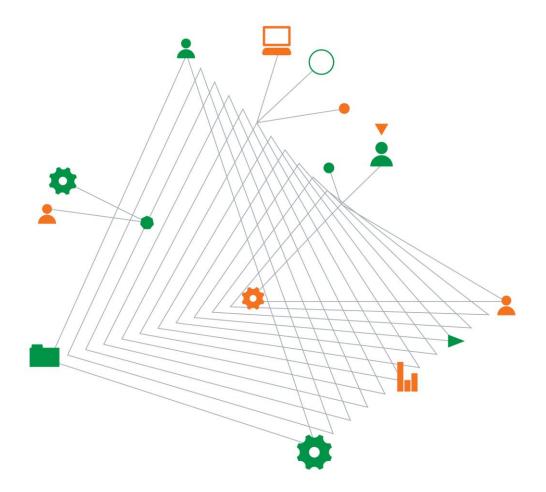


The Lakes (2012) Ltd

The Lakes - Stages 3E & 3M

Geotechnical Completion Report (Revision 1)

26 August 2016



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

The Lakes - Stages 3E & 3M

Prepared for The Lakes (2012) Ltd C/- Harrison Grierson Consultants Ltd Level 1 Harrison Grierson House 141 Cameron Road Tauranga

Prepared by Coffey Geotechnics (NZ) Ltd 96 Cameron Road, Tauranga Tauranga Central 3110 New Zealand t: +64 7 577 4286

26 August 2016

Document authorisation

Our ref: GENZTAUC13086AP-AI (Rev 1)

For and on behalf of Coffey

Robert Telford Senior Engineering Geologist

Quality information

Revision history

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1. INTRODUCTION AND SCOPE

Revision 1 – this document is a revision of a previous Geotechnical Completion Report for The Lakes Stage 3E issued on 24 June 2016. This original report has been updated to include the two lots within Stage 3M.

This Geotechnical Completion Report (GCR) has been prepared by Coffey Geotechnics (NZ) Ltd (Coffey) for the Lakes (2012) Limited following completion of earthworks for Stages 3E and 3M of the Lakes Subdivision and in general accordance with the conditions of Council resource consent number RC21332.

This GCR contains the results of site investigations together with as-built plans derived from Harrison Grierson Consultants Ltd (HGCL) topographical data. It describes bulk earthworks completed during the 2007-2008, 2013-2014 and 2014-2015 earthworks seasons.

The extent of earthworks observed by Coffey is shown on the appended plans (Figures 1 to 6, Appendix A). A Statement of Professional Opinion (Form G2) and Summary of Technical Data (Form G3) for the works described herein are also appended.

2. DESCRIPTION OF SUBDIVISION

Stages 3E and 3M of the Lakes subdivision are located near the intersection of Pyes Pa Road and Takitimu Drive (State Highway SH26) in Pyes Pa, Tauranga. The site location and original ground contours are shown on Figure 1.

Before work began, the majority of the site consisted of a flat or gently rolling north-south oriented plateau at approximately RL 60m (Moturiki Datum, 1953). During the 2007 to 2008 earthworks season, excavation of the elevated plateau was undertaken in the southern extent of Stage 3E and also within lots 352 to 355 to the west. Contours of the works completed are shown on Figure 2. The finished ground surface (surveyed in 2012) is shown on Figure 3.

In 2012 ownership of the Lakes subdivision passed from Grasshopper Farms Ltd to The Lakes (2012) Ltd. Further earthworks were completed during the 2013-2014 and 2014-2015 work seasons, for which additional excavation was undertaken on the plateau in Stages 3E and 3M. Minor filling was placed within the road reserve at the northern end of 3E. Combined cut/fill contours for the 2013-2014 and 2014-2015 earthworks are shown on Figure 4 in Appendix A.

Civil infrastructure for these stages of the subdivision was installed in 2015 and 2016. The finished (March 2016) ground surface is shown on Figure 5 at approximately RL 58m in the southern region of Stage 3E and increasing gently to approximately RL 60m in the northern end of 3E and 3M.

3. RELATED REPORTS

The following documents were prepared prior to or during the design and development of Stages 3E:

- 1. 'Pyes Pa West Urbanisation Development, Tauranga Geotechnical Assessment Report', report prepared by S&L Consultants Ltd (Ref: 16944, dated October 2003).
- 2. 'Detailed Site Investigation for the Lakes Subdivision Stage 3, Takitimu Drive, Tauranga', report prepared by Coffey Environments (Ref: ENNZAUCK51132AA, dated 21 March 2013).
- 3. 'Geotechnical Investigation Report for the Lakes Subdivision Stage 3 (Phase 1) at Pyes Pa, Tauranga', report prepared by Coffey (Ref: GENZTAUC13086AF-AA, dated 29 April 2013).

- 4. *'Summary of Works Report, The Lakes, Stage 3, Tauranga'* report prepared by Coffey Environments (Ref: ENNZAUCK51132AB, dated 7 April 2014).
- 5. 'Geotechnical Investigation Report for the Lakes Subdivision Stage 3 Zone 2 at Pyes Pa, Tauranga', report prepared by Coffey (Ref: GENZTAUC13086AK-AC, dated 7 April 2014).
- 6. 'The Lakes Subdivision Stage 3 Zone 1 Earthworks Completion Report', report prepared by Coffey (Ref: GENZTAUC13086AF-AE, dated 15 August 2014).

Key conclusions of the main documents are summarised below.

3.1. Geotechnical Assessments

The original geotechnical assessment for the Lakes subdivision was completed by S&L Consultants Ltd and contained an overview of geotechnical conditions for the entire Lakes project. The report concluded that the site was generally adequate for subdivision and residential development, subject to appropriate design and construction.

Subsequent geotechnical investigation reports by Coffey in April 2013 and April 2014 summarised additional investigations that were completed to specifically assess the Stage 3 area. These investigations generally confirmed the S&L conclusion that the site was adequate for subdivision.

3.2. Contaminated Soils Report

Due to the presence of farm buildings and facilities on the original site, Coffey was also engaged to conduct an environmental assessment of the proposed development area. The results of this assessment were described in the Coffey Environments report of March 2013 (Section 3, reference 2). This report identified isolated areas of possibly contaminated soil at the sites of a (suspected) pre-existing sheep dip, an above-ground fuel storage tank and a diary effluent pond.

Further investigation at the suspected sheep dip site did not find evidence of significant soil contamination in this area. Soils beneath the fuel storage tank and the effluent pond were sub-excavated during the early stage of earthworks in 2013 and were buried beneath road areas within the development area as required by the Environmental Management Plan. This work was observed and results presented by Coffey Environments in the Summary of Works Report of April 2014 (Section 3, reference 4).

3.3. Earthworks Completion Report

The August 2014 Earthworks Completion Report (ECR) concluded that the bulk earthworks undertaken in 2007-2008 and 2013-2014 were generally completed in accordance with the relevant standards and guidelines including NZS 4431 (Code of Practice for Earth Fill for Residential Development) and the Tauranga City Council Infrastructure Development Code (TCC IDC).

The ECR also referred to the presence of subsurface erosion features ('tomos') found in other stages of the Lakes Subdivision, indicating soils below the plateau may be subject to erosion and scouring. While 'tomos' have not been observed within Stage 3E, it is possible erosional features may be encountered during construction on these lots.

4. INVESTIGATIONS COMPLETED

Geotechnical investigations have been undertaken on this and adjacent sites during each stage of the Lakes subdivision's design and construction, including five test pits that were excavated in 2012 within or near Stage 3E to depths of up to 6m to assess shallow ground conditions before the 2013-2014 work season (Coffey, TP04 – TP08 on Figure 3). Logs are included in Appendix C.

On completion of the bulk earthworks in 2016, Coffey drilled a total of 40 hand-auger boreholes to target depths of 2m or 2.5 on approximately every second lot to confirm finished subgrade conditions. The location of each borehole is shown on Figure 5. Although not shown on the plan, the boreholes are numbered according to the relevant lot number. For example, the hand auger borehole on Lot 352 in Stage 3E is referred to as HAL352. Where two hand auger boreholes occur on the same lot, they are appended with the letter A and B. Logs of these boreholes are included in Appendix D.

5. OVERVIEW OF GEOLOGICAL CONDITIONS

The subject area is located on an elevated, gently sloping plateau. Below the topsoil layer, the predevelopment soil profile across this plateau comprised of volcanic ashes including the Hamilton Ash and Rotoehu Ash. This ash sequence is common throughout the Tauranga area. At this location the volcanic ashes overlie ancient alluvial deposits of the Matua Sub-Group and weakly cemented pumice sands of the Te Ranga Ignimbrite.

Excavations in 2007-2008 and 2013-2014 reduced the thickness of the volcanic ashes across most of the plateau by up to 7m. The subsoils below many of the finished lots therefore comprise volcanic ash silts but in some areas excavations have penetrated through the ash layers and the finished lots are underlain by variable Matua Sub-Group soils. These include silts, sands and clays which can be highly sensitive to reworking.

6. EARTHWORKS OPERATIONS

6.1. Plant

Earthworks during the 2007-2008 season were completed by Bob Hicks Earthmovers Ltd. The contractor for the 2013-2014 and 2014-2015 seasons was JMC Civil Construction Ltd.

The main items of plant used during each of the bulk earthworks phase comprised Terex motorscrapers and bulldozer or tractor towed 'scoops', hydraulic excavators, bulldozers, articulated allterrain dump trucks (ADT's) and sheep's-foot rollers.

6.2. Construction Programme

Earthworks in 2007 and 2008 summer included excavations of up to 4m depth on the main plateau as shown on Figure 2.

In 2010, work on the Lakes subdivision site ceased under the original developer, Grasshopper Farms Ltd, when that company went into receivership. Records from this time are incomplete until work started again on site under The Lakes (2012) Ltd in 2012.

During the 2013-2014 and 2014-2015 earthworks seasons, the remaining earthworks were completed to form the current ground surface, including excavation of up to 6m depth within Stage 3E and approximately 1m in Stage 3M. As mentioned above, minor filling was also placed within the road reserve at the norther end of 3E at this time. Cut and fill contours for this period are shown on Figure 4 and the finished ground surface is shown on Figure 5.

We note the cut/fill contours are shown at 1m vertical intervals. As such, fill depths of less than 1m will not appear on this plan. It is understood minor filling was completed to 'fine-tune' the finished landform and fill materials were observed in the post-development boreholes on Lots 390, 392 and 404. Fill depths shown in the *G3* – *Summary of Geotechnical Data For Individual Lots* table, allow for minor earthworks shown in these areas.

Several pre-existing farm buildings and facilities were removed from site at this time. This included the sub-excavation and disposal of contaminated soils from areas around the buildings in accordance with the 2014 Summary of Works Report.

7. QUALITY CONTROL

7.1 Fill Control

The finished ground profile within the Stage 3E and 3M areas is almost entirely formed by excavation, with only minor filling placed in 2015 and 2016 to fine-tune the finished level. No laboratory testing was therefore undertaken on fills within the subject area. The minor fill materials observed onsite have been assessed using undrained shear strength measurements in the post-development hand auger boreholes.

8. ENGINEERING EVALUATION AND RECOMMENDATIONS

8.1 Fill Quality

Based on hand auger investigations, results indicate that the minor fill observed on parts of the site has been compacted to adequate standard (greater than 150kPa).

8.2 Static Settlement

As the entire site is now between 1m and 6m below original ground level, static settlement is not considered to be of concern within Stages 3E or 3M of the Lakes Subdivision.

8.3 Slope Stability

Similarly, it is considered that Stage 3E and 3M are not situated in proximity to a slope that may have an adverse effect on the site.

8.4 Foundation Design & Bearing Capacity

Most of the lots discussed in this GCR are underlain by natural volcanic soils which have been exposed by excavation. While the large majority of tests and investigations in these soils indicate they are adequate for standard shallow foundations, areas of relatively weak or sensitive materials have also been encountered in the post-development hand-auger boreholes.

It is therefore recommended that dwellings on the new lots be supported on pod-raft type foundations (e.g. 'rib-raft') which have been designed for a geotechnical ultimate bearing capacity of 200kPa. The ground conditions under many of these lots should also be adequate for standard foundations designed in accordance with NZS 3604, however this would need to be confirmed by specific site investigation at the building consent stage.

It should be understood that due to the volcanic nature of the natural soils on this site, it is possible that local soil conditions may vary from those discussed above. Some soils observed onsite are also potentially prone to sub-surface erosion (e.g. 'tomos). It is therefore important that any potentially soft or unsuitable soils encountered in the foundation excavations are brought to the attention of a geotechnical professional.

8.5 Stormwater Management

To further reduce the potential for surface and sub-surface erosion, all stormwater from impervious areas within the development will need to be carefully collected and piped to a safe disposal point or to the reticulated network. Particular care should be taken to avoid areas of ponded stormwater or concentrated flows around and under buildings or structures.

9. CONCLUSION

Based on the observations and investigations presented in this report and with some reliance on the diligence of the earthworks contractors, it is concluded that the earthworks and subdivision of Stages 3E and 3M have been completed in general accordance with our previous recommendations and current Tauranga City Council Infrastructure Development Code.

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

Report Prepared By:

R TELFORD TCC Category 2 Geotechnical Engineer

Report Reviewed By:

D SULLIVAN Principal Geotechnical Engineer



Important information about your Coffey Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give

preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.



Important information about your Coffey Report

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.

Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

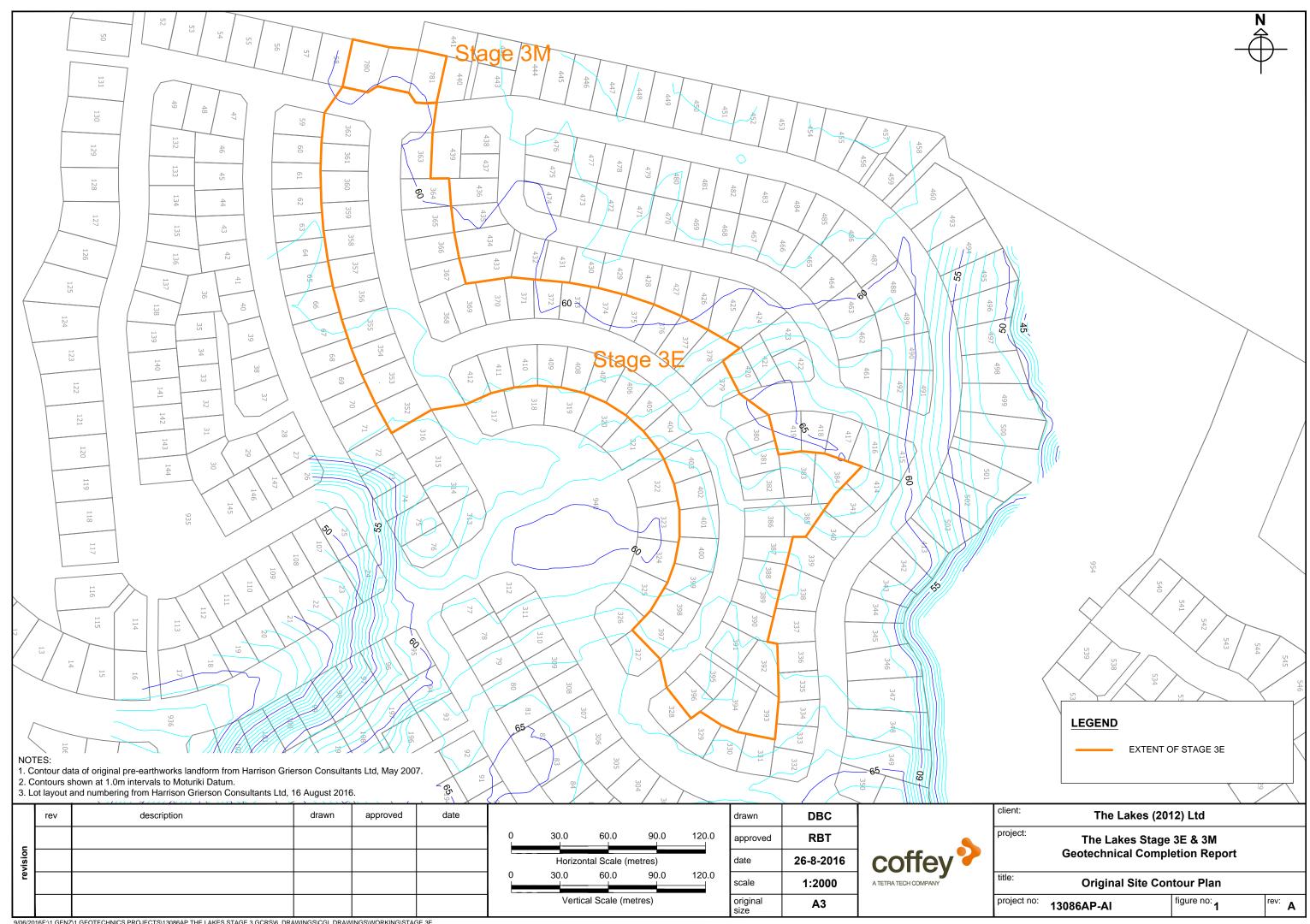
Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical information in Construction Contracts" published by the Institution of Engineers Australia, National headquarters, Canberra, 1987.

Appendix A - Figures



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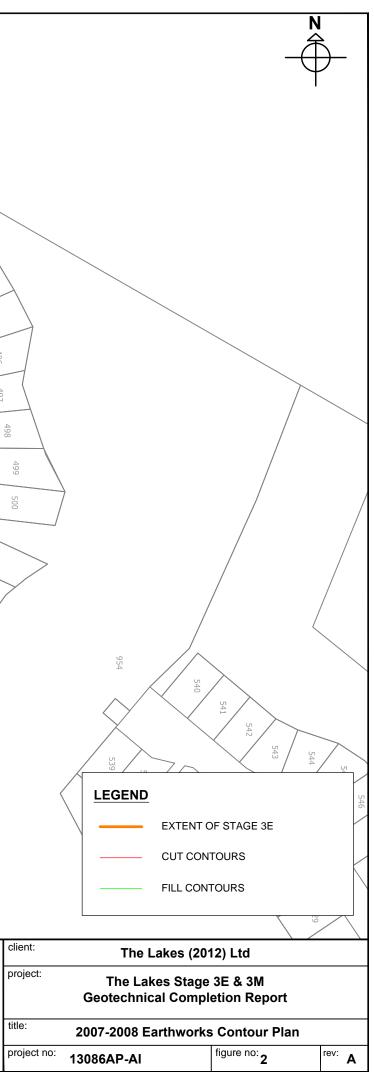
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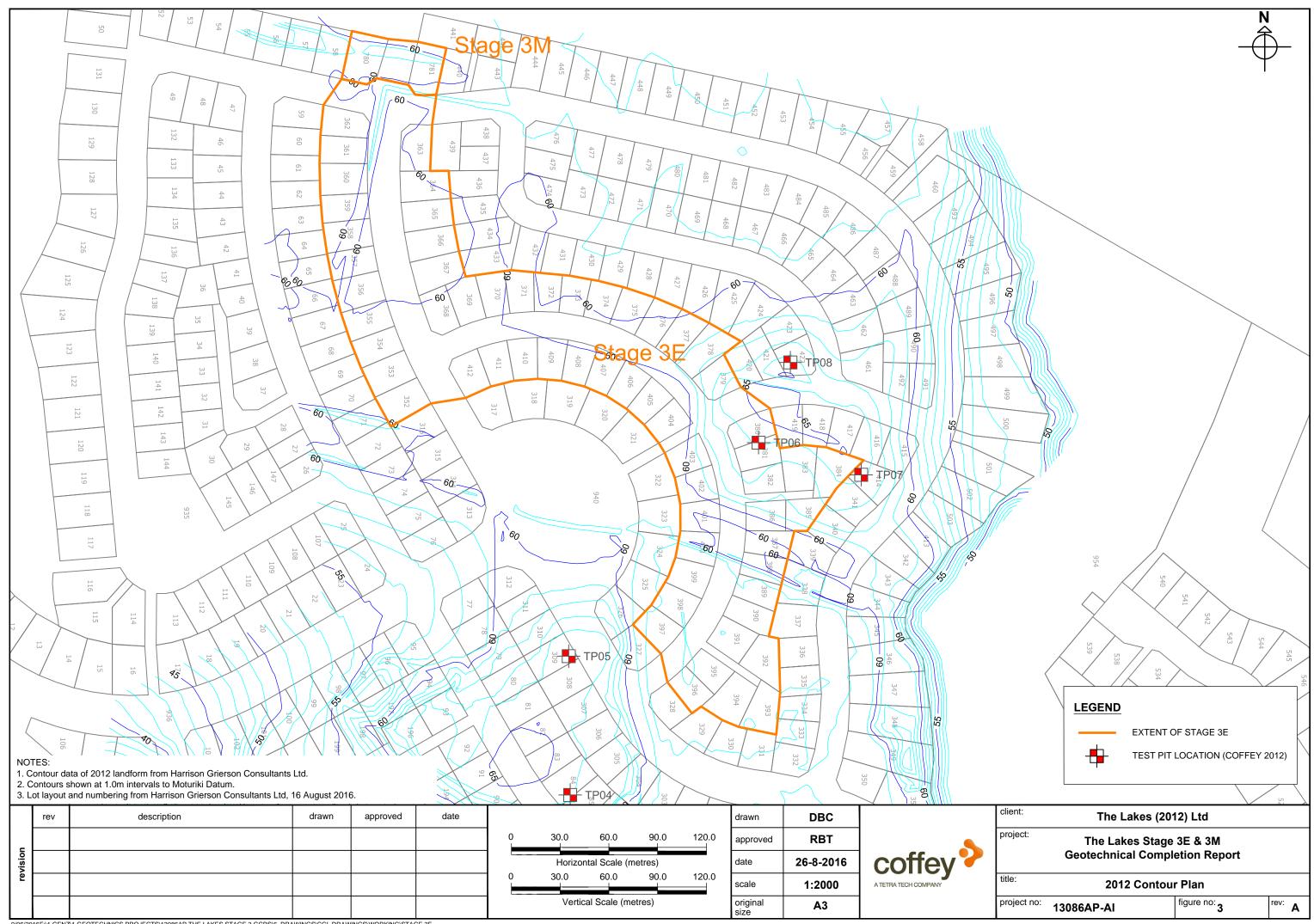
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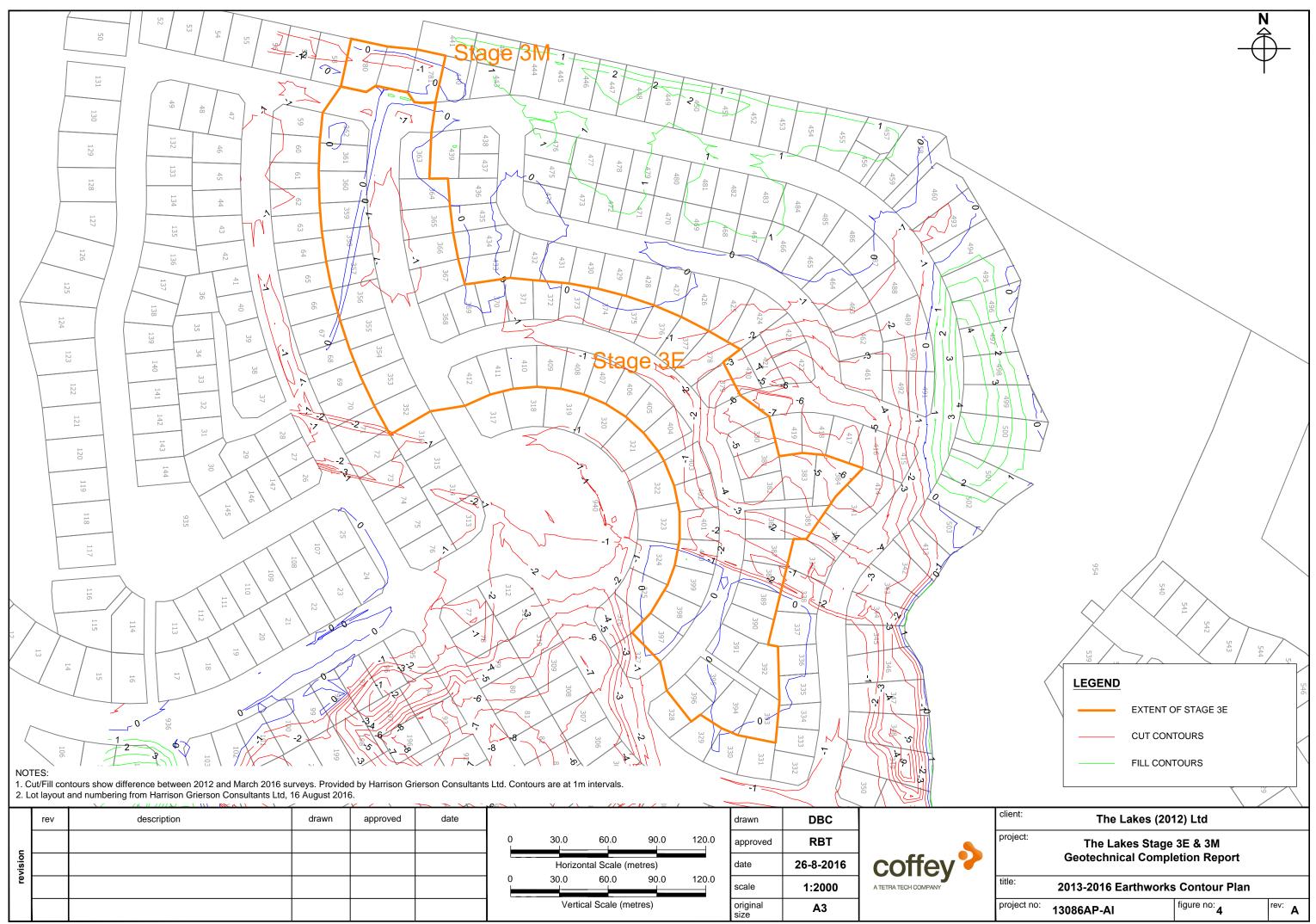
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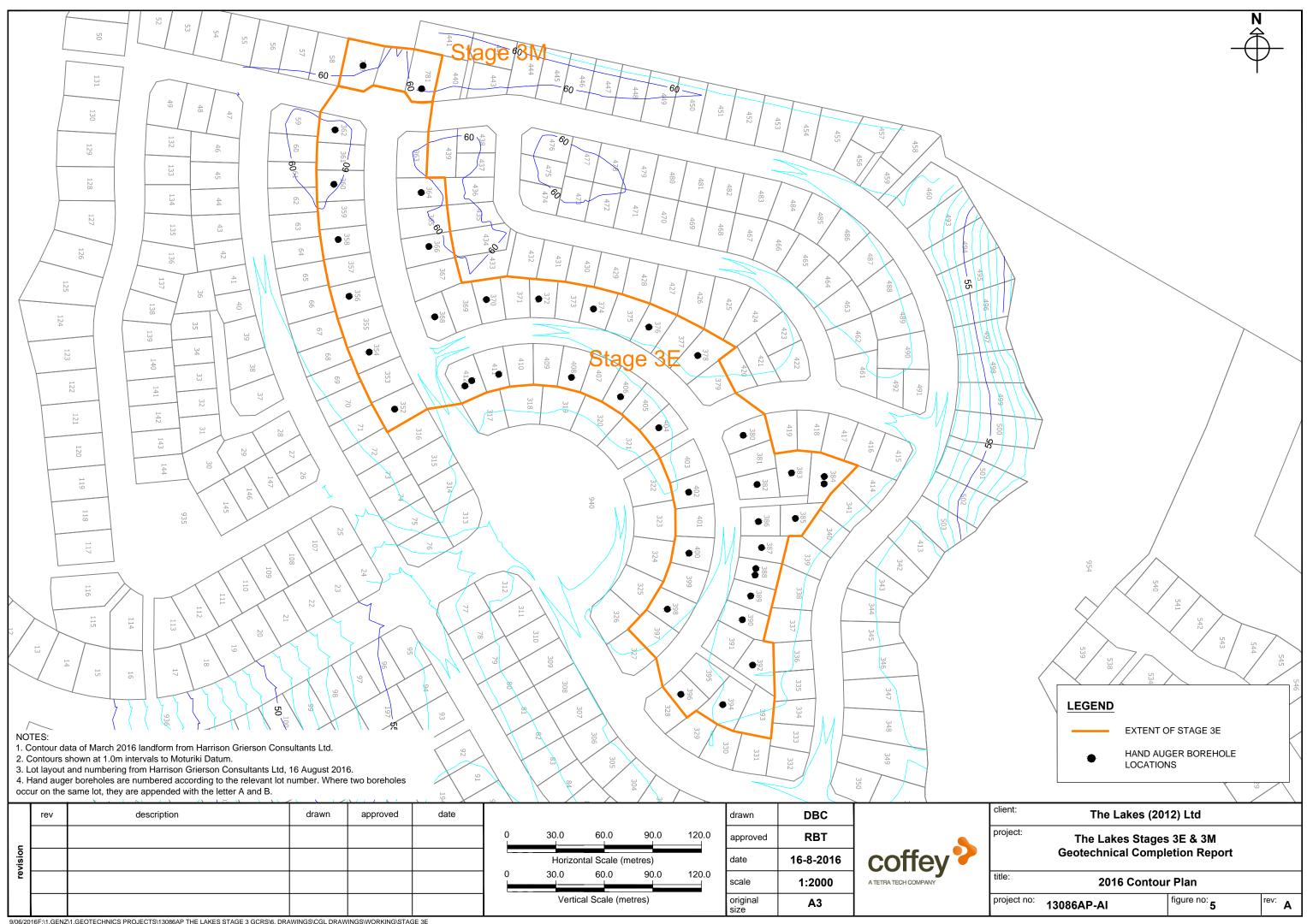




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Appendix B - Geotechnical Suitability Statement & Geotechnical Data Summary Table

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

NAME OF SUBDIVISION	The Lakes Subdivision – Stage 3E
COUNCIL FILE NUMBER RC No:	RC21332
ENGINEER RESPONSIBLE FOR	Robert Telford
DEVELOPMENT	
QUALIFICATIONS:	TCC Category 2 Geotechnical Engineer

I, Robert Telford of Coffey Geotechnics Ltd, 96 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 our development evaluation reports dated 29 April 2013 and 7 April 2014.
- 3) In my professional opinion, not to be construed as a guarantee, I consider that;
 - a) The areas shown in my report dated 24 June 2016 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. GENZTAUC13086AP-AI, dated 24 June 2016.
 - b) The earth fills shown on the attached Plans ref Figure 02 & Figure 04 have been placed in general accordance with the requirements of the Infrastructure Development Code.
 - c) The completed works give due regard to all land slope and foundation stability 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. GENZTAUC13086AP-AI, dated 24 June 2016.
 - e) The original ground not affected by filling is suitable for the erection thereon of residential buildings requiring specific design subject to the recommendations presented in my Geotechnical Completion Report Ref. GENZTAUC13086AP-AI, dated 24 June 2016.
- 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

(L Tellod

Date: 26 August 2016



PRODUCER STATEMENT SUITABILITY OF LAND FOR BUILDING DEVELOPMENT

INFRASTRUCTURE DEVELOPMENT CODE

G2

DP No:	Lot 1001 DP486181	Property Address	310 Lakes Boulevard, Pyes Pa	RC No:	21332

	-			Subsu	rface data		Foundatio	Building Restriction Line	S/W Specific Design	S/W Soakage	S/W Reticulate	Designated Building Platform	Minimum Building Platform	Compressible Soils	On-Site Effluent Disposal	Consent Notice			
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354	481	>202	Ν	-	Ν	Y	2	N	Y	N	N	N	Y	N	Ν	N	N	Y	
355	520	N/T	Ν	-	Ν	Y	2	N	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	
356	560	>202	Ν	-	Ν	Y	1	N	Y	N	Ν	Ν	Y	N	Ν	N	Ν	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa,
357	480	N/T	Ν	-	Ν	Y	1	N	Y	N	N	Ν	Y	N	Ν	Ν	Ν	Y	subject to Section 8 of Coffey GCR ref: GENZTAUC13086AP-AI (Rev 1).
358	520	>183	Ν	-	Ν	Υ	1	Ν	Y	Ν	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	N/T = Not Tested.
359	480	N/T	Ν	-	Ν	Υ	1	Ν	Y	N	Ν	Ν	Υ	Ν	Ν	Ν	Ν	Y	
360	560	180	Ν	-	Ν	Y	1	Ν	Y	Ν	Ν	Ν	Υ	Ν	Ν	Ν	Ν	Y	
361	487	N/T	Ν	-	Ν	Y	1	N	Y	N	Ν	Ν	Y	N	Ν	Ν	Ν	Y	
362	476	183	Ν	-	Ν	Y	0	Ν	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	
			SUMMARY OF GOTECHNICAL DATA FOR INDIVIDUAL LOTS										G3						



INFRASTRUCTURE DEVELOPMENT CODE

DP No:	Lot 1001 DP486181	Property Address	310 Lakes Boulevard, Pyes Pa	RC No:	21332

	Subsurface data Foundations					Building Restr	S/W Specific Design	S/W Soakage	S/W Reticulate	Designated Building Platform	Minimum Buil	Compressible	On-Site Efflue	Consent Notice							
Lot No:	Area (m²)	Shear Strength (kPa)	Subdivision Filling		Topography Top		tural graphy worked	Conventional Specific Shallow Design Foundation to		Restriction Line	Design		e	uilding Pla	Building Platform	Soils	Effluent Disposal	'n			
		at 0.5m depth	Y/N	Depth (m)	Y/N	Y/N	Depth (m)	3604:2011	NZS					tform	orm		<u>a</u>		Comments		
																			·		
363	526	N/T	Ν	-	N	Y	0	N	Y	Ν	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y			
364	553	158	Ν	-	N	Y	0	Ν	Y	Ν	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y			
365	537	N/T	Ν	-	N	Y	1	Ν	Y	Ν	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y			
366	540	169	Ν	-	N	Y	1	N	Y	N	N	N	Y	Ν	Ν	Ν	Ν	Y			
367	580	N/T	Ν	-	N	Y	1	N	Y	N	N	Ν	Y	Ν	Ν	Ν	Ν	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref:		
368	475	>183	Ν	-	N	Y	1	N	Y	N	N	N	Y	Ν	Ν	Ν	Ν	Y	GENZTAUC13086AP-AI (Rev 1).		
369	499	N/T	Ν	-	N	Y	1	N	Y	Ν	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	N/T = Not Tested.		
370	439	>202	Ν	-	N	Y	1	Ν	Y	Ν	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y			
371	422	N/T	Ν	-	N	Y	1	N	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y			
372	387	>183	Ν	-	N	Y	1	Ν	Y	Ν	Ν	Ν	Υ	Ν	Ν	Ν	Ν	Y			



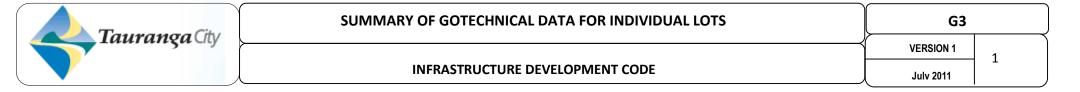
DP No:	Lot 1001 DP486181	Property Address	310 Lakes Boulevard, Pyes Pa	RC No:	21332

	A		Subsurface data Shear Subdivision Natural Natural						Foundations Foundations Foundation to Founda			S/W Soakage	S/W Reticulate	Designated Building Platform	Minimum Building	Compressible	On-Site Efflue	Consent Notice		
Lot No:	Area (m²)	Shear Strength (kPa)		livision Iling	Natural Topography Unworked	Natural Topography Earthworked		Conventional Specific Shallow Design Foundation to		iction Line	S/W Specific Design		e	uilding Pla	Building Platform	Soils	Effluent 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	D				tform	form		al		Comments	
373	388	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y		
374	436	173	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	Ν	N	Y		
375	468	N/T	Ν	-	Ν	Y	1	N	Y	N	N	N	Y	N	N	Ν	N	Y		
376	455	>202	Ν	-	Ν	Y	1	N	Y	N	N	Ν	Y	Ν	Ν	Ν	Ν	Y	Ded reft time foundations designed for	
377	508	N/T	Ν	-	Ν	Y	1	N	Y	N	N	N	Y	Ν	N	Ν	Ν	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref:	
378	628	156	Ν	-	Ν	Y	2	N	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	GENZTAUC13086AP-AI (Rev 1). N/T = Not Tested.	
379	461	N/T	Ν	-	Ν	Y	4	N	Y	N	Ν	Ν	Υ	Ν	Ν	Ν	Ν	Y	N/T = Not Tested.	
380	449	108	Ν	-	Ν	Y	6	N	Y	N	N	Ν	Υ	Ν	Ν	Ν	Ν	Y		
381	435	N/T	Ν	-	Ν	Y	5	N	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y		
382	408	>183	Ν	-	Ν	Y	4	N	Y	N	N	Ν	Y	Ν	Ν	Ν	Ν	Y		

	SUMMARY OF GOTECHNICAL DATA FOR INDIVIDUAL LOTS	G3)
TaurangaCity		VERSION 1	1	
	INFRASTRUCTURE DEVELOPMENT CODE	Julv 2011	-	J

DP No:	Lot 1001 DP486181	Property Address	310 Lakes Boulevard, Pyes Pa	RC No:	21332

	A			Subsu	rface data			Foundati	ons	Building Restriction Line	S/W Specific Design	S/W Soakage	S/W Reticulate	Designated Building Platform	Minimum Building Platform	Compressible	On-Site Efflue	Consent Notice	
Lot No:	Area (m²)	Shear Strength (kPa)		livision Iling	Natural Topography Unworked	Торо	tural graphy worked	Conventional Shallow Foundation to	Specific Design	iction Line	Design		e	uilding Pla	lding Platf	Soils	Effluent Disposal	ë	
		at 0.5m depth	Y/N	Depth (m)	Y/N	Y/N	Depth (m)	NZS 3604:2011 Y/N/NA	Y/N/NA					tform	orm		<u> </u>		Comments
383	555	>202	N	_	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
				-		1	5												
384	588	74	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
385	400	>202	Ν	-	N	Y	4	N	Y	Ν	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	
386	445	>202	Ν	-	N	Y	3	N	Y	Ν	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	
387	434	133	Ν	-	N	Y	3	N	Y	N	N	Ν	Y	N	Ν	Ν	Ν	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref:
388	409	>202	Ν	-	N	Y	3	N	Y	N	N	N	Y	Ν	Ν	N	Ν	Y	GENZTAUC13086AP-AI (Rev 1).
389	417	>202	Y	< 1	Ν	Y	3	N	Y	Ν	Ν	Ν	Υ	Ν	Ν	Ν	Ν	Υ	N/T = Not Tested.
390	452	>202	Y	< 1	N	Y	3	N	Y	Ν	Ν	Ν	Y	Ν	Ν	Ν	Ν	Υ	
391	506	N/T	Y	< 1	N	Y	4	N	Y	N	N	Ν	Υ	Ν	Ν	Ν	Ν	Υ	
392	546	>202	Y	< 1	Ν	Y	4	N	Y	Ν	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	



DP No:	Lot 1001 DP486181	Property Address	310 Lakes Boulevard, Pyes Pa	RC No:	21332

	A			Subsu	rface data			Foundati	ons	Building Restriction Line	S/W Specific Design	S/W Soakage	S/W Reticulate	Designated Building Platform	Minimum Building Platform	Compressible	On-Site Efflue	Consent Notice	
Lot No:	Area (m²)	Shear Strength (kPa)		division Iling	Natural Topography Unworked	Торо	tural graphy worked	Conventional Shallow Foundation to	Specific Design	iction Line	Design		e	uilding Pla	lding Platf	Soils	Effluent Disposal	ë	
		at 0.5m depth	Y/N	Depth (m)	Y/N	Y/N	Depth (m)	NZS 3604:2011 Y/N/NA	Y/N/NA	(D				tform	orm		<u>a</u> _		Comments
393	536	N/T	Y	< 1	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
							5												
394	606	>183	Y	< 1	N	Y	4	N	Y	N	N	N	Y	N	Ν	Ν	Ν	Y	
395	420	N/T	Y	< 1	N	Y	4	N	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	
396	408	>183	Ν	-	N	Y	5	N	Y	N	N	N	Y	N	Ν	Ν	N	Y	Ded reft time foundations designed for
397	468	N/T	Y	< 1	N	Y	4	N	Y	N	N	Ν	Y	Ν	N	Ν	N	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref:
398	467	>183	Y	< 1	N	Y	3	N	Y	N	N	Ν	Y	Ν	Ν	Ν	Ν	Y	GENZTAUC13086AP-AI (Rev 1).
399	461	N/T	Y	< 1	N	Y	3	N	Y	N	N	N	Y	Ν	Ν	Ν	Ν	Y	N/T = Not Tested.
400	459	>202	Y	< 1	N	Y	2	N	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Υ	
401	459	N/T	N	-	N	Y	2	N	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Υ	
402	455	>183	Ν	-	Ν	Y	2	Ν	Y	N	Ν	Ν	Υ	Ν	Ν	Ν	Ν	Y	



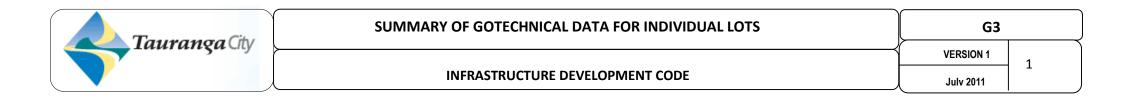
DP No:	Lot 1001 DP486181	Property Address	310 Lakes Boulevard, Pyes Pa	RC No:	21332

	A			Subsu	rface data			Foundati	ons	Building Restriction Line	S/W Specific Design	S/W Soakage	S/W Reticulate	Designated Building Platform	Minimum Building Platform	Compressible	On-Site Efflue	Consent Notice	
Lot No:	Area (m²)	Shear Strength (kPa)		livision Iling	Natural Topography Unworked	Торо	tural graphy worked	Conventional Shallow Foundation to	Specific Design	iction Line	Design		e	uilding Pla	lding Platf	Soils	Effluent Disposal	ë	
		at 0.5m depth	Y/N	Depth (m)	Y/N	Y/N	Depth (m)	NZS 3604:2011 Y/N/NA	Y/N/NA	τD.				tform	orm		<u>a</u> _		Comments
403	458	N/T	N		N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
403	458	IN/ I	N	-	IN	Y	2	IN	Y	N	IN	N	Ŷ	IN	IN	IN	N	ř	
404	416	>202	Ν	-	N	Y	4	N	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	
405	419	N/T	N	-	N	Y	3	N	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	
406	425	>183	N	-	N	Y	2	N	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	Pod-raft type foundations designed for
407	429	N/T	N	-	N	Y	2	N	Y	N	N	N	Y	Ν	Ν	Ν	Ν	Y	geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref:
408	431	>202	N	-	N	Y	2	N	Y	N	N	Ν	Y	Ν	Ν	Ν	Ν	Y	GENZTAUC13086AP-AI (Rev 1).
409	430	N/T	Ν	-	N	Y	1	N	Y	N	N	N	Y	Ν	Ν	Ν	Ν	Y	N/T = Not Tested.
410	428	N/T	N	-	N	Y	1	N	Y	N	N	Ν	Y	Ν	Ν	Ν	Ν	Y	
411	424	>202	N	-	N	Y	1	N	Y	N	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	
412	472	55	N	-	N	Y	1	Ν	Y	N	N	Ν	Y	Ν	Ν	Ν	Ν	Υ	



DP No:	Lot 1001 DP486181	Property Address	310 Lakes Boulevard, Pyes Pa	RC No:	21332

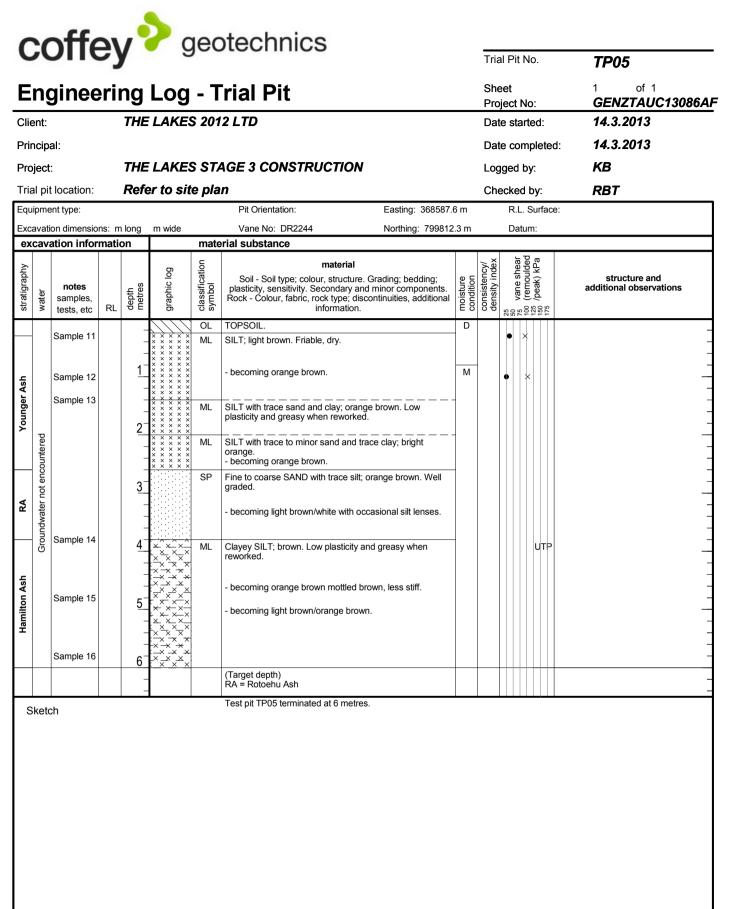
_	Ar			Subsu	rface data			Foundatio		Building Restri	S/W Specific D	S/W Soakage	S/W Reticulate	Designated Bu	Minimum Building	Compressible	On-Site Effluent	Consent Notice	
Lot No:	Area (m²)	Shear Strength (kPa)		livision Iling	Natural Topography Unworked	Торо	tural graphy worked	Conventional Shallow Foundation to	Specific Design	ction Line	Design			Building Plat	ding Platform	Soils	nt Disposal	e	
		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		al		Comments
780	644	>202	Ν	-	Ν	Y	1.0	N	Y	Ν	Ν	Ν	Y	Ν	Ν	Ν	Ν	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa,
781	547	>202	Y	1.0	Ν	Y	1.0	N	Y	N	Ν	Ν	Y	N	Ν	Ν	Ν	Y	subject to Section 8 of Coffey GCR ref: GENZTAUC13086AP-AI (Rev 1).



Appendix C - Pre Development Investigation Data

_		-ff	~				otechnics									
C	7		=)	y		jec				Tria	al Pit	No.		TP0	4	
Ε	ng	ginee	eri	ng	Log	- T	rial Pit			She	eet ject l	No		1 GEN	of 1 ZTAUC13()86 A F
Cli	ent:			THE		S 201	2 LTD					rted:			2013	
Pri	ncip	al:								Dat	e co	mplet	ed:	14.3.	2013	
Pro	oject	:		THE		S STA	AGE 3 CONSTRUCTION	,		Log	ged	by:		RBT		
Tria	al pi	t location:		Refe	er to sit	te pla	n			Che	ecked	d by:		RBT		
Equ	iipme	ent type:					Pit Orientation:	Easting: 368588.	5 m		R.L	Surfa	ce:			
		ion dimensio		-	m wide		Vane No: DR2244	Northing: 799726	.9 m		Dat	um:				
ex	cav	ation infor	mati	on			rial substance			. ×	F	a Ç				
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material Soil - Soil type; colour, structure plasticity, sensitivity. Secondary ar Rock - Colour, fabric, rock type; dis information.	nd minor components	moisture condition	consistency/ density index		100 (remoulded 125 /peak) kPa	2		icture and al observations	
TS		Sample 1		-		OL	Organic SILT with trace clay, dark g wood fragments and building debris		D							_
	1			-		ML	SILT with minor very fine sand, light friable, very stiff.		1			UT	P			-
_		Sample 2		<u> 1</u>			- occasional tree roots (2-5mm).									
Younger Ash	σ			-	× × × × × × × × × × × × × × × × × ×											_
nnge	Intere	Sample 3		-	× × × × × × × × × × × ×	ML	SILT with minor clay; orange/brown		M							_
۶	encountered			2	$\begin{array}{c} & & & & & & & \\ & \times & \times & \times & \times & \\ & \times & \times$	ML	Very slight plasticity, moist.	'								
				-	X X	ML	SILT with trace to minor fine sand a orange. Stiff, friable to very slightly of our Torrest the same series of the same serie	cohesive, moist.	M- W							_
	Groundwater not			3	<u>× × × × ×</u>	SP	SILT with trace sand and minor clay	worked, moist to wet.	M							_
RA	round			-			SAND with trace to minor silt; light of Pumiceous, friable, moist.									
	G	Sample 4		-			- becomes pale orange/white and n below 3.4m.	ninor to some silt	-							-
		- cumpic r		4	× × × × × × × ×	ML	Clayey SILT; chocolate brown, very when reworked. Non plastic, moist.	stiff in-situ, friable				UT	P			-
₽				-	$\begin{array}{c} \times \times \times \times \\ \times - \times - \times - \times \\ \times - \times - \times - \times$											-
		Sample 5		-	×××× ××××	-	- becoming mottled chocolate brow	n/orange brown.								-
				5			(max. reach of excavator)									_
				-	-		RA = Rotoehu Ash HA = Hamilton Ash									-
				6	-		Test pit TP04 terminated at 4.8 met	res.								_
				-												
_	Sketo			-												
	Keu	511														
		fication symb	ools an	nd			vane shear (kPa)									
		escription on New Zeala	and Ge	eotechnic	al Society In	c 2005	remoulded x peak x peak x peak	moisture			sistend	cy/ den	-		vor 1	
	otes, I ₅₀	samples, tes undisturbe		ple 50m	m diameter		>>>> peak greater than 200kPa UTP unable to penetrate	D dry M moist W wet		VS S F		very so soft firm	ш	VL L MD	very loose loose medium dense	_
	63		ed sam	nple 63m	m diameter		water ▼ 10/1/98 water level	S saturated		F St VSt		stiff very st	iff	MD D VD	dense very dense	-
	s	bulk samp environme	le				 on date shown water inflow 			H		hard		vU	very delibe	
F	2	refusal					water outflow									

TRIAL PIT TEST PITS 150313.GPJ COFFEY.GDT 28.3.13



v.6	soil desc based on notes, sa	New Zealand Geotechnical Society Inc 2005 mples, tests undisturbed sample 50mm diameter	vane ● × >>× UTP wate	shear (kPa) remoulded peak peak greater than 200kPa unable to penetrate	moi D M W	sture dry moist wet	consis VS S F	tency/ density ind very soft soft firm
ں I	U ₆₃ D	undisturbed sample 63mm diameter disturbed sample		10/1/98 water level on date shown	S	saturated	St VSt	stiff very stiff
OH E	Bs E R	bulk sample environmental sample refusal		water inflow water outflow			н	hard

VL

MD

VD

D

very loose loose

dense

medium dense

very dense

•	~	htt				aec	otechnics							
•	~		-)		2	,				Tria	I Pit N	lo.	TP06	
E	n	ginee	eri	ng	Log	- T	rial Pit			She Proj	et ect N	0:	1 of 1 GENZTAUC1	3086AF
Cli	ent:			THE		S 201	2 LTD			Dat	e star	ted:	14.3.2013	
Pri	ncip	al:								Date	e com	pleted	d: 14.3.2013	
Pro	ject	t:		THE		S STA	AGE 3 CONSTRUCTION			Log	ged b	y:	KB	
Tria	al pi	t location:		Refe	er to sit	te pla	n			Che	cked	by:	RBT	
		ent type:				-	Pit Orientation:	Easting: 368704.4	4 m			Surface	e:	
Exc	avat	ion dimensio	ons: m	n long	m wide		Vane No: DR2244	Northing: 799943	.7 m		Datu	m:		
ex	cav	ation infor	mati	on			rial substance				L 7	3 _		
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material Soil - Soil type; colour, structure. plasticity, sensitivity. Secondary an Rock - Colour, fabric, rock type; disc information.	d minor components.	moisture condition	consistency/ density index	25 50 vane shear 100 (remounded	125 /peak) kPa 175	structure and additional observatio	ons
		Sample 17		-	× × × × × × × × × × × × × × × × × × ×	OL ML	TOPSOIL SILT; light brown, friable and dry.		D		•	×		-
Younger Ash	_	Sample 18		<u>1</u> -	· · · · · · · · · · · · · · · · · · ·	ML	- becoming orange brown and moist		м					
You	Groundwater not encountered	Sample 19		2	<pre></pre>	ML	when reworked.							-
RA	vater not ei			3	* * * * * *	SP	plasticity. Fine to coarse SAND with trace silt; occasional silty lenses. Well graded.							-
	Ground	Sample 20		-	× × × ×	ML	- becoming white/light brown. Clayey SILT; brown. Medium plastic when reworked.	ity, very stiff, greasy				UTP		-
Hamilton Ash		Sample 21		4 - - 5			- becoming orange brown and less	stiff.						
				6			(Target depth) RA = Rotoehu Ash Test pit TP06 terminated at 5 metres	5.						
S	<u>i</u> ket				<u> </u>									
1 1 1 1	otes,		and Ge ts ed sam ed sam sample	otechnic ple 50m ple 63m	al Society In m diameter m diameter	c 2005	vane shear (kPa) ● remoulded × peak >× peak greater than 200kPa UTP unable to penetrate water 10/1/98 water level on date shown ▶ water inflow water outflow water outflow	moisture D dry M moist W wet S saturated		cons VS S F St VSt H	v s fi s v	/ density ery soft oft rm tiff ery stiff ard	L loose MD medium de D dense	

-

C	;(offe	Ð١		? g	jec	otechnics			Tris	al Pit	Nc			TDO	7	
			_				rial Pit			She					1 GEN	of 1 Z TAUC1 3	3086AF
Clie Prir	ent:				LAKES					Dat	e sta	arte		1:	14.3. 14.3.	2013	
Pro Tria	-	: t location:			ELAKES er to sit		AGE 3 CONSTRUCTION			-	iged ecke	-			KB RBT		
Equ	ipme	ent type: ion dimensio	ns: m		m wide		Pit Orientation: Vane No: DR2244	Easting: 368767. Northing: 799923			R.I		urface):			
ex	cav	ation infor	mati	on		mate	rial substance										
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material Soil - Soil type; colour, structure. plasticity, sensitivity. Secondary an Rock - Colour, fabric, rock type; dis information.	d minor components.	moisture condition	consistency/ density index	25 50 vane shear	100 (remoulded	175 /peak) KPa			cture and I observation	ns
		Sample 22		-	× × × × × × × × × × × × × × × × × × ×	OL ML	TOPSOIL SILT; light brown. Friable and dry.		D		•	×					-
Younger Ash	pa	Sample 23 Sample 24		<u>1</u> - -	× × × × × × × × × × × × × × × × × × ×	ML	- becoming orange brown with trace		M		• >	×					
Yc	t encountered	Sample 24		2	× × × × × × × × × × × × × × × × × × ×	ML	when reworked										
RA	Groundwater not			<u>3</u>		SP	SAND with trace silt; orange brown, grained, pumiceous. Well graded.	line to coarse									-
	Gro	Sample 25			× × × × × × × × ×	ML	Clayey SILT; brown. Medium plastic reworked.	ity and greasy when	-								-
НА		Sample 26					- becoming orange brown.										-
				6			(Target depth) RA = Rotoehu Ash HA = Hamilton Ash Test pit TP07 terminated at 5 metre:	5.									
S	keta	l		1 -	1	1			1	1							
s b	oil de ased otes, 50 63 5		ind Ge s d sam d sam sample le	otechnic ple 50m ple 63m	cal Society In m diameter m diameter	c 2005	vane shear (kPa)	moisture D dry M moist W wet S saturated		Cons VS S F St VSt H		ver sof firn stif	ry soft ft n f ry stiff	y index	VL L MD D VD	very loose loose medium der dense very dense	nse

C	1	offe	21		> c	lec	otechnics					
-				y						Trial Pit No.	TP08	
Ε	n	ginee	ri	ng	Log	- T	rial Pit			Sheet Project No:	1 of 1 GENZTAUC13086AF	
Clie	ent:			THE		S 201	2 LTD			Date started:	15.3.2013	
Pri	ncip	al:								Date completed:	15.3.2013	
Pro	ject	:		THE		S STA	GE 3 CONSTRUCTION	Logged by:	RBT			
Tria	al pi	t location:		Refe	er to sit	e pla	n	Checked by:	RBT			
Equ	ipme	ent type:				•	Pit Orientation:	Easting: 368724 r	n	R.L. Surface:		
Exc	avat	ion dimensio	ns: n	n long	m wide		Vane No: DR2244	Northing: 799993	m	Datum:		
ex	cav	ation infor	mati	on			erial substance					
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material Soil - Soil type; colour, structure. plasticity, sensitivity. Secondary and Rock - Colour, fabric, rock type; disc information.	d minor components.	moisture condition	consistency/ density index 25 75 vane shear 100 (remoulded 125 /peak) kPa	structure and additional observations	
		Sample 27		-		OL	Organic SILT with numerous fine roo		D		-	
Younger Ash	tered	Sample 28				ML	SILT with trace to minor clay, some to brown. Stiff, dry, friable. - becoming moist, minor clay, occasi - becoming mottled yellow/orange br - trace very fine sand, moist.	ional rootlets.	M		- - - - - - - - - - - - - -	
	Groundwater not encountered	Sample 29		-	× × × × × × × × × × × × × × × × × × ×	SP	Fine to coarse SAND with trace silt; black flecks.	yellow/brown with				
УIJ	indwater r	Sample 30		3		SP	Fine to medium SAND with minor sil Pockets rework to soft sandy silt with plastic.	t; pale yellow/white. n some clay, slightly	M- W			
АН	Grou	Sample 31		4 <u></u>		CL ML	Silty CLAY; chocolate brown with wh stiff in-situ, soft and with medium to h reworked. SILT with trace clay and trace fine sa Very stiff to hard, non plastic and mo	high plasticity when and; yellowish brown.	_		- - - - - -	
		Sample 32		5_	× × × × × × × × × × × × × × × × × × ×		SILT with minor clay; orangish brown clay, moderately plastic, soft to firm. (Target depth)	n. Reworks to silty				
				<u>6</u>			RA = Rotoehu Ash HA = Hamilton Ash Test pit TP08 terminated at 5.2 metr	es.			-	
S	keta	ch										
s t n U	oil de ased otes, 50 63 53		and Ge t s ed sam ed sam sample le	otechnic ple 50m ple 63m	cal Society In m diameter m diameter	c 2005	vane shear (kPa) ● remoulded × peak >>> peak greater than 200kPa UTP unable to penetrate water ✓ 10/1/98 water level on date shown ▶ water inflow ✓ water outflow	moisture D dry M moist W wet S saturated		consistency/ density inVSvery softSsoftFfirmStstiffVStvery stiffHhard	dex VL very loose L loose MD medium dense D dense VD very dense	

TRIAL PIT TEST PITS 150313.GPJ COFFEY.GDT 28.3.13

Appendix D - Post Development Investigation Data



TETRA	A TECH		PANY								orehole ID.		HAL352	
En	ngi	ne	ering	g l	_00] -	Ha	nd Auger			heet: roject no.			
client	project project												GENZTAUC13086AI 30 May 2016	
	incipal: date comp oject: THE LAKES STAGE 3E GCR logged by:											əd.		
												. .	-	
													NM	
	ation: CENTRE OF LOT 352 checked by: ition: E: 368485; N: 799970 (Datum Not Specified) surface elevation: Not Specified angle from horizontal												DCP id.:	
	ill model: drilling fluid: hole diameter : 50 mm												vane id.: DR2244	
drillir	ing information material substance													
method & support	1 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 density	shear (blo ⊕ remoulded ⊚ peak 100 (kPa)	CP ows/ mm) ∞∞♀	structure and additional observations	
		-						ORGANIC SILT: low plasticity, dark brown.	M	VSt to H			TOPSOIL	
			VS >183 kPa		_		ML	SILT: low plasticity, orange brown, with fine to medium grained sand.	-		9 		MATUA SUB-GROUP	
			VS >183 kPa VS >183 kPa		-		SP	SAND: fine to medium grained, white, with minor silt.						
					0.5 —		ML	Sandy SILT: non plastic, white, with fine	-			ΙİΪ.		
					- - - 1.0-		· · · · · · · · · · · · · · · · · · ·	grained sand.						
		Encountered					ML	SILT: low plasticity, orange brown, with minor fine grained sand, trace clay.	D to M					
		Not Enco	VS >183 kPa					1.0 m: soil is friable.	D					
					-						VsUть II 			
					- 1.5—						VSUTP			
			VS UTP		-			1.7 m: with some silt.	M					
.			VS >183 kPa		- <u>2.0</u> -			Hand Auger HAL352 terminated at 2.0 m Target depth						
metho AD AS HA W HA * e.g. B	bit shor AD/T blank b	screwi luger luger wn by	ng*	penetration ranging to water				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	b Cla moistur D dr M mo W we Wp pla	soil desc ased on ssificatio re y bist	Unified n System	C S F S V F F V L	firm St stiff /St very stiff 4 hard Fb friable /L very loose loose loose MD medium dense	



		COMPANY							В	orehole ID.		HAL354	
E	~:		.		~	Lla	nd Augar		s	heet:		1 of 1 GENZTAUC13086AP	
En	igi	neerin	g	ΓΟĆ	J -	на	nd Auger		р	roject no.			
client	-	THE LAK	ES				d	ate started:		30 May 2016			
princi	rincipal:										ed:	30 May 2016	
proje	roject:THE LAKES STAGE 3E GCRloggeocation:CENTRE OF LOT 354check											ODS	
locati												DBC	
		368468; N: 800	90°	DCP id.:									
	Il model: drilling fluid: hole diameter : 50 mm rilling information material substance											vane id.: SL588	
~*	tion	samples &			БĊ	ttion	material description		cy / ensity		CP	structure and additional observations	
method & support	1 2 penetration	field tests	RL (m)	depth (m)	graphic log	class ification symbol	SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	⊕ remoulded ⊚ peak (kPa) B € € 8 8 8 8 8 8	mm) ∞∞₽		
HA		VS >202 kF VS >202 kF VS >202 kF VS 153/ 32 kPa	'a				ORGANIC SILT: low plasticity, dark brown. SILT: non plastic to low plasticity, orange brown, with trace fine grained sand. 0.35 m: with minor clay SAND: fine to medium grained, brown, with some silt. 1.1 m: with trace silt		USt to H			TOPSOIL VOLCANIC ASHES MATUA SUB-GROUP	
	auger	VS 148/ 112 kPa	M			, , , , , , , , , , , , , , , , , , ,	SILT: non plastic, pale brown, with minor fine grained sand. Hand Auger HAL354 terminated at 2.0 m Target depth samples & field tests B bulk disturbed sample D disturbed sample	5	soil desc	I I I I I I			
HA W HA * e.g. B T	hand a washb hand a	ore uger wn by suffix	ving* C casing penetration ranging to water				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	based on Unified Classification System D dry M moist W wet Wp plastic limit WI liquid limit			S F St H Ft VI L M VI VI	soft firm stiff St very stiff hard o friable very loose loose D medium dense dense	



Borehole ID. Sheet: project no.													HAL356		
Ēr	ngi			_	-0() -	Ha	nd Auger			roject no.	GENZTAUC13086AP			
client													30 May 2016		
princ											ate complete	ed:	30 May 2016		
proje											gged by:		ODS		
locati	ation: CENTRE OF LOT 356 checked by:											DBC			
	tion: E: 368456; N: 800038 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: model: drilling fluid: hole diameter : 50 mm												DCP id.: vane id.: SL588		
		ormatio	n			mat	erial sub	•					Valie Id.: 02500		
method & support	penetration		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 ⊕remoulded ⊚peak 100	ws/	structure and additional observations		
ang Sugar	- 0 0	water		RL	dep	dra dra	cla syr	ORGANIC SILT: low plasticity, dark brown.	Ê ð M	ह छू VSt to	(kPa) 2 2 2 2 0 2 2 0 2 0 2 0 0 2 0 0 0 0 0 0		TOPSOIL		
• HA		Not Encountered	VS >202 kPa VS >202 kPa VS >202 kPa VS >202 kPa		0.5			SILT: non plastic to low plasticity, orange brown, with trace fine grained sand.	н			VOLCANIC ASHES			
w w			/S >202 kPa /S >202 kPa		1.5			Hand Auger HAL356 terminated at 2.0 m Target depth							
AD AS HA W HA * e.g. B T V	auger auger hand a washb hand a bit sho AD/T	uger dilling* uger screwing* land auger M mud N nil B bulk disturbed sample soll description bulk disturbed sample D disturbed sample based on Unified land auger penetration SS split spoon sample based on Unified land auger no resistance U## undisturbed sample based on Unified vashbore no resistance U## undisturbed sample based on Unified vashbore no resistance U## undisturbed sample based on Unified vashbore no resistance U## undisturbed sample D vashbore no resistance N* SPT sample recovered M No SPT with solid cone W Westcomed Wp plastic limit VS vase shear; peak/remouded (kPa) R refusal Wit liquid limit				ription Unified n System		/S very soft S soft firm St stiff /St very stiff H hard To friable /L very loose							



Borehole ID. HAL358 1 of 1 sheet: **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 30 May 2016 date started: principal: 30 May 2016 date completed: THE LAKES STAGE 3E GCR logged by: NM project: **CENTRE OF LOT 358** DBC location. checked by: position: E: 368449; N: 800072 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: DR2244 drilling information material substance DCP material description vane structure and consistency / relative density class ification g (blows/ 100 mm) samples & shear ⊕ remould ⊚ peak additional obs /ations Ē method & support moisture condition penetra SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic I symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. Μ VSt TOPSOIL 11111 |||||||11111 11 ||||||11111 1 + 1||||||11111 **SILT**: low plasticity, orange brown, with trace fine grained sand, trace clay. ML D to M | | | | |11111 MATUA SUB-GROUP 11 11111 ||||||VS >183 kPa | | |9 11 11111 1111 |||||| | | | |111 11111 111 11111 111 11111 VS >183 kPa 0.5 1111 ||11 |||||||11111 М |||||111 11111 11 ||||||11111 ||||0.7 m: minor fine grained sand with clay | | | |11111 VS 107/ 19 kPa absent 11111 1 111 φij Ðı ||||11111 11 1 11 11111 Encountered 1111 ||||111 0.9 m: some fine grained sand. St 11111 ||||||||||VS 81/ 1111 11 1 ⊕¦⊙ 19 kPa 1.0 ₹ ż 11111 Not 111 11111 |||||||1 | | 11111 1.1 m: minor fine grained sand. 111 |||||||11111 VS 94/ 19 kPa ||||11111 ⊕|•|| 11111 ||||||||||11111 11111 ||||||1.3 m: minor clay, trace fine grained sand. 11 ||||||11111 11 ||||||11111 11111 111 | | | | |VS 81/ 19 kPa 11111 111 ⊕¦⊙ 15 11111 11111 111 1 1 1 1 11111 1 | | | 11111 111 |||||11111 g Clayey SILT: low plasticity, orange, with trace VSt CL-ML |||||11111 VS 120/ 25 kPa fine to medium grained sand, greasy. |||||11111 ⊕¦ ||||11111 1.8 m: minor fine to medium grained sand. ||11111 11111 11 ||1 + 111111 VS >183 kPa 11111 2.0 Hand Auger HAL358 terminated at 2.0 m 11111 Target depth iiiii 111 |||||||11111 ||||||11111 | | | | |11 classification symbol & method AD auger drilling* support consistency / relative density samples & field tests soil description N nil bulk disturbed sample mud VS Μ В very soft AS auger screwing' based on Unified soft firm C casing D disturbed sample S F hand auger HA Classification System Е environmental sample W penetration washbore SS split spoon sample St stiff HA hand auge no resistance ranging to refusal very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense TC bit water outflow very dense

HB

hammer bouncing

VD

HAS.GPJ STAGE 3E NON CORED + DCP COF BOREHOLE: 20 ž ٤ Ę



Borehole ID. HAL360 1 of 1 sheet: **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 30 May 2016 date started: 30 May 2016 principal: date completed: THE LAKES STAGE 3E GCR logged by: ODS/NM project: **CENTRE OF LOT 360** DBC location. checked by: position: E: 368445; N: 800106 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: SL588 drilling information material substance DCP material description vane structure and consistency / relative density class ification g shear ⊕ remould ● peak (blows/ 100 mm) samples & additional obs /ations Ē method & support moisture condition penetra SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic l symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. Μ VSt to TOPSOIL Шİ Η |||||||11111 1.1.1 ||||||11111 ||||| | | |11111 | | | |11111 111 VS >202 kPa 11111 VOI CANIC ASHES **SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand. 11 | | | | |1111 1111 |||||| | | | ||||||11111 111 111 111 VS 180/ 41 kPa 11111 + | || 0.5 liiiii 111 ||||||11 |||||||11111 0.6 m: with trace clav 111 1 1 1 1 111 |||||||11111 |||||||||11111 | | || | | | |11111 | | |11111 ||||||11 1 11111 Encountered 1111 ||||| | | |11111 |||||||||VS 190/ $\left| \cdot \right|$ 1111 1 ф ¥ ż 39 kPa 1.0 iiiii Not HAS.GPJ 111 111 11111 11111 STAGE 3E 111 1111 11111 ||||||||||11111 VS 163/ 34 kPa 11111 ∉ þ NON CORED + DCP ||||11111 1 | |11111 |||11111 ||||||||||11111 11111 ||||| | | | |VS 175/ 74 kPa 11111 \mathbf{O} ₽ COF BOREHOLE: 15 11111 MATUA SUB-GROUP SILT: non plastic to low plasticity, orange, with trace clay and trace fine to coarse grained 11111 sand 111 1 1 1 1 11111 1 | | | 11111 111 1 1 1 1 11111 Log VS >202 kPa ||||11111 ||||11111 ||||11111 |||||20 | | |11111 ž 111 1111 ||||111 11111 VS >202 kPa 2.0 ٤ Hand Auger HAL360 terminated at 2.0 m 11111 Target depth 11111 111 |||||||Ę 11111 ||||||11111 | | | | |11 classification symbol & method AD auger drilling* consistency / relative density support samples & field tests soil description N nil bulk disturbed sample mud VS Μ В very soft AS auger screwing' based on Unified soft firm C casing D disturbed sample S F hand auger HA Classification System Е environmental sample W penetration washbore SS split spoon sample St stiff hand auger no resistance ranging to refusal HA very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense TC bit

water outflow

V bi

HB

hammer bouncing

VD

very dense



Borehole ID. HAL362 1 of 1 sheet: **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 30 May 2016 date started: principal: 30 May 2016 date completed: THE LAKES STAGE 3E GCR logged by: NM project: **CENTRE OF LOT 362** DBC location. checked by: position: E: 368446; N: 800140 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: DR2244 drilling information material substance DCP material description vane structure and consistency / relative density class ification g shear ⊕ remould ● peak (blows/ 100 mm) samples & additional obs /ations Ē method & support penetra SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic l moisture conditior symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. Μ VSt to TOPSOIL 11111 Η |||||||11111 11 ||||||11111 ||||||||||11111 | | | | |11111 11 11111 ||||||VS >183 kPa | | |9 11 11111 ML SILT: low plasticity, yellow brown, with minor D MATUA SUB-GROUP 1111 ||||| | | | |fine grained sand, trace clay ||||111 11111 111 ||||||11111 VS >183 kPa 0.5 111 ||||||11 |||||||11111 111 1 1 1 1 11111 111 |||||||11111 D to M ||||++++11111 VS 169/ 31 kPa | | |11111 ||||| | |11111 ||||11 11111 Encountered 1111 1 + 1111 11111 |||||VS 133/ 33 kPa | | |1111 0 ż 1.0 € ₹ D 11111 Not HAS.GPJ 111 11111 11111 STAGE 3E 111 |||||||11111 VS >183 kPa ||||11111 | | | 111 11111 NON CORED + DCP ||||11111 11111 ||||||1.3 m: Some sand. Greasy 11111 ||||||||||||||111 11111 11111 | | |111 VS 151/ 25 kPa 11111 ŀ COF BOREHOLE: 15 θ 11111 11111 111 111 11111 1 1 1 1 11111 111 ||||||11111 Log ||||||||||11111 |||||11111 VS >183 kPa ||||||||20 ||||11111 ž ||||1111 ||||11111 VS >183 kPa 11111 2.0 ٤ Hand Auger HAL362 terminated at 2.0 m 11111 Target depth iiiii 111 |||||||Ę 11111 ||||||iiiii | | | | |11 method AD auger drilling* classification symbol & consistency / relative density support samples & field tests soil description N nil bulk disturbed sample mud VS Μ В very soft AS auger screwing' based on Unified soft firm C casing D disturbed sample S F HA W hand auger Classification System Е environmental sample penetration washbore SS split spoon sample St stiff hand auger no resistance ranging to refusal HA very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense TC bit water outflow

HB

V bi

hammer bouncing

VD

very dense



			- y							_			
ATETF	A TECH	COMF	PANY							В	orehole ID.		HAL364
Fr	nai	no	orin	n I	0	- r	Ha	nd Auger		S	heet:		1 of 1
	igi				-0(1 -	i ia	na Augei		р	roject no.		GENZTAUC13086AF
clier	it:	тн	E LAKE	S						d	ate started:		31 May 2016
prino	cipal:									d	ate complete	ed:	31 May 2016
proje	ect:	ΤН	E LAKE	s s	TAG	E 3E	E GCF	2		lc	gged by:		ODS
loca	tion:	CE	NTRE C)F L	от з	864				С	hecked by:		DBC
positi	on: E:	36849	99; N: 80010)1 (Da	atum No	ot Spe	cified)	surface elevation: Not Specified		-	m horizontal:	90°	DCP id.:
	nodel: ing info	ormati	ion			mat	erial sub	drilling fluid:	ł	nole diar	meter : 50 mm		vane id.: SL588
	Lo Lo							material description		sity	vane D0		structure and
method & support	1 2 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	class ification symbol	SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	shear (blc ⊕ remoulded ⊚ peak (kPa) B 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	mm)	additional observations
			V0 - 000 1-D-		-			ORGANIC SILT: low plasticity, dark brown.	M	VSt to H			TOPSOIL VOLCANIC ASHES
			VS >202 kPa					SILT: non plastic to low plasticity, orange brown, with trace fine grained sand.					VOLCANIC ASHES
			VS 158/ 32 kPa		-								
z		Not Encountered	VS 98/ 34 kPa		- 1.0—			SILT: low plasticity, orange brown, with minor clay.		St VSt to			MATUA SUB-GROUP
			VS 117/ 22 kPa		-					н	⊕		
			VS 156/ 44 kPa		1.5 —								
			VS >202 kPa		-			1.7 m: becoming non to slightly plastic, becoming orange, with trace fine to medium grained sand, greasy					
					-2.0			Hand Auger HAL364 terminated at 2.0 m Target depth					
meth AD AS HA W HA	auger auger hand a washb hand a	screwi auger ore auger	ng*		mud casing etration	− no re rangi ▼ refus	al	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	soil desc pased on assificatio re y poist		V S F S V F F	F firm St stiff /St very stiff H hard Fb friable
* B T V	bit sho AD/T blank TC bit V bit	bit	suffix		✓ 10-0 leve wate	Oct-12 v el on dat er inflow er outflo	e shown /	NC SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	Wp pla	astic limit uid limit			Loose MD medium dense



	RA TECH	COMF		al		1 - Ľ	На	nd Auger		s	orehole ID).	HAL366
clier	<u> </u>			_		1					roject no. ate started		<u>GENZTAUC13086AF</u> 31 May 2016
	cipal:			.0							ate comple		31 May 2016
proje		тн	E LAKE	2.2	TΔG	F 3F	GCE)			aged by:	sieu.	NM
loca											hecked by:		DBC
			04; N: 8000				cified)	surface elevation: Not Specified	á		m horizonta		DCP id.:
drill n	nodel:							drilling fluid:	ł	nole dia	meter : 50 m	m	vane id.: DR2244
drill	ing infe	ormat	ion			mate	erial sub	stance material description		_≩	vane	DCP	structure and
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	consistency / relative density	shear (⊕remoulded ⊚peak 11 (kPa) B 0 0 0 0 0 0 0 0 0	blows/ 00 mm)	additional observations
			VS >183 kPa		=		ML	ORGANIC SILT: low plasticity, dark brown.	D	VSt			TOPSOIL -
			VS 169/ 26 kPa		0.5 —			fine grained sand, trace clay.					-
		ntered	VS 169/ 31 kPa		-								
 z 		Not Encountered	VS 183/ 32 kPa		1.0-						⊕		-
			VS 151/ 31 kPa		-					St			
			VS 94/ 21 kPa		1.5—		ML	SILT : low plasticity, orange, with minor to trace clay, trace fine to coarse grained sand. Greasy.		VSt to H	 ⊕ ⊕ 		MATUA SUB-GROUP
			VS 151/ 31 kPa		-						<pre> </pre>		
* *			VS >183 kPa		-2.0			Hand Auger HAL366 terminated at 2.0 m Target depth					
meti AD AS HA W HA * e.g. B	hod auger auger hand a washt hand a	oore auger own by	ng*	pen wate	etration		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)	t Cla moistu D dr M m W we Wp pla	soil desc based on ussificatio re y bist	a symbol & ription Unified n System	F S	F firm St stiff /St very stiff H hard Pb friable /L very loose



A TETR	A TECH	COMP		n I	0	Y	На	nd Auger			Borehole heet:	ID.	HAL368
	<u> </u>				-0(1 -	Па	nd Auger			roject no		GENZTAUC13086A
clien	it:	TH	E LAKE	S						d	ate start	ed:	31 May 2016
princ	cipal:										ate com		31 May 2016
proje	ect:		E LAKE				GCF	2		lo	ogged by		NM
locat			NTRE C							С	hecked b	oy:	DBC
positi drill m		36850	08; N: 80002	25 (Da	itum No	ot Spe	cified)	surface elevation: Not Specified drilling fluid:		-	om horizor meter : 50		DCP id.: vane id.: DR2244
	ing info	ormati	ion			mate	erial sub	-					Valie Id.: Divezerr
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	class ification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ⊕remoulded ⊚peak (kPa) 000000000000000000000000000000000000	DCP (blows/ 100 mm	
		-			-			ORGANIC SILT: low plasticity, dark brown.	D	VSt			TOPSOIL
			VS >183 kPa		- 0.5 —		ML	SILT: low plasticity, orange brown, with minor fine grained sand, trace clay.	M				MATUA SUB-GROUP
		pa	VS 169/ 31 kPa		-			0.6 m: becoming minor clay, trace fine to medium grained sand.					
HA		Not Encountered	VS 169/ 31 kPa		- 1.0			1.1 m: becoming orange with minor clay, trace					-
			VS 169/ 31 kPa		-			fine to medium grained sand, greasy.					
			VS 169/ 31 kPa		- 1.5— -			1.6 m: minor fine to medium grained sand. Compressible	w	St			
			VS 61/ 21 kPa		-						 ⊕@ 		
			VS >183 kPa		2.0-			1.9 m: some fine to medium grained sand.		VSt to H			
					_			Hand Auger HAL368 terminated at 2.0 m Target depth					
meth AD AS HA W HA	auger auger hand a washb hand a	screwii iuger ore iuger	ng*	pene wate	nud casing etration		al	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 mo W we	soil desc pased on issificatio re y poist et	Unified on System		consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose
e.g. B T V	AD/T blank t TC bit V bit	oit			leve		e shown	Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing		astic limit uid limit			L loose MD medium dense D dense VD very dense



A TETRA T			ANY								Borehole ID).	HAL370
Eng	gi	ne	erin	g l	_00) -	Ha	nd Auger			heet: roject no.		1 of 1 GENZTAUC13086AF
client:	<u> </u>		E LAKE					-			late started	1:	31 May 2016
princip	al:									d	late comple	eted:	31 May 2016
project	t:	ΤН	E LAKE	s s	TAG	E 38	E GCF	2		lo	ogged by:		ODS
locatio	n:	CE	NTRE C)F L	от з	70				с	hecked by	:	DBC
position: drill mod		36854	0; N: 8000	36 (Da	itum No	ot Spe	cified)	surface elevation: Not Specified drilling fluid:		-	om horizonta meter : 50 m		DCP id.: vane id.: SL588
drilling		ormati	on			mat	erial sub	stance					
method & 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 density	⊕ remoulded ⊚ peak 1 (kPa)	DCP (blows/ 00 mm)	structure and additional observations
			VS >202 kP <i>a</i>		-			ORGANIC SILT: low plasticity, dark brown. SILT: non plastic to low plasticity, orange brown, with trace fine grained sand.	M	VSt			TOPSOIL
			VS >202 kPa		- 0.5								
		Not Encountered	VS >202 kPa		- - 1.0-								-
			VS 153/ 44 kPa		-								
			VS >202 kPa		1.5 —			SILT: non plastic, pale orange brown, with minor fine to coarse grained sand. Greasy.	_		 		-
			VS >202 kPa		-						 		
					-2.0			Hand Auger HAL370 terminated at 2.0 m Target depth			 		
AS a HA h W w HA h	uger of uger s and a vashbo and a bit sho	ore	ng*	pen wate	nud casing etration	- no re rangi ◄ refus Oct-12 v	ater	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 pedid components	b Cla moistur D dry M mo W we	soil desc pased on issificatio re y pist et	n symbol & rription Unified on System	F F F	St stiff /St very stiff H hard -b friable /L very loose
e.g. A B b T T	oit shơ AD/T olank t C bit / bit		suffix		Leve	Oct-12 v	ater e shown		W we Wp pla		t		/L very loose



			<u> </u>							_			
A TETR	A TECH	COMF	ANY							В	orehole ID.		HAL372
E۲	nai	no	orin	a I		N	Ha	nd Auger		S	heet:		1 of 1
	iyi			_	LOÍ	<u>J</u> -	Па	nu Auger		р	roject no.		GENZTAUC13086A
clien	t:	ΤН	E LAKE	S						d	ate started:		31 May 2016
princ	ipal:									d	ate comple	ted:	31 May 2016
proje	ect:	ΤН	E LAKE	s s	TAG	E 31	E GCI	?		lc	ogged by:		NM
locat	ion:	CE	NTRE C)F L	.от з	872				С	hecked by:		DBC
positio	on: E:	36857	2; N: 8000	36 (D	atum No	ot Spe	cified)	surface elevation: Not Specified	а	angle fro	om horizontal:	90°	DCP id.:
drill m	odel: ng info	rmoti	on			mat	erial sul	drilling fluid:	h	ole diar	meter : 50 mn	n	vane id.: DR2244
ariii		Jinau						material description		, sity	vane [DCP	structure and
method & 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	● remoulded ● peak 10 (kPa)	lows/ 0 mm)	additional observations
	о и – И п	>		œ	σ		0 0	ORGANIC SILT: low plasticity, dark brown.	M	VSt to		9009	TOPSOIL
					-	$ \rangle$				H			
			VS >183 kPa				ML	SILT: low plasticity, orange brown, with minor fine to medium grained sand.	D				VOLCANIC ASHES
			V3 - 103 KF2		-								
					-								
			VS >183 kPa		0.5								
					-								
					-						 		
			VS >183 kPa		-								
		red											
		Not Encountered	VS 169/				ML	SILT: low plasticity, yellow brown, with minor clay, trace fine grained sand.	М	VSt			MATUA SUB-GROUP
ż		Not En	31 kPa		1.0-								
					-								
			VS 151/ 25 kPa		_						⊕ ⊕		
					-								
					-								
			VS 169/ 25 kPa		1.5-								
			10 4001								i i i i i i		
			VS 133/ 31 kPa		-								
					-								
			VS 151/ 19 kPa		20								
			- to KFd		2.0-			Hand Auger HAL372 terminated at 2.0 m Target depth					
			[class	ification			
neth AD AS	od auger auger			M	port mud casing	I	N nil	samples & field tests B bulk disturbed sample D disturbed sample	s	oil desc ased on	ription	۱ I	consistency / relative density VS very soft S soft
HA N	hand a washb	auger ore	-		etration			E environmental sample SS split spoon sample			n System	1	firm St stiff
HA	hand a	auger				no re rang	esistance ing to sal	U## undisturbed sample ##mm diameter HP hand penetrometer (kPa)	moistu D dry	y		Ì	/St very stiff H hard
		wn by	suffix	wat	T 10-0	Oct-12 v	vater	N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone	M mo W we	oist			Fb friable /L very loose _ loose
e.g. B	AD/T blank				leve	el on dat er inflov	te shown v	Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal		uid limit		1	MD medium dense
T V	TC bit V bit			-	- wat	er outflo	w	HB hammer bouncing					VD very dense



ATETRA			PANY							В	orehole ID.		HAL374
E۳	ina	no	orina	n I	~	N .	ปว	nd Augor		s	heet:		1 of 1
	igi				-0(J -	Па	nd Auger		р	roject no.		GENZTAUC13086AF
client		ΤН	E LAKE	S						d	ate started:		31 May 2016
princi	ipal:									d	ate complete	ed:	31 May 2016
proje	ct:		E LAKE				GCF	2		lc	gged by:		ODS
locati	-		NTRE C								hecked by:		DBC
positio drill mo		36860	05; N: 80002	29 (Da	tum No	ot Spe	cified)	surface elevation: Not Specified drilling fluid:			m horizontal: meter : 50 mm	90°	DCP id.: vane id.: SL588
	ng info	ormati	on			mate	erial sub						
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	class ification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	shear ⊕remoulded ⊚peak 100	CP ws/ mm)	structure and additional observations
ĕ ₪ A A	- N m	Ň		RL	de		sy	ORGANIC SILT: low plasticity, dark brown.	Ĕ 8 M	रु <u>चे</u> VSt to			TOPSOIL
- HA		Not Encountered	VS >202 kPa VS 173/ 52 kPa VS 165/ 46 kPa VS 102/ 29 kPa VS 165/ 39 kPa					SILT: non plastic to low plasticity, orange brown, with trace fine grained sand.			$\begin{array}{c} \begin{array}{c} \\ \\ \\ \\ \\ \end{array}\end{array}$		VOLCANIC ASHES
-					-2.0			Hand Auger HAL374 terminated at 2.0 m Target depth					
AS HA W HA * e.g. B	bd auger hand a washb hand a bit sho AD/T blank t TC bit	screwi auger ore auger wn by	ng*	pene	nud easing etration er er leve wate		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	b Cla moistur D dr M mo W we Wp pla	soil desc ased on ssificatio re y bist		F F L L	F firm St stiff /St very stiff H hard Fb friable /L very loose Joose MD medium dense



A TETR/		COMPANY							В	orehole ID		HAL376
Er	ngi	neerir	g	Loc) - (Ha	nd Auger			heet:		1 of 1 GENZTAUC13086AF
client		THE LAK			<u> </u>		5			roject no. ate started	:	31 May 2016
princ			-							ate comple		31 May 2016
proje		THE LAK	ES S	STAG	E 3E	E GCR				ogged by:		ODS
locat		CENTRE								hecked by:		DBC
positio	on: E:	368640; N: 800	018 (D	atum No	ot Spe	cified)	surface elevation: Not Specified	a		om horizontal		DCP id.:
drill m							drilling fluid:	ł	nole dia	meter : 50 mr	n	vane id.: SL588
drilli		ormation				erial sub	stance material description		, ity	vane	DCP	structure and
method & support	1 2 penetration	samples a field tests	RL (m)	depth (m)	graphic log	class ification symbol	SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	● remoulded ● peak (kPa)	olows/ 10 mm) ∗ ∞ ∞ ₽	additional observations
- HA		VS >202 kl VS >202 kl VS 177/ 34 kPa VS 156/ 35 kPa VS 133/ 32 kPa	Pa				ORGANIC SILT: low plasticity, dark brown. SILT: non plastic to low plasticity, orange brown, with trace fine grained sand.	M	VSt to H	$\begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} $		TOPSOIL
		VS 102/ 46 kPa	Pa				SILT: non plastic to low plasticity, pale orange brown, with trace to minor fine to coarse grained sand and with trace clay.					MATUA SUB-GROUP
<u>↓</u> ↓				-2.0			Hand Auger HAL376 terminated at 2.0 m Target depth					
metho AD AS HA W HA * e.g. B	auger auger hand a washb hand a	ore auger wn by suffix	M C			al /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	b Cla moistur D dr M mo W we Wp pla	soil desc ased on ssificatio re y bist	Unified n System		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



A TETR	A TECH	COMP		g l	-0() -	Ha	nd Auger		sl	orehole neet: roject no		HAL378 1 of 1 GENZTAUC13086A
clien	t:	TH	E LAKE	S						da	ate starte	ed:	31 May 2016
princ	ipal:									da	ate comp	oleted:	31 May 2016
proje	ect:	ТН	E LAKE	s s	TAG	E 3E	GCF	2		lo	gged by	:	ODS
locat	ion:	CE	NTRE C)F L	от з	78				cl	necked b	by:	DBC
positio	on: E:	36867	0; N: 80000)1 (Da	itum No	ot Spec	cified)	surface elevation: Not Specified	a	angle fro	m horizon	tal: 90°	DCP id.:
drill m						4		drilling fluid:	ł	nole diar	neter : 50	mm	vane id.: SL588
arilli	ng info	rmati	on				erial sub	stance material description		ity _	vane	DCP	structure and
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	consistency / relative density	shear ⊕remoulded ⊚peak (kPa) 0500000000000000000000000000000000000	(blows/ 100 mm)	additional observations
					-			ORGANIC SILT: low plasticity, dark brown.	M	VSt to H			TOPSOIL
			VS >202 kPa		-			SILT : non plastic, pale orange brown, with minor fine to coarse grained sand.	-		 ⊕ ⊕		MATUA SUB-GROUP
			VS 156/ 24 kPa		0.5 —			0.6 m: with some fine to coarse grained sand			$\begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\$		
		Not Encountered	VS 98/ 21 kPa		- - 1.0-					St	⊕		
		Ž	VS 96/ 18 kPa		-			1.1 m: becoming pale brown, with trace fine to coarse grained sand and with trace clay. Sticky			$\begin{array}{c} \cdot \cdot \cdot \cdot \\ - \cdot \cdot \cdot \\ - \cdot \cdot \\ -$		
			VS 79/ 21 kPa		- 1.5—						$\begin{array}{c} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$		
			VS >202 kPa		-					Н	· · · · · · · · · · · · · · · · · · ·		
<u></u>					-2.0			Hand Auger HAL378 terminated at 2.0 m Target depth					
meth AD AS HA W HA		screwir luger ore luger	ıg*	pen wate	nud casing etration	no res rangir ◄ refusa		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	moistur D dr M mo W we	soil desci ased on ssification re y bist et	symbol &		consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose
e.g. B T V	AD/T blank t TC bit V bit		Julia		leve	Oct-12 w I on date er inflow er outflov	e shown	Nc SPT with solid cone VS vane shear, peak/remouded (kPa) R refusal HB hammer bouncing		astic limit uid limit			L loose MD medium dense D dense VD very dense



		_	-y							-			
TETR	RA TECH	COMF	PANY							В	orehole ID.		HAL380
Er	nai	no	orin	a I	~	N _	На	nd Augor		S	heet:		1 of 1
	iyi		enni	<u>y 1</u>	-06	<u>J -</u>	па	nd Auger		р	roject no.		GENZTAUC13086A
clien	nt:	ΤH	E LAKE	S						d	ate started:		31 May 2016
princ	cipal:									d	ate complete	ed:	31 May 2016
proje	ect:	ΤН	E LAKE	s s	TAG	E 3E	E GCF	2		lc	ogged by:		ODS
loca	tion:	CE	NTRE C)FL	от з	80				с	hecked by:		DBC
positi	ion: E:	36869	99; N: 79995	51 (Da	tum No	ot Spe	cified)	surface elevation: Not Specified	a		om horizontal:	90°	DCP id.:
drill n	nodel:					•	,	drilling fluid:		-	meter : 50 mm		vane id.: SL588
drill	ing info	ormati	ion			mate	erial sub	stance			· · ·		1
method & support	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 density	shear ⊕ remoulded ⊚ peak (blo 100	CP ows/ mm)	structure and additional observations
E ⊼ A A	- 0 0	Š		Ľ	ð	5	ିରଟ	ORGANIC SILT: low plasticity, dark brown.	E 8 M	8 ≞ VSt to	1 1 1 20 00 00 00 00 00 00 00 00 00 00 00 00	^{ء ∞ 2}	TOPSOIL
			VS 173/ 38 kPa		-			SILT: non plastic, brown, with minor fine to coarse grained sand.	-	Н			MATUA SUB-GROUP
			VS 108/ 26 kPa		0.5			0.6 m: becoming orange brown, with trace clay. Greasy					-
z		Not Encountered	VS 189/ 19 kPa		- 1.0			0.9 m: clay absent					
			VS 106/ 19 kPa		-								
			VS >202 kPa		1.5 — - -								
			VS >202 kPa		- - 2.0			Hand Auger HAL380 terminated at 2.0 m Target depth					
meth AD AS HA W HA * e.g. B T	bit sho AD/T blank I TC bit	screwi iuger ore iuger wn by	ng*	pen wate	etration etration		al 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	b Cla moistur D dr M mo W we Wp pla	soil desc ased on ssificatio re y bist	Unified n System	 	consistency / relative density /S very soft S soft = firm St stiff /St very stiff H hard >b friable /L very loose



A TETR/	A TECH	COMP		-							orehole I	ID.	HAL382
Ēr	Ŋ				-0(J -	На	nd Auger		р	roject no		GENZTAUC13086AF
client	t:	ΤH	E LAKE	S	_	_	_			d	ate starte	ed:	31 May 2016
princ	ipal:									d	ate comp	leted:	31 May 2016
proje	ct:	ΤH	E LAKE	s s	TAG	E 3E	GCF	2		lo	ogged by:	:	NM
locati	ion:	CE	NTRE C	DF L	OT 3	882				С	hecked b	y:	DBC
		36870	06; N: 79992	21 (Da	atum No	ot Spee	cified)	surface elevation: Not Specified			om horizon		DCP id.:
drill m drilli	ng info	ormati	on			mate	erial sub	drilling fluid: stance	I		meter : 50 i	mm	vane id.: DR2244
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	class ification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	vane shear ⊕remoulded ⊚peak (kPa)	DCP (blows/ 100 mm)	structure and additional observations
	3 7 - 3	- Me		RI	de	B	3 C	ORGANIC SILT: low plasticity, dark brown.	<u>ё</u> 8 М	<u>७ च</u> VSt	200 		TOPSOIL -
			VS >183 kPa		-			SILT : low plasticity, yellow brown, with minor fine to medium grained sand, trace clay.			 0 0 		MATUA SUB-GROUP
			VS >183 kPa		0.5				M to W	-			-
		ered	VS 151/ 37 kPa		-			Sandy SILT: non plastic, orange brown, with fine to medium grained sand.			 		· · · · · · · · · · · · · · · · · · ·
HA		Not Encountered	VS 126/ 31 kPa		1.0-			SILT: low plasticity, yellow brown, with minor		St			-
			VS 94/ 31 kPa		-			fine to medium grained sand, trace clay.			⊕ ⊕ 		
			VS 94/ 31 kPa		1.5—								-
			VS 120/ 31 kPa		-			1.7 m: becoming red brown.		VSt	- ⊕ ● 		
			VS 81/					1.9 m: becoming yellow brown with minor clay, trace fine grained sand.		St			
F			<u>31 kPa</u>		2.0-			Hand Auger HAL382 terminated at 2.0 m Target depth					
metho AD AS HA W HA	od auger s hand a washbo hand a	screwii uger ore		M i C o pen	etration		l nil sistance ng to al	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)	t Cla moistu D dr M mo	soil desc based on ussificatio re y bist	n symbol &		F firm St stiff /St verystiff H hard Fb friable
* B T V	bit show AD/T blank b TC bit V bit		suffix		■ 10- leve	Oct-12 w el on date er inflow er outflow	e shown	N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing		et astic limit uid limit		L N	MD medium dense



Borehole ID. HAL383 sheet: 1 of 1 **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 09 Jun 2016 date started: principal: 09 Jun 2016 date completed: THE LAKES STAGE 3E GCR logged by: ODS project: **CENTRE OF LOT 383** DBC location. checked by: position: E: 368728; N: 799928 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: SL588 drilling information material substance DCP structure and material description vane consistency / relative density classification g shear ⊕ remould ● peak (blows/ 100 mm) samples & additional obs /ations Ē method & support penetra moisture condition SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic l symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. D to M TOPSOIL Шİ |||||||11111 11 ||||||11111 1 + 1| | | |11111 | | | | |11111 11 11111 |||||||||MATUA SUB-GROUP SAND: fine to coarse grained, yellow-brown. | | | | |1111 1111 ||| | | | ||||||11111 11 ||||||SILT: non plastic to low plasticity, brown, with Н 11111 0.5 trace fine grained sand. ||||||111 1111 VS >202 kPa 111 |||• 11111 111 1111 11 ||||||11111 ||||||||||11111 | | |11111 | | | | |||||11111 | | | | |11 | | | | |11111 VS >202 kPa Encountered 1111 |||||||• 11111 | | | | || | |11111 ||||||¥ ż 1.0 11111 Not HAS.GPJ 11111 111 |||||||STAGE 3E 11111 11 | | | | |VS UTP ||||VS UTP 11111 NON CORED + DCP ||||| | | | |11111 11111 111 11111 ||||111 11111 1.4 m: becoming orange brown 11111 ||||| | | | |VS >202 kPa COF BOREHOLE: 15 iiiii Μ 111 1.5 m: becoming slightly plastic. Sand becomes absent 11111 111 ||||||11111 1 1 1 1 11111 111 11111 Log ||||11111 |||||11111 VS >202 kPa | | | |||||11111 20 11111 11 111 ž 11 1111 11111 11 2.0 Hand Auger HAL383 terminated at 2.0 m Target depth ٤ iiiii 111 |||||||Ę 11111 ||||||iiiii | | | | |111 consistency / relative density VS Verv soft method AD auger drilling* classification symbol & support samples & field tests soil description N nil bulk disturbed sample mud Μ В AS auger screwing' disturbed sample environmental sample based on Unified soft firm C casing D S F HA W hand auger Classification System Е penetration split spoon sample undisturbed sample ##mm diameter washbore SS St stiff hand auger no resistance ranging to refusal HA very stiff VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense TC bit water outflow HB hammer bouncing VD very dense



A TET	RA '	TECH (COMP		n I	0	ч – г	Нэ	nd Auger			Borehole II heet:	D.	HAL384A 1 of 1
					-	-0(1 -	110	nu Augel			roject no.	.l.	GENZTAUC13086AF
clie			ιH	E LAKE	3							ate starte		31 May 2016
prir			T 11		· ~ ~	T 40		- 001				ate comp	leted:	31 May 2016
pro								GCF	ſ			bgged by:		NM
loca								oified)	surface elevation: Not Specified			hecked by	,	DCP id.:
drill			00074	18; N: 79992	20 (Da		or she	cilieu)	drilling fluid:		U	meter : 50 n		vane id.: DR2244
dri	llin	g info	rmati	on			mate	erial sub						1
method &	lindque	¹ 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 density	(kPa)	DCP (blows/ 100 mm)	
1							$\left \right\rangle$		ORGANIC SILT: low plasticity, dark brown.	D	VSt			TOPSOIL
				VS >183 kPa		-		ML	SILT : low plasticity, orange brown, with minor clay, trace fine grained sand.					MATUA SUB-GROUP
				VS 74/ 19 kPa		- 0.5			0.4 m: becoming orange with some clay, trace fine grained silt, sticky and greasy.	W	St			-
			intered	VS 68/ 19 kPa		-			0.8 m: occasional pockets of manganese.					
HA ⊓			Not Encountered	VS 74/ 19 kPa		1.0-						⊕ © 		-
				VS 55/ 19 kPa		-						 ⊕● 		
				VS 74/ 19 kPa		- 1.5								-
				VS 68/ 19 kPa		-						 ⊕@ 		
<u>,</u>	¥			VS 68/ 19 kPa		- 2.0			Hand Auger HAL384A terminated at 2.0 m Target depth			⊕ <mark> </mark> 		
Me AD AS HA W HA * e.g	t L L	I auger c auger s hand au vashbc hand an bit show AD/T blank b TC bit	orewin uger ore uger vn by	ng*	M r C c pen	etration	- no re rangii ◄ refus Oct-12 w	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	t Cla moistu D dr M ma W we Wp pla	soil desc based on ussification re y bist	n symbol & rription Unified nn System		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



A TETRA 1			PANY								orehole IE	D.	HAL384B
En	gi	ne	ering	gl	_00] -	Ha	nd Auger			heet:		^{1 of 1} GENZTAUC13086AF
client:	<u> </u>		E LAKE								roject no. ate starteo	d:	09 Jun 2016
princip	al:			-							ate comple		09 Jun 2016
project		тн	E LAKE	's s	TAG	E 3E	E GCF	2			ogged by:		ODS
locatio											hecked by	r:	DBC
			18; N: 79992				cified)	surface elevation: Not Specified	á		om horizonta		DCP id.:
drill moo								drilling fluid:	ł	nole dia	meter : 50 m	ım	vane id.: SL588
drilling	-	rmati	on				erial sub	stance material description		, it	vane	DCP	structure and
method & support	¹ 2 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	class ification symbol	SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	shear ⊕remoulded ⊚peak (kPa) S ⁰⁰ S	(blows/ 00 mm)	additional observations
					-			ORGANIC SILT: low plasticity, dark brown.	M	VSt to H			TOPSOIL
			VS >202 kPa		-			SILT : non plastic to low plasticity, orange, with trace fine to coarse grained sand. Greasy.	_				MATUA SUB-GROUP
			VS 139/ 24 kPa		0.5			0.5 m: with trace clay			□ □ ⊕ @ 		-
		Not Encountered	VS 156/ 29 kPa		- - 1.0-						i i i i i		-
		Z	VS 74/ 28 kPa		-					St			
			VS 62/ 25 kPa		- 1.5—			1.4 m: becomes sticky					-
			VS 61/ 29 kPa								 		
					-			Hand Auger HAL384B terminated at 2.0 m Target depth			 		
AS a HA h W w HA h	auger o auger s nand a vashbo nand a	ore uger	ng*		nud casing etration		I nil sistance ng to al	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetration test (SPT) N standard penetration test (SPT)	t Cla moistu D dr M mo	soil desc based on ussificatio re y bist			Consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable
e.g. A B b T T	oit shơ AD/T blank t IC bit / bit	wn by bit	suffix		✓ 10-0 leve wate	Oct-12 w el on dat er inflow er outflo	e shown	N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	Wp pla	astic limit uid limit		ן ז נ	VL very loose L loose MD medium dense D dense VD very dense



Borehole ID. HAL385 sheet: 1 of 1 **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 09 Jun 2016 date started: principal: 09 Jun 2016 date completed: THE LAKES STAGE 3E GCR logged by: ODS project: **CENTRE OF LOT 385** DBC location. checked by: position: E: 368731; N: 799900 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: SL588 drilling information material substance structure and DCP material description vane consistency / relative density class ification g shear ⊕ remould ● peak (blows/ 100 mm) samples & additional obs ations Ē method & support moisture condition penetra SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic I symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. Μ Н TOPSOIL 11111 ||||||11111 11111 11 ||||||||||| | | |11111 **SILT**: non plastic to low plasticity, dark orange brown, with trace fine grained sand. | | | | |VOLCANIC ASHES 11 11111 ||||||VS >202 kPa iiiii 11 |||@ 1111 |||||| | | |11111 | | | | |111 |||||||11111 0.5 ||||||111 1111 VS >202 kPa 111 |||• 11111 111 1111 11111 11 ||||||11111 ||||||||||11111 | | |11111 | | | | |||||11111 | | | | |11 11111 VS >202 kPa Encountered 1111 |||||||• 11111 | | | | || | |1111 ||||||¥ ż 1.0 Not 11111 1.0 m: becoming orange brown 111 11111 |||11111 111 |||||||11111 VS >202 kPa ||||11111 | | | IIIĨ 11111 ||||11111 11111 111 11111 ||||111 11111 11111 ||||| | | | |VS >202 kPa 11111 111 15 iiiii 111 1.5 m: with trace clay, becoming slightly plastic 11111 111 ||||||11111 1 1 1 1 11111 111 ||||||11111 11111 |||||11111 VS >202 kPa |||| ||||11111 | |11111 111 11 1111 ||11111 11111 11 2.0 Hand Auger HAL385 terminated at 2.0 m Target depth iiiii 111 |||||||11111 ||||||iiiii | | | | |11 consistency / relative density VS very co⁴ method AD auger drilling* classification symbol & support samples & field tests soil description N nil bulk disturbed sample very soft soft firm mud Μ В AS auger screwing' disturbed sample environmental sample based on Unified C casing D S F HA W hand auger Classification System Е penetration washbore SS split spoon sample St stiff hand auger no resistance ranging to refusal HA very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense TC bit water outflow HB hammer bouncing VD very dense

HAS.GPJ STAGE 3E NON CORED + DCP COF BOREHOLE: Log 20 ž ٤ Ę



		I Cy							_	anah - I- ID		
		COMPANY								orehole ID.		HAL386
End	qi	neerin	a l	Loc) - (Ha	nd Auger			heet:		
client:	<u> </u>	THE LAK			<u> </u>		<u> </u>			roject no. ate started:		<u>GENZTAUC13086AF</u> 31 May 2016
			20								l.	-
principa				-		- 001				ate complete	ea:	31 May 2016
project		THE LAK				: GCF	2			ogged by:		ODS
locatior		CENTRE							С	hecked by:		DBC
position: drill mod		368708; N: 799	898 (Da	atum No	ot Spe	cified)	surface elevation: Not Specified drilling fluid:		-	om horizontal: 9 meter : 50 mm	90°	DCP id.: vane id.: SL588
		rmation			mat	erial sub		1				Vane Id., SL300
	tion	samples &			Ð	tion	material description		ty / nsity	vane DO	CP ws/	structure and additional observations
	² penetration	field tests	RL (m)	depth (m)	graphic log	class ification symbol	SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	Premoulded Premoulded (kPa) B 2 2 2 3	mm) ∞∞₽	
HA		VS >202 kF VS >202 kF VS >202 kF VS >202 kF VS >202 kF	22				ORGANIC SILT: low plasticity, dark brown. SILT: non plastic to low plasticity, orange brown, with trace to minor clay and trace fine grained sand. 0.4 m: becoming greasy	M	VSt to H			TOPSOIL
I I	I I I I I I I I I I I I I I I I I I I	bre	sup M C pen				SILTY SAND: fine to coarse grained, pale brown. SILTY SAND: fine to coarse grained, pale brown. Clayey SILT: low plasticity, pale brown, with trace fine grained sand. Hand Auger HAL386 terminated at 2.0 m Target depth samples & field tests B bulk disturbed sample D disturbed sample E environmental sample S split spcon sample U## undisturbed sample ###mm diameter HP hand penetration test (SPT) N* SPT - sample recovered Ne CPT with bodild covered	t Cla moistu D dr M mo W we	soil desc pased on ussificatio re y pist et			firm tt stiff /St very stiff h hard b friable /L very loose
e.g. Al B bl T T	it shov D/T lank b C bit bit		wat	■ 10-i leve	Oct-12 w	vater e shown		W we Wp pla				/L very loose loose /D medium dense



blank bit

TC bit

V bi

vater inflow

water outflow

R

HB

refusal

hammer bouncing

D

VD

dense

very dense

Borehole ID. HAL387 sheet: 1 of 1 **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 09 Jun 2016 date started: principal: 09 Jun 2016 date completed: THE LAKES STAGE 3E GCR logged by: ODS project: **CENTRE OF LOT 387** DBC location. checked by: position: E: 368709; N: 799882 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: SL588 drilling information material substance DCP material description vane structure and consistency / relative density class ification g shear ⊕ remould ● peak (blows/ 100 mm) samples & additional obs ations Ē method & support penetra moisture condition SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic l symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. Μ TOPSOIL 11 1111 1 + 1||||||1111 11 VS 185/ 19 kPa 11 SILT: low plasticity, orange brown, with trace fine to medium grained sand and with trace VSt to 1111 MATUA SUB-GROUP ⊕ijo 11 Ĥ 1111 clay. Greasy. ||| | |1111 11 1111 11 Tiiii ||0.5 ||||||111 VS 133/ 24 kPa e lo l 11 4 | | | | 111 111 1111 11 111 1111 ||||| | |111 | | |111 11 111 VS >202 kPa Encountered |||||||• 0.9 m: with some fine to coarse grained sand ΠĪ | | |111 ¥ 1.0 ż 1 111 Not HAS.GPJ 111 111 ||||||1 | | 9111 STAGE 3E 11 | | | | |VS UTP ||||388 I I I VS UTP 1.2 m: becoming grey brown 11111 + DCP ||||| | | | |11111 ||NON CORED 1111 11 |||||11 1.4 m: with some fine grained sand 111 1 VS 182/ 52 kPa 111 111 ¢ 0 COF BOREHOLE: 1.5 11 SILTY SAND: fine to coarse grained, grey MD 1 1 1 1 brown 111 g SILT: non plastic to low plasticity, grey brown, Н 1 111 with trace to minor fine to coarse grained sand. |||||111 VS >202 kPa ø ||||1.8 m: becoming brown and non plastic 7 11 11 ž 11 |||||11111 VS >202 kPa 11 2.0 ٤ Hand Auger HAL387 terminated at 2.0 m 11111 Target depth 11111 111 Ę 11111 ||||||11111 11 111 method AD auger drilling* classification symbol & consistency / relative density support samples & field tests soil description N nil bulk disturbed sample mud VS Μ В very soft AS auger screwing' based on Unified soft firm C casing D disturbed sample S F HA W hand auger Classification System Е environmental sample penetration washbore SS split spoon sample St stiff hand auger HA no resistance ranging to refusal very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense



A TETR/	A TECH	COMP		~ I	~	N	ᆸ	nd Augor			orehole I heet:	D.	HAL388A 1 of 1
٢	iyi			_	-0(J -	пa	nd Auger		р	roject no.		GENZTAUC13086AF
client	t:	TH	E LAKE	S						d	ate starte	ed:	31 May 2016
princ	ipal:									d	ate comp	leted:	31 May 2016
proje	ct:	ΤН	E LAKE	s s	TAG	E 31	E GCF	2		lo	ogged by:		ODS
locati	ion:	CE	NTRE C	DF L	от з	88				С	hecked b	y:	DBC
-		36870	06; N: 79986	69 (Da	atum No	ot Spe	cified)	surface elevation: Not Specified		-	om horizont		DCP id.:
drill m drilli	ng info	ormati	on			mat	erial sub	drilling fluid:	1		neter : 50 r	nm	vane id.: SL588
method & support	¹ 2 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	class ification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	(kPa)	DCP (blows/ 100 mm)	structure and additional observations
		-		_	-			ORGANIC SILT: low plasticity, dark brown.	M	VSt to H		 	TOPSOIL .
			VS 144/ 24 kPa		-			SILT: non plastic to low plasticity, orange brown, with trace to minor clay and trace fine to coarse grained sand.			 ⊕ @ 		MATUA SUB-GROUP
			VS >202 kPa		0.5—								-
					-			0.7 m: pale brown, with trace clay and with minor fine to coarse grained sand					
- HA		Not Encountered	VS 71/ 21 kPa		- 1.0-			0.85 m: becoming sticky		St			-
		2	VS 49/ 34 kPa		-								
			VS 63/		-			1.3 m: with some fine to coarse grained sand		St			
			29 kPa		1.5								-
			VS >202 kPa		-			1.8 m: becoming brown, with trace fine grained sand, clay absent		H	 •		
<u>v</u> *					2.0-			Hand Auger HAL388A terminated at 2.0 m Target depth					
metho AD AS HA W HA	AS auger screwing* C casing HA hand auger W washbore penetratio				nud casing etration		N nil sistance ng to al	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)	t Cla moistu D dr	soil desc based on assificatio	symbol &		Consistency / relative density VS very soft VS soft F firm St stiff VSt very stiff H hard Fb friable
* B T V	* bit shown by suffix e.g. AD/T B blank bit T TC bit ₩ water unt					el on dat er inflow	e shown	N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing	W we Wp pla			1 1 1	VL very loose L loose MD medium dense D dense VD very dense



Borehole ID. **HAL388B** 1 of 1 sheet: **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 09 Jun 2016 date started: 09 Jun 2016 principal: date completed: THE LAKES STAGE 3E GCR ODS project: logged by: **CENTRE OF LOT 388** DBC location: checked by: position: E: 368706; N: 799865 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: SL588 drilling information material substance DCP (blows/ 100 mm) classification symbol consistency / relative density structure and additional observat material description vane penetration samples & field tests shear ⊕ remould ● peak graphic log rvations method & support Ē moisture condition SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components Ê depth (water (kPa) RL ORGANIC SILT: low plasticity, dark brown. М TOPSOIL 1.1.1 |||||||||++++|||||||||||1111 111 VS 184/ 46 kPa | | | | ⊕ | |● **SILT**: non plastic to low plasticity, orange brown with mottled brown, with trace fine to VSt to H MATUA SUB-GROUP 11 medium grained sand. TTT ||||||1111 1111 111 1111 0.5 111 111 VS >202 kPa 111 |||• 111 ||||||**SAND**: fine to coarse grained, orange brown, with trace silt. MD ||||||||||| | || | | | |||||| | |Not Encountered ||||**SILT**: non plastic, orange brown, with trace fine to coarse grained sand. ||||||VS 180/ 44 kPa | | |1.0 ф \mathbf{O} ₹ **SAND**: fine to coarse grained, yellow brown, with trace silt. MD to

CDF_0_9_06_LIBRARY.GLB rev:AN Log_COF BOREHOLE: NON CORED + DCP_STAGE 3E HAS.GPJ_<<DrawingFile>> 21/06/2016 11:

 VS >202 kPa		SILTY SAND: fine grained, yellow brown.		
	1.5	SAND: fine to coarse grained, brown grey, with lenses of grey clayey silt.		
VS >202 kPa		SILT: non plastic, brown, with trace fine grained sand.		
		Hand Auger HAL388B terminated at 2.0 m Target depth		
nethod AD auger drilling* AS auger screwing* HA hand auger W washbore HA hand auger	support M mud N nil C casing penetration	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample	classification symbol & soil description based on Unified Classification System	consistency / relative density VS very soft S soft F firm St stiff
HA hand auger bit shown by suffix e.g. AD/T 3 blank bit F TC bit / V bit	water 10-Oct-12 water level on date shown water outflow	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	moisture D dry M moist W wet Wp plastic limit WI liquid limit	VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense



Borehole ID. HAL389 sheet: 1 of 1 **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 09 Jun 2016 date started: principal: 09 Jun 2016 date completed: THE LAKES STAGE 3E GCR logged by: ODS project: **CENTRE OF LOT 389** DBC location. checked by: position: E: 368704; N: 799852 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: SL588 drilling information material substance structure and DCP material description vane consistency / relative density class ification g shear ⊕ remould ● peak (blows/ 100 mm) samples & additional obs ations Ē method & support penetra moisture condition SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic l symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. М Н TOPSOIL IIII ||||||11111 11 ||||||11111 ||||| | | || | | | | | | | | | |11111 11 11111 **SILT**: non plastic to low plasticity, brown, with trace fine grained sand and with trace clay. ||||||VOLCANIC ASHES VS >202 kPa || 🏟 11 11111 1111 |||||| | | | || | | | |11111 111 1111 111 11111 0.5 | | | | |111 1111 VS >202 kPa 111 |||• 11111 0.6 m: clay becomes absent 111 11111 11 ||||||11111 ||||| | | |11111 | | |11111 | | |11111 11 11111 VS >202 kPa Encountered 1111 |||||||• 0.9 m: becoming orange brown 11111 | | | | || | |1111 ||||||¥ ż 1.0 Not 11111 1.0 m: with trace clay, sand becomes absent HAS.GPJ 111 11111 |||||||11111 STAGE 3E 111 |||||||11111 VS >202 kPa ||||11111 | | | IIIĬ 11111 NON CORED + DCP ||||11111 11111 111 11111 ||||111 11111 11111 ||||| | | | || | | **|** VS >202 kPa 11111 COF BOREHOLE: 15 iiiii 111 11111 111 ||||||11111 1 1 1 1 11111 111 ||||||11111 Log ||||11111 |||||11111 VS >202 kPa ||||11111 20 11111 11 111 ž 11 1111 11111 11111 11 2.0 ٤ Hand Auger HAL389 terminated at 2.0 m Target depth iiiii 111 |||||||Ę 11111 ||||||iiiii | | | | |11 consistency / relative density VS Verv 20⁴ method AD auger drilling* classification symbol & support samples & field tests soil description N nil bulk disturbed sample very soft soft firm mud Μ В AS auger screwing' based on Unified C casing D disturbed sample S F HA W hand auger Classification System Е environmental sample penetration washbore SS split spoon sample St stiff hand auger no resistance ranging to refusal HA very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense TC bit water outflow

HB

V bi

hammer bouncing

VD

very dense



			-y							_				
A TETRA	TECH	COMP	ANY							E	Borehole	ID.		HAL390
En	ai	n 0	orin	~	~	N	ปล	nd Augor		s	heet:			1 of 1
	y	ne	enni	y ı	-0(<u>J</u> -	па	nd Auger		р	project no).		GENZTAUC13086A
client	:	TH	E LAKE	S						d	late start	ed:		31 May 2016
princi	pal:									d	late com	plete	d:	31 May 2016
projec	ct:	ΤΗ	E LAKE	s s	TAG	E 3E	GCF	2		lo	ogged by	/:		ODS
locatio	on:	CE	NTRE C)F L	от з	890				С	hecked l	by:		DBC
positio	n: E::	36869	98; N: 79983	38 (Da	atum No	ot Spec	cified)	surface elevation: Not Specified	á	angle fro	om horizor	ntal: 9	0°	DCP id.:
drill mo	odel:					_		drilling fluid:	ł	nole dia	meter : 50	mm		vane id.: SL588
drillin	ng info	rmati	on			mate	erial sub	stance				-		
method & support	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 density	vane shear ⊕remoulded ⊚peak (kPa)	DC (blov 100 n	vs/ nm)	structure and additional observations
	~ ∩ ∩	3		~	Ū	5	0.0	ORGANIC SILT: low plasticity, dark brown.	M E B	H	8 ²⁰ 20 8	0 4 9	Π	TOPSOIL
	 							Clayey SILT: low plasticity, pink brown with mottled grey and mottled dark brown, with trace fine to coarse grained sand. SILT: low plasticity, orange brown, with minot clay and with trace fine to coarse grained sand.	-					FILL MATUA SUB-GROUP
			VS UTP		-			Sandy SILT: non plastic, brown to pale brown, sand is fine to coarse grained.	_		 V\$ UTP 			
		ountered	VS >202 kPa VS >202 kPa					SILT : non plastic to low plasticity, orange brown, with trace fine grained sand and with trace clay.	_					
			VS >202 kPa		-									
			VS >202 kPa		1.5									
v			VS >202 kPa		- - 			Hand Auger HAL390 terminated at 2.0 m Target depth						
method support AD auger drilling* AS auger screwing* HA hand auger W washbore HA hand auger					mud casing etration - ໙ ຫ		nil	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter	s b	soil desc based on assificatio			II II V S F S	St stiff /St very stiff
* bit shown by suffix e.g. AD/T B blank bit				er Intervention	Oct-12 w el on date er inflow	ig to al ater e shown	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	D dr M m W we Wp pla	y oist	t			H hard b friable /L very loose Loose MD medium dense D dense /D very dense	



Borehole ID. HAL392 sheet: 1 of 1 **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 31 May 2016 date started: principal: 31 May 2016 date completed: THE LAKES STAGE 3E GCR logged by: ODS project: **CENTRE OF LOT 392** DBC location. checked by: position: E: 368704; N: 799808 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: SL588 drilling information material substance structure and DCP material description vane consistency / relative density class ification g (blows/ 100 mm) samples & shear ⊕ remould ⊚ peak additional obs ations Ē method & support moisture condition penetra SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic I symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. Μ VSt to TOPSOIL 11111 Η | | | | |11111 11 ||||||11111 ||||| | | || | | | | | | | | | |11111 11 11111 | | | | |FILL SILT: non plastic to low plasticity, brown with mottled pale brown and grey, with trace to VS >202 kPa 11 11111 minor fine to medium grained sand and with 1111 |||||| | | |trace clay. | | | | |11111 111 ||||||11111 0.5 ||||||111 1111 VS >202 kPa 111 |||• 11111 111 1111 11111 11 ||||||11111 |||||||||11111 | | || | | | |11111 | | || | | |11111 11 1 ||||||11111 VS 158/ 49 kPa Encountered 11111 1 + 1⊕ | • | 11111 | | |1111 111 ¥ ż 1.0 MATUA SUB-GROUP Not 11111 SILT: low plasticity, orange brown, with minor clay and trace fine grained sand. 111 11111 |||||||11111 111 |||||||11111 VS >202 kPa ||||11111 | | | IIIĨ 11111 ||||11111 11111 111 1.3 m: becoming greasy 11111 ||||111 11111 11111 ||||| | | | |VS >202 kPa 11111 15 iiiii 111 11111 111 ||||||11111 1 1 1 1 11111 111 ||||||11111 g ||||11111 |||||11111 VS >202 kPa ||||11111 ||||111 11111 11 1111 1 + 1111 11111 VS >202 kPa 2.0 Hand Auger HAL392 terminated at 2.0 m 11111 Target depth iiiii 111 |||||||11111 ||||||11111 | | | | |11 method AD auger drilling* classification symbol & support consistency / relative density samples & field tests soil description N nil bulk disturbed sample mud VS Μ В very soft AS auger screwing' based on Unified soft firm C casing D disturbed sample S F HA W hand auger Classification System Е environmental sample penetration washbore SS split spoon sample St stiff hand auger no resistance ranging to refusal HA very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense TC bit water outflow HB hammer bouncing VD very dense

HAS.GPJ STAGE 3E NON CORED + DCP COF BOREHOLE: 20 ž ٤ Ę



	TECH									B	orehole ID.		HAL394
											heet:		1 of 1
En	Igi	ne	erin	gι	-0(J -	Ha	nd Auger		р	roject no.		GENZTAUC13086A
client	:	TH	E LAKE	S							ate started:		31 May 2016
princi	ipal:									d	ate complete	ed:	31 May 2016
proje	ct:	тн	E LAKE	s s	TAG	E 3E	E GCF	2		lc	ogged by:		NM
locati											hecked by:		DBC
			36; N: 79978				cified)	surface elevation: Not Specified	2		om horizontal:	90°	DCP id.:
drill me				(,	drilling fluid:		U	meter : 50 mm		vane id.: DR2244
drillir	ng info	ormat	ion			mate	erial sub	stance	1				
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	class ification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	⊕ remoulded ⊚ peak 100 (kPa)	ows/ mm)	structure and additional observations
	3 0	3			-			ORGANIC SILT: low plasticity, dark brown.	D	VSt to H			TOPSOIL
			VS >183 kPa		-		ML	SILT : low plasticity, orange brown mottled with, with some clay, trace fine grained sand.					MATUA SUB-GROUP
			VS >183 kPa		0.5-								
		itered	VS UTP		-		ML	Sandy SILT: non plastic, white, with fine grained sand.	_		 YS UTP 	iii.	
z		Not Encountered	VS >183 kPa		1.0		ML	SILT: low to medium plasticity, orange brown,	_				
			VS >183 kPa		-			with some clay, trace fine grained sand. 1.2 m: soil is friable.					
			VS UTP		- 1.5						VSUTP		
			VS UTP		-								
_			VS UTP		-2.0			Hand Auger HAL394 terminated at 2.0 m Target depth			 		
			 		_								
AD AS HA W	A hand auger washbore A hand auger washbore A hand auger				nud casing etration	I	I nil sistance ng to al	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)	b Cla moistur D dru M mo	soil desc ased on ssificatio re y bist		V F V F	F firm St stiff /St very stiff H hard Fb friable
в	bit shown by suffix g. AD/T Value on date shown by suffix					el on dat er inflow	e shown	N* SPT - sample recovered Nc SPT with solid cone VS vane shear, peak/remouded (kPa) R refusal HB hammer bouncing		et astic limit uid limit		L	MD medium dense



	A TECH		PANY							В	orehole	ID.	HAL396
Er	nai	ne	erin	a I		- 1	Ha	nd Auger		S	heet:		1 of 1
clien					;)					roject no		GENZTAUC13086AF
		11	E LANE	.5							ate starte		31 May 2016
	cipal:	τu			TA0	E 21					ate com		31 May 2016
proje							= GCF	ſ			ogged by		NM
loca							cific d)	ourfood alguation. Nat Crasified			hecked b	,	DCP id.:
	nodel:	3000	60; N: 79979	90 (Da		n ope	cineu)	surface elevation: Not Specified drilling fluid:			om horizon meter : 50		vane id.: DR2244
drill	ing info	ormat	ion	1		mat	erial sub	stance	1		1		1
method & support	1 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 density	vane shear ⊕remoulded ⊚peak (kPa) 03 00 000	DCP (blows/ 100 mm)	structure and additional observations
			VS >183 kPa	3	-			SILT: low to medium plasticity, red brown, with trace fine to medium grained sand.	D	VSt to H			MATUA SUB-GROUP
			VS UTP		0.5-						 		-
		pa	VS UTP		_						 Y\$ UTP 		-
N HA		Not Encountered	VS >183 kPa	3	1.0-								-
			VS >183 kPa	a	-		ML	SILT: low plasticity, yellow orange, with some clay, trace fine grained sand.	M		· · · · · · · · · · · · · · · · · · ·		-
			VS >183 kPa	3	- 1.5— -								-
			VS >183 kPa	a	-						· · · · · · · · · · · · · · · · · · ·		
↓ ↓			VS >183 kPa	a	2.0			Hand Auger HAL396 terminated at 2.0 m Target depth					
meth AD AS HA W HA	auger auger hand a washb hand a	screwi auger ore		M C pen	etration	– no re	N nil esistance ing to sal	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)	t Cla moistu D dr M mo	soil desc ased on ssificatio re y bist			consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable
* B T V	bit sho AD/T blank TC bit V bit	bit	suffix	wat	■ 10-0 leve	Oct-12 v I on dat er inflow er outflo	e shown /	N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remouded (kPa) R refusal HB hammer bouncing		et astic limit uid limit			VL very loose L loose MD medium dense D dense VD very dense



Borehole ID. HAL398 sheet: 1 of 1 **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 30 May 2016 date started: 30 May 2016 principal: date completed: THE LAKES STAGE 3E GCR logged by: NM project: **CENTRE OF LOT 398** DBC location. checked by: position: E: 368652; N: 799844 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: DR2244 drilling information material substance DCP material description vane structure and consistency / relative density class ification g (blows/ 100 mm) samples & shear ⊕ remould ⊚ peak additional obs /ations Ē moisture condition method 8 support SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components penetra field tests graphic I symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. D VSt to TOPSOIL 11111 Η |||||||11111 11111 11 ||||||1 + 1| | | |11111 ML SILT: low plasticity, orange brown, with trace | | | | |11111 MATUA SUB-GROUP 11 fine to medium grained sand, trace clay. 11111 ||||||VS >183 kPa | | |9 11 11111 1111 |||||| | | | |111 111 11111 ||||||111 11111 VS >183 kPa 0.5 ||||||||11 |||||||11111 0.6 m: some clay. | | | |111 11111 111 ||||||11111 ||||| | | |11111 | | |11111 VS >183 kPa | | | | | 11111 ||||11 1 11 11111 Encountered 1111 1 + 1111 11111 |||||||||||||VS >183 kPa 11111 . ż 1.0 ₹ 11111 Not 1.0 m: a 100mm lense of pale yellow fine to HAS.GPJ 111 medium grained sand with minor silt is present. 11111 ||||||1 | | 11111 1.1 m: with minor fine grained sand, trace clay. STAGE 3E 111 |||||||11111 VS >183 kPa ||||11111 | | | | | | |11111 NON CORED + DCP ||||11111 11111 111 11 11111 ||||111 11111 11111 ||||| | | | |VS >183 kPa 11111 . . COF BOREHOLE: 15 11111 111 1.5 m: with minor clay, trace fine grained sand 11111 111 1 1 1 1 11111 1 1 1 1 11111 111 ||||||11111 Log 11111 |||||11111 VS >183 kPa ||||||||20 ||||11111 ž 11 1111 1 + 111111 VS >183 kPa 11111 2.0 ٤ Hand Auger HAL398 terminated at 2.0 m 11111 Target depth iiiii 111 |||||||Ę 11111 ||||||iiiii | | | | |11 classification symbol & method AD auger drilling* support consistency / relative density samples & field tests soil description N nil bulk disturbed sample mud VS Μ В very soft AS auger screwing' based on Unified soft firm C casing D disturbed sample S F hand auger HA Classification System Е environmental sample penetration W washbore SS split spoon sample St stiff hand auger no resistance ranging to refusal HA very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense TC bit water outflow HB hammer bouncing VD very dense



Er	ngi	COMP	ering	_	-0() -	На	nd Auger		sl pi	orehole heet: roject no		HAL400 1 of 1 GENZTAUC13086AF
clien		IH	E LAKE	5							ate starte		30 May 2016
princ	ipal:			_	_					da	ate comp	oleted:	30 May 2016
proje	ect:		E LAKE				GCF	2		lo	bgged by	:	ODS
locat	ion:	CE	NTRE C	DF L	OT 4	00				c	hecked b	y:	DBC
positio drill m		36866	65; N: 79987	77 (Da	atum No	ot Spe	cified)	surface elevation: Not Specified drilling fluid:		•	om horizon meter : 50		DCP id.: vane id.: SL588
	ng info	ormati	on			mate	erial sub		1		neter . 50		Valle IU., SESSO
method & support	penetration	er	samples & field tests	(L)	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 ⊕remoulded ⊚peak	DCP (blows/ 100 mm)	structure and additional observations
sup	o be	water		RL (m)	depi	grap	clas sym	ORGANIC SILT: low plasticity, dark brown.	D to M	VSt to	(kPa) 50 (kPa)	0 4 0 8 P	TOPSOIL
- HA			VS >202 kPa VS >202 kPa VS >202 kPa VS 165/ 38 kPa		- - - - - - - - - - - - - - -			SILT: non plastic, orange brown, with trace fine to coarse grained sand. 0.6 m: becoming slightly plastic 0.75 m: becoming mottled pale brown 1.0 m: with minor clay	M	Н	$\begin{array}{cccccccccccccccccccccccccccccccccccc$		VOLCANIC ASHES
			VS >202 kPa VS >202 kPa VS 158/ 41 kPa		- - - 1.5 - - -			SILT: non plastic to low plasticity, brown with mottled pale brown and orange brown, with trace to minor fine to coarse grained sand. 1.7 m: with trace clay 1.75 m: becoming brown			$\begin{array}{c} & & \\$		MATUA SUB-GROUP
<u>+</u> +			VS 104/ <u>45 kPa</u>		-2.0			Hand Auger HAL400 terminated at 2.0 m Target depth			+ + + + + + + + + + + + + + + + + + + +		
meth AD AS HA W HA * e.g. B T V	auger of auger s hand a washbo hand a	hbore penetration a uger nor resistance ranging to water level on date show koit it				⊢ no re: rangii ▼ refusa Oct-12 w el on date er inflow	sistance lg to al ater e shown	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample S 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	b Cla moistur D dr M mo W we Wp pla	re bist	Unified n System		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



Borehole ID. HAL402 1 of 1 sheet: **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 30 May 2016 date started: 30 May 2016 principal: date completed: THE LAKES STAGE 3E GCR logged by: NM project: **CENTRE OF LOT 402** DBC location. checked by: position: E: 368665; N: 799916 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: DR2244 drilling information material substance DCP material description vane structure and consistency / relative density class ification g (blows/ 100 mm) samples & shear ⊕ remould ⊚ peak additional obs /ations Ē method & support moisture condition penetra SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic l symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. D VSt to TOPSOIL 11111 Η |||||||11111 11 ||||||11111 ||||| | | |11111 | | | | |11111 11 11111 ||||||VS >183 kPa | | |9 11 11111 ML SILT: low plasticity, orange brown, with minor VOLCANIC ASHES 1111 ||||| | | | |fine grained sand, trace clay. ||||11111 111 ||||||11111 VS >183 kPa 0.5 111 ||||||11 |||||||11111 111 11111 111 ||||||11111 ||||0.7 m: with minor clay. | | | |11111 | | ||||||11111 VS >183 kPa | | |**0** | | |11111 ||||11111 Encountered 1111 1 + 10.9 m: becoming orange with some clay, trace М 11111 |||||fine grained sand VS 151/ 1111 ||||| | ¥ ż 25 kPa 1.0 Ð, 11111 Not HAS.GPJ 111 11111 11111 STAGE 3E 111 |||||||11111 VS >183 kPa ||||11111 111 11111 NON CORED + DCP ||||11111 11111 111 11111 ||||||11111 11111 ||||111 VS >183 kPa 11111 . . COF BOREHOLE: 15 ML M to W MATUA SUB-GROUP 111 SILT: low plasticity, orange brown, with some 11111 clay, minor fine to medium grained sand. 11111 111 ||||||11111 1 | | | 11111 111 1 1 1 1 11111 Log ||||||||||11111 |||||11111 VS >183 kPa ||||| | |0 ||||20 ||||11111 ž 11 1111 11111 11 2.0 ٤ Hand Auger HAL402 terminated at 2.0 m 11111 Target depth iiiii 111 |||||||Ę 11111 ||||||11111 | | | | |111 classification symbol & method AD auger drilling* support consistency / relative density samples & field tests soil description N nil bulk disturbed sample mud VS Μ В very soft AS auger screwing' based on Unified soft firm C casing D disturbed sample S F hand auger НА Classification System Е environmental sample penetration W washbore SS split spoon sample St stiff hand auger no resistance ranging to refusal HA very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B AD/T evel on date shown İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense TC bit water outflow HB hammer bouncing VD very dense



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TETR	A TECH	COM	PANY							В	orehole	ID.		HAL404
Fr	nai	nc	orin	a I	0	- r	Ha	nd Auger		S	heet:			1 of 1
	igi			_	-0(1 -	i ia	na Augei		р	roject n	0.		GENZTAUC13086A
clien	t:	ТН	E LAKE	S						d	ate star	ted:		30 May 2016
princ	ipal:									d	ate com	nple	ted:	30 May 2016
proje	ct:	ΤH	E LAKE	s s	TAG	E 3E	E GCF	2		lo	ogged by	y:		ODS
locat	ion:	CE	ENTRE C)F L	OT 4	104				с	hecked	by:		DBC
positio	on: E:	3686	48; N: 79995	55 (Da	atum No	ot Spe	cified)	surface elevation: Not Specified	â	angle fro	om horizo	ntal:	90°	DCP id.:
drill m	odel: ng info	ormat	ion			mat	erial sub	drilling fluid:	ł	nole dia	meter : 50) mn	۱ ا	vane id.: SL588
<u>unn</u>								material description		sity	vane		CP	structure and
hod & port	penetration	5	samples & field tests	Ê	depth (m)	graphic log	classification symbol	SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	shear ⊕ remoulded ⊚ peak	10	lows/ 0 mm)	additional observations
method 8 support	3 pe	water		RL (m)	dept	grap	class	colour, secondary and minor components	mois		(kPa) 50 12 00 50 12 00 80 12 00		989	
						$ \rangle$		ORGANIC SILT : low plasticity, dark brown.	D to M	VSt to H				TOPSOIL
					-									
					-									
	111		VS >202 kPa			\bigotimes		SILT: non plastic to low plasticity, pale brown,	-					FILL
								with trace to minor fine to coarse grained sand and with trace clay.			¶ 			
					-		×	SILT: non plastic to low plasticity, orange	м					VOLCANIC ASHES
			VS >202 kPa		0.5-			brown, with trace fine grained sand.						
												lii	ij	
			VS >202 kPa		-									
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		p										lii	iii	
		Not Encountered			-									
4 z		ot Enco	VS >202 kPa		1.0-			1.0 m: with trace clay						
		Ž			_								İİİ	
	111												iii	
			VS >202 kPa		-						 			
					-						¶ 			
	111													
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			VS >202 kPa		1.5									
					-									
			VS >202 kPa		-			SILT: non plastic, brown, with trace to minor fine to coarse grained sand.	1			, i i	111	MATUA SUB-GROUP
					-			nino to operac grannet adnu.			Ť 			
					-									
			VS >202 kPa										iii	
1			VO - ZUZ Nr d	1	2.0-			Hand Auger HAL404 terminated at 2.0 m					111	
					-			Target depth						
meth AD	auger				port mud	1	l nil	samples & field tests B bulk disturbed sample	5	oil desc		2		consistency / relative density VS very soft
AS HA	auger hand a	ger screwing* C casing nd auger						D disturbed sample E environmental sample		ased on ssificatio	Unified n System			S soft F firm
W HA	A hand auger				- N 6	⊢ no re	sistance	SS split spoon sample U## undisturbed sample ##mm diameter	moistu				_	St stiff VSt very stiff
					<u></u>	rangi refus	ng to al	HP hand penetrometer (kPa) N standard penetration test (SPT)	D dr M mo	y bist				H hard Fb friable
* e.g.	bit sho AD/T	wn by	suffix	wat	V 10-	Oct-12 w el on dat	ater e shown	N* SPT - sample recovered Nc SPT with solid cone		astic limit				VL very loose L loose
T TC bit water outflow						er inflow		VS vane shear; peak/remouded (kPa) R refusal	WI liq	uid limit				MD medium dense D dense
/	V bit				wat		vv	HB hammer bouncing						VD very dense



Borehole ID. HAL406 sheet: 1 of 1 **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 30 May 2016 date started: 30 May 2016 principal: date completed: THE LAKES STAGE 3E GCR NM logged by: project: **CENTRE OF LOT 406** DBC location. checked by: position: E: 368624; N: 799974 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: DR2244 drilling information material substance DCP material description vane structure and consistency / relative density class ification g (blows/ 100 mm) samples & shear ⊕ remould ⊚ peak additional obs /ations Ē method & support penetra SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic I moisture conditior symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. Μ VSt to TOPSOIL 11111 Η |||||||11111 11 ||||||11111 ||||||||||11111 | | | | |11111 11 11111 ||||||VS >183 kPa | | |9 11 11111 ML SILT: low plasticity, orange brown, with minor D MATUA SUB-GROUP 1111 |||||| | | | |clay, trace fine grained sand 111 111 11111 111 111 11111 VS >183 kPa 0.5 111 ||||||11 |||||||11111 | | | |111 11111 111 |||||||11111 ||||| | | |11111 | | ||||||11111 VS >183 kPa | | | | | | | |11111 ||||| | | |11111 Encountered 1111 1 + 1| | | || | | | |11111 ||||11 1 VS UTP V\$ UTP ₹ ż 1.0 SAND: fine to medium grained, pale yellow Not SP 111 brown, with some silt. | | | | |11111 1 | | |||||||11111 111 | | | | |11111 VS 151/ 21 kPa ||||۱Ŷ 11111 æ١ Sandy SILT: non plastic to low plasticity, pale yellow brown, with fine to medium grained MI ΙĨ 11111 ||||11111 111 sand ||||11111 |||||11111 ||||111 11111 SILT: low plasticity, pale yellow brown, with minor fine to medium grained sand, trace clay. MI M to W 11111 ||||| | | | |VS >183 kPa 111 . . 15 11111 111 11111 ||||||111 1 1 1 1 11111 1 1 1 1 11111 111 1 1 1 1 11111 Log ||||11111 |||||11111 VS >183 kPa ||||||||ML Sandy SILT: non plastic to low plasticity, pale | | |yellow brown, with fine to medium grained 11111 sand 11 11111 ||||11111 VS >183 kPa 2.0 Hand Auger HAL406 terminated at 2.0 m 11111 Target depth iiiii | | | |111 Ę 11111 ||||||11111 | | | | |11 classification symbol & Method AD auger drilling* support consistency / relative density samples & field tests soil description mud N nil bulk disturbed sample VS Μ В verv soft AS auger screwing' based on Unified soft firm C casing D disturbed sample S F hand auger НА Classification System Е environmental sample penetration W washbore SS split spoon sample St stiff no resistance ranging to refusal HA hand auger very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense TC bit water outflow HB hammer bouncing VD very dense

HAS.GPJ STAGE 3E NON CORED + DCP COF BOREHOLE: 20 ž ٤



Borehole ID. HAL408 sheet: 1 of 1 **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 30 May 2016 date started: 30 May 2016 principal: date completed: THE LAKES STAGE 3E GCR logged by: ODS project: **CENTRE OF LOT 408** DBC location. checked by: position: E: 368594; N: 799986 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: SL588 drilling information material substance DCP material description vane structure and consistency / relative density class ification g (blows/ 100 mm) samples & shear ⊕ remould ⊚ peak additional obs /ations Ē method & support penetra SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic I moisture conditior symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. D to M VSt to TOPSOIL Шİ Η |||||||11111 11 ||||||11111 |||||||||||11111 ||||11111 111 VS >202 kPa 11111 VOLCANIC ASHES **SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand. М 11 1111 1111 |||||111 1 |||||11111 ||111 1111 111 11111 VS >202 kPa 0.5 iiiii 111 11 |||||||11111 111 11111 111 ||||||11111 VS 173/ 44 kPa ||||11111 ф | | |11111 | | |SILT: low plasticity, brown to orange brown, MATUA SUB-GROUP 11 1 11 11111 with trace clay and with trace fine to coarse grained sand. Greasy. Encountered 1111 1 + 1||||||11111 ||||||||||VS 185/ 1111 11 I | |o ф ż 44 kPa 1.0 ₹ iiiii 1.0 m: becoming orange brown Not 111 11111 1 | | 11111 111 1111 11111 ||||||||||11111 VS 166/ 36 kPa 1.2 m: with minor clay 11111 ∉ þ ||||11111 11111 11 11111 ||||111 11111 11111 | | | | |VS 190/ 44 kPa ¢ 15 iiiii 11111 111 11111 1 1 1 1 11111 111 ||||||11111 g VS >202 kPa ||||11111 |||||1.75 m: with minor to some fine to coarse 11111 ||||grained sand 11111 111 Sandy SILT: non plastic, orange brown, 111 1111 greasy ||||11111 VS UTP 11111 2.0 Hand Auger HAL408 terminated at 2.0 m Target depth iiiii |||||111 11111 ||||||iiiii | | | | |11 method AD auger drilling* classification symbol & support consistency / relative density samples & field tests soil description N nil bulk disturbed sample mud VS Μ В very soft AS auger screwing' based on Unified soft firm C casing D disturbed sample S F HA W hand auger Classification System Е environmental sample penetration washbore SS split spoon sample St stiff no resistance ranging to refusal HA hand auge very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit T SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense

very dense

VD

HAS.GPJ STAGE 3E NON CORED + DCP COF BOREHOLE: 20 ž ٤ Ę

TC bit

V bi

water outflow

HB

hammer bouncing



Borehole ID. HAL411 sheet: 1 of 1 **Engineering Log - Hand Auger** GENZTAUC13086AP project no. THE LAKES client: 30 May 2016 date started: principal: 30 May 2016 date completed: THE LAKES STAGE 3E GCR logged by: ODS project: **CENTRE OF LOT 411** DBC location. checked by: position: E: 368547; N: 799989 (Datum Not Specified) surface elevation: Not Specified angle from horizontal: 90° DCP id.: drill model: drilling fluid: hole diameter : 50 mm vane id.: SL588 drilling information material substance structure and DCP material description vane consistency / relative density class ification g (blows/ 100 mm) samples & shear ⊕ remould ⊚ peak additional obs ations Ē method & support moisture condition penetra SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components field tests graphic I symbol Ē depth (water (kPa) 8 8 8 R ORGANIC SILT: low plasticity, dark brown. Μ VSt to TOPSOIL 11111 Η | | | | |11111 11111 11 ||||||||||| | | |11111 SILT: non plastic to low plasticity, orange brown, with trace fine grained sand and with trace clay. Greasy. VOLCANIC ASHES 111 VS >202 kPa 11111 11 11111 1111 |||||111 1 |||||||||||11111 111 111 VS >202 kPa 0.5 iiiii 111 11 |||||||11111 111 11111 111 ||||||11111 | | | | | | | • ||||11111 VS >202 kPa | | |11111 | | |11111 11 1 ||11111 Encountered 1111 1 + 1111 11111 |||||||||||1111 ||||VS 172 kPa ż 1.0 ø ₹ 11111 Not 1.0 m: with trace fine to coarse grained sand HAS.GPJ 111 11111 11111 STAGE 3E 111 |||||||11111 ||||||||||11111 VS 190 kPa 11111 NON CORED + DCP ||||11111 11111 111 11111 11 ||||111 11111 11111 ||||| | | | |VS >202 kPa COF BOREHOLE: 15 iiiii 111 11111 111 ||||||11111 1 1 1 1 11111 111 1 1 1 1 11111 g VS >202 kPa ||||11111 |||||11111 ||||11111 20 | | |11111 ž 1111 111 ||||111 11111 VS >202 kPa 11111 2.0 ٤ Hand Auger HAL411 terminated at 2.0 m 11111 Target depth iiiii 111 |||||||Ę 11111 ||||||iiiii | | | | |11 method AD auger drilling* classification symbol & consistency / relative density support samples & field tests soil description N nil bulk disturbed sample mud VS Μ В very soft AS auger screwing' based on Unified soft firm C casing D disturbed sample S F HA W hand auger Classification System Е environmental sample penetration washbore SS split spoon sample St stiff hand auger HA no resistance ranging to refusal very stiff undisturbed sample ##mm diameter VSt U## moisture HP hand penetrometer (kPa) hard н dry moist wet D M W standard penetration test (SPT) Fb Ν friable wate N* SPT - sample recovered VL very loose bit shown by suffix 10-Oct-12 water Wp WI plastic limit ⊻ SPT with solid cone Nc loose L e.g. B evel on date shown AD/T İiguid limit VS vane shear; peak/remouded (kPa) MD medium dense blank bit vater inflow R refusal D dense TC bit water outflow HB hammer bouncing VD very dense



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TETRA	TECH	COMP	ANY							В	orehole ID.		HAL412A
En	ai	no	orin		00	.	Ha	nd Auger		s	heet:		1 of 1
	y			_	-0	<u> </u>	Па	na Auger		р	roject no.		GENZTAUC13086A
client		ΤН	E LAKE	S						d	ate started:		30 May 2016
princi	pal:									d	ate complete	d:	30 May 2016
projec	ct:	ΤН	E LAKE	's s	TAGI	E 3E	E GCF	2		lo	ogged by:		NM
locatio	on:	CE	NTRE C	FL	OT 4	12				с	hecked by:		DBC
positio	n: E::	36853	1; N: 79998	5 (Da	tum No	ot Spe	cified)	surface elevation: Not Specified	a	ingle fro	m horizontal:	90°	DCP id.:
drill mo								drilling fluid:	ł	iole dia	meter : 50 mm		vane id.: DR2244
drillin	-	rmati	on			mate	erial sub			È	vane DC		cómucó una cural
& t	penetration		samples & field tests	ē	Ê	ic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic,	tion	consistency / relative density	vane DC shear (blo ⊕remoulded ⊚peak 100 r	ws/	structure and additional observations
method & support	¹ ² pene	water		RL (m)	depth (m)	graphic log	classi symbo	colour, secondary and minor components	moisture condition	consis	(kPa) (kPa) (kPa)		
A					_			SILT: low plasticity, orange brown, with minor clay, trace fine to medium grained sand	D	VSt		Π	VOLCANIC ASHES
			VS >183 kPa		-								
			VS 55/ 19 kPa		0.5-		ML	SILT: low plasticity, orange brown, with some clay, trace fine grained sand, greasy.	M	St	. 		MATUA SUB-GROUP
			VS >183 kPa		-			0.7 m: becoming yellow brown with trace fine to medium grained sand.		VSt to H			
z		Not E	VS >183 kPa		1.0								
			VS >183 kPa		- - 1.5— -		SP	SAND: fine to medium grained, yellow, with minor silt.	D	L to MD			
			VS 151/ 43 kPa VS >183 kPa				ML	SILT : low plasticity, pale grey yellow, with some fine to medium grained sand.	M to W	VSt to H			
					-			Hand Auger HAL412A terminated at 2.0 m Target depth					
e.g. AD/T					nud casing etration er ↓ 10-C level	− no re rangii ◄ refusi Oct-12 w	aľ vater 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	moistur D dr M mo W we Wp pla	soil desc ased on ssificatio			F firm St stiff /St very stiff 4 hard Fb friable /L very loose _ loose MD medium dense



A TETRA T										В	orehole	ID.	HAL412B
	!		!	~ 1		-				s	heet:		1 of 1
En	gi	ne	erin	g L	<u>-0ĉ</u>	J -	на	nd Auger		р	roject no).	GENZTAUC13086AP
client:		THE	ELAKE	S						d	ate start	ed:	09 Jun 2016
princip	al:									d	ate com	pleted:	09 Jun 2016
project	t:	THE	E LAKE	s s	TAG	E 31	E GCF	2		lo	ogged by	<u>-</u>	ODS
locatio	n:	CEI)F L	ОТ 4	12				с	hecked b	oy:	DBC
position:	: E:3	36852	7; N: 79998	32 (Da	itum No	ot Spe	cified)	surface elevation: Not Specified	а	ingle fro	m horizor	ital: 90°	DCP id.:
drill mod		rmoti				mot	erial sub	drilling fluid:	h	ole dia	meter : 50	mm	vane id.: SL588
								material description		sity	vane	DCP	structure and
method & support	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	consistency / relative density	shear ⊕ remoulded ⊚ peak (kPa) 05 05 00	(blows/ 100 mm)	
			VS 156/ 44 kPa /S >202 kPa /S >202 kPa		- - - - - - - - - - - - - -			SILT: non plastic to low plasticity, orange brown, with trace fine to medium grained sand. Greasy.0.5 m: with trace clay	Μ	VSt to H	$\begin{array}{c} \cdot \cdot \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ $		MATUA SUB-GROUP
			VS 156/ 29 kPa VS 118/ 38 kPa VS 122/ 69 kPa		- - - 1.5 - - - - - - - - - - 			1.5 m: becoming grey-brown and non-plastic, with some fine to coarse grained sand					
					-			Hand Auger HAL412B terminated at 2.0 m Target depth					
					nud casing etration	− no re rangi ⊲ refus		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)	moistur D dry M mo W we Wp pla	oil desc ased on ssificatio re / bist			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



Engineering Log - Hand Auger

client: THE LAKES

principal:

project: THE LAKES STAGE 3M

location: Center of Lot 780

Borehole ID.	HAL780
sheet:	1 of 1
project no.	GENZTAUC13086AP
date started:	17 Aug 2016
date completed:	17 Aug 2016
logged by:	ODS
checked by:	RBT

										necked by		RBI
position: N drill model:	ot Specif	ied					surface elevation: Not Specified drilling fluid:		-	m horizonta neter : 50 m		DCP id.:
drilling in	formatio	n			mate	rial sub	stance					
method & support ¹ 2 penetration	/ater	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	meter 1 (kPa)	DCP (blows/ 00 mm)	structure and additional observations
							ORGANIC SILT: non plastic, black. SILT: non plastic, orange brown, with trace fine to coarse sand.		/St to H			TOPSOIL YOUNGER ASH DEPOSIT VS >202 kPa
				-			0.6 m: with trace fine grained sand 0.85 to 0.95 m: becomes mottled with dark brown					VS >202 kPa VS >202 kPa
HA - HA - HA - HA - HA - HA - HA - HA -	Not Encountered			1.0 — - -			SILT: low plasticity, orange brown, with trace clay. Is greasy.	M				MATUA SUB-GROUP VS 173/ 32 kPa
				1.5			1.5 m: with trace to medium clay, low plasticity, sand is absent					VS 156/ 36 kPa
				- 2.0 -								VS 114/ 31 kPa
				- 			Hand Auger HAL780 terminated at 2.5 m Target depth					VS 173/ 35 kPa
method support AD auger drilling* M mud AS auger screwing* C casing HA hand auger penetrati W washbore method HA hand auger washbore HA hand auger water * bit shown by suffix e.g.				nud etration etration		iter	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)	soil bas Classi moisture D dry M moisi W wet	il desci sed on ification t t	symbol &	F S	firm st stiff /St very stiff hard b friable /L very loose



Engineering Log - Hand Auger

client: THE LAKES

principal:

project: THE LAKES STAGE 3M

location: Center of Lot 781

Borehole ID.	HAL781
sheet:	1 of 1
project no.	GENZTAUC13086AP
date started:	17 Aug 2016
date completed:	17 Aug 2016
logged by:	ODS
checked by:	RBT

		nter of l		•••					U	hecked b	<i>у</i> .	RBI
position: N	lot Spec	cified					surface elevation: Not Specified		•	om horizon		DCP id.:
drill model: drilling in	formati	<u></u>			moto	rial sub	drilling fluid:	ſ	nole dial	meter : 50	mm	
	Iormau	011			mate				≥	hand	DCP	atmusture and
method & support 1 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 density	hand penetro- meter (kPa)	(blows/ 100 mm) ∾ * ∞ ∞ ₽	structure and additional observations
HA HA			2	- - - - - - - - - - - - - - - - - - -			ORGANIC SILT: non plastic, black. Sandy SILT: non plastic, orange brown, sand is fine to coarse. SILT: non plastic to low plasticity, orange brown with mottled dark brown, with trace fine to coarse sand. Sandy SILT: non plastic, brown, sand is fine. SILT: low plasticity, orange brown, with trace fine sand. 1.3 m: becomes greasy, with trace to minor clay, sand absent					TOPSOIL FILL VS >202 kPa VS >202 kPa VS >202/36 kPa MATUA SUB-GROUP VS >202 kPa VS >202 kPa VS >202 kPa VS >202 kPa
			2.0			Hand Auger HAL781 terminated at 2.5 m				VS >202 kPa VS 201/ 46 kPa		
				_			Target depth					
AS auge HA hand W wash HA hand	auger nown by s c bit it	ıg*	pene	nud casing etration c m er er leve wat		ater 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	t Cla moistu D dr M ma W we Wp pla	soil desc based on assificatio re y oist	Unified n System		consistency / relative density /S very soft S soft E firm St stiff /St very stiff H hard Fb friable /L very loose D dense D dense VD very dense