ref.	Test Site
Stage 10, Greenhill Park		171738.09	Lot 251
Tested by	Date	Sheet No.	Revision
RG	17/04/2019		A

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		4			Topsoil	
200		9			Silty SAND, greyish brown, moist.	
300		7				
400		18				
500		14			SAND, some silt, brown, moist, fine, poorly graded.	
600		13				
700		9				
800		6			SAND, light brown, moist, fine to medium, well graded.	
900		6				
1000		3			Sandy SILT, light brown, moist.	
1100	90/51	3				
1200		3			Clayey SILT, greyish brown, moist.	
1300		3				
1400		4				
1500		3				
1600		3			Silty SAND, greyish brown, moist.	
1700		3				
1800		3			SAND, trace silt, greyish brown, moist, fine, poorly graded.	
1900		3				
2000					EOB at 2.0m	
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

Notes:

- 1 Weather leading up to test was:
- 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.: C350a Exp. Date: 16/03/2019



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Project Name		Job Ref.	Test Site
Stage 10, Greenhill Park		171738.09	Lot 252
Tested by	Date	Sheet No.	Revision
RG	17/04/2019		A

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0 2 4 6 8 10 12 14 16			
100		3			Topsoil	
200		8			Sandy SILT, greyish brown, moist.	
300		8				
400		10			SAND, trace silt, grey, moist, fine, poorly graded.	
500		15				
600		15			SAND, minor silt, greyish brown, moist.	
700		12				
800		7			SILT, some sand, grey, moist.	
900		7				
1000	146/32	6			Clayey SILT, greyish brown, moist.	
1100		4				
1200		4				
1300		4				
1400		3			Silty SAND, greyish brown, moist, medium to coarse, well graded.	
1500		3				
1600		5				
1700		5				
1800		6				
1900		8			SAND, grey, moist, fine to medium.	
2000					EOB at 2.0m	
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

Notes:

- 1 Weather leading up to test was:
- 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.: C350a Exp. Date: 16/03/2019



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Project Name		Job Ref.	Test Site
Stage 10, Greenhill Park		171738.09	Lot 253
Tested by	Date	Sheet No.	Revision
RG	17/04/2019		A

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		3													Topsoil		
200		8													Silty SAND, greyish brown, moist, fine, poorly graded.		
300		5															
400		11															
500		17													SAND, some silt, trace gravel, light brown, moist.		
600		7															
700		8															
800		5													SAND, light brown, moist, fine to medium, well graded.		
900		5															
1000		4															
1100	109/68	5													Clayey SILT, light brown, moist,		
1200		5															
1300		6															
1400		6													Silty SAND, grey, moist, fine to medium, well graded.		
1500		4															
1600		3															
1700		4													Sandy SILT, greyish brown, moist.		
1800		5															
1900		5															
2000															EOB at 2.0m		
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:

- 1 Weather leading up to test was:
- 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.: C350a Exp. Date: 16/03/2019



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test
JM	9/12/2019		254

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		2		SAND, light brown, some gravel	
200		4			
300		5			
400		4			
500		10		SILTY SAND, damp	
600		8			
700		6			
800		5			
900		6		SAND, medium to coarse, light brown, damp	
1000		5			
1100		5			
1200		5		SAND, medium to coarse, light brown, moist	
1300		5			
1400		5			
1500		4		SILTY SAND, light brown, minor gravel, moist	
1600		3			
1700		3			
1800		1		SAND, medium to coarse, gravel, moist	
1900		1			
2000				EOB at 2000mm	
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: Warm			
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.: C365 Exp. Date: 21/01/2020			

Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		255

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		5													SAND, light brown, some gravel		
200		7															
300		7															
400		9													SILTY SAND, damp		
500		16															
600		19															
700		11													SAND, medium to coarse, light brown, damp		
800		6															
900		5															
1000		4													SILT, some sand, light brown, moist		
1100		5															
1200		6															
1300		5													SAND, medium to coarse, light brown, moist		
1400		6															
1500		6															
1600		5													EOB at 2000mm		
1700		3															
1800		4															
1900		5															
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

- Weather leading up to test was: Warm
- Ground water was not encountered during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: C365 Exp. Date: 21/01/2020

Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Revision
JM	9/12/2019		256

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		14			TOPSOIL	
200		15				
300		18				
400		8			SAND, some silt, light brown, some fine gravel	
500		3				
600		3				
700		6				
800		3			SILT, some sand, light grey, damp	
900		4				
1000		4				
1100		3			SAND, minor silt, light grey, damp	
1200		3				
1300		2			SAND, minor silt, light grey, moist	
1400		1				
1500		2				
1600		3			SILT, some sand, light grey, saturated	
1700		4				
1800		5			SAND, medium to coarse, light brown, minor gravel, saturated	
1900		5				
2000					EOB at 2000mm	
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

- Weather leading up to test was: Warm
- Ground water was not encountered during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: C365 Exp. Date: 21/01/2020



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		257

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		3		TOPSOIL	
200		3			
300		3			
400		5			
500		11			
600		15		SILTY SAND, light brown, some fine gravel	
700		11			
800		7			
900		7			
1000		8			
1100		8		SILTY SAND, light brown, some fine gravel, moist	
1200		5			
1300		3			
1400		3			
1500		7			
1600		10			
1700		14		SAND, medium to coarse, light grey, saturated	
1800		13			
1900		15			
2000				EOB at 2000mm	
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: Warm			
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.: C365 Exp. Date: 21/01/2020			

Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		258

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		6													SAND, light brown, some fine gravel		
200		8															
300		12															
400		7													SILT, some sand, light brown		
500		3															
600		4															
700		4													SANDY SILT, light brown, damp		
800		4															
900		6															
1000																	
1100																	
1200																	
1300															SILT, some sand, light brown, moist		
1400																	
1500																	
1600															SAND, medium to coarse, grey, saturated		
1700																	
1800																	
1900															EOB at 2000mm		
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			

Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		259

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0 2 4 6 8 10 12 14 16	<div><div>Good Ground</div><div>Result</div></div>		
100		1			TOPSOIL	
200		3				
300		3				
400		9			SILTY SAND, light brown, some fine gravel	
500		7				
600		9				
700		7			SILTY SAND, light brown, some fine gravel, damp	
800		6				
900		7				
1000		3				
1100		4			SILT, some sand, light grey, moist	
1200		7				
1300		7				
1400		5			SAND, medium to coarse, light brown, moist	
1500		5				
1600		4				
1700		4				
1800		3			SAND, medium to coarse, light brown, saturated	
1900		5				
2000					EOB at 2000mm	
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: Warm			
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.: C365 Exp. Date: 21/01/2020			

Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		260

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		12													SAND, medium to coarse, light brown, some fine gravel		
200		12															
300		17													SILT, minor sand, light brown		
400		5															
500		7													SILT, minor sand, light grey, damp		
600		6															
700		6													SILT, minor sand, light grey, moist		
800		8															
900		8													SAND, medium, grey, moist		
1000																	
1100															EOB at 2000mm		
1200																	
1300																	
1400																	
1500																	
1600																	
1700																	
1800																	
1900																	
2000																	
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:

- 1 Weather leading up to test was: Warm
- 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.: C365 Exp. Date: 21/01/2020



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		261

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100					SAND, medium to coarse, light brown, some fine gravel	
200		1				
300		5				
400		8				
500		10			SILT, some sand, brown	
600		9				
700		7				
800		4			SAND, some silt, light grey, damp	
900		6				
1000						
1100						
1200					SAND, some silt, light grey, moist	
1300						
1400						
1500						
1600					SAND, medium to coarse, grey, saturated	
1700						
1800						
1900						
2000					EOB at 2000mm	
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: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		262

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		4													GRAVEL		
200		14															
300		15															
400		14													SILT, some sand, grey, damp		
500		11															
600		5															
700		4													SAND, some silt, light grey, damp		
800		5															
900		6															
1000															SILTY SAND, light grey, moist		
1100																	
1200																	
1300															SAND, medium to coarse, grey, moist		
1400																	
1500																	
1600															EOB at 2000mm		
1700																	
1800																	
1900																	
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		263

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		10													SAND, some silt, brown, some fine gravel	<div><div></div></div>	
200		11															
300		7															
400		6													SILTY SAND, light brown, damp		
500		6															
600		5															
700		3															
800		4															
900		6															
1000															SAND, some silt, light brown, moist		
1100																	
1200																	
1300																	
1400																	
1500																	
1600																	
1700																	
1800																	
1900															SAND, fine to medium, minor silt, light brown, saturated		
2000																	
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800															SAND, medium to coarse, grey, some fine gravel, saturated		
2900																	
3000																	
3100																	
3200																	
3300																	
3400															EOB at 4000mm		
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to test was: Warm			
2	Ground water was encountered during testing at a depth of 2000mm			
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.: C365 Exp. Date: 21/01/2020			



DB CONSULTING ENGINEERS

Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		264

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		3													SAND, medium to coarse, light brown, some fine gravel		
200		9															
300		5															
400		9													SILTY SAND, light brown, damp		
500		7															
600		5															
700		6													SILTY SAND, light grey, damp		
800		4															
900		5															
1000															SILTY SAND, light grey, moist		
1100																	
1200																	
1300															SAND, medium to coarse, light brown, moist		
1400																	
1500																	
1600															SAND, medium to coarse, light brown, saturated		
1700																	
1800																	
1900															EOB at 2000mm		
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		265

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)														Soil Description	Water Table																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
			0	2	4	6	8	10	12	14	16																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
100			<div><div>Good Ground</div><div>Result</div></div>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		266

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		7			TOPSOIL	
200		7				
300		16				
400		13				
500		8			SILT, some sand, light grey, some fine gravel	
600		10				
700		5				
800		8				
900		8			SANDY SILT, light grey, damp	
1000		5				
1100		5				
1200		4			SAND, some silt, light grey, moist	
1300		5				
1400		6				
1500		4				
1600		3				
1700		4			SAND, medium to coarse, light grey, moist	
1800		3				
1900		2				
2000					EOB at 2000mm	
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: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		267

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		8													SAND, fine to medium, brown, some fine gravel		
200		11															
300		15															
400		12															SANDY SILT, light grey
500		13															
600		16															
700		12															SANDY SILT, light grey, damp
800		11															
900		9															
1000															SILTY SAND, light grey, damp		
1100																	
1200																	
1300															SAND, medium to coarse, light grey, moist		
1400																	
1500																	
1600																	
1700																	
1800																	
1900																	
2000																	
2100																	EOB at 2000mm
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: Warm		
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.: C365	Exp. Date: 21/01/2020	




DB CONSULTING ENGINEERS

Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		268

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		9													TOPSOIL		
200		18															
300		14													SILTY SAND, light brown, some fine gravel		
400		20+															
500																	
600																	
700																	
800															SAND, some silt, grey, damp		
900		5															
1000		5															
1100		4															
1200		4															
1300		4													SAND, medium to coarse, grey, moist		
1400		4															
1500		6															
1600		5															
1700		4															
1800		5													EOB at 2000mm		
1900		6															
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		12			TOPSOIL	
200		8			SAND, medium to course, brown, some fine gravel	
300		10				
400		9				
500		9				
600		8			SILTY SAND, light grey	
700		4				
800		3				
900		2				
1000		3			SILTY SAND, SOME ORGANIC, brown, damp	
1100		4				
1200		3				
1300		7				
1400		9			SANDY SILT, light grey, damp	
1500		6				
1600		5				
1700		5				
1800		3			SANDY SILT, light grey, moist	
1900		4				
2000						
2100						
2200					SAND, medium to course, light brown, saturated	
2300						
2400						
2500					SILTY SAND, light grey, saturated	
2600						
2700						
2800						
2900						
3000						
3100					SAND, medium to course, light grey, saturated	
3200						
3300						
3400						
3500					EOB at 4000mm	

Notes:	EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to test was: Warm		
2	Ground water was encountered during testing at a depth of 2400mm		
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.: C365	Exp. Date: 21/01/2020	



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		270

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		10														TOPSOIL	
200		18															
300		10															
400		20+														SILTY SAND, grey/brown	
500																	
600																	
700																SILTY SAND, grey/brown, some fine gravel, damp	
800																	
900																	
1000		5															
1100		4														SANDY SILT, light grey, damp	
1200		4															
1300		12															
1400		17															
1500		16														SANDY SILT, light grey, moist	
1600		15															
1700		10															
1800		8														SAND, medium, light grey, moist	
1900		10															
2000																EOB at 2000mm	
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: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		271

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		7													TOPSOIL		
200		7															SAND, medium to coarse, light brown, some fine gravel
300		10															
400		12													SILTY SAND, light grey		
500		10															
600		8													SILTY SAND, light grey, damp		
700		11															
800		19															
900		18															
1000		15															
1100		12													SILTY SAND, light brown, moist		
1200		11															
1300		8															
1400		6															
1500		6															
1600		6															
1700		8															
1800		7													EOB at 2000mm		
1900		8															
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		272

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		13													TOPSOIL		
200		8															
300		16													SAND, some silt, brown, some fine gravel		
400		12															
500		12													SANDY SILT, light grey		
600		20+															
700															SANDY SILT, light grey, damp		
800																	
900															SANDY SILT, light grey, moist		
1000																	
1100															EOB at 2000mm		
1200																	
1300																	
1400																	
1500																	
1600																	
1700																	
1800																	
1900																	
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10, Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2019		273

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0 2 4 6 8 10 12 14 16	<div><div>Good Ground</div><div>Result</div></div>		
100		10			SAND, some silt, brown, some fine gravel	
200		14				
300		16				
400		20				
500		20+				
600					SILT, some sand, light grey	
700						
800						
900						
1000		6				
1100		5			SILT, some sand, light grey, damp	
1200		7				
1300		8				
1400		6				
1500		7				
1600		7			SILT, some sand, light grey, moist	
1700		7				
1800		5				
1900						
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test
JM	9/12/2020		274

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		5													TOPSOIL		
200		15															
300		18															
400		20+													SILTY SAND, light brown, some fine gravel		
500																	
600																	
700															SILT, some sand, light grey, damp		
800																	
900																	
1000		5															
1100		3															
1200		4													SILT, some sand, light grey, moist		
1300		4															
1400		9															
1500		7													SAND, medium to coarse, grey, moist		
1600		4															
1700		5															
1800		4													EOB at 2000mm		
1900		6															
2000		7															
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

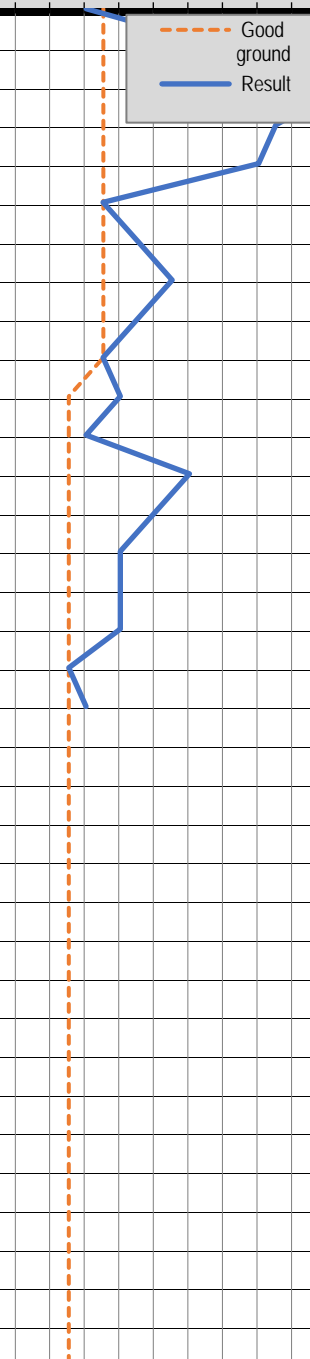
Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to test was: Warm			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: C365 Exp. Date: 21/01/2020			

Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2020		275

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		9			TOPSOIL	
200		10				
300		16				
400		18			SAND, some silt, grey, some fine gravel	
500		13				
600		8				
700		4			SILTY SAND, light grey, damp	
800		11				
900		6				
1000		5			SAND, some silt, light grey, moist	
1100		5				
1200		6				
1300		6				
1400		5				
1500		5				
1600		6			SAND, medium, light grey, moist	
1700		4				
1800		3				
1900		3				
2000						
2100						
2200						
2300						
2400						
2500						
2600						
2700					SAND, medium to coarse, light grey, saturated	
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500					EOB at 4000mm	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to test was: Warm			
2	Ground was encountered during testing at a depth of 2700mm			
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.: C365 Exp. Date: 21/01/2020			

Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Revision
JM	9/12/2020		276

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		4		SILTY SAND, light grey	
200		12		SILTY SAND, brown, damp	
300		19		SILTY SAND, light grey, damp	
400		15		SAND, medium, light grey, moist	
500		14		SAND, some silt, light grey, moist	
600		5		SAND, medium, light grey, saturated	
700		7		EOB at 2000mm	
800		9			
900		7			
1000		5			
1100		6			
1200		4			
1300		10			
1400		8			
1500		6			
1600		6			
1700		6			
1800		3			
1900		4			
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



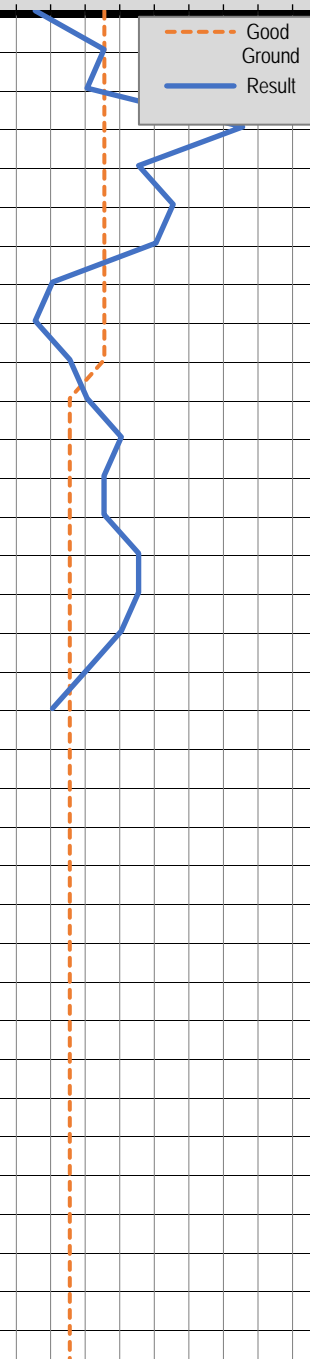
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Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2020		277

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)														Soil Description	Water Table
			0	2	4	6	8	10	12	14	16							
100		3	<div><div>Result</div><div>Good Ground</div></div>														SANDY SILT, light brown	
200		6																
300		4																
400		10																
500		10																
600		4																
700		3																
800		5																
900		6																
1000																		
1100																		
1200																		
1300																		
1400																		
1500																		
1600																		
1700																		
1800																		
1900																		
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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: Warm			
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.: C365 Exp. Date: 21/01/2020			

Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2020		278

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table	
			0 2 4 6 8 10 12 14 16			
100		1		TOPSOIL		
200		5				
300		4				
400		13		SAND, some silt, light grey		
500		7		SAND, some silt, light grey, damp		
600		9				
700		8				
800		2				
900		1				
1000		3		SAND, some silt, brown, damp		
1100		4				
1200		6				
1300		5				
1400		5		SAND, some silt, brown, moist		
1500		7				
1600		7				
1700		6		SILT, some sand, light grey, saturated		
1800		4				
1900		2		EOB at 2000mm		
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

- Weather leading up to test was: Warm
- Ground water was not encountered during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: C365 Exp. Date: 21/01/2020

Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2020		279

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		16													SILTY SAND, light brown, some fine gravel		
200		15															
300		12															
400		20+															
500															SANDY SILT, light grey, damp		
600																	
700																	
800																	
900																	
1000		6													SILT, some sand, light grey, damp		
1100		8															
1200		9															
1300		14													SAND, medium, light brown, moist		
1400		15															
1500		17													SAND, medium, light brown, saturated		
1600		20+															
1700															EOB at 2000mm		
1800																	
1900																	
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2020		280

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		12		TOPSOIL	
200		14			
300		10			
400		15		SILT, some sand, light brown, some fine gravel	
500		15			
600		13			
700		16		SILT, some sand, light brown, some fine gravel, damp	
800		15			
900		15			
1000		12			
1100		12		SAND, some silt, grey, damp	
1200		8			
1300		15			
1400		15			
1500		12			
1600		10		SILTY SAND, light brown, moist	
1700		7			
1800		9			
1900		8			
2000				EOB at 2000mm	
2100					
2200					
2300					
2400					
2500					
2600					
2700					
2800					
2900					
3000					
3100					
3200					
3300					
3400					
3500					

Notes:

- 1 Weather leading up to test was: Warm
- 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.: C365 Exp. Date: 21/01/2020



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Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2020		281

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		9														TOPSOIL	
200		15														SANDY SILT, light grey, some fine gravel	
300		10															
400		19															
500		20+															
600																SANDY SILT, light grey, some fine gravel, damp	
700																	
800																	
900																	
1000		5															
1100		5														SANDY SILT, light grey, some fine gravel, moist	
1200		15															
1300		15															
1400		9															
1500		5															
1600		10														EOB at 2000mm	
1700		10															
1800		10															
1900		6															
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2020		282


Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		9													SANDY SILT, light grey, gravel		
200		8															
300		11															
400		10													SANDY SILT, light grey, damp		
500		6															
600		5															
700		4															
800		5															
900		7															
1000		6													SAND, some silt, light brown, moist		
1100		5															
1200		5															
1300		5													SILT, some sand, light grey, moist		
1400		7															
1500		5															
1600		6													EOB at 2000mm		
1700		10															
1800		6															
1900		4															
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



DB CONSULTING ENGINEERS

Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2020		283

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		5													SILTY SAND, light brown, some fine gravel		
200		7															
300		6															
400		15													SILTY SAND, light brown		
500		17															
600		15															
700		10															
800		10													SILTY SAND, light brown, damp		
900		10															
1000																	
1100															SAND, some silt, light brown, moist		
1200																	
1300																	
1400															SANDY SILT, light brown, moist		
1500																	
1600																	
1700															SANDY SILT, light brown, saturated		
1800																	
1900																	
2000																	
2100																	
2200																	
2300																	
2400															SAND, fine to medium, light brown, saturated		
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100															EOB at 4000mm		
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to test was: Warm			
2	Ground was encountered during testing at a depth of 2700mm			
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.: C365 Exp. Date: 21/01/2020			



DB CONSULTING ENGINEERS

Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2020		284

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		11													SILTY SAND, light grey		
200		6															
300		20+															
400															SANDY SILT, light grey, damp		
500																	
600																	
700																	
800																	
900																	
1000															SAND, some silt, light grey, moist		
1100																	
1200																	
1300																	
1400															SAND, fine to medium, light grey, moist		
1500																	
1600																	
1700																	
1800															EOB at 2000mm		
1900																	
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2020		285

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		7													TOPSOIL		
200		12															
300		11													SILTY SAND, light brown, some fine gravel		
400		15															
500		13													SILT, some sand, light grey, damp		
600		15															
700		20+													SILT, some sand, SOME ORGANIC, brown, damp		
800																	
900															SANDY SILT, light grey, moist		
1000																	
1100															SAND, medium to coarse, grey, saturated		
1200																	
1300															EOB at 2000mm		
1400																	
1500																	
1600																	
1700																	
1800																	
1900																	
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
1	Weather leading up to test was: Warm			
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.: C365 Exp. Date: 21/01/2020			



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Project Name		Job Ref.	
Stage 10 Greenhill Park, Hamilton		171738-AREA-M-S10-01	
Tested by	Date	Sheet No.	Test Site
JM	9/12/2020		286

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		11														TOPSOIL	
200		17															
300		20+															
400																SILTY SAND, brown	
500																	
600																	
700																SILT, some sand, brown, damp	
800																	
900																	
1000																SANDY SILT, light grey, moist	
1100																	
1200																	
1300																	
1400																	
1500																	
1600																SAND, medium, light grey, moist	
1700																	
1800																	
1900																SAND, medium, light grey, saturated	
2000																EOB at 2000mm	
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: Warm			
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.: C365 Exp. Date: 21/01/2020			

Appendix V Stormwater Management
On-lot Water Efficiency Measures
Lot Levels (Minimum Lot Levels)

ON-LOT WATER EFFICIENCY MEASURES

WATER SUPPLY AND WASTEWATER DISPOSAL

The efficiency of taps, showers and toilets contribute to how much water we use. A reduction in the use of potable water by each house directly relates to the amount of wastewater generated (i.e. reduced water use results in reduced wastewater generation). To reduce potable water demand and the amount of wastewater generated, as a minimum, each house is required to install low demand fittings for kitchen, bathroom and laundry facilities.

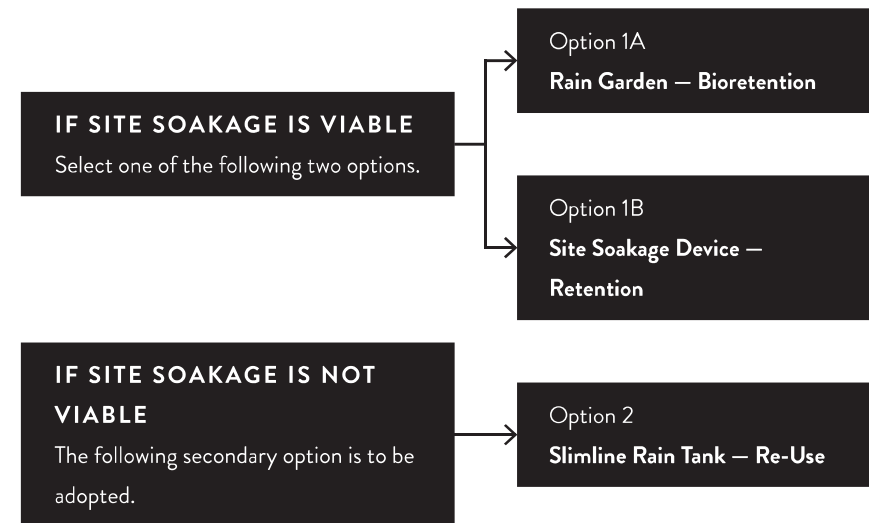
All household fittings are required to have a minimum 3 Star Rating.

STORMWATER DISPOSAL

Each lot is required to adopt an on-lot stormwater efficiency measure to ensure that surface water runoff is appropriately managed.

First, the suitability of the site for soakage needs to be assessed. Soakage is the process of helping stormwater soak into the ground using specially designed soakage devices. Soakage allows for the infiltration of stormwater into the soil which recharges the groundwater table below.

A site infiltration test is mandatory for all lots to confirm the in-situ soils are capable of achieving the minimum percolation rates. Refer to Hamilton City Council 'Three Waters Practice Note HCC 03: Soakage' for guidance on soil testing.



* Other alternative stormwater efficiency options will also be considered subject to approval by Greenhill Park and Hamilton City Council.

The selected option is to be designed by a suitably qualified Engineer and approved by the Hamilton City Council Building Control Unit. Refer to page 33 to 36 of these guidelines for further information of the design requirements for Options 1A, 1B & 2.

Hamilton City Council also encourages the installation of multiple stormwater efficiency options within a property, where practical.

Option 1A

RAIN GARDEN – BIORETENTION

Design to provide minimum 'live storage' retention for runoff from a 10mm rainfall event for trafficked hardstand areas.

The following table outlines indicative storage volumes and estimated rain garden areas for a range of lot sizes.

Lot Area (m ²)	Live Storage Volume (m ³)	Rain Garden Area (m ²)
300	0.8	4.1
350	0.9	4.7
400	1.1	5.4
450	1.2	6.1
500	1.4	6.8
550	1.5	7.4

Based on hardstand coverage equal to 30% of total lot area

KEY REQUIREMENTS

- Rain garden to be located to capture runoff from main hardstand areas within the lot (as much as practical).
- Maximum live storage depth to be 300mm (safety requirements to be considered when device is at maximum storage capacity).
- A channel and grate to be installed across vehicle entrance to capture hardstand run off and direct it to rain garden.

- Rain garden to be integrated with garden design (refer to page 34 for details).
- Overflow to be connected to stormwater connection provided.

FOR MORE INFORMATION

Refer to Hamilton City Council 'Three Waters Practice Note – HCC04 – Bio-retention (Rain Gardens)' for information on typical design requirements.

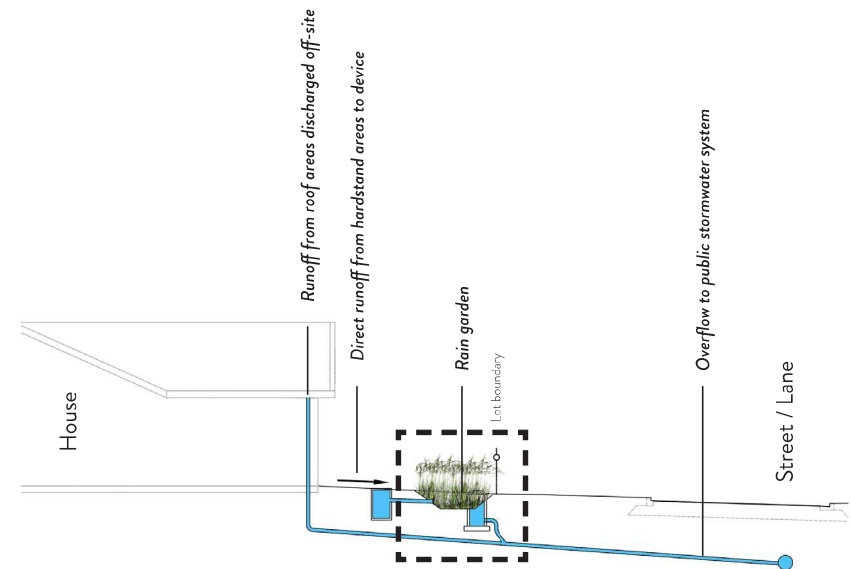


DIAGRAM — 7
Rain Garden – Bioretention

GREENHILL PARK RAIN GARDEN PLANT LIST

Native plants are encouraged, but other exotic plant species which complement your front yard planting design could be used. Deciduous plants should not be used as their leaf-fall can block the outflow.

The plants selected need to —

- Be able to tolerate short periods of inundation and longer dry periods
- Be perennial rather than annual
- Have deep fibrous root systems and a spreading growth form
- Form a dense, weed-suppressing cover



Botanical Name	Common Name
Apodasmia similis	oioi
Blechnum penna-marina	alpine hard fern
Libertia ixioides	mikoikoi
Carex dipsacea	teasel sedge
Carex secta	purei
Carex virgata	pukio
Dianella nigra	turutu
Libertia grandiflora	mikoikoi
Lobelia angulata	panakenake
Pimelea prostrata	pinatoro

All rain garden plants to be a minimum grade of Pb 8 at the time of planting. * Other plant species can be approved at the discretion of the Design Review Panel.

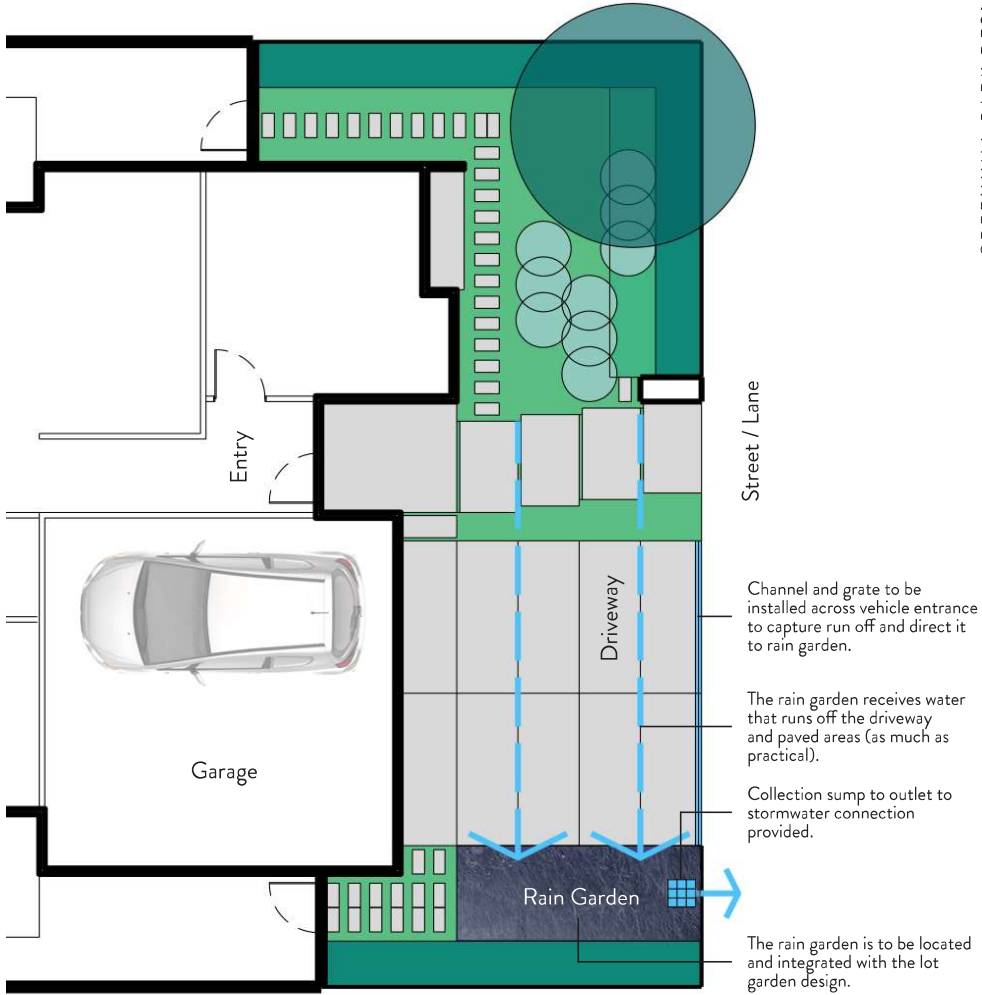


DIAGRAM — 8
Rain Garden Typical Location

Option 1B

SITE SOAKAGE DEVICE – RETENTION

Design to provide minimum 'live storage' retention for runoff from a 10mm rainfall event for roof and trafficked hardstand areas.

The following table outlines indicative storage volumes for a range of lot sizes.

Lot Area (m ²)	Live Storage Volume (m ³)
300	2.2
350	2.6
400	3.0
450	3.4
500	3.7
550	4.1

Based on 80% site coverage (roof and hardstand areas)

KEY REQUIREMENTS

- Soakage device(s) to be located to capture runoff from roof downpipes and hardstand areas (as much as practical).
- A channel and grate to be installed across vehicle entrance to capture hardstand run off and direct it to soakage device.
- Soakage device to be integrated with garden design.
- Overflow to be connected to stormwater connection provided.

FOR MORE INFORMATION

Refer to Hamilton City Council 'Three Waters Practice Note HCC 03: Soakage' for information on typical design requirements.

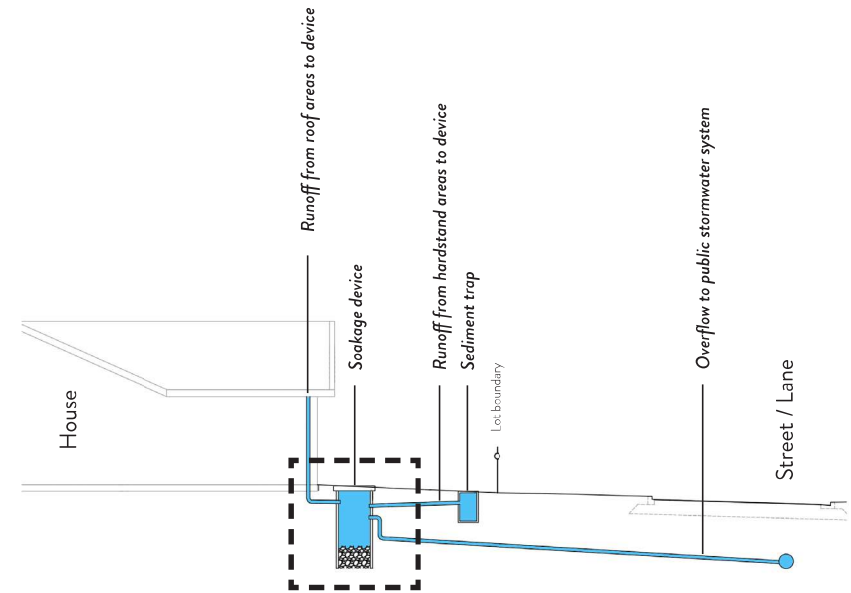


DIAGRAM — 9
Site Soakage Device – Retention

Option 2

SLIMLINE RAIN TANK – RE-USE

The slimline rain tank is to be connected to a separate grey-water household re-use system with a minimum capacity of 5,000L.

KEY REQUIREMENTS

- Rain tank to be connected into a fully integrated grey-water re-use system within the main dwelling with connections to toilets, laundry and irrigation systems.
- All roof run-off is to be captured by rain tanks and available for re-use. Run-off from hardstand areas (driveways and paving) can be discharged directly into stormwater connection provided.
- A maximum of two (2) tanks may be used to achieve the required storage and align with downpipe locations.
- Overflow to be connected to stormwater connection provided.

LOCATION AND INSTALLATION

Slimline rain tanks should be placed in the rear or side yard of the lot as unobtrusively as possible. Care should be taken, where tanks are placed next to the house, to ensure they are placed adjacent to a blank wall and not in front of a window.

COLOUR

The colour of all rain tanks should match the colour of the homes exterior wall cladding adjacent to the tank.

* Colours that do not match but are complementary to the design and materials of the house can be approved at the discretion of the Design Review Panel.

FOR MORE INFORMATION

Refer to Hamilton City Council 'Three Waters Practice Note – HCC02 – Rainwater Re-use Systems (Rain Tanks)' for information on design requirements.

APPROVED RAIN TANK PRODUCTS

Tanksalot® Slimline Tank www.tanksalot.co.nz

ThinTanks™ NZ Slimline Rainwater Poly Tank www.thintanks.co.nz

* Other rain tank products will also be considered subject to approval by Greenhill Park.

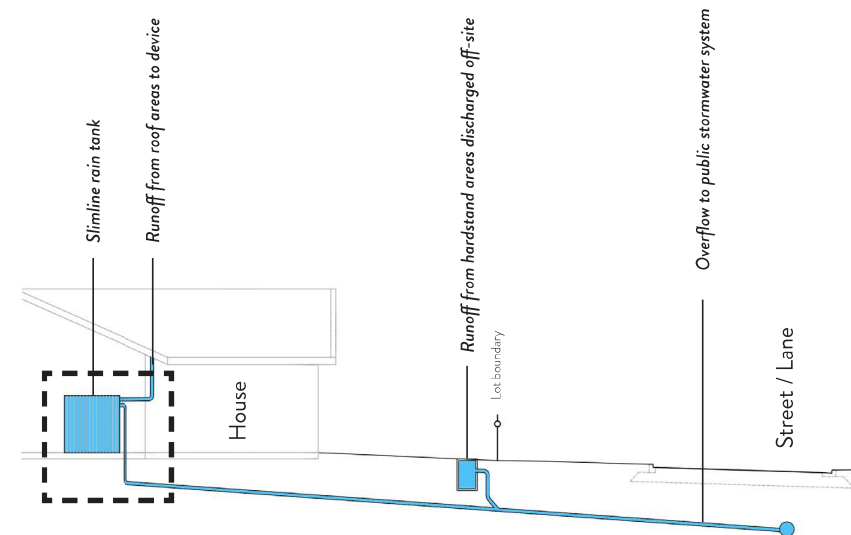


DIAGRAM — 10
Slimline Rain Tank – Re-use

Lot Levels Area M

Lot	Stage	Minimum Lot Level (mRL)	1% AEP Flood Level (mRL)	Flood Level Reference	Calculated Freeboard (to Lot Level)
185	9	37.700	36.10	Swale 4A	1.600
186	9	37.600	36.10	Swale 4A	1.500
187	9	37.474	36.10	Swale 4A	1.374
188	9	37.393	36.10	Swale 4A	1.293
189	9	37.320	36.10	Swale 4A	1.220
190	9	37.246	36.10	Swale 4A	1.146
191	9	37.172	36.10	Swale 4A	1.072
192	9	37.090	36.10	Swale 4A	0.990
193	9	37.000	36.10	Swale 4A	0.900
194	9	36.800	36.10	Swale 4A	0.700
195	9	36.610	36.10	Swale 4A	0.510
196	9	36.850	36.10	Swale 4A	0.750
197	9	36.790	36.10	Swale 4A	0.690
198	9	36.842	36.10	Swale 4A	0.742
199	9	36.380	36.10	Swale 4A	0.280
200	9	36.452	36.10	Swale 4A	0.352
201	9	36.538	36.10	Swale 4A	0.438
202	9	36.596	36.10	Swale 4A	0.496
203	9	36.598	36.10	Swale 4A	0.498
204	9	36.600	36.10	Swale 4A	0.500
205	9	36.605	36.10	Swale 4A	0.505
206	9	37.710	36.10	Swale 4A	1.610
207	9	37.077	36.10	Swale 4A	0.977
208	9	37.140	36.10	Swale 4A	1.040
209	9	37.215	36.10	Swale 4A	1.115
210	9	37.289	36.10	Swale 4A	1.189
211	9	37.363	36.10	Swale 4A	1.263
212	9	37.437	36.10	Swale 4A	1.337
213	9	37.512	36.10	Swale 4A	1.412
214	9	37.586	36.10	Swale 4A	1.486
215	9	37.649	36.10	Swale 4A	1.549
216	9	37.714	36.10	Swale 4A	1.614
217	9	37.787	36.40	Swale 3A	1.387
218	9	37.750	36.40	Swale 3A	1.350
219	9	37.653	36.10	Swale 4A	1.553
220	9	37.569	36.10	Swale 4A	1.469
221	9	37.485	36.10	Swale 4A	1.385
222	9	37.391	36.10	Swale 4A	1.291

Lot	Stage	Minimum Lot Level (mRL)	1% AEP Flood Level (mRL)	Flood Level Reference	Calculated Freeboard (to Lot Level)
223	9	37.294	36.10	Swale 4A	1.194
224	9	37.196	36.10	Swale 4A	1.096
225	9	37.100	36.10	Swale 4A	1.000
226	9	37.000	36.10	Swale 4A	0.900
227	9	36.900	36.10	Swale 4A	0.800
228	9	36.814	36.10	Swale 4A	0.714
229	9	36.710	36.10	Swale 4A	0.610
230	9	36.986	36.10	Swale 4A	0.886
231	9	37.133	36.10	Swale 4A	1.033
232	9	37.143	36.10	Swale 4A	1.043
233	9	37.218	36.10	Swale 4A	1.118
234	9	37.292	36.10	Swale 4A	1.192
235	9	37.366	36.10	Swale 4A	1.266
236	9	37.440	36.10	Swale 4A	1.340
237	9	37.514	36.10	Swale 4A	1.414
238	9	37.586	36.10	Swale 4A	1.486
239	9	37.650	36.10	Swale 4A	1.550
240	9	37.713	36.10	Swale 4A	1.613
241	9	37.788	36.40	Swale 3A	1.388
242	9	37.941	36.40	Swale 3A	1.541
243	10	37.713	36.46	Swale 3B	1.253
244	10	37.586	36.46	Swale 3B	1.126
245	10	37.531	36.10	Swale 4A	1.431
246	10	37.483	36.10	Swale 4A	1.383
247	10	37.435	36.10	Swale 4A	1.335
248	10	37.379	36.10	Swale 4A	1.279
249	10	37.323	36.10	Swale 4A	1.223
250	10	37.267	36.10	Swale 4A	1.167
251	10	37.211	36.10	Swale 4A	1.111
252	10	37.155	36.10	Swale 4A	1.055
253	10	37.100	36.10	Swale 4A	1.000
254	10	37.090	36.10	Swale 4A	0.990
255	10	37.155	36.10	Swale 4A	1.055
256	10	36.610	36.10	Swale 4A	0.510
257	10	36.617	36.10	Swale 4A	0.517
258	10	36.623	36.10	Swale 4A	0.523
259	10	36.629	36.10	Swale 4A	0.529
260	10	36.634	36.10	Swale 4A	0.534
261	10	36.640	36.10	Swale 4A	0.540
262	10	36.645	36.10	Swale 4A	0.545
263	10	36.650	36.10	Swale 4A	0.550

Lot	Stage	Minimum Lot Level (mRL)	1% AEP Flood Level (mRL)	Flood Level Reference	Calculated Freeboard (to Lot Level)
264	10	36.886	36.10	Swale 4A	0.786
265	10	37.109	36.10	Swale 4A	1.009
266	10	37.216	36.10	Swale 4A	1.116
267	10	37.322	36.10	Swale 4A	1.222
268	10	37.428	36.10	Swale 4A	1.328
269	10	37.535	36.10	Swale 4A	1.435
270	10	37.650	36.10	Swale 4A	1.550
271	10	37.587	36.10	Swale 4A	1.487
272	10	37.410	36.10	Swale 4A	1.310
273	10	37.347	36.10	Swale 4A	1.247
274	10	37.298	36.10	Swale 4A	1.198
275	10	37.251	36.10	Swale 4A	1.151
276	10	37.197	36.10	Swale 4A	1.097
277	10	37.034	36.10	Swale 4A	0.934
278	10	37.005	36.10	Swale 4A	0.905
279	10	37.660	36.10	Swale 4A	1.560
280	10	37.763	36.10	Swale 4A	1.663
281	10	37.576	36.10	Swale 4A	1.476
282	10	37.627	36.10	Swale 4A	1.527
283	10	37.683	36.10	Swale 4A	1.583
284	10	37.739	36.46	Swale 3B	1.279
285	10	37.777	36.46	Swale 3B	1.317
286	10	37.630	36.46	Swale 3B	1.170
287	11	38.161	36.46	Swale 3B	1.701
288	11	38.150	36.46	Swale 3B	1.690
289	11	38.218	36.40	Swale 3A	1.818
290	11	38.178	36.40	Swale 3A	1.778
291	11	38.139	36.40	Swale 3A	1.739
292	11	38.095	36.40	Swale 3A	1.695
293	11	38.054	36.40	Swale 3A	1.654
294	11	38.000	36.40	Swale 3A	1.600
295	11	38.456	36.40	Swale 3A	2.056
296	11	38.464	36.40	Swale 3A	2.064
297	11	38.168	36.40	Swale 3A	1.768
298	11	38.061	37.24	Swale 1	0.821
299	11	38.252	37.24	Swale 1	1.012
300	11	38.534	36.40	Swale 3A	2.134
301	11	38.826	36.40	Swale 3A	2.426
302	11	38.964	36.40	Swale 3A	2.564
303	11	39.081	36.40	Swale 3A	2.616
304	11	39.020	36.40	Swale 3A	2.669

Lot	Stage	Minimum Lot Level (mRL)	1% AEP Flood Level (mRL)	Flood Level Reference	Calculated Freeboard (to Lot Level)
305	11	38.948	36.40	Swale 3A	2.722
306	11	38.878	36.40	Swale 3A	2.774
307	11	38.806	36.40	Swale 3A	2.826
308	11	38.737	36.40	Swale 3A	2.770
309	11	38.678	36.40	Swale 3A	2.278
310	11	38.662	36.40	Swale 3A	2.262
311	11	38.365	36.40	Swale 3A	1.965
312	11	38.467	36.40	Swale 3A	2.067
313	11	38.557	36.40	Swale 3A	2.157
314	11	38.648	36.40	Swale 3A	2.248
315	11	38.744	36.40	Swale 3A	2.344
316	11	38.841	36.40	Swale 3A	2.441
317	11	38.936	36.40	Swale 3A	2.536
318	11	39.021	36.40	Swale 3A	2.621
319	11	39.042	36.40	Swale 3A	2.642
320	11	38.944	36.40	Swale 3A	2.544
321	11	38.845	36.40	Swale 3A	2.445
322	11	38.730	36.40	Swale 3A	2.330
323	11	38.645	36.40	Swale 3A	2.245
324	11	38.561	36.40	Swale 3A	2.161
325	11	38.463	36.40	Swale 3A	2.063
326	11	38.250	36.40	Swale 3A	1.850
327	12	38.169	36.46	Swale 3B	1.709
329	12	38.082	36.46	Swale 3B	1.622
330	12	38.191	36.46	Swale 3B	1.731
331	12	38.298	36.46	Swale 3B	1.838
332	12	38.406	36.46	Swale 3B	1.946
333	12	38.581	36.46	Swale 3B	2.121
334	12	38.712	36.46	Swale 3B	2.252
335	12	38.806	36.46	Swale 3B	2.346
336	12	39.003	36.46	Swale 3B	2.543
337	12	38.766	36.46	Swale 3B	2.306
338	12	38.814	36.46	Swale 3B	2.354
339	12	38.896	36.46	Swale 3B	2.436
340	12	38.977	36.46	Swale 3B	2.517
341	12	39.065	36.46	Swale 3B	2.605
342	12	38.987	36.46	Swale 3B	2.527
343	12	38.902	36.46	Swale 3B	2.442
344	12	38.835	36.46	Swale 3B	2.375
345	12	38.804	36.46	Swale 3B	2.344
346	12	38.803	36.46	Swale 3B	2.343

Lot	Stage	Minimum Lot Level (mRL)	1% AEP Flood Level (mRL)	Flood Level Reference	Calculated Freeboard (to Lot Level)
347	12	38.703	36.46	Swale 3B	2.243
348	12	38.700	36.46	Swale 3B	2.240
349	12	38.751	36.46	Swale 3B	2.291
350	12	39.039	36.46	Swale 3B	2.579
351	12	39.109	36.46	Swale 3B	2.649
352	12	39.179	36.46	Swale 3B	2.719
353	12	39.248	36.46	Swale 3B	2.788
354	12	39.317	36.46	Swale 3B	2.857
355	12	39.393	36.46	Swale 3B	2.933
356	12	39.486	36.46	Swale 3B	3.026
357	13	38.000	38.00	Swale 1D	0.000
358	13	38.100	38.00	Swale 1D	0.100
359	13	38.263	38.00	Swale 1D	0.263
360	13	38.444	38.00	Swale 1D	0.444
361	13	38.670	38.00	Swale 1D	0.670
362	13	38.696	38.00	Swale 1D	0.696
363	13	38.925	38.00	Swale 1D	0.925
364	13	38.802	38.00	Swale 1D	0.802
365	13	38.681	38.00	Swale 1D	0.681
366	13	38.610	38.00	Swale 1D	0.610
367	13	39.145	38.00	Swale 1D	1.145
368	13	39.300	38.00	Swale 1D	1.300
369	13	39.448	38.00	Swale 1D	1.448
370	13	39.571	38.00	Swale 1D	1.571
371	13	39.713	38.00	Swale 1D	1.713
372	13	39.845	38.00	Swale 1D	1.845
373	13	39.987	38.00	Swale 1D	1.987
374	13	40.120	36.46	Swale 3B	3.660
375	14	39.017	37.24	Swale 1	1.777
376	14	39.095	37.24	Swale 1	1.855
377	14	39.170	36.40	Swale 3A	2.770
378	14	39.226	36.40	Swale 3A	2.826
379	14	39.174	36.40	Swale 3A	2.774
380	14	39.122	36.40	Swale 3A	2.722
381	14	39.069	36.40	Swale 3A	2.669
382	14	39.016	36.40	Swale 3A	2.616
383	14	39.162	36.40	Swale 3A	2.762
384	14	39.223	36.40	Swale 3A	2.823
385	14	39.305	36.40	Swale 3A	2.905
386	14	39.366	36.40	Swale 3A	2.966
387	14	39.427	36.40	Swale 3A	3.027

Lot	Stage	Minimum Lot Level (mRL)	1% AEP Flood Level (mRL)	Flood Level Reference	Calculated Freeboard (to Lot Level)
388	14	39.428	38.00	Swale 1D	1.428
389	14	39.316	38.00	Swale 1D	1.316
390	14	39.191	38.00	Swale 1D	1.191
391	14	39.419	38.00	Swale 1D	1.419
392	14	39.409	38.00	Swale 1D	1.409
393	14	39.325	36.40	Swale 3A	2.925
394	14	39.214	36.40	Swale 3A	2.814
395	14	39.130	36.40	Swale 3A	2.730
396	15	39.127	36.40	Swale 3A	2.727
397	15	39.222	36.40	Swale 3A	2.822
398	15	39.318	36.40	Swale 3A	2.918
399	15	39.429	38.00	Swale 1D	1.429
400	15	39.414	38.00	Swale 1D	1.414
401	15	38.923	38.00	Swale 1D	0.923
402	15	39.946	38.00	Swale 1D	1.946
403	15	39.233	38.00	Swale 1D	1.233
404	15	39.309	38.00	Swale 1D	1.309
405	15	39.278	38.00	Swale 1D	1.278
406	15	38.925	38.00	Swale 1D	0.925
407	15	39.339	38.00	Swale 1D	1.339
408	15	39.607	38.00	Swale 1D	1.607
409	15	39.358	36.46	Swale 3B	2.898
410	15	39.288	36.46	Swale 3B	2.828
411	15	39.215	36.46	Swale 3B	2.755
412	15	39.138	36.46	Swale 3B	2.678
413	15	39.057	36.46	Swale 3B	2.597
414	15	39.151	36.46	Swale 3B	2.691
415	15	39.231	36.46	Swale 3B	2.771
416	15	39.311	36.46	Swale 3B	2.851
417	15	39.391	36.46	Swale 3B	2.931
418	15	39.471	36.46	Swale 3B	3.011
419	15	39.544	38.00	Swale 1D	1.544
420	15	39.811	38.00	Swale 1D	1.811
421	15	39.930	35.46	Swale 3B	4.470
422	15	39.825	36.46	Swale 3B	3.365
423	15	39.741	36.46	Swale 3B	3.281
424	15	39.657	37.46	Swale 3B	2.197
425	15	39.571	38.46	Swale 3B	1.111
426	15	40.020	38.00	Swale 1D	2.020
427	15	39.908	38.00	Swale 1D	1.908
428	15	39.748	38.00	Swale 1D	1.748

Lot	Stage	Minimum Lot Level (mRL)	1% AEP Flood Level (mRL)	Flood Level Reference	Calculated Freeboard (to Lot Level)
429	15	39.696	38.00	Swale 1D	1.696
430	15	39.589	38.00	Swale 1D	1.589
431	15	39.472	38.00	Swale 1D	1.472
432	15	39.320	38.00	Swale 1D	1.320
433	15	39.144	38.00	Swale 1D	1.144