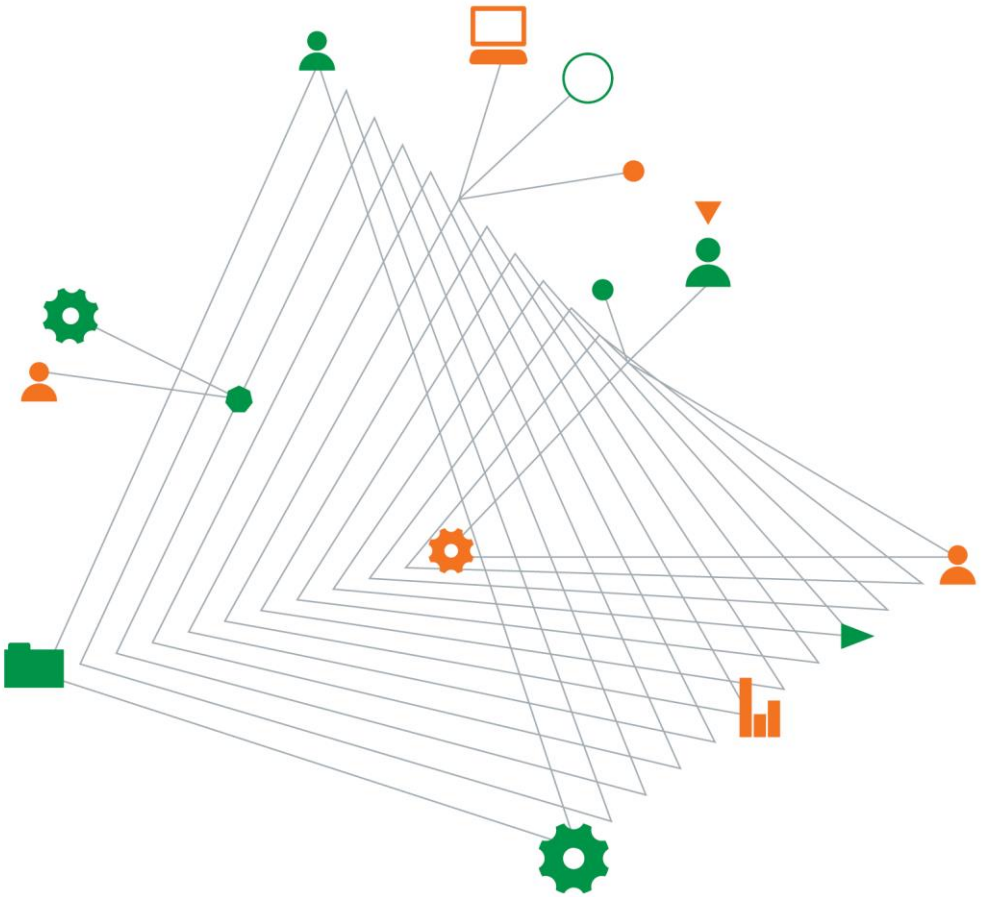
The Lakes (2012) Ltd

The Lakes - Stages 3E & 3M

Geotechnical Completion Report (Revision 1)

26 August 2016



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The Lakes - Stages 3E & 3M

Prepared for
The Lakes (2012) Ltd
C/- Harrison Grierson Consultants Ltd
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Prepared by
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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

Revision	Description	Date	Author	Reviewer	Signatory
Draft	Draft for review	21/06/2016	D Cullen	D Sullivan	D Cullen
Final	Final for issue	24/06/2016	D Cullen	D Sullivan	D Cullen
Rev 1	Revision 1	26/8/2016	R Telford	D Sullivan	R Telford

Distribution

Report Status	No. of copies	Format	Distributed to	Date
Rev 1	1	Hardcopy + PDF	The Lakes (2012) Ltd	26/8/2016
Rev 1	1	PDF	Harrison Grierson Consultants Ltd	26/8/2016
Rev 1	2	Hardcopy + PDF	Tauranga City Council	26/8/2016

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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 pre-development 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 motor-scrapers and bulldozer or tractor towed 'scoops', hydraulic excavators, bulldozers, articulated all-terrain 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

Coffey Geotechnics (NZ) Ltd
GENZTAUC13086AP-AI (Rev 1)

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

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.

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SPECIALISTS MANAGING THE EARTH

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

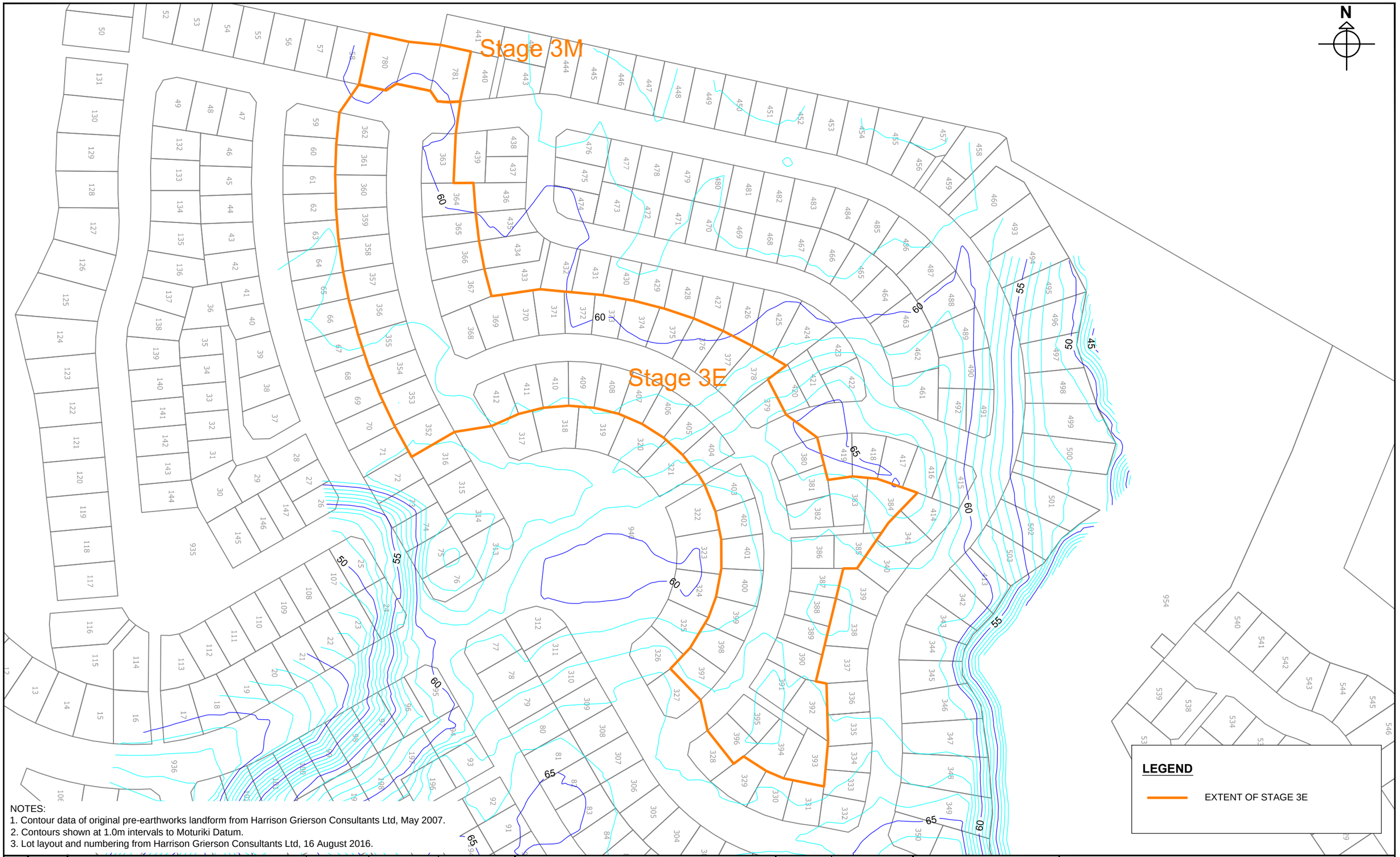
Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As 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



NOTES:
1. Contour data of original pre-earthworks landform from Harrison Grierson Consultants Ltd, May 2007.
2. Contours shown at 1.0m intervals to Moturiki Datum.
3. Lot layout and numbering from Harrison Grierson Consultants Ltd, 16 August 2016.

revision	rev	description	drawn	approved	date

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Vertical Scale (metres)

drawn	DBC
approved	RBT
date	26-8-2016
scale	1:2000
original size	A3

coffey
A TETRA TECH COMPANY

client: The Lakes (2012) Ltd

project: The Lakes Stage 3E & 3M Geotechnical Completion Report

title: Original Site Contour Plan

project no: 13086AP-AI | figure no: 1 | rev: A

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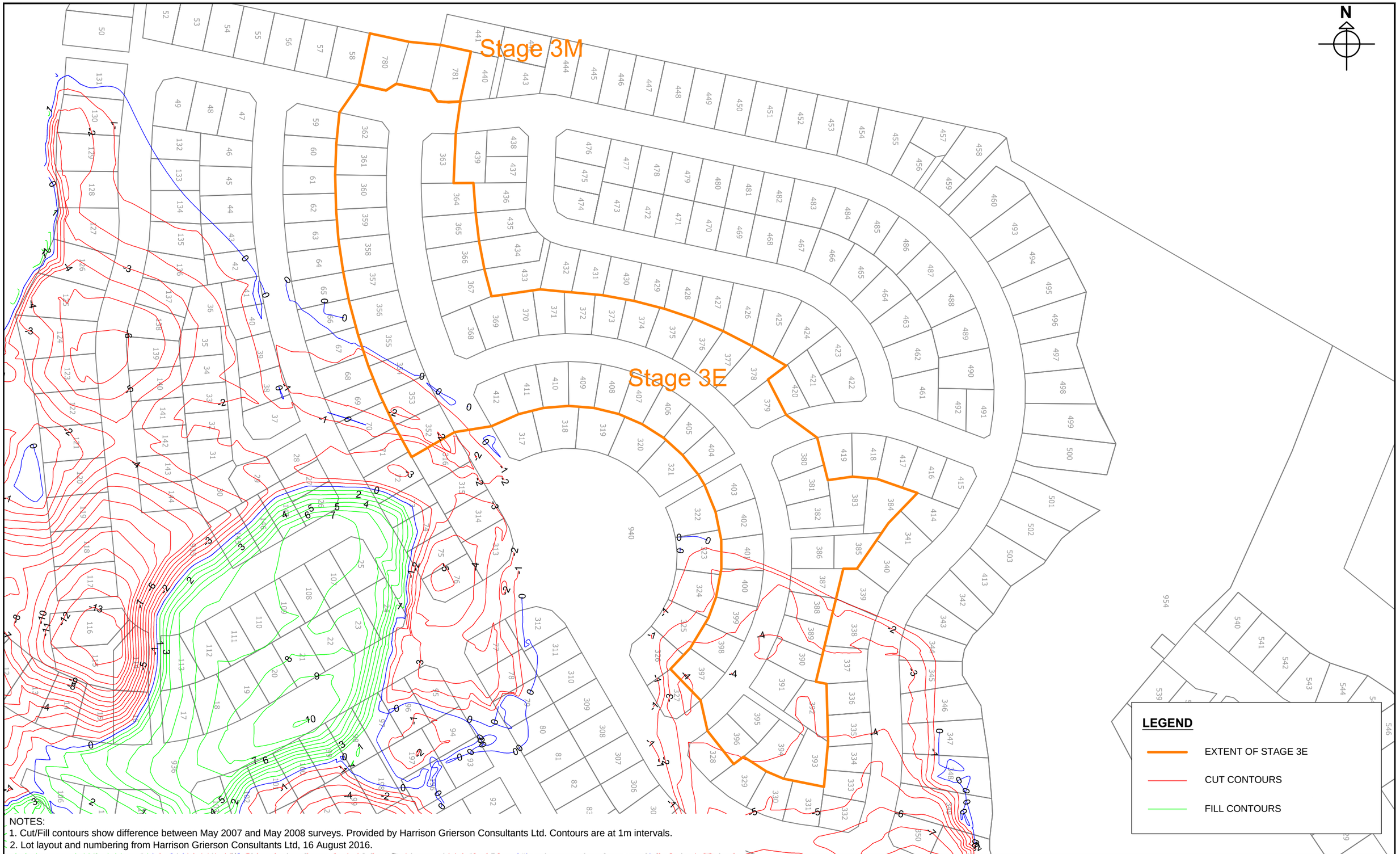

NOTES:
1. Cut/Fill contours show difference between May 2007 and May 2008 surveys. Provided by Harrison Grierson Consultants Ltd. Contours are at 1m intervals.
2. Lot layout and numbering from Harrison Grierson Consultants Ltd, 16 August 2016.

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approved	RBT
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original size	A3

coffey
A TETRA TECH COMPANY

client: The Lakes (2012) Ltd

project: The Lakes Stage 3E & 3M Geotechnical Completion Report

title: 2007-2008 Earthworks Contour Plan

project no: 13086AP-AI | figure no: 2 | rev: A

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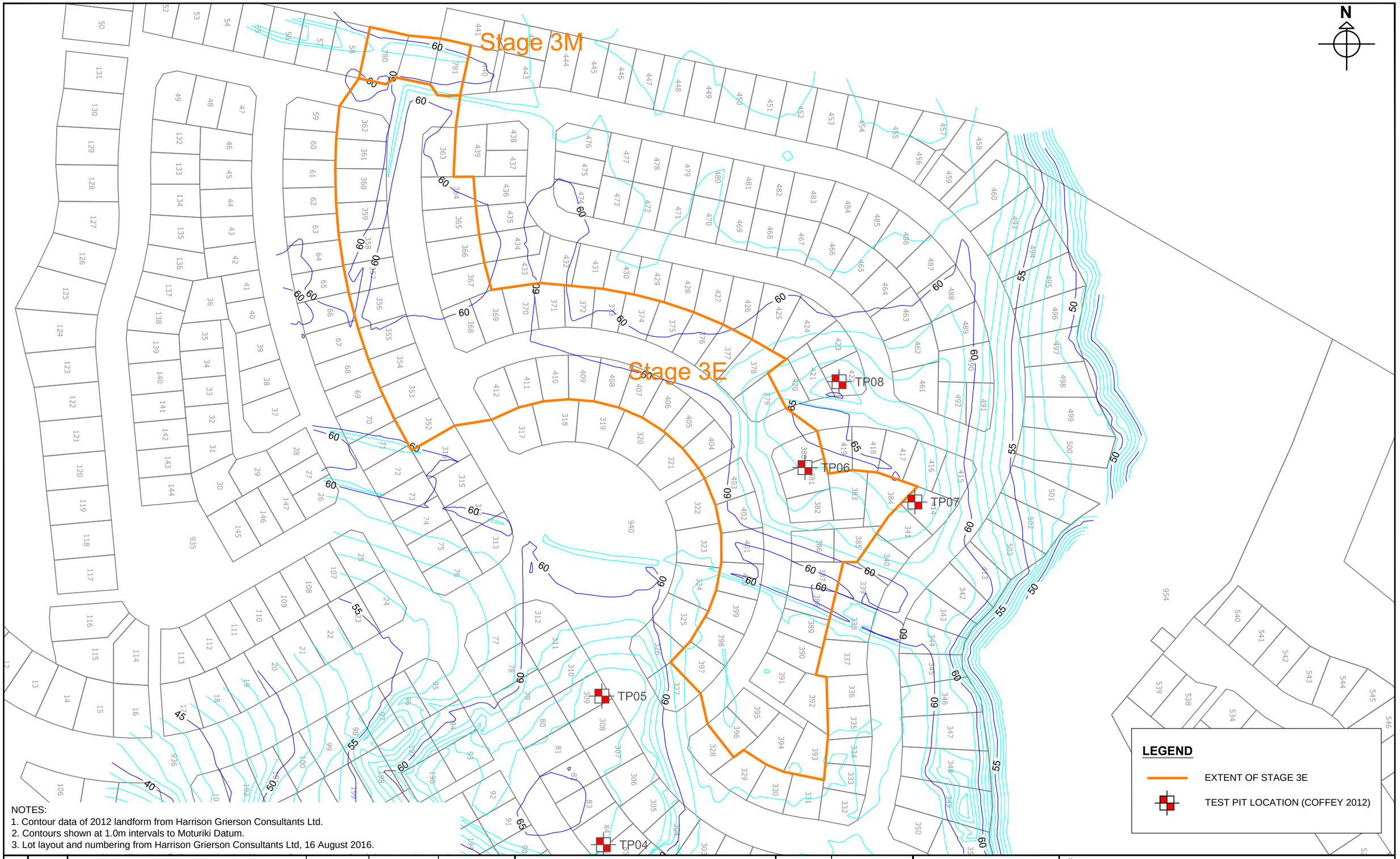

NOTES:
1. Contour data of 2012 landform from Harrison Grierson Consultants Ltd.
2. Contours shown at 1.0m intervals to Moturiki Datum.
3. Lot layout and numbering from Harrison Grierson Consultants Ltd, 16 August 2016.

revision	rev	description	drawn	approved	date

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Vertical Scale (metres)

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approved	RBT
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original size	A3

coffey
A TETRA TECH COMPANY

client: The Lakes (2012) Ltd
project: The Lakes Stage 3E & 3M Geotechnical Completion Report
title: 2012 Contour Plan
project no: 13086AP-AI | figure no: 3 | rev: A

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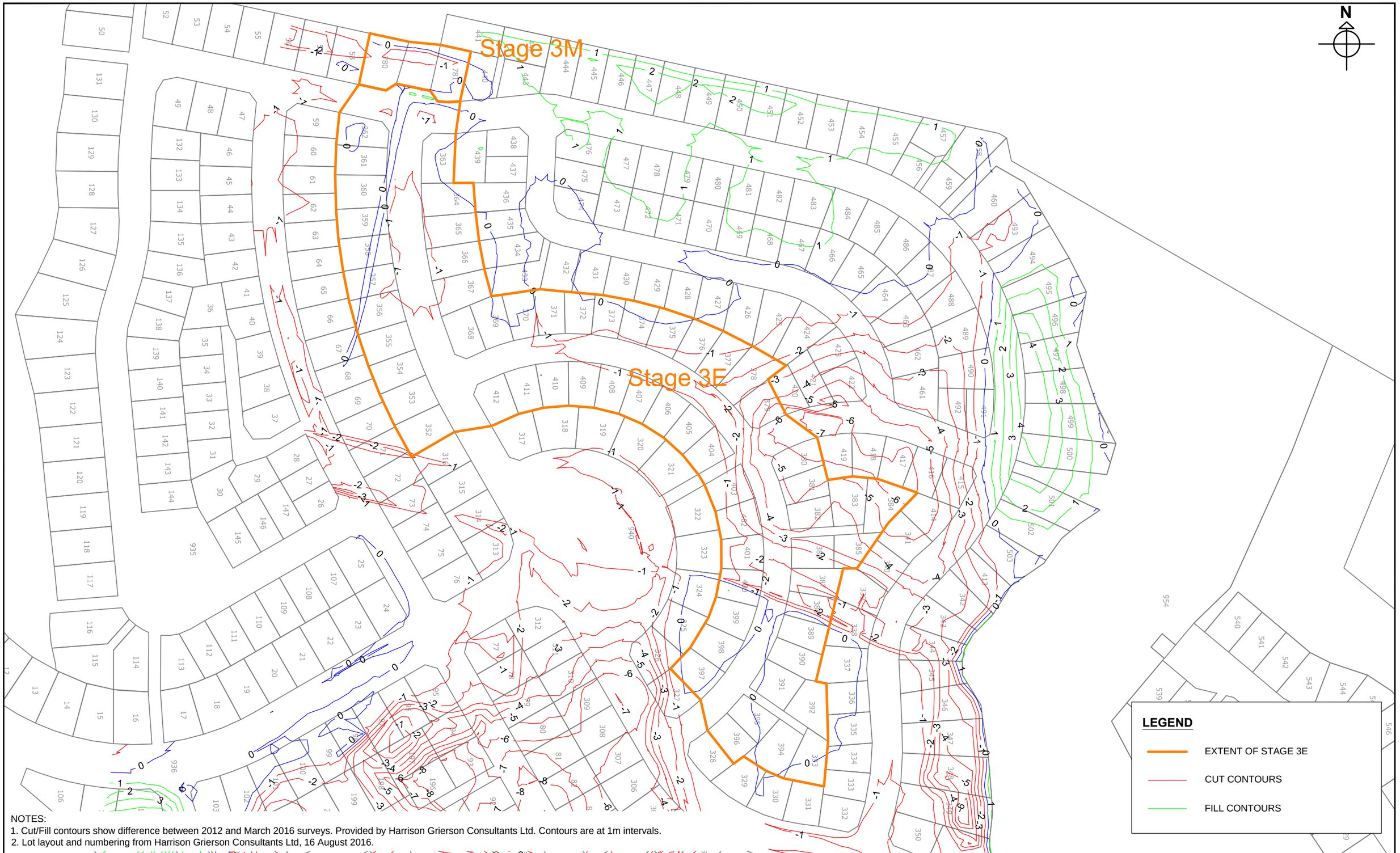

NOTES:
1. Cut/Fill contours show difference between 2012 and March 2016 surveys. Provided by Harrison Grierson Consultants Ltd. Contours are at 1m intervals.
2. Lot layout and numbering from Harrison Grierson Consultants Ltd, 16 August 2016.

revision	rev	description	drawn	approved	date

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Vertical Scale (metres)

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approved	RBT
date	26-8-2016
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original size	A3

coffey
A TETRA TECH COMPANY

client: The Lakes (2012) Ltd

project: The Lakes Stage 3E & 3M
Geotechnical Completion Report

title: 2013-2016 Earthworks Contour Plan

project no: 13086AP-AI | figure no: 4 | rev: A

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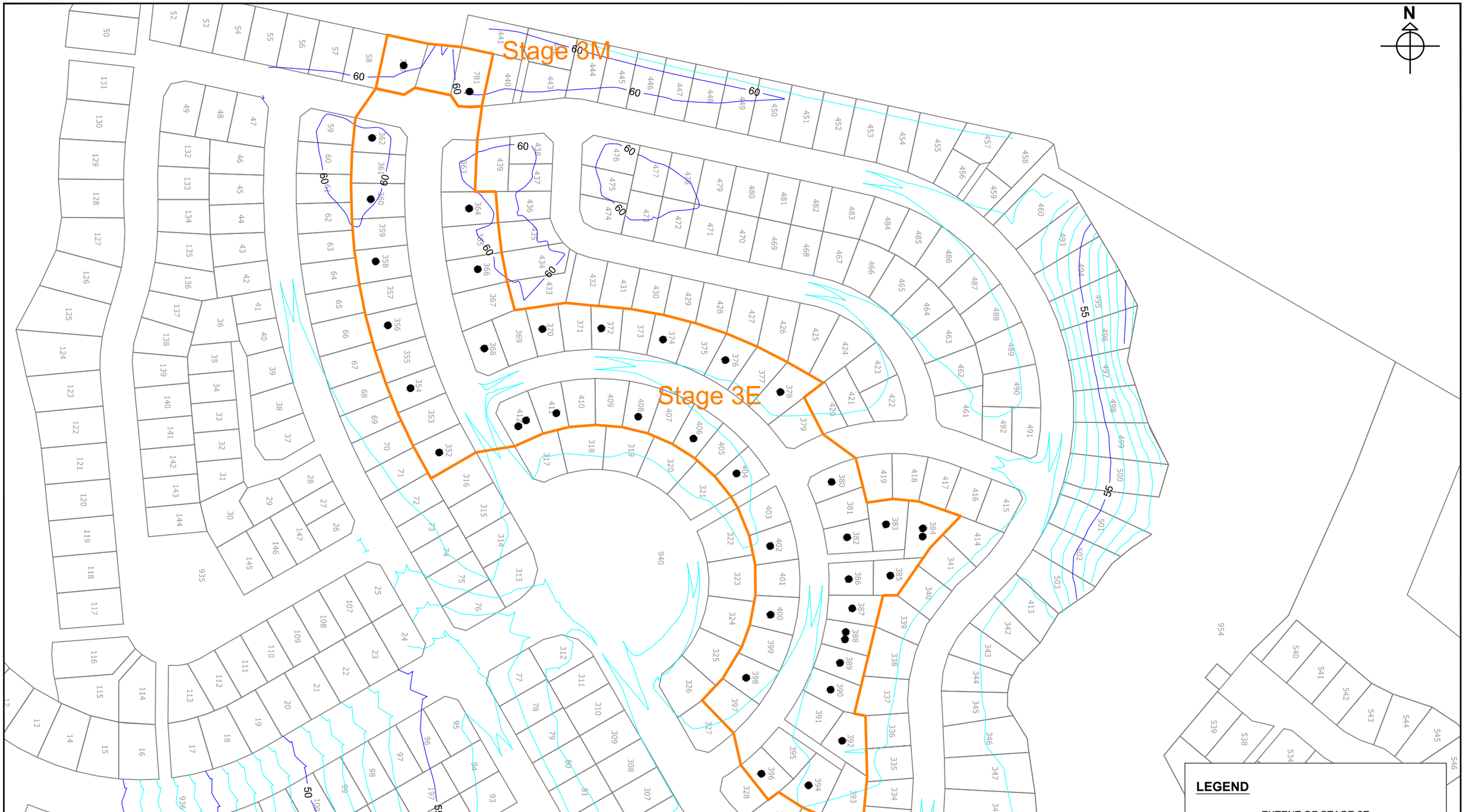

NOTES:
1. Contour data of March 2016 landform from Harrison Grierson Consultants Ltd.
2. Contours shown at 1.0m intervals to Moturiki Datum.
3. Lot layout and numbering from Harrison Grierson Consultants Ltd, 16 August 2016.
4. Hand auger boreholes are numbered according to the relevant lot number. Where two boreholes occur on the same lot, they are appended with the letter A and B.

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Vertical Scale (metres)

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approved	RBT
date	16-8-2016
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coffey
A TETRA TECH COMPANY

client:	The Lakes (2012) Ltd		
project:	The Lakes Stages 3E & 3M Geotechnical Completion Report		
title:	2016 Contour Plan		
project no: 13086AP-AI	figure no: 5	rev: A	

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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 DEVELOPMENT	Robert Telford
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.
2) 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  Date: 26 August 2016

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

Lot No:	Area (m^2)	Subsurface data						Foundations		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	Comments
		Shear Strength (kPa) at 0.5m depth	Subdivision Filling Y/N	Subdivision Filling Depth (m)	Natural Topography Unworked Y/N	Natural Topography Earthworked Y/N	Natural Topography Earthworked Depth (m)	Conventional Shallow Foundation to NZS 3604:2011 Y/N/NA	Specific Design Y/N/NA										
352	552	>183	N	-	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref: GENZTAUC13086AP-AI (Rev 1). N/T = Not Tested.
353	550	N/T	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
354	481	>202	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
355	520	N/T	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
356	560	>202	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
357	480	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
358	520	>183	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
359	480	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
360	560	180	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
361	487	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
362	476	183	N	-	N	Y	0	N	Y	N	N	N	Y	N	N	N	N	Y	

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

Lot No:	Area (m^2)	Subsurface data						Foundations		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	Comments
		Shear Strength (kPa) at 0.5m depth	Subdivision Filling Y/N	Subdivision Filling Depth (m)	Natural Topography Unworked Y/N	Natural Topography Earthworked Y/N	Natural Topography Earthworked Depth (m)	Conventional Shallow Foundation to NZS 3604:2011 Y/N/NA	Specific Design Y/N/NA										
363	526	N/T	N	-	N	Y	0	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref: GENZTAUC13086AP-AI (Rev 1). N/T = Not Tested.
364	553	158	N	-	N	Y	0	N	Y	N	N	N	Y	N	N	N	N	Y	
365	537	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
366	540	169	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
367	580	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
368	475	>183	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
369	499	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
370	439	>202	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
371	422	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
372	387	>183	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	

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

Lot No:	Area (m^2)	Subsurface data						Foundations		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	Comments
		Shear Strength (kPa) at 0.5m depth	Subdivision Filling Y/N	Subdivision Filling Depth (m)	Natural Topography Unworked Y/N	Natural Topography Earthworked Y/N	Natural Topography Earthworked Depth (m)	Conventional Shallow Foundation to NZS 3604:2011 Y/N/NA	Specific Design Y/N/NA										
373	388	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref: GENZTAUC13086AP-AI (Rev 1). N/T = Not Tested.
374	436	173	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
375	468	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
376	455	>202	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
377	508	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
378	628	156	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
379	461	N/T	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
380	449	108	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
381	435	N/T	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
382	408	>183	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	

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

Lot No:	Area (m^2)	Subsurface data						Foundations		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	Comments
		Shear Strength (kPa) at 0.5m depth	Subdivision Filling Y/N	Subdivision Filling Depth (m)	Natural Topography Unworked Y/N	Natural Topography Earthworked Y/N	Natural Topography Earthworked Depth (m)	Conventional Shallow Foundation to NZS 3604:2011 Y/N/NA	Specific Design Y/N/NA										
383	555	>202	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref: GENZTAUC13086AP-AI (Rev 1). N/T = Not Tested.
384	588	74	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
385	400	>202	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
386	445	>202	N	-	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
387	434	133	N	-	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
388	409	>202	N	-	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
389	417	>202	Y	< 1	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
390	452	>202	Y	< 1	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
391	506	N/T	Y	< 1	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
392	546	>202	Y	< 1	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	

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

Lot No:	Area (m^2)	Subsurface data						Foundations		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	Comments
		Shear Strength (kPa) at 0.5m depth	Subdivision Filling Y/N	Subdivision Filling Depth (m)	Natural Topography Unworked Y/N	Natural Topography Earthworked Y/N	Natural Topography Earthworked Depth (m)	Conventional Shallow Foundation to NZS 3604:2011 Y/N/NA	Specific Design Y/N/NA										
393	536	N/T	Y	< 1	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref: GENZTAUC13086AP-AI (Rev 1). N/T = Not Tested.
394	606	>183	Y	< 1	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
395	420	N/T	Y	< 1	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
396	408	>183	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
397	468	N/T	Y	< 1	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
398	467	>183	Y	< 1	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
399	461	N/T	Y	< 1	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
400	459	>202	Y	< 1	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
401	459	N/T	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
402	455	>183	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	

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

Lot No:	Area (m^2)	Subsurface data						Foundations		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	Comments
		Shear Strength (kPa) at 0.5m depth	Subdivision Filling Y/N	Subdivision Filling Depth (m)	Natural Topography Unworked Y/N	Natural Topography Earthworked Y/N	Natural Topography Earthworked Depth (m)	Conventional Shallow Foundation to NZS 3604:2011 Y/N/NA	Specific Design Y/N/NA										
403	458	N/T	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref: GENZTAUC13086AP-AI (Rev 1). N/T = Not Tested.
404	416	>202	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
405	419	N/T	N	-	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
406	425	>183	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
407	429	N/T	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
408	431	>202	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
409	430	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
410	428	N/T	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
411	424	>202	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
412	472	55	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	

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

Lot No:	Area (m^2)	Subsurface data						Foundations		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	Comments
		Shear Strength (kPa) at 0.5m depth	Subdivision Filling		Natural Topography Unworked	Natural Topography Earthworked		Conventional Shallow Foundation to NZS 3604:2011	Specific Design										
			Y/N	Depth (m)	Y/N	Y/N	Depth (m)	Y/N/NA	Y/N/NA										
780	644	>202	N	-	N	Y	1.0	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 8 of Coffey GCR ref: GENZTAUC13086AP-AI (Rev 1).
781	547	>202	Y	1.0	N	Y	1.0	N	Y	N	N	N	Y	N	N	N	N	Y	

Appendix C - Pre Development Investigation Data

coffey geotechnics

Engineering Log - Trial Pit

Trial Pit No. **TP04**

Sheet 1 of 1

Project No: **GENZTAUC13086AF**

Client: **THE LAKES 2012 LTD**

Date started: **14.3.2013**

Principal:

Date completed: **14.3.2013**

Project: **THE LAKES STAGE 3 CONSTRUCTION**

Logged by: **RBT**

Trial pit location: **Refer to site plan**

Checked by: **RBT**

Equipment type:

Pit Orientation:

Easting: 368588.5 m

R.L. Surface:

Excavation dimensions: m long m wide

Vane No: DR2244

Northing: 799726.9 m

Datum:

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material (Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
TS		Sample 1				OL	Organic SILT with trace clay, dark grey/brown, occasional wood fragments and building debris, friable. (FILL)	D		UTP	
Younger Ash	Groundwater not encountered	Sample 2		1		ML	SILT with minor very fine sand, light yellow/brown. Dry, friable, very stiff. - occasional tree roots (2-5mm).			● ×	
		Sample 3		2		ML	SILT with minor clay; orange/brown, occasional rootlets. Very slight plasticity, moist.	M			
						ML	SILT with trace to minor fine sand and trace clay; bright orange. Stiff, friable to very slightly cohesive, moist.	M-W			
RA				3		ML	SILT with trace sand and minor clay; orange/brown. Stiff in-situ but becomes greasy when reworked, moist to wet.	M			
						SP	SAND with trace to minor silt; light orange/grey. Pumiceous, friable, moist. - becomes pale orange/white and minor to some silt below 3.4m.				
HA		Sample 4		4		ML	Clayey SILT; chocolate brown, very stiff in-situ, friable when reworked. Non plastic, moist.			UTP	
		Sample 5		5			- becoming mottled chocolate brown/orange brown. - becoming orange brown.				
				6			(max. reach of excavator) RA = Rotoehu Ash HA = Hamilton Ash Test pit TP04 terminated at 4.8 metres.				

Sketch

classification symbols and soil description
based on New Zealand Geotechnical Society Inc 2005

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
Bs	bulk sample
E	environmental sample
R	refusal

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 index

VS	very soft	VL	very loose
S	soft	L	loose
F	firm	MD	medium dense
St	stiff	D	dense
VSt	very stiff	VD	very dense
H	hard		

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Engineering Log - Trial Pit

Trial Pit No. ***TP05***

Sheet 1 of 1

Project No: ***GENZTAUC13086AF***

Client: ***THE LAKES 2012 LTD***

Date started: ***14.3.2013***

Principal:

Date completed: ***14.3.2013***

Project: ***THE LAKES STAGE 3 CONSTRUCTION***

Logged by: ***KB***

Trial pit location: ***Refer to site plan***

Checked by: ***RBT***

Equipment type:

Pit Orientation:

Easting: 368587.6 m

R.L. Surface:

Excavation dimensions: m long m wide

Vane No: DR2244

Northing: 799812.3 m

Datum:

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
						OL	TOPSOIL.	D			
Younger Ash	Groundwater not encountered	Sample 11				ML	SILT; light brown. Friable, dry.			● ×	
		Sample 12		1			- becoming orange brown.	M		● ×	
		Sample 13				ML	SILT with trace sand and clay; orange brown. Low plasticity and greasy when reworked.				
				2		ML	SILT with trace to minor sand and trace clay; bright orange. - becoming orange brown.				
RA				3		SP	Fine to coarse SAND with trace silt; orange brown. Well graded. - becoming light brown/white with occasional silt lenses.				
Hamilton Ash		Sample 14		4		ML	Clayey SILT; brown. Low plasticity and greasy when reworked. - becoming orange brown mottled brown, less stiff.			UTP	
		Sample 15		5			- becoming light brown/orange brown.				
		Sample 16		6							
							(Target depth) RA = Rotoehu Ash				

Test pit TP05 terminated at 6 metres.

Sketch

classification symbols and soil description
based on New Zealand Geotechnical Society Inc 2005

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
Bs	bulk sample
E	environmental sample
R	refusal

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 index

VS	very soft	VL	very loose
S	soft	L	loose
F	firm	MD	medium dense
St	stiff	D	dense
VSt	very stiff	VD	very dense
H	hard		

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Engineering Log - Trial Pit

Trial Pit No. **TP06**

Sheet 1 of 1

Project No: **GENZTAUC13086AF**

Client: **THE LAKES 2012 LTD**

Date started: **14.3.2013**

Principal:

Date completed: **14.3.2013**

Project: **THE LAKES STAGE 3 CONSTRUCTION**

Logged by: **KB**

Trial pit location: **Refer to site plan**

Checked by: **RBT**

Equipment type:

Pit Orientation:

Easting: 368704.4 m

R.L. Surface:

Excavation dimensions: m long m wide

Vane No: DR2244

Northing: 799943.7 m

Datum:

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
						OL	TOPSOIL	D			
Younger Ash	Groundwater not encountered	Sample 17		1		ML	SILT; light brown, friable and dry.			● 125 ×	
		Sample 18					- becoming orange brown and moist.	M			
		Sample 19		2		ML	SILT with trace fine sand and clay; orange brown. Greasy when reworked.				
						ML	SILT with minor sand and trace clay.; bright orange. Low plasticity.				
RA				3		SP	Fine to coarse SAND with trace silt; orange brown, occasional silty lenses. Well graded.				
							- becoming white/light brown.				
		Sample 20				ML	Clayey SILT; brown. Medium plasticity, very stiff, greasy when reworked.			150 UTP	
Hamilton Ash				4			- becoming orange brown and less stiff.				
		Sample 21		5							
				6			(Target depth) RA = Rotoehu Ash Test pit TP06 terminated at 5 metres.				

Sketch

classification symbols and soil description
based on New Zealand Geotechnical Society Inc 2005

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
Bs	bulk sample
E	environmental sample
R	refusal

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 index

VS	very soft	VL	very loose
S	soft	L	loose
F	firm	MD	medium dense
St	stiff	D	dense
VSt	very stiff	VD	very dense
H	hard		

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Engineering Log - Trial Pit

Trial Pit No. **TP07**

Sheet 1 of 1

Project No: **GENZTAUC13086AF**

Client: **THE LAKES 2012 LTD**

Date started: **14.3.2013**

Principal:

Date completed: **14.3.2013**

Project: **THE LAKES STAGE 3 CONSTRUCTION**

Logged by: **KB**

Trial pit location: **Refer to site plan**

Checked by: **RBT**

Equipment type:

Pit Orientation:

Easting: 368767.5 m

R.L. Surface:

Excavation dimensions: m long m wide

Vane No: DR2244

Northing: 799923.9 m

Datum:

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
		Sample 22				OL	TOPSOIL	D			
Younger Ash	Groundwater not encountered	Sample 23		1		ML	SILT; light brown. Friable and dry. - becoming orange brown with trace sand and moist.	M		● ×	
		Sample 24		2		ML	SILT with trace sand and clay; orange brown. Greasy when reworked.				
						ML	SILT with minor sand; bright orange.				
RA				3		SP	SAND with trace silt; orange brown, fine to coarse grained, pumiceous. Well graded. - becoming light brown/white.				
HA		Sample 25		4		ML	Clayey SILT; brown. Medium plasticity and greasy when reworked. - becoming orange brown.				
		Sample 26		5							
				6			(Target depth) RA = Rotoehu Ash HA = Hamilton Ash Test pit TP07 terminated at 5 metres.				

Sketch

classification symbols and soil description
based on New Zealand Geotechnical Society Inc 2005

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
Bs	bulk sample
E	environmental sample
R	refusal

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 index

VS	very soft	VL	very loose
S	soft	L	loose
F	firm	MD	medium dense
St	stiff	D	dense
VSt	very stiff	VD	very dense
H	hard		

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Engineering Log - Trial Pit

Trial Pit No. ***TP08***

Sheet 1 of 1

Project No: ***GENZTAUC13086AF***

Client: ***THE LAKES 2012 LTD***

Date started: ***15.3.2013***

Principal:

Date completed: ***15.3.2013***

Project: ***THE LAKES STAGE 3 CONSTRUCTION***

Logged by: ***RBT***

Trial pit location: ***Refer to site plan***

Checked by: ***RBT***

Equipment type: | Pit Orientation: | Easting: 368724 m | R.L. Surface:

Excavation dimensions: m long m wide | Vane No: DR2244 | Northing: 799993 m | Datum:

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
		Sample 27				OL	Organic SILT with numerous fine rootlets; greyish brown.	D			
Younger Ash	Groundwater not encountered			1		ML	SILT with trace to minor clay, some fine rootlets; yellowish brown. Stiff, dry, friable.				
							- becoming moist, minor clay, occasional rootlets.				
		Sample 28					- becoming mottled yellow/orange brown.	M			
				2			- trace very fine sand, moist.				
		Sample 29				SP	Fine to coarse SAND with trace silt; yellow/brown with black flecks.				
RA				3		SP	Fine to medium SAND with minor silt; pale yellow/white. Pockets rework to soft sandy silt with some clay, slightly plastic.	M-W			
		Sample 30				CL	Silty CLAY; chocolate brown with white flecks. Stiff to very stiff in-situ, soft and with medium to high plasticity when reworked.				
				4							
		Sample 31				ML	SILT with trace clay and trace fine sand; yellowish brown. Very stiff to hard, non plastic and moist.				
HA				5							
		Sample 32				ML	SILT with minor clay; orangish brown. Reworks to silty clay, moderately plastic, soft to firm.				
				6			(Target depth) RA = Rotoehu Ash HA = Hamilton Ash Test pit TP08 terminated at 5.2 metres.				

Sketch

classification symbols and soil description
based on New Zealand Geotechnical Society Inc 2005

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
Bs	bulk sample
E	environmental sample
R	refusal

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 index

VS	very soft	VL	very loose
S	soft	L	loose
F	firm	MD	medium dense
St	stiff	D	dense
VSt	very stiff	VD	very dense
H	hard		

TRIAL PIT TEST PITS 150313.GPJ COFFEY.GDT 28.3.13

Form GEO 5.5 Rev.6

Appendix D - Post Development Investigation Data

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Engineering Log - Hand Auger

Borehole ID.	***HAL352***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***30 May 2016***
principal:	date completed: ***30 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***NM***
location: ***CENTRE OF LOT 352***	checked by: ***DBC***

position: E: 368485; N: 799970 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA		Not Encountered	VS >183 kPa		0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown, with fine to medium grained sand.					**MATUA SUB-GROUP**
			VS >183 kPa				SP	**SAND**: fine to medium grained, white, with minor silt.					
					0.5		ML	**Sandy SILT**: non plastic, white, with fine grained sand.					
			VS >183 kPa				ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, trace clay.	D to M				
N			VS >183 kPa		1.0			1.0 m: soil is friable.	D				
			VS UTP								VS UTP		
			VS UTP		1.5			1.7 m: with some silt.	M		VS UTP		
			VS UTP								VS UTP		
			VS >183 kPa		2.0			Hand Auger HAL352 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	**HAL354**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
client:	**THE LAKES**
date started:	**30 May 2016**
principal:	
date completed:	**30 May 2016**
project:	**THE LAKES STAGE 3E GCR**
logged by:	**ODS**
location:	**CENTRE OF LOT 354**
checked by:	**DBC**

position: E: 368468; N: 800003 (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**

method & support	penetration 1 2 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 (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA N		Not Encountered			0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
			VS >202 kPa					**SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand.					**VOLCANIC ASHES**
			VS >202 kPa		0.5			0.35 m: with minor clay					
			VS 153/ 32 kPa										
			VS >202 kPa		1.0			**SAND**: fine to medium grained, brown, with some silt.		L to MD			**MATUA SUB-GROUP**
								1.1 m: with trace silt					
			VS 148/ 112 kPa		1.5			**SILT**: non plastic, pale brown, with minor fine grained sand.		VSt			
					2.0			Hand Auger HAL354 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL356***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***30 May 2016***
principal:	date completed: ***30 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 356***	checked by: ***DBC***

position: E: 368456; N: 800038 (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							
method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >202 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
			VS >202 kPa					**SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand.					**VOLCANIC ASHES**
			VS >202 kPa		0.5								
			VS >202 kPa										
			VS >202 kPa		1.0								
			VS >202 kPa										
								SILT: low plasticity, orange, with trace clay and with trace fine to coarse grained sand. Greasy.					**MATUA SUB-GROUP**
			VS >202 kPa		1.5								
			VS >202 kPa										
					2.0			Hand Auger HAL356 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL358***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***30 May 2016***
principal:	date completed: ***30 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***NM***
location: ***CENTRE OF LOT 358***	checked by: ***DBC***

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered			0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt			**TOPSOIL**
			VS >183 kPa				ML	**SILT**: low plasticity, orange brown, with trace fine grained sand, trace clay.	D to M				**MATUA SUB-GROUP**
			VS >183 kPa		0.5								
									M				
			VS 107/ 19 kPa					0.7 m: minor fine grained sand with clay absent.					
			VS 81/ 19 kPa		1.0			0.9 m: some fine grained sand.		St			
			VS 94/ 19 kPa					1.1 m: minor fine grained sand.					
								1.3 m: minor clay, trace fine grained sand.					
			VS 81/ 19 kPa		1.5								
							CL-ML	**Clayey SILT**: low plasticity, orange, with trace fine to medium grained sand, greasy.		VSt			
			VS 120/ 25 kPa					1.8 m: minor fine to medium grained sand.					
			VS >183 kPa		2.0			Hand Auger HAL358 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL360***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***30 May 2016***
principal:	date completed: ***30 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS/NM***
location: ***CENTRE OF LOT 360***	checked by: ***DBC***

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >202 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H	⊙		**TOPSOIL**
			VS 180/ 41 kPa		0.5			**SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand. 0.6 m: with trace clay			⊕ ⊙		**VOLCANIC ASHES**
			VS 190/ 39 kPa		1.0						⊕ ⊙		
			VS 163/ 34 kPa								⊕ ⊙		
			VS 175/ 74 kPa		1.5			**SILT**: non plastic to low plasticity, orange, with trace clay and trace fine to coarse grained sand.			⊕ ⊙		**MATUA SUB-GROUP**
			VS >202 kPa								⊙		
			VS >202 kPa		2.0			Hand Auger HAL360 terminated at 2.0 m Target depth			⊙		

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL362***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***30 May 2016***
principal:	date completed: ***30 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***NM***
location: ***CENTRE OF LOT 362***	checked by: ***DBC***

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/100 mm) 2 4 6 8 10	structure and additional observations
HA			VS >183 kPa					**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H	⊙		**TOPSOIL**
HA			VS >183 kPa		0.5		ML	**SILT**: low plasticity, yellow brown, with minor fine grained sand, trace clay.	D		⊙		**MATUA SUB-GROUP**
HA			VS 169/ 31 kPa						D to M		⊕ ⊙		
HA		Not Encountered	VS 133/ 33 kPa		1.0				D		⊕ ⊙		
HA			VS >183 kPa					1.3 m: Some sand. Greasy			⊙		
HA			VS 151/ 25 kPa		1.5						⊕ ⊙		
HA			VS >183 kPa								⊙		
HA			VS >183 kPa		2.0			Hand Auger HAL362 terminated at 2.0 m Target depth			⊙		

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	**HAL364**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
client:	**THE LAKES**
date started:	**31 May 2016**
principal:	
date completed:	**31 May 2016**
project:	**THE LAKES STAGE 3E GCR**
logged by:	**ODS**
location:	**CENTRE OF LOT 364**
checked by:	**DBC**

position: E: 368499; N: 800101 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N					0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
			VS >202 kPa					**SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand.					**VOLCANIC ASHES**
			VS 158/ 32 kPa		0.5								
		Not Encountered	VS 98/ 34 kPa					**SILT**: low plasticity, orange brown, with minor clay.		St			**MATUA SUB-GROUP**
			VS 117/ 22 kPa		1.0					VSt to H			
			VS 156/ 44 kPa		1.5			1.7 m: becoming non to slightly plastic, becoming orange, with trace fine to medium grained sand, greasy					
			VS >202 kPa										
					2.0			Hand Auger HAL364 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	**HAL366**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
client:	**THE LAKES**
date started:	**31 May 2016**
principal:	
date completed:	**31 May 2016**
project:	**THE LAKES STAGE 3E GCR**
logged by:	**NM**
location:	**CENTRE OF LOT 366**
checked by:	**DBC**

position: E: 368504; N: 800069 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA		Not Encountered	VS >183 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	D	VSt			**TOPSOIL**
N			VS 169/ 26 kPa		0.5		ML	**SILT**: low plasticity, yellow brown, with trace fine grained sand, trace clay.	M				**VOLCANIC ASHES**
			VS 169/ 31 kPa										
			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										
			VS >183 kPa		2.0			Hand Auger HAL366 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL368***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***NM***
location: ***CENTRE OF LOT 368***	checked by: ***DBC***

position: E: 368508; N: 800025 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered			0.0			**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**
								0.6 m: becoming minor clay, trace fine to medium grained sand.					
			VS 169/ 31 kPa										
			VS 169/ 31 kPa		1.0								
								1.1 m: becoming orange with minor clay, trace fine to medium grained sand, greasy.					
			VS 169/ 31 kPa										
			VS 169/ 31 kPa		1.5								
								1.6 m: minor fine to medium grained sand. Compressible	W	St			
			VS 61/ 21 kPa										
								1.9 m: some fine to medium grained sand.		VSt to H			
			VS >183 kPa		2.0			Hand Auger HAL368 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL370***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 370***	checked by: ***DBC***

position: E: 368540; N: 800036 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >202 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt			**TOPSOIL**
			VS >202 kPa		0.5			**SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand.					**VOLCANIC ASHES**
			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.					**MATUA SUB-GROUP**
			VS >202 kPa		2.0			Hand Auger HAL370 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL372***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***NM***
location: ***CENTRE OF LOT 372***	checked by: ***DBC***

position: E: 368572; N: 800036 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA / N					0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
			VS >183 kPa				ML	**SILT**: low plasticity, orange brown, with minor fine to medium grained sand.	D				**VOLCANIC ASHES**
			VS >183 kPa		0.5								
			VS >183 kPa										
		Not Encountered	VS 169/ 31 kPa		1.0		ML	**SILT**: low plasticity, yellow brown, with minor clay, trace fine grained sand.	M	VSt			**MATUA SUB-GROUP**
			VS 151/ 25 kPa										
			VS 169/ 25 kPa		1.5								
			VS 133/ 31 kPa										
			VS 151/ 19 kPa		2.0			Hand Auger HAL372 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL374***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 374***	checked by: ***DBC***

position: E: 368605; N: 800029 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >202 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
			VS 173/ 52 kPa		0.5			**SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand.					**VOLCANIC ASHES**
			VS 165/ 46 kPa		1.0								
			VS 102/ 29 kPa										
			VS 165/ 39 kPa		1.5								
			VS 170/ 38 kPa		2.0			Hand Auger HAL374 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL376***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 376***	checked by: ***DBC***

position: E: 368640; N: 800018 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered			0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
			VS >202 kPa					**SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand.					**VOLCANIC ASHES**
			VS 177/ 34 kPa		0.5								
			VS 156/ 35 kPa		1.0								
			VS 133/ 32 kPa										
			VS 102/ 46 kPa		1.5			**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**
			VS >202 kPa					1.8 m: with some fine to coarse grained sand					
					2.0			Hand Auger HAL376 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL378***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 378***	checked by: ***DBC***

position: E: 368670; N: 800001 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered			0.0			**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			⊕ ⊙		
			VS 98/ 21 kPa							St	⊕ ⊙		
			VS 96/ 18 kPa		1.0			1.1 m: becoming pale brown, with trace fine to coarse grained sand and with trace clay. Sticky			⊕ ⊙		
			VS 79/ 21 kPa		1.5						⊕ ⊙		
			VS >202 kPa							H	⊙		
					2.0			Hand Auger HAL378 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL380***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 380***	checked by: ***DBC***

position: E: 368699; N: 799951 (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								
method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered			0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
			VS 173/ 38 kPa		0.5			**SILT**: non plastic, brown, with minor fine to coarse grained sand.					**MATUA SUB-GROUP**
			VS 108/ 26 kPa					0.6 m: becoming orange brown, with trace clay. Greasy					
			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					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

coffey
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Engineering Log - Hand Auger

Borehole ID.	***HAL382***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***NM***
location: ***CENTRE OF LOT 382***	checked by: ***DBC***

position: E: 368706; N: 799921 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA					0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt			**TOPSOIL**
HA			VS >183 kPa					**SILT**: low plasticity, yellow brown, with minor fine to medium grained sand, trace clay.					**MATUA SUB-GROUP**
HA			VS >183 kPa		0.5				M to W				
HA		Not Encountered	VS 151/ 37 kPa					**Sandy SILT**: non plastic, orange brown, with fine to medium grained sand.					
HA			VS 126/ 31 kPa		1.0								
HA			VS 94/ 31 kPa					**SILT**: low plasticity, yellow brown, with minor fine to medium grained sand, trace clay.		St			
HA			VS 94/ 31 kPa		1.5								
HA			VS 120/ 31 kPa					1.7 m: becoming red brown.		VSt			
HA			VS 81/ 31 kPa		2.0			1.9 m: becoming yellow brown with minor clay, trace fine grained sand.		St			
								Hand Auger HAL382 terminated at 2.0 m Target depth					

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method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

coffey
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Engineering Log - Hand Auger

Borehole ID.	***HAL383***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client:	***THE LAKES***
date started:	***09 Jun 2016***
principal:	
date completed:	***09 Jun 2016***
project:	***THE LAKES STAGE 3E GCR***
logged by:	***ODS***
location:	***CENTRE OF LOT 383***
checked by:	***DBC***

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >202 kPa		0.5			**ORGANIC SILT**: low plasticity, dark brown.	D to M				**TOPSOIL**
			VS >202 kPa		1.0			**SAND**: fine to coarse grained, yellow-brown.					**MATUA SUB-GROUP**
			VS UTP					**SILT**: non plastic to low plasticity, brown, with trace fine grained sand.		H	VS UTP		
			VS >202 kPa		1.5			1.4 m: becoming orange brown 1.5 m: becoming slightly plastic. Sand becomes absent	M				
			VS >202 kPa		2.0			Hand Auger HAL383 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL384A***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***NM***
location: ***CENTRE OF LOT 384***	checked by: ***DBC***

position: E: 368748; N: 799926 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >183 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	D	VSt			**TOPSOIL**
							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			
			VS 68/ 19 kPa					0.8 m: occasional pockets of manganese.					
			VS 74/ 19 kPa		1.0								
			VS 55/ 19 kPa										
			VS 74/ 19 kPa		1.5								
			VS 68/ 19 kPa										
			VS 68/ 19 kPa		2.0			Hand Auger HAL384A terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL384B***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***09 Jun 2016***
principal:	date completed: ***09 Jun 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 384***	checked by: ***DBC***

position: E: 368748; N: 799921 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >202 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
								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					
			VS 156/ 29 kPa		1.0								
			VS 74/ 28 kPa							St			
			VS 62/ 25 kPa		1.5			1.4 m: becomes sticky					
			VS 61/ 29 kPa										
					2.0			Hand Auger HAL384B terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL385***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***09 Jun 2016***
principal:	date completed: ***09 Jun 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 385***	checked by: ***DBC***

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N					0			**ORGANIC SILT**: low plasticity, dark brown.	M	H			**TOPSOIL**
			VS >202 kPa					**SILT**: non plastic to low plasticity, dark orange brown, with trace fine grained sand.					**VOLCANIC ASHES**
			VS >202 kPa		0.5								
		Not Encountered	VS >202 kPa										
			VS >202 kPa		1.0			1.0 m: becoming orange brown					
			VS >202 kPa		1.5			1.5 m: with trace clay, becoming slightly plastic					
			VS >202 kPa										
					2.0			Hand Auger HAL385 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	**HAL386**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
client:	**THE LAKES**
date started:	**31 May 2016**
principal:	
date completed:	**31 May 2016**
project:	**THE LAKES STAGE 3E GCR**
logged by:	**ODS**
location:	**CENTRE OF LOT 386**
checked by:	**DBC**

position: E: 368708; N: 799898 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA, N		Not Encountered	VS >202 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
			VS >202 kPa		0.5			**SILT**: non plastic to low plasticity, orange brown, with trace to minor clay and trace fine grained sand. 0.4 m: becoming greasy					**MATUA SUB-GROUP**
			VS >202 kPa		1.0								
			VS >202 kPa		1.5			**SILTY SAND**: fine to coarse grained, pale brown.		MD to D			
										L			
			VS >202 kPa		2.0			**Clayey SILT**: low plasticity, pale brown, with trace fine grained sand.		VSt to H			
								Hand Auger HAL386 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:40

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

coffey
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Engineering Log - Hand Auger

Borehole ID.	**HAL387**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
client:	**THE LAKES**
date started:	**09 Jun 2016**
principal:	
date completed:	**09 Jun 2016**
project:	**THE LAKES STAGE 3E GCR**
logged by:	**ODS**
location:	**CENTRE OF LOT 387**
checked by:	**DBC**

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered			0.0			**ORGANIC SILT**: low plasticity, dark brown.	M				**TOPSOIL**
			VS 185/ 19 kPa					**SILT**: low plasticity, orange brown, with trace fine to medium grained sand and with trace clay. Greasy.		VSt to H	⊕ ⊙		**MATUA SUB-GROUP**
			VS 133/ 24 kPa		0.5						⊕ ⊙		
			VS >202 kPa					0.9 m: with some fine to coarse grained sand			⊙		
			VS UTP		1.0			1.2 m: becoming grey brown			VS UTP		
								1.4 m: with some fine grained sand					
			VS 182/ 52 kPa		1.5			**SILTY SAND**: fine to coarse grained, grey brown.		MD	⊕ ⊙		
			VS >202 kPa					**SILT**: non plastic to low plasticity, grey brown, with trace to minor fine to coarse grained sand. 1.8 m: becoming brown and non plastic		H	⊙		
			VS >202 kPa		2.0			Hand Auger HAL387 terminated at 2.0 m Target depth			⊙		

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

coffey
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HAL388A***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 388***	checked by: ***DBC***

position: E: 368706; N: 799869 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA, N					0.0			**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			⊕		
		Not Encountered	VS 71/ 21 kPa					0.85 m: becoming sticky		St	⊕ ⊙		
			VS 49/ 34 kPa		1.0			1.3 m: with some fine to coarse grained sand		F	⊕		
			VS 63/ 29 kPa		1.5					St	⊕ ⊙		
			VS >202 kPa					1.8 m: becoming brown, with trace fine grained sand, clay absent		H	⊕		
					2.0			Hand Auger HAL388A terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

coffey
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HAL388B***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***09 Jun 2016***
principal:	date completed: ***09 Jun 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 388***	checked by: ***DBC***

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA, N		Not Encountered			0.0			**ORGANIC SILT**: low plasticity, dark brown.	M				**TOPSOIL**
			VS 184/ 46 kPa					**SILT**: non plastic to low plasticity, orange brown with mottled brown, with trace fine to medium grained sand.		VSt to H	⊕ ⊙		**MATUA SUB-GROUP**
			VS >202 kPa		0.5			**SAND**: fine to coarse grained, orange brown, with trace silt.		MD			
			VS 180/ 44 kPa		1.0			**SILT**: non plastic, orange brown, with trace fine to coarse grained sand.			⊕ ⊙		
			VS >202 kPa					**SAND**: fine to coarse grained, yellow brown, with trace silt. **SILTY SAND**: fine grained, yellow brown.		MD to D			
					1.5			**SAND**: fine to coarse grained, brown grey, with lenses of grey clayey silt.		MD			
			VS >202 kPa					**SILT**: non plastic, brown, with trace fine grained sand.		H	⊙		
			VS >202 kPa		2.0			Hand Auger HAL388B terminated at 2.0 m Target depth			⊙		

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

coffey
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HAL389***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***09 Jun 2016***
principal:	date completed: ***09 Jun 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 389***	checked by: ***DBC***

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA, N		Not Encountered	VS >202 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	H			**TOPSOIL**
			VS >202 kPa		0.5			**SILT**: non plastic to low plasticity, brown, with trace fine grained sand and with trace clay.					**VOLCANIC ASHES**
			VS >202 kPa					0.6 m: clay becomes absent					
			VS >202 kPa		1.0			0.9 m: becoming orange brown 1.0 m: with trace clay, sand becomes absent					
			VS >202 kPa		1.5								
			VS >202 kPa										
					2.0			Hand Auger HAL389 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL390***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 390***	checked by: ***DBC***

position: E: 368698; N: 799838 (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**

method & support	penetration 1 2 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 (kPa) ⊕ remoulded ⊙ peak 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA		Not Encountered	VS >202 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	H			**TOPSOIL**
			VS >202 kPa					**Clayey SILT**: low plasticity, pink brown with mottled grey and mottled dark brown, with trace fine to coarse grained sand.			⊙		**FILL**
			VS UTP		0.5			**SILT**: low plasticity, orange brown, with minot clay and with trace fine to coarse grained sand.			VS UTP		**MATUA SUB-GROUP**
			VS >202 kPa					**Sandy SILT**: non plastic, brown to pale brown, sand is fine to coarse grained.			⊙		
N			VS >202 kPa		1.0			**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						⊙		
			VS >202 kPa		2.0			Hand Auger HAL390 terminated at 2.0 m Target depth			⊙		

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL392***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 392***	checked by: ***DBC***

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA, N		Not Encountered	VS >202 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
			VS >202 kPa		0.5			**SILT**: non plastic to low plasticity, brown with mottled pale brown and grey, with trace to minor fine to medium grained sand and with trace clay.					**FILL**
			VS 158/ 49 kPa		1.0			**SILT**: low plasticity, orange brown, with minor clay and trace fine grained sand.					**MATUA SUB-GROUP**
			VS >202 kPa					1.3 m: becoming greasy					
			VS >202 kPa		1.5								
			VS >202 kPa										
			VS >202 kPa		2.0			Hand Auger HAL392 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL394***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***31 May 2016***
principal:	date completed: ***31 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***NM***
location: ***CENTRE OF LOT 394***	checked by: ***DBC***

position: E: 368686; N: 799786 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >183 kPa		0			**ORGANIC SILT**: low plasticity, dark brown.	D	VSt to H			**TOPSOIL**
			VS >183 kPa		0.5		ML	**SILT**: low plasticity, orange brown mottled with, with some clay, trace fine grained sand.					**MATUA SUB-GROUP**
			VS UTP								VS UTP		
			VS >183 kPa		1.0		ML	**Sandy SILT**: non plastic, white, with fine grained sand.					
			VS >183 kPa				ML	**SILT**: low to medium plasticity, orange brown, with some clay, trace fine grained sand. 1.2 m: soil is friable.					
			VS UTP		1.5						VS UTP		
			VS UTP								VS UTP		
			VS UTP		2.0			Hand Auger HAL394 terminated at 2.0 m Target depth			VS UTP		

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method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	**HAL396**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
client: **THE LAKES**	date started: **31 May 2016**
principal:	date completed: **31 May 2016**
project: **THE LAKES STAGE 3E GCR**	logged by: **NM**
location: **CENTRE OF LOT 396**	checked by: **DBC**

position: E: 368660; N: 799790 (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**

method & support	penetration 1 2 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 (kPa) ⊕ remoulded ⊙ peak (50 100 150 200)	DCP (blows/ 100 mm) (2 4 6 8 10)	structure and additional observations
HA / N		Not Encountered	VS >183 kPa		0.0			**SILT**: low to medium plasticity, red brown, with trace fine to medium grained sand.	D	VSt to H			**MATUA SUB-GROUP**
								0.3 m: soil is friable.					
			VS UTP		0.5						VS UTP		
			VS UTP								VS UTP		
			VS >183 kPa		1.0		ML	**SILT**: low plasticity, yellow orange, with some clay, trace fine grained sand.	M				
			VS >183 kPa										
			VS >183 kPa		1.5								
			VS >183 kPa										
			VS >183 kPa		2.0			Hand Auger HAL396 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	**HAL398**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
client:	**THE LAKES**
date started:	**30 May 2016**
principal:	
date completed:	**30 May 2016**
project:	**THE LAKES STAGE 3E GCR**
logged by:	**NM**
location:	**CENTRE OF LOT 398**
checked by:	**DBC**

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**

method & support	penetration 1 2 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 (kPa) ⊕ remoulded ⊙ peak (50 100 150 200)	DCP (blows/ 100 mm) (2 4 6 8 10)	structure and additional observations
HA N		Not Encountered	VS >183 kPa		0			**ORGANIC SILT**: low plasticity, dark brown.	D	VSt to H			**TOPSOIL**
			VS >183 kPa		0.5		ML	**SILT**: low plasticity, orange brown, with trace fine to medium grained sand, trace clay.					**MATUA SUB-GROUP**
			VS >183 kPa					0.6 m: some clay.					
			VS >183 kPa		1.0			1.0 m: a 100mm lense of pale yellow fine to medium grained sand with minor silt is present. 1.1 m: with minor fine grained sand, trace clay.					
			VS >183 kPa		1.5			1.5 m: with minor clay, trace fine grained sand.					
			VS >183 kPa										
			VS >183 kPa		2.0			Hand Auger HAL398 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	**HAL400**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
client: **THE LAKES**	date started: **30 May 2016**
principal:	date completed: **30 May 2016**
project: **THE LAKES STAGE 3E GCR**	logged by: **ODS**
location: **CENTRE OF LOT 400**	checked by: **DBC**

position: E: 368665; N: 799877 (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							
method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >202 kPa		0			**ORGANIC SILT**: low plasticity, dark brown.	D to M	VSt to H			**TOPSOIL**
			VS >202 kPa		0.5			**SILT**: non plastic, orange brown, with trace fine to coarse grained sand.					**VOLCANIC ASHES**
			VS >202 kPa					0.6 m: becoming slightly plastic	M				
			VS 165/ 38 kPa		1.0			0.75 m: becoming mottled pale brown					
			VS >202 kPa					1.0 m: with minor clay					
			VS >202 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.					**MATUA SUB-GROUP**
			VS 158/ 41 kPa					1.7 m: with trace clay 1.75 m: becoming brown					
			VS 104/ 45 kPa		2.0			Hand Auger HAL400 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	**HAL402**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
date started:	**30 May 2016**
date completed:	**30 May 2016**
logged by:	**NM**
checked by:	**DBC**

client: **THE LAKES**

principal:

project: **THE LAKES STAGE 3E GCR**

location: **CENTRE OF LOT 402**

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >183 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	D	VSt to H			**TOPSOIL**
			VS >183 kPa		0.5		ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, trace clay.					**VOLCANIC ASHES**
			VS >183 kPa					0.7 m: with minor clay.					
			VS 151/ 25 kPa		1.0			0.9 m: becoming orange with some clay, trace fine grained sand.	M				
			VS >183 kPa										
			VS >183 kPa		1.5		ML	**SILT**: low plasticity, orange brown, with some clay, minor fine to medium grained sand.	M to W				**MATUA SUB-GROUP**
			VS >183 kPa										
					2.0			Hand Auger HAL402 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL404***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***30 May 2016***
principal:	date completed: ***30 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 404***	checked by: ***DBC***

position: E: 368648; N: 799955 (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**

method & support	penetration 1 2 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 (kPa) remoulded ⊕ peak ⊙ 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >202 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	D to M	VSt to H			**TOPSOIL**
			VS >202 kPa					**SILT**: non plastic to low plasticity, pale brown, with trace to minor fine to coarse grained sand and with trace clay.			⊙		**FILL**
			VS >202 kPa		0.5			**SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand.	M		⊙		**VOLCANIC ASHES**
			VS >202 kPa								⊙		
			VS >202 kPa		1.0			1.0 m: with trace clay			⊙		
			VS >202 kPa								⊙		
			VS >202 kPa		1.5						⊙		
			VS >202 kPa					**SILT**: non plastic, brown, with trace to minor fine to coarse grained sand.			⊙		**MATUA SUB-GROUP**
			VS >202 kPa		2.0			Hand Auger HAL404 terminated at 2.0 m Target depth			⊙		

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

coffey
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Engineering Log - Hand Auger

Borehole ID.	**HAL406**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
date started:	**30 May 2016**
date completed:	**30 May 2016**
logged by:	**NM**
checked by:	**DBC**

client: **THE LAKES**

principal:

project: **THE LAKES STAGE 3E GCR**

location: **CENTRE OF LOT 406**

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >183 kPa		0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
			VS >183 kPa		0.5		ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand.	D				**MATUA SUB-GROUP**
			VS >183 kPa										
			VS UTP		1.0		SP	**SAND**: fine to medium grained, pale yellow brown, with some silt.			VS UTP		
			VS 151/ 21 kPa				ML	**Sandy SILT**: non plastic to low plasticity, pale yellow brown, with fine to medium grained sand.					
			VS >183 kPa		1.5		ML	**SILT**: low plasticity, pale yellow brown, with minor fine to medium grained sand, trace clay.	M to W				
			VS >183 kPa				ML	**Sandy SILT**: non plastic to low plasticity, pale yellow brown, with fine to medium grained sand.					
			VS >183 kPa		2.0			Hand Auger HAL406 terminated at 2.0 m Target depth					

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL408***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***30 May 2016***
principal:	date completed: ***30 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 408***	checked by: ***DBC***

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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >202 kPa					**ORGANIC SILT**: low plasticity, dark brown.	D to M	VSt to H			**TOPSOIL**
			VS >202 kPa		0.5			**SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand.	M				**VOLCANIC ASHES**
			VS 173/ 44 kPa					**SILT**: low plasticity, brown to orange brown, with trace clay and with trace fine to coarse grained sand. Greasy.					**MATUA SUB-GROUP**
			VS 185/ 44 kPa		1.0			1.0 m: becoming orange brown					
			VS 166/ 36 kPa					1.2 m: with minor clay					
			VS 190/ 44 kPa		1.5								
			VS >202 kPa					1.75 m: with minor to some fine to coarse grained sand					
			VS UTP		2.0			**Sandy SILT**: non plastic, orange brown, greasy.			VS UTP		
								Hand Auger HAL408 terminated at 2.0 m Target depth					

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method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL411***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***30 May 2016***
principal:	date completed: ***30 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 411***	checked by: ***DBC***

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							
method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS >202 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown.	M	VSt to H			**TOPSOIL**
			VS >202 kPa		0.5			**SILT**: non plastic to low plasticity, orange brown, with trace fine grained sand and with trace clay. Greasy.					**VOLCANIC ASHES**
			VS >202 kPa										
			VS 172 kPa		1.0			1.0 m: with trace fine to coarse grained sand					
			VS 190 kPa										
			VS >202 kPa		1.5								
			VS >202 kPa										
			VS >202 kPa		2.0			Hand Auger HAL411 terminated at 2.0 m Target depth					

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method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL412A***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client: ***THE LAKES***	date started: ***30 May 2016***
principal:	date completed: ***30 May 2016***
project: ***THE LAKES STAGE 3E GCR***	logged by: ***NM***
location: ***CENTRE OF LOT 412***	checked by: ***DBC***

position: E: 368531; N: 799985 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA, N		Not Encountered	VS >183 kPa		0			**SILT**: low plasticity, orange brown, with minor clay, trace fine to medium grained sand..	D	VSt	⊙		**VOLCANIC ASHES**
			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	⊙		
			VS >183 kPa		1.0						⊙		
			VS >183 kPa				SP	**SAND**: fine to medium grained, yellow, with minor silt.	D	L to MD	⊙		
			VS 151/ 43 kPa		1.5		ML	**SILT**: low plasticity, pale grey yellow, with some fine to medium grained sand.	M to W	VSt to H	⊕⊙		
			VS >183 kPa		2.0			Hand Auger HAL412A terminated at 2.0 m Target depth			⊙		

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method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	***HAL412B***
sheet:	1 of 1
project no.	***GENZTAUC13086AP***
client:	***THE LAKES***
date started:	***09 Jun 2016***
principal:	
date completed:	***09 Jun 2016***
project:	***THE LAKES STAGE 3E GCR***
logged by:	***ODS***
location:	***CENTRE OF LOT 412***
checked by:	***DBC***

position: E: 368527; N: 799982 (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**

method & support	penetration 1 2 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) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered	VS 156/ 44 kPa		0.0			**SILT**: non plastic to low plasticity, orange brown, with trace fine to medium grained sand. Greasy.	M	VSt to H	⊕ ⊙		**MATUA SUB-GROUP**
			VS >202 kPa		0.5			0.5 m: with trace clay			⊕		
			VS >202 kPa		1.0						⊕		
			VS 156/ 29 kPa								⊕ ⊙		
			VS 118/ 38 kPa		1.5			1.5 m: becoming grey-brown and non-plastic, with some fine to coarse grained sand			⊕ ⊙		
			VS 122/ 69 kPa								⊕ ⊙		
					2.0			Hand Auger HAL412B terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP STAGE 3E HAS.GPJ <<DrawingFile>> 21/06/2016 11:41

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	**HAL780**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
client:	**THE LAKES**
date started:	**17 Aug 2016**
principal:	
date completed:	**17 Aug 2016**
project:	**THE LAKES STAGE 3M**
logged by:	**ODS**
location:	**Center of Lot 780**
checked by:	**RBT**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:

drill model: | drilling fluid: | hole diameter : 50 mm

drilling information | **material substance**

method & support	penetration (1 2 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 penetrometer (kPa) (100 200 300 400)	DCP (blows/ 100 mm) (2 4 6 8 10)	structure and additional observations
HA N		Not Encountered			0			**ORGANIC SILT**: non plastic, black.	D to M	VSt to H			**TOPSOIL**
					0.5			**SILT**: non plastic, orange brown, with trace fine to coarse sand.					**YOUNGER ASH DEPOSIT** VS >202 kPa
								0.6 m: with trace fine grained sand					VS >202 kPa
					1.0			0.85 to 0.95 m: becomes mottled with dark brown					VS >202 kPa
								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
													VS 114/ 31 kPa
					2.0								VS 173/ 35 kPa
					2.5			Hand Auger HAL780 terminated at 2.5 m Target depth					

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

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

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Engineering Log - Hand Auger

Borehole ID.	**HAL781**
sheet:	1 of 1
project no.	**GENZTAUC13086AP**
client:	**THE LAKES**
date started:	**17 Aug 2016**
principal:	
date completed:	**17 Aug 2016**
project:	**THE LAKES STAGE 3M**
logged by:	**ODS**
location:	**Center of Lot 781**
checked by:	**RBT**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:

drill model: | drilling fluid: | hole diameter : 50 mm

drilling information | **material substance**

method & support	penetration 1 2 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 penetrometer (kPa) 100 200 300 400	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N		Not Encountered			0.0			**ORGANIC SILT**: non plastic, black.	D to M	VSt to H			**TOPSOIL**
								Sandy SILT: non plastic, orange brown, sand is fine to coarse.	M				**FILL** VS >202 kPa
					0.5			**SILT**: non plastic to low plasticity, orange brown with mottled dark brown, with trace fine to coarse sand.					VS >202 kPa
								Sandy SILT: non plastic, brown, sand is fine.					VS 202/ 36 kPa
					1.0			**SILT**: low plasticity, orange brown, with trace fine sand.					**MATUA SUB-GROUP** VS >202 kPa
								1.3 m: becomes greasy, with trace to minor clay, sand absent					
					1.5								VS >202 kPa
					2.0								VS >202 kPa
					2.5			Hand Auger HAL781 terminated at 2.5 m Target depth					VS 201/ 46 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP HAL780-781.GPJ <<DrawingFile>> 26/08/2016 11:30

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

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

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

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