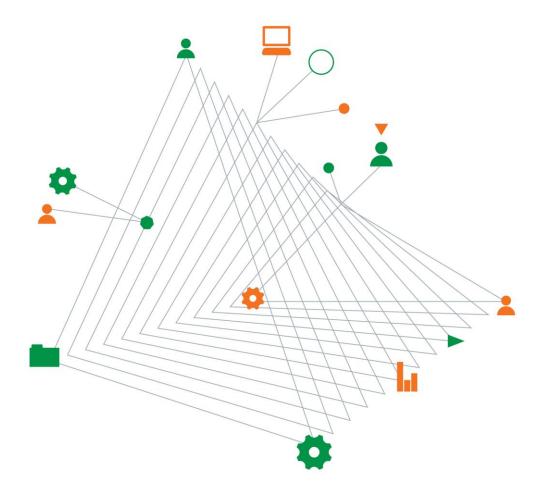


## The Lakes (2012) Ltd

#### Lots 887, 888 & 889, Stage 2T, The Lakes

Geotechnical Completion Report



Experience comes to life when it is powered by expertise This page has been left intentionally blank

#### Lots 887, 888 & 889, Stage 2T, The Lakes

Prepared for The Lakes (2012) Ltd

Prepared by Coffey Geotechnics (NZ) Ltd 96 Cameron Road, Tauranga Tauranga Central 3110 New Zealand t: +647 577 4288

#### **Document authorisation**

Our ref: GENZTAUC13086AE-AE

For and on behalf of Coffey

Tellod

Robert Telford Project Engineering Geologist

#### **Quality information**

#### **Revision history**

Revision	Description	Date	Author	Reviewer	Signatory
AE	Draft GCR	10/09/2014	R Telford	S Hargraves	S Hargraves

#### Distribution

Report Status	No. of copies	Format	Distributed to	Date
AE	1	PDF + Hardcopy	The Lakes (2012) Ltd	15/09/2014
AE	1	PDF + Hardcopy	Harrison Grierson Consultants Ltd	15/09/2014
AE	1	PDF + Hardcopy	Tauranga City Council	15/09/2014

## Table of contents

1.	Introd	uction and Scope1
2.	Descr	iption of Subdivision1
3.	Relate	ed Reports1
4.	Invest	tigations Completed2
5.	Overv	view of Geological Conditions2
6.	Earth	works Operations
	6.1.	Contractors & Plant
	6.2.	Construction Programme
		6.2.1. 2007-2008
		6.2.2. 2012-2013
		6.2.3. 2014
7.	Qualit	y Control4
	7.1.	Undercut Inspections4
	7.2.	Quality Control4
8.	Engin	eering Evaluation & Recommendations4
	8.1.	Subsoil Drainage4
	8.2.	Fill Quality4
	8.3.	Static Settlement
		8.3.1. Future Settlements
	8.4.	Seismic Liquefaction
	8.5.	Foundation Design & Bearing Capacity6
		8.5.1. Strength Reduction Factor
	8.6.	Future Cut, Fill & Retaining Wall Design7
	8.7.	Re-Spread Topsoil7
	8.8.	Service Trenches7
	8.9.	Contractor's Work7
	8.10.	Suitability Statement
9.	Summ	nary of Recommendations8
10.	Limita	itions9

#### Important information about your Coffey Report

#### Appendices

Appendix A - Figures

Appendix B - Geotechnical Suitability Statement

Appendix C - Investigation Data

Appendix D - Settlement Monitoring Data

## 1. Introduction and Scope

This Geotechnical Completion Report (GCR) has been prepared by Coffey Geotechnics (NZ) Ltd (Coffey) for The Lakes (2012) Limited as part of the documentation to be submitted to the Tauranga City Council following subdivision development in general accordance with the conditions of Council resource consent number RC21332. It contains a Geotechnical Suitability Statement (Appendix B), the results of site investigations and relevant quality control test data, together with as-built plans derived from Harrison Grierson Consultants Ltd (HGCL) topographical data.

This report is specific to Lots 887, 888 and 889 within Stage 2T of The Lakes subdivision as these lots were excluded from the overall GCR for this stage of the development.

## 2. Description of Subdivision

Stages 2Q, 2R, 2S & 2T of the Lakes subdivision (collectively referred to as 2QRST) are located to the south-east of the intersection of Takitimu Drive (State Highway 36) and Kennedy Road in Tauriko, Tauranga. Lots 887, 888 and 889 described herein are located at the southern end of the 2QRST area within Stage 2T.

The locations of the subject lots are shown on the attached plan (Figure 08). The new lots are located on flat or gently sloping ground that has been formed through excavation and controlled filling at the foot of a steep natural slope that rises to the east and south-east of the subject properties. Due to the risk of possible instability on the natural (i.e. un-modified) parts of the slope to the east and south-east of the lots, a debris barrier was constructed at the toe of the slope in the location shown on Figure 10.

With the exception of drainage materials used during the civil construction stage, all bulk fill materials used during this development were obtained from excavation on site.

## 3. Related Reports

Stages 2QRST of the Lakes development have been subject to several stages of geotechnical investigation and assessment which are summarised in the following documents:

- Shrimpton & Lipinski Ltd, "Pyes Pa West Urbanisation Development, Tauranga Geotechnical Assessment Report", ref: 16944, dated October 2003.
- 2. Coffey letter, "Re Geotechnical Design Debris Protection Bunds for Areas E, F and K, The Lakes, Pyes Pa", ref: GEOTTAUC13086, dated 11 June 2008.
- 3. Coffey letter, "Re: Review of existing debris barriers for The Lakes areas 2Q and 2T", ref: GENZTAUC13086AE-AA, dated 1 February 2013.
- 4. Coffey letter, "Slope Stability Assessment for The Lakes Subdivision Stage 2Q", ref: GENZTAUC13086AG-AA, dated 13 March 2013.
- Coffey letter, "Re: Design of Debris Protection Bunds The Lakes Stages 2QRST", ref: GENZTAUC13086AE-AB, dated 26 March 2013.
- 6. Coffey report, "Geotechnical Completion Report on Stage 2QRST at The Lakes Subdivision", ref: GENZTAUC13086AE-AC (Revision 1), dated 9 June 2014.

For a full understanding of the site history and development it is recommended that these documents are read in conjunction with this report, particularly the Stage 2QRST GCR dated 9 June 2014.

## 4. Investigations Completed

Subsurface investigations for the 2QRST development were completed in several stages prior to and during the two phases of bulk earthworks. The majority of these investigations were located some distance from the subject lots and are therefore not discussed further in this report. Refer to the Coffey GCR dated 9 June 2014 for a complete description and summary of results.

In the vicinity of the three lots, investigations have included:

- 13 test pits (TP1 to TP13) excavated to approximately 3m depth in 2008, prior to the subexcavation of peat and organic soils within Stage 2T;
- Two Cone Penetrometer Tests (CPT11 & CPT12) completed by Coffey in 2013 to assess subsurface conditions after the 2007-2008 earthworks and before the start of work in 2013-2014;
- Four test pits completed by Coffey (TP101 to TP104) up to 4.5m depth in November 2013;
- Three hand-auger boreholes drilled in August 2014 to up to 5m depth within the lots to confirm founding conditions beneath the sites and to assess the condition of filling placed in 2007-2008 (HA185 to HA187); and
- Ten shallow boreholes drilled in August 2014 to up to 0.8m depth within the subject lots, specifically to assess the condition of a thin layer of fill placed in 2014 (HA188 to HA197).

The test locations are shown on the appended site plans (Figures 08 to 12). Borehole and test-pit logs are attached to this report (Appendix C).

## 5. Overview of Geological Conditions

The original landform in the vicinity of Stage 2T consisted of a deeply incised valley which was overlooked by a steep, approximately 30m-40m high escarpment to the east and south-east. The original (i.e. pre 2007) ground contours are shown on Figure 08.

The slopes to the east and south-east of the site comprise a sequence of volcanic ashes overlying Matua Sub-Group soils and pumice sands of the Te Ranga Ignimbrite, with a surface veneer of colluvial soils on the slope face. The volcanic ash sequence on the slopes is common throughout the Tauranga area, consisting of the Hamilton Ash, Rotoehu Ash and Post-Rotoehu or 'younger' Ashes.

The valley floor contained ancient fluvially re-worked sediments of the Matua Sub-Group, comprising mixed and inter-bedded silts, sands and clays. At the foot of the steep slopes, the Matua Sub-Group soils were overlain by more recent sediments and colluvial material derived from the escarpment.

Beneath Lots 887, 888 and 889, the original (pre 2007) near-surface soils contained several metres of peat and highly organic silts and sands. The peat was removed to approximately 4m depth in 2008 before controlled fill was placed in the area. Subsequent investigations in 2013 however indicated that organic bearing soils still remain in places at depth in this area.

## 6. Earthworks Operations

## 6.1. Contractors & Plant

Earthworks on Lots 887, 888 and 889 have been completed in three stages in 2007-2008, 2012-2013 and 2014. Work during the 2007-2008 season was completed by Bob Hicks Earthmovers Ltd. The principal contractor for the 2012-2013 season was Higgins Group Holdings Ltd (Higgins), who sub-contracted the majority of work to Andrew Young Earthmoving Ltd. The civil construction works in 2013 and 2014 were completed by Higgins who also placed minor additional filling within the subject lots in 2014.

The main items of plant used during each of the bulk earthworks phase comprised Terex and towed motor scrapers, hydraulic excavators, bulldozers and sheepsfoot rollers.

## 6.2. Construction Programme

Earthworks completed in each of the three main work stages are summarised below.

#### 6.2.1. 2007-2008

Works completed during 2007-2008 included sub-excavation of peat and organic soils to up to approximately 4m depth beneath the subject lots and replacement of the excavated material with up to 5m depth of controlled fill as shown on Figure 09. Subsoil drains were installed beneath the fill to control seepage and elevated groundwater as required.

At the end of the work season, an approximately 3m high debris protection bund was constructed between Stage 2T and the steep escarpment to the east and south east of the subject lots. The location of this bund and the 'finished' ground surface after May 2008 is shown on Figure 10. The surface was not topsoiled at the end of this work season.

#### 6.2.2. 2012-2013

The works undertaken in the 2012-2013 season included further excavation and filling within areas to the north of the subject properties. Lots 887 to 889 were however relatively unaffected by these earthworks; the ground surface in this area being stripped of loose soil and vegetation and then covered in a 150mm layer of topsoil.

Contours of cuts and fills during this period calculated by HGCL are shown on Figure 11. These contours compare the ground surface following the 2007-08 season to the post-topsoil surface at the end of the 2012-13.

#### 6.2.3. 2014

During the civil construction phase in 2014, up to 0.5m of fill was placed within Lots 887 to 889 by Higgins. The purpose of this late filling was to provide a more suitable gradient for stormwater drainage within this part of the subdivision.

The topsoil laid on these lots in 2012-13 was removed before the new filling was completed and then replaced over the finished ground surface at the end of work. The fill depth contours shown on Figure 11 therefore include approximately 150mm of topsoil within the subject lots. These contours were

provided by HGCL and represent the difference between the un-topsoiled ground surface surveyed in May 2008 and the finished, topsoiled surface surveyed in April 2014.

## 7. Quality Control

## 7.1. Undercut Inspections

During the initial gully cleaning and excavation in 2007-2008, general topsoil stripping and removal of the peat layer was supervised by Coffey staff.

As noted in Section 6.2.1, the finished ground surface after 2008 was not topsoiled. Clearing work at the start of the 2012-13 season therefore consisted of removing sparse vegetation and grass across the site. Minor excavation was also undertaken to sub-excavate several erosion features that had formed on the fill surface in the time between the two work seasons. The cleared surface was inspected by Coffey before any fill was placed.

Finally, in 2014 topsoil was removed from Lots 887 to 889 before the additional fill was placed in this area. Coffey inspected and approved he cleared surface before filling.

## 7.2. Quality Control

The placement of fill during 2007 and 2008 was overseen by Coffey. A description of the testing and supervision completed is included in the previous Stage 2QRST GCR report dated 9 June 2014. It is noted that although Nuclear Density Meter (NDM) measurements were taken within fill materials at this time, no NDM tests were actually located within Lots 887 to 889.

No specific monitoring or testing was conducted within the subject lots in 2012-2013 as work in this area did not include placement of new engineered fill. The thin layer of fill placed across the sites in 2014 was inspected and tested by Coffey in August 2014 (HA188 to HA197 inclusive).

## 8. Engineering Evaluation & Recommendations

## 8.1. Subsoil Drainage

As shown on Figure 09, a network of subsoil drains was installed below the filling near the subject lots in 2007-2008. During civil construction in March 2013 however, localised shallow groundwater levels were observed at some locations in pipe trenches within the subdivision and at levels above the drainage network, indicating the drains may not be functioning effectively. It was considered possible that the outlet to the drainage network was damaged or partially blocked during construction of SH36.

## 8.2. Fill Quality

Based on the results of monitoring and testing completed by Coffey during the 2007-2008 work season, it is considered that the majority of fill placed at this time generally met the requirements of 'certified fill' as defined by the Tauranga City Council Infrastructure Development Code (TCC IDC) and NZS 4431. However, undrained shear strength measurements from TP101 to TP104 and HA185 to HA187 inclusive indicate that parts of this fill may have lost some strength since it was placed. While most shear strengths measured were above 150kPa (and often over 200kPa), readings of between 60kPa and 100kPa were recorded at some locations. These low shear strengths are

possibly due to shallow or perched groundwater within the fill material which can result in softening, especially in cohesive soils.

The additional fill placed in 2014 also produced variable test results. The average undrained shear strength measured within this layer in boreholes HA185 to HA197 inclusive was 150kPa, although measurements as low as 100kPa were also recorded (ignoring measurements within the surficial topsoil layer).

Although placed under engineered conditions, due to the relatively low shear strengths discussed above, the fill dating from 2007-2008 and the additional fill placed in 2014 would not meet the requirements of 'certified fill' as defined by the TCC IDC or NZS 4431. However, the existing fill on this site is generally considered suitable for residential development, subject to the specific foundation design recommendations outlined in Section 8.5 below.

## 8.3. Static Settlement

'Static' or load induced settlements due to fill loads have been measured within or near the subject lots since February 2008, using four settlement markers installed at this time (SM05 to SM08 shown on Figure 09). The results of this monitoring programme are shown on Charts 1 & 2 in Appendix D.

The data for these points contains a large gap from March 2009 to October 2012 when work on site was placed on hold. The data also contains a number of inconsistencies due to damage to individual marker pegs or changes in survey methodology which make interpreting the long term settlement of the site somewhat difficult.

To provide a more accurate measure of the rate of settlement currently occurring at the site, three additional settlement monitoring points were installed in July 2014 (SM887 to SM889 on Figure 11). These points, along with SM5, SM6 and SM8, were measured weekly for six weeks up to 27 August 2014. Monitoring point SM7 was damaged during civil construction works in February 2013 and was abandoned.

Since July, no further discernible settlement has occurred within the tolerances of the survey method being used (approximately  $\pm 2$ mm). It is therefore considered that any consolidation settlements resulting from the placement of fill on these sites in 2007-2008 and 2014 is effectively complete at the time of writing.

#### 8.3.1. Future Settlements

Notwithstanding the above, these sites may be affected by further settlement in the future, due either to consolidation settlements resulting from new building loads or additional filling, or 'creep' settlements which occur naturally over time as the underlying soils age.

Calculations completed for the overall GCR for Stage 2QRST (ref: GENZTAUC13086AE-AC) and the results of the settlement monitoring described above indicate these sites may experience on the order of 15mm to 20mm of additional consolidation settlement due to typical development loads (e.g. a single story dwelling and minor landscape filling). This consolidation would be expected to occur within 6 months of construction.

In addition to this load induced deformation, a further 15mm to 20mm of 'creep' settlement may occur over the assumed 50 year design life of the proposed dwellings. The combination of these two affects may result in up to 20mm to 30mm of differential settlement across the proposed building platforms.

Provided the foundation design recommendations outlined in Section 8.5 are followed, it is considered that the combined creep and consolidation settlements beneath a typical single storey dwelling built

on these lots should be within limits recommended by the Ministry of Business, Innovation and Employment (i.e. less than 25mm per 6m length of building).

#### 8.4. Seismic Liquefaction

The potential for earthquake induced liquefaction of soils beneath these sites was also assessed in the overall GCR for Stage 2T (ref: GENZTAUC13086AE-AC). This report concluded that some soils beneath the subject lots may liquefy in a significant earthquake. However, due to the depth at which potentially liquefiable soils are encountered, the risk of adverse effects at the ground surface is considered to be relatively low.

In the event of a 'Serviceability Limit State' (SLS) earthquake with a return period of 1 in 25 years, liquefaction may induce vertical ground settlements of up to 10mm within Stage 2T and beneath the subject lots. Any differential settlements due to this liquefaction at the ground surface should be within the serviceability limits of a dwelling designed in accordance with the recommendations given in Section 8.5.

During an 'Ultimate Limit State' (ULS) earthquake with a return period of 1 in 500 years, liquefaction induced settlements of around 50mm may occur within Stage 2T. Provided the dwellings on the subject lots are designed in accordance with the recommendations presented below, settlement of this magnitude should not pose a significant safety risk to occupants of these buildings.

## 8.5. Foundation Design & Bearing Capacity

Due to the presence of variable and non-certified filling beneath the subject lots as well as risks of future settlement and earthquake induced liquefaction, it is recommended that buildings on Lots 887 to 889 be supported on pod-raft type foundations (e.g. 'rib-raft' or similar) specifically designed for an ultimate bearing capacity of 210kPa.

Alternatively, dwellings may be supported on specifically designed suspended timber foundations. In this case, the foundation bearing capacity should be confirmed by a Chartered Professional Engineer (CPEng) at the design stage.

Regardless of foundation option selected, the design will also need to consider the effects of future differential settlement on these sites (see Sections 8.3.1 and 8.6) and may need to allow for relevelling of the dwelling in the event of excessive deformation.

Due to the variable nature of the underlying fill materials, it is essential that all foundation excavations are inspected by a TCC Category 1 or Category 2 Geo-professional during construction. These inspections should include undrained shear strength measurements at regular intervals within the excavation. Any materials with an undrained shear strength of less than 110kPa or any other unsuitable materials encountered should be sub-excavated and replaced with appropriately compacted clean fill.

Foundations within a 45 degree zone of influence from pipe inverts or service trenches will require engineering design input in accordance with the specifications in the TCC Infrastructure Development Code.

#### 8.5.1. Strength Reduction Factor

As required by Section B1/VM4 of the New Zealand Building Code Handbook, a strength reduction factor of 0.50 or 0.80 should be applied to all recommended geotechnical ultimate soil capacities in

conjunction with their use in factored design load cases for static and earthquake overload conditions respectively.

## 8.6. Future Cut, Fill & Retaining Wall Design

The subject lots are situated on gently sloping land and may therefore be subject to minor cuts and fills as part of the development of individual lots. To reduce the risk of adverse effects due to excessive load induced settlement, it is recommended that the depth of fill placed on these lots be restricted to 300mm or less above existing ground level (including topsoil or raised gardens, etc). Fills of more than 300mm depth will require specific geotechnical input. Possible options for reducing development loads and therefore mitigating effects due to future load induced settlements are presented in an advisory document by Coffey (ref: GENZTAUC13086AE-AD dated 15 June 2014).

Any retaining walls with a total retained height of more than 0.5m (including tiered walls on subject or neighbouring properties) or those supporting a building or accessway/parking area should be designed by a Chartered Professional Engineer giving consideration to toe slope gradients and crest surcharge slopes. Consideration must also be given to existing retaining walls on the subject or neighbouring properties. Filling within the zone of influence of any existing retaining wall will need specific engineering input to ensure the stability of the existing wall is not adversely affected.

It is generally advised that unsupported cut and fill batters should be graded no steeper than 1 vertical to 2.5 horizontal. Fills above an existing retaining wall on the subject or neighbouring property should not encroach within a distance equal to the height of the wall without geotechnical review. Excavation below an existing retaining wall should not encroach within a distance equal to the height of the wall without geotechnical to twice the height of the wall without geotechnical advice.

## 8.7. Re-Spread Topsoil

Topsoil was re-spread across the site at the completion of earthworks development. Topsoil depths were checked across the subdivision by the drilling of boreholes following final landscaping works. The results of this investigation, which are indicative only and subject to variation at other locations, show that topsoil depths on the subject lots vary from 0.1 to 0.2 metres (average 0.15 metres).

Building development or future earthworks will require over-excavation of these re-spread topsoil materials to expose the fill subgrade, followed by the placement and compaction of further subfloor filling as required to achieve design grades.

## 8.8. Service Trenches

It should be noted that the backfilling and compaction of stormwater and sewer trenches on this subdivision were not inspected or tested by Coffey and these should accordingly be classified as uncertified filling for geotechnical purposes. Trench backfilling was inspected by HGCL as part of their supervision during civil construction.

As is normal on all subdivisions, building developments involving foundations within a 45 degree zone of influence from all service pipe inverts will require specific design by a Chartered Professional Engineer with a view to piling foundation loads to below that zone (as specified in the TCC Infrastructure Development Code).

## 8.9. Contractor's Work

This report has relied on the Contractor's diligence and construction observations to ensure that the works have been carried out in accordance with:

(i) The approved Contract drawings and design details,

- (ii) The approved Contract specifications,
- (iii) Authorised Variations to (i) and (ii) during the execution of the works,
- (iv) The conditions of Resource and Earthworks Consents where applicable,
- (v) The relevant Geotechnical Investigation reports, recommendations and site instructions,

and that all as-built information and other details provided to the Client and/or Coffey Geotechnics (NZ) Limited are accurate and correct in all respects.

## 8.10. Suitability Statement

A copy of our suitability statement, in the form of the Tauranga City Council forms G2 and G2a are appended.

## 9. Summary of Recommendations

Based on the information contained in this report, it is considered that the geotechnical aspects of the works with Lots 887,888 and 889 have been completed in general accordance with accepted engineering practice and standards. From a geotechnical perspective, development on the new lots may therefore proceed, subject to the following recommendations:

- All buildings on the new lots should be supported on either raft type foundations designed for an Ultimate Bearing Capacity of 210kPa or on suspended timber foundations specifically designed for a bearing capacity to be determined by a Chartered Professional Engineer (CPEng) at design stage.
- 2. All foundation excavations must be inspected and tested by a TCC Category 1 or 2 Geoprofessional. Testing should include undrained shear strength measurements at regular intervals within the excavation. Any soils within the top 0.5m with undrained shear strengths of less than 110kPa or other unsuitable materials encountered must be sub-excavated and replaced with compacted clean fill.
- 3. Building development or future earthworks on the new lots will require over-excavation of the existing topsoil materials to expose the earthfill subgrade, followed by the placement and compaction of further subfloor filling as required to achieve design grades and bearing in mind the restrictions given in (3) above.
- 4. The placement of more than 300mm thickness of additional fill on any lot (above existing ground level and including topsoil) should be subject to geotechnical review due to the risk of inducing further settlement on the subject or neighbouring properties as outlined in Section 8.6. The recommended 300mm limit is measured from existing ground level to finished ground level including topsoil.
- 5. All retaining walls with a total height of more than 0.5m (including tiered walls) or those supporting slopes or building/vehicle loads must be specifically designed by a Chartered Professional Engineer giving consideration to toe slope gradients, crest surcharge slopes and fill surcharge effects. The design of any retaining wall or the placement of filling on any lot should also consider possible adverse effects on pre-existing retaining walls on the subject or neighbouring properties as discussed in Section 8.6.

- Building developments involving foundations within a 45 degree zone of influence from all service pipe inverts will require specific design by a Chartered Professional Engineer with a view to piling foundation loads to below that zone (as specified in the TCC Infrastructure Development Code).
- 7. It is recommended that a consent notice be placed on these properties specifically including the requirement for Cat 2 geotechnical inspection and testing of foundation excavations given in (2) and restrictions on additional fill thicknesses given in (3) above.

## 10. Limitations

This report has been prepared solely for the use of the client, The Lakes (2012) Limited, their professional advisers and the relevant Territorial Authorities in relation to the specific project described herein. No liability is accepted in respect of its use for any other purpose or by any other person or entity. All future owners of this property should seek professional geotechnical advice to satisfy themselves as to its ongoing suitability for their intended use.

The opinions, recommendations and comments given in this report result from the application of normal methods of site investigation. As the post construction factual evidence has been obtained solely from boreholes and test pits, which by their nature only provide information about a relatively small volume of subsoils, there may be special conditions pertaining to this site which have not been disclosed by the investigation and which have not been taken into account in the report.

For and on behalf of Coffey

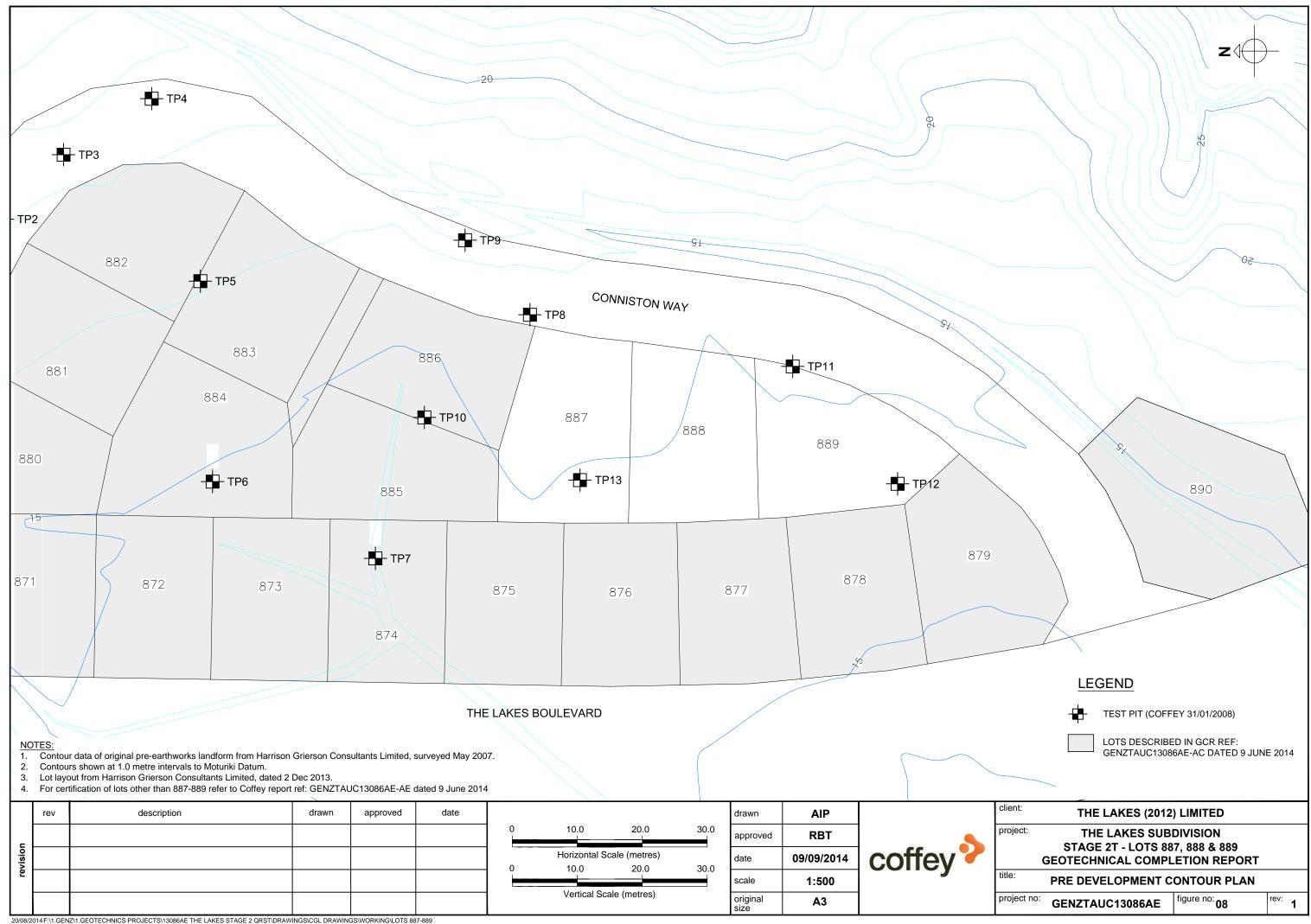
Prepared by:

**R.B. TELFORD** Project Engineering Geologist

Reviewed and Authorised by:

S.V. HARGRAVES Principal Engineering Geologist TCC Category 1 Geo-Professional

Appendix A - Figures

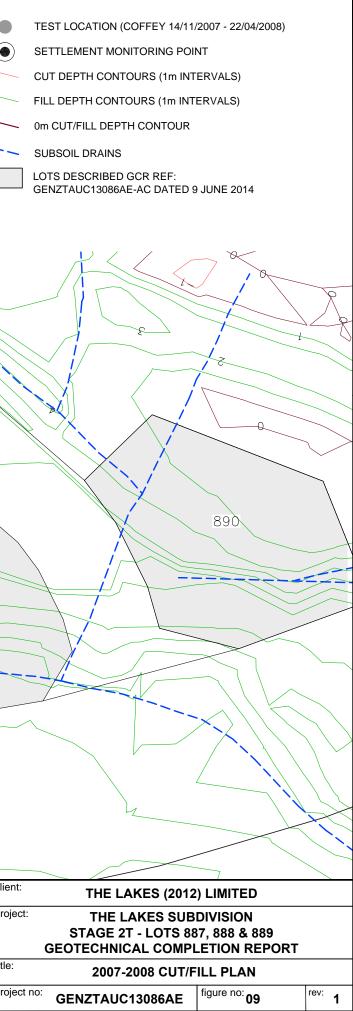


20/08/2014 F:\1.GENZ\1.GEOTECHNICS PROJECTS\13086AE THE LAKES STAGE 2 QRST\DRAWINGS\CGL DRAWINGS\WORKING\LOTS 887-889 GCR\13086AE LOTS 887-889 GCR FIG 8 ORIGINAL CONTOUR PLAN.DWG

			Z
<ul> <li>1088</li> <li>1090</li> </ul>			
882 <b>1089</b> 883	CONNISTON WA		
• 1089 883 881	©\$M7 886		
0 884	885	887 888	SM6
871 872 87	● <b>SM8</b> 3 874 875	876 877	879
NOTES: 1. Cut / Fill contour data from Harrison Grierson Consulta 2. Cut / Fill contours show difference between May 2007 a	nts Limited.	HE LAKES BOULEVARD	
2. Cott / I in contours show difference between the job at 2007 at 3. Lot layout from Harrison Grierson Consultants Limited, 4. Testing conducted by Coffey and test locations surveye 4. For certification of lots other than 887-889 refer to Coffe	dated 2 Dec 2013	10.0 20.0 30.0 drav	vn AIP
20/08/2014 F:\1.GENZ\1.GEOTECHNICS PROJECTS\13086AE THE LAKES STAGE 2 QRST		10.0     20.0     30.0     approximately a	le 1:500

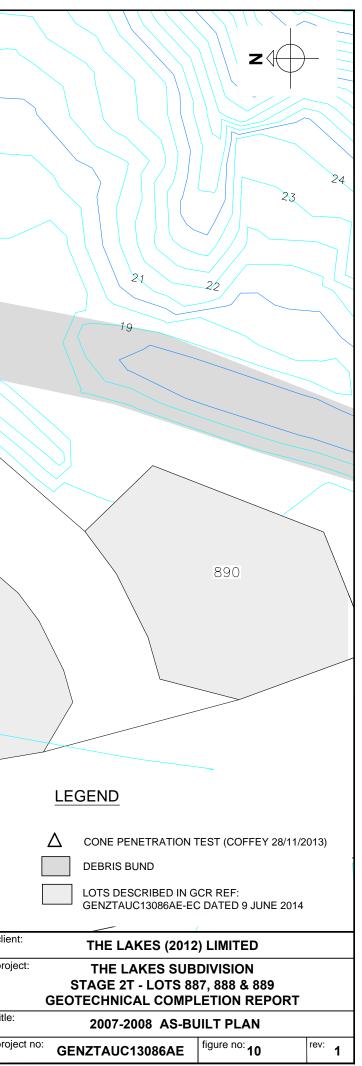
GCR\13086AE LOT 887-889 GCR FIG 9 CUT-FILL PLAN.DWG

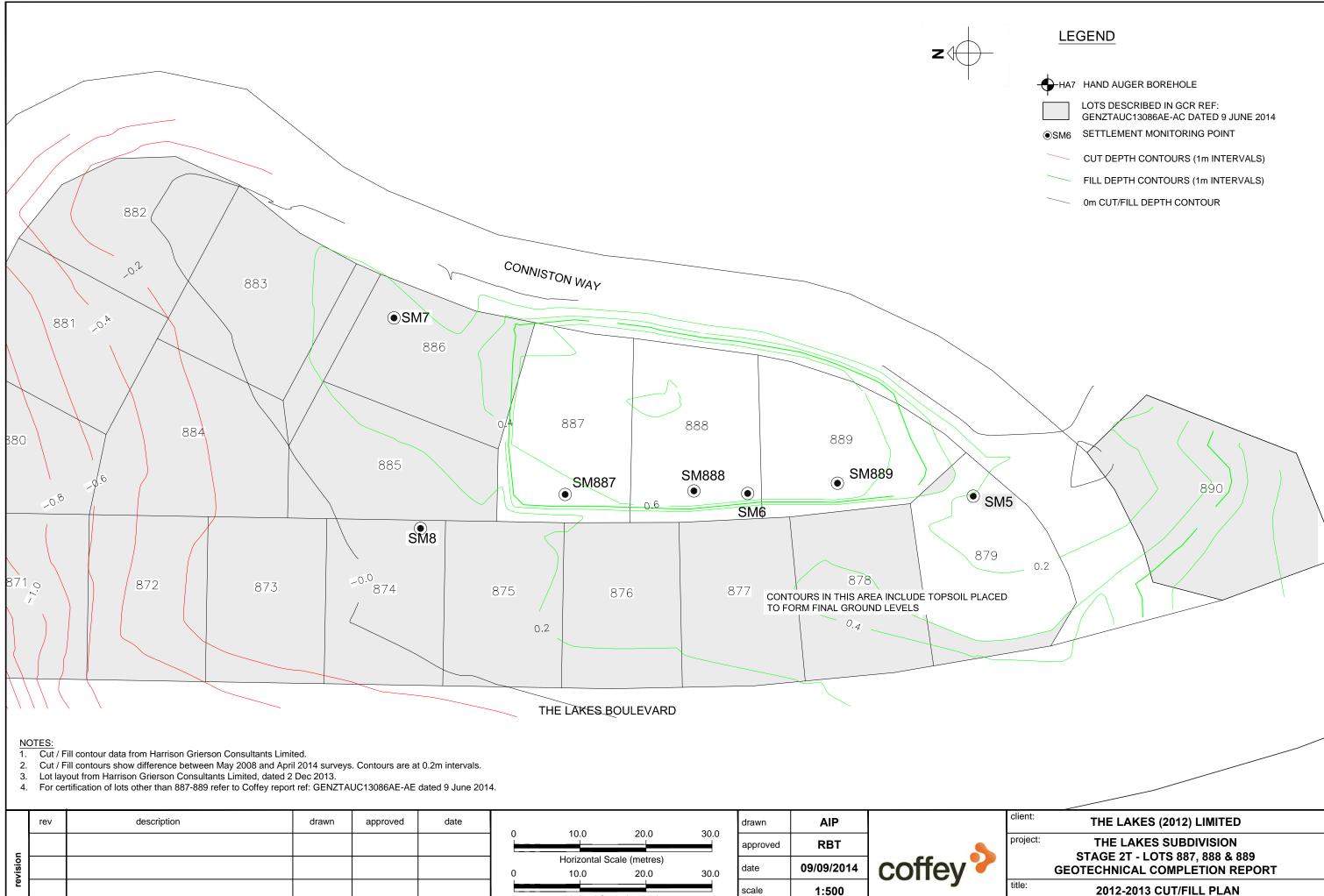
#### LEGEND



21		19									$\mathcal{I}$		
					11	9		18					
		882											
			883		CONN	VISTON WA	Ir				17		
	881	CPT 12 Δ			886								
							887		888				
880		884		885					000		889		
871		872	873								CPT 11 A 87	8	9
			073	874		875	5	376	5	377			
				91									
							THE L	AKES BOUL	EVARD				
1. 2.	Contours a Moturiki Da Lot layout fr	atour data from Harrison Grierson re of May 2008 landform surveye tum. rom Harrison Grierson Consultar tion of lots other than 887-889 re	ed at end of 2007-2008 earthw	orks season. Conto			vals to						
т. /	rev	description	drawn		date					drawn	AIP		ľ
						0	10.0	20.0	30.0	approved	RBT		Ī
revision						o	Horizontal So 10.0	cale (metres) 20.0	30.0	date	09/09/2014	coffey	
							Vertical Sca			scale	1:500		1 F
										original size	A3		

20/08/2014F:\1.GENZ\1.GEOTECHNICS PROJECTS\13086AE THE LAKES STAGE 2 QRST\DRAWINGS\CGL DRAWINGS\WORKING\LOTS 887-889 GCR\13086AE LOT 887-889 GCR FIG 10 AS-BUILT PLAN.DWG





Vertical Scale (metres)

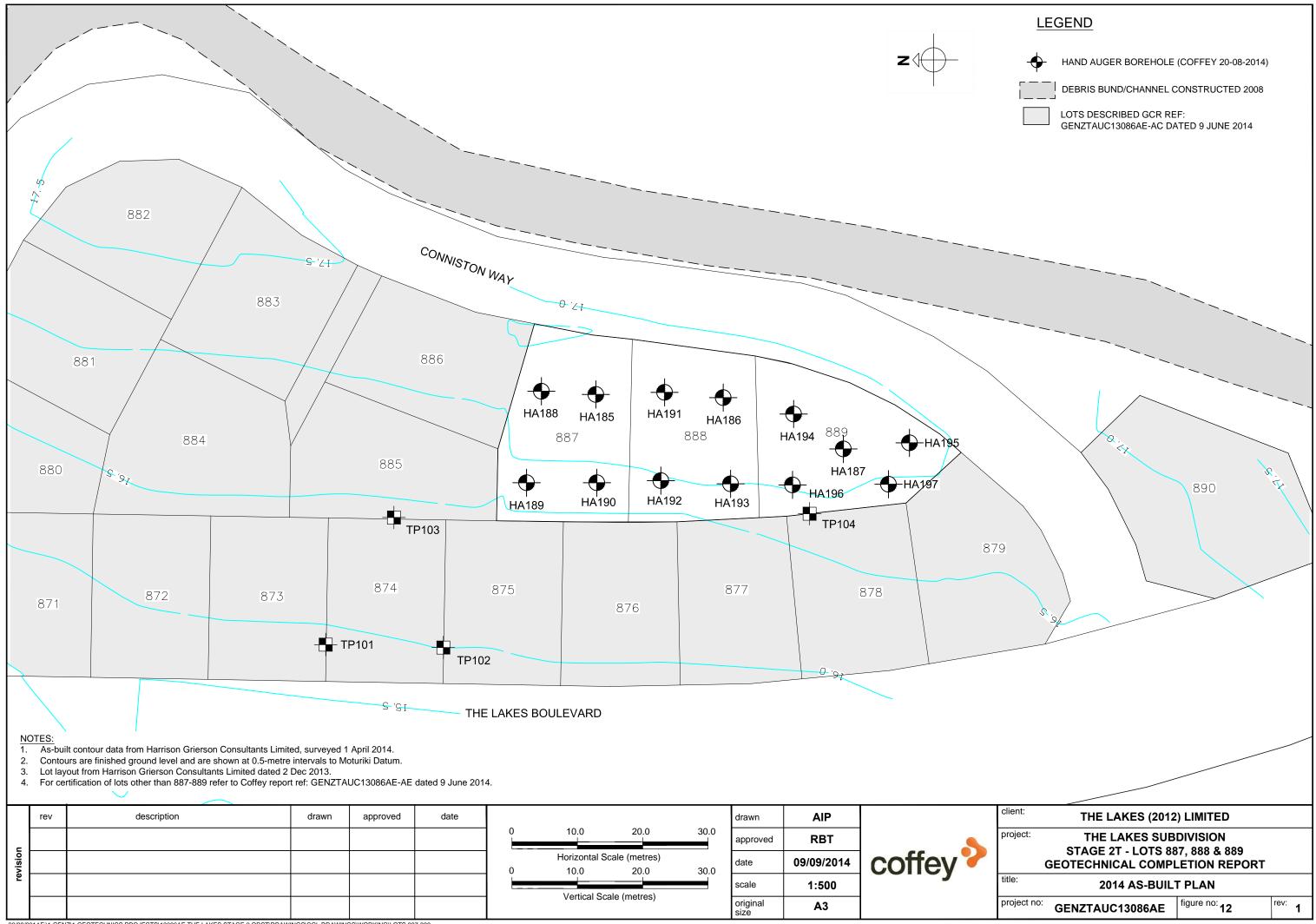
original

size

A3

20/08/2014 F.\1.GENZ\1.GEOTECHNICS PROJECTS\13086AE THE LAKES STAGE 2 QRST\DRAWINGS\CGL DRAWINGS\WORKING\LOTS 887-889 GCR\13086AE LOTS 887-889 GCR FIG 11 CUT-FILL PLAN.DWG

2012-2013 CUT/FILL PLAN rev: 1 project no: figure no: **11** GENZTAUC13086AE



20/08/2014 F.\1.GENZ\1.GEOTECHNICS PROJECTS\13086AE THE LAKES STAGE 2 QRST\DRAWINGS\CGL DRAWINGS\WORKING\LOTS 887-889 GCR\13086AE LOTS 887-889 GCR FING 12 AS-BUILT PLAN.DWG Appendix B - Geotechnical Suitability Statement

# STATEMENT OF PROFESSIONAL OPINION AS TO THE GEOTECHNICAL SUITABILITY OF LAND FOR BUILDING

NAME OF SUBDIVISION	Lots 887, 888 & 889 only Within Stage 2T of The Lakes Subdivision
COUNCIL FILE NUMBER RC No:	RC21332
ENGINEER RESPONSIBLE FOR	Sally V. Hargraves
DEVELOPMENT	
QUALIFICATIONS:	BSc, PhD, Category 1 Geoprofessional

I, Sally Victoria Hargraves of Coffey Geotechnics Ltd, 141 Cameron Road, Tauranga, hereby confirm that:

- 1) I am a professional person, appropriately qualified with experience in geomechanics to ascertain the suitability of the land for building development and was retained as the Soils Engineer to the above development.
- An appropriate level of site investigation and construction supervision has been carried out under my direction and is described in my development evaluation report dated 15 September 2014
- 3) In my professional opinion, not to be construed as a guarantee, I consider that;
  - a) The areas shown in my report dated 15 September 2014 of each new allotment are suitable for the erection thereon of the building types appropriate to the zoning of the land, provided that reference is made to my Geotechnical Completion Report Ref. GENZTAUC13086AE-AE, dated 15 September 2014.
  - b) Although the earth fills shown on the attached plans ref Figure 09 & Figure 11 were not placed in accordance with the requirements of the Infrastructure Development Code, the filling is generally considered suitable for development subject to the limitations outlined in my Geotechnical Completion Report Ref. GENZTAUC13086AE-AE, dated 15 September 2014.
  - c) The completed works give due regard to all land slope considerations.
  - d) The filled ground is suitable for the erection thereon of residential buildings requiring specific design subject to the recommendations presented in my Geotechnical Completion Report Ref. GENZTAUC13086AE-AE, dated 15 September 2014.
- 4) This professional opinion is furnished to the Council and the owner 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 for any dwelling.

Signed

Slarg\_\_\_\_

Date: 15 September 2014

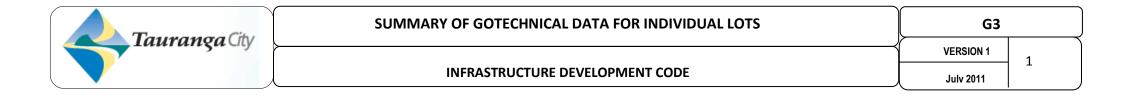


SUI	PRODUCER STATEMENT TABILITY OF LAND FOR BUILDING DEVELOPMENT	G2	
(	INFRASTRUCTURE DEVELOPMENT CODE	VERSION 1 July 2011	1

Property Address 99 Kennedy Road, Pyes Pa

RC No: 21332

	A			Subsu	rface data			Foundatio	ons	Building Restr	S/W Specific E	S/W Soakage	S/W Reticulate	Designated Building	Minimum Buil	Compressible	On-Site Effluent	Consent Notice	
Lot No:	Area (m²)	Shear Strength (kPa)		livision Iling	Natural Topography Unworked	Торо	tural graphy worked	Conventional Shallow Foundation to	Specific Design	Restriction Line	Design		e		<b>Building Platform</b>	Soils	nt Disposal	ĕ	
		at 0.5m depth	Y/N	Depth (m)	Y/N	Y/N	Depth (m)	NZS 3604:2011 Y/N/NA	Y/N/NA					Platform	orm		_		Comments
								•											
887	544	85 - >200	Y	4	N	N	-	N	Y	N	N	N	Y	N	N	Y	N	Y	Raft type foundations specifically designed for Ultimate Bearing Capacity = 210kPa or suspended timber foundations specifically designed for bearing capacity to be confirmed by CPEng at design stage.
888	514	150 - >200	Y	4.5	N	N	-	Ν	Y	N	N	N	Y	N	N	Y	N	Y	All foundation excavations to be inspected and tested by Cat 1 or Cat 2 Geo-Professional. Any soils encountered with undrained shear strength < 110kPa or other unsuitable soils identified are to be sub-excavated and replaced with well
889	521	100 - >200	Y	5.5	Ν	N	-	Ν	Y	N	N	N	Y	N	N	Y	N	Y	Placement of more than 300mm of additional fill on any site should be subject to specific geotechnical review.



Appendix C - Investigation Data

Engi	ne		g l	-0(		Ha	nd Auger		Borehole ID. sheet: project no.	HA185 1 of 1 GENZTAUC	
client: principal:	The	e Lakes	201	2 Lt	d				date started: date complete	20 Aug 2014 d: 20 Aug 2014	
project:	The	e Lakes	Sta	ge 2	QR	ST			logged by:	AIP	
ocation:	Lot	t 887							checked by:	RBT	
drill model:		3; N: 80014	14 (BC	OPC20	,		surface elevation: Not Specified		ingle from horizontal: 9 nole diameter : 50 mm		764 / SL588
drilling int	ormati	on			mate		ostance material description		<u>, ≩</u> vane DC	P structure a	ad
method & support 1 2 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	vare shear sh	ws/ additional obser	
	20/08/14 4						ORGANIC SILT: non plastic, black/dark brown, with some rootlets, moist.         Sandy SILT: low to medium plasticity, brown mottled orange, with inclusion of cream sand, moist, very stiff.         - Becoming dark brown. Occasional inclusions of orange mottled pink Silt.         SAND: medium to coarse grained, white/pale grey, pumiceous, moist.         - Inclusions of white non-plastic pumiceous SILT.         Sandy SILT: low to medium plasticity, pale brown mottled cream, wet, very stiff to hard.         - Organic staining.         Becoming dark brown. Organic staining.         Sandy SILT: non plastic to low plasticity, pale grey, moist, very stiff.         - Trace organic sand.         Sandy SILT: low to medium plasticity, pale brown, loosing sample due to suction, moist, very stiff.         Silty SAND: fine to coarse grained, pale brown mottled orange, moist.         Sandy SILT: low to medium plasticity, pale brown mottled orange, moist.         Sandy SILT: low to medium plasticity, pale brown mottled orange, moist.         Sandy SILT: low to medium plasticity, pale brown mottled orange, moist.         Sandy SILT: low to medium plasticity, pale brown most, hard.         - Yellow/Orange silty SAND with some fine gravels.         Sandy SILT: low plasticity, pale grey, moist, very stiff to hard.	M M W M M M M	VSt       0       1       1       1         H       0       1       0       1       1         H       0       1       0       1       1         VSt       0       1       0       1       1         H       0       1       0       1       1         WSt       1       0       1       1       1         WSt       1       1       1       1       1       1         WSt       1       1       1       1       1       1       1         WSt       1 <t< td=""><td>Image: Non-Order State           Image: Non-Order</td><td></td></t<>	Image: Non-Order State           Image: Non-Order	
AS auge HA hand W wash	       r drilling* r screwir auger		M r C c	5.0	I	nil	Hand Auger HA185 terminated at 4.6 m Refusal           samples & field tests           B         bulk disturbed sample           D         disturbed sample           E         environmental sample           SS         split spoon sample           U##         undisturbed sample ##mm diameter           HP         hand penetrometer (kPa)	s b	ification symbol & oil description ased on Unified ssification System		

	ine	erin	g l	-0(		На	nd Auger		s p	Boreh heet: rojec ate s	t no	).		1 of <b>GEI</b>	186 1 NZTAUC1308 Aug 2014	36A
principal: project: location:	The	e Lakes 888	-	-	-	ST			d Ic	ate c oggeo heck	om d by	plet /:			Aug 2014 C	
		2; N: 80012	24 (BC	)PC20	00)		surface elevation: Not Specified		angle fro	om ho	rizon	ntal:		ND .	DCP id.: vane id.: 4523 / 4	4583
u support support penetration		on samples & field tests	(m)	depth (m)	graphic log	classification symbol	stance material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	var she ⊕remo ⊛pe	ar	(bl	)CP lows/ ) mm)		structure and Iditional observations	;
			RL RL				Clayey ORGANIC SILT: low plasticity, black, moist to wet. SILT: non plastic to low plasticity, orange brown streaked cream, with minor sand and some clay, moist to wet, stiff. Clayey SILT: low to medium plasticity, brown orange streaked orange brown, moist, hard. SILT: non plastic, brown streaked cream, with minor sand and minor clay, moist to wet, very stiff. Sandy SILT: non plastic, orange brown streaked cream, with some clay, moist, hard. Clayey SILT: low to medium plasticity, brown streaked brown orange, moist, hard. SILT: non plastic, orange brown streaked cream, with minor sand and minor clay, moist, very stiff to hard. - with a <200mm lense of cream mottled reddish brown clayey silt at 1.9m - becoming organic stained brown grey from 2.7m - becoming organic prown streaked cream from 2.8m SiLT: non plastic, orange brown streaked cream from 2.8m SILT: non plastic, orange brown streaked cream, with some clay and some topsoil inclusions, moist, very stiff. - topsoil inclusions absent from 3.2m Sandy Clayey SILT: low to medium plasticity, orange brown, with minor well cemented silt clasts, moist.	M to W M to W M to W	St H					TOPS(           VS 54/           FILL           VS 200           VS 193           VS 200           VS 183           VS 200           VS 104           VS 105           VS 164           VS 654	8/ 30 kPa 0 kPa 0 kPa 0 kPa 0 kPa 9/ 28 kPa 0 kPa 10 kPa 4/ 44 kPa 9/ 41 kPa 2/ 49 kPa	
AS auge HA hanc W wash HA hanc	     	ıg*	M r C c pen	etration	I	1	- with some topsoil inclusions from 5.2m Hand Auger HA186 terminated at 5.2 m Target depth samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered	t Cla moistu D dr M m W we	y oist	ription Unified	                                 			Consister VS S F St VSt H F b VL	ncy / relative density very soft soft firm stiff very stiff hard friable very loose	

		-	ey								В	oreh	ole	ID.		HA187
=r	nai	no	orin	u I	~	<b>n</b> – <b>r</b>	На	nd Auger			S	heet	:			1 of 1
_1	iyi			<u> </u>			1 IA				р	rojec	t no			GENZTAUC1308
lien	t:	Th	e Lakes	201	12 Lt	d					d	ate s	starte	ed:		20 Aug 2014
rinc	ipal:										d	ate c	comp	oleteo	d:	20 Aug 2014
roje	ect:	The	e Lakes	Sta	ge 2	QR	ST				lc	ogge	d by	:		DBC
ocat	ion:	Lo	t 889								С	heck	ed b	y:		RBT
		36812	24; N: 80010	06 (BC	OPC20	00)		surface elevation: Not Specified			ngle fro				0°	DCP id.:
	ng info	rmati	on			mate	rial sub	ostance		h	ole diar	meter	: 50	mm		vane id.: 4523 / 4
	<u> </u>							material description			y / Isity	va		DCI		structure and
support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture	condition	consistency / relative density	she ⊕rema ⊚p (kF 33 00	oulded eak Pa)	(blow 100 m	ım)	additional observations
1	3 6 7				-		0 0	Clayey ORGANIC SILT: low plasticity, black,	v		01		₩ ₩ ₩	0 4 9		TOPSOIL FILL
					-			vet. SILT: non plastic to low plasticity, orange	-⁄ M to	w	VSt to H		\$¦		11	\VS 140/ 12 kPa FILL
		-			- 0.5			brown streaked cream, with some sand and some clay, moist to wet, very stiff to hard.				⊕ <mark>   </mark>				VS 137/ 18 kPa
					-			<ul> <li>with some topsoil inlcusions from 0.4m. Slig groundwater seepage encountered between 0m to 0.8m</li> </ul>	nt				¦¢			VS 200 kPa
					-			Om to 0.8m - topsoil inclusions absent from 0.5m				Vs	ų́тр			VS UTP
					1.0-							1/s	ŪπÞ		İİ.	VS UTP
					-	$\bigotimes$						1	uтÞ	ΪÌÌ	ΪÌ	VS UTP
					-										İİ	
					1.5							  ⊕	  @			VS 193/ 33 kPa
					-	$\bigotimes$										
					- 2.0			- becoming cream mottled brown from 1.9m				∣ii ⊕ii	ii P		11	VS 176/ 12 kPa
					-			- becoming orange brown mottled cream from	n			lii.	ii.	İİİ	ii	
					-			2.1m					i i l			VS 200 kPa
z					2.5-											
ż					-								1 1 1		111	VS 200 kPa
					-											VO 200 Ki u
					3.0-			- with some topsoil inclusions from 3.1m				11				VS 200 kPa
	111				-			- topsoil inclusions absent from 3.2m					11			VS 200 KPa
					- 3.5 —											N/0 000 L 5
					-								11		11	VS 200 kPa
					-	$\bigotimes$						i i				
					4.0	$\bigotimes$		- with a <100mm lense of dark brown clayey s at 4.0m	silt			⊕   				VS 156/ 28 kPa
					-			u( +.011				1 1 1	11			
	111				- 4.5							11	19			VS 200 kPa
					-	$\bigotimes$						11	11			
					-	$\bigotimes$										VS 200 kPa
					5.0-	$\bigotimes$		- with a gravel inclusion at 4.9m								
		-			_	rxxx		Hand Auger HA187 terminated at 5.2 m	_	+				<u>   </u> 		
					-			Target depth						<u>;;;</u>		
<b>neth</b> AD	auger			sup M r	<b>port</b> mud	N	nil	samples & field tests B bulk disturbed sample	0	S	ificatior oil desc	ription	۱			onsistency / relative density 'S very soft
AS HA	auger a	uger	ng*	Сd	casing			D disturbed sample E environmental sample			ased on ssificatio				S F	s soft
N HA	washb hand a			pen	etration	no res	istance	SS split spoon sample U## undisturbed sample ##mm diameter		istur					S	
				wate	er	rangin refusa	g to	HP hand penetrometer (kPa) N standard penetration test (SPT)	D M W	dry mo	ist				H F	l hard b friable
* e.g.	bit shơ AD/T		suffix		<b>1</b> 0-	Oct-12 wa		N* SPT - sample recovered Nc SPT with solid cone	W S Wp		t urated stic limit				V L	loose
B T	blank t TC bit	oit				er inflow er outflov		VS vane shear; peak/remouded (kPa) R refusal	wi		id limit					1D medium dense dense

En	gi	ne		g l	-0(		Ha	nd Auger		:	Borel sheet proje	t: ct n	0.			HA188 1 of 1 GENZTAUC13086
client: princip projec locatio	pal: ct:	The	e Lakes e Lakes : 887	-	-	-	ST				date : date : logge checl	com ed by	nple y:	eteo	d:	20 Aug 2014 20 Aug 2014 AIP RBT
	n: E:		3; N: 8001	52 (BC	OPC20	00)		surface elevation: Not Specified		angle f hole dia	rom ho	orizo	ntal	1: 9	0°	DCP id.: vane id.: 764 / SL5
drillin	benetration <b>b</b>	ormati	on samples & field tests		(m)			stance material description SOIL TYPE: plasticity or particle characteristic,	o re	consistency / relative density	Va sh ⊕ren	ane iear	(	DCI blov 00 m	vs/	structure and additional observations
support	3 penel	water		RL (m)	depth (m)	graphic log	classification symbol	colour, secondary and minor components	A moisture condition	consiste relative	(k) (k)	Pa)	2	4 @	∞ ₽	TOPSOIL FILL
		Not Encountered			- - - - 0.5 - -			ORGANIC SILT: non plastic, dark brown, some rootlets, wet. Sandy SILT: non plastic to low plasticity, brown mottled cream, some fine gravel, dry to moist, stiff to hard. Inclusions of coarse orange sand	 M	H St to VSt		     			             	TOPSOIL FILL FILL VS 215/ >87 kPa VS 198/ 33 kPa VS 119/ 44 kPa VS 84/ 27 kPa
					- 1.0 - -			Sandy SILT: non plastic to low plasticity, pale brown, minor fine gravels, moist, stiff to very \stiff. Hand Auger HA188 terminated at 1.0 m Target depth			 	 ⊛   		       		
					- 1.5— - -									             		
					2.0								li	             	ij.	
					- 2.5— - -							ii ii			     	
					3.0										         	
					3.5									         	         	
					4.0											
					4.5											
					5.0											
AS a HA I W y	auger auger hand a washb	ore		M T C c pen	etration	I	nil sistance ig to	samples & field tests       B     bulk disturbed sample       D     disturbed sample       E     environmental sample       SS     split spoon sample       U##     undisturbed sample ##mm diameter       HP     hand penetrometer (kPa)       N     etanded pagetariate test (EPT)	C moist D c	iry	s <b>criptio</b> n Unifie	ed	_			Consistency / relative density           VS         very soft           S         soft           F         firm           St         stiff           VSt         very stiff           H         hard           Eb         fine
*   e.g. / B	A hand auger bit shown by suffix g. AD/T blank bit					Oct-12 wa el on date er inflow er outflov	ng to al ater e shown		Do Mr Wv Ss		nit					H hard Fb friable VL very loose L loose MD medium de D dense

	gi	ne	ering	g l	-0(		Ha	nd Auger			Borehole ID sheet: project no. date started		HA189 1 of 1 GENZTAUC13086A 20 Aug 2014
orinci oroje ocati	ct:		e Lakes : 887	Sta	ige 2	QRS	ST				date comple logged by: checked by:		20 Aug 2014 AIP RBT
oositio drill me		36811	9; N: 8001	54 (BC	OPC20	00)		surface elevation: Not Specified		angle	from horizonta iameter : 50 m	l: 90°	DCP id.: vane id.: 764 / SL58
drillir	ng info	ormati	on	1		mate		ostance					1
method & support	<sup>1</sup> 2 penetration 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative densitv	vane shear ⊕remoulded ⊚peak (kPa) 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DCP (blows/ 00 mm)	
								ORGANIC SILT: non plastic, dark brown/black, some rootlets, moist. Sandy SILT: non plastic, orange/brown, some fine pumiceous gravels, moist, stiff. Inclusions of orange medium plasticity clayey SILT Sandy SILT: non plastic, cream, limonite staining, wet, stiff. Becoming medium plasticity Hand Auger HA189 terminated at 0.8 m Target depth	W	St			TOPSOIL FILL           FILL           VS 90/ 31 kPa           VS 87/ 44 kPa           VS 99/ 46 kPa
					4.0 								
AS HA W HA * e.g. B	od auger auger hand a washb hand a	vn by suffix it				I	ater e shown	samples & field tests       B     bulk disturbed sample       D     disturbed sample       E     environmental sample       SS     split spoon sample       U##     undisturbed sample ##mm diameter       HP     hand penetrometer (kPa)       N     standard penetration test (SPT)       N*     SPT - sample recovered       Nc     SPT with solid cone       VS     vane shear; peak/remouded (kPa)       R     refusal       HB     hammer bouncing	moist D ( M ) V ) S ( Wp )	soil de based c Classifica	d nit		consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense

principal: project: pocation: position: E Irill model:															1 of 1 GENZT/ 20 Aug	AUC13086 2014
osition: E		e Lakes 887	Sta	ige 2	QRS	S <i>T</i>				lo	ogged	by	:	ed:	20 Aug DBC	2014
		9; N: 80014	43 (BC	OPC200	00)		surface elevation: Not Specified			ngle fro	meter :	izon	tal:			P id.: ie id.: 4523 / 45
etriod & hpport penetration	formati	on samples & field tests		(m			material description		e c	ency / density	van shea ⊕remou	ar	(bl	CP ows/ mm)		cture and I observations
support support	³ 4I¢thater		RL (m)	depth (m)	graphic log	classification symbol	SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components Clayey ORGANIC SILT: low plasticity, black,		ot V condition	consistency / relative density	© pea (kPa 23 00 12	ik	2 4	<u>,</u>		
2   	200						Clayer OrcANIC SILT: low plasticity, black, moist to wet. SILT: non plastic, cream streaked brown orange, with minor sand and some clay, moist. Clayer SILT: low plasticity, brown mottled brown orange, moist to wet, very stiff. - slight groundwater seepage encountered at 0.2m - with some topsoil inclusions from 0.4m		M to W	VSt St H	+       +       +       +       +         +         +         +         +         +         +         +         +         +         +           +           +           +           +           +           +           +           +           +             +             +             +             +               +                 +	●        			FILL VS 119/ 15 k VS 164/ 10 k VS 99/ 4 kPa	Pa Pa
				1.0 - - - - 1.5 - - - -			SILT: non plastic to low plasticity, orange brown streaked cream, with minor sand and some clay, moist, stiff to hard. - topsoil inclusions absent from 0.5m Hand Auger HA190 terminated at 0.8 m Target depth									
				- 2.0								i	ij			
				2.5 - - -												
				3.0												
				3.5— - - - 4.0—												
				- - - 4.5 -												
				5.0												
method AD auge AS auge HA hand W wash	r drilling' r screwir auger		M r C c	port mud casing etration	I	nil istance g to	samples & field tests       B     bulk disturbed sample       D     disturbed sample       E     environmental sample       SS     split spoon sample       U##     undisturbed sample ##mm diameter       HP     hand penetrometer (kPa)	0	so ba	oil desc ised on sificatio	n symbo cription Unified on Syste	) &			S so F fir St st VSt ve	ative density ery soft oft m iff ery stiff ard

	gir	e	ering	g L	-0(		Ha	nd Auger			s p	Boreho heet: project	t no			1 o <b>GE</b>	<b>4191</b> <sup>f 1</sup> ENZTAUC1308 Aug 2014
orincipa project: ocation			e Lakes 888	Sta	ge 2	QRS	ST				lo	late co oggec hecke	l by	:	ed:		Aug 2014 P
oosition: drill mode		813	3; N: 80013	3 (BC	)PC200	00)		surface elevation: Not Specified			•	om hor meter					DCP id.: vane id.: 764 / Sl
drilling	benetration	natio	samples &		(m)		classification symbol	ostance material description SOIL TYPE: plasticity or particle characteristic,		ine	consistency / relative density	van shea ⊕remoi ⊛pea	ar	(bl	CP ows/		structure and additional observations
support	3 ben 3 - 1 - 1	red water		RL (m)	depth (m)	graphic log	classi symb	ORGANIC SILT: non plastic, dark brown, some rootlets, moist.		M moisture condition		(kPa 8 00 00 1 1	a)	Π	∞ ∞ <del>?</del> 	TOP	SOIL FILL
		Not Encountered			- - 0.5 -			Clayey SILT: low to medium plasticity, pale brown, some fine to medium sand, moist to wet, stiff to very stiff. Occasional inclusions pink and white pumiceous sand	_/	M to W	St to VSt	+ - + + + + + + + + + + + + + + + + + +				VS 2	93/ 44 kPa 15/ 82 kPa 15/ 46 kPa
					- 1.0 - -			SILT: non plastic, pale yellow/cream, pumiceous, moist, stiff to very stiff. Becoming sandy. Sand is fine to coarse. Hand Auger HA191 terminated at 0.8 m Target depth				-⊕ !@                 				- <u>VS 1</u>	37/ 46 kPa
					- 1.5 - - -												
					2.0 — - - 2.5 —												
					- - 3.0 — -								         	             			
					- 3.5 — - -												
					4.0 — - - 4.5 —												
method AD au AS au HA ha W wa	thod suger drilling* N auger screwing* C hand auger washbore P						nil istance	samples & field tests       B     bulk disturbed sample       D     disturbed sample       E     environmental sample       SS     split spoon sample       U##     undisturbed sample ##mm diameter       HP     hand penetrometer (kPa)		<b>so</b> ba	il desc sed on sificatio	n symbor cription Unified on Syste	           &				ency / relative density very soft soft firm stiff very stiff hard

CO Engi	ine		g l	-0(		На	nd Auger			s p	oreh heet: rojec	t no	) <u>.</u>		HA192 <sup>1 of 1</sup> GENZTAUC13 20 Aug 2014	086A
principal: project: ocation:	The	e Lakes 888	-	-	-	ST				d Ic	ate s ate c oggeo heck	omp d by	olete :	ed:	20 Aug 2014 20 Aug 2014 DBC RBT	
position: E drill model:	36811	9; N: 8001	34 (BC	OPC20	00)		surface elevation: Not Specified			gle fro le dia					DCP id.: vane id.: 4523	3 / 4583
support support penetration	ormati	on samples & field tests	(m)	depth (m)	graphic log	classification symbol	nstance material description SOIL TYPE: plasticity or particle characteristic,		moisture condition	consistency / relative density	var she ⊕remo ⊛pe	ar	(blo	CP ows/ mm	structure and additional observation	ons
	I     I <th></th> <th></th> <th></th> <th>Clayey ORGANIC SILT: low plasticity, black, moist to wet. SILT: non plastic to low plasticity, brown orange streaked cream, with minor sand and some clay, moist to wet, hard. - slight groundwater seepage encountered at 0.2m Clayey SILT: medium plasticity, brown streaked brown orange, with trace rootlets, moist, very stiff. SILT: non plastic, cream streaked brown orange, with minor sand, moist, very stiff to hard. - becoming brown mottled brown orange with minor sand and minor clay from 0.7m Hand Auger HA192 terminated at 0.8 m Target depth</th> <th>/ 1 -</th> <th></th> <th>H VSt /St to H</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>					Clayey ORGANIC SILT: low plasticity, black, moist to wet. SILT: non plastic to low plasticity, brown orange streaked cream, with minor sand and some clay, moist to wet, hard. - slight groundwater seepage encountered at 0.2m Clayey SILT: medium plasticity, brown streaked brown orange, with trace rootlets, moist, very stiff. SILT: non plastic, cream streaked brown orange, with minor sand, moist, very stiff to hard. - becoming brown mottled brown orange with minor sand and minor clay from 0.7m Hand Auger HA192 terminated at 0.8 m Target depth	/ 1 -		H VSt /St to H							
method AD auge AS auge HA hand W wash HA hand * bit sh e.g. AD/T B blank	I uger drilling* uger screwing* and auger vashbore iand auger it shown by suffix D/T lank bit				I	ater e shown	samples & field tests       B     bulk disturbed sample       D     disturbed sample       E     environmental sample       SS     split spoon sample       U##     undisturbed sample ##mm diameter       HP     hand penetrometer (kPa)       N     standard penetration test (SPT)       N*     SPT - sample recovered       NC     SPT with solid cone       VS     vane shear; peak/remouded (kPa)       R     refusal       HB     hammer bouncing	L N V S V	bas Class noisture O dry M mois V wet S satur Vp plast	il desc sed on sificatio	ription Unified n Syste	l d			Consistency / relative densi           VS         very soft           S         soft           F         firm           St         stiff           VSt         very stiff           H         hard           Fb         friable           VL         very loose           L         loose           MD         medium dense           VD         very dense	-

			erin			<b>]</b> -	Ha	nd Auger			Bore shee proje	t:				HA193 1 of 1 GENZTAUC13086
lien	t:	The	e Lakes	201	2 Lt	d					date	start	ted:			20 Aug 2014
orinc	ipal:										date	com	plet	ed		20 Aug 2014
oroje	ct:	Th	e Lakes	Sta	ge 2	QRS	ST				logge	ed by	y:			DBC
ocat	ion:	Lo	t 888								chec	ked	by:			RBT
	on: E: odel:	36811	9; N: 8001	23 (BC	PC200	00)		surface elevation: Not Specified		angle f hole di					0	DCP id.: vane id.: 4523 / 458
drilli	-	ormati	on			mate		stance					_		_	
t t	penetration		samples & field tests		Ê	c log	cation	material description	e 6	ency / density	Va sh ⊕ren	ane near <sup>moulded</sup> peak	(b	)CP lows ) mn		structure and additional observations
support	benel	water		RL (m)	depth (m)	graphic log	classification symbol	SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	(k	Peak (Pa)				
	- 0 -			_	-			Clayey ORGANIC SILT: low plasticity, black, \moist to wet.	M to \	V						
		Encountered			-			SILT: non plastic, brown orange mottled	_/   M	VSt		<b>P</b> i	lii	ij	¦.	<b>FILL</b> VS 160/ 23 kPa
z 		Not Not			- 0.5			cream, with minor sand and some clay, moist, very stiff to hard.			_€		!!			VS 156/ 33 kPa
					-			- becoming brown orange streaked pale grey		H						VS 200 kPa
		+						flecked black from 0.6m Hand Auger HA193 terminated at 0.8 m			+	└╽╋ ╽╽╽				VS 200 kPa
					1.0-			Target depth								
					-											
					- 1.5 —						ii		lii	ļį	i	
					1.5								!!	ij	il.	
					-											
					2.0-											
					-										H	
					-						į į		lii	ii	il.	
					2.5						ii		11	11	Ì	
	11				-										L	
					- 3.0 —											
					-								1 2 2			
					-								1 2 2			
					3.5 -								ii	ii	i	
	11				-						i i	i i i	11	ij	i	
					40										Ì	
					4.0								lii		i	
					-											
					4.5 —								1			
					-							iii		ii	Ì	
					-								11	11	Ì	
					5.0 —											
					-								11		İ.	
			<b>,</b>		_								l i i			
meth AD	auger	drilling		<b>sup</b> M r	nud	N	nil	samples & field tests B bulk disturbed sample	cla	ssificationsoil des	scriptio	on	•		co VS	S very soft
AS HA W	auger hand wash		ng^		asing stration	I		D disturbed sample E environmental sample	c	based o lassificat					S F	soft firm
HA	hand			No.	0 0	⊢ no res	sistance	SS split spoon sample U## undisturbed sample ##mm diameter	moist					1	St VS	St very stiff
	<b>F</b> 2 - 1		a	wate		rangin refusa		HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered	M n W v	lry noist vet					H Fb VL	b friable
, ə.g. 3	bit sh AD/T blank	own by	SUIIIX		leve	Oct-12 wa el on date er inflow		N° SP1 - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa)	S s Wp i	aturated	nit				L	loose
-	TC bi					er outflow		R refusal	WII	iquid limi	ι			1	D	

	ine	erin	g l	-0(	-	Ha	nd Auger			Borehol sheet: project date sta	no.			HA194 <sup>1 of 1</sup> GENZTAUC13086A 20 Aug 2014
principal project: location:	: Th	e Lakes t 889				ST				date co logged checkee	mpl by:	lete	d:	20 Aug 2014 AIP RBT
position: E drill model		30; N: 8001	13 (BC	OPC20	00)		surface elevation: Not Specified			rom horiz ameter : {			90°	DCP id.: vane id.: 764 / SL58
method & support 2 benetration 2 benetration		samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ⊕remould ⊚peak (kPa)	r led .	DC (blo 100 i		structure and additional observations
							ORGANIC SILT: non plastic, dark brown/black, some rootlets, wet. Clayey SILT: low to medium plasticity, pale brown, moist, very stiff. Sandy SILT: non plastic, pale grey mottled orange, occasional white pumice clasts, moist, hard. - becoming orange and clayey. Low to medium plasticity - inclusions of pale grey pumiceous sand Hand Auger HA194 terminated at 0.8 m Target depth		VSt H					TOPSOIL FILL           FILL           VS 137/ 38 kPa           VS 200 kPa           VS 200 kPa           VS 200 kPa
AS aug HA han W was HA han * bit s e.g. AD/	er drilling er screwi d auger hbore d auger d auger thown by T hk bit	ng*	leve wate			e shown	samples & field tests         B       bulk disturbed sample         D       disturbed sample         E       environmental sample         SS       split spoon sample         U##       undisturbed sample ##mm diameter         HP       hand penetrometer (kPa)         N       standard penetration test (SPT)         N*       SPT - sample recovered         Nc       SPT with solid cone         VS       vane shear; peak/remouded (kPa)         R       refusal         HB       hammer bouncing	Ci D d M n W w S s Wp p	soil des based o assificat	nit	1&			consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense

En	igi	ne		g l	-0(	-	На	nd Auger			Borehole sheet: project n	0.		HA195 1 of 1 GENZTAUC13086/
ilient orinci oroje	pal: ct:	The	e Lakes e Lakes				ST				date star date com logged b	nplet y:		AIP
ocati ositio	n: E:		t <b>889</b> 25; N: 80009	96 (BC	)PC200	00)		surface elevation: Not Specified		•	checked from horizo iameter : 50	ntal:		DCP id.: vane id.: 764 / SL58
drillir	ng info	ormati	on			mate	rial sul	ostance						
support &	2 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative densitv	vane shear ⊕remoulded ⊛peak (kPa) S	(b 100	DCP lows/ Dmm	1)
		Not Encountered			- - - - 0.5 - -			ORGANIC SILT: non plastic, dark brown, minor rootlets, moist. Clayey SILT: low to medium plasticity, pale brown, some fine to medium sand, moist, very stiff to hard. - inclusion of white pumiceous sand. - becoming orange/brown. Trace dark brown organic silt.	M	VSt H				TOPSOIL FILL VS 200 kPa FILL VS 187/ 27 kPa VS 200 kPa
					- 1.0 - - -			Hand Auger HA195 terminated at 0.8 m Target depth						L_ <u>VS 200 kPa</u> -         
					1.5— - - 2.0—									
					- - 2.5 - -									
					- 3.0 — - - -									
					3.5— - - 4.0—									
					- - 4.5 - -									
					- 5.0 <del>-</del> - -									
AD AS HA W	S auger screwing* C casi A hand auger washbore <b>penetra</b>						nil istance g to	samples & field tests       B     bulk disturbed sample       D     disturbed sample       E     environmental sample       SS     split spoon sample       U##     undisturbed sample ##mm diameter       HP     hand penetrometer (kPa)       N     standard penetration test (SPT)	Cl moist D d	soil de based o assifica	on symbol & scription on Unified tion System	_		consistency / relative density       VS     very soft       S     soft       F     firm       St     stiff       VSt     very stiff       H     hard

En	gi	ne	erin	g l	-0(		На	nd Auger			s F	Boreho sheet: project	t no			HA196 1 of 1 GENZTAUC13086
client: princip projec pcatic	oal: ct:	The	e Lakes 889	-	-	-	ST				c I	late si late co oggec checke	omp I by:	olete :	ed:	20 Aug 2014 20 Aug 2014 DBC RBT
ositior Irill mo		36811	9; N: 8001	13 (BC	OPC20	00)		surface elevation: Not Specified			•	om hor Imeter			90°	DCP id.: vane id.: 4523 / 458
drillin o	benetration <b>B</b>	ormati	on samples & field tests		Ê			ostance material description SOIL TYPE: plasticity or particle characteristic,	9	a r	incy / density	van she ⊕remo	ar	(blo	CP ows/ mm)	structure and additional observations
support	- 1 3 pene	20/08/141 Avater		RL (m)	depth (m)	graphic log	classification symbol	Clayey ORGANIC SILT: low plasticity, black,	_	A condition M	consistency / relative density	© per (kPa 23 € €	ak a) 007	0.4	 ۳۳۲	
					- - - 0.5 - -			<ul> <li>Clayey OroAnte SiL1: low plasticity, black, moist to wet.</li> <li>Clayey SILT: low to medium plasticity, brown orange mottled cream, with minor sand, moist to wet, firm to hard.</li> <li>- perched groundwater encountered at 0.3m</li> <li>- with some topsoil inclusions from 0.4m</li> <li>- becoming brown orange mottled cream flecked black from 0.5m. Topsoil inclusions</li> </ul>	M	to W to W M	F VSt H VSt	 ∰¶         				VS 41/ 10 kPa FILL VS 119/ 40 kPa VS UTP
								absent SILT: non plastic, brown orange streaked cream, with some sand and some clay, moist, very stiff. Hand Auger HA196 terminated at 0.8 m Target depth								
					- 2.0 - 										iii	
					- 2.5— - - -								         	         		
					3.0— - - - 3.5—											
					- - - 4.0-									             		
					- - 4.5 - -											
					- 5.0 - - -											
AS a HA I W N	auger	ore		Mi Co	port mud casing etration	I	nil istance g to	samples & field tests       B     bulk disturbed sample       D     disturbed sample       E     environmental sample       SS     split spoon sample       U##     undisturbed sample ##mm diameter       HP     hand penetrometer (kPa)	D	so ba Class noisture dry	il des sed or sification	n symbo cription of Unified on Syste	I	11		consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard
e.g. / B I T <sup>-</sup>	bit shc AD/T blank I TC bit V bit	wn by : oit	suffix	wat	■  10-  leve	Oct-12 wa el on date er inflow er outflov	ater shown	N     standard penetration test (SPT)       N*     SPT - sample recovered       Nc     SPT with solid cone       VS     vane shear; peak/remouded (kPa)       R     refusal       HB     hammer bouncing	M S S S S S	/ wet satu /p plas	st irated tic limi d limit	t				Fb     friable       VL     very loose       L     loose       MD     medium dense       D     dense       VD     very dense

	ngi	ne	ering	g l	-0(		На	nd Auger			Bore shee proje date	et: ect n	0.			HA197 1 of 1 GENZTAUC13086 20 Aug 2014
princ proje locat	ct:		e Lakes 889	Sta	ge 2	QR	ST				date logge chec	ed b	y:		d:	20 Aug 2014 DBC RBT
oositic drill m		36811	9; N: 8000	99 (BC	DPC20	00)		surface elevation: Not Specified		•	rom h amete				0°	DCP id.: vane id.: 4523 / 45
ø	-	ormati	samples &		(u			ostance material description	o 5	ncy / lensitv	v	ane hear moulded		DC	vs/	structure and additional observations
support	1 2 penetration	water	field tests	RL (m)	depth (m)	graphic log	classification symbol	SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture	consistency / relative density		kPa)	2		nm)	
		Not Encountered			- - - 0.5 - -			Clayey ORGANIC SILT: low plasticity, black, moist to wet. Clayey SILT: low to medium plasticity, brown orange mottled cream, with minor sand, moist to wet, stiff to hard. - becoming slightly plastic from 0.2m - becoming brown orange mottled brown from 0.4m	M to W M to W M	Н						TOPSOIL FILL FILL VS 99/ 18 kPa VS 200 kPa VS 200 kPa
					- 1.0 - - -			- becoming moderately plastic and brown orange streaked cream from 0.6m SILT: non plastic, brown orange streaked cream, with minor sand and some clay, moist, hard. Hand Auger HA197 terminated at 0.8 m Target depth		H		                   				VS 200 kPa
					1.5— - - 2.0—								li		İİ	
					- - - 2.5—											
					- - 3.0- - -										         	
					- 3.5— - -										         	
					4.0— - - 4.5—											
					4.5 - - 5.0 - -											
<b>meth</b> AD AS HA W HA	auger	drilling' screwir auger oore		M r C c	port mud casing etration	nud     N nil     B     bulk disturbed sample       asing     D     disturbed sample       tration     E     environmental sample       SS     split spoon sample       U##     undisturbed sample #mm diameter				sification symbol & soil description based on Unified sssification System					consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard	
HA e.g. B T V		own by s	suffix	wate	■  10-  leve	Oct-12 wa el on date er inflow er outflov	g to i ater shown	U## undisturbed sample ##mm diameter HP hand penetrometer (KPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	W we S sa Wp pla	y bist	nit					

coffey	geotechnics
Engineering L	og - Trial Pit

E	ng	ginee	eri	ng	Log	- T	rial Pit			She Pro	et ject N	No:		1 of 1 <b>GENZTAUC13086</b>
Clie	ent:			The	Lakes (	2012	)			Date started: Date completed:				27.11.2013
Priı	ncipa	al:											l:	27.11.2013
Prc	ject:			The	Lakes S	Stage	e 2qrst			Log	ged I	oy:		KMJ
Tria	al pit	location:		Bou	ndary o	f Lot	ts 874 & 875			Che	eckec	l by:		RBT
Equ	ipme	nt type:					Pit Orientation:	Easting: 368092.6	67 m		R.L	. Surface	e: 16	
		on dimension		0	1m wide		Vane No: DR4523	Northing: 800166.	76 m		Dat	um: x/y=	EBOPC	2000, RL=Moturiki
ex	cav	ation infor	mati	ion		mate	erial substance						1	
stratigraphy	water	<b>notes</b> samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Desc Soil name; plasticity or gradi components. Moisture, sensiti bedding, cementation, defects. Ori Rock name, grain size & type, c minor components. Weathering, r	ng, colour, secondary vity, strength. Structure, gin, additional observations.	moisture condition	consistency/ density index	density index 25 50 vane shear 100 (remoulded 150 /peak) kPa 175			structure and additional observations
						OL ML	SILT, no plasticity, black, rootlets, SILT, low plasticity, brown, with w fine sand.	• • •	M	St	•	×		
	pe		_15				<ul> <li>white pumiceous silt pockets</li> <li>becoming orange-brown</li> <li>occasional pockets/layers of orga</li> </ul>	nic silts with organic odor			•	×		
	e Observed		_14	2		ML	<ul> <li>- increasing plasticity</li> <li>SILT, medium plasticity, interbedd brown.</li> </ul>	ed brown, grey & light	_		•	UPT <sup>*</sup>		
ALLUVIAL DEPOSITS	None		<u>1</u> 3	3 <sup>-</sup>		SP	- tree trunks & rootlets Silty SAND, fine grained, grey.						×	
ALLUV			_12			ML	Clayey SILT/Clayey SAND, mediuu sensitive, organic odor, sand is fin							
				-			EOBH @ 4.2m, target depth. Test pit TP102 terminated at 4.2 m	ietres.						
			_11	5_										
			10	6										
S	iketo	:h	<u>1 IU</u>				1			I			1	

	classification symbols and soil description based on New Zealand Geotechnical Society Inc 2005	vane shear (kPa) ● remoulded × peak ≫× peak greater than 200kPa	<b>moisture</b> D dry
Form GEO 5.5 Rev.6	notes, samples, tests         U <sub>50</sub> undisturbed sample 50mm diameter         U <sub>63</sub> undisturbed sample 63mm diameter         D       disturbed sample         Bs       bulk sample         E       environmental sample         R       refusal	Water     UTP     unable to penetrate       water     10/1/98 water level       on date shown       ▶     waterinflow       ✓     wateroutflow	M moist W wet S saturated

Trial Pit No.

**TP102** 

consiste	ency/ density index
VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
н	hard

VL L MD D VD very loose loose medium dense dense very dense

coney	• gee		Trial Pit	No.	TP103		
Engineerin	na Loa - T	rial Pit			Sheet		1 of 1
	The Lakes (2012)				Project		GENZTAUC13086AE 27.11.2013
Principal:	The Lakes (2012)	,			Date co		
	The Lakes Stage	2arst			Logged	-	KMJ
-	Boundary of Lot	-			Checke	-	RBT
Equipment type:	Doundary of Lot	Pit Orientation:	Easting: 368113.82			Surface	
Excavation dimensions: 4m lo		Vane No: DR4523	Northing: 800175.79	9 m	Da	tum: x/y=	=EBOPC2000, RL=Moturiki
excavation informatio		rial substance	ion.			. T	
notes samples, tests, etc RL	depth metres graphic log classification symbol	Material Descript Soil name; plasticity or grading, o components. Moisture, sensitivity, s bedding, cementation, defects. Origin, a Rock name, grain size & type, colour minor components. Weathering, moist	olour secondary	moisture condition	consistency/ density index 25 vane shear	100 (remoulded 125 /peak) kPa 175	structure and additional observations
Image: Part of the second	2 0 ML 1 2 ML 3 2 ML 4 5 5 - - - - - - - - - - - - -	SILT, no plasticity, black, rootlets, orga Sandy SILT, low plasticity, brown, with gravel & fine to medium grained sand. - silt pockets, white, with black specks. - becoming orange-brown with black s - grey inclusion - grey silt lenses & occasional organic - decreasing sand content SILT, low plasticity, orange-brown - tree trunks Sandy SILT, low plasticity, grey, trace of - abundant tree trunks from 2.9 to 3.5m (Clayey SILT, medium plasticity, blue-g odor. EOBH @ 3.5m, target depth AD = ALLUVIAL DEPOSITS Test pit TP103 terminated at 3.5 metre	white specks, with fine pecks pockets te inclusion & black clay & fine sand.		St- Vst	×	× · · · · · · · · · · · · · · · · · · ·
	otechnical Society Inc 2005 ple 50mm diameter ple 63mm diameter	vane shear (kPa) ● remoulded × peak >>× peak greater than 200kPa UTP unable to penetrate water ↓ 10/1/98 water level on date shown ▶ waterinflow wateroutflow	moisture D dry M moist W wet S saturated		consisten VS S F St VSt H	<b>cy/ densi</b> very sof soft firm stiff very stiff hard	t VL very loose L loose MD medium dense D dense

coffey	geotechnics

COILE	y	9				Trial	Pit No.	TP104
Engineeri	ng Lo	g - 1	rial Pit			She	et ect No:	1 of 1 <b>GENZTAUC13086AE</b>
Client:	The Lake	- s (2012	12)				e started:	27.11.2013
Principal:						Date	e completed:	27.11.2013
Project:	The Lake	s Stag	e 2qrst				ged by:	KMJ
Trial pit location:		_	ts878 & 889				cked by:	RBT
Equipment type:			Pit Orientation:	Easting: 368114.25	m		R.L. Surface:	
Excavation dimensions: 4r	i		Vane No: DR4523	Northing: 800111.6	3 m		Datum: x/y=l	EBOPC2000, RL=Moturiki
excavation informat	lon		erial substance Material Descript	ion		_ ×	ਬ ਕ	
samples, tests, etc RL	depth metres graphic log	classification symbol	Soil name; plasticity or grading, c components. Moisture, sensitivity, y bedding, cementation, defects. Origin, a Rock name, grain size & type, colour minor components. Weathering, moist	olour, secondary strength. Structure, dditional observations. , fabric, inclusions &	moisture condition	consistency/ density index	<ul> <li>25</li> <li>50</li> <li>50</li> <li>vane shear</li> <li>100</li> <li>(remoulded</li> <li>125</li> <li>/peak) kPa</li> <li>175</li> </ul>	structure and additional observations
LIT LIT LIT LIT LIT LIT	1 	OL ML	SILT, no plasticity, black, rootlets, orga SILT, no plasticity, brown, black speck - organic inclusion - dark brown inclusion - increasing sand content - becoming pale yellow-brown, black s sand - pale grey silt pockets SILT, low plasticity, grey-white, with bla EOBH @ 3.5m target depth. Test pit TP104 terminated at 3.5 metre	s & rootlets. pecks, with fine grained ack specks, pumiceous.	M	St- Vst	• × • × • ×	
	Geotechnical Soci mple 50mm diam mple 63mm diam	eter	5 vane shear (kPa) ● remoulded × peak >>> peak greater than 200kPa UTP unable to penetrate water ↓ 10/1/98 water level on date shown ▶ waterinflow	moisture D dry M moist W wet S saturated		consi VS S F St VSt H	istency/ densit very soft soft firm stiff very stiff hard	y index VL very loose L loose MD medium dense D dense VD very dense

	U	1	7)						Tria	l Pit No.	TP01
Engineering Log - T						rial Pit		She Proi	et ect No:	1 of 1 <b>GENZTAUC13086AE</b>	
Client:	:		The	Lakes	(2012	)				e started:	31.1.2008
Princip	pal:								Date	e completed:	31.1.2008
Projec			The	Lakes	Stage	e 2arst				ged by:	GW
-	bit location				-	of Lot 881			_	cked by:	RBT
-	nent type:	•	Din	onay n	or ar	Pit Orientation:	Easting: 368143	.83 m		R.L. Surface: n	
Excavat	tion dimensi	ons: m	long	m wide		Vane No: not specified	Northing: 800242	2.63 m		Datum: x/y:WB	OPC2000; RL: Məturiki
exca	vation inf	orma	tion		mate	erial substance					
stratigraphy water	notes samples tests, et		depth metres	graphic log	classification symbol	Material Descript Soil name; plasticity or grading, c components. Moisture, sensitivity, bedding, cemeritation, defects. Origin, a Rock name, grain size & type, colour minor components. Weathering, moist	olour, secondary strength. Structure, dditional observations. , fabric, inclusions &	moisture condition	consistency/ density index	25 50 vane shear 100 (remoulded 125 /peak) kPa 175	structure and additional observations
Sedimentary Deposits Colluvium 31/01/2008 ▼					SP	Sandy SILT, no plasticity, orange-brow brown,black specks; sand is fine to me SAND, fine to medium grained, cream - water seeping from side of test pit	xdium grained.	W			
			6	-		EOBH @ 5.5m, target depth Test pit TP01 terminated at 5.5 metres					-
soil d base	s, samples, t undistu undistu disturb bulk sa	ealand ests rbed sa rbed sam ed sam mple	Geotech ample 50 ample 63	nical Society mm diamete mm diamete	er	vane shear (kPa)         ●       remoulded         ×       peak         >>×       peak greater than 200kPa         UTP       unable to penetrate         water       10/1/98 water level         on date shown       →         ▶→       waterinflow         →       wateroutflow	moisture D dry M moist W wet S saturated		cons VS S F St VSt H	istency/ density in very soft soft firm stiff very stiff hard	dex VL very loose L loose MD medium dense D dense VD very dense

C		off	E	Żγ						Trial	Pit No.	TP02
							rial Pit			Shee Proie	et ect No:	1 of 1 GENZTAUC13086AI
Clien	nt:			The	Lakes (	(2012)	)				e started:	31.1.2008
Princ	cipa	d:			-	-				Date	e completed:	31.1.2008
Proje	ect:			The	Lakes :	Stage	2arst				ged by:	GW
-		location:				-	of Lot 881 & 882				cked by:	RBT
	_	nt type:		2	onay n		Pit Orientation:	Easting: 368163.68	3 m		R.L. Surface: m	
Excav	/atio	n dimension	s:ml	ong n	n wide		Vane No: not specified	Northing: 800235.1	13 m		Datum: x/y: WB	OPC2000; RL: Məturiki
exca	ava	ation infor	mati	on		mate	rial substance					
stratigraphy	water	<b>notes</b> samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Descrip Soil name; plasticity or grading; components. Moisture, sensitivity bedding, cementation, defects. Origin, Rock name, grain size & type, colou minor components. Weathering, mois	colour, secondary strength. Structure, additional observations. r, fabric, inclusions &	moisture condition	consistency/ density index	25 55 vane shear 100 (remoulded 125 /peak) kPa 175	structure and additional observations
Colluvium	countered			- - 1		ML	Sandy SILT, no plasticity, creamy blac sand is fine to medium grained.		M	F	×	-
Sedimentary Deposits	groundwater not encountered			 2		SP	SAND, fine to medium grained, black SAND, fine to medium grained, crear		_	H	• × >>*	
Sedime	0,			3		SP	SAND, fine to medium grained, crear	ny speckled pale green.	-		>>×	-
				 			EOBH @ 3.0m, target depth. Test pit TP02 terminated at 3 metres.					
												- - - -
				 6								-
	etc											
soi bas	il des sed tes, s		and G ts ed san ed san sampl ole	eotechn nple 50r nple 63r e	nical Society nm diamete nm diamete	r	vane shear (kPa) ● remoulded × peak >>> peak greater than 200kPa UTP unable to penetrate water ■ 10/1/98 water level on date shown ■ waterinflow ■ wateroutflow	<b>moisture</b> D dry M moist W wet S saturated	Ì	consi VS F St VSt H	istency/ density in very soft soft firm stiff very stiff hard	dex VL very loose L loose MD medium dense D dense VD very dense

TRIAL PIT 13086AE GCRHAND AUGERS.GPJ COFFEY.GDT 14.4.14

C		off	E	₹	/ -					Tria	al Pit No.	
							rial Pit			She		1 of 1
	-	<u></u>		_	Lakes (						ject No:	GENZTAUC13086AE 31.1.2008
Clie		_1.		me	Lanes	2012	)				e started:	
	ncipa			<b>.</b>		<b>0</b> 4	0				e completed:	31.1.2008
Pro	ject:	:			Lakes S	-	-			Log	iged by:	GW
		location:		Driv	reway N	orth-	East of Lot 852			Che	ecked by:	RBT
-		nt type:					Pit Orientation:	Easting: 368170.85			R.L. Surface: n	
		on dimension ation infor		-	n wide	mate	Vane No: not specified	Northing: 800224.1	l4 m		Datum: Xy: WE	iOPC2000; RL: Moturiki
stratigraphy		notes			graphic log	classification symbol	Material Descrip Soil name; plasticity or grading, o components. Moisture, sensitivity, bedding, cementation, defects. Origin, Rock name, grain size & type, colou	colour, secondary strength. Structure, additional observations.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	structure and additional observations
stra	water	samples, tests, etc	RL	depth metres	grap	clas sym	minor components. Weathering, mois	ture, strength, defects.	con	con	255 50 100 175 175 175 175 175	
Colluvium	countered			- - 1_		ML	Sandy SILT, no plasticity, creamy blac sand is fine to medium grained.	k, speckled light brown;	М	F St-H	• × >>×	
ts	ot en			-		SP	SAND, fine to medium grained, black,	speckled light grey.			• ×	-
Sedimentary Deposits	groundwater not encountered			2 		ML	Sandy SILT, no plasticity, creamy stre	aked pale green.			• ×	-   -
Sediı				-	$\begin{pmatrix} \times & \times & \times \\ & \times & \times & \times \\ & \times & \times & \times \\ & & \times & \times$							-
				3	( `X, X,X) X · X · X ·		EOBH @ 3.0m, target depth					
				4 			Test pit TP03 terminated at 3 metres.					- - - - - - - - - - - - - - - - - - -
				-								-
	keto			6								
s b	oil de ased otes, <sup>50</sup> <sup>63</sup> s		and G ts ed sar ed sar samp ole	Beotechr nple 50i nple 63i le	nical Society mm diameter mm diameter	r	vane shear (kPa)         ●       remoulded         ×       peak         >>×       peak greater than 200kPa         UTP       unable to penetrate         water	<b>moisture</b> D dry M moist W wet S saturated		Cons VS S F St VSt H	sistency/ density ir very soft soft firm stiff t very stiff hard	idex VL very loose L loose MD medium dense D dense VD very dense

TRIAL PIT 13086AE GCRHAND AUGERS.GPJ COFFEY.GDT 14.4.14

L		off	E	ŻY	-					Tria	I Pit No.	TP04
							rial Pit			She Proj	et ect No:	1 of 1 <b>GENZTAUC13086AE</b>
Clie	ent:			The	Lakes	(2012	)			Date	e started:	31.1.2008
Prir	ncipa	al:								Date	e completed:	31.1.2008
Pro	ject:			The	Lakes	Stage	e 2qrst			Log	ged by:	GW
Tria	al pit	location:		Driv	ewav E	ast o	f Lot 852			Che	cked by:	RBT
		nt type:					Pit Orientation:	Easting: 368173.8	5 m		R.L. Surface: m	
Exca	avatio	on dimension:	s: ml	ong n	n wide		Vane No: not specified	Northing: 800224.	14 m		Datum: x/y: WB0	OPC2000; RL: Moturiki
ex	cava	ation infor	mati	on			erial substance					
stratigraphy	water	<b>notes</b> samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Descrip Soil name; plasticity or grading, components. Moisture, sensitivity, bedding, cementation, defects. Origin, Rock name, grain size & type, colou minor components. Weathering, mois	colour, secondary strength. Structure, additional observations. r, fabric, inclusions &	moisture condition	consistency/ density index	25 50 vane shear 100 (remoulded 125 /peak) kPa 175	structure and additional observations
Colluvium	red			-		SP	SAND, fine to medium grained, black grey.	creamy speckled light	М			- -
its	groundwater not encountered			<u>1</u>   -		SM	Silty SAND, fine to medium grained, t with wood inclusions.	black speckled, creamy,				-
/ Deposi	ater not e			-			- becoming creamy pale green					-
Sedimentary Deposits	groundwa			2 - - -		SP	SAND, fine to medium grained, crean	ny speckled green.	_			
				3			EOBH @ 3.0m, targt depth.					
				-			Test pit TP04 terminated at 3 metres.					-
				<u>4</u> -								-
				5								
				-								-
				6	-							_
S	keto	ch										
s b n U	oil de ased otes,		and G <b>s</b> ed san	eotechr 1ple 50r 1ple 63r	nical Society nm diamete nm diamete	r	vane shear (kPa) ● remoulded × peak ≫× peak greater than 200kPa UTP unable to penetrate water ▼ 10/1/98 water level	<b>moisture</b> D dry M moist W wet S saturated		cons VS S F St	<b>istency/ density ind</b> very soft soft firm stiff	<b>lex</b> VL very loose L loose MD medium dense D dense

		off	E	Ż	-					Tria	l Pit No.	TP05
				-			rial Pit			She Proi	et ject No:	1 of 1 <b>GENZTAUC13086AE</b>
Clie	ent:			The	Lakes (	(2012	)				e started:	31.1.2008
Pri	ncipa	al:			-					Date	e completed:	31.1.2008
	ject:			The	Lakes :	Stage	2arst				ged by:	GW
	-	location:				-	882 & Lot 883			-	ecked by:	RBT
	-	nt type:		Dou			Pit Orientation:	Easting: 368154.5	1 m	One	R.L. Surface:	
-		on dimensions	s: mlo	ong n	n wide		Vane No: not specified	Northing: 800205.	31 m		Datum: x/y: W	/BOPC2000; RL: Məturiki
ex	cava	ation infor	mati	on		mate	rial substance					
stratigraphy	water	<b>notes</b> samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Descrip Soil name; plasticity or grading, components. Moisture, sensitivity bedding, cemertation, defects. Origin, Rock name, grain size & type, colou minor components. Weathering, mois	colour, secondary strength. Structure, additional observations. r, fabric, inclusions &	moisture condition	consistency/ density index	<ul> <li>25 50 50 705 706</li> <li>vane shear 706</li> <li>remoulded 125</li> <li>/peak) kPa</li> <li>175</li> </ul>	structure and additional observations
U О	ered					SP	SAND, fine to medium grained, black		М			
Deposits P	groundwater not encountered			1 - -	<u>* * * * </u>	OL SP	PEAT, Organic SILT, dark brown, mo SAND, fine to medium grained, black brown, with trace silt.					 - - -
Sedimentary Deposits	groundwa			2 		SP	SAND, fine to medium grained, crear	ny speckled pale green.	_			 - - -
				3			EOBH @ 3.0m, target depth P=Peat C=Colluvium					
							Test pit TP05 terminated at 3 metres.					
				5								- - -
				- - 6								- - -
S	keto	ch										
							1	i	-i-			
s t n U	oil de based otes,		and G <b>s</b> ed sam ed sam	eotechn Iple 50r Iple 63r	nical Society nm diamete nm diamete	r	vane shear (kPa) ● remoulded >>> peak >>> peak greater than 200kPa UTP unable to penetrate water ▼ 10/1/98 water level	moisture D dry M moist W wet S saturated		cons VS S F St	sistency/ density very soft soft firm stiff	index VL very loose L loose MD medium dense D dense

	C	)	E	ŻY						Tria	al Pit No.	<b>TP</b> 06
							rial Pit			She Pro	eet ject No:	1 of 1 <b>GENZTAUC13086AB</b>
Clien	nt:			The	Lakes (	(2012	)				e started:	31.1.2008
Princ	cipal:									Dat	e completed:	31.1.2008
Proje	ect:			The	Lakes S	Stage	2qrst			Log	ged by:	GW
Trial	pit lo	cation:		Lot	884					Che	ecked by:	RBT
Equip	ment ty	ype:					Pit Orientation:	Easting: 368117.99	9 m		R.L. Surface:	n
		limensions		-	n wide		Vane No: not specified	Northing: 800200.1	15 m		Datum: x/y: WI	00PC2000; RL: Moturiki
exc	avati	on infor	mati	on			rial substance				- <b>7</b> m	
stratigraphy	atei	<b>notes</b> amples, ests, etc	RL	depth metres	graphic log	classification symbol	Material Descrip Soil name; plasticity or grading, components. Moisture, sensitivity, bedding, cementation, defects. Origin, Rock name, grain size & type, colou minor components. Weathering, mois	colour, secondary strength. Structure, additional observations. r, fabric, inclusions &	moisture condition	consistency/ density index	25 50 vane shear 75 (remoulded 120 (remoulded 150 /peak) kPa 175	structure and additional observations
ပ				_		SP	SAND, fine to medium grained, black	creamy speckled grey.	М			-
Sedimentary Deposits	groundwater not encountered			1 2 3	x x x x x x x x x x x x x x x x x x x	ML	SILT, no plasticity, light grey, creamy,		-			- - - - - - - - - - - - - - - - - - -
						SP	green/grey, with some wood. SAND, fine to medium grained, cream	y speckled green.	1			
				-			EOBH @ 3.3m, target depth C=Colluvium					-
				4  5			Test pit TP06 terminated at 3.3 metre:	5.				-    
				-								-
				6								-
Sk	etch											
<b>so</b> i ba	il descr sed on tes, san		and G	eotechn	ical Society	Inc 2005	vane shear (kPa) ● remoulded × peak >>× peak greater than 200kPa UTP unable to penetrate	<b>moisture</b> D dry M moist	Ť	cons VS S	sistency/ density in very soft soft	ndex VL very loose L loose

(		off	Fe	)	, 💙					Tria	al Pit No.	<b>TD</b> 07
							rial Pit			She		<b>TP07</b> 1 of 1
_		ginict	/ 1								ject No:	GENZTAUC13086AE
	ent:			The	Lakes (	(2012)	)				e started:	31.1.2008
Pri	ncipa	al:								Dat	e completed:	31.1.2008
Pro	oject:	:		The	Lakes \$	Stage	2qrst			Log	ged by:	GW
Tri	al pit	location:		Lot	874					Che	ecked by:	RBT
Equ	ipme	nt type:					Pit Orientation:	Easting: 368118.1	16 m		R.L. Surface:	m
_		on dimension ation info		-	n wide	mato	Vane No: not specified rial substance	Northing: 800179.	.32 m		Datum: x/y:W	/BOPC2000; RL: Moturiki
	Lav		linau				Material Descript	ion		. ×	8 년 교	
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Soil name; plasticity or grading, c components. Moisture, sensitivity, bedding, cementation, defects. Origin, a Rock name, grain size & type, colour minor components. Weathering, moist	olour, secondary strength. Structure, additional observations. , fabric, inclusions &	moisture condition	consistency/ density index	<ul> <li>25 50 50 50</li> <li>vane shear</li> <li>100</li> <li>(remoulded</li> <li>120</li> <li>(peak) kPa</li> <li>175</li> </ul>	structure and additional observations
ပ				-		SP	SAND, fine to medium grained, black	creamy speckled grey.	М			-
posits				<u>1</u>		SM	Silty SAND, fine to medium grained, b grey/brown, with abundant wood inclu-					-
Sedimentary Deposits	31/01/2008			2 <sup></sup>			- water seeping in site					- - -
Se	31/0			3	$\begin{pmatrix} \times & \times \\ \times & \times \\ \times & \times \\ & & \times & \times \\ & & & \times & \times$	SM	Silty SAND, fine to medium grained, c	reamy speckled green.				-
				-	-		EOBH @ 3.0m, target depth C=Colluvium Test pit TP07 terminated at 3 metres.					-
				4	-							-
					-							
				-								-
5	Sketo	ch		6								
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	otes, J <sub>50</sub> J <sub>63</sub> S		land G ts ed sar ed sar samp ple	Beotechr nple 50i nple 63i le	nical Society mm diamete mm diamete	r	vane shear (kPa)         ● remoulded         × peak         >>× peak greater than 200kPa         UTP unable to penetrate         water         ✓       10/1/98 water level on date shown         ►       waterinflow         ✓       wateroutflow	moisture D dry M moist W wet S saturated		Cons VS S F St VSt H	sistency/ density very soft soft firm stiff very stiff hard	index VL very loose L loose MD medium dense D dense VD very dense

U		off	E	₹y						Tria	I Pit No.	TP08
							rial Pit			She	et ect No:	1 of 1 <b>GENZTAUC13086AE</b>
Clie	nt:			The	Lakes (	2012	)				e started:	31.1.2008
Prin	cipa	al:				-				Date	e completed:	31.1.2008
Proj	ect:			The	Lakes S	Stage	2qrst			Log	ged by:	GW
-		location:				-	East of Lot 886			-	cked by:	RBT
		nt type:			<b>,</b>		Pit Orientation:	Easting: 368147.9	94 m		R.L. Surface: m	
Exca	vatic	on dimension	s: ml	ong n	n wide		Vane No: not specified	Northing: 800157	.58 m		Datum: x/y:WB	OPC2000; RL: Moturiki
exc	cava	ation info	rmati	on			rial substance				L 77 -	
stratigraphy	water	<b>notes</b> samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Descript Soil name; plasticity or grading, c components. Moisture, sensitivity, bedding, cementation, defects. Origin, a Rock name, grain size & type, colou minor components. Weathering, moist	colour, secondary strength. Structure, additional observations. r, fabric, inclusions &	moisture condition	consistency/ density index	25 50 vane shear 100 (remoulded 125 /peak) kPa 175	structure and additional observations
Colluvium				- - 1		SP	SAND, fine to medium grained, black with trace silt.	cream speckled grey,	М			-
Peat					ж ж ж ж ж ж ж ж ж ж к к к к к к к к к к	OL	PEAT, Organic SILT, no plasticity, fibr abundant organic inclusions.	ous, black, with				- - - -
SD				3		SP	<ul> <li>water seeping in from the side of test SAND, fine to medium grained, black, grey/brown.</li> <li>EOBH @ 3.0m, target depth SD=Sedimentary Deposits</li> </ul>	•				- - - -
				4_ 			Test pit TP08 terminated at 3 metres.					- - - - - - - - - - - - - 
				<u> </u>								
SI	ketc	ch		0								
so ba	oil de ased otes, 0 3		land G ts ed san ed san sampl ple	nple 50r nple 63r	ical Society nm diamete nm diamete	r	vane shear (kPa) ● remoulded × peak >>× peak greater than 200kPa UTP unable to penetrate water ↓ 10/1/98 water level on date shown waterinflow wateroutflow	<b>moisture</b> D dry M moist W wet S saturated		cons VS S F St VSt H	istency/ density in very soft soft firm stiff very stiff hard	dex VL very loose L loose MD medium dense D dense VD very dense

	off	C	7 Y						Tria	al Pit No.	TP09
Eng	ginee	eri	ng	Log	- T	rial Pit			She Pro	et ject No:	1 of 1 <b>GENZTAUC13086AB</b>
Client:			The	Lakes (	(2012	)			Dat	e started:	31.1.2008
Princip	al:								Dat	e completed:	31.1.2008
Project	-		The	Lakes S	Stage	2qrst			Log	ged by:	GW
-	t location:				-	f Lot 886			-	ecked by:	RBT
Equipme						Pit Orientation:	Easting: 368159.	11 m		R.L. Surface:	
Excavati	on dimension	s: mlo	ong n	n wide		Vane No: not specified	Northing: 800167	'.7 m		Datum: x/y:Wi	90PC2000; RL: Moturiki
excav	ation info	rmati	on		mate	rial substance					
stratigraphy water	<b>notes</b> samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Descript Soil name; plasticity or grading, c components. Moisture, sensitivity, bedding, cementation, defects. Origin, a Rock name, grain size & type, colour minor components. Weathering, moist	olour, secondary strength. Structure, dditional observations. , fabric, inclusions &	moisture condition	consistency/ density index	25 50 vane shear 75 (remoulded 126 /peak) kPa 175	structure and additional observations
Colluvium			-		SP	SAND, fine to medium grained, black o brown/grey, trace silt.		M			-
			<u>1</u>   -   -	ж ж ж ж ж ж ж к к к к к к к к к к к к к	OL	PEAT, Organic Sandy SILT, no plastic with abundant rootlets & wood.	ty, dark brown/black				
Peat			2 <sup>_</sup>	×××× ×××××× ××××××××××××××××××××××××××							-  -
31/01/2008 ▼			3	<u>*</u> * * **	SP	- water seeping out of wall SAND, fine to medium grained, cream	y speckled pale green.	W			-
31			 4	-		EOBH @ 3.3m, target depth SD=Sedimentary Deposits Test pit TP09 terminated at 3.3 metres					- -  -
				-							- - - -
			 6	-							
Sket											
<b>soil d</b> based		land G ts ed sam ed sam sampl ple	eotechr nple 50r nple 63r e	nical Society nm diamete nm diamete	r	vane shear (kPa)         • remoulded         × peak         >>> peak greater than 200kPa         UTP unable to penetrate         water         ✓       10/1/98 water level on date shown         ▶       waterinflow         ✓       wateroutflow	moisture D dry M moist W wet S saturated		cons VS S F St VSt H	sistency/ density in very soft soft firm stiff t very stiff hard	ndex VL very loose L loose MD medium dense D dense VD very dense

(	2	off	F	21	, 🤊							
											I Pit No.	<b>TP10</b>
	n	ginee	eri	ng	Log	- 1	rial Pit			She Proj	et ect No:	1 of 1 GENZTAUC13086AE
Cli	ent:			The	Lakes	(2012)	)			Date	e started:	31.1.2008
Pri	ncip	al:								Date	e completed:	31.1.2008
Pro	oject	:		The	Lakes	Stage	2qrst			Log	ged by:	GW
Tri	al pi	t location:		Bou	ndary o	of Lot	885 & Lot 886			Che	cked by:	RBT
Equ	ipme	ent type:					Pit Orientation:	Easting: 368140.74	4 m		R.L. Surface: m	1
_		on dimension ation info		-	n wide	mate	Vane No: not specified rial substance	Northing: 800171.	77 m		Datum: x/y:WB	OPC2000; RL: Moturiki
	Cav		linati				Material Descrip	tion		~ ×	ar ed	
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Soil name; plasticity or grading, components. Moisture, sensitivity, bedding, cementation, defects. Origin, Rock name, grain size & type, colou minor components. Weathering, mois	colour, secondary strength. Structure, additional observations. r, fabric, inclusions &	moisture condition	consistency/ density index	25 50 vane shear 100 (remoulded 150 /peak) kPa 175	structure and additional observations
Colluvium						SP	SAND, fine to medium grained, black brown/grey, with trace silt.	speckled light	M			- - - - - - -
SD	_			2 		SP	SAND, fine to medium grained, black	speckled creamy grey.				-
				<u>3</u>	- - -		EOBH @ 2.5m, target depth SD=Sedimentary Deposits Test pit TP10 terminated at 2.5 metres	5.				
				4								
				5_								-
				6	-							-
יי ר נ	otes, J <sub>50</sub> J <sub>63</sub> Ss		land G ts ed sar ed sar samp ple	eotechr nple 50r nple 63r le	nical Society nm diamete nm diamete	r	vane shear (kPa) remoulded × peak >>> peak greater than 200kPa UTP unable to penetrate water ↓ 10/1/98 water level on date shown waterinflow wateroutflow	<b>moisture</b> D dry M moist W wet S saturated		cons VS S F St VSt H	sistency/ density in very soft soft firm stiff very stiff hard	dex VL very loose L loose MD medium dense D dense VD very dense

		off														
(		OII	E	}	-					Tria	Pit N	lo.		TP1	1	
E	ng	ginee	eri I	ng	Log	- T	rial Pit			She				1 CEN	of 1 <b>ZTAUC13</b>	006 A E
	ent:	-			Lakes						ect No e start			<u>31.1.</u>		UOUAL
	ncipa	al:				,						pleted	:	31.1.		
	ject:			The	Lakes	Stage	2arst				ged by	-		GW		
	-	location:				_	ry of Lot 889				cked			RBT		
		nt type:					Pit Orientation:	Easting: 368139.7	76 m			Surface	n, m			
		on dimension			n wide		Vane No: not specified	Northing: 800117	′.39 m		Datu	n:x/y∷	WBOPC	2000; RL:	Məturiki	
ex	cava	ation info	mati	on			rial substance				<u>د</u> ت	2 m				
stratigraphy	water	<b>notes</b> samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description Soil name; plasticity or grading, colo components. Moisture, sensitivity, stre bedding, cementation, defects. Origin, addi Rock name, grain size & type, colour, fal minor components. Weathering, moisture,	ur, secondary ngth. Structure, tional observations. bric, inclusions &	moisture condition	consistency/ density index	25 50 Vane shear 100 (remoulded	125 /peak) kP			icture and al observations	6
υ				-		SP	SAND, fine to medium grained, creamy sp	eckled grey.	М							_
						SM	Silty SAND, fine to medium grained, black light brown, with abundant wood.	< creamy speckled								
SD				2 		SP	SAND, fine to medium grained, black crea	amy speckled light								-
	/2008			<u>3</u>	× ×	SM	- water seeping in Silty SAND, fine to medium grained, crea	my speckled pale	W							-
	31/01						green. EOBH @ 3.3m, target depth C=Colluvium SD=Sedimentary Deposits Test pit TP11 terminated at 3.3 metres.									-
				<u>5</u>	-											
				-	-											-
				6	-											
9 1 1 1	otes,		land G ts ed san ed san sampl ple	nple 50 nple 63 nple 63	nical Society mm diamete mm diamete	r	vane shear (kPa)         ●       remoulded         ×       peak         >>×       peak greater than 200kPa         UTP       unable to penetrate         water       10/1/98 water level on date shown         ▶       waterinflow         ✓       wateroutflow	<b>moisture</b> D dry M moist W wet S saturated		cons VS S F St VSt H	v s fi s v	<b>/ densi</b> t ery soft oft irm tiff ery stiff lard		VL L MD D VD	very loose loose medium den dense very dense	se

(	2	off	F	)	, 🤊							
											I Pit No.	<b>TP12</b>
E	n	ginee	eri	ng	Log	- 1	rial Pit			She Proj	et ect No:	1 of 1 GENZTAUC13086AE
Clie	ent:			The	Lakes (	(2012)	)			Date	e started:	31.1.2008
Pri	ncip	al:								Date	e completed:	31.1.2008
Pro	oject	:		The	Lakes	Stage	2qrst			Log	ged by:	GW
Tria	al pi	t location:		Sou	th-Wes	t Cori	ner of Lot 889			Che	cked by:	RBT
Equ	ipme	ent type:					Pit Orientation:	Easting: 368121.6	m		R.L. Surface: r	n
		on dimension		-	n wide	moto	Vane No: not specified	Northing: 800100.9	)1 m		Datum: x/y: WI	00PC2000; RL: Moturiki
	cav	ation info	mati				Material Descript	ion		. ×	a ਹੋ ਕ	
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Soil name; plasticity or grading, c components. Moisture, sensitivity, y bedding, cementation, defects. Origin, a Rock name, grain size & type, colour minor components. Weathering, moist	olour, secondary strength. Structure, dditional observations. fabric. inclusions &	moisture condition	consistency/ density index	<sup>25</sup> <sup>55</sup> <sup>75</sup> <sup>70</sup> <sup>70</sup> <sup>70</sup> <sup>725</sup> <sup>700</sup> <sup>700</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>710</sup> <sup>71</sup>	structure and additional observations
Colluvium				- - - 1_ -	* * * * *	SP	SAND, fine to medium grained, cream		М			- - - - -
SD				2 		ML	SILT, no plasticity, light brown. creamy trace fine sand.	, with abundant wood &				- - - - - - - - - - - - - - - - - - -
	31/01/2008			3	* * * * * * * * * * * * * * * * * *	SM	- water seeping into test pit Silty SAND, fine to medium grained, cr green.	eamy speckled pale	W			-
				<u>4</u>			EOBH @ 3.3m, target depth. Test pit TP12 terminated at 3.3 metres					
				<u>5</u>	-							-
				6	-							-
	6ket											
ייייייייייייייייייייייייייייייייייייי	otes, J <sub>50</sub> J <sub>63</sub> J <sub>63</sub> J <sub>63</sub> J <sub>63</sub>		land G ts ed sar ed sar samp ple	Beotechr nple 50i nple 63i le	nical Society nm diamete nm diamete	r	vane shear (kPa)         ● remoulded         × peak         >>× peak greater than 200kPa         UTP         unable to penetrate         water         ✓       10/1/98 water level on date shown         ►       waterinflow         ✓       wateroutflow	moisture D dry M moist W wet S saturated		cons VS S F St VSt H	<b>istency/ density ir</b> very soft soft firm stiff very stiff hard	ndex VL very loose L loose MD medium dense D dense VD very dense

	off	C	7 y						Tria	l Pit No.	TP13
						rial Pit			She Proj	et ject No:	1 of 1 <b>GENZTAUC13086AB</b>
Client:			The	Lakes (	2012	)			-	e started:	31.1.2008
Princip	oal:								Date	e completed:	31.1.2008
Project			The	Lakes S	Stage	2arst				ged by:	GW
-			Lot		<u>-</u>				-		RBT
	it location: ent type:		LUL	007		Pit Orientation:	Easting: 368136.6	30 m	Che	R.L. Surface: m	
	ion dimension	s ml	ona n	n wide		Vane No: not specified	Northing: 800145				OPC2000; RL: Moturiki
	vation infor		-		mate	erial substance	Noranng. 666116	.01111		Balam. xy. WB	
stratigraphy water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Descrip Soil name; plasticity or grading, components. Moisture, sensitivity bedding, cementation, defects. Origin, Rock name, grain size & type, colo minor components. Weathering, moi	colour, secondary , strength. Structure, additional observations. .r, fabric, inclusions &	moisture condition	consistency/ density index	25 55 vane shear 100 (remoulded 155 (peak) kPa 175	structure and additional observations
31/01/2008 ♥					SM SP SM	Silty SAND, fine to medium grained, light brown. SAND, fine to medium grained, black - water seeping into test pit Silty SAND, fine to medium grained, i green. EOBH @ 2.5m, target depth SD=Sedimentary Deposits Test pit TP13 terminated at 2.5 metre	speckled grey.	M W			- - - - - - - - - - - - - - - - - - -
Sket	tch		6								-
<b>soil d</b> based		land G ts ed san ed san sampl ple	eotechn nple 50n nple 63n e	ical Society nm diametei nm diametei	r	vane shear (kPa) 5 remoulded × peak >>× peak greater than 200kPa UTP unable to penetrate water ↓ 10/1/98 water level on date shown ↓ waterinflow wateroufflow	moisture D dry M moist W wet S saturated		cons VS S F St VSt H	sistency/ density in very soft soft firm stiff very stiff hard	dex VL very loose L loose MD medium dense D dense VD very dense

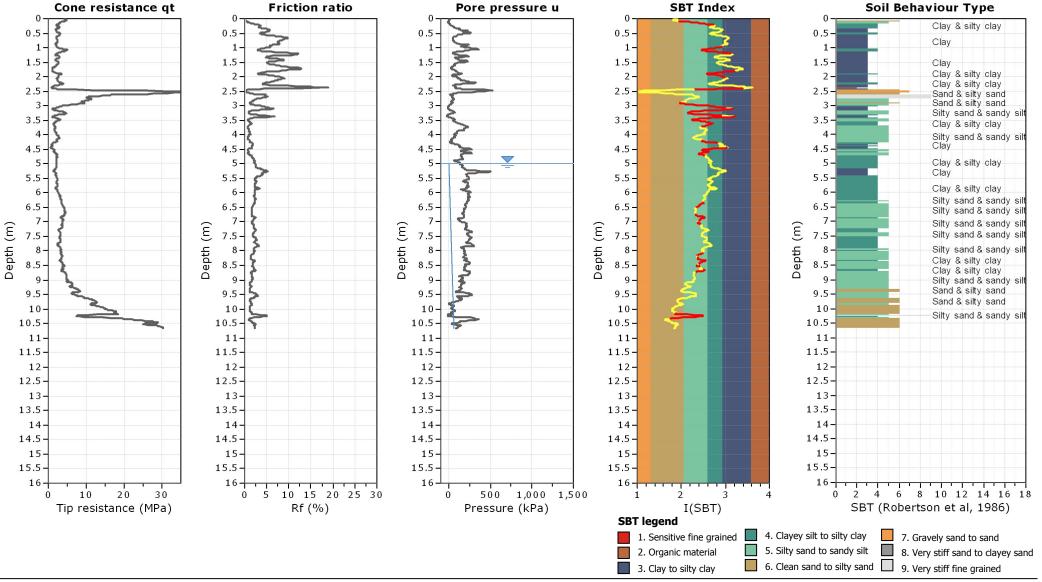


**Coffey** 96 Cameron Road, Tauranga 3110 New Zealand

## Project: GENZTAUC13086AE - THE LAKES STAGE 2QRST EARTHWORKS Location: TAURANGA

CPT: CPT-11

Total depth: 10.67 m, Date: 28/11/2012 Surface Elevation: 16.00 m Coords: X:0.00, Y:0.00 Cone Type: 50 MPa Piezocone Cone Operator: Ground Investigation



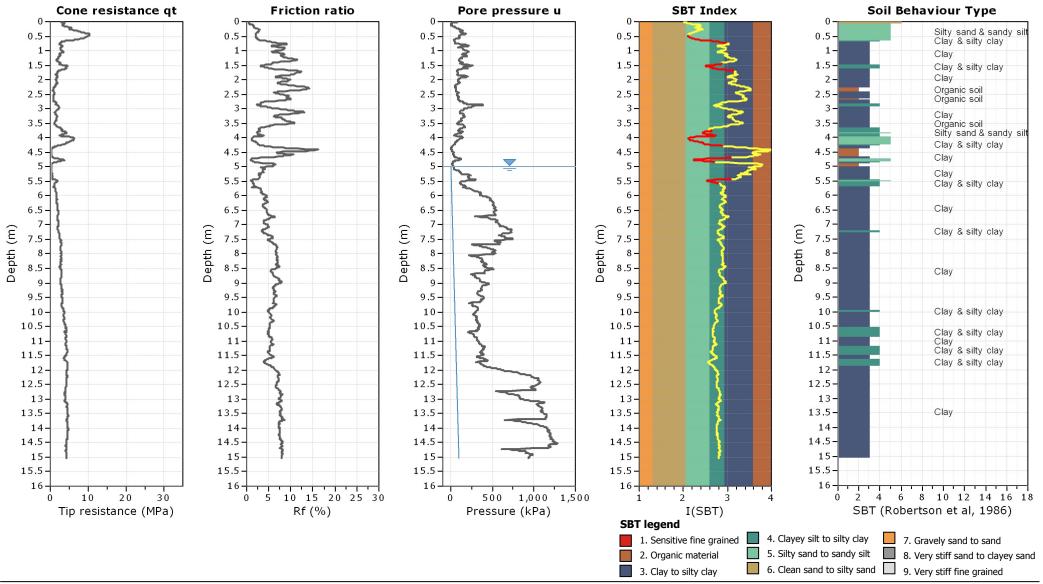


**Coffey** 96 Cameron Road, Tauranga 3110 New Zealand

## Project: GENZTAUC13086AE - THE LAKES STAGE 2QRST EARTHWORKS Location: TAURANGA

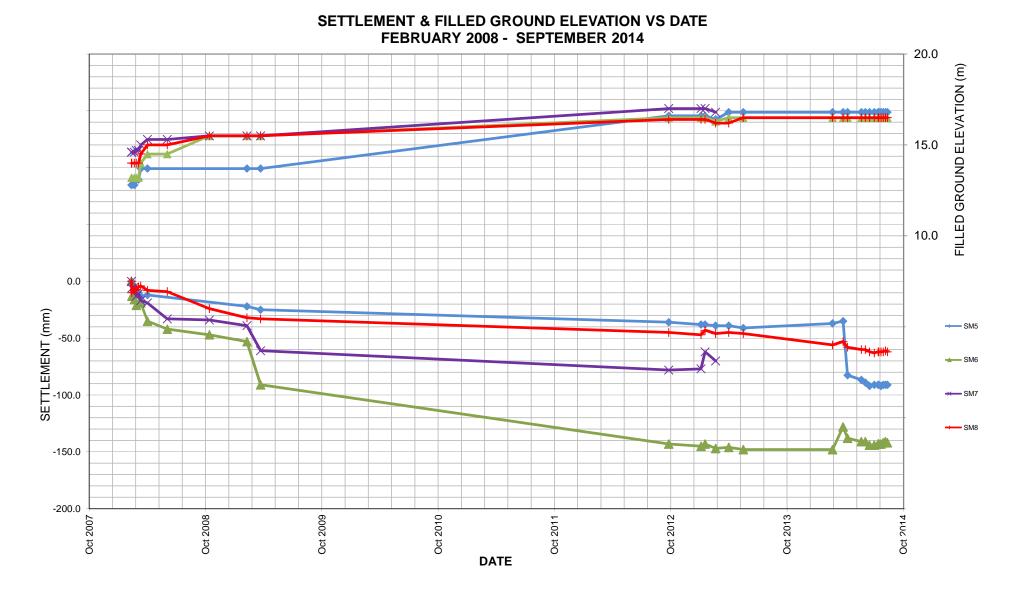
CPT: CPT-12

Total depth: 15.02 m, Date: 28/11/2012 Surface Elevation: 17.00 m Coords: X:0.00, Y:0.00 Cone Type: 50 MPa Piezocone Cone Operator: Ground Investigation



Appendix D - Settlement Monitoring Data

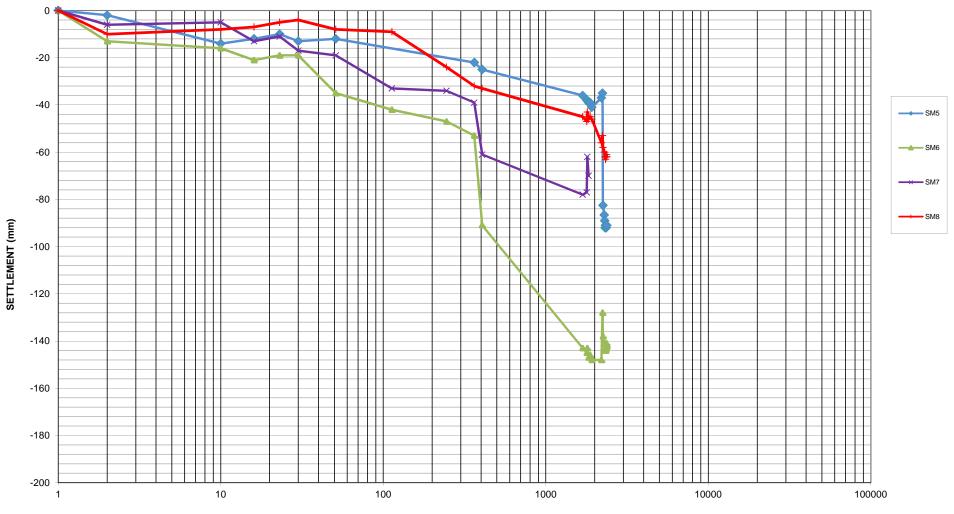




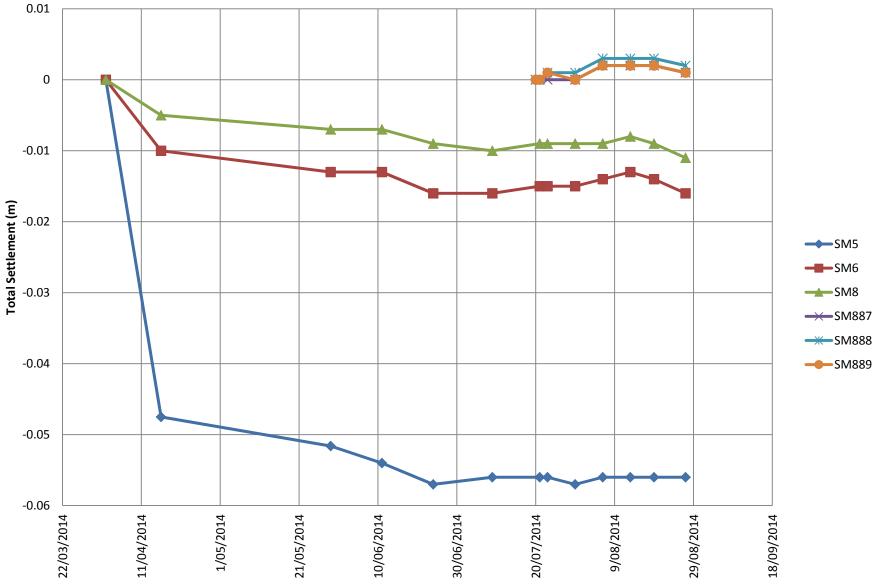


## THE LAKES (2012) LTD THE LAKES STAGE 2T LOTS 887-889 GEOTECHNICAL COMPLETION REPORT

**SETTLEMENT VS TIME (Log Scale)** 



TIME (days, Log scale)



## **Total Settlement vs Time**

This page has been left intentionally blank