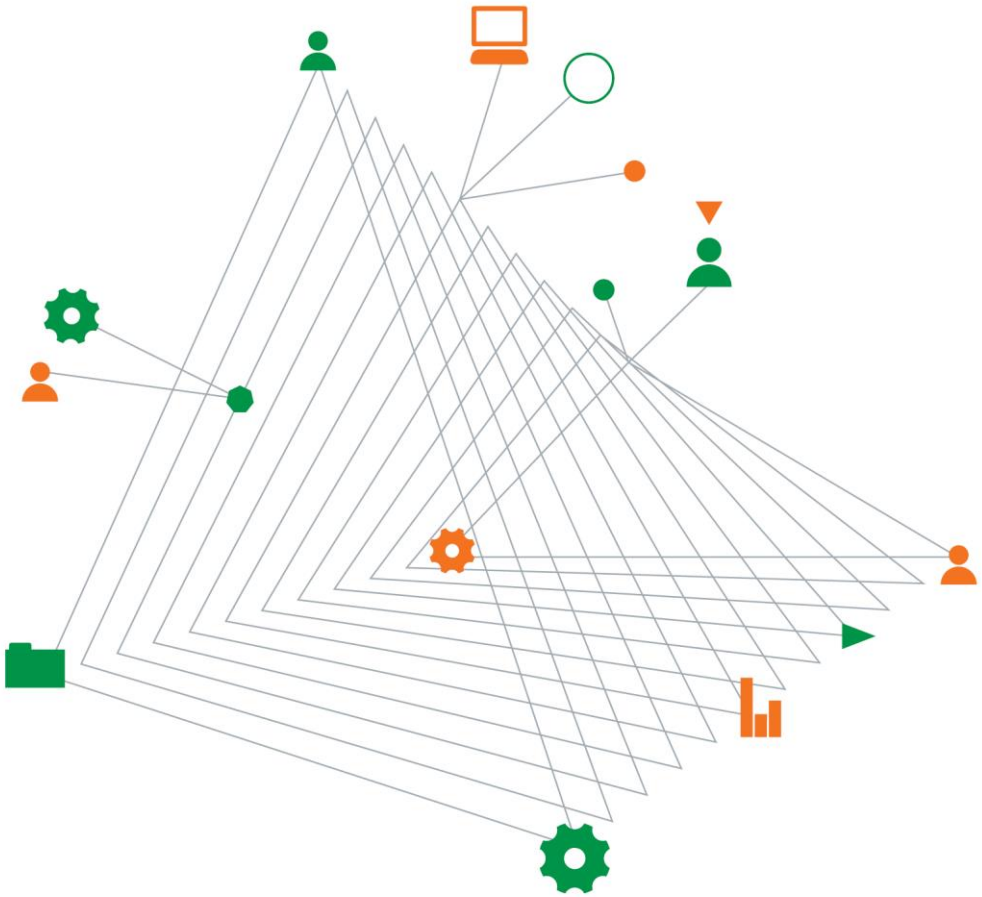
The Lakes (2012) Ltd

The Lakes - Stage 3I

Geotechnical Completion Report

19 January 2018



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The Lakes - Stage 3I

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19 January 2018

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For and on behalf of Coffey

Robert Telford
Associate Engineering Geologist

Quality information

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0	Draft for review	8/12/2018	RBT		
A	Final	19/1/2017	RBT	DAS	RBT

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Table of contents

Important information about your Coffey Report

Appendices

1. Introduction & Scope

This Geotechnical Completion Report (GCR) has been prepared by Coffey Services (NZ) Ltd (Coffey) for the Lakes (2012) Limited following completion of earthworks for Stage 3I 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, 2014-2015, 2015-2016 and 2016-2017 earthworks seasons. It also summarises minor works completed within the development area such as walking tracks, a debris bund and a permanent stormwater pond ('Pond 2').

The extent of earthworks observed by Coffey is shown on the appended plans (Figures 1 to 5, 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

Stage3I of the Lakes subdivision is 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 in Appendix A. Stage 3I consists a total of 85 lots new residential lots with associated reserves, roads and easements.

Before earthworks began, Stage 3I consisted of a low-lying valley orientated in a north-south direction parallel to Pyes Pa Road. The valley was bounded by steep slopes to the north, west and east. The valley originally extended to the south beyond the 3I boundary but this area was infilled during construction of Takitimu Drive (State Highway SH36). The southern boundary of Stage 3I is now marked by the highway.

During the 2007 to 2008 earthworks season, major works were undertaken within the Lakes area and to form the Takitimu Drive road alignment. These earthworks included placement of up to 15m of filling within the stage 3I area to form the current highway embankment. Cut and fill contours for these works are shown on Figure 2. The post earthworks ground surface (surveyed in 2010) is shown on Figure 3.

Earthworks recommenced in the summer of 2014-2015 with the placement of fill in the in the valley of Stage 3I. Filling continued during the 2015-2016 work season as further cut material was sourced from other stages within the Lakes Development. The ridge at the northern end of Stage 3I (referred to as the 'spur ridge' on the site plans) was excavated at this time. The total cut and fill contours from these work seasons are shown on Figure 4.

Earthworks were also carried out to form a permanent stormwater pond near the northern end of the stage (Pond 2), a debris bund along the toe of the eastern slope below Pyes Pa Road and a network of walking tracks on the slope to the west of the stage. Two earth-fill buttresses were also constructed below the collector road that accesses the site from the west. These structures are discussed in more detail elsewhere in this report.

Civil infrastructure for Stage 3I of the subdivision was installed in 2016 and 2017. The 2017 finished ground surface is shown on Figure 5.

3. Related Reports

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

1. *'Pyes Pa West Urbanisation Development, Tauranga – Geotechnical Assessment Report'*, report prepared by S&L Consultants Ltd (Ref: 16944, dated October 2003).

2. *'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).

3. *'Slip Debris Volume Calculations for Western Slope, The Lakes Subdivision Stage 3 – Zone 2'*, memo prepared by Coffey (Ref: GENZTAUC13086AK-AD, dated 27 March 2014).

4. *'The Lakes Stage 3 - Zone 3, Geotechnical Investigation Report (Addendum 1)',* report prepared by Coffey (Ref: GENZTAUC13086AQ-AB, dated 10 July 2015).

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 methods.

Subsequent geotechnical investigation reports by Coffey in April 2014 and July 2015 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. The Coffey assessments provided additional detail around potential slope stability risks, likely static settlements beneath the proposed fill areas and the risk of earthquake induced liquefaction within the development.

4. Investigations Completed

Geotechnical investigations have been undertaken on this and adjacent sites during each stage of the Lakes subdivision's design and construction. The investigations used for this report are listed below. Logs of each investigation are included in Appendix C.

2013 - 2014

- Four machine boreholes drilled to a maximum depth of 20.0m across the site. Standard Penetration Tests (SPT) were carried out at 1.5m intervals (Coffey, MH302 to MH305 on Figure 3);

- Thirteen Cone Penetrometer Tests to depths between 6.5 and 15.0 meters below the existing ground level using a truck mounted rig supplied by Geotech Drilling Limited (Coffey, CPT301 to CPT313 on Figure 3);

- Twenty-one trial pits excavated to a maximum depth of 5.8m depth to assess near surface soils and, particularly peat lenses within the floor of the Stage 3I valley (Coffey, TP301 to TP305 and TP308 to TP323 on Figure 3);

- Eight hand-auger boreholes drilled to a maximum depth of 5.0m (Coffey, HA304 to HA308, HA311 to HA312 and HA314 on Figure 3);

2015

- Fourteen hand-auger boreholes drilled to a maximum depth of 5.2m (Coffey, HA01-AQ to HA11-AQ and HA13-AQ to HA15-AQ on Figure 3).

On completion of the bulk earthworks in 2016, Coffey drilled a total of 162 hand-auger boreholes to assess finished subgrade conditions within the new lots. The locations of these boreholes are shown

on Figure 5. Although labels are not shown on the plan, the boreholes are numbered according to the relevant lot number. For example, the hand auger borehole on Lot 532 is referred to as HAL532. Boreholes located on the boundary between two lots are referenced with the lot number of both lots (e.g. HA152-153). Logs of these boreholes are included in Appendix D.

5. Earthworks Operations

5.1. Plant

Earthworks during the 2007-2008 season were completed by Bob Hicks Earthmovers Ltd. The earthworks contractor for the 2014-2017 period was JMC Civil Construction Ltd (JMC) and civil infrastructure was installed by Higgins Group Holdings Ltd (Higgins).

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

5.2. Construction Programme

5.2.1. 2007 – 2008

Under ownership of Grasshopper Farms Ltd, earthworks during this period included filling of up to 15m under the lots at the southern extent of Stage 3I. This fill formed part of the construction for the Takitimu Drive road alignment. The fill materials were sourced from outside the Stage 3I area.

Fill compaction testing for the highway was carried out by Coffey.

5.2.2. 2014 to 2017 Earthworks Seasons

In 2012 ownership of the Lakes subdivision passed from Grasshopper Farms Ltd to The Lakes (2012) Ltd. Earthworks under The Lakes direction began in 2014. The early works included the excavation of peat lenses and colluvial soils which were identified by Coffey's site investigations. From late 2014, filling commenced in the valley with material sourced from other earthworks stages within the Lakes Development. Filling continued during early 2015 and into the 2015-2016 earthwork period that followed. In total up to 5m of fill was placed across the valley floor as shown on Figure 4.

In October and November of 2015, topsoil stripping of the western slope in the vicinity of the earth fill buttresses and the spur ridge to the north of Stage 3I took place, followed by the excavation of the spur ridge into the summer of 2015-2016. Although not shown on Figure 4, some lots in the area of the spur ridge were excavated below finished ground level and then filled to current levels. Reference should be made to the borehole logs in Appendix D to confirm specific ground conditions in this area.

The two buttress fills were constructed on the western slope during March and April of 2016. Minor excavations were also carried out above these buttresses to reduce overall slope gradients. Cut and fill depths from these earthworks can been seen on Figure 4.

Construction of the debris bund along the eastern site boundary took place in stages from late 2015, beginning at the northern end of Stage 3I. The fill contour depths between the toe of the eastern slope and the adjacent lot boundaries can be seen in Figure 4 and the extent of the completed debris bund is shaded on Figure 5.

The installation of civil infrastructure and the construction of the western slope walking tracks were completed by Higgins in 2017.

6. Quality Control

6.1. Site Preparation Observations

During 2014-2017, Coffey undertook regular observations of fill areas to ensure topsoil, vegetation or unsuitable materials had been removed before filling. Coffey also provided laboratory testing services for the earlier earthworks during construction of the Takitimu Drive embankment.

6.2. Fill Control

The fill placed within Stage 3I in the 2007-2008 earthworks season was tested using a Nuclear Density Meter (NDM), laboratory moisture content and undrained shear strength tests. NDM tests from 2014 onwards were undertaken by Fulton Hogan on behalf of JMC Limited. Undrained shear strength tests or Dynamic Cone Penetration Tests (DCP or 'Scala') were also carried out, depending on the fill being tested.

The locations of tests completed in 2007-2008 are shown on Figure 2, with test results represented with the letter 'A' (e.g. A-319). Tests undertaken from 2014 onwards are shown on Figure 4, with test results represented with the letter 'B' (e.g. B-157).

6.2.1. Compaction Control Criteria

The compaction control criteria for this project were specified using the 'minimum allowable shear strength and maximum allowable air voids' method as defined below:

- Air voids percentage (defined in NZS 4402:1986 and as measured by NDM) targeting an average value less than 10% over any 10 consecutive tests and maximum single value no greater than 12%.
- Undrained shear strength measured by hand held shear vane calibrated using the NZGS 2001 method. A single undrained shear strength 'test' was defined as the average of four individual shear vane readings at each NDM location. The target test values were an average value greater than 150kPa and minimum single value no less than 140kPa.

6.2.2. Test Results

Summary tables showing the results of the laboratory fill tests for bulk earthworks at Stage 3I are included in Appendix E and the locations of the tests are shown on Figures 2 and 4. The majority of tests met or exceeded the compaction control criteria given above. Failed tests are shown in red on the relevant figures.

All tests undertaken during the 2007-2008 earthworks period were deemed to have met the above criteria. Fourteen tests during the 2014-2017 season did not meet the required test values.

Following the failed results the filling at test locations B-37, B-60A, B-61A, B-64A, B-70 and B-71 was reworked and retested. The filling at test locations B-45, B-137, B-255, B-259, B-260, B-263, B-290 and B-292 was observed by Coffey using either test pits or hand-auger boreholes. It was concluded that the 'failed' results in these areas were due to variable sand content within the fill leading to inaccurate shear strength or DCP results.

7. Engineering Evaluation

7.1. Fill Quality

Based on the appended earth fill quality control test data and reliance on the diligence of the bulk earthworks contractor at times when engineering staff were not present on site, results indicate that the compaction control criteria were generally met during the bulk earthworks periods.

It should be understood however that, due to the variability of the source materials used, it is possible that discrete pockets or layers of less than optimally compacted fill or sensitive natural soils may be encountered within individual lots. Any questionable or unsuitable ground conditions encountered during construction and/or during the normal Council site inspections must be brought to the attention of a geotechnical engineer.

7.2. Static Settlement

Most of the Stage 3I area is located on engineered filling placed over variable alluvial soils. Static settlements beneath the filling were monitored at a total of eleven survey points shown as 'SM1' to 'SM11' on Figure 4. The monitoring points consisted of steel rods attached to plates installed at the base of the filling. Plots of the data for these points are provided in Appendix F.

The individual points were surveyed for a period of at least 6 months and until the data at each location indicated consolidation settlements were effectively complete (i.e. 'T90'). Most points were then monitored for a further 6 to 12 months to assess the long term 'creep' or residual settlements at each location.

The data indicate that total settlements beneath the majority of the filled area ranged from approximately 20mm to 90mm (SM1 to SM9) over the monitoring period. At the northern end of the site, pre-subdivision analyses indicated that Lots 532, 543 and 544 may be affected by significant differential settlements as these lots spanned across the boundary between filling and excavated ground. These lots were therefore surcharged with 2m of loose fill (equivalent to approximately 25kPa) between March 2016 and February 2017. Data from SM10 and SM11 indicate the filling and surcharge induced up to 150mm of total settlement within these lots.

The probable long-term residual settlements (i.e. 'creep') at each of the monitoring locations have been assessed by extrapolating the settlement data out for a period of 50 years. These calculations indicate likely total residual settlements within Stage 3I will be less than 50mm. Differential settlements within each of the new lots are expected to less than 25mm per 6m horizontal length and within the maximum limits required by the New Zealand Building Code and Tauranga City Council Infrastructure Development Code.

7.3. Slope Stability

The stability of slopes within and adjacent to Stage 3I was assessed during the initial pre-subdivision site investigation. Three possible areas of instability were identified and are discussed below.

7.3.1. Eastern Slope

This slope rises approximately 15m above the site's eastern boundary to Pyes Pa Road. Along most of its length the slope below Pyes Pa Road is in its natural or pre-subdivision state and was not significantly altered as part of this development. The southern end was cut into an approximately 1V:2.5H (22°) batter during construction of the nearby highway in 2007-2008. The northern end was also cut into a 1V:2.5H batter with an approximately 10m wide bench half-way up during the 2015-2016 work season.

Several previous landslides were identified along the natural part of the eastern slope during the site assessment in 2014. Subsequent analyses indicated this slope may have a low factor of safety during

elevated groundwater (i.e. storm) and seismic conditions. A debris bund consisting of nominally compacted earth fill was therefore constructed at the foot of this slope to reduce the risk to adjacent lots. The completed bund is shown on Figure 5.

The cut batters at the northern and southern ends of the slope are considered adequately stable for residential development below this slopes. No additional protection measures were considered necessary in these areas.

7.3.2. Western Slope

This approximately 35m high escarpment rises to the west of the site and up to previous stages of the Lakes subdivision. This slope is also understood to have a low factor of safety under elevated groundwater and seismic conditions. However, analyses by Coffey during the planning stages of Stage 3I indicated that, in the event of instability, the debris from this slope would likely be contained within the stream channel at the foot of the escarpment. The debris would not be expected to impact on the nearby properties.

This slope also underlies the collector road connecting Stage 3I with the previous Lakes stages. Analyses indicated that parts of the slope below the road were overly steep in their previous state and were not sufficiently stable to support this key access. Two earth-fill buttresses were therefore designed in this area and were constructed from engineered fill during the Stage 3I works. The buttress fills are shown on Figure 4. The steeper natural slopes above these buttresses were also re-graded (cut) to a more stable slope angle.

Stability calculations indicated that the buttress fills and minor regrading of the natural slopes were sufficient to achieve minimum factors of safety of 1.5 under prevailing groundwater conditions, 1.2 under elevated groundwater conditions and 1.0 under seismic loads as required by the TCC IDC.

7.3.3. Lot 537

Lot 537 at the northern end of the development is located above a steep slope which falls approximately 5m to the Nanako Stream. Any future development works including construction or filling within 5m of the crest of this slope must be approved by a geotechnical engineer (TCC Category 1 or 2). A Building Restriction Line (BRL) has been defined on this lot and is shown on Figure 5 to illustrate this area.

Stormwater from paved or impermeable surfaces including roofs and driveways on this lot must also be directed away from the slope and BRL.

7.4. Liquefaction

The Geotechnical Investigation Report for this stage of the Lakes subdivision concluded that there was a low risk of significant liquefaction within Stage 3I during a 1 in 25 year return period earthquake (equivalent to the Serviceability Limit State of ‘SLS’ event for residential development). There is a moderate to high risk of liquefaction during a 1 in 500 year event (i.e. the Ultimate Limit State or ‘ULS” earthquake) within lots underlain by alluvial soils.

However, the finished lots which may be affected by liquefaction are now underlain by between 2m and 5m of engineered filling. This crust of non-liquefiable material would be expected to reduce the effects of liquefaction as observed at the ground surface and the majority of the new lots are therefore considered adequate for dwellings designed to current New Zealand standards and NZS 3604.

The exception to this is the lots adjacent to Pond 2 (Lots 522 to 533, 535 and 536), where the analyses indicated a possible risk of horizontal ground deformation or ‘lateral spreading’ around the pond embankments. The dwellings on these lots should be supported on specifically designed foundations which are capable of safely supporting up to 500mm of horizontal stretching beneath the building platform. Foundation design recommendations are given in Section 7.6 below.

7.5. Maximum Excavation Depths

Based on the results of the earthworks testing and subsequent post-subdivision testing by Coffey, the finished subgrade conditions within Stage 3I are considered adequate for residential development with excavations to a maximum of 1.5m depth below current ground level.

Any future development which entails excavations of more than 1.5m depth below current ground levels must be subject to additional investigation and assessment by a TCC Category 1 or 2 Geo-Professional at the design/building consent stage The additional analyses should confirm the bearing capacity of founding soils and parameters for the specific design of retaining walls where required.

7.6. Foundation Design & Bearing Capacity

7.6.1. Lots 522 to 533, 535 and 536

As discussed above, dwellings on Lots 522 to 533, 535 and 536 must be supported by specifically designed foundations which can safely support up to 500mm of horizontal ground stretching in the event of a ULS earthquake. Solutions may include the 'enhanced foundation slab' options developed for the TC2 area of the Canterbury Rebuild.

These foundations may be designed for a geotechnical ultimate bearing capacity of 300kPa.

7.6.2. Remaining Lots

Subject to the maximum excavation depths discussed in Section 7.5, the subgrade conditions beneath the remaining lots are adequate for shallow foundations designed in accordance with NZS 3604 or for 'waffle-slab' type foundations (e.g. Rib-raft). A geotechnical ultimate bearing capacity of 300kPa may be assumed for these foundations.

8. Additional Works

In addition to the bulk earthworks, several minor structures have also been constructed within the development area and for which Coffey provided geotechnical advice or observations. These structures are summarised below.

8.1. Western Slope Walkway

A network of pedestrian walkways have been constructed on the western slope to connect Stage 3I with previous stages of the Lakes subdivision. The walkways are shown on Harrison Grierson drawings ref: 139618-AB401 to -404 Appendix G. Typical cross sections and construction details are shown on drawing 137845-01-668.

The northern section of the walkway (approx. CH490m to CH650m on drawing AB404) follows the alignment of a pre-existing farm track. Construction of this section required only minor earthworks to level the existing track and to install stormwater drainage. Stormwater from the drains is directed to a series of culverts beneath the path and then piped to disposal points below any steep slopes.

The middle walkway section (approx. CH490m to CH300m on drawing AB404) was formed across the foot of a steep slope and does not follow a pre-existing alignment. The width of the track on this section has therefore been reduced to 0.75m to minimise excavations into the slope which may otherwise lead to instability. As shown on drawing 668 (detail B) the path has been graded so that stormwater 'sheet-flows' off the track and is not concentrated on the slope below.

The southern walkway section (CH0 to CH300 on drawing AB404) follows a natural, gently sloping bench or terrace approximately mid-way up the western slope. This portion of the walkway required only minor earthworks to create a level surface with minimal excavation into the slope.

8.2. Pond 2

The completed structure for Pond 2 is shown on HGCL drawings 135952-AB401 to –AB403 and –AB411 in Appendix G. The southern and eastern pond embankments were constructed from non-structural filling placed during the main Stage 3I earthworks. The northern end of the pond was excavated into natural soils. The western pond embankment was formed from engineered fill.

The original pond design include a clay core along the embankment length. Testing and observations by Coffey however indicated that the general fill materials used were placed and compacted to achieve an acceptably low permeability for the pond design. The clay core was therefore not installed.

Settlements below the western embankment were monitored at three locations for a period of six months from April to October 2016. The monitoring points are shown as SM12 to SM14 on Figure 4 and the surveyed data for these points are presented in Appendix F. The results show the embankment did not settle significantly over the survey period. Future long-term settlements below the pond embankment are also expected to be minimal.

8.3. Noise Fence

A timber noise-fence has been constructed along the boundaries of Lots 577 to 588 and the adjacent highway. This fence was designed by others. It is understood that the as-built drawings and completion documents will be provided by Harrison Grierson.

The fence has been designed and built with a 50mm to 100mm gap at ground level to avoid collecting or concentrating stormwater from the batter below the highway. Future owners will need to maintain this gap.

8.4. Lot 588

As well as the noise-fence, an approximately 3m high timber pole retaining wall has been constructed around the western and northern boundaries of Lot 588. This wall was designed by Coffey. The design calculations included a 12kPa surcharge to account for future development or vehicle loads on this site.

Coffey has undertaken observations and testing during the construction of the retaining wall. A separate construction report and producer statement (PS4 – Construction) will be provided in due course to be added to the property file.

9. Variable Ground Conditions

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. 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.

10. Re-Subdivision

Per the Section DS-10.12 of the TCC IDC, any re-subdivision or infill subdivision of the lots described in this report will need to be reviewed by a TCC Category 1 Geo-Professional prior to the resource consent application.

11. Conclusion

Based on the observations and investigations presented in this report and with reliance on the diligence of the earthworks contractors, it is concluded that the earthworks and subdivision of Stage 3I of the Lakes development has been completed in general accordance with previous recommendations, NZS 4431 and the Tauranga City Council Infrastructure Development Code.

12. 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

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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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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

N

Eastern Slope

Eastern Slope

Eastern Slope

PYES PA ROAD

ROW 3

TAKITIMU DRIVE (SH36)

Spur Ridge

Western Slope

COLLECTOR ROAD

LEGEND

Extent of Stage 3I earthworks observed by Coffey

Notes:
1. Contour information provided by Harrison Grierson Consultans Ltd. Contours are to Moturiki Datum, 1953.
2. Lot boundaries provided by Harrison Grierson Consultants Ltd, received 25/10/2017.

revision	rev	description	drawn	approved	date
	A	**Final**	**RBT**	**DAS**	**14/12/2017**
	0	**Draft**	**RBT**		**7/12/2017**

0 30.0 60.0 90.0 120.0
Horizontal Scale (metres)

0 30.0 60.0 90.0 120.0
Vertical Scale (metres)

drawn	
approved	
date	
scale	**1:2000**
original size	**A3**

coffey
A TETRA TECH COMPANY

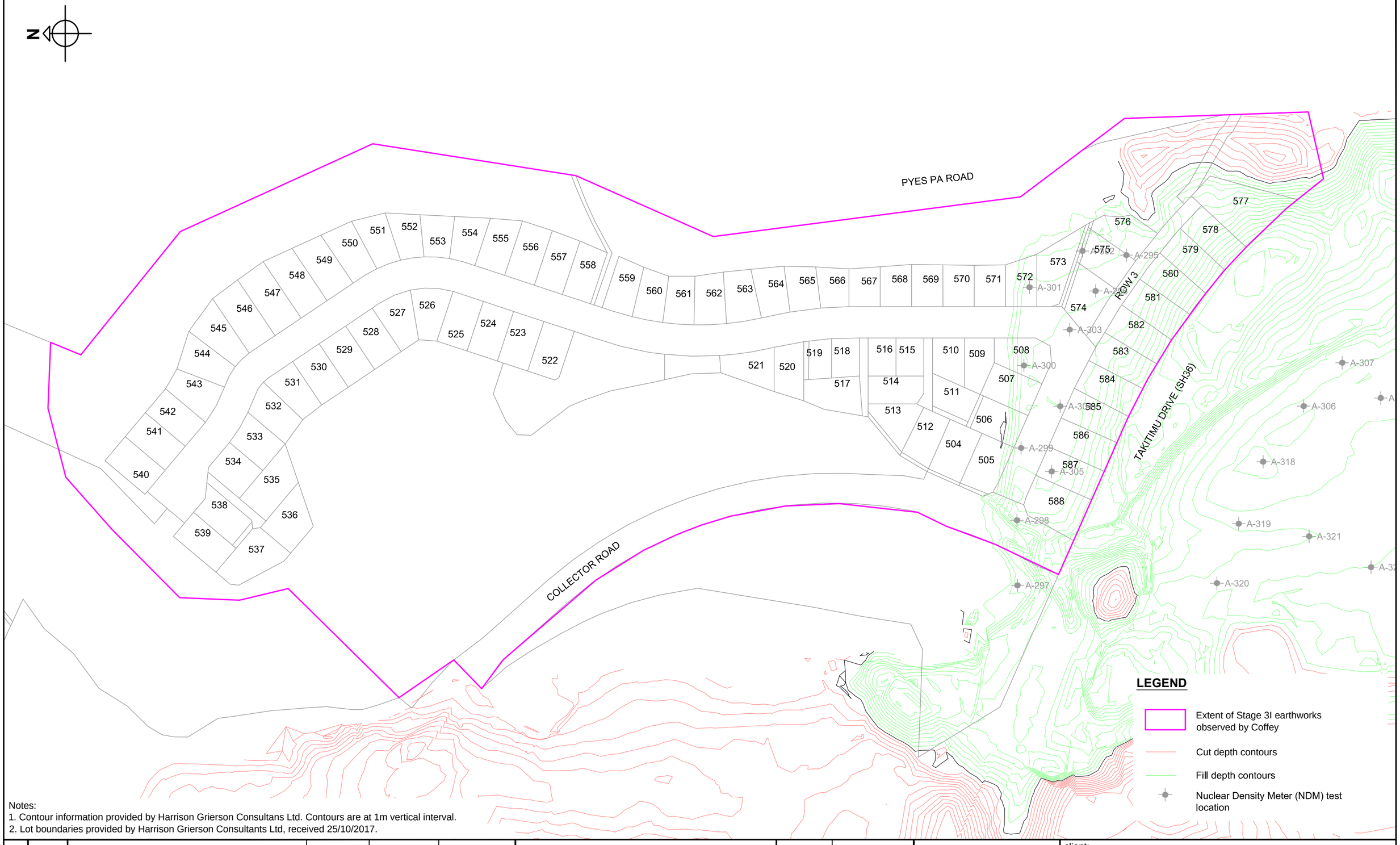
client: **The Lakes (2012) Ltd**

project: **The Lakes Subdivision Stage 3I Earthworks Completion Report**

title: **Original (2007) Contours**

project no: **GENZTAUC13086AP-AM** figure no: **1** rev: **A**

7/12/2017F:\1.GENZ\1.GEOTECHNICS PROJECTS\13086AP THE LAKES STAGE 3 GCRS\6. DRAWINGS\CGL DRAWINGS\WORKING\STAGE 3I GCR\13086AP SITE PLANS FOR STAGE 3I GCR (DRAFT) 17.02.14.DWG



Notes:
1. Contour information provided by Harrison Grierson Consultans Ltd. Contours are at 1m vertical interval.
2. Lot boundaries provided by Harrison Grierson Consultants Ltd, received 25/10/2017.

revision	rev	description	drawn	approved	date
	A	Final	RBT	DAS	14/12/2017
	0	Draft	RBT		7/12/2017

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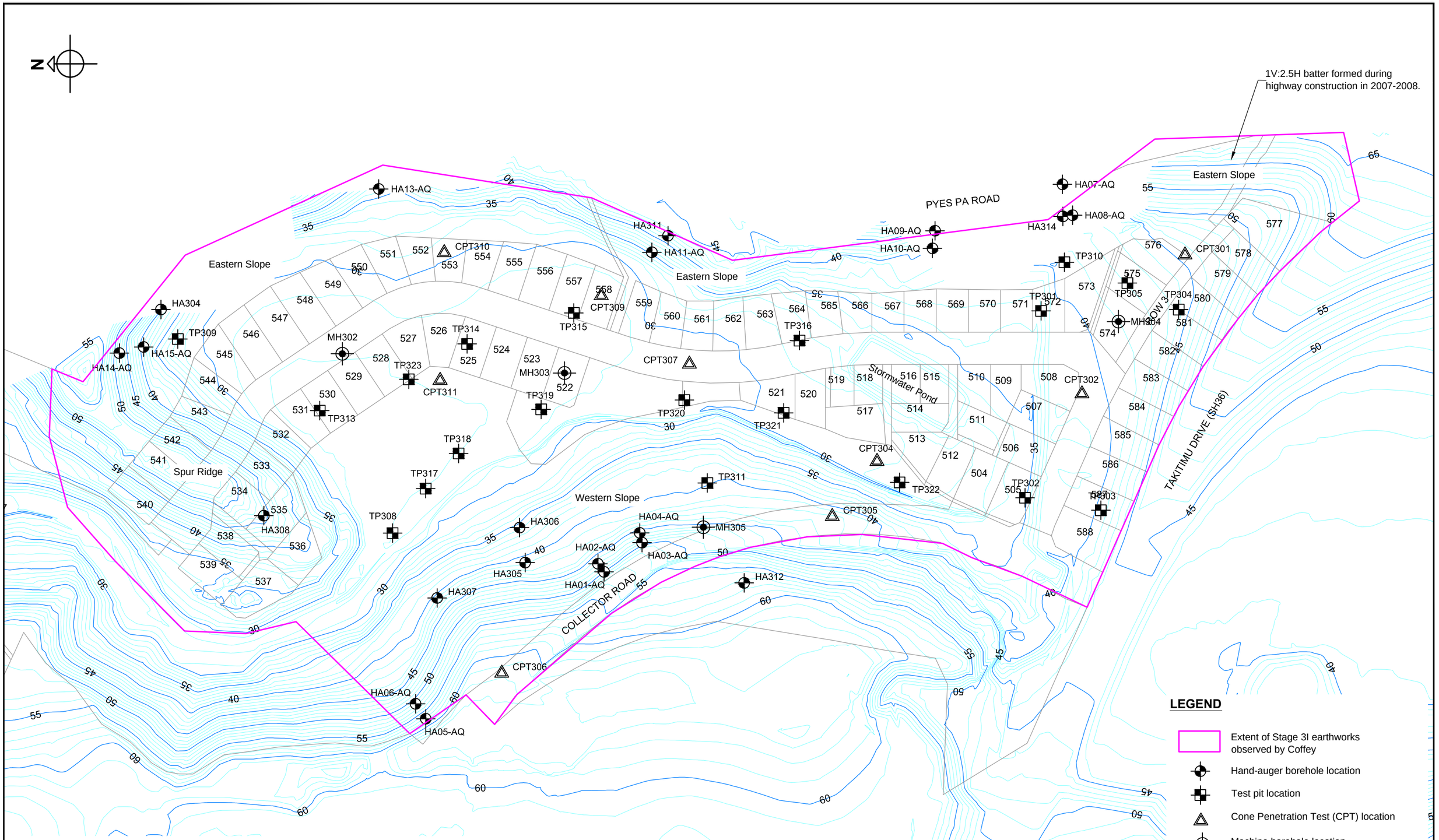
Horizontal Scale (metres)
0 30.0 60.0 90.0 120.0
Vertical Scale (metres)

drawn	
approved	
date	
scale	1:2000
original size	A3

coffey
A TETRA TECH COMPANY

client:	The Lakes (2012) Ltd
project:	The Lakes Subdivision Stage 3I Earthworks Completion Report
title:	2007 - 2010 Earthworks
project no:	GENZTAUC13086AP-AM
figure no:	2
rev:	A

7/12/2017F:\1.GENZ\1.GEOTECHNICS PROJECTS\13086AP THE LAKES STAGE 3 GCRS\6. DRAWINGS\CGL DRAWINGS\WORKING\STAGE 3I GCR\13086AP SITE PLANS FOR STAGE 3I GCR (DRAFT) 17.02.14.DWG



Notes:
1. 2010 contour information provided by Harrison Grierson Consultans Ltd. Contours are to Moturiki Datum, 1953.
2. Lot boundaries provided by Harrison Grierson Consultants Ltd, received 25/10/2017.

revision	rev	description	drawn	approved	date
	A	Final	RBT	DAS	14/12/2017
	0	Draft	RBT		7/12/2017

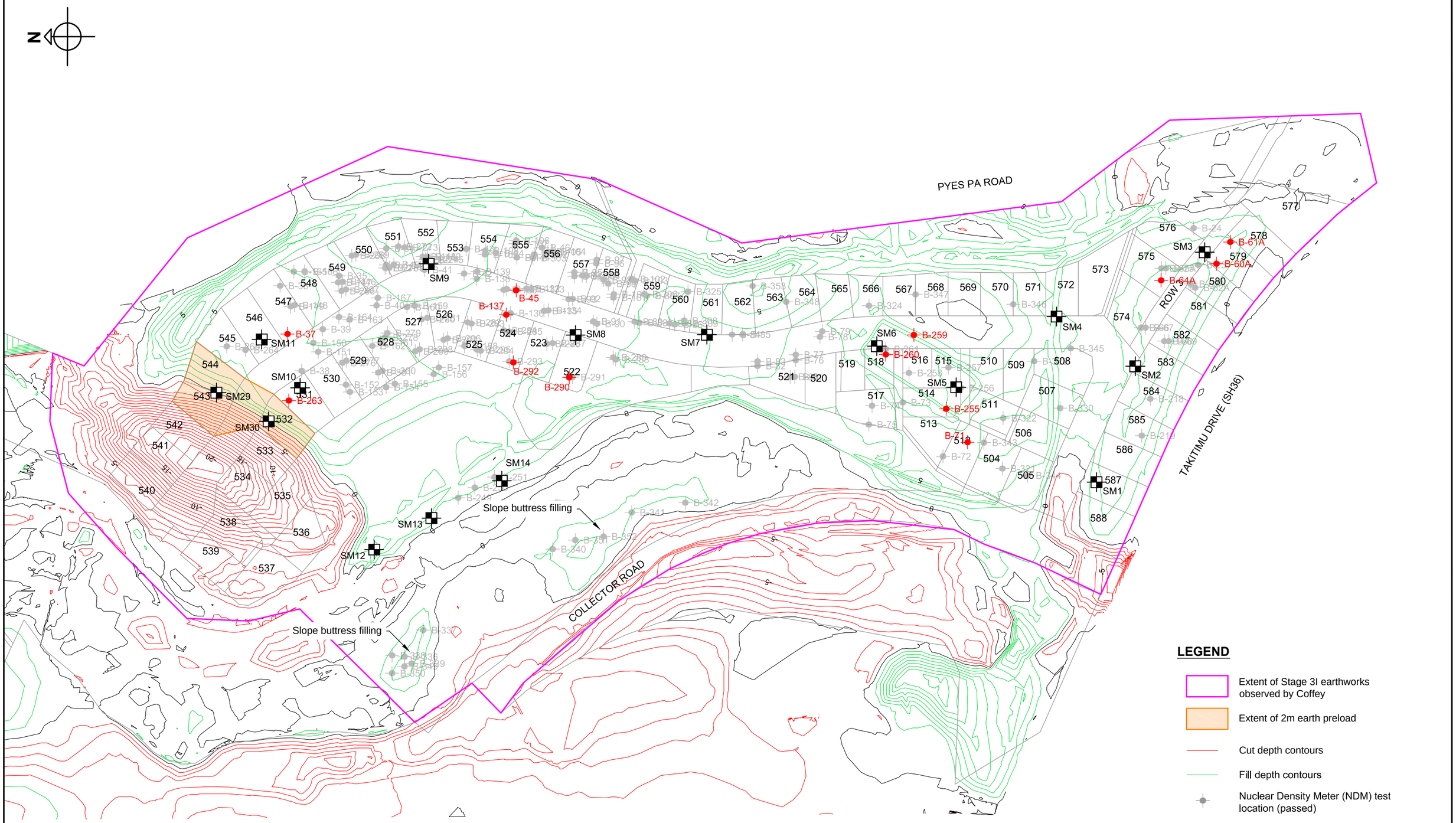
0 30.0 60.0 90.0 120.0
Horizontal Scale (metres)
0 30.0 60.0 90.0 120.0
Vertical Scale (metres)

drawn	RBT
approved	
date	
scale	1:2000
original size	A3

coffey
A TETRA TECH COMPANY

client:	The Lakes (2012) Ltd
project:	The Lakes Subdivision Stage 3I Earthworks Completion Report
title:	2010 Contours
project no:	GENZTAUC13086AP-AM
figure no:	3
rev:	A

7/12/2017F:\1.GENZ\1.GEOTECHNICS PROJECTS\13086AP THE LAKES STAGE 3 GCRS\6. DRAWINGS\CGL DRAWINGS\WORKING\STAGE 3I GCR\13086AP SITE PLANS FOR STAGE 3I GCR (DRAFT) 17.02.14.DWG



LEGEND

- Extent of Stage 3I earthworks observed by Coffey
- Extent of 2m earth preload
- Cut depth contours
- Fill depth contours
- Nuclear Density Meter (NDM) test location (passed)
- Nuclear Density Meter (NDM) test location (failed)

Notes:
1. Contour information provided by Harrison Grierson Consultans Ltd. Contours are at 1m vertical interval.
2. Lot boundaries provided by Harrison Grierson Consultants Ltd, received 25/10/2017.

revision	description	drawn	approved	date
A	Final	RBT	DAS	14/12/2017
0	Draft	RBT		7/12/2017

0 30.0 60.0 90.0 120.0
Horizontal Scale (metres)
0 30.0 60.0 90.0 120.0
Vertical Scale (metres)

drawn	
approved	
date	
scale	1:2000
original size	A3

coffey
A TETRA TECH COMPANY

client:	The Lakes (2012) Ltd
project:	The Lakes Subdivision Stage 3I Earthworks Completion Report
title:	2010 - 2017 Earthworks
project no:	GENZTAUC13086AP-AM
figure no:	4
rev:	A

7/12/2017F:\1.GENZ\1.GEOTECHNICS PROJECTS\13086AP THE LAKES STAGE 3 GCRS\6. DRAWINGS\CGL DRAWINGS\WORKING\STAGE 3I GCR\13086AP SITE PLANS FOR STAGE 3I GCR (DRAFT) 17.02.14.DWG

N

1V:2.5H batter formed during highway construction in 2007-2008.

1V:2.5H batters and intermediate bench formed during earthworks in 2014-2015.

Eastern Slope

Eastern Slope

PYES PA ROAD

Eastern Slope

ROW 2

TAKITIMU DRIVE (SH36)

Pond 2

Western Slope

COLLECTOR ROAD

Building Restriction Line

LEGEND

- Extent of Stage 3I earthworks observed by Coffey
- Eastern slope debris bund (approx. only - has not been surveyed)
- Hand-auger borehole location

Notes:
1. 2017 contour information provided by Harrison Grierson Consultans Ltd. Contours are to Moturiki Datum, 1953.
2. Lot boundaries provided by Harrison Grierson Consultants Ltd, received 25/10/2017.

revision	rev	description	drawn	approved	date
	A	Final	RBT	DAS	14/12/2017
	0	Draft	RBT		7/12/2017

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Horizontal Scale (metres)

0 30.0 60.0 90.0 120.0
Vertical Scale (metres)

drawn	ODS
approved	
date	21/11/2017
scale	1:2000
original size	A3

coffey
A TETRA TECH COMPANY

client: **The Lakes (2012) Ltd**

project: **The Lakes Subdivision Stage 3I Geotechnical Completion Report**

title: **2017 Contour Plan**

project no: **GENZTAUC13086AP-AM** figure no: **5** rev: **A**

7/12/2017F:\1.GENZ\1.GEOTECHNICS PROJECTS\13086AP THE LAKES STAGE 3 GCRS\6. DRAWINGS\CGL DRAWINGS\WORKING\STAGE 3I GCR\13086AP SITE PLANS FOR STAGE 3I GCR (DRAFT) 17.02.14.DWG

Appendix B - Geotechnical Suitability Statement & Geotechnical Data Summary Table

CERTIFICATION **G2**

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

NAME OF SUBDIVISION	
COUNCIL FILE NUMBER RC No:	
ENGINEER RESPONSIBLE FOR DEVELOPMENT:	
QUALIFICATIONS:	

I Rob Telford (Full Name) of Coffey Services (NZ) Ltd (Name & Address of Firm)

Hereby confirm that;

1. I am a professional person, appropriately qualified with experience in geotechnical engineering 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 my development evaluation report dated: 7 April 2014

3. In my professional opinion, not to be construed as a guarantee, I consider that;

a) ~~Every part~~ the area shown in my report dated 19/1/2018 of each new allotment is suitable for the erection thereon of the building types appropriate to the zoning of the land, provided that: refer to Geotechnical Completion Report ref: 773-TR66E13086AP-AM dated 19/1/2018

b) The earth fills shown on the attached Plan No. Fig. 1 to 5 have been placed in 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 not requiring specific design in terms of NZS 3604: 2011 and related documents provided that:~~ Refer to Geotechnical Completion Report dated 19/1/2018

e) ~~The original ground not affected by filling is suitable for the erection thereon of residential buildings not requiring specific design in terms of NZS 3604: 2011 and related documents provided that:~~ Refer to Geotechnical Completion Report dated 19/1/2018

4. This professional opinion is furnished to the Council and the owner for their purpose 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 R Telford Date 19/1/2018

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										
504	657	DCP	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.
505	643	DCP	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
506	600	157 – UTP	Y	5	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
507	600	157 – UTP	Y	6	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
508	637	143 – UTP	Y	6	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
509	461	141 – UTP	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
510	450	147 – UTP	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
511	512	UTP	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
512	551	179	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
513	552	179 - 213	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
514	500	213	Y	4	Y	N	-	Y	N	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										
515	350	158 – 196	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.
516	350	157 - >247	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
517	807	179 - >247	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
518	356	153 – 179	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
519	358	153 – UTP	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
520	507	179 – UTP	Y	2	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
521	533	147 - >247	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
522	548	>213 – UTP	Y	3	Y	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	Specifically designed foundations per Section 7.6.1 of Coffey GCR ref: GENZTAUC13086AP-AM. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.
523	550	>213 – UTP	Y	3	Y	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
524	550	140 – >213	Y	3	Y	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
525	548	>213	Y	3	Y	N	-	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										
526	530	>213 - >247	Y	3	Y	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	Specifically designed foundations per Section 7.6.1 of Coffey GCR ref: GENZTAUC13086AP-AM. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.
527	540	215 - >247	Y	4	Y	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
528	549	143 - >224	Y	4	Y	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
529	550	143 - 247	Y	4	Y	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
530	550	199 - >247	Y	4	Y	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
531	524	>213 - >247	Y	4	Y	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
532	545	179 - >247	Y	4	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
533	517	143 – 179 & DCP	Y	>2	N	Y	15	N	Y	N	N	N	Y	N	N	N	N	Y	
534	523	DCP	Y	>2	N	Y	19	Y	N	N	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.

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										
535	699	DCP	Y	>2	N	Y	13	N	Y	N	N	N	Y	N	N	N	N	Y	Specifically designed foundations per Section 7.6.1 of Coffey GCR ref: GENZTAUC13086AP-AM. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.
536	618	193 & DCP	Y	>2	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	
537	739	150 & DCP	Y	>2	N	Y	4	Y	N	Y	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM. Development subject to BRL restrictions per Section 7.3.3 of Coffey GCR ref: GENZTAUC13086AP-AM.
538	590	150 & DCP	Y	>2	N	Y	17	Y	N	N	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.

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										
539	576	DCP	Y	>2	N	Y	4	Y	N	N	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.
540	540	DCP	Y	>2	N	Y	12	Y	N	N	N	N	Y	N	N	N	N	Y	
541	540	DCP	Y	>2	N	Y	20	Y	N	N	N	N	Y	N	N	N	N	Y	
542	540	>213 - >247 & DCP	Y	1	N	Y	20	Y	N	N	N	N	Y	N	N	N	N	Y	
543	543	>213 - >247	Y	>2	N	Y	13	Y	N	N	N	N	Y	N	N	N	N	Y	
544	543	196 - >213 & DCP	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
545	592	>213 & DCP	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
546	686	161 - >213 & DCP	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
547	699	UTP & DCP	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
548	677	>247 – UTP & DCP	Y	4	Y	N	-	Y	N	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										
549	623	>247 – UTP	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.
550	558	161 – UTP	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
551	500	161 - >247	Y	2	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
552	427	>213 - >247	Y	2	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
553	412	>213 - >247	Y	2	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
554	455	>213 – UTP	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
555	551	>247 – UTP	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
556	593	179 - >247	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
557	556	179 – UTP	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
558	536	213 – UTP	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
559	506	162 - UTP	Y	3	Y	N	-	Y	N	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										
560	461	>215 – UTP	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.
561	452	192 – 231	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
562	507	165 - >247	Y	5	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
563	529	164 – UTP	Y	6	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
564	493	>213 - UTP	Y	5	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
565	451	140 - >247	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
566	401	140 – UTP	Y	2	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
567	400	224 – UTP	Y	1	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
568	424	UTP	Y	1	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
569	434	>213 – UTP & DCP	Y	1	Y	N	-	Y	N	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										
570	429	175 & DCP	Y	2	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.
571	429	175 - >213 & DCP	Y	3	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
572	486	198 - UTP & DCP	Y	5	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
573	800	198 – UTP	Y	4	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
574	681	>247 - UTP	Y	7	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
575	607	196 - UTP	Y	6	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
576	572	209 - >247	Y	6	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
577	1208	144 - UTP	Y	15	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.

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										
578	630	144 - >213	Y	16	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.
579	622	125 - >213	Y	15	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
580	598	125 - >213	Y	15	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
581	630	161 – 231	Y	15	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
582	610	161 - >247	Y	13	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
583	610	196 - >247	Y	12	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
584	629	122 - 196	Y	11	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
585	612	83 - >247	Y	12	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
586	630	83 – UTP	Y	11	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	
587	630	>182 - 222	Y	10	Y	N	-	Y	N	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										
588	830	107 - >182	Y	10	Y	N	-	Y	N	N	N	N	Y	N	N	N	N	Y	Suitable for standard foundations designed in accordance with NZS 3604 or 'waffle-slab' type foundations, for a geotechnical ultimate bearing capacity of 300kPa. Additional geotechnical review required if excavation depth >1.5m, per Section 7.5 of Coffey GCR ref: GENZTAUC13086AP-AM.

Key:

DCP – Dynamic Cone Penetration Test

UTP – Unable To Penetrate

Appendix C - Pre Development Investigation Data

Engineering Log - Machine Borehole

Machine Borehole No. **MH302**

Sheet 1 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **14.1.2014**

Principal:

Date completed: **14.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **South of Spur Ridge**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 369029.196 m | Slope: -90° | R.L. Surface: 28 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799744.166 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance									rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
TS	TT	C			27.5	0.5		OL	Organic SILT, no plasticity, black-brown, organic odor, rootlets.	M	VS							
ALLUVIAL DEPOSITS								ML	Sandy SILT, no plasticity, grey, orange streaks, strong organic odor, rootlets; sand is fine grained.						87			
					27.0	1.0			- becoming brown-grey, decreasing sand content									
					26.5	1.5												
				SPT 3,3,2 N*=5				SM	Silty SAND, fine to medium grained, grey, sub-angular, black specks, sensitive.	W	L							
					26.0	2.0			- becoming white-grey						80			
					25.5	2.5			- increasing silt content									
					25.0	3.0												
				SPT 0,1,0 N*=1				ML	SILT, low plasticity, grey-white, black specks, occasional orange staining, sensitive; minor fine sand.		S							
					24.5	3.5												
								SM	Silty SAND, fine to medium grained, pale grey, black specks.						100			
					24.0	4.0		ML	SILT, low plasticity, grey-white, minor black specks.	M-W								
					23.5	4.5			- increasing sand content									
			▼ 14/01/2014	SPT 0,0,0 N*=0				ML	Sandy SILT, no plasticity, mottled green-grey, organic odor; sand is fine grained.						100			
					23.0	5.0												
					22.5	5.5												

method
- AD auger drilling
- OB open barrel
- TT triple tube
- W washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- ▼ 10/1/98 water level on date shown
- ► water inflow
- ◁ partial drill fluid loss
- ◄ complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

Engineering Log - Machine Borehole

Machine Borehole No. **MH302**

Client:	*THE LAKES LTD (2012)*	Project No:	*GENZTAUC13086AK*
		Date started:	*14.1.2014*
Principal:		Date completed:	*14.1.2014*
Project:	*STAGE 3 - ZONE 2*	Logged by:	*KMJ*
Machine Borehole Location:	*South of Spur Ridge*	Checked by:	*RBT*

Drill model & mounting: T2 Tractor Mount | Easting: 369029.196 m | Slope: -90° | R.L. Surface: 28 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799744.166 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

Stratigraphy: **ALLUVIAL DEPOSITS** | method: TT | support: C

notes samples, tests, etc	RL	depth metres	classification symbol	Material Description	moisture condition	consistency/ density index	recovery %
			ML (cont)	Sandy SILT, no plasticity, mottled green-grey, organic odor; sand is fine grained. *(continued)* - increasing sand content - becoming green-grey	M-W	S	100
	22.0	6.0	SM	Silty SAND, fine to coarse grained, black & pink mottles, with some fine blue-grey gravel.	W	VL-L	
SPT 1,3,2 N*=5	21.5	6.5					80
	21.0	7.0		- increasing silt content			
SPT 2,2,2 N*=4	20.5	7.5					
	20.0	8.0		- occasional coarse gravel			80
	19.5	8.5	ML	Silty SAND/Sandy SILT, no plasticity, pink-grey; sand is fine grained; sensitive.	M-W	VS	
SPT 2,3,4 N*=7	19.0	9.0	SM	Silty SAND, fine to medium grained, blue-grey, orange mottles, white inclusion; with minor medium to coarse gravel.	W	L	
	18.5	9.5					67
	18.0	10.0		- yellow staining			
SPT 2,4,7 N*=11	17.5	10.5	ML	Sandy SILT, no plasticity, pale grey, occasional yellow staining; sand is very fine grained. - mottled orange		S	67
	17.0	11.0					

method: AD auger drilling; OB open barrel; TT triple tube; W washbore
support: N nil; C casing
vane shear (kPa): ● remoulded; × peak; >>× peak greater than 200kPa; UTP unable to penetrate

classification symbols and soil description based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests: U_{50} undisturbed sample 50mm diameter; U_{63} undisturbed sample 63mm diameter; D disturbed sample; N* SPT - sample recovered; Nc SPT with solid cone; Bs bulk sample; E environmental sample

water: 10/1/98 water level on date shown; water inflow; partial drill fluid loss; complete drill fluid loss

moisture: D dry; M moist; W wet; S saturated

consistency/ density index: VS very soft; S soft; F firm; St stiff; VSt very stiff; H hard; VL very loose; L loose; MD medium dense; D dense; VD very dense

weathering: UW unweathered; SW slightly weathered; MW moderately weathered; HW highly weathered; CW completely weathered; RS residual soil

rock mass strength: EW extremely weak; VW very weak; W weak; MS moderately strong; S strong; VS very strong; ES extremely strong

Engineering Log - Machine Borehole

Machine Borehole No. **MH302**

Sheet 3 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **14.1.2014**

Principal:

Date completed: **14.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **South of Spur Ridge**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 369029.196 m | Slope: -90° | R.L. Surface: 28 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799744.166 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance										rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
ALLUVIAL DEPOSITS	TT	C			16.5	11.5		ML (cont)	Sandy SILT, no plasticity, pale grey, occasional yellow staining; sand is very fine grained. *(continued)*	W	S								
									- decreasing sand content										
				SPT 8,12,18 N*=30	16.0	12.0													
					15.5	12.5		ML	SILT, no plasticity, pale grey, some pale orange staining.	M-W									
															87				
					15.0	13.0													
					14.5	13.5		SW	SAND, fine to coarse grained, sub-angular, mottled white & grey & black & orange.	W	VD								
				SPT 18,28,22=35mm N*=R	14.0	14.0		ML	SILT, no plasticity, pale grey, some fine sand.		S								
									- yellow staining										
								GW	- increasing sand content						93				
					13.5	14.5			Gravel, fine to coarse grained, mottled grey & white, orange staining, angular to sub-angular, with some silt.										
								ML		M	S								
					13.0	15.0			SILT, non to low plasticity, grey-brown, black specks, orange-brown mottles; with some very fine sand.										
				SPT 5,7,12 N*=19															
					12.5	15.5			- becoming yellow-brown, mixed with fine grained, sub-angular gravel										
									- heavy orange staining @ 15.7m						93				
					12.0	16.0													
					11.5	16.5													

method
- **AD** auger drilling
- **OB** open barrel
- **TT** triple tube
- **W** washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- **UTP** unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

coffey

Engineering Log - Machine Borehole

Machine Borehole No. **MH302**

Sheet 4 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **14.1.2014**

Principal:

Date completed: **14.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **South of Spur Ridge**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 369029.196 m | Slope: -90° | R.L. Surface: 28 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799744.166 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information | **material substance** | **rock mass defects**

stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	weathering alteration	estimated strength (EW VW W MS S VS ES)	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	recovery %	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: particular	defect description: general
ALLUVIAL DEPOSITS	TT	C		SPT 2,2,3 N*=5	11.0	17.0		ML (cont)	SILT, non to low plasticity, grey-brown, black specks, orange-brown mottles; with some very fine sand. *(continued)*	M	S								
								SM	Silty SAND, fine grained, pale grey, white specks, green staining.	W									
					10.5	17.5		ML	SILT, non to low plasticity, pale brown, with some black specks.	M-W	S								
									- orange streaks										
					10.0	18.0		SP	SAND, fine to medium grained, mottled grey & white & black.	W	MD				87				
				SPT 7,10,15 N*=25	9.5	18.5			- some silt from 18.6 to 19.95m										
					9.0	19.0									50				
					8.5	19.5													
				SPT 7,12,14 N*=26	8.0	20.0			EOBH @ 19.95m, target depth TS = TOPSOIL MH302 terminated at 19.95 metres.										
					7.5	20.5													
					7.0	21.0													
					6.5	21.5													
					6.0	22.0													

method
- AD auger drilling
- OB open barrel
- TT triple tube
- W washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

Engineering Log - Machine Borehole

Machine Borehole No. **MH303**

Sheet 1 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **13.1.2014**

Principal:

Date completed: **13.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Base of Gully**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 369014.764 m | Slope: -90° | R.L. Surface: 28 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799618.011 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance									rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength (EW VW W MS S VS ES)	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	recovery %	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
TOPSOIL	TT	C						OL	Organic SILT, no plasticity, dark grey-black, organic odor, abundant rootlets.	M	S							
								ML	- increasing sand content									
					27.5	0.5		ML	Sandy SILT, no plasticity, pale grey, orange staining, black specks, sand is fine to medium grained, trace rootlets.						93			
									- sand becoming fine grained									
					27.0	1.0		ML	Sandy SILT, no plasticity,blue-grey, organic odor; sand is fine grained.	W								
								MH	SILT, medium to high plasticity, pale grey, orange staining, rootlets, organic odor.									
					26.5	1.5		ML			S-F							
				SPT 3,2,3 N*=5					Sandy SILT/Silty SAND, no plasticity, blue-grey, organic odor; sand is fine grained, rootlets.									
					26.0	2.0									100			
ALLUVIAL DEPOSIT					25.5	2.5			- wood fragments, sample is sensitive - becoming dark grey, black inclusion									
					25.0	3.0		ML	SILT, no plasticity, blue-grey, some organic staining, organic odor, some fine sand.									
				SPT 0,1,0 N*=1														
					24.5	3.5			- becoming moist	M-W					100			
					24.0	4.0												
					23.5	4.5		ML	Sandy SILT, no plasticity, blue-grey, sand is fine to medium grained.		S							
			13/01/2014	SPT 2,2,2 N*=4														
					23.0	5.0		ML	SILT, non to low plasticity, white-grey, black specks, some green staining.						100			
					22.5	5.5												

method
- AD auger drilling
- OB open barrel
- TT triple tube
- W washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

coffey

Engineering Log - Machine Borehole

Machine Borehole No. **MH303**

Sheet 2 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **13.1.2014**

Principal:

Date completed: **13.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Base of Gully**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 369014.764 m | Slope: -90° | R.L. Surface: 28 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799618.011 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance									rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
ALLUVIAL DEPOSIT	TT	C			22.0	6.0		ML (cont)	SILT, non to low plasticity, white-grey, black specks, some green staining. *(continued)*	M-W	S					100			
								SW	SAND, fine to coarse grained, blue-grey, black inclusions, some coarse gravel. - 100mm silt layer		MD								
				SPT 3,4,6 N*=10	21.5	6.5										100			
					21.0	7.0			- increasing silt content										
								SW	Silty SAND, fine to coarse grained, angular to sub-angular, mottled grey & orange & pink & black; silt is pink-orange, low plasticity.	W-S	L-MD								
				SPT 4,4,6 N*=10	20.5	7.5										100			
					20.0	8.0													
					19.5	8.5													
					19.0	9.0													
				SPT 3,3,3 N*=6	18.5	9.5										93			
					18.0	10.0			- becoming fine to medium grained, with some fine to medium gravel										
					17.5	10.5													
				SPT 2,2,3 N=5	17.0	11.0										70			

method
- **AD** auger drilling
- **OB** open barrel
- **TT** triple tube
- **W** washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- **UTP** unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

coffey

Engineering Log - Machine Borehole

Machine Borehole No. **MH303**

Sheet 3 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **13.1.2014**

Principal:

Date completed: **13.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Base of Gully**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 369014.764 m | Slope: -90° | R.L. Surface: 28 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799618.011 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance									rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
ALLUVIAL DEPOSIT	TT	C						SW (cont)		W-S	L-MD							
								ML	Sandy SILT/Silty SAND, no plasticity, pink-grey; sand is fine to medium grained.		S-F							
					16.5	11.5			- orange staining									
								ML	Sandy SILT, no plasticity, pale grey, black specks, sensitive, sand is fine grained.	W-S	VS							
				SPT 1,1,4 N=5	16.0	12.0												
					15.5	12.5			- increasing sand content, mottled black & pink from 12.5 to 12.6m									
					15.0	13.0												
				SPT 3,5,6 N*=11	14.5	13.5			- decreasing sand content									
					14.0	14.0												
					13.5	14.5			- becoming moist to wet	M-W								
								ML	SILT, no plasticity, grey-pink, minor fine sand.									
				SPT 6,9,6 N*=15	13.0	15.0												
					12.5	15.5		GP	GRAVEL, fine grained, mixed colours of grey, black, brown, pink & white.									
								ML	SILT, no plasticity, pale grey, with some fine sand; sensitive.	S	VS							
					12.0	16.0			- some yellow-green fine sand									
								GW	GRAVEL, fine to coarse grained, yellow-brown, some silt, black staining.	M-W								
					11.5	16.5												

method
- AD auger drilling
- OB open barrel
- TT triple tube
- W washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

coffey

Engineering Log - Machine Borehole

Machine Borehole No. **MH303**

Sheet 4 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **13.1.2014**

Principal:

Date completed: **13.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Base of Gully**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 369014.764 m | Slope: -90° | R.L. Surface: 28 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799618.011 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance									rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
ALLUVIAL DEPOSIT	TT	C		SPT 8,16,24 N*=40	11.0	17.0		ML	SILT, no plasticity, pale grey, minor black staining.	M-W	VS				60			
					10.5	17.5												
					10.0	18.0												
				SPT 4,3,6 N*=9				ML	Sandy SILT, non to low plasticity, brown, black specks; sand is fine grained. - 200mm silty sand layer, sand is fine to coarse grained, mixed colours of black, orange, grey & white - becoming orange-brown/green-brown						80			
					9.5	18.5												
					9.0	19.0												
					8.5	19.5												
				SPT 4,6,7 N*=13											100			
					8.0	20.0			EOBH @ 19.95m, target depth TS = TOPSOIL MH303 terminated at 19.95 metres.									
					7.5	20.5												
					7.0	21.0												
					6.5	21.5												
					6.0	22.0												

method
- **AD** auger drilling
- **OB** open barrel
- **TT** triple tube
- **W** washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- **UTP** unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

Engineering Log - Machine Borehole

Machine Borehole No. **MH304**

Sheet 1 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **15.1.2014**

Principal:

Date completed: **15.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Central Area of Proposed Fill Area**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 369051.42 m | Slope: -90° | R.L. Surface: 41 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799314.24 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance									rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength (EW VW W MS S VS ES)	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	recovery %	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
FILL	TT	C			40.5	0.5		ML	SILT, non to low plasticity, brown, mottled pink-orange, rootlets, trace sand & black inclusions.	M	F-St							
								ML	SILT, low plasticity, pink-brown, black specks, brown mottling.		St				73			
					40.0	1.0			- becoming pink orange-brown, pink mottling									
					39.5	1.5			- white silt pocket, 20mm, with organic/manganese core in the pocket - 10mm fine sand lenses - becoming dark brown - becoming mottling dark brown & brown									
				SPT 2,3,3 N*=6	39.0	2.0			- some brown fine sand						100			
					38.5	2.5			- orange-brown with pink-white silt pockets, black specks									
					38.0	3.0			- becoming moist to wet	M-W								
				SPT 3,4,4 N*=8					- creamy pink-orange, black mottles									
					37.5	3.5												
					37.0	4.0			- becoming brown, increasing sand content						93			
									- grey-white mottles									
					36.5	4.5			- 100mm buried topsoil, no plasticity, black, organic odor	M								
ALLUVIAL DEPOSITS				SPT 1,2,2 N*=4				ML	Sandy SILT, non to low plasticity, orange-brown/yellow-brown, black specks, sand is fine grained.	W	S-F				80			
					36.0	5.0												
					35.5	5.5												

method
- AD auger drilling
- OB open barrel
- TT triple tube
- W washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

Engineering Log - Machine Borehole

Machine Borehole No. **MH304**

Sheet 2 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **15.1.2014**

Principal:

Date completed: **15.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Central Area of Proposed Fill Area**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 369051.42 m | Slope: -90° | R.L. Surface: 41 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799314.24 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance									rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
ALLUVIAL DEPOSITS	TT	C						ML (cont)	Sandy SILT, non to low plasticity, orange-brown/yellow-brown, black specks, sand is fine grained. *(continued)*	W	S-F				80			
					35.0	6.0		SM	Silty SAND, fine to medium grained, pale brown, black specks.	W-S	L-MD							
				SPT 3,4,4 N*=8	34.5	6.5									80			
					34.0	7.0			- minor fine gravel @ 7.2m									
				SPT 5,6,6 N*=12	33.5	7.5												
					33.0	8.0									87			
					32.5	8.5												
				SPT 5,5,6 N*=11	32.0	9.0												
			15/01/2014		31.5	9.5									80			
					31.0	10.0												
					30.5	10.5			- increasing silt content - becoming pink-grey									
				SPT 3,2,3 N*=5	30.0	11.0									93			

method
- AD auger drilling
- OB open barrel
- TT triple tube
- W washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

Engineering Log - Machine Borehole

Machine Borehole No. **MH304**

Sheet 3 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **15.1.2014**

Principal:

Date completed: **15.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Central Area of Proposed Fill Area**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 369051.42 m | Slope: -90° | R.L. Surface: 41 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799314.24 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance										rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
ALLUVIAL DEPOSITS	TT	C						SM (cont)	Silty SAND, fine to medium grained, pale brown, black specks. *(continued)*	W-S	L-MD								
								ML	- yellow-green sand inclusion		S-F								
					29.5	11.5			SILT, non to low plasticity, pink-grey, slight light-green staining, black specks.										
									- some sand inclusion - 50mm fine silty sand lenses, light-green										
					29.0	12.0		SM	SAND/Silty SAND, fine to medium grained, dark green-grey, mottling white & yellow & black, some silt.		MD								
				SPT 8,11,10 N*=21											93				
					28.5	12.5													
					28.0	13.0													
									- becoming fine to coarse grained, pale grey from 13.2 to 13.3m - yellow-green mottling										
					27.5	13.5			- increasing silt content, pale pink-grey										
				SPT 8,10,10 N*=20											93				
					27.0	14.0			- becoming fine to coarse grained										
					26.5	14.5													
									- increasing silt content - dark orange-brown staining										
					26.0	15.0													
				SPT 6,8,9 N*=17											67				
					25.5	15.5													
								ML	SILT, low plasticity, pale pink-grey, minor fine sand	M-W	F-St								
					25.0	16.0			- becoming orange-brown , black specks										
					24.5	16.5									93				

method
- **AD** auger drilling
- **OB** open barrel
- **TT** triple tube
- **W** washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- **UTP** unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

coffey

Engineering Log - Machine Borehole

Machine Borehole No. **MH304**

Sheet 4 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **15.1.2014**

Principal:

Date completed: **15.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Central Area of Proposed Fill Area**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 369051.42 m | Slope: -90° | R.L. Surface: 41 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799314.24 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance									rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
ALLUVIAL DEPOSITS	TT	C		SPT 5,6,6 N*=12	24.0	17.0		ML (cont)	SILT, low plasticity, pale pink-grey, minor fine sand *(continued)*	M-W	F-St							
									- fine to medium sand pocket @ 17.0m - becoming pink orange-white with orange streaks									
					23.5	17.5			- becoming pink-brown									
								SM	Silty SAND, fine to coarse grained, angular to sub-angular, mottling brown & pink & orange, trace medium gravel		MD							
					23.0	18.0			- increasing silt content									
				SPT 5,6,7 N*=13											87			
					22.5	18.5												
					22.0	19.0									60			
					21.5	19.5			- orange staining									
				SPT 9,11,15 N*=26											50			
					21.0	20.0			EOBH @ 19.95m, target depth MH304 terminated at 19.95 metres.									
					20.5	20.5												
					20.0	21.0												
					19.5	21.5												
					19.0	22.0												

method
- **AD** auger drilling
- **OB** open barrel
- **TT** triple tube
- **W** washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- **UTP** unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

Engineering Log - Machine Borehole

Machine Borehole No. **MH305**

Sheet 1 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **14.1.2014**

Principal:

Date completed: **14.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Edge of Access Track**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 368925.813 m | Slope: -90° | R.L. Surface: 46 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799541.213 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance										rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength (EW VW W MS S VS ES)	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	recovery %	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
FILL	TT	C			45.5	0.5		GP	Gravel, coarse grained, grey with light green vanes.	M-W									
								ML	Gravelly SILT, no plasticity, grey mottled orange-brown, gravel is fine to medium grained		F								
								ML	SILT, non to low plasticity, brown, interbedded with black silt vanes.										
					45.0	1.0			- becoming black-brown from 0.8 to 1.0m										
					44.5	1.5													
VOLCANIC ASHES				SPT 1,1,1 N*=2				ML	SILT, non to low plasticity, orange-brown, trace sand.		S-F				80			
					44.0	2.0			- increasing sand content - becoming grey-brown										
					43.5	2.5		ML	SILT, low plasticity, brown.										
								ML	SILT, non to low plasticity, mottled black & orange-grey, orange streaks, abundant black mottles.										
					43.0	3.0			- orange-brown staining from 2.6 to 2.7m						87				
				SPT 1,2,2 N*=4															
					42.5	3.5			- orange staining										
					42.0	4.0			- abundant dark orange-brown staining & inclusions - becoming orange-brown with black vanes & specks; some fine sand										
					41.5	4.5									100				
MATUA SUBGROUP				SPT 1,0,0 N*=0				ML	SILT, low to medium plasticity, creamy pale orange-white, black specks, some orange staining		F								
					41.0	5.0			- abundant dark orange-black inclusions from 5.0 to 5.1m - becoming yellow-white to yellow grey, black mottles, some fine sand						100				
					40.5	5.5													

method
- AD auger drilling
- OB open barrel
- TT triple tube
- W washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

Engineering Log - Machine Borehole

Machine Borehole No. **MH305**

Sheet 2 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **14.1.2014**

Principal:

Date completed: **14.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Edge of Access Track**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 368925.813 m | Slope: -90° | R.L. Surface: 46 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799541.213 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance									rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
MATUA SUBGROUP	TT	C			40.0	6.0		ML (cont)	SILT, low to medium plasticity, creamy pale orange-white, black specks, some orange staining *(continued)*	M-W	F				100			
				SPT 1,0,1 N*=1	39.5	6.5			- becoming medium to high plasticity from 6.5 to 6.7m - abundant orange fine gravel									
					39.0	7.0			- 100mm silty sand layer, dark brown - becoming orange-brown to orange-grey		S-F				100			
				SPT 0,1,2 N*=3	38.5	7.5			- 100mm silty sand layer, dark brown - becoming wet	W								
					38.0	8.0		ML	SILT/Sandy SILT, low plasticity, pink-brown, sensitive; sand is fine to medium grained, dark brown, angular to sub-angular. - interbedded silt and sandy silt from 7.9 to 8.5m		VS							
					37.5	8.5		ML	SILT, low plasticity, pink-brown/orange-brown, minor black specks, some fine sand. - heavy orange staining & abundant black inclusions		S							
				SPT 0,0,0 N*=0	37.0	9.0		ML	- 100mm dark brown, fine to medium grained sand layer	W					100			
					36.5	9.5			Sandy SILT, non to low plasticity, pink-brown/orange-brown; sand is fine to medium grained, mixed colours of black, orange & white.									
					36.0	10.0			- increasing sand content, trace fine gravel from 9.9 to 10.0m						93			
					35.5	10.5			- fine to medium black/grey sand & coarse black gravel from 10.2 to 10.3m - sand content missing from 10.3 to 10.4m - abundant black mottles		VS-S							
				SPT 0,0,0 N*=0	35.0	11.0		ML		W-S					100			

method
- **AD** auger drilling
- **OB** open barrel
- **TT** triple tube
- **W** washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- **UTP** unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

Engineering Log - Machine Borehole

Machine Borehole No. **MH305**

Sheet 3 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **14.1.2014**

Principal:

Date completed: **14.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Edge of Access Track**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 368925.813 m | Slope: -90° | R.L. Surface: 46 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799541.213 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance									rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
MATUA SUBGROUP	TT	C	14/01/2014		34.5	11.5		ML (cont)	SILT, low plasticity, pink-brown to orange-brown, black specks, sensitive; with some fine to medium sand. *(continued)*	W-S	VS-S				100			
					34.0	12.0		SM	Silty SAND, fine to medium grained, angular to sub-angular, yellow-brown, orange staining, black specks. - decreasing sand content till 12.5m		VL							
				SPT 1,1,2 N*=3	33.5	12.5			- black inclusions									
					33.0	13.0		ML	SILT, low to medium plasticity, pale pink-white to pale grey-white. - 20mm fine sand lenses		S				87			
				SPT 0,0,1 N*=1	32.5	13.5		ML	Sandy SILT, low plasticity, pale pink-grey, with green staining; sand is fine to coarse grained. - interbedded silt and sand lenses	W								
					32.0	14.0			- trace fine gravel									
								GM	Silty Gravel, fine to coarse grained, grey to blue-grey, with fine to medium grained sand, orange staining						80			
					31.5	14.5		ML	Sandy SILT/Silty SAND, no plasticity, sand is fine grained, pale grey, black specks.									
				SPT 2,2,3 N*=5	31.0	15.0		SM	Silty SAND, fine grained, grey, black specks.		VL-L				67			
TE RANGA IGNIMBRITE					30.5	15.5												
					30.0	16.0			- becoming sensitive									
					29.5	16.5												

method
- **AD** auger drilling
- **OB** open barrel
- **TT** triple tube
- **W** washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- **UTP** unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

coffey

Engineering Log - Machine Borehole

Machine Borehole No. **MH305**

Sheet 4 of 4

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **14.1.2014**

Principal:

Date completed: **14.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Machine Borehole Location: **Edge of Access Track**

Checked by: **RBT**

Drill model & mounting: T2 Tractor Mount | Easting: 368925.813 m | Slope: -90° | R.L. Surface: 46 m | Vane No:

Hole diameter: mm | Drilling fluid: | Northing: 799541.213 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information							material substance										rock mass defects			
stratigraphy	method	support	water	notes samples, tests, etc	RL	depth metres	graphic log core recovery	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name; grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.	moisture condition	consistency/ density index	weathering alteration	estimated strength EW VW W MS S VS ES	vane shear (remoulded /peak) kPa 25 50 75 100 125 150 175	recovery %	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: number, type, orientation, shape, roughness, aperture, infill description (refer to defect description explanation sheet) particular / general
TE RANGA IGNIMBRITE	TT	C		SPT 2,2,3 N*=5	29.0	17.0		SM (cont)	Silty SAND, fine grained, grey, black specks. *(continued)*	W	VL-L				100			
					28.5	17.5												
				SPT 2,2,2 N*=4	28.0	18.0												
					27.5	18.5									100			
					27.0	19.0			- decreasing sand content									
				SPT 1,0,0 N*=0	26.5	19.5		ML	SILT, low plasticity, pink-white/orange-white, yellow staining & black specks, trace fine sand.		S-F				80			
					26.0	20.0			EOBH @ 19.95m, target depth MH305 terminated at 19.95 metres.									
					25.5	20.5												
					25.0	21.0												
					24.5	21.5												
					24.0	22.0												

method
- AD auger drilling
- OB open barrel
- TT triple tube
- W washbore

support
- N nil
- C casing

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- N* SPT - sample recovered
- Nc SPT with solid cone
- Bs bulk sample
- E environmental sample

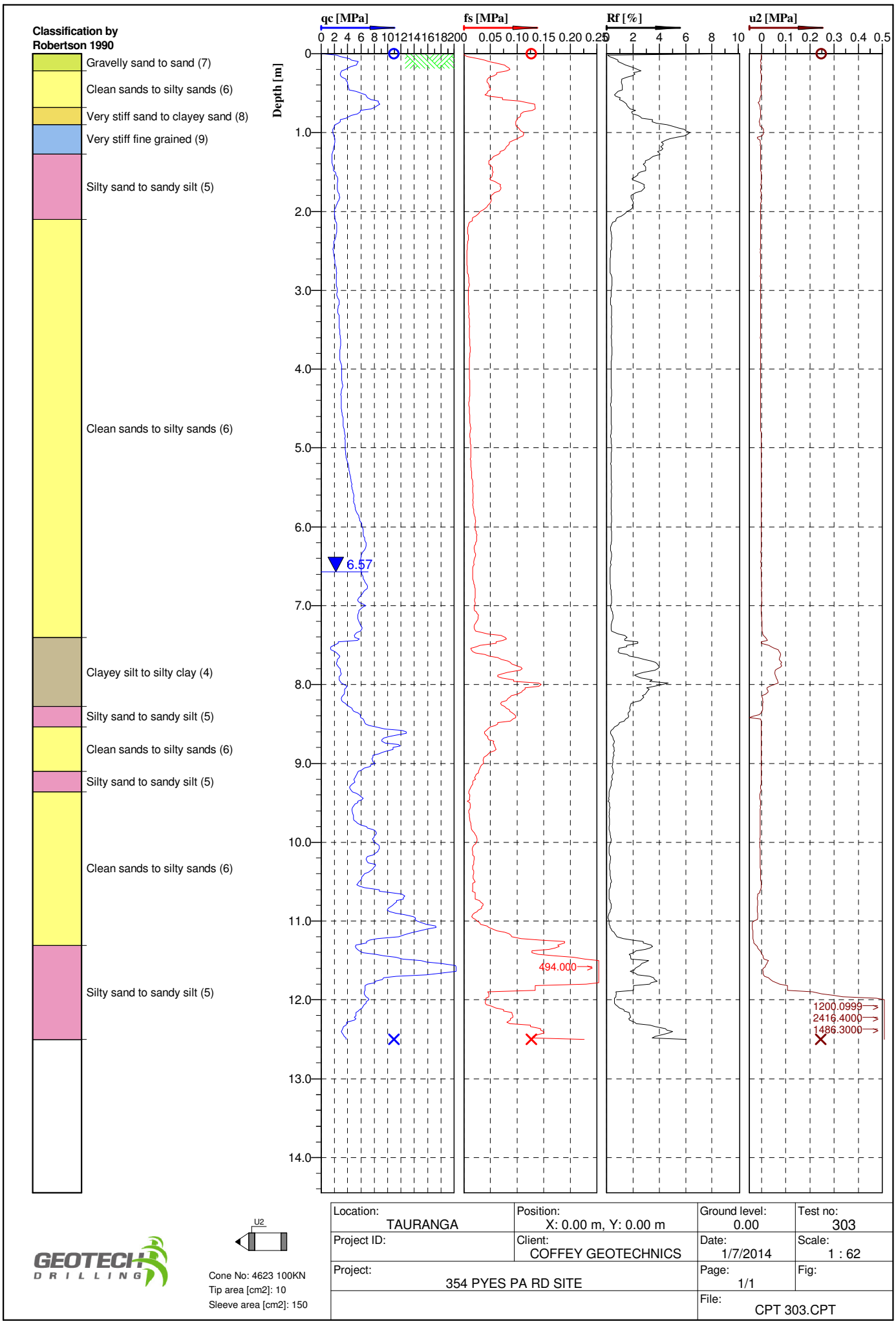
water
- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density index
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

weathering
- UW unweathered
- SW slightly weathered
- MW moderately weathered
- HW highly weathered
- CW completely weathered
- RS residual soil

rock mass strength
- EW extremely weak
- VW very weak
- W weak
- MS moderately strong
- S strong
- VS very strong
- ES extremely strong

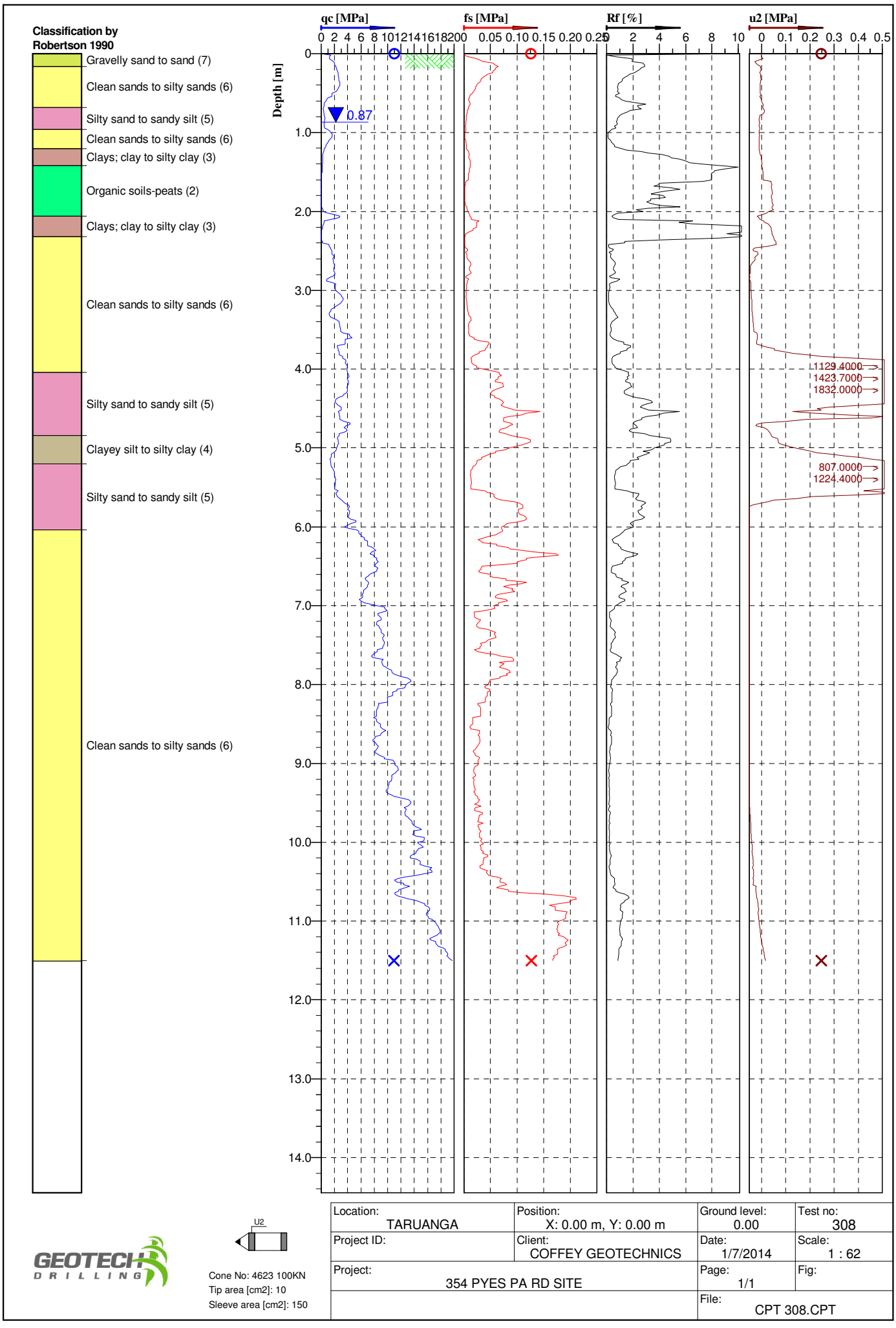


GEOTECH DRILLING

U2

Cone No: 4623 100KN
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: TAURANGA	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test no: 303
Project ID:	Client: COFFEY GEOTECHNICS	Date: 1/7/2014	Scale: 1 : 62
Project: 354 PYES PA RD SITE		Page: 1/1	Fig:
		File: CPT 303.CPT	

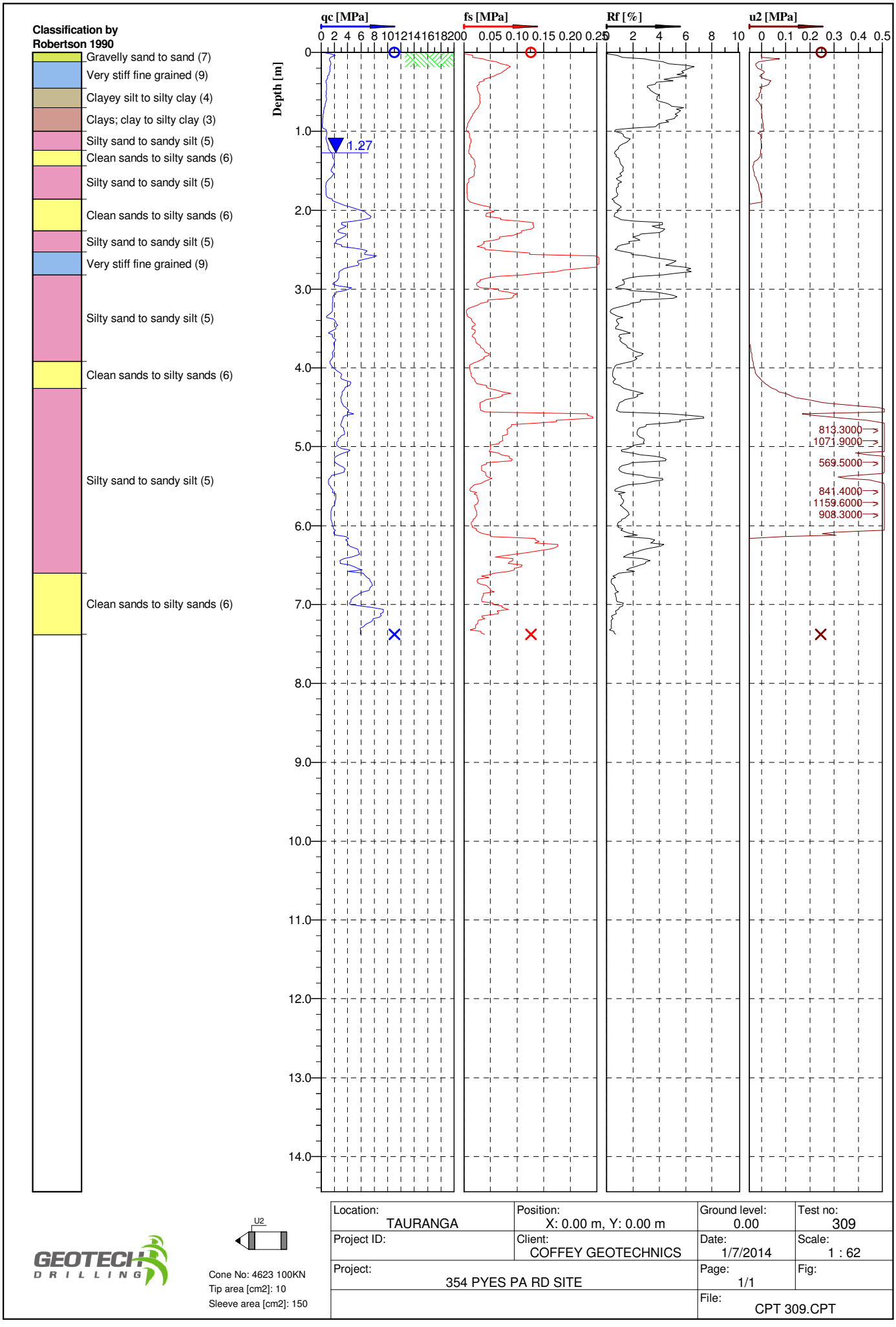


Location: TARUANGA	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test no: 308
Project ID:	Client: COFFEY GEOTECHNICS	Date: 1/7/2014	Scale: 1 : 62
Project: 354 PYES PA RD SITE		Page: 1/1	Fig:
		File: CPT 308.CPT	

GEOTECH DRILLING

U2

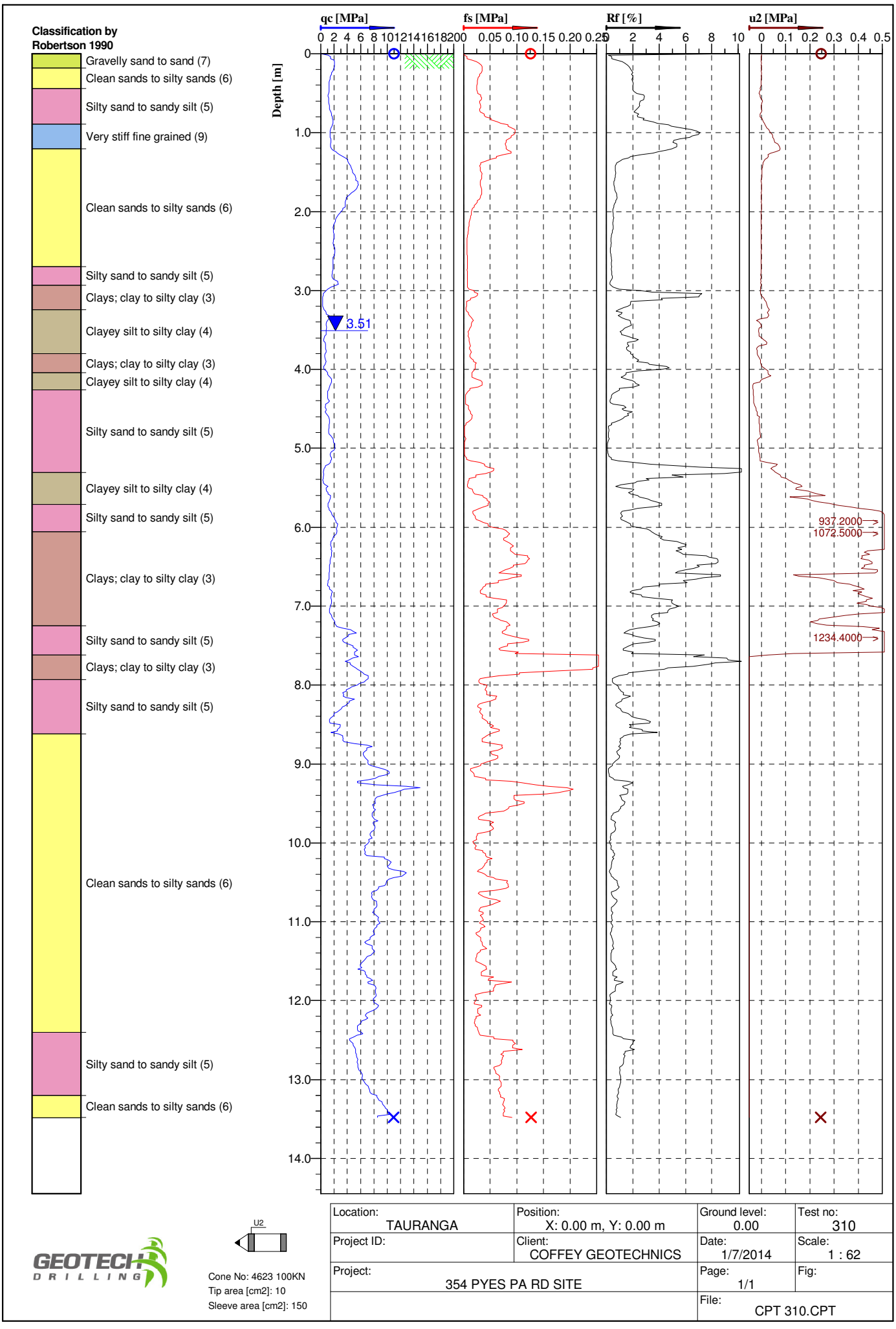
Cone No: 4623 100KN
Tip area [cm2]: 10
Sleeve area [cm2]: 150



U2

Cone No: 4623 100KN
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: TAURANGA	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test no: 309
Project ID:	Client: COFFEY GEOTECHNICS	Date: 1/7/2014	Scale: 1 : 62
Project: 354 PYES PA RD SITE		Page: 1/1	Fig:
		File: CPT 309.CPT	

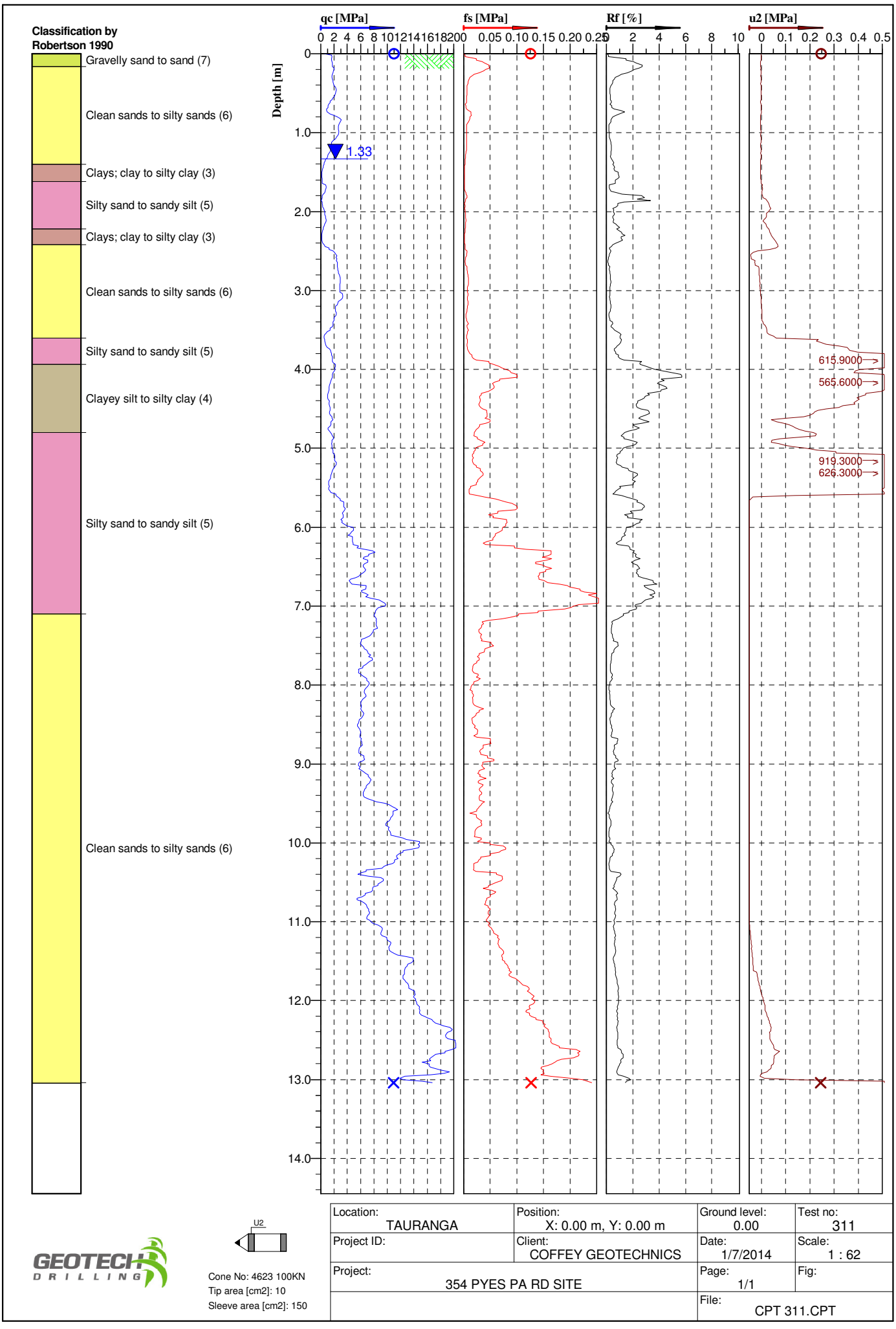


Location: TAURANGA	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test no: 310
Project ID:	Client: COFFEY GEOTECHNICS	Date: 1/7/2014	Scale: 1 : 62
Project: 354 PYES PA RD SITE		Page: 1/1	Fig:
		File: CPT 310.CPT	

GEOTECH DRILLING

U2

Cone No: 4623 100KN
Tip area [cm2]: 10
Sleeve area [cm2]: 150

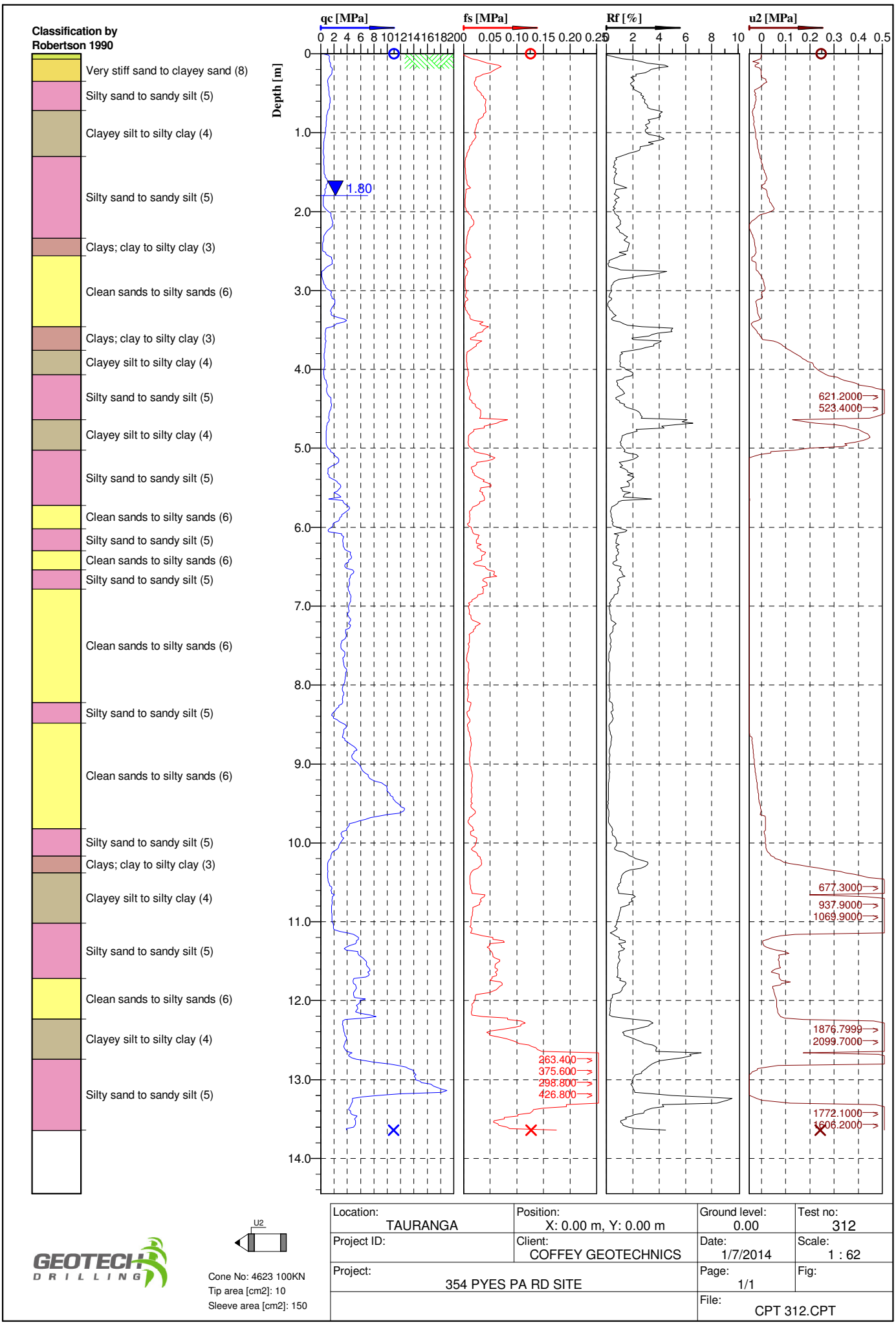


Location: TAURANGA	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test no: 311
Project ID:	Client: COFFEY GEOTECHNICS	Date: 1/7/2014	Scale: 1 : 62
Project: 354 PYES PA RD SITE		Page: 1/1	Fig:
		File: CPT 311.CPT	

GEOTECH DRILLING

U2

Cone No: 4623 100KN
Tip area [cm2]: 10
Sleeve area [cm2]: 150

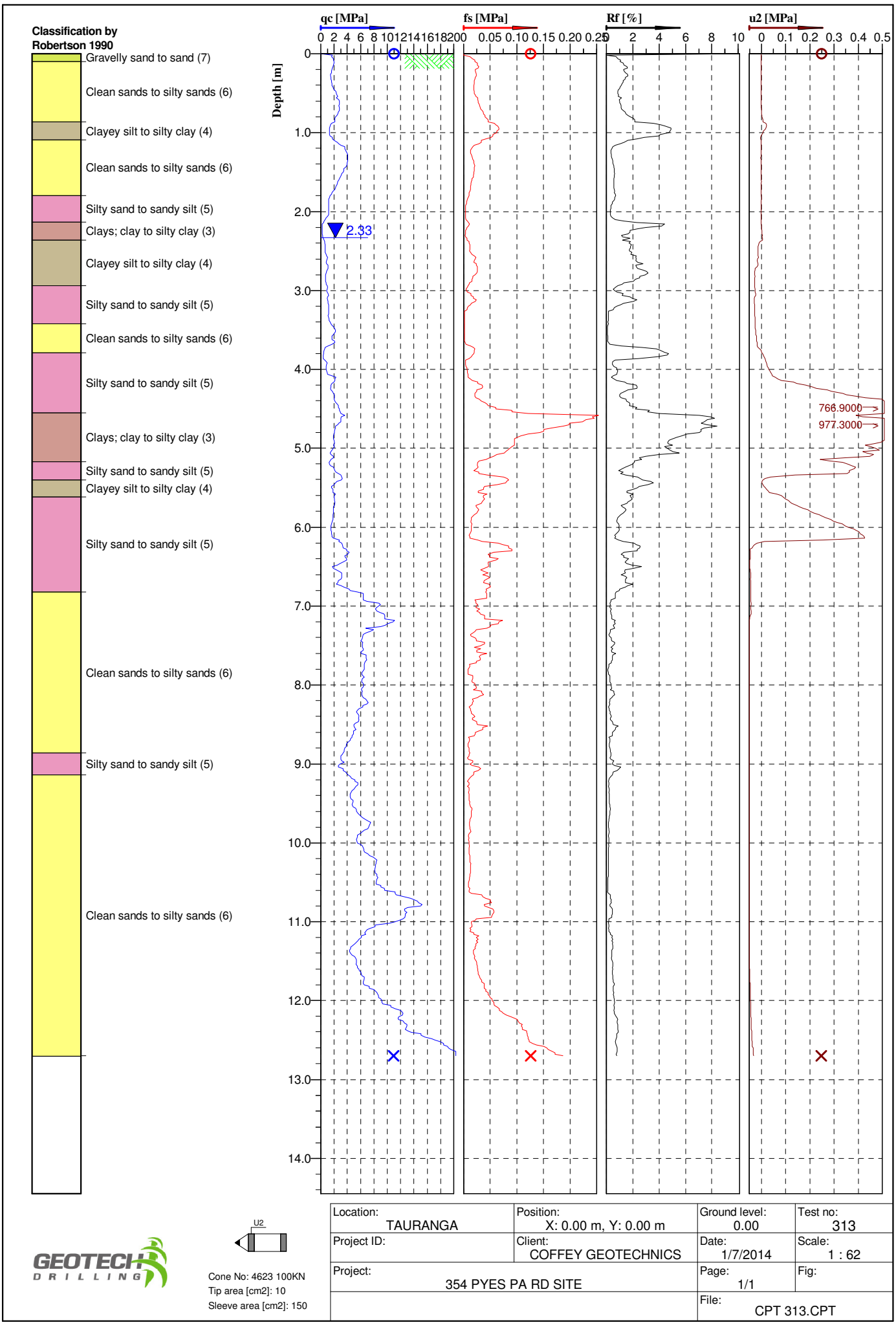


GEOTECH DRILLING

U2

Cone No: 4623 100KN
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: TAURANGA	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test no: 312
Project ID:	Client: COFFEY GEOTECHNICS	Date: 1/7/2014	Scale: 1 : 62
Project: 354 PYES PA RD SITE		Page: 1/1	Fig:
		File: CPT 312.CPT	



GEOTECH DRILLING

U2

Cone No: 4623 100KN
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: TAURANGA	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test no: 313
Project ID:	Client: COFFEY GEOTECHNICS	Date: 1/7/2014	Scale: 1 : 62
Project: 354 PYES PA RD SITE		Page: 1/1	Fig:
		File: CPT 313.CPT	

coffey

Engineering Log - Trial Pit

Trial Pit No.	**TP301**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**12.12.2013**
Principal:		Date completed:	**12.12.2013**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**GJN**
Trial pit location:	**SE of Pipe Stockpile**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: N-S | Easting: 369053.82 m | R.L. Surface: 37 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799353.69 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
FILL	groundwater not encountered		36	1		ML	Sandy SILT, no plasticity, orange mottled white,	M-W	VSt-H		
						ML	Sandy SILT, no plasticity, black; organic odor & fibre.				
						ML	Sandy SILT, no plasticity, orange,				
						ML	Sandy SILT, no plasticity, mottled pink-brown				
			35	2		SM	Silty SAND, fine to medium grained, grey		F-St		
			34	3							
AD			33	4		SP	SAND, fine to medium grained, light grey, trace silt				
			32	5			EOBH @ 4.2m, hole collapsed AD = ALLUVIAL DEPOSITS Test pit TP301 terminated at 4.2 metres.				
			31	6							

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

Engineering Log - Trial Pit

Trial Pit No.	**TP302**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**12.12.2013**
Principal:		Date completed:	**12.12.2013**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**GJN**
Trial pit location:	**NW Corner of Proposed Fill Area**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: N-S | Easting: 368949.29 m | R.L. Surface: 35 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799362.67 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	structure and additional observations
FILL			34	1		ML	Sandy SILT, no plasticity, mottled orange-white, brown.	D-M	F H		
							50mm black layer (possibly buried topsoil)				
ALLUVIAL DEPOSITS			33	2		SP	SAND, fine to medium grained, poorly graded, light brown, trace gravel.				
			32	3			becoming moist to wet becoming dark orange-white	M-W			
	▼ 12/12/2013						becoming grey, fine grained seepage				
			31	4			EOBH @ 3.8m, hole collapsed, increasing water inflow Test pit TP302 terminated at 3.8 metres.				
			30	5							
			29	6							

vane shear (remoulded /peak) kPa: 25 50 75 100 125 150 175

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

Engineering Log - Trial Pit

Trial Pit No.	***TP303***		
Sheet	1 of 1		
Project No:	***GENZTAUC13086AK***		
Client:	***THE LAKES LTD (2012)***	Date started:	***12.12.2013***
Principal:		Date completed:	***12.12.2013***
Project:	***STAGE 3 - ZONE 2***	Logged by:	***GJN***
Trial pit location:	***SW Corner of Proposed Fill Area***	Checked by:	***RBT***

Equipment type: 20t CAT | Pit Orientation: N-S | Easting: 368942.31 m | R.L. Surface: 40.5 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799320.25 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	structure and additional observations
FILL	12/12/2013 ▼		40	1		ML	Sandy SILT, no plasticity, mottled pink-brown, white.	M	VSt-H		
			39	2			- black staining				
			38				- minor water inflow				
			37	3							
			36	4							
			35	5			EOBH @ 4.8m, target depth. Test pit TP303 terminated at 4.8 metres.				
			34	6							

vane shear (remoulded /peak) kPa: 25 50 75 100 125 150 175

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

Engineering Log - Trial Pit

Trial Pit No.	**TP304**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**12.12.2013**
Principal:		Date completed:	**12.12.2013**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**GJN**
Trial pit location:	**SE Corner of Proposed Fill Area**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: N-S | Easting: 369054.59 m | R.L. Surface: 44 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799276.71 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	structure and additional observations
UNCONTROLLED FILL	12/12/2013 ▼		43	1		ML	Sandy SILT, no plasticity, orange-pink. - water inflow, 50mm sand lense	M-W	F		
			42	2							
ENGINEERED FILL						ML	Sandy SILT, no plasticity, orange-pink, with orange-black silt pocket (embankment fill). - silt pocket, orange-black, no plasticity		H		
			41	3							
			40	4							
			39	5			EOBH @ 4.8m, target depth. Test pit TP304 terminated at 4.8 metres.				
			38	6							

Vane shear (remoulded /peak) kPa: 25, 50, 75, 100, 125, 150, 175

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

Engineering Log - Trial Pit

Trial Pit No.	**TP305**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**12.12.2013**
Principal:		Date completed:	**12.12.2013**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**GJN**
Trial pit location:	**Eastern End of Proposed Fill Area**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: N-S | Easting: 369069.39 m | R.L. Surface: 42 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799305.38 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	structure and additional observations
UNCONTROLLED FILL	groundwater not encountered		41	1		ML	Sandy SILT, non plastic, liquid limit, pink orange, mottled brown.	M	VSt-H		
			40	2			- some black organic pockets				
BT						OL	Organic SILT, non plastic liquid limit, black.				
			39	3			- old telephone wire				
ALLUVIAL DEPOSITS						ML	Sandy SILT non plastic liquid limit, brown orange.		St-Vst		
			38	4							
						SM	Silty SAND, fine to medium grained, white, with cobbles & gravels of completely weathered pumice.				
			37	5							
			36	6			EOBH @ 5.2m, target depth. Test pit TP305 terminated at 5.2 metres.				

vane shear (remoulded /peak) kPa: 25 50 75 100 125 150 175

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

coffey

Engineering Log - Trial Pit

Trial Pit No. **TP308**

Sheet 1 of 1

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **10.1.2014**

Principal:

Date completed: **10.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **AP**

Trial pit location: **Base of Section C-C**

Checked by: **RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 368941.002 m | R.L. Surface: 27 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799953.274 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
ALLUVIAL DEPOSITS						OL	Sandy SILT, no plasticity, black, organic odour; sand is fine grained. (TOPSOIL)	D-M			
						SW	Silty SAND, fine to coarse, orange brown, subangular to subrounded. Dry to moist.	M-W			
	▶		26	1		PT	PEAT, moderately decomposed branches and logs, approximately 75% of soil volume. Dark brown black, strong organic odour.				Groundwater inflow at 1.5m
			25	2							
			24	3		ML	SILT some sand, non plastic, pale grey white with blue green staining.				
			23	4							Hard digging at 3.8m
			22	5		SW	SAND, some gravel, medium to coarse, blue grey. Saturated. Gravels fine to medium.				Easy digging at 4.8m
			21	6			Test pit TP308 terminated at 5.5 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		

TRIAL PIT 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

coffey

Engineering Log - Trial Pit

Trial Pit No.	**TP309**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**10.1.2014**
Principal:		Date completed:	**10.1.2014**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**AP**
Trial pit location:	**Base of Section E-E**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 369038.885 m | R.L. Surface: 35 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799836.544 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	structure and additional observations
VOLCANIC ASHES						OL	Sandy SILT, no plasticity, black, organic odour; sand is fine grained. (TOPSOIL)	D-M			
						SW	SAND, some silt, fine to coarse, orange. Dry.				
			34	1		SW	SAND, trace silt, fine to coarse, pale yellow brown. Dry to moist.				
			33	2			- Layered deposits dip parallel to slope (i.e. draped ashes)				
			32	3		SW	Sand, trace silt, fine to coarse, pale grey. Moist, pumiceous.	M			
			31	4							
			30	5			- layering with yellow medium to coarse sand with limonite staining.	M-W			Hard digging below 5.0m depth
	▶					SW	Silty SAND, fine to coarse, grey sub angular to sub rounded. Wet to saturated, pumiceous.				
			29	6			Test pit TP309 terminated at 5.8 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		

TRIAL PIT 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

coffey

Engineering Log - Trial Pit

Trial Pit No. **TP310**

Sheet 1 of 1

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **10.1.2014**

Principal:

Date completed: **10.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **GJN**

Trial pit location: **Base of Section H-H**

Checked by: **RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 369080.399 m | R.L. Surface: 40 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: | Northing: 799340.217 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
VOLCANIC ASHES	groundwater not encountered		39 38 37	1 2 3		SW	SAND with trace gravel and cobbles, fine to medium, angular to sub-angular, white. Dry to moist, pumiceous. Cobbles 60 to 80mm, pumiceous.	D-M			
			36 35 34	4 5 6			(Refusal) Test pit TP310 terminated at 3 metres.				Too hard to excavate with clearing bucket

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

coffey

Engineering Log - Trial Pit

Trial Pit No.	**TP311**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**10.1.2014**
Principal:		Date completed:	**10.1.2014**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**AP**
Trial pit location:	**Below Access Road - Section D-D**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 368956.902 m | R.L. Surface: 40 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799540.004 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	structure and additional observations
ALLUVIAL TERRACE DEPOSITS			39	1		OL	Sandy SILT, no plasticity, black, organic odour; sand is fine grained. (TOPSOIL)	D-M	F		
						ML	Sandy SILT, no plasticity, orange. Dry to moist, sensitive. Sand is fine to coarse.	M			
						ML	Sandy SILT, no plasticity, pale orange. Moist, sensitive. Sand is fine to medium.		VSt		
			38	2		SW	SAND minor silt, fine to coarse, pale orange. Moist to wet.	M-W			
VOLCANIC ASHES			37	3							
						SW	SAND, medium to coarse, pale brown white. Moist to wet.				
			36	4							
			35	5			- sand layering with pale brown fine to coarse sand.				
			34	6			(Target depth) Test pit TP311 terminated at 5.4 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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

Engineering Log - Trial Pit

Trial Pit No.	***TP312***		
Sheet	1 of 1		
Project No:	***GENZTAUC13086AK***		
Client:	***THE LAKES LTD (2012)***	Date started:	***10.1.2014***
Principal:		Date completed:	***10.1.2014***
Project:	***STAGE 3 - ZONE 2***	Logged by:	***AP***
Trial pit location:	***Base of Gully***	Checked by:	***RBT***

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 369019.722 m | R.L. Surface: 27 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799614.268 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	structure and additional observations
ALLUVIAL DEPOSITS			26	1		OL	Sandy SILT, no plasticity, black, organic odour; sand is fine grained. (TOPSOIL)	M	VSt		
						ML	Sandy SILT, low plasticity, grey. Moist, sensitive. Sand is fine to medium.				
							- increasing sand content below 0.8m depth, limonite staining.				
	▶					PT	PEAT, dark brown black, moderately decomposed logs and branches. Strong organic odour.	W-S			Groundwater seepage/inflow a 1.0m
			25	2		SW	SAND, trace silt, fine, grey, subrounder to subangular. Wet to saturated, organic inclusions (approximately 20%).				
			24	3							
	▶										Groundwater seepage/inflow a 3.1m
			23	4		ML	SILT, trace sand, non plastic, grey with blue green staining. Moist to wet.	M-W			
			22	5							Digging becoming hard
			21	6			Test pit TP312 terminated at 5.5 metres.				

vane shear scale: 25 50 75 100 125 150 175

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

Engineering Log - Trial Pit

Trial Pit No.	**TP313**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**10.1.2014**
Principal:		Date completed:	**10.1.2014**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**GJN**
Trial pit location:	**Base of Gully**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 368998.034 m | R.L. Surface: 28 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799758.139 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
ALLUVIAL DEPOSITS						OL	Sandy SILT, no plasticity, black, organic odour; sand is fine grained. (TOPSOIL)	M	F-St		
								W			
						ML	Silty SAND, fine, grey brown. Moist, minor limonite staining.				
			27	1			Sandy SILT trace gravel, non plastic, grey brown. Wet, limonite staining, rootlets (fine), gravels are pumiceous.				
			26	2							
	▶						- becoming wet to saturated at 2.5m depth.				Groundwater seepage/inflow a 2.5m
						SW	Silty SAND, trace gravel, fine to coarse, white with brown and orange staining. Saturated, gravels are fine to medium, pumiuceous.	S			
			25	3			- becomes pale yellow white at 3.0m				
			24	4							
						SW	Silty SAND, some gravel, fine to medium, blue grey. Staurated.				
			23	5			(Target depth) Test pit TP313 terminated at 4.6 metres.				
			22	6							

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

coffey

Engineering Log - Trial Pit

Trial Pit No.	**TP314**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**10.1.2014**
Principal:		Date completed:	**10.1.2014**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**AP**
Trial pit location:	**Base of Gully**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 369035.352 m | R.L. Surface: 28 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799675.712 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	structure and additional observations
ALLUVIAL DEPOSITS						OL	Sandy SILT, no plasticity, black, organic odour; sand is fine grained. (TOPSOIL)	M	F-St		
						ML	Sandy SILT, nonplastic, brown. Moist, some rootlets.				
			27	1		ML	SILT, minor sand, low plasticity, brown. Moist to wet.	M-W			
						ML	Sandy SILT, non plastic, pale grey with orange staining. Moist to wet, sensitive.		VSt		
	▶		26	2							Groundwater seepage/inflow a 2.5m
			25	3							
			24	4		ML	Sandy SILT, non plastic blue grey. Wet, sands fine.	S			
			23	5		SM	Silty SAND, fine to coarse, grey blue, subangular. Wet.				
						GW	Gravelly SAND, fine to coarse, dark grey green with brown staining, Angular gravel.				
			22	6			(Target depth) Test pit TP314 terminated at 5.5 metres.				

vane shear (remoulded /peak) kPa: 25 50 75 100 125 150 175

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

coffey

Engineering Log - Trial Pit

Trial Pit No. **TP315**

Sheet 1 of 1

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **24.1.2014**

Principal:

Date completed: **24.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Trial pit location: **Base of Gully**

Checked by: **RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 369052.664 m | R.L. Surface: 29 m

Excavation dimensions: 3m long 1.5m wide | Vane No: SL588 | Northing: 799615.101 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
TS						OL	Organic SILT, no plasticity, black, rootlets, organic odor (TOPSOIL).	M	F-St		
ALLUVIAL DEPOSIT	23/01/2014 ▼		28.5	0.5		ML	Sandy SILT, non to low plasticity, white-grey, orange mottles, sand is fine grained.			● ×	
			28.0	1.0						● ×	
			27.5	1.5						● ×	
			27.0	2.0			- becoming orange-brown with orange mottling	M-W			
			26.5	2.5						● ×	
			26.0	3.0		SP	SAND, fine grained, grey.				
			25.5	3.5			EOBH @ 3.0m, target depth. TS= TOPSOIL Test pit TP315 terminated at 3 metres.				
			25.0	4.0							

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

Engineering Log - Trial Pit

Trial Pit No.	**TP316**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**10.1.2014**
Principal:		Date completed:	**10.1.2014**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**AP**
Trial pit location:	**Base of Gully, North of Sediment Pond**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 369036.594 m | R.L. Surface: 32 m

Excavation dimensions: 4.5m long 2.2m wide | Vane No: DR4523 | Northing: 799488.445 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
ALLUVIAL DEPOSITS						OL	Sandy SILT, no plasticity, black, organic odour; sand is fine grained. (TOPSOIL)	M	St	● ×	
			31	1		SW	SAND some silt, fine to coarse, pale brown. Moist to wet.	M-W		● ×	
						SW	SAND some silt, fine to coarse, pale brown. Wet to saturated. Limonite staining	W-S			
			30	2		ML	Silty SAND with some minor clay, fine to coarse, subrounded to subangular. Pale grey.				Hole collapsing below 2.0m depth
			29	3			- becoming pale brown, increasing fines content, limonite staining.				
	►		28	4							Groundwater seepage/inflow a 4.0m
			27	5			- becoming sandy fine to coarse, trace fine gravels, pale grey.				
			26	6			(Target depth) Test pit TP316 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		

TRIAL PIT 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

Engineering Log - Trial Pit

Trial Pit No. **TP317**

Sheet 1 of 1

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **24.1.2014**

Principal:

Date completed: **24.1.2014**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Trial pit location: **Base of Gully - Stream Edge**

Checked by: **RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 368954.447 m | R.L. Surface: 28 m

Excavation dimensions: 10m long 1.5m wide | Vane No: SL588 | Northing: 799697.977 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
TS						ML	Sandy SILT, no plasticity, black, organic odor, rootlets; sand is fine grained (TOPSOIL).	D-M	F-St		
AD			27.5	0.5		SM	Silty SAND, fine to coarse grained, oragne-brown, sub-angular.				
PEAT			27.0	1.0		OL	Organic SILT, no plasticity, black, organic odor, with tree branches & organic inclusions (PEAT).				
	23/01/2014		26.5	1.5							
			26.0	2.0							
AD						ML	Sandy SILT/Silty SAND, no plasticity, white-grey, orange staining; sand is fine grained, abundant tree branches.	W-S			
			25.5	2.5			EOBH @ 2.3m, target depth. TS= TOPSOIL AD= ALLUVIAL DEPOSITS Test pit TP317 terminated at 2.3 metres.				
			25.0	3.0							
			24.5	3.5							
			24.0	4.0							

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

Engineering Log - Trial Pit

Trial Pit No.	**TP318**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**24.1.2014**
Principal:		Date completed:	**24.1.2014**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**KMJ**
Trial pit location:	**Base of Gully - Stream Edge**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 368974.098 m | R.L. Surface: 28 m

Excavation dimensions: 19m long 1.5m wide | Vane No: SL588 | Northing: 799679.552 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
TS						ML	Sandy SILT, no plasticity, organic odor, rootlets, sand is fine to medium grained (TOPSOIL).	M-W	St		
PEAT			27.5	0.5		ML	Sandy SILT, non to low plasticity, pale-grown, with peat inclusions.				
						OL	Organic SILT, no plasticity, black, with brown & grey staining, some fine sand.		F		
			27.0	1.0							
			26.5	1.5							
AD	▼ 23/01/2014					ML	SILT, low plasticity, grey-white, abundant tree branches, minor fine sand.	W	St		
			26.0	2.0							
							EOBH @ 2.0m, target depth. TS= TOPSOIL AD= ALLUVIAL DEPOSITS Test pit TP318 terminated at 2 metres.				
			25.5	2.5							
			25.0	3.0							
			24.5	3.5							
			24.0	4.0							

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

coffey

Engineering Log - Trial Pit

Trial Pit No.	**TP319**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**24.1.2014**
Principal:		Date completed:	**24.1.2014**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**KMJ**
Trial pit location:	**Base of Gully - Stream Edge**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 368998.748 m | R.L. Surface: 26 m

Excavation dimensions: 8m long 1.5m wide | Vane No: SL588 | Northing: 799633.397 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
TS						OL	Sandy SILT, no plasticity, rootlets, dar-brown to black, organic odor, some fine sand (TOPSOIL).	M	St		
P			25.5	0.5		OL	Organic SILT, no plasticity, black, organic odor.				
ALLUVIAL DEPOSIT	23/01/2014 ▼					ML	Sandy SILT, non to low plasticity, pale orange-brown, sand is fine grained.	M-W			
			25.0	1.0		ML	Sandy SILT, low plasticity, pale grey-white; minor clay, tree branches. - orange staining	W			
			24.5	1.5							
			24.0	2.0		SM	Silty SAND, fine to medium grained, blue-grey, abundant tree branches.				
			23.5	2.5			EOBH @ 2.3m, target depth. TS= TOPSOIL P= PEAT Test pit TP319 terminated at 2.3 metres.				
			23.0	3.0							
			22.5	3.5							
			22.0	4.0							

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

coffey

Engineering Log - Trial Pit

Trial Pit No.	**TP320**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**24.1.2014**
Principal:		Date completed:	**24.1.2014**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**KMJ**
Trial pit location:	**Base of Gully - Stream Edge**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 369003.944 m | R.L. Surface: 26.5 m

Excavation dimensions: 8m long 1.5m wide | Vane No: SL588 | Northing: 799553.254 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
TS						OL	Sandy SILT, no plasticity, sand is fine to medium, organic odor, rootlets (TOPSOIL).	M	St	● ×	
ALLUVIAL DEPOSITS			26.0	0.5		ML	- becoming pale orange-brown SILT, low plasticity, creamy orange-brown, minor black specks, orange mottles; minor fine sand.			● ×	
			25.5	1.0		OL	Organic SILT, no plasticity, black.			● ×	
						ML	Sandy SILT, no plasticity, grey.	M-W			
	23/01/2014 ▼		25.0	1.5			- brown, black staining, sand is fine grained.				
			24.5	2.0		ML	Sandy SILT/Silty SAND, non to low plasticity, white-grey to blue-grey, sand is fine grained. - increasing sand content	W		● ×	
			24.0	2.5			EOBH @ 2.2m, target depth. TS= TOPSOIL Test pit TP320 terminated at 2.2 metres.				
			23.5	3.0							
			23.0	3.5							
			22.5	4.0							

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

Engineering Log - Trial Pit

Trial Pit No.	***TP321***		
Sheet	1 of 1		
Project No:	***GENZTAUC13086AK***		
Client:	***THE LAKES LTD (2012)***	Date started:	***24.1.2014***
Principal:		Date completed:	***24.1.2014***
Project:	***STAGE 3 - ZONE 2***	Logged by:	***KMJ***
Trial pit location:	***Base of Gully - Stream Edge***	Checked by:	***RBT***

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 368996.81 m | R.L. Surface: 29 m

Excavation dimensions: 5m long 1.5m wide | Vane No: SL588 | Northing: 799497.73 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
TS						OL	Organic SILT, no plasticity, black (TOPSOIL).	M	St	● ×	
ALLUVIAL DEPOSITS			28.5	0.5		OL	Sandy SILT, no plasticity, grey, organic odor, rootlets.				
						SM	Silty SAND, fine to medium grained, grey-white, fine to medium grained, black staining, tree branches, organic odor.				hole collapsed from 0.5m, not stable
			28.0	1.0		ML	Sandy SILT, no plasticity, grey-white, orange staining.				
			27.5	1.5							
			27.0	2.0							
	▶ 23/01/2014		26.5	2.5			EOBH @ 2.5m, target depth. TS= TOPSOIL Test pit TP321 terminated at 2.5 metres.				
			26.0	3.0							
			25.5	3.5							
			25.0	4.0							

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

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Engineering Log - Trial Pit

Trial Pit No.	**TP322**		
Sheet	1 of 1		
Project No:	**GENZTAUC13086AK**		
Client:	**THE LAKES LTD (2012)**	Date started:	**24.1.2014**
Principal:		Date completed:	**24.1.2014**
Project:	**STAGE 3 - ZONE 2**	Logged by:	**KMJ**
Trial pit location:	**Base of Gully - Stream Edge**	Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 368957.893 m | R.L. Surface: 28 m

Excavation dimensions: 8m long 1.5m wide | Vane No: SL588 | Northing: 799432.837 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
TS	groundwater not encountered			0.0		OL	Sandy SILT, no plasticity, pale grey-brown, organic odor, rootlets (TOPSOIL). becoming black, with grey staining	M	F-St	● ×	
ALLUVIAL DEPOSITS			27.5	0.5		ML	Sandy SILT, no plasticity, pale brown, occasional organic pockets; sand is fine.	M-W		● ×	
			27.0	1.0		ML	SILT, no plasticity, grey-white, some fine sand, trace clay.	W	VSt	● ×	
			26.5	1.5							
			26.0	2.0							
			25.5	2.5			EOBH @ 2.3m, target depth. TS= TOPSOIL Test pit TP322 terminated at 2.3 metres.				
			25.0	3.0							
			24.5	3.5							
			24.0	4.0							

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

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Engineering Log - Trial Pit

Trial Pit No.	**TP323**
Sheet	1 of 1
Project No:	**GENZTAUC13086AK**
Client:	**THE LAKES LTD (2012)**
Date started:	**24.1.2014**
Principal:	
Date completed:	**24.1.2014**
Project:	**STAGE 3 - ZONE 2**
Logged by:	**KMJ**
Trial pit location:	**Base of Gully - Stream Edge**
Checked by:	**RBT**

Equipment type: 20t CAT | Pit Orientation: E-W | Easting: 369015.603 m | R.L. Surface: 28 m

Excavation dimensions: 3m long 1.5m wide | Vane No: SL588 | Northing: 799707.456 m | Datum: x/y = BOPC2000, z = Moturiki

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations. Rock name, grain size & type, colour, fabric, inclusions & minor components. Weathering, moisture, strength, defects.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
TS						OL	Organic SILT, no plasticity, black, rootlets, organic odor (TOPSOIL).	M	F-St		
ALLUVIAL DEPOSITS	23/01/2014 ▼		27.5	0.5		ML	Sandy SILT, low plasticity, creamy orange mottling, pale brown, sand is fine grained.			● ×	
			27.0	1.0		SM	Silty SAND, fine grained, white-grey.	M-W			
			26.5	1.5							
			26.0	2.0							
			25.5	2.5							
			25.0	3.0						● ×	
			24.5	3.5			EOBH @ 3.0m, target depth. TS= TOPSOIL Test pit TP323 terminated at 3 metres.				
			24.0	4.0							

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 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.5 Rev.6

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Engineering Log - Hand Auger

Hand Auger No.	***HA304***
Sheet	1 of 1
Project No:	***GENZTAUC13086AK***
Client: ***THE LAKES LTD (2012)***	Date started: ***24.1.2014***
Principal:	Date completed: ***24.1.2014***
Project: ***STAGE 3 - ZONE 2***	Logged by: ***GJN***
Hand Auger location: ***Mid-Point of Section H-H***	Checked by: ***RBT***

Dynamic penetrometer type: | Easting: 369058.61 m | Slope: -90° | R.L. Surface: 45 m | Vane No: SL588

Hole diameter: 50 mm | Northing: 799853.72 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	penetration resistance test: blows per 100 mm (2 4 6 8 10 12 14 16 18)
COLLUVIUM	groundwater not encountered		44	1		ML	Sandy SILT, non plastic, orange brown. Moist, fine rootlets.	M	F	● ×	
						ML	Sandy SILT, non plastic, bark brown black. Moist, organic. [TOPSOIL]				
						ML	Sandy SILT, non plastic, grey brown. Moist, sand is fine. - becoming orange brown below 1.2m depth.			● ×	
VOLCANIC ASHES			43	2		ML	SILT, some sand, non plastic, orange brown. Moist. - becoming brown at 2.1m depth. - sand content increasing below 2.5m depth.		VSt	● × ● × ● ×	
			42	3		SW	SAND, some silt, fine to medium, pale yellow orange. Moist. - becoming light grey white below 2.7m depth.				
TE RANGA IGNIMBRITE			41	4		SW	SAND, minor silt, fine to coarse, light brown white. Dry to moist, pumiceous.	D-M			
			40	5							
							EOBH = Target Depth Borehole HA304 terminated at 5 metres.				
			39	6							

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

water
- 10/1/98 water level on date shown
- water inflow
- water outflow

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density 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		

HAND AUGER SCALA 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.2 Rev.6

Engineering Log - Hand Auger

Hand Auger No.	***HA305***		
Sheet	1 of 1		
Project No:	***GENZTAUC13086AK***		
Client:	***THE LAKES LTD (2012)***	Date started:	***19.12.2013***
Principal:		Date completed:	***19.12.2013***
Project:	***STAGE 3 - ZONE 2***	Logged by:	***SLC***
Hand Auger location:	***Slope Below Access Road***	Checked by:	***RBT***

Dynamic penetrometer type: | Easting: 368913.05 m | Slope: -90° | R.L. Surface: 41 m | Vane No: DR2244

Hole diameter: 50 mm | Northing: 799642.32 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	penetration resistance test (blows per 100 mm)
TS							Organic SILT, dry and friable, brown.	D	St-VSt		
VOLCANIC ASHES	groundwater not encountered		40	1			Sandy SILT, non plastic, friable, pale brown. Sand is fine grained.				
							- becoming pale brown. Moist.	M			
			39	2			- becoming moist to wet.	M-W			
							- beocming dark brown (non organic). Minor clay, low to medium plasticity. - becoming pale brown .				
			38	3			- 50mm sand lense.				
MATUA SUBGROUP							Silty SAND, fine to medium, pale brown with black and orange brown specks.		S-VSt		
							Silty SAND/Sandy SILT, fine to medium, low plasticity, pale brown with black (non organic) specks.				
			37	4			Sandy SILT, low plasticity, pale brown with black specks.	W			
							Silty SAND, fine to medium, pale brown with black and orange brown specks. Minor, fine, and idurated gravels.				
							Sandy SILT, low plasticity, pale brown with black specks.				
							Silty SAND, fine to medium, pale brown with black and orange brown specks. Minor, fine, and medium gravels.				
							Sandy SILT, low plasticity, pale brown with black specks.				
			36	5			Silty SAND, fine to medium, pale brown with black and orange brown specks. Minor, fine, and medium gravels.		St		
							Sandy SILT, low plasticity, pale pink brown. Minor weathered fine pumice gravels. Becoming quick.				
			35	6			EOBH = Target Depth Borehole HA305 terminated at 5 metres.				

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

vane shear (kPa)
- ● remouded
- × 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		

HAND AUGER SCALA 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.2 Rev.6

Engineering Log - Hand Auger

Hand Auger No.	***HA306***
Sheet	1 of 1
Project No:	***GENZTAUC13086AK***
Client:	***THE LAKES LTD (2012)***
Date started:	***19.12.2013***
Principal:	
Date completed:	***19.12.2013***
Project:	***STAGE 3 - ZONE 2***
Logged by:	***KMJ***
Hand Auger location:	***Slope Below Access Road***
Checked by:	***RBT***

Dynamic penetrometer type: | Easting: 368932.62 m | Slope: -90° | R.L. Surface: 36 m | Vane No: DR4523

Hole diameter: 50 mm | Northing: 799645.48 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description: Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	penetration resistance test: blows per 100 mm
COLLUVIUM	groundwater not encountered					ML	Sandy SILT, no plasticity, black, organic odor; sand is fine grained. (COLLUVIUM)	D-M	F-ST		
							- becoming creamy orange-brown				
VOLCANIC ASHES			35	1		ML	Sandy SILT, no plasticity, creamy orange-brown.				
							- becoming moist to wet	M-W			
			34	2			- increasing sand content				
						SM	Silty SAND, fine to medium grained, pale brown with black specks.				
			33	3			- dark orange-black & white inclusions.				
MATUA SUBGROUP						ML	Sandy SILT/Silty SAND, no plasticity, pale grey-brown; sand is fine to medium grained.		St-Vst		
			32	4			- becoming pale grey-white with black specks				
							EOBH = Target Depth Borehole HA306 terminated at 4.6 metres.				
			31	5							
			30	6							

vane shear (remoulded /peak) kPa: 25 50 75 100 125 150 175

penetration resistance test: blows per 100 mm: 2 4 6 8 10 12 14 16 18

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

water
- 10/1/98 water level on date shown
- water inflow
- water outflow

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density 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		

HAND AUGER SCALA 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.2 Rev.6

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Engineering Log - Hand Auger

Hand Auger No. **HA307**

Sheet 1 of 1

Project No: **GENZTAUC13086AK**

Client: **THE LAKES LTD (2012)**

Date started: **19.12.2013**

Principal:

Date completed: **19.12.2013**

Project: **STAGE 3 - ZONE 2**

Logged by: **KMJ**

Hand Auger location: **Slope Below Access Road**

Checked by: **RBT**

Dynamic penetrometer type: | Easting: 368893.28 m | Slope: -90° | R.L. Surface: 41 m | Vane No: DR4523

Hole diameter: 50 mm | Northing: 799691.58 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	penetration resistance test blows per 100 mm
TS	groundwater not encountered					ML	Sandy SILT, no plasticity, black, organic odor; sand is fine grained. (TOPSOIL)	D	St		
COLLUVIUM			40	1		ML	Sandy SILT, no plasticity, brown.	D-M			
							- becoming orange-brown				
							- low plasticity clay inclusion	M-W			
			39	2		ML	Sandy SILT, non to low plasticity, pale brown with black specks, possibly colluvium deposits. - increasing sand content		St-Vst		
							- black & dark orange-brown inclusion				
							- some medium sub-angular gravel & orange-black staining				
VOLCANIC ASHES			38	3		ML	Sandy SILT, low plasticity, orange-brown, with dark-orange staining & orange streaks; some fine black gravel; white inclusion.				
							- increasing medium plasticity clay content				
							- heavy orange-black staining				
						ML	Sandy SILT, non to low plasticity, pale orange-brown, black specks; sand is fine grained. - becoming pale-brown grey, medium plasticity				
TI			37	4		ML	Sandy SILT, low plasticity, pale-grey with black specks (completely weathered ignimbrite).			>>	
			36	5			EOBH = Refusal TS = TOPSOIL TI = TE RANGA IGNIMBRITE Borehole HA307 terminated at 4.6 metres.			>>	
			35	6							

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

water
- 10/1/98 water level on date shown
- water inflow
- water outflow

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density 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		

HAND AUGER SCALA 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.2 Rev.6

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Engineering Log - Hand Auger

Hand Auger No.	***HA308***
Sheet	1 of 1
Project No:	***GENZTAUC13086AK***
Client:	***THE LAKES LTD (2012)***
Date started:	***19.12.2013***
Principal:	
Date completed:	***19.12.2013***
Project:	***STAGE 3 - ZONE 2***
Logged by:	***SLC***
Hand Auger location:	***Mid Level of Steep Ridge***
Checked by:	***RBT***

Dynamic penetrometer type: | Easting: 368939.31 m | Slope: -90° | R.L. Surface: 46 m | Vane No: DR2244

Hole diameter: 50 mm | Northing: 799788.53 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	penetration resistance test: blows per 100 mm
TS						ML	Organic SILT, dry and friable, brown.	D	VSt		
VOLCANIC ASHES	groundwater not encountered		45	1		ML	Sandy SILT, non plastic, fribale, pale grey with pale brown mottles. Sand is fine to coarse. - becoming pale grey with grey and orange brown mottles. Minor quartz grains <3mm. - no mottling below 1.0m	M	St		
						ML	SILT, low plasticity, pale orange brown. Minor clay.				
			44	2		ML	Sandy SILT, low plasticity, pale brown with brown and orange brown mottles. Sand is fine to coarse.				
						ML	- becoming very dark orange brown grading to dark red brown with red black inclusions (gravely SAND lense <20mm). Sandy SILT, low plasticity, pale brown with brown and orange brown mottles. Sand is fine to coarse. - becoming pale brown with some fine to medium gravels, some clay. - no gravels. Occasional very dark brown silty SAND lenses <40mm in thickness (manganese ?). - occasional orange specks and orange brown mottles <40mm. - moist to wet, pale brown with black inclusions within dark brown stained soil (non organic). - pale brown grey SAND lense <50mm, sand is fine to medium. Wet. - sand becoming fine grained. - becoming slightly sensitive. - pumiceous silty SAND inclusions <30mm. - sand inclusions absent below 4.0m. Wet to saturated.	M-W W W-S			
			43	3							
			42	4							
			41	5							
							EOBH = Target Depth. TS = TOPSOIL Borehole HA308 terminated at 5 metres.				
			40	6							

HAND AUGER SCALA 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.2 Rev.6

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

water
- 10/1/98 water level on date shown
- water inflow
- water outflow

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density 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		

coffey

Engineering Log - Hand Auger

Hand Auger No.	***HA311***
Sheet	1 of 1
Project No:	***GENZTAUC13086AK***
Client: ***THE LAKES LTD (2012)***	Date started: ***10.1.2014***
Principal:	Date completed: ***10.1.2014***
Project: ***STAGE 3 - ZONE 2***	Logged by: ***GJN***
Hand Auger location: ***Crest of Section F-F***	Checked by: ***RBT***

Dynamic penetrometer type: | Easting: 369095.9 m | Slope: -90° | R.L. Surface: 43 m | Vane No: DR2244

Hole diameter: 50 mm | Northing: 799562.27 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	penetration resistance test: blows per 100 mm
COLLUVIUM	groundwater not encountered					ML	Sandy SILT, non plastic, dark drown black. Moist, rootlets. (TOPSOIL)	D-M	F-S		
						ML	Sandy SILT, non plastic, orange brown. Dry to moist. - becoming brown at 0.5m depth.				
						ML	SILT, non plastic, dark brown black with brown mottles. Dry to Moist.				
			42	1		ML	Sandy SILT, non plastic, orange brown. Moist. Sand is fine.	M			
VA						ML	Sandy SILT, non plastic, orange brown. Moist. - sand content increasing, becoming fine to medium.				
UNWELDED IGNIMBRITE			41	2		SM	Silty SAND, fine to coarse, orange yellow, subrounded to subangular. Dry to moist, pumiceous. - becoming grey below 2.3m depth. - becoming moist to wet below 2.5m depth.	D-M			
			40	3							
			39	4							
			38	5							
			37	6			EOBH = Target Depth VA = Volcanic Ashes Borehole HA311 terminated at 5 metres.				

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

water
- 10/1/98 water level on date shown
- water inflow
- water outflow

moisture
- D dry
- M moist
- W wet
- S saturated

consistency/ density 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		

HAND AUGER SCALA 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.2 Rev.6

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Engineering Log - Hand Auger

Hand Auger No.	***HA312***		
Sheet	1 of 1		
Project No:	***GENZTAUC13086AK***		
Client:	***THE LAKES LTD (2012)***	Date started:	***24.1.2014***
Principal:		Date completed:	***24.1.2014***
Project:	***STAGE 3 - ZONE 2***	Logged by:	***RBT***
Hand Auger location:	***Crest of Section D-D***	Checked by:	***RBT***

Dynamic penetrometer type: | Easting: 368901.91 m | Slope: -90° | R.L. Surface: 52 m | Vane No: DR2244

Hole diameter: 50 mm | Northing: 799519.93 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	penetration resistance test: blows per 100 mm
TS	groundwater not encountered					ML	Highly organic SILT, with minor sand, non plastic, dark brown. Moist, rootlets.	M	St		
YOUNGER ASHES						ML	SILT, with trace clay and trace fine sand, orange brown. Moist.				
			51	1					VSt		
							- becomes SILT with minor clay, grey brown, slightly plastic. Moist, trace fine black inclusions (non organic).				
			50	2							
ROTOEHU ASH						ML	Sandy SILT, non plastic, pale grey orange. Moist, becomes greasy when reworked.				
							- 100mm thick layer of dark orange sandy SILT, slightly plastic. Wet.	W			
						SW	Silty SAND, orange grey, pumiceous.	M-W			
			49	3							
HAMILTON ASH						MH	Silty CLAY / Clayey SILT, slightly to moderately plastic, dark brown. Moist to wet.				
			48	4					H	>>	
							- Becoming SILT with minor clay, slightly plastic, dark orange brown.			UTP	
			47	5							
							EOBH = Target Depth TS = TOPSOIL Borehole HA312 terminated at 5 metres.			UTP	
			46	6							

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

water
- 10/1/98 water level on date shown
- water inflow
- water outflow

moisture

D	dry
M	moist
W	wet
S	saturated

consistency/ density 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		

HAND AUGER SCALA 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.2 Rev.6

Engineering Log - Hand Auger

Hand Auger No.	***HA314***		
Sheet	1 of 1		
Project No:	***GENZTAUC13086AK***		
Client:	***THE LAKES LTD (2012)***	Date started:	***10.1.2014***
Principal:		Date completed:	***10.1.2014***
Project:	***STAGE 3 - ZONE 2***	Logged by:	***GJN***
Hand Auger location:	***Crest of Section H-H***	Checked by:	***RBT***

Dynamic penetrometer type: | Easting: 369113.22 m | Slope: -90° | R.L. Surface: 55 m | Vane No: DR2244

Hole diameter: 50 mm | Northing: 799343.94 m | Bearing: | Datum: x/y = BOPC2000, z = Moturiki

drilling information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	Material Description (Soil name; plasticity or grading, colour, secondary components. Moisture, sensitivity, strength. Structure, bedding, cementation, defects. Origin, additional observations.)	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	penetration resistance test — blows per 100 mm (2 4 6 8 10 12 14 16 18)
COLLUVIUM	groundwater not encountered		54	1		OL	Sandy SILT, dark brown, friable. Dry to moist, rootlets. (TOPSOIL)	D-M	F-St	● ×	
						ML	Sandy SILT, non plastic, orange mottled brown. Dry to moist.				
							- becoming dry below 0.6m depth.				
			53	2			- thin layer of buried topsoil, approximately 50mm thick.			●×	
VOLCANIC ASHES			52	3		ML	Sandy SILT, non plastic, yellow orange. Dry	D	VSt-H	● >>×	
							- becoming pale brown.			>>×	
			51	4						● ×	
UI			50	5		SP	SAND, some silt, fine, grey brown. Dry, pumiceous.		D	● >>×	
							- becoming pink white				
			49	6			UI = UNWELDED IGNIMBRITE (Target depth) Borehole HA314 terminated at 5 metres.				

classification symbols and soil description
based on Field Description of Soil and Rock, New Zealand Geotechnical Society Inc 2005

vane shear (kPa)
- ● remoulded
- × peak
- >>× peak greater than 200kPa
- UTP unable to penetrate

water
- 10/1/98 water level on date shown
- water inflow
- water outflow

moisture

D	dry
M	moist
W	wet
S	saturated

consistency/ density 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		

HAND AUGER SCALA 13086AK_INVESTIGATION DATA.GPJ COFFEY.GDT 28.3.14

Form GEO 5.2 Rev.6

coffey

Engineering Log - Hand Auger

Borehole ID.	***HA01-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client:	***THE LAKES 2012 (LTD)***
date started:	***28 Jan 2015***
principal:	
date completed:	***28 Jan 2015***
project:	***THE LAKES STAGE 3 ZONE 3***
logged by:	***DBC***
location:	***Top of slope below Collector Road***
checked by:	***RBT***

position: E: 368,908; N: 799,598 (BOPC2000) surface elevation: 50 m (MOTUHT1953) angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm vane id.: 4523

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	structure and additional observations
HA N		Not Encountered		50	0			**ORGANIC SILT**: non plastic, orange brown.	D				**TOPSOIL / COLLUVIUM**
					0.5			**SILT**: non plastic, orange mottled brown, with abundant topsoil inclusions.	D	St			**COLLUVIUM** VS 67/ 12 kPa VS 84/ 16 kPa
				49	1.0			**ORGANIC SILT**: non plastic, black.	D to M	F			**BURIED TOPSOIL / COLLUVIUM**
								SILT: non plastic, orange brown.	D to M	S			VS 50/ 14 kPa
					1.5			**SILT**: non plastic, brown orange.	M	VSt			**COLLUVIUM** VS 12/ 10 kPa **YOUNGER ASHES** VS 113/ 25 kPa
				48	2.0			**SILT**: non plastic, pale brown orange, with some sand. - with a <100mm lense of loose grey SAND at 2.0m.	M	S			**ROTOEHU ASH** VS 12/ 10 kPa
					2.5			**Silty CLAY**: high plasticity, cream brown.	M	St			**MATUA SUBGROUP** VS 77/ 20 kPa
				47	3.0			**Clayey SILT**: medium to high liquid limit, cream grey. - becoming cream from 2.8m. - becoming moderately plastic, cream streaked dark orange (oxidisation) from 3.0m.	M M to W	St H			VS 84/ 14 kPa VS 206/ 28 kPa
					3.5			**SILT**: low liquid limit, cream streaked dark orange, (oxidisation), with some clay. - becoming non to slightly plastic, cream pale grey, with minor clay from 3.2m. - becoming non plastic with trace clay from 3.3m. - becoming non to slightly plastic, cream pale grey streaked orange, with minor clay from 3.7m.	M M to W				VS >215/ 35 kPa
				46	4.0			- becoming creamy pale grey from 4.0m.		St			VS >215 kPa
					4.5			- becoming creamy pale grey streaked orange from 4.4m.	W				VS 89/ 35 kPa
				45	5.0			**Clayey SILT**: medium liquid limit, cream pale grey streaked orange.	M to W	St			VS 54/ 16 kPa
								Sandy SILT: low liquid limit, cream pale grey, with some clay.	W	VSt			
								Hand Auger HA01-AQ terminated at 5.2 m Target depth					VS 106/ 38 kPa

CDF_0_9_06_LIBRARY.GLB rev:AI Log COF BOREHOLE: NON CORED + DCP #13086AQ HA01-AQ TO HA15-AQ 02-02-2015 DBC.GPJ <<DrawingFile>> 20/02/2015 10:38

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
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA02-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client:	***THE LAKES 2012 (LTD)***
date started:	***28 Jan 2015***
principal:	
date completed:	***28 Jan 2015***
project:	***THE LAKES STAGE 3 ZONE 3***
logged by:	***DBC***
location:	***Middle of slope below Collector Road***
checked by:	***RBT***

position: E: 368,912; N: 799,602 (BOPC2000) surface elevation: 47 m (MOTUHT1953) angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm vane id.: 4523

drilling information | **material substance**

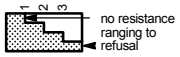
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (remoulded / peak) (kPa) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8	structure and additional observations
HA, N		Not Encountered		47	0			**ORGANIC SILT**: non plastic, brown.	D				**TOPSOIL / COLLUVIUM**
								SILT: non plastic, orange brown.	D	VSt			**COLLUVIUM**
					0.5			**ORGANIC SILT**: non plastic, dark brown.	D				VS 103/ 10 kPa
				46	1.0			**SILT**: non plastic, orange brown flecked cream.	D	F VSt			**BURIED TOPSOIL / COLLUVIUM** **YOUNGER ASHES** VS 46/ 10 kPa VS 158/ 10 kPa VS 154/ 20 kPa
					1.5			**SILT**: low liquid limit, brown orange streaked pale grey, with some clay.	D to M	VSt			**MATUA SUBGROUP** VS 101/ 20 kPa
				45	2.0			**Sandy SILT**: non plastic, dark orange red, (oxidisation).	D to M M	H			VS UTP
					2.5			**SILT**: non plastic to low liquid limit, orange brown, with abundant dark reddish black oxidised inclusions with some sand and some clay.	M	H			VS UTP
				44	3.0			**Clayey SILT**: low to medium liquid limit, orange brown, with abundant dark reddish black oxidised inclusions with some sand.	M to W	VSt			VS 189/ 16 kPa
					3.5			**Sandy SILT**: non plastic to low liquid limit, orange brown, with abundant dark reddish black oxidised inclusions with some clay.	W	VSt			VS 156/ 18 kPa
				43	4.0			**Clayey SILT**: medium liquid limit, brown orange, with minor dark reddish black oxidised inclusions with some sand.	W	VSt			VS 103/ 19 kPa
								SILT: non plastic, brown orange, with minor dark reddish black oxidised inclusions.	M	H			VS UTP
					4.5			**Clayey SILT**: medium liquid limit, brown orange, with minor dark reddish black oxidised inclusions with some sand. - becoming brown orange with some sand. Hole squeezing.	M to W	St			VS 99/ 28 kPa VS 82/ 20 kPa
				42	5.0			**SILT**: non plastic, brown orange, with minor dark reddish black oxidised inclusions. Hand Auger HA02-AQ terminated at 5.0 m Target depth	W to S	H			VS UTP

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

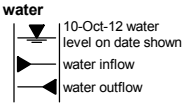
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA03-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client:	***THE LAKES 2012 (LTD)***
date started:	***29 Jan 2015***
principal:	
date completed:	***29 Jan 2015***
project:	***THE LAKES STAGE 3 ZONE 3***
logged by:	***DBC***
location:	***Top of slope below Collector Road***
checked by:	***RBT***

position: E: 368,924; N: 799,577 (BOPC2000) surface elevation: 49 m (MOTUHT1953) angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm vane id.: 4523

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	structure and additional observations
HA N		Not Encountered		49	0.0			**ORGANIC SILT**: non plastic, dark brown mottled orange brown.	D	VSt			**TOPSOIL / COLLUVIUM**
													VS 113/ 12 kPa
					0.5			**SILT**: non plastic, orange brown flecked cream.	D	St			**COLLUVIUM**
										VSt			VS 69/ 15 kPa
				48	1.0			- with trace clay from 0.9m.	M				VS 180/ 11 kPa
								- becoming non to slightly plastic with minor clay from 1.2m.					VS 119/ 18 kPa
					1.5			- becoming non plastic, brown orange with trace clay from 1.5m.		H			VS >215 kPa
								SILT: non plastic to low liquid limit, pale brown orange, with minor clay.	M	VSt			**MATUA SUBGROUP**
				47	2.0			- becoming pale brown orange streaked orange brown with minor sand, minor clay and some black manganese nodules from 1.9m.					VS 140/ 28 kPa
									M				
								Sandy SILT: non plastic low liquid limit, pale brown orange streaked orange brown, with minor clay and some black manganese nodules.	M	VSt			VS 139/ 31 kPa
					2.5			**Clayey SILT**: medium to high liquid limit, pale brown orange streaked orange brown, with minor sand and minor black manganese nodules.	M to W	VSt			VS 144/ 24 kPa
				46	3.0			**SILT**: low liquid limit, pale brown orange streaked orange brown flecked dark grey, with minor sand and some clay.					VS 160/ 31 kPa
					3.5			- with some sand, some clay and minor black manganese nodules from 3.6m.					VS 154/ 27 kPa
				45	4.0			**Sandy SILT**: non plastic to low liquid limit, pale brown orange streaked orange brown flecked dark grey, with minor clay.	M to W	H			VS 202/ 49 kPa
					4.5			**SILT**: low liquid limit, pale brown orange streaked orange brown flecked dark grey, with minor sand, some clay and minor black manganese nodules.	M to W	St			VS 82/ 24 kPa
										VSt			VS 140/ 23 kPa
				44	5.0					H			
								Hand Auger HA03-AQ terminated at 5.0 m Target depth					VS >215 kPa

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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
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA04-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client:	***THE LAKES 2012 (LTD)***
date started:	***29 Jan 2015***
principal:	
date completed:	***29 Jan 2015***
project:	***THE LAKES STAGE 3 ZONE 3***
logged by:	***DBC***
location:	***Middle of slope below Collector Road***
checked by:	***RBT***

position: E: 368,930; N: 799,578 (BOPC2000) surface elevation: 46 m (MOTUHT1953) angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm vane id.: 4523

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	structure and additional observations
HA N		Not Encountered		46				**ORGANIC SILT**: non plastic, dark brown.	D	VSt	⊕		**TOPSOIL / COLLUVIUM** VS 148/ 35 kPa
					0.5			**SILT**: non plastic, orange brown flecked cream.	D to M	H			**YOUNGER ASHES** VS UTP
				45	1.0			- becoming pale brown orange flecked cream from 0.9m.					VS UTP
					1.5			**SILT**: non plastic to low liquid limit, orange brown flecked cream, with minor sand, minor clay and minor black manganese nodules.	M	H	⊙		**MATUA SUBGROUP** VS >215 kPa
				44	2.0			**SANDY SILT / SILTY SAND**: fine to medium grained, non plastic, pale brown orange.	M	MD	⊕		VS 187/ 22 kPa
					2.5						⊕		VS 204/ 15 kPa
											⊕		VS 103/ 20 kPa
				43	3.0			**Silty SAND**: fine to medium grained, pale grey brown, with some black manganese nodules. - black manganese nodules absent from 2.9m.	M	MD	⊕		VS 110/ 28 kPa
					3.5						⊕		VS 67/ 35 kPa
				42	4.0								
					4.5								
				41	5.0			Hand Auger HA04-AQ terminated at 5.2 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AI Log COF BOREHOLE: NON CORED + DCP #13086AQ HA01-AQ TO HA15-AQ 02-02-2015 DBC.GPJ <<DrawingFile>> 20/02/2015 10:39

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
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA05-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client:	***THE LAKES 2012 (LTD)***
date started:	***29 Jan 2015***
principal:	
date completed:	***29 Jan 2015***
project:	***THE LAKES STAGE 3 ZONE 3***
logged by:	***SLC***
location:	***Top of slope below Collector Road***
checked by:	***RBT***

position: E: 368,826; N: 799,698 (BOPC2000) surface elevation: 57 m (MOTUHT1953) angle from horizontal: 90° DCP id.:

drill model: Hand Auger 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	structure and additional observations
HA N		Not Encountered		57	0.0			**ORGANIC SILT**: non plastic, dark brown, minor fine grained sand.	D				**TOPSOIL**
					0.5			**SILT**: non plastic, pale brown mottled brown, some black specks.		St			**COLLUVIUM** VS 55/ 14 kPa
													VS 50/ 11 kPa
				56	1.0			**SILT**: non plastic, orange brown, trace fine grained sand.	D to M	St to VSt			**VOLCANIC ASHES** VS 78/ 22 kPa
					1.5								VS 154/ 29 kPa
													VS 159/ 37 kPa
				55	2.0			**SILT**: non plastic, brown.	M	VSt			**MATUA SUBGROUP** VS 147/ 29 kPa
								2.0 m: minor pale brown and black inclusions (accretionary lapilli).					VS 147/ 27 kPa
					2.5			**Silty CLAY**: medium to high plasticity, brown.					VS 103/ 21 kPa
								2.5 m: becoming pale brown.					VS 138/ 31 kPa
								2.8 m: becoming orange brown.					VS 144/ 22 kPa
				54	3.0			**Clayey SILT**: low to medium liquid limit, pale brown mottled pale grey.					VS 126/ 22 kPa
								3.2 m: becoming pale brown with pale pink mottles.					VS 124/ 42 kPa
					3.5			3.5 m: 100mm silty sand lense (fine grained, pale brown with pale grey specks).	D to M				VS 160/ 17 kPa
								INTERBEDDED SILTY SAND & CLAYEY SILT: Silty sand is fine grained and pale brown with black banding. Clayey SILT is low to medium plasticity and pale brown/pink brown. Bedding is 50mm to 150mm.	M	VSt			VS 146/ 37 kPa
				53	4.0			**Clayey SILT**: low to medium liquid limit, pale pink brown.	M to W	St to VSt			VS 101/ 14 kPa
					4.5								VS 90/ 22 kPa
				52	5.0			Hand Auger HA05-AQ terminated at 5.0 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
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA06-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client: ***THE LAKES 2012 (LTD)***	date started: ***29 Jan 2015***
principal:	date completed: ***29 Jan 2015***
project: ***THE LAKES STAGE 3 ZONE 3***	logged by: ***SLC***
location: ***Middle of slope below Collector Road***	checked by: ***RBT***

position: E: 368,834; N: 799,704 (BOPC2000) surface elevation: 52 m (MOTUHT1953) angle from horizontal: 90° DCP id.:

drill model: Hand Auger 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	structure and additional observations
HA N		Not Encountered		52	0.0			**ORGANIC SILT**: non plastic, dark brown.	D				**TOPSOIL**
					0.5			**SILT**: non plastic, pale orange brown, minor fine grained sand. 0.5 m: becoming orange brown.		F to VSt			**COLLUVIUM** VS 47/ 14 kPa VS 42/ 11 kPa
				51	1.0			1.0 m: becoming brown mottled dark brown and pale brown with black specks, dry to moist.	D to M				VS 79/ 17 kPa VS 199/ 31 kPa
					1.5			**Clayey SILT**: non plastic.		VSt			VS 137/ 34 kPa VS 129/ 34 kPa
				50	2.0			**Sandy SILT**: non plastic, brown, sand is fine grained.					VS 137/ 39 kPa
								Clayey SILT: non plastic to low liquid limit, dark brown.					VS 110/ 22 kPa
					2.5								VS 141/ 26 kPa
				49	3.0								VS 110/ 31 kPa
								Clayey Sandy SILT: low to medium liquid limit, dark brown with pale brown specks, sand is fine grained.	M	VS			**MATUA SUBGROUP**
					3.5			**SILT**: low liquid limit, brown mottled orange brown and dark brown, trace clay, minor fine grained sand.					VS 134/ 21 kPa VS 184/ 37 kPa
				48	4.0								VS 178/ 37 kPa
								Sandy SILT: non plastic to low liquid limit, pale brown mottled pale grey, sand is fine to medium grained.					VS 104/ 17 kPa
					4.5								VS 149/ 42 kPa
				47	5.0			Hand Auger HA06-AQ terminated at 5.0 m Target depth					VS 187/ 47 kPa

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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
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA07-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client:	***THE LAKES 2012 (LTD)***
date started:	***05 Feb 2015***
principal:	
date completed:	***05 Feb 2015***
project:	***THE LAKES STAGE 3 ZONE 3***
logged by:	***DBC***
location:	***Top of slope below Pyes Pa Road***
checked by:	***RBT***

position: E: 369,127; N: 799,329 (BOPC2000) | surface elevation: 56 m (MOTUHT1953) | angle from horizontal: 90° | DCP id.:

drill model: Hand Auger | hole diameter : 50 mm | vane id.: 4523

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	structure and additional observations
HA N		Not Encountered		56	0.0			**SILT**: non plastic, brown orange mottled dark brown, with common topsoil inclusions.	M	S to F	⊕⊙		**COLLUVIUM**
													VS 37/ 5 kPa
					0.5			- becoming brown orange from 0.4m.	D to M		⊕		VS 20/ 5 kPa
				55	1.0						⊕		VS 15/ 0 kPa
											⊕⊙		VS 37/ 24 kPa
					1.5			**SILT**: non plastic, brown orange.	D to M	St to VSt	⊕⊙		**YOUNGER ASHES**
													VS 70/ 25 kPa
				54	2.0						⊕ ⊙		VS 135/ 16 kPa
					2.5						⊕ ⊙		VS 90/ 23 kPa
											⊕⊙		VS 67/ 20 kPa
				53	3.0			**SILT**: non plastic, brown orange flecked black flecked cream, with trace clay.	M	St to VSt	⊕ ⊙		**MATUA SUBGROUP**
													VS 84/ 23 kPa
					3.5						⊕ ⊙		VS 108/ 33 kPa
				52	4.0			- with some black manganese nodules and some white nodules from 4.0m.			⊕ ⊙		VS 131/ 32 kPa
					4.5						⊕ ⊙		VS 110/ 46 kPa
											⊕ ⊙		VS 158/ 33 kPa
				51	5.0			- becoming non to slightly plastic, creamy pink with minor clay from 4.9m.	M to W				
								Hand Auger HA07-AQ terminated at 5.2 m Target depth			⊕ ⊙		VS 156/ 42 kPa

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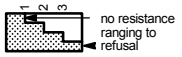
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

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

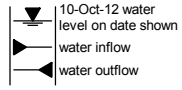
support
- M mud
- C casing
- N nil

penetration



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
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA08-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client: ***THE LAKES 2012 (LTD)***	date started: ***05 Feb 2015***
principal:	date completed: ***05 Feb 2015***
project: ***THE LAKES STAGE 3 ZONE 3***	logged by: ***RBT***
location: ***Bottom of slope below Pyes Pa Road***	checked by: ***RBT***

position: E: 369,109; N: 799,329 (BOPC2000) surface elevation: 48 m (MOTUHT1953) angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm vane id.: 2244

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)	DCP (blows/ 100 mm)	structure and additional observations
HA N		Not Encountered		48				**SILT**: non plastic, mottled greyish brown, friable with some organic inclusions.	D	F to St			**COLLUVIUM**
					0.5								VS 43/ 18 kPa
				47	1.0			- with occasional pale yellow white very weak gravel inclusions (weathered pumice) from 1.0m.		H			VS 70/ 18 kPa
					1.5								VS UTP
								- with a possible rock inclusion at 1.6m.	D to M				
				46	2.0			**SILT**: non plastic, greyish brown, friable (organic inclusions absent).	D	VSt			**MATUA SUBGROUP**
													VS 107/ 56 kPa
					2.5			- becoming greyish orange from 2.35m.		H			VS UTP
								- with occasional white pumice gravels at 2.6m.	D to M				Hand auger refused on gravel. Used scala to break through.
				45	3.0			- becoming pale greyish orange from 3.0m. Difficult to auger.					VS UTP
										VSt			
					3.5								VS >182/ 50 kPa
								- becoming mottled orange grey with brown pockets from 3.8m.					
				44	4.0			Hand Auger HA08-AQ terminated at 4.0 m Collapse					VS 112/ 72 kPa
					4.5								
				43	5.0								

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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
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA09-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client:	***THE LAKES 2012 (LTD)***
date started:	***30 Jan 2015***
principal:	
date completed:	***30 Jan 2015***
project:	***THE LAKES STAGE 3 ZONE 3***
logged by:	***DBC***
location:	***Top of slope of Pyes Pa Road***
checked by:	***RBT***

position: E: 369,099; N: 799,413 (BOPC2000) | surface elevation: 50 m (MOTUHT1953) | angle from horizontal: 90° | DCP id.:

drill model: Hand Auger | hole diameter : 50 mm | vane id.: 4523

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	structure and additional observations
HA N		Not Encountered		50				**ORGANIC SILT**: non plastic, dark brown.	D	S			**TOPSOIL / COLLUVIUM** Very loose topsoil continually falling into borehole throughout drilling, resulting in collapse at 3.2m.
					0.5					VS			VS 20/ 10 kPa VS 0/ 0 kPa
				49	1.0								VS 0/ 0 kPa
													VS 0/ 0 kPa
					1.5					F to St			
								- with minor roots from 1.6m.					VS 41/ 32 kPa
				48	2.0			- becoming dark brown mottled brown orange from 1.9m.					VS 54/ 27 kPa
										VSt			
					2.5			- with minor rootlets from 2.4m.					VS 130/ 46 kPa
								SILT: non plastic, brown orange streaked pinkish white streaked black.	D	VSt			**COLLUVIUM** VS 106/ 49 kPa
				47	3.0								
								Hand Auger HA09-AQ terminated at 3.2 m Collapse					
					3.5								
				46	4.0								
					4.5								
				45	5.0								

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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
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA10-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client:	***THE LAKES 2012 (LTD)***
date started:	***30 Jan 2015***
principal:	
date completed:	***30 Jan 2015***
project:	***THE LAKES STAGE 3 ZONE 3***
logged by:	***DBC***
location:	***Bottom of slope below Pyes Pa Road***
checked by:	***RBT***

position: E: 369,089; N: 799,414 (BOPC2000) | surface elevation: 45 m (MOTUHT1953) | angle from horizontal: 90° | DCP id.:

drill model: Hand Auger | hole diameter : 50 mm | vane id.: 4523

drilling information | **material substance**

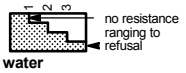
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA N		Not Encountered		45	0.0			**ORGANIC SILT**: non plastic, dark brown.	D	VSt			**TOPSOIL / COLLUVIUM**
								- becoming dark brown mottled brown orange from 0.3m.					VS 119/ 15 kPa
					0.5								VS 119/ 12 kPa
				44	1.0								VS 162/ 23 kPa
													VS 120/ 23 kPa
					1.5			**SILT**: non plastic, brown orange streaked dark brown.	D to M	St to VSt			**COLLUVIUM**
													VS 82/ 35 kPa
				43	2.0								VS 126/ 20 kPa
								- becoming brown orange streaked black streaked pale pinkish white from 2.3m.	M				
					2.5				M	VSt			**BURIED TOPSOIL / COLLUVIUM**
								SILT: non plastic, black.					VS 193/ 27 kPa
								SILT: non plastic, brown orange streaked black streaked pale pinkish white.	M	VSt			**COLLUVIUM**
				42	3.0								VS 108/ 28 kPa
													VS 168/ 55 kPa
					3.5								VS 120/ 41 kPa
								- with minor gravel inclusions (fine gravel sized) from 3.8m.					
				41	4.0			**Sandy SILT**: non plastic, pale brown orange.	D to M	VSt			**MATUA SUBGROUP**
													VS 120/ 36 kPa
					4.5			**Silty SAND**: fine to medium grained, pale brown orange.	D to M				VS >215 kPa
				40	5.0								VS 137/ 51 kPa
								Hand Auger HA10-AQ terminated at 5.2 m Target depth					VS 133/ 55 kPa

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

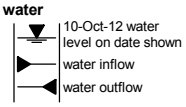
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA11-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client:	***THE LAKES 2012 (LTD)***
date started:	***30 Jan 2015***
principal:	
date completed:	***30 Jan 2015***
project:	***THE LAKES STAGE 3 ZONE 3***
logged by:	***SWH***
location:	***Middle of slope below Pyes Pa Road***
checked by:	***RBT***

position: E: 369,087; N: 799,571 (BOPC2000) | surface elevation: 36 m (MOTUHT1953) | angle from horizontal: 90° | DCP id.:

drill model: Hand Auger | hole diameter : 50 mm | vane id.: 2244

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	structure and additional observations
HA N		Not Encountered		36	0		OL	**SILT**: non plastic, dark brown-black, some roots, trace of fine grained sand.	D				**TOPSOIL**
							ML	**Sandy SILT**: fine grained, non plastic, brown.		F to St			**COLLUVIUM**
					0.5								VS 45/ 23 kPa
													VS 62/ 23 kPa
				35	1.0								VS 81/ 29 kPa
							ML	**SILT**: non plastic to low liquid limit, pale brown-orange, some fine grained sand.		St to VSt			
					1.5					St			VS 110/ 37 kPa
													VS 97/ 37 kPa
				34	2.0		ML	**Sandy SILT**: fine grained, low liquid limit, pale brown.					**MATUA SUBGROUP** VS 83/ 34 kPa
					2.5								VS 76/ 37 kPa
													VS 60/ 37 kPa
				33	3.0								VS 68/ 40 kPa
					3.5			3.5 m: becoming pale brown-pale grey					VS 86/ 43 kPa
													VS 91/ 45 kPa
				32	4.0			3.8 m: becoming pale yellow-pale grey, with some specks of black and orange					VS 83/ 48 kPa
					4.5								VS 89/ 55 kPa
													VS 86/ 55 kPa
				31	5.0								VS 97/ 57 kPa
								Hand Auger HA11-AQ terminated at 5.0 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
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA13-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client: ***THE LAKES 2012 (LTD)***	date started: ***30 Jan 2015***
principal:	date completed: ***30 Jan 2015***
project: ***THE LAKES STAGE 3 ZONE 3***	logged by: ***SWH***
location: ***Bottom of slope below Pyes Pa Road***	checked by: ***RBT***

position: E: 369,122; N: 799,724 (BOPC2000) surface elevation: 37 m (MOTUHT1953) angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm vane id.: 2244

drilling information | **material substance**

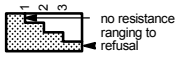
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear ⊕ remoulded ⊙ peak (kPa) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8	structure and additional observations
HA N		Not Encountered		37	0.0		OL	**SILT**: non plastic, black, some roots, some fine grained sand.	D				**TOPSOIL**
							ML	**SILT**: non plastic, brown-orange.		S to F			**COLLUVIUM**
					0.5								VS 112/ 43 kPa
													VS 29/ 18 kPa
				36	1.0			0.8 m: becoming dark brown-orange, with some fine to medium grained sand					VS 34/ 18 kPa
													VS 34/ 23 kPa
					1.5			**SILT**: non plastic, brown.		VSt			**VOLCANIC ASHES** VS 102/ 43 kPa
				35	2.0								VS 120/ 50 kPa
					2.5								VS 128/ 55 kPa
													VS 139/ 57 kPa
								2.7 m: becoming pale brown-pale grey, with some black specks and a trace of fine grained sand					VS 133/ 53 kPa
				34	3.0								VS 123/ 55 kPa
					3.5								VS 107/ 45 kPa
				33	4.0								VS 97/ 37 kPa
													VS 107/ 40 kPa
					4.5								VS 128/ 53 kPa
				32	5.0			Hand Auger HA13-AQ terminated at 5.0 m Target depth					VS 118/ 48 kPa

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

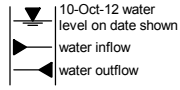
support
- M mud
- C casing
- N nil

penetration



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
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA14-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client: ***THE LAKES 2012 (LTD)***	date started: ***30 Jan 2015***
principal:	date completed: ***30 Jan 2015***
project: ***THE LAKES STAGE 3 ZONE 3***	logged by: ***DBC***
location: ***Top of slope below Pyes Pa Road***	checked by: ***RBT***

position: E: 369,030; N: 799,869 (BOPC2000) surface elevation: 48 m (MOTUHT1953) angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm vane id.: 4523

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		48	0.0			**ORGANIC SILT**: non plastic, dark brown mottled orange brown.	D				**TOPSOIL / COLLUVIUM**
					0.5			**SILT**: non plastic, orange brown flecked cream.	D to M	H F to St			**COLLUVIUM** VS UTP VS 31/ 10 kPa
				47	1.0								VS 57/ 11 kPa
								ORGANIC SILT: non plastic, black.	D to M	F			**BURIED TOPSOIL / COLLUVIUM** VS 45/ 19 kPa
					1.5			**SILT**: non plastic, brown orange.	M	F			**COLLUVIUM** VS 31/ 16 kPa
				46	2.0								VS 38/ 18 kPa
					2.5			**SILT**: non plastic, brown orange, with trace clay.	M	VSt			**YOUNGER ASHES** VS 130/ 44 kPa
								SILT: non plastic, brown orange, with trace clay, and minor dark grey and cream inclusions (course sand sized). - with some black manganese nodules and dark grey inclusions (fine to medium gravel sized) from 2.9m.	M	VSt			**VOLCANIC ASHES** VS 126/ 38 kPa
				45	3.0				D to M	MD			VS 67/ 41 kPa
					3.5			**Silty SAND**: fine to medium grained, pale orange brown.					
				44	4.0			**Sandy SILT**: non plastic to low liquid limit, pale orange brown, with minor clay.	M to W	VSt			VS 160/ 48 kPa
					4.5			**SILT**: non plastic to low liquid limit, pale orange brown, with some sand and minor clay.	M to W	St to VSt			VS 139/ 49 kPa
				43	5.0								VS 79/ 19 kPa
								Hand Auger HA14-AQ terminated at 5.2 m Target depth					VS 97/ 44 kPa

CDF_0_9_06_LIBRARY.GLB rev:AI Log COF BOREHOLE: NON CORED + DCP #13086AQ HA01-AQ TO HA15-AQ 02-02-2015 DBC.GPJ <<DrawingFile>> 20/02/2015 10:39

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
- S saturated
- 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

Engineering Log - Hand Auger

Borehole ID.	***HA15-AQ***
sheet:	1 of 1
project no.	***GENZTAUC13086AQ***
client:	***THE LAKES 2012 (LTD)***
date started:	***30 Jan 2015***
principal:	
date completed:	***30 Jan 2015***
project:	***THE LAKES STAGE 3 ZONE 3***
logged by:	***SWH***
location:	***Middle of slope below Pyes Pa Road***
checked by:	***RBT***

position: E: 369,034; N: 799,856 (BOPC2000) | surface elevation: 39 m (MOTUHT1953) | angle from horizontal: 90° | DCP id.:

drill model: Hand Auger | hole diameter : 50 mm | vane id.: 2244

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		39	0.0		OL	**SILT**: non plastic, black, some roots, trace of sand.	D				**TOPSOIL**
							ML	**SILT**: non plastic, brown.		F	VS 164/ 55 kPa		**COLLUVIUM**
					0.5						VS 46/ 20 kPa		
								0.8 m: becoming brown-orange, nonplastic to low plasticity		St to VSt	VS 89/ 37 kPa		
				38	1.0						VS 99/ 40 kPa		
					1.5						VS 107/ 43 kPa		
								1.8 m: becoming dark brown-black		F	VS 62/ 26 kPa		
				37	2.0			**SILT**: low liquid limit, pale brown.		St to VSt			**VOLCANIC ASHES**
											VS 97/ 45 kPa		
					2.5						VS 107/ 40 kPa		
											VS 115/ 48 kPa		
				36	3.0						VS 112/ 40 kPa		
					3.5						VS 123/ 43 kPa		
											VS 99/ 45 kPa		
				35	4.0			4.0 m: with a trace of fine grained pale orange-grey subangular gravel			VS 120/ 48 kPa		
					4.5			4.5 m: with some fine grained sand		VSt	VS 136/ 53 kPa		
								4.6 m: becoming pale orange-pale brown, with some black specks			VS 167/ 57 kPa		
				34	5.0			Hand Auger HA15-AQ terminated at 5.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AI Log COF BOREHOLE: NON CORED + DCP #13086AQ HA01-AQ TO HA15-AQ 02-02-2015 DBC.GPJ <<DrawingFile>> 20/02/2015 10:39

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
- S saturated
- 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

Appendix D - Post Development Investigation Data

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Engineering Log - Hand Auger

Borehole ID.	***HAL504***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***26 Oct 2017***
principal:	date completed: ***26 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 504***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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
		Not Encountered			0.0			0.0 m: Refused at 3 different locations due to gravel hardfill Hand Auger HAL504 terminated at 0.0 m Refusal					
					0.5								
					1.0								
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:08

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
S saturated
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.	***HAL504-505***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***26 Oct 2017***
principal:	
date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 504 AND 505***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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			0.0 m: Refused at 3 different locations due to gravel hardfill Hand Auger HAL504-505 terminated at 0.0 m Refusal					

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:08

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
- S saturated
- 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.	***HAL505***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***26 Oct 2017***
principal:	date completed: ***26 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 505***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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			0.0			0.0 m: Refused at 3 different locations due to gravel hardfill Hand Auger HAL505 terminated at 0.0 m Refusal					DCP REFUSAL

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:08

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
S saturated
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.	***HAL505-506***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***26 Oct 2017***
principal:	
date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 504 506 AND 511***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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**: non plastic, dark brown black.	D to M				**TOPSOIL**
					0.5			0.3 m: Refused at 3 different locations due to gravel hardfill Hand Auger HAL505-506 terminated at 0.3 m Refusal					
					1.0								
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:08

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
- S saturated
- 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.	**HAL506**
sheet:	1 of 1
project no.	**773-GENZTAUC13086A**
client:	**THE LAKES (2012) LIMITED**
date started:	**26 Oct 2017**
principal:	
date completed:	**26 Oct 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**PRM**
location:	**CENTRE OF LOT 506**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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	VS UTP		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
			VS UTP		0.5			**SILT**: non plastic, pale grey-brown, with minor fine grained sand.		H	VS UTP		**FILL**
			VS UTP		1.0			refusal at three different locations due to hardfill gravels			VS UTP		
								Hand Auger HAL506 terminated at 1.0 m Refusal					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:08

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
S saturated
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.	***HAL506-507***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***26 Oct 2017***
principal:	
date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 506 AND 507***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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	DCP (blows/ 100 mm)	structure and additional observations
HA N		Not Encountered	VS 157/ 43 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
			VS 157/ 43 kPa		0.5			**SILT**: non plastic, brown orange mottled pale brown white, trace fine to medium grained sand, minor subangular gravel clasts.		VSt			**FILL**
			VS >182 kPa		1.0								
			VS 182/ 32 kPa		1.5								
			VS 182/ 32 kPa		2.0			Hand Auger HAL506-507 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL507***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***26 Oct 2017***
principal:	date completed: ***26 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***CENTRE OF LOT 507***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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			0.0			**SILT**: non plastic, brown orange mottled black, trace fine to medium grained sand, trace subangular gravel. refusal at 3 different locations due to gravel	D to M				**FILL**
								Hand Auger HAL507 terminated at 0.2 m Refusal					
					0.5								
					1.0								
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:08

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
S saturated
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.	***HAL507-508***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***26 Oct 2017***
principal:	
date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 507 AND 508***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 UTP		0.0			**Sandy SILT**: non plastic, pale brown, sand is fine grained, with minor gravel, and trace clay.	D	VSt to H	VS UTP		**FILL**
			VS 204/ 25 kPa		0.5				M				
			VS 183/ 58 kPa		1.0					VSt			
			VS 162/ 45 kPa		1.5			**Clayey SILT**: low plasticity, pale brown, with some fine grained sand.					
			VS 158/ 42 kPa		2.0			Hand Auger HAL507-508 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:08

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
S saturated
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.	**HAL508**
sheet:	1 of 1
project no.	**773-GENZTAUC13086AP**
client:	**THE LAKES (2012) LIMITED**
date started:	**07 Dec 2017**
principal:	
date completed:	**07 Dec 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**PRM**
location:	**CENTRE OF LOT 508**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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	VS UTP		0.0			**ORGANIC SILT**: non plastic, dark brown mottled brown, with some fine to medium grained sand, trace clay.	D	H			**TOPSOIL**
			VS UTP										**FILL**
			VS UTP		0.5			**SILT**: non plastic, brown mottled pale brown, with trace to minor fine to medium grained sand.	D to M		VS UTP		
			VS UTP						M		VS UTP		
			VS 175/ 42 kPa		1.0			0.8 m: with trace clay **Clayey SILT**: low plasticity, orange-brown mottled brown, with trace fine grained sand.		VSt	VS UTP		
			VS 150/ 60 kPa					**SILT**: non plastic, orange-brown.					
			VS 90/ 45 kPa		1.5			**Clayey SILT**: low plasticity, orange-brown mottled brown/dark brown. 1.5 m: becoming medium plasticity, mottled pale pink-brown		St			
			VS 87/ 47 kPa		2.0			Hand Auger HAL508 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL508c***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***07 Dec 2017***
principal:	
date completed:	***07 Dec 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***CORNER OF LOT 508***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown mottled brown, with some fine to medium grained sand, trace clay.	D	VSt to H	VS UTP		**TOPSOIL**
								Clayey SILT: low plasticity, brown mottled pale brown, sand is fine grained.					**FILL** Stiff to auger from 0.3m to 0.9m.
					0.5				M				
								Sandy SILT: non plastic, brown, sand is fine grained.					
			VS 194/ 60 kPa		1.0			**Clayey SILT**: low plasticity, orange-brown mottled brown, with trace fine grained sand.					
			VS 172/ 25 kPa		1.5			1.3 m: becoming pale brown mottled brown					
			VS 184/ 37 kPa					**Clayey SILT**: non plastic, pale brown, with minor fine grained sand, faint organic odour, trace fine rootlets.					
			VS 87/ 35 kPa		2.0			Hand Auger HAL508c terminated at 2.0 m Target depth		St			
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:08

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
S saturated
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

client:	***THE LAKES (2012) LIMITED***	Borehole ID.	***HAL509***
principal:		sheet:	1 of 1
project:	***THE LAKES, STAGE 3I GCR***	project no.	***773-GENZTAUC13086A***
location:	***CENTRE OF LOT 509***	date started:	***07 Dec 2017***
		date completed:	***07 Dec 2017***
		logged by:	***PRM***
		checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown mottled brown, with some fine to medium grained sand, trace clay.	D	H			**TOPSOIL**
			VS UTP					**SILT**: non plastic, pale brown, with minor fine grained sand.	D to M		VS UTP		**FILL**
			VS 179/ 35 kPa		0.5					VSt	VS UTP		Stiff to auger from 0.7m to 1.0m.
			VS 190/ 35 kPa		1.0			0.8 m: becoming orange-brown, trace clay	M				
			VS >224 kPa		1.5			1.1 m: becoming brown mottled pale pink		H			
			VS 140/ 22 kPa		2.0			**Silty CLAY**: low plasticity, pale orange-brown mottled pale pink, with minor fine grained sand.		VSt			
								Hand Auger HAL509 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:08

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
S saturated
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.	***HAL509-510***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***26 Oct 2017***
principal:	
date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 509 AND 510***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 UTP		0.5			**SILT**: non plastic, pale brown mottled dark brown/orange.	M	H	VS UTP		**FILL**
			VS 247 kPa		1.0			**Sandy SILT**: non plastic, brown mottled dark grey.				⊙	
			VS 129/ 21 kPa					**Silty CLAY**: low plasticity, pale brown mottled pale pink/brown, with minor fine grained sand.		VSt	⊕ ⊙		
			VS 129/ 25 kPa		1.5			**Silty CLAY**: medium plasticity, pale pink mottled white-pink/ pale orange.			⊕ ⊙		
			VS UTP					**Clayey SILT**: low plasticity, pale brown mottled brown, with minor fine to medium grained sand.			VS UTP		
					2.0			**SILT**: non plastic, brown, with minor fine to medium grained subangular gravel. shear vane UTP due to gravel hardfill					
					2.5			Hand Auger HAL509-510 terminated at 1.9 m Refusal					
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	**HAL510**
sheet:	1 of 1
project no.	**773-GENZTAUC13086A**
client:	**THE LAKES (2012) LIMITED**
date started:	**07 Dec 2017**
principal:	
date completed:	**07 Dec 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**PRM**
location:	**CENTRE OF LOT 510**
checked by:	**DBC**

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 UTP		0.5			**ORGANIC SILT**: non plastic, dark brown black. **SILTY SAND**: fine grained, brown mottled pale brown.	D / D to M	MD	VS UTP		**TOPSOIL** **FILL**
					1.0			Hand Auger HAL510 terminated at 0.9 m Target depth					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

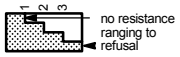
CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:08

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

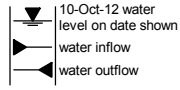
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- 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.	***HAL510-511***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***26 Oct 2017***
principal:	
date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 510 AND 511***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D				**TOPSOIL**
								SILT: non plastic, pale brown, with minor fine to medium grained sand.	D to M	H	VS UTP		**FILL**
			VS >247 kPa		0.5			**Clayey SILT**: low plasticity, pale brown mottled brown, with trace fine grained sand.	M			⊙	
					1.0			Refusal on hardfill gravel at 1.0m at 2 locations Hand Auger HAL510-511 terminated at 1.0 m Refusal					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL511***		
sheet:	1 of 1		
project no.	***773-GENZTAUC13086AP***		
client:	***THE LAKES (2012) LIMITED***	date started:	***26 Oct 2017***
principal:		date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***	logged by:	***PRM***
location:	***CENTRE OF LOT 511***	checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 UTP		0.5			**ORGANIC SILT**: non plastic, dark brown black.	D	VSt to H	VS UTP		**TOPSOIL**
								SILT: non plastic, pale brown, with minor fine grained sand.	M				**FILL**
			VS 183/ 39 kPa		1.0			**Clayey SILT**: low plasticity, pale brown mottled pale grey, with trace fine grained sand.			⊕ ⊙		
			VS 227/ 55 kPa		1.5			**Sandy SILT**: non plastic, pale brown, sand is fine to medium grained.			⊕ ⊙		
					2.0			Hand Auger HAL511 terminated at 1.6 m Refusal					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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

client:	***THE LAKES (2012) LIMITED***	Borehole ID.	***HAL512***
principal:		sheet:	1 of 1
project:	***THE LAKES, STAGE 3I GCR***	project no.	***773-GENZTAUC13086A***
location:	***CENTRE OF LOT 512***	date started:	***07 Dec 2017***
		date completed:	***07 Dec 2017***
		logged by:	***PRM***
		checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D				**TOPSOIL**
								SILT: non plastic, pale brown, with trace fine grained sand.	D to M	H	VS UTP		**FILL**
			VS UTP		0.5			0.5 m: with minor fine grained sand			VS UTP		
			VS UTP					0.8 m: with trace fine grained sand	M		VS UTP		
			VS UTP		1.0						VS UTP		
			VS UTP		1.5						VS UTP		
			VS UTP		2.0			Hand Auger HAL512 terminated at 2.0 m Target depth			VS UTP		
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL512-513***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***26 Oct 2017***
principal:	
date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 512 AND 513***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 179/ 21 kPa VS 217/ 29 kPa		0.5 1.0			**ORGANIC SILT**: non plastic, dark brown black. **SILT**: non plastic, brown mottled pale orange/dark brown, with trace subangular fine grained gravel. **Clayey SILT**: low plasticity, pale brown mottled pale orange, with minor fine to medium grained sand.	M	VSt H	⊕ ⊙		**TOPSOIL** **FILL**
					1.5 2.0 2.5 3.0 3.5 4.0 4.5			Refusal on gravel hardfill Hand Auger HAL512-513 terminated at 1.4 m Refusal					

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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
S saturated
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.	***HAL513***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***26 Oct 2017***
principal:	date completed: ***26 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 513***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 >182 kPa		0.5			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
								SILTY SAND: fine to medium grained, pale brown grey.					**FILL**
			VS >182 kPa		1.0			**SILT**: non plastic, brown orange, trace fine to medium grained sand.		VSt to H			
			VS >182 kPa		1.5			**Clayey SILT**: low plasticity, brown orange mottled black.					
			VS >182 kPa		2.0			**SILT**: non plastic, brown orange mottled black white.					
					2.5			Hand Auger HAL513 terminated at 2.0 m Target depth					
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL513-514***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***26 Oct 2017***
principal:	
date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 513 AND 514***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 213/ 39 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
					0.5			**SILT**: non plastic, pale brown, with minor fine grained sand.		H	⊕ ⊙		**FILL**
			VS 166/ 35 kPa					**Clayey SILT**: low plasticity, pale brown mottled pale grey/pale orange, with minor fine grained sand.		VSt	⊕ ⊙		
					1.0			Refusal on gravel hardfill					
								Hand Auger HAL513-514 terminated at 1.0 m Refusal					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	**HAL514**
sheet:	1 of 1
project no.	**773-GENZTAUC13086AP**
client:	**THE LAKES (2012) LIMITED**
date started:	**07 Dec 2017**
principal:	
date completed:	**07 Dec 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**PRM**
location:	**CENTRE OF LOT 514**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH4523

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 UTP		0.5			**ORGANIC SILT**: non plastic, dark brown black.	D	H	VS UTP		**TOPSOIL**
								SILT: non plastic, pale brown, with minor fine grained sand.					**FILL**
			VS UTP					**SILT**: non plastic, grey-white, with trace clay.	M		VS UTP		
			VS 87/ 22 kPa		1.0			**SILT**: non plastic, brown, sand is fine grained.					
								Clayey SILT: low plasticity, pale grey mottled orange.		St	⊕ ⊙		
			VS UTP		1.5			**Sandy SILT**: non plastic, brown, sand is fine grained.		VSt to H			
								1.4 m: becoming grey-white			VS UTP		
					2.0			Hand Auger HAL514 terminated at 2.0 m Refusal					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	**HAL515**
sheet:	1 of 1
project no.	**773-GENZTAUC13086A**
client:	**THE LAKES (2012) LIMITED**
date started:	**26 Oct 2017**
principal:	
date completed:	**26 Oct 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**PRM**
location:	**CENTRE OF LOT 515**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 158/ 35 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
								SILT: non plastic, brown, with minor fine grained sand.					**FILL**
			VS 140/ 45 kPa		0.5			**Clayey SILT**: low plasticity, brown mottled pale orange/grey.		VSt			
								SILT: non plastic, brown mottled grey, with minor fine grained sand.					
					1.0			**SILTY SAND**: fine grained, pale grey-white. Too stiff to auger further					**TE RANGA IGNIMBRITE**
								Hand Auger HAL515 terminated at 1.2 m Refusal					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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
S saturated
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.	***HAL515-516***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***02 Nov 2017***
principal:	
date completed:	***02 Nov 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 515 AND 516***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 UTP VS 196/ 45 kPa VS 199/ 58 kPa		0.5 1.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
								Clayey SILT: low plasticity, grey mottled orange. 0.45 m: with minor fine grained sand	M	VSt	VS UTP		**FILL**
								SILT: non plastic, brown, with trace fine grained sand.					
								SAND: fine grained, grey mottled pale brown.		D			**TE RANGA IGNIMBRITE**
					1.5 2.0 2.5 3.0 3.5 4.0 4.5			Hand Auger HAL515-516 terminated at 1.3 m Refusal					

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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
- S saturated
- 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.	***HAL516***		
sheet:	1 of 1		
project no.	***773-GENZTAUC13086A***		
client:	***THE LAKES (2012) LIMITED***	date started:	***26 Oct 2017***
principal:		date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***	logged by:	***SBG***
location:	***CENTRE OF LOT 516***	checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 157/ 46 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
								SILT: non plastic, brown orange, trace fine to medium grained sand.	M				**FILL**
								Clayey SILT: low plasticity, pale brown grey brown, minor to some fine to medium grained sand.		VSt	⊕ ⊙		
			VS 172/ 29 kPa		0.5			**SILT**: non plastic, brown orange, trace clay, trace fine to medium grained sand.			⊕ ⊙		
					1.0			**SAND**: fine to medium grained, grey brown black, trace silt.					**MATUA SUBGROUP**
					1.5			**Sandy SILT**: non plastic, brown grey mottled black, sand is fine to medium grained.					DCP REFUSAL
					2.0			Hand Auger HAL516 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL516-517***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***02 Nov 2017***
principal:	
date completed:	***02 Nov 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 516 AND 517***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 UTP VS >247 kPa VS 125/ 32 kPa VS 90/ 34 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
					0.5			**Sandy SILT**: non plastic, pale brown mottled pale orange, sand is fine to medium grained, with trace clay.		H	VS UTP		**FILL**
								Clayey SILT: low plasticity, brown.					
					1.0			**Silty CLAY**: low plasticity, pale grey-white mottled pale orange.		VSt			
										St			DCP REFUSAL
					1.5			**Sandy SILT**: non plastic, brown mottled grey, sand is fine grained.					
								SAND: fine grained, brown mottled orange brown, with trace silt.					
					2.0			Hand Auger HAL516-517 terminated at 2.0 m Refusal					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL517***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***02 Nov 2017***
principal:	date completed: ***02 Nov 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***CENTRE OF LOT 517***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH1447

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M	H			**TOPSOIL**
			VS 140/ 25 kPa		0.5			**SILT**: non plastic, grey mottled pale orange, with trace to minor clay.					**FILL**
			VS 147/ 42 kPa		1.0			**SILTY SAND**: fine to medium grained, pale grey mottled pale orange.	W	MD			
			VS UTP		1.5			**SILT**: non plastic, brown.	M	VSt to H	VS UTP		
			VS 231/ 45 kPa		2.0			Hand Auger HAL517 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL517-518***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***02 Nov 2017***
principal:	
date completed:	***02 Nov 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 517-518***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 179/ 56 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M	VSt			**TOPSOIL**
								SILT: non plastic, orange-brown, with trace fine grained sand.					**FILL**
					0.5			**Silty CLAY**: medium to high plasticity, grey-brown.					
			VS 132/ 31 kPa					**SILT**: non plastic, orange-brown mottled black, with trace fine grained sand.					
			VS 152/ 40 kPa		1.0			1.0 m: with minor clay, and some fine to medium grained sand					
			VS 92/ 46 kPa		1.5			**Clayey SILT**: low plasticity, orange-brown mottled dark brown/white.		St			
			VS UTP		2.0			Hand Auger HAL517-518 terminated at 2.0 m Target depth			VS UTP		
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL518***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***02 Nov 2017***
principal:	date completed: ***02 Nov 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 518***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 161/ 40 kPa VS 136/ 31 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M	VSt			**TOPSOIL**
					0.2			**Sandy SILT**: non plastic, orange-brown mottled white/dark brown.	M				**FILL**
					0.5			**Silty CLAY**: low to medium plasticity, grey-brown mottled black/dark brown, with minor fine grained sand.			⊕ ⊙		
					1.0			**SAND**: fine to medium grained, grey-brown, with trace silt.		D	⊕ ⊙		DCP REFUSAL
					1.5								
					2.0			Hand Auger HAL518 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL518-519***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***02 Nov 2017***
principal:	
date completed:	***02 Nov 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 518-519***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 153/ 29 kPa VS UTP		0.0			**ORGANIC SILT**: non plastic, dark brown black mottled orange, trace fine to medium grained sand.	M				**TOPSOIL**
								SILT: non plastic, brown.					**FILL**
					0.5			**Sandy SILT**: non plastic, pale grey mottled pale orange/pale brown, sand is fine grained.		VSt			
								Silty CLAY: low to medium plasticity, pale grey mottled pale orange.			⊕ ⊙		
								SILT: non plastic, brown.					
					1.0					H	VS UTP		
								SAND: fine grained, pale grey-white.		D			**TE RANGA IGNIMBRITE**
								too stiff to auger further at 1.3 m					
					1.5			Hand Auger HAL518-519 terminated at 1.3 m Refusal					
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL519***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***02 Nov 2017***
principal:	
date completed:	***02 Nov 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***CENTRE OF LOT 519***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black mottled orange, trace fine to medium grained sand.	D to M	H			**TOPSOIL**
									M				**FILL**
			VS 231/ 51 kPa		0.5			**SILT**: non plastic, orange-brown, with minor clay.					
			VS 183/ 29 kPa		1.0			**Sandy SILT**: non plastic, pale orange-brown.		VSt to H			
					1.5								DCP REFUSAL
								SAND: fine to medium grained, grey.					**TE RANGA IGNIMBRITE**
					2.0			Hand Auger HAL519 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL519-520***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***02 Nov 2017***
principal:	
date completed:	***02 Nov 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 519-520***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown black mottled orange, trace fine to medium grained sand.	M	H	VS UTP		**TOPSOIL**
			VS UTP		0.5			**SILT**: non plastic, brown mottled pale brown/pale grey/pale orange, with minor fine grained sand.			VS UTP		**FILL**
			VS UTP		1.0						VS UTP		
			VS 128/ 31 kPa		1.5			**Clayey SILT**: low plasticity, brown.		VSt	⊕ ⊙		
			VS UTP					**SILT**: non plastic, brown, with trace fine grained subrounded gravel, with trace fine grained sand.		H	VS UTP		
			VS UTP		2.0			Hand Auger HAL519-520 terminated at 2.0 m Target depth			VS UTP		
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL520***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***02 Nov 2017***
principal:	date completed: ***02 Nov 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 520***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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 >213 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black mottled orange, trace fine to medium grained sand.	M	H			**TOPSOIL**
			VS 179/ 31 kPa		0.5			**SILT**: non plastic, pale brown mottled pale orange.		VSt			**FILL**
			VS 197/ 49 kPa		1.0			**Sandy SILT**: non plastic, pale brown mottled pale orange-brown, sand is fine grained.					
			VS 179/ 34 kPa		1.5			**Clayey SILT**: low plasticity, brown, with minor fine grained sand.					
								SAND: fine to medium grained, grey, with trace silt.					
					2.0			Hand Auger HAL520 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL520-521***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***02 Nov 2017***
principal:	date completed: ***02 Nov 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***BOUNDARY OF LOT 520-521***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL819

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black mottled orange, trace fine to medium grained sand.	D to M				**TOPSOIL**
								SILT: non plastic, orange-brown mottled black, with minor fine grained sand.	M	VSt			**FILL**
			VS >247 kPa		0.5			0.4 m: with minor clay					
										St			
			VS 204 kPa		1.0			**Clayey SILT**: low plasticity, orange-brown, with minor fine to medium grained sand.		VSt			
			VS >247 kPa		1.5			**Sandy SILT**: non plastic, brown-grey mottled black/white, sand is fine to medium grained.	M to W	H			
			VS >247 kPa		2.0			Hand Auger HAL520-521 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL521***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***02 Nov 2017***
principal:	date completed: ***02 Nov 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***CENTRE OF LOT 521***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 147/ 50 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black mottled orange, trace fine to medium grained sand.	M	VSt			**TOPSOIL**
								Clayey SILT: low plasticity, brown mottled pale pink/ dark brown, with minor fine grained sand, and trace fine grained subrounded gravel.					**FILL**
			VS 166/ 50 kPa		0.5								
			VS UTP		1.0			**SILTY SAND**: fine grained, pale brown.			VS UTP		
					1.5			1.4 m: becoming pale brown mottled pale grey/pale orange					
			VS 179/ 61 kPa										
			VS 176/ 48 kPa		2.0			Hand Auger HAL521 terminated at 2.0 m Refusal					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:09

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
S saturated
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.	***HAL521c***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***02 Nov 2017***
principal:	
date completed:	***02 Nov 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***CORNER LOT 521***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 166/ 42 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black mottled orange, trace fine to medium grained sand.	D to M				**TOPSOIL**
								SILT: non plastic, orange-brown mottled dark brown.	M	VSt			**FILL**
			VS 162/ 39 kPa		0.5			**Clayey SILT**: non plastic to low plasticity, orange-brown mottled dark black, with minor fine to medium grained sand.					
			VS 162/ 58 kPa		1.0			**Silty CLAY**: low plasticity, brown grey mottled dark brown, with minor fine to medium grained sand.					
			VS 196/ 45 kPa		1.5			**Sandy SILT**: non plastic, pale brown-grey, sand is fine to medium grained.					
			VS 179/ 45 kPa		2.0			Hand Auger HAL521c terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	**HAL522**
sheet:	1 of 1
project no.	**773-GENZTAUC13086AP**
client:	**THE LAKES (2012) LIMITED**
date started:	**05 Oct 2017**
principal:	
date completed:	**05 Oct 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**SBG**
location:	**CENTRE OF LOT 522**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 817

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			VS 104/ 25 kPa		0.0			**SILT**: non plastic to low plasticity, brown orange mottled grey.	D to M				**FILL**
			VS >247 kPa		0.5			**Clayey SILT**: low to medium plasticity, brown orange mottled white black grey.	M	VSt / H			
			VS >247 kPa		1.0			**SILT**: non plastic, brown orange mottled black white, trace fine to medium grained sand.					
			VS >247 kPa		1.5			**Clayey SILT**: low plasticity, brown orange mottled white grey black, trace fine to medium grained sand.					
			VS >247 kPa		2.0			**SILT**: non plastic, brown orange, trace fine to medium grained sand.					
					2.5			Hand Auger HAL522 terminated at 2.0 m Target depth					
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL522-523***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 522 AND 523***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 UTP VS UTP VS UTP VS 140/ 35 kPa VS 140/ 32 kPa VS 140/ 37 kPa		0.5 1.0 1.5 2.0			**ORGANIC SILT**: non plastic, dark brown-black.	M				**TOPSOIL**
								Clayey SILT: low plasticity, brown mottled dark brown/pink, with trace fine to medium grained sand.		H	VS UTP VS UTP VS UTP		**FILL**
								1.3 m: brown orange		VSt			
								Hand Auger HAL522-523 terminated at 2.0 m Target depth					
					2.5 3.0 3.5 4.0 4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:09

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
S saturated
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.	***HAL522C***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***ODS***
location: ***SOUTHERN CORNER OF LOT 522***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 >213 kPa		0.5			**SILT**: low plasticity, orange brown mottled brown and grey, with minor clay and trace to minor fine to medium grained sand.	M	H to VSt			**FILL**
			VS >213 kPa										
			VS 182/ 52 kPa		1.0			1.2 m: becomes orange brown mottled brown with some clay and trace fine grained sand					
			VS 184/ 50 kPa		1.5								
			VS 150/ 40 kPa		2.0			Hand Auger HAL522C terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:09

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
S saturated
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.	***HAL523***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 523***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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			VS >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black mottled orange, trace fine to medium grained sand.	D to M				**TOPSOIL**
			VS >247 kPa		0.5			**Clayey SILT**: low plasticity, brown orange mottled grey black white.	M	H			**FILL**
			VS >247 kPa										
			VS >247 kPa		1.0			**SILT**: non plastic, brown orange, trace fine to medium grained sand.					
			VS UTP		1.5						VS UTP		
			VS UTP								VS UTP		
					2.0			Hand Auger HAL523 terminated at 2.0 m					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL523-524***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***EASTERN BOUNDARY OF LOT 523 AND 524***
checked by:	***DBC***

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

drill model: Hand Auger | 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 >213 kPa		0.0			**SILT**: low plasticity, orange brown mottled brown and grey, with minor clay and trace fine grained sand.	D to M	H	⊙		**FILL**
			VS >213 kPa		0.5			0.5 m: with some clay			⊙		
			VS >213 kPa		1.0						⊙		
			VS >213 kPa		1.5						⊙		
			VS >213 kPa		2.0			Hand Auger HAL523-524 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL524***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***CENTRE OF LOT 524***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 217 kPa VS 140 kPa VS 247 kPa VS 247 kPa VS 247 kPa VS UTP		0.5 1.0 1.5			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
								Clayey SILT: low to medium plasticity, brown orange mottled black white grey.	M	H VSt H	VS UTP		**FILL**
								SILT: low plasticity, brown orange mottled black white, minor fine to medium grained sand. **Sandy SILT**: non plastic, brown orange mottled grey white. 1.5 m: becoming slightly plastic					
					2.0 2.5 3.0 3.5 4.0 4.5			Hand Auger HAL524 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
- S saturated
- 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.	***HAL524-525***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 524 AND 525***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 215/ 37 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS UTP		0.5			**Clayey SILT**: low plasticity, brown mottled dark brown/pink, with trace fine to medium grained sand.	M	VSt	VS UTP		**FILL**
			VS 140/ 40 kPa		1.0			1.2 to 1.3 m: becoming moderately plastic					
			VS UTP		1.5						VS UTP		
			VS 194/ 35 kPa		2.0			**Sandy SILT**: non plastic, pale grey, sand is fine grained.					
					2.5			Hand Auger HAL524-525 terminated at 2.0 m Target depth					
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	**HAL525**
sheet:	1 of 1
project no.	**773-GENZTAUC13086AP**
client: **THE LAKES (2012) LIMITED**	date started: **05 Oct 2017**
principal:	date completed: **05 Oct 2017**
project: **THE LAKES, STAGE 3I GCR**	logged by: **ODS**
location: **CENTRE OF LOT 525**	checked by: **DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 >213 kPa		0.5			**ORGANIC SILT**: non plastic, black.	D to M				**TOPSOIL**
								SILT: non plastic to low plasticity, orange brown mottled grey and dark brown, with trace to minor clay and trace fine to medium grained sand.					**FILL**
								ORGANIC SILT: non plastic, black mottled orange brown.		VSt to H			**BURIED TOPSOIL**
			VS 173/ 31 kPa		1.0			**SILT**: low plasticity, orange brown mottled brown and grey, with minor clay and trace fine to coarse grained sand.					**FILL**
			VS >213 kPa		1.5			1.3 m: with some clay and trace fine grained sand					
			VS 208/ 61 kPa		2.0			Hand Auger HAL525 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL525-526***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***EASTERN BOUNDARY OF LOT 525 AND 526***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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			VS >213 kPa		0.5			**ORGANIC SILT**: non plastic, black.	M				**TOPSOIL**
			VS >213 kPa		1.0			**SILT**: low plasticity, orange brown mottled brown and grey, with minor clay and trace fine to coarse grained sand.		VSt to H			**FILL**
			VS >213 kPa		1.5			0.5 m: perched water table encountered	S				
			VS 157/ 40 kPa		2.0			Hand Auger HAL525-526 terminated at 2.0 m Target depth					
			VS >213 kPa		2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL526***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 526***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black, trace fine grained sand.	D to M				**TOPSOIL**
			VS >247 kPa		0.5			**Clayey SILT**: low to medium plasticity, brown orange mottled white black red.	M	H			**FILL**
			VS >247 kPa					**Sandy SILT**: low plasticity, pale grey mottled brown orange black, minor clay.					
			VS >247 kPa		1.0			**Clayey SILT**: low plasticity, brown orange mottled black white.					
			VS >247 kPa		1.5			**SILT**: non plastic, brown mottled black white grey.					
			VS >247 kPa		2.0			Hand Auger HAL526 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL526-527***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 526 AND 527***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 215/ 40 kPa		0.5			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS >224 kPa		1.0			**Clayey SILT**: low plasticity, dark brown mottled pale orange/pale pink, with trace fine grained sand.	M	H			**FILL**
			VS UTP		1.5			1.1 to 1.3 m: becoming moderately plastic			VS UTP		
			VS UTP		2.0			Hand Auger HAL526-527 terminated at 2.0 m Target depth			VS UTP		
			VS UTP		2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL527***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 527***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black mottled red white grey, trace fine to medium grained sand.	D to M	H			**TOPSOIL**
			VS >247 kPa		0.5			**SILT**: low plasticity, brown orange mottled white black, trace fine to medium grained sand, minor clay.	M				**FILL**
			VS >247 kPa		1.0								
			VS >247 kPa		1.5			**Clayey SILT**: low to medium plasticity, brown orange mottled black white grey.			VS UTP		
			VS >247 kPa		2.0			**SILT**: low plasticity, brown orange, trace fine to medium grained sand.					
			VS UTP					Hand Auger HAL527 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL527-528***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***04 Oct 2017***
principal:	
date completed:	***04 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 527 AND 528***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 >224 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
								Sandy SILT: non plastic, brown mottled orange-brown and dark brown, sand is fine to medium grained.	M				**FILL**
			VS UTP		0.5			**Clayey SILT**: low plasticity, brown mottled dark brown/white/pale brown, with trace fine to medium grained sand.		H	⊙		
			VS UTP		1.0			**SILTY SAND**: fine to medium grained, pale grey-white.			VS UTP		
			VS UTP					**Clayey SILT**: low plasticity, brown mottled brown/dark brown/ orange-brown, with minor fine grained sand.		H	VS UTP		
			VS UTP		1.5						VS UTP		
			VS UTP		2.0			Hand Auger HAL527-528 terminated at 2.0 m Target depth			VS UTP		
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL528***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 528***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 182/ 50 kPa		0.0			**ORGANIC SILT**: non plastic, black.	D				**TOPSOIL**
			VS 197/ 52 kPa		0.5			**SILT**: low plasticity, orange brown mottled brown, with minor clay.	M	VSt to H			**FILL**
			VS >213 kPa		1.0			1.2 m: becomes grey mottled brown. With minor to some clay and trace fine grained sand					
			VS >213 kPa		1.5			1.5 m: becomes brown mottled grey. With minor to some fine to medium grained sand and with trace to minor clay					
			VS 175/ 40 kPa		2.0			**Sandy SILT**: non plastic to low plasticity, brown mottled grey and orange brown, with trace clay. Sand is fine grained.	W	VSt			
								Hand Auger HAL528 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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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A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HAL528-529***		
sheet:	1 of 1		
project no.	***773-GENZTAUC13086AP***		
client:	***THE LAKES (2012) LIMITED***	date started:	***04 Oct 2017***
principal:		date completed:	***04 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***	logged by:	***PRM***
location:	***BOUNDARY OF LOT 528 AND 529***	checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 143/ 32 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M	VSt to H	⊕ ⊙		**TOPSOIL**
			VS >224 kPa		0.5			**SILT**: non plastic, brown mottled pale orange and dark brown, with trace fine grained sand.	M		⊙		**FILL**
			VS >224 kPa		1.0			**Clayey SILT**: low plasticity, brown mottled orange-brown, with trace fine to medium grained sand.			⊙		
			VS 98/ 25 kPa		1.5			1.5 m: becoming moderately plastic, white mottled orange-brown and brown		St to VSt	⊕ ⊙		
			VS 105/ 28 kPa		2.0			Hand Auger HAL528-529 terminated at 2.0 m Target depth			⊕ ⊙		
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL529-530***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***04 Oct 2017***
principal:	date completed: ***04 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***BOUNDARY OF LOT 529 AND 530***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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			VS 247/ 42 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown black mottled grey white.	D to M				**TOPSOIL**
			VS 247 kPa		0.5			**Sandy SILT**: low plasticity, brown orange mottled dark brown black white. 0.4 m: becoming slightly plastic	M	H			**FILL**
			VS 247 kPa		1.0			**SILTY SAND**: fine to medium grained, brown orange mottled white black. 0.9 m: becoming pale grey mottled brown orange black		H			
			VS 247 kPa		1.5			**Sandy SILT**: low plasticity, brown orange mottled grey white black.	S W				
		04/10/17	VS 247 kPa		2.0			Hand Auger HAL529-530 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL530***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***04 Oct 2017***
principal:	date completed: ***04 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 530***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 199/ 48 kPa		0.5			**ORGANIC SILT**: low plasticity, dark brown black mottled grey white.	M				**TOPSOIL**
			VS 134/ 22 kPa					**SILT**: low plasticity, orange-brown mottled brown, with minor clay and trace fine to coarse grained sand.		VSt			**FILL**
			VS 115/ 38 kPa		1.0			0.9 m: with minor fine to medium grained sand	W				
			VS 103/ 38 kPa		1.5								
			VS 89/ 31 kPa		2.0					St			
								Hand Auger HAL530 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL531***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***04 Oct 2017***
principal:	date completed: ***04 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 531***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 >213 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS >213 kPa		0.5			**SILT**: low plasticity, orange-brown mottled brown/grey, with minor clay, and trace fine to coarse grained sand.	M	H			**FILL**
			VS >213 kPa		1.0			1.1 m: with minor fine to medium grained sand	W				
			VS >213 kPa		1.5			1.6 m: with trace fine to medium grained sand					
			VS >213 kPa		2.0			Hand Auger HAL531 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL531-532***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***04 Oct 2017***
principal:	
date completed:	***04 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 531 AND 532***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black mottled orange, trace fine grained sand.	D to M	VSt to H			**TOPSOIL**
			VS 247 kPa		0.5			**Sandy SILT**: non plastic, brown orange mottled black white, sand fine to medium grained.	M				**FILL**
			VS 247 kPa					0.9 m: becoming slightly plastic					
			VS 162/ 58 kPa		1.0			1.0 m: becoming mottled dark brown black white					
			VS 179/ 40 kPa		1.5								
			VS 204/ 25 kPa		2.0			**SILTY SAND**: fine to medium grained, pale brown orange.	W				
								Hand Auger HAL531-532 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL532***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 532***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 >213 kPa		0.5			**ORGANIC SILT**: non plastic, black. 0.3 m: becoming mottled brown	D to M				**TOPSOIL**
			VS >213 kPa VS 157/ 46 kPa VS >213 kPa VS 132/ 28 kPa		1.0 1.5 2.0			**SILT**: low plasticity, orange brown mottled brown and grey, with minor to some clay and with trace fine grained sand. 0.6 to 0.65 m: mixed topsoil 1.5 to 1.6 m: trace organic odour Hand Auger HAL532 terminated at 2.0 m Target depth	M	VSt to H			**FILL**
					2.5 3.0 3.5 4.0 4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:10

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
S saturated
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.	***HAL532-533***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***WESTERN BOUNDARY OF LOT 532 AND 533***
checked by:	***DBC***

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

drill model: Hand Auger | 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 179/ 52 kPa		0.0			**ORGANIC SILT**: non plastic, black.	D to M				**TOPSOIL**
			VS >213 kPa		0.5			**SILT**: low plasticity, orange brown mottled brown, with trace fine grained sand and minor clay.	M	VSt to H	⊕ ⊙		**FILL**
					1.0			**SAND**: fine to medium grained, orange brown mottled brown, with minor silt.		MD			
					1.5			1.3 m: with some silt	M to W				
					2.0			Hand Auger HAL532-533 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL533***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***04 Oct 2017***
principal:	date completed: ***04 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***CENTRE OF LOT 533***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 143/ 35 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
								Clayey SILT: low plasticity, dark brown mottled pale brown/orange, with minor fine grained sand.	M	VSt			**FILL**
			VS 196/ 35 kPa		0.5								
								Sandy SILT: non plastic, pale white-grey mottled pale orange, sand is fine grained.					
			VS 140/ 37 kPa		1.0								
			VS 140/ 37 kPa		1.5								
			VS 105/ 35 kPa		2.0			Hand Auger HAL533 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL533-534***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***04 Oct 2017***
principal:	
date completed:	***04 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 533 AND 534***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M	VSt			**TOPSOIL**
								SILT: non plastic, pale orange-brown, with some fine grained sand.	M				**FILL**
					0.5			**SILTY SAND**: fine to medium grained, white-grey. 0.7 m: becoming pale grey-white		MD	VS UTP		
					1.0			**SILTY SAND**: fine to medium grained, white-grey.					
					1.5								
					2.0			Hand Auger HAL533-534 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL534***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***04 Oct 2017***
principal:	date completed: ***04 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 534***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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			0.0			**ORGANIC SILT**.	D				**TOPSOIL**
					0.5			**SAND**: fine to coarse grained, orange pale brown, some silt. 0.4 m: becoming pale brown with trace to minor silt	D to M	MD			**FILL**
					1.0			**SAND**: fine to coarse grained, grey, some silt.	M				
					1.5								
					2.0			Hand Auger HAL534 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:10

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
S saturated
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.	***HAL534-535***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***04 Oct 2017***
principal:	
date completed:	***04 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 534 and 535***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown mottled orange brown, trace fine grained sand.	D to M	MD			**TOPSOIL**
			VS 213/ 48 kPa		0.5			**SAND**: fine to medium grained, pale brown mottled white black, minor silt.	M				**FILL**
			VS 162/ 29 kPa		1.0			0.7 m: becoming brown orange mottled dark brown black white					
			VS 193/ 45 kPa		1.5			1.2 m: becoming pale brown mottled black white dark brown					
			VS 193/ 42 kPa		2.0			Hand Auger HAL534-535 terminated at 2.0 m Target depth					
			VS 196/ 104 kPa		2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL535***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***04 Oct 2017***
principal:	date completed: ***04 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 535***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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**: non plastic, dark brown black, trace fine grained sand.	D to M				**FILL**
								SAND: fine to medium grained, pale brown orange mottled white black.	M	L to D			
					0.5								
								0.8 m: with trace silt					
					1.0								
					1.5			1.6 m: with minor silt					
					2.0			Hand Auger HAL535 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:10

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
S saturated
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.	***HAL535-536***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***04 Oct 2017***
principal:	
date completed:	***04 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 535 AND 536***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M		VS UTP		**TOPSOIL**
					0.5			**SILTY SAND**: fine to medium grained, white-grey mottled pale orange, with trace clay.	M	MD			**MATUA SUBGROUP**
					1.0								
					1.5			**CLAYEY SAND**: fine to medium grained, white mottled pale orange/dark brown, clay is slightly plastic.		L			
					2.0			Hand Auger HAL535-536 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:10

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
S saturated
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.	**HAL536**
sheet:	1 of 1
project no.	**773-GENZTAUC13086A**
client:	**THE LAKES (2012) LIMITED**
date started:	**04 Oct 2017**
principal:	
date completed:	**04 Oct 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**ODS**
location:	**CENTRE OF LOT 536**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 193/ 40 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
					0.5			**Clayey SILT**: low plasticity, orange-brown mottled brown/dark brown, with trace fine to medium grained sand.	M	VSt MD	⊕ ⊙		**FILL**
					1.0			**SAND**: fine to coarse grained, grey, with minor silt, and trace subrounded fine grained gravel. 0.8 m: becoming fine grained with some silt, gravel absent					
					1.5								
					2.0			Hand Auger HAL536 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:10

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
S saturated
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.	***HAL536-537***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***04 Oct 2017***
principal:	
date completed:	***04 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***BOUNDARY OF LOT 536 AND 537***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
								SILT: low plasticity, orange-brown mottled brown, with minor clay and trace fine to coarse grained sand.	M	H	VS UTP		**FILL**
					0.5			**SAND**: fine to medium grained, brown mottled grey, with minor silt.	M to W	MD to D			
					1.0			**SAND**: fine to medium grained, pale grey, with minor silt.					
					1.5								
					2.0			Hand Auger HAL536-537 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:10

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
S saturated
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.	***HAL537***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***06 Oct 2017***
principal:	date completed: ***06 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 537***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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			0.0			**ORGANIC SILT**: non plastic to low plasticity, dark brown black mottled orange white.	D to M				**TOPSOIL**
								SAND: fine to medium grained, pale brown orange mottled white black, trace silt.	M	L to MD			**FILL**
					0.5			0.6 m: becoming pale brown mottled white black					
					1.0								
					1.5			**SAND**: fine to medium grained, pale brown mottled white black, some silt.					**TE RANGA IGNIMBRITE**
					2.0			Hand Auger HAL537 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL537-538***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***04 Oct 2017***
principal:	date completed: ***04 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***ODS***
location: ***BOUNDARY OF LOT 537 AND 538***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 150/ 36 kPa		0.0			**ORGANIC SILT**: non plastic, black.	D to M				**TOPSOIL**
			VS 92/ 31 kPa		0.5			**SILT**: low plasticity, orange brown, minor clay, trace fine grained sand.	M	VSt			**FILL**
			VS 136/ 31 kPa		1.0			0.9 m: becoming mottled brown with trace fine to medium grained sand 1.0 m: with some fine to medium grained sand		St			
					1.5			**SAND**: fine to medium grained, brown, minor silt. 1.4 m: becoming grey brown		L to MD			
					2.0			**SAND**: fine to medium grained, grey, minor to some silt.	M to W				
								Hand Auger HAL537-538 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
S saturated
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.	***HAL538***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***04 Oct 2017***
principal:	
date completed:	***04 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***CENTRE OF LOT 538***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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			0.0			**ORGANIC SILT**: non plastic, dark brown mottled black orange.	D to M				**TOPSOIL**
					0.5			**SAND**: fine to medium grained, pale brown grey mottled white black, minor silt.	M	MD			**FILL**
					1.0								
					1.5				W				
					2.0			Hand Auger HAL538 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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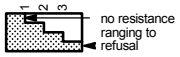
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

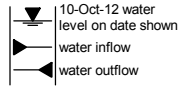
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- 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.	***HAL538-539***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 538 AND 539***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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**: non plastic, dark brown black mottled orange.	D to M				**TOPSOIL**
					0.5			**SAND**: fine to medium grained, pale brown orange, minor silt.	M	L to MD			**FILL**
					1.0			0.6 m: becoming pale brown mottled black white orange					
					1.5				W				
					2.0			Hand Auger HAL538-539 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL540***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***06 Oct 2017***
principal:	date completed: ***06 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 540***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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 black.	D to M				**TOPSOIL**
					0.5			**SAND**: fine to medium grained, pale grey brown, trace silt.	M	MD			**FILL**
					1.0			0.9 m: with trace clay					
					1.5			**SILTY SAND**: fine to medium grained, brown grey mottled dark brown, trace clay.					
					2.0			**SAND**: fine to medium grained, pale grey brown.					
					2.5								
					3.0			Hand Auger HAL540 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL540-541***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 540 AND 541***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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**: non plastic, dark brown-black.	D to M				**TOPSOIL**
					0.5			**SILTY SAND**: fine grained, pale grey-white.	M	D			**FILL**
					1.0					MD to D			
					1.5					D			
					2.0			Hand Auger HAL540-541 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL540C***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***WESTERN CORNER OF LOT 540***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 114/ 34 kPa		0.5			**SILTY SAND**: fine to coarse grained, orange brown mottled grey.	M	L to MD	⊕ ⊙		**FILL**
					1.0			0.5 m: becomes brown					
			VS 117/ 31 kPa		1.5			**Sandy SILT**: non plastic, grey, with trace clay. Sand is fine to medium grained.	W	VSt	⊕ ⊙		
			VS 113/ 31 kPa		2.0			Hand Auger HAL540C terminated at 2.0 m Target depth			⊕ ⊙		
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL541-542***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***BOUNDARY OF LOT 541 AND 542***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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**: non plastic, dark brown black, trace fine to medium grained sand.	D to M				**TOPSOIL**
					0.5			**SILTY SAND**: fine to medium grained, pale grey brown.	M	MD			**FILL**
					1.0			**SAND**: fine to medium grained, pale grey.					**TE RANGA IGNIMBRITE**
					2.0			Hand Auger HAL541-542 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL542***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***CENTRE OF LOT 542***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 >213 kPa		0.5			**ORGANIC SILT**: non plastic, black.	D to M				**TOPSOIL**
			VS >213 kPa		1.0			**SILT**: low plasticity, orange brown mottled grey and brown, with minor to some clay and trace fine to medium grained sand. 0.7 m: with minor fine to medium grained sand	M	H			**FILL**
					1.5			**SAND**: fine to medium grained, brown grey, with trace to minor silt. 1.3 m: becomes pale grey with trace fine subrounded pumiceous gravel		MD to D			**TE RANGA IGNIMBRITE**
					2.0								
					2.5								
					3.0			Hand Auger HAL542 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL542-543***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***WESTERN BOUNDARY OF LOT 542 AND 543***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 158/ 42 kPa VS >247 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown black mottled orange.	D to M				**TOPSOIL**
								Clayey SILT: low to medium plasticity, orange brown, trace fine to medium grained sand.	M				**FILL**
					0.5			**SAND**: fine to medium grained, pale grey brown.		L to MD			**TE RANGA IGNIMBRITE**
					1.0								
					1.5								
					2.0								
					2.5								
					3.0			Hand Auger HAL542-543 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL543***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***CENTRE OF LOT 543***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : | vane id.: 4523

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
			VS >224 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M	H			**TOPSOIL**
			VS >224 kPa		0.5			**Clayey SILT**: low plasticity, brown mottled orange-brown/pale brown, with minor fine grained sand.	M				**FILL**
		Not Encountered						**Clayey SILT**: low to medium plasticity, white, with trace fine grained sand.					
					1.0			**Clayey SILT**: low plasticity, brown mottled orange-brown/pale brown, with minor fine grained sand.		L to D			
								SAND: fine grained, pale grey-brown, with minor silt and trace clay.					
					1.5			**Clayey SILT**: low plasticity, brown mottled orange-brown/pale brown, with minor fine grained sand.		MD			
			VS >224 kPa		2.0			**SAND**: fine grained, pale grey-brown, with minor silt and trace clay.					
			VS 73/ 22 kPa		2.5			**Clayey SILT**: non plastic, pale grey-brown, with minor fine grained sand.		St to H			
			VS >224 kPa		3.0			Hand Auger HAL543 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL543-544***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***WESTERN BOUNDARY OF LOT 543 AND 544***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 >213 kPa		0.5			**ORGANIC SILT**: non plastic, black.	D to M				**TOPSOIL**
								SILT: non plastic to low plasticity, grey mottled orange brown and brown, with minor fine to medium grained sand and with trace clay.		H			**FILL**
					1.0			**SAND**: fine to medium grained, brown grey, with minor silt.		D			
			VS >213 kPa					**SILT**: non plastic to low plasticity, orange brown mottled grey, with trace to minor fine to medium grained sand.					
					1.5			**SILT**: non plastic, orange brown, with trace fine to medium grained sand and with trace clay.		H			**POST ROTOEHU ASH**
								SAND: fine to medium grained, brown, with trace silt.		MD			**ROTOEHU ASH**
					2.0			Hand Auger HAL543-544 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	**HAL544**
sheet:	1 of 1
project no.	**773-GENZTAUC13086A**
client:	**THE LAKES (2012) LIMITED**
date started:	**05 Oct 2017**
principal:	
date completed:	**05 Oct 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**SBG**
location:	**CENTRE OF LOT 544**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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; Perched water table	VS 247 kPa; VS 196/ 66 kPa		0.0			**ORGANIC SILT**: non plastic to low plasticity, dark brown black, trace fine to medium grained sand.	D to M				**TOPSOIL**
					0.5			**Sandy SILT**: low plasticity, brown orange mottled white black. 0.5 m: becoming slightly to moderately plastic	M	VSt to H			**FILL**
					1.0			**SILTY SAND**: fine to medium grained, brown grey mottled orange dark brown. 1.6 m: becoming grey mottled orange		MD to D			
					2.0			2.0 m: becoming orange grey mottled brown	W				
					2.5				S				
					3.0			Hand Auger HAL544 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL544-545***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***BOUNDARY OF LOT 544 AND 545***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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 black, trace fine grained sand.	D to M				**TOPSOIL**
								Sandy SILT: low plasticity, brown orange mottled grey, sand fine to medium grained.	M	MD			**FILL**
					0.5			**SILTY SAND**: fine to medium grained, brown grey mottled dark brown.					
					1.0			**SAND**: fine to medium grained, brown grey, minor silt.					DCP REFUSAL
					1.5								
					2.0				S				
					2.5			**SAND**: fine to medium grained, pale grey brown.		D			**TE RANGA IGNIMBRITE**
					3.0			Hand Auger HAL544-545 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL545***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***CENTRE OF LOT 545***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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	VS 197/ 46 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
					0.5			**Clayey SILT**: low plasticity, brown mottled orange-brown/pale brown, with minor fine grained sand.	M	MD			**FILL**
			VS 179/ 31 kPa					**SILTY SAND**: fine grained, pale orange brown.		MD			
					1.0			**Clayey SILT**: low plasticity, brown mottled orange-brown/pale brown, with minor fine grained sand.		VSt to H			
			VS UTP					**SILTY SAND**: fine grained, pale orange brown.			VS UTP		
								Sandy SILT: non plastic, pale orange brown mottled white, sand is fine grained.		D			
			VS 197/ 46 kPa		1.5			**SILTY SAND**: fine grained, pale grey mottled pale orange.					DCP REFUSAL
					2.0								
					2.5			**SILTY SAND**: fine to medium grained, grey mottled orange.					**TE RANGA IGNIMBRITE**
					3.0			Hand Auger HAL545 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:10

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
S saturated
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.	***HAL545-546***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***WESTERN BOUNDARY OF LOT 545 AND 546***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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	VS >213 kPa VS >213 kPa		0.0			**ORGANIC SILT**: non plastic, black.	D to M				**TOPSOIL**
								SILT: low plasticity, orange brown mottled grey and brown, with some clay and with trace fine grained sand.		H			**FILL**
					0.5			0.4 m: becomes pale brown mottled grey, non plastic to slightly plastic with trace to minor clay and minor fine to medium grained sand					
					1.0			**SILTY SAND**: fine to medium grained, pale brown grey, with trace fine subrounded pumiceous gravel.	M to W	MD to VD			
					1.5								REFUSAL
					2.0			Hand Auger HAL545-546 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL546***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 546***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 161/ 31 kPa		0.0			**ORGANIC SILT**: non plastic, black.	D to M				**TOPSOIL**
								Sandy SILT: non plastic, orange brown mottled grey, sand is fine to medium grained.	M	VSt	⊕ ⊙		**FILL**
			VS 103/ 46 kPa		0.5			**SILT**: low plasticity, orange brown mottled grey, with minor to some clay and trace fine to medium grained sand.		VSt to H	⊕ ⊙		
			VS >213 kPa		1.0						⊙		
			VS 161/ 31 kPa		1.5			1.7 m: with trace to minor fine to medium grained sand			⊕ ⊙		
			VS >213 kPa		2.0						⊙		
								Hand Auger HAL546 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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
S saturated
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

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:10

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Engineering Log - Hand Auger

Borehole ID.	***HAL546-547***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 546 AND 547***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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 black, trace fine to medium grained sand.	D to M				**TOPSOIL**
								SILTY SAND: fine to medium grained, brown grey mottled dark brown.	S	L			**FILL**
					0.5			0.8 m: becoming mottled black					
					1.0			**SILTY SAND**: fine to medium grained, brown mottled grey, minor clay.		L to D			**TE RANGA IGNIMBRITE**
					1.5								
					2.0			Hand Auger HAL546-547 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL547***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 547***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 UTP		0.0			**ORGANIC SILT**: non plastic, black.	D to M				**TOPSOIL**
								Sandy SILT: non plastic, orange brown mottled grey, sand is fine to medium grained.					**FILL**
			VS >213 kPa		0.5			**SILT**: low plasticity, orange brown mottled grey, with minor to some clay and trace fine to medium grained sand.	M	H	VS UTP ⊙		
			VS >213 kPa		1.0			0.9 m: becomes grey mottled grey brown with some clay and with trace fine grained sand			⊙		
								1.1 m: with trace to minor clay and with minor fine to medium grained sand	W				
			VS >213 kPa		1.5			1.3 m: becomes orange brown mottled brown grey with minor clay and with trace fine grained sand	M		⊙		
			VS >213 kPa		2.0			Hand Auger HAL547 terminated at 2.0 m Target depth			⊙		
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL547-548***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***05 Oct 2017***
principal:	
date completed:	***05 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 547 AND 548***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 4523

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	M				**TOPSOIL**
								SILTY SAND: fine to medium grained, pale orange-brown-grey, with trace clay.		D	VS UTP		**FILL**
					0.5								DCP REFUSAL
			VS UTP		1.0				M to W				
			VS >213 kPa		1.5			**Clayey SILT**: non plastic, brown mottled pale brown, with trace fine grained sand.		H	VS UTP		
			VS >213 kPa		2.0			Hand Auger HAL547-548 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL548***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***06 Oct 2017***
principal:	
date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***CENTRE OF LOT 548***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS UTP		0.5			**SILT**: non plastic, pale grey-brown, with minor fine grained sand.	M	H	VS UTP		**FILL**
			VS UTP		1.0			0.6 m: with trace clay			VS UTP		
			VS UTP								VS UTP		
			VS UTP		1.5			1.5 m: refusal on gravel Hand Auger HAL548 terminated at 1.5 m Refusal			VS UTP		
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL548-549***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***06 Oct 2017***
principal:	
date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 548 AND 549***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 231/ 45 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black, trace clay.	D to M				**TOPSOIL**
								Sandy SILT: low to medium plasticity, brown orange mottled pink white black, trace clay.	M	H			**FILL**
			VS >247 kPa		0.5			**Clayey SILT**: low plasticity, brown orange mottled dark brown, trace fine to medium grained sand.					
			VS >247 kPa		1.0								
			VS >247 kPa		1.5								
			VS 213/ 42 kPa										
			VS >247 kPa		2.0			Hand Auger HAL548-549 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL549***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***06 Oct 2017***
principal:	date completed: ***06 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 549***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS >247 kPa		0.5			**Clayey SILT**: non plastic to low plasticity, brown orange mottled dark brown, trace fine to medium grained sand.	M	H			**FILL**
			VS >247 kPa										
			VS >247 kPa		1.0			**Sandy SILT**: low to medium plasticity, brown orange, minor clay.					
			VS >247 kPa					**Clayey SILT**: low to medium plasticity, brown orange mottled dark brown.					
			VS >247 kPa		1.5								
			VS >247 kPa		2.0			Hand Auger HAL549 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL549-550***		
sheet:	1 of 1		
project no.	***773-GENZTAUC13086AP***		
client:	***THE LAKES (2012) LIMITED***	date started:	***06 Oct 2017***
principal:		date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***	logged by:	***PRM***
location:	***BOUNDARY OF LOT 549 AND 550***	checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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 UTP VS UTP VS UTP VS 197/ 46 kPa VS >213 kPa		0.5 1.0 1.5 2.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M		VS UTP VS UTP VS UTP		**TOPSOIL**
								SILT: non plastic, pale orange-brown, with minor fine grained sand. 0.5 to 0.8 m: with minor clay	M	VSt to H			**FILL**
								Clayey SILT: low plasticity, brown, with minor fine grained sand.			⊕ ⊙		
								Hand Auger HAL549-550 terminated at 2.0 m Target depth			⊙		
					2.5 3.0 3.5 4.0 4.5								

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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
S saturated
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.	***HAL550***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***06 Oct 2017***
principal:	date completed: ***06 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 550***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	M				**TOPSOIL**
			VS >247 kPa		0.5			**Clayey SILT**: low plasticity, orange-brown mottled pink/black.		H			**FILL**
			VS >247 kPa		1.0								
			VS >247 kPa		1.5								
			VS >247 kPa		2.0			Hand Auger HAL550 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:11

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
S saturated
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.	***HAL550-551***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***06 Oct 2017***
principal:	
date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 550 AND 551***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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 161/ 31 kPa		0.5			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS 164/ 31 kPa		1.0			**Clayey SILT**: non plastic, pale brown mottled orange-brown, with trace pumice gravel, minor fine grained sand.	M	VSt to H			**FILL**
			VS UTP		1.5			**Clayey SILT**: non plastic, pale brown mottled orange-brown, with trace pumice gravel, minor fine grained sand. 1.2 to 2.0 m: interbedded clayey SILT and Sandy SILT at approximately 0.2m intervals			VS UTP		
			VS >213 kPa		2.0			Hand Auger HAL550-551 terminated at 2.0 m Target depth					
			VS >213 kPa		2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL551***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***06 Oct 2017***
principal:	date completed: ***06 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 551***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	M				**TOPSOIL**
								Clayey SILT: low plasticity, orange-brown mottled pink/black.		H			**FILL**
			VS >247 kPa		0.5								
			VS 231/ 45 kPa		1.0								
			VS >247 kPa		1.5								
			VS >247 kPa		2.0			Hand Auger HAL551 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:11

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
S saturated
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.	***HAL551-552***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***06 Oct 2017***
principal:	
date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 551 AND 552***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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 >213 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS >213 kPa		0.5			**Clayey SILT**: non plastic, pale orange-brown, with minor fine grained sand.	M	H			**FILL**
			VS >213 kPa		1.0								
			VS UTP		1.5						VS UTP		
			VS >213 kPa		2.0			Hand Auger HAL551-552 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL552***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***06 Oct 2017***
principal:	date completed: ***06 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 552***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown black.	D to M				**TOPSOIL**
			VS >247 kPa		0.5			**Clayey SILT**: low plasticity, brown orange mottled pink white, trace fine to medium grained sand.	M	H			**FILL**
			VS >247 kPa		1.0								
			VS >247 kPa		1.5			**SAND**: fine to medium grained, pale grey brown mottled black white, trace sub angular gravel clasts, trace silt.		MD			
			VS >247 kPa		2.0			**Sandy SILT**: low plasticity, pale brown orange mottled pink white, trace clay.		H			
					2.0			Hand Auger HAL552 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL552-553***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***06 Oct 2017***
principal:	
date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 552 AND 553***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS 196/ 42 kPa		0.5			**Clayey SILT**: non plastic, pale orange-brown mottled pale pink, with minor fine to medium grained sand.	M	VSt to H			**FILL**
			VS >247 kPa		1.0			1.0 m: becoming moderstely plastic					
			VS UTP		1.5			**Sandy SILT**: non plastic, pale brown-grey, sand is fine grained.			VS UTP		
			VS 127/ 40 kPa		2.0			**Clayey SILT**: non plastic, pale orange-brown mottled pale pink, with minor fine to medium grained sand.					
								Hand Auger HAL552-553 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL553***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***06 Oct 2017***
principal:	date completed: ***06 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 553***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown black.	D to M				**TOPSOIL**
			VS >247 kPa		0.5			**Sandy SILT**: non plastic, brown orange mottled dark brown white black, minor clay, trace sub angular gravel.	M	H			**FILL**
			VS >247 kPa		1.0			**Clayey SILT**: low to medium plasticity, brown orange mottled dark brown, trace fine to medium grained sand.					
			VS >247 kPa		1.5			**SAND**: fine to medium grained, grey brown, trace silt.					
			VS >247 kPa		2.0			**Sandy SILT**: non plastic, grey brown, minor clay.		H			
								Hand Auger HAL553 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL553-554***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***06 Oct 2017***
principal:	
date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 553 AND 554***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS >213 kPa		0.5			**Clayey SILT**: low plasticity, brown mottled pale brown/white.	M	H	⊙		**FILL**
			VS >213 kPa		1.0						⊙		
			VS >213 kPa								⊙		
			VS UTP		1.5						VS UTP		
			VS UTP		2.0			Hand Auger HAL553-554 terminated at 2.0 m Target depth			VS UTP		
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL554***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***05 Oct 2017***
principal:	date completed: ***05 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 554***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS UTP		0.5			**Clayey SILT**: non plastic, brown orange mottled white black, minor fine to medium grained sand.	M	H	VS UTP		**FILL**
			VS UTP		1.0						VS UTP		
			VS UTP		1.5			1.4 m: becoming slightly to moderatley plastic			VS UTP		
					2.0			1.8 m: becoming slightly plastic Hand Auger HAL554 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL554-555***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***06 Oct 2017***
principal:	date completed: ***06 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***BOUNDARY OF LOT 554 AND 555***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 817

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 240/ 45 kPa		0.0			**ORGANIC SILT**: low plasticity, dark brown black mottled pink white.	D to M				**TOPSOIL**
			VS >247 kPa		0.5			**Clayey SILT**: low plasticity, brown orange mottled white black pink, minor fine to medium grained sand.	M	H			**FILL**
			VS >247 kPa					0.9 to 1.1 m: with pumiceous inclusions					
			VS >247 kPa		1.0								
			VS UTP		1.5			**Sandy SILT**: non plastic, brown grey mottled white black, sand fine to medium grained, trace clay.			VS UTP		
			VS >247 kPa		2.0			Hand Auger HAL554-555 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL555***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***06 Oct 2017***
principal:	
date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***CENTRE OF LOT 555***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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 UTP		0.5			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS UTP					**Sandy SILT**: non plastic, pale orange-brown mottled brown, sand is fine to medium grained.	M	H	VS UTP		**FILL**
			VS UTP		1.0			**Clayey SILT**: low plasticity, pale orange brown mottled pale grey, with minor fine grained sand.			VS UTP		
			VS >213 kPa		1.5								
			VS UTP								VS UTP		
			VS >213 kPa		2.0			Hand Auger HAL555 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL555-556***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***06 Oct 2017***
principal:	date completed: ***06 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***BOUNDARY OF LOT 555 AND 556***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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	VS 247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS 247 kPa		0.5			**Sandy SILT**: non plastic, orange brown mottled white dark brown, sand is fine to medium grained.	M	VSt to H			**FILL**
			VS 188/ 45 kPa		1.0			**Clayey SILT**: low plasticity, orange brown mottled white pale brown, trace fine to medium grained sand.					
			VS 247 kPa		1.5			**Sandy CLAY**: low to medium plasticity, orange brown, trace fine to medium grained sand.					
			VS 247 kPa		2.0			Hand Auger HAL555-556 terminated at 2.0 m Target depth					
			VS 247 kPa		2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL556***		
sheet:	1 of 1		
project no.	***773-GENZTAUC13086A***		
client:	***THE LAKES (2012) LIMITED***	date started:	***06 Oct 2017***
principal:		date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***	logged by:	***SBG***
location:	***CENTRE OF LOT 556***	checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS >247 kPa		0.5			**SILTY SAND**: fine to medium grained, orange brown mottled grey white.	M				**FILL**
			VS >247 kPa					**Clayey SILT**: low plasticity, orange brown mottled white grey black, trace fine to medium grained sand.		H			
			VS >247 kPa		1.0								
			VS >247 kPa		1.5			1.5 m: with minor fine to medium grained sand 1.51 m: becomes slightly to moderately plastic	W		VS UTP		DCP REFUSAL
			VS UTP		2.0			Hand Auger HAL556 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL556-557***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***06 Oct 2017***
principal:	
date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 556 AND 557***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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 179/ 31 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS UTP		0.5			**Clayey SILT**: low plasticity, orange-brown, with trace fine grained sand.	M	VSt to H	⊕ ⊙		**FILL**
			VS UTP		1.0						VS UTP		
			VS UTP		1.5						VS UTP		
			VS UTP		2.0						VS UTP		
			VS 161/ 31 kPa					Hand Auger HAL556-557 terminated at 2.0 m Target depth			⊕ ⊙		
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL557***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***06 Oct 2017***
principal:	date completed: ***06 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 557***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	M				**TOPSOIL**
			VS >247 kPa		0.5			**Clayey SILT**: non plastic, orange-brown mottled white/black, with minor fine to medium grained sand.		H			**FILL**
			VS >247 kPa		1.0								
			VS >247 kPa		1.5			1.4 m: becoming slightly to moderately plastic					
			VS 209/ 45 kPa		2.0			1.8 m: becoming slightly plastic					
					2.5			Hand Auger HAL557 terminated at 2.0 m Target depth					
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL557-558***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***06 Oct 2017***
principal:	
date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 557 AND 558***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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 UTP VS UTP VS UTP		0.5 1.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
								Clayey SILT: non plastic, orange-brown, with trace fine grained sand.	M	VSt	VS UTP VS UTP VS UTP		**FILL**
					1.5 2.0 2.5 3.0 3.5 4.0 4.5			1.2 m: Refused at 3 different locations due to gravel hardfill Hand Auger HAL557-558 terminated at 1.2 m Refusal					

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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
S saturated
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.	***HAL558***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***06 Oct 2017***
principal:	
date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***CENTRE OF LOT 558***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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	VS 247 kPa VS 213/ 42 kPa VS 247 kPa VS UTP		0.5 1.0			**ORGANIC SILT**: non plastic, dark brown black, trace fine to medium grained sand. **Sandy SILT**: non plastic, brown orange mottled dark brown, sand fine to medium grained. **Clayey SILT**: low plasticity, brown orange, minor fine to medium grained sand.	D to M M	 H	VS UTP		**TOPSOIL** **FILL**
					1.5 2.0 2.5 3.0 3.5 4.0 4.5			1.2 m: Refused at 3 different locations due to gravel hardfill Hand Auger HAL558 terminated at 1.2 m Refusal					

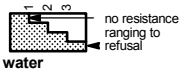
CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:11

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

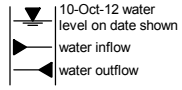
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- 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.	***HAL558-559***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***06 Oct 2017***
principal:	
date completed:	***06 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 558 AND 559***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 764

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 UTP		0.5			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS UTP		1.0			**Clayey SILT**: non plastic, orange-brown, with trace fine grained sand.	M	H	VS UTP		**FILL**
			VS UTP		1.5						VS UTP		
			VS UTP		2.0						VS UTP		
			VS UTP		2.5			Hand Auger HAL558-559 terminated at 2.0 m Target depth			VS UTP		
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL559***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***10 Oct 2017***
principal:	
date completed:	***10 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PM***
location:	***CENTRE OF LOT 559***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH1447

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 162/ 30 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M	VSt	⊕ ⊙		**TOPSOIL**
			VS >247 kPa		0.5			**Sandy SILT**: non plastic, pale brown mottled orange brown, sand fine to medium grained, minor slightly plastic clay.		H			**FILL**
			VS >247 kPa		1.0								
			VS >247 kPa		1.5								
			VS >247 kPa		2.0								
			VS >247 kPa		2.5								
			VS >247 kPa		3.0			Hand Auger HAL559 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL559-560***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***10 Oct 2017***
principal:	
date completed:	***10 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 559 AND 560***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH4523

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 >215 kPa		0.0			**SILTY SAND**: fine to medium grained, pale brown orange.	M				**FILL**
			VS >215 kPa		0.5			**Sandy SILT**: non plastic, pale brown orange mottled black white red, sand fine to medium grained.		H			
			VS >215 kPa		1.0			**Silty CLAY**: low to medium plasticity, brown orange, trace fine to medium grained sand.					
			VS >215 kPa		1.5			**Sandy SILT**: non plastic, sand fine to medium grained.					
			VS >215 kPa		2.0			Hand Auger HAL559-560 terminated at 2.0 m Target depth					
			VS >215 kPa		2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL560***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***10 Oct 2017***
principal:	date completed: ***10 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***CENTRE OF LOT 560***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH1447

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
								Sandy SILT: non plastic, pale orange brown, minor fine grained sand.					**FILL**
			VS 166/ 39 kPa		0.5			**Clayey SILT**: low plasticity, pale pink mottled pale brown.		VSt to H	VS UTP		
			VS UTP		1.0						⊕ ⊙		
			VS UTP		1.5						VS UTP		
					2.0			2.0 m: Refusal due to hardfill Hand Auger HAL560 terminated at 2.0 m Refusal			VS UTP		
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL560-561***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***10 Oct 2017***
principal:	
date completed:	***10 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 560 AND 561***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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	VS 227/ 58 kPa		0.0			**ORGANIC SILT**: dark brown black.	M				**TOPSOIL**
			VS 173/ 48 kPa		0.5			**Clayey SILT**: non plastic, brown, trace fine grained sand.		H			**FILL**
			VS >247 kPa		1.0			**Clayey SILT**: low plasticity, pale pink brown mottled brown, trace fine to medium grained sand.		St			
			VS 158/ 39 kPa		1.5					VSt to H			
			VS 144/ 32 kPa		2.0								
			VS 140/ 29 kPa		2.5								
			VS UTP								VS UTP		
			VS 147/ 32 kPa		3.0			Hand Auger HAL560-561 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL561***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***10 Oct 2017***
principal:	
date completed:	***10 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***CENTRE OF LOT 561***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH4523

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 129 kPa VS 192 kPa VS 215 kPa VS 215 kPa		0.5 1.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
								Silty CLAY: low to medium plasticity, brown orange.	M	VSt			**FILL**
								Clayey SILT: low plasticity, brown mottled pale grey pink white.		H			
					1.5 2.0 2.5 3.0 3.5 4.0 4.5			1.3 m: Refusal due to hardfill Hand Auger HAL561 terminated at 1.3 m Refusal					

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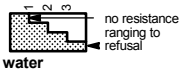
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

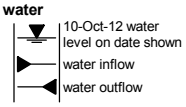
* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- 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.	***HAL561-562***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***10 Oct 2017***
principal:	
date completed:	***10 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 561 AND 562***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH1447

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 231/ 58 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
					0.5			**Sandy SILT**: non plastic, pale orange brown, sand fine to medium grained.		H			**FILL**
			VS 231/ 42 kPa					**Clayey SILT**: low plasticity, pale orange mottled pale pink brown, trace to minor fine to medium grained sand.					
			VS 144/ 42 kPa		1.0					St to VSt			
			VS 107/ 48 kPa		1.5			1.6 m: becoming moderately plastic with trace fine grained sand					
			VS 72/ 42 kPa		2.0			Hand Auger HAL561-562 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL562***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***10 Oct 2017***
principal:	date completed: ***10 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 562***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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	VS 129/ 43 kPa VS 165/ 48 kPa VS 215 kPa VS 215 kPa VS 215 kPa VS >247 kPa VS >247 kPa VS 176/ 95 kPaUTP VS 247 kPa VS 247 kPa		0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
								Silty CLAY: low to medium plasticity, brown orange.	M	VSt			**FILL**
								Clayey SILT: low plasticity, pale brown orange mottled pink white black, trace fine to medium grained sand.		H St to VSt			
								Silty CLAY: low to medium plasticity, brown orange.		VSt to H	UTP		
								Hand Auger HAL562 terminated at 3.0 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
S saturated
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.	***HAL562-563***		
sheet:	1 of 1		
project no.	***773-GENZTAUC13086AP***		
client:	***THE LAKES (2012) LIMITED***	date started:	***10 Oct 2017***
principal:		date completed:	***10 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***	logged by:	***SBG***
location:	***BOUNDARY OF LOT 562 AND 563***	checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SV817

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	VS >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS 198/ 69 kPa		0.5			**Clayey SILT**: low to medium plasticity, brown orange.	M	St			**FILL**
			VS 247 kPa		1.0			1.0 m: becoming pale brown mottled black white		VSt			
			VS 247 kPa		1.5								
			VS 209/ 76 kPa		2.0			**Silty CLAY**: medium plasticity, pale brown grey mottled dark brown, trace fine to medium grained sand.	M to W	St to VSt			
			VS 179/ 61 kPa		2.5								
			VS 213/ 66 kPa		3.0			Hand Auger HAL562-563 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL563***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***10 Oct 2017***
principal:	date completed: ***10 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***ODS***
location: ***CENTRE OF LOT 563***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 164/ 49 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS 213 kPa		0.5			**SILT**: low plasticity, orange brown mottled brown grey, trace to minor fine to medium grained sand, minor clay.		VSt to H	⊕ ⊙		**FILL**
			VS 213 kPa		1.0						⊙		
			VS 180 kPa		1.5						⊙		
			VS 213 kPa		2.0			**SILT**: low plasticity, orange brown, trace fine grained sand, trace fine grained pumice, trace sub rounded gravel.			⊙		
			VS 109/ 72 kPa		2.5			2.5 m: becoming slightly mottled grey			⊕⊕ ⊙		
			VS 213 kPa		3.0			Hand Auger HAL563 terminated at 3.0 m Target depth			⊙		
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL563-564***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***10 Oct 2017***
principal:	
date completed:	***10 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 563 AND 564***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH1447

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	VS UTP		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
			VS 176/ 48 kPa		0.5			**Sandy SILT**: non plastic, pale orange brown, sand fine grained.		VSt to H	VS UTP		**FILL**
			VS 90/ 39 kPa		1.0			**Clayey SILT**: low plasticity, brown mottled pale orange brown, trace fine grained sand.					
			VS 147/ 48 kPa		1.5			**Clayey SILT**: low to medium plasticity, brown mottled pink dark brown, trace to minor fine grained sand.		St VSt			
			VS 179/ 42 kPa		2.0			**SILT**: non plastic, orange brown, trace fine grained sand.					
								Hand Auger HAL563-564 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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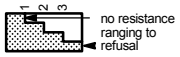
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

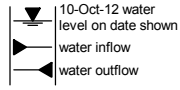
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- 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.	***HAL564***		
sheet:	1 of 1		
project no.	***773-GENZTAUC13086AP***		
client:	***THE LAKES (2012) LIMITED***	date started:	***10 Oct 2017***
principal:		date completed:	***10 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***	logged by:	***ODS***
location:	***CENTRE OF LOT 564***	checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 >213 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M	H			**TOPSOIL**
			VS >247 kPa		0.5			**SILT**: non plastic, brown mottled orange brown grey, trace to minor fine to medium grained sand, trace to minor clay.		VSt			**FILL**
			VS UTP		1.0						VS UTP		
			VS 179/ 61 kPa		1.5					H			
			VS >213 kPa		2.0					VSt to H			
			VS 134/ 58 kPa		2.5			**SILT**: low plasticity, orange brown, minor clay, trace fine to medium grained sand, trace fine grained pumice, trace sub rounded gravel.					
			VS >213 kPa		3.0			Hand Auger HAL564 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL564-565***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***10 Oct 2017***
principal:	date completed: ***10 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***BOUNDARY OF LOT 564 AND 565***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SV817

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, Dark brown black.	D to M				**TOPSOIL**
					0.5			**Clayey SILT**: low plasticity, brown orange mottled black dark brown and white.	M	H			**FILL**
			VS UTP					**Silty CLAY**: medium plasticity, brown orange mottled black dark brown, trace fine to medium grained sand.	W	St to VSt	VS UTP		
			VS UTP		1.0						VS UTP		
			VS UTP		1.5						VS UTP		
			VS 227/ 72 kPa		2.0			**Clayey SILT**: medium plasticity, brown orange, trace fine to medium grained sand.	M				
			VS 107/ 61 kPa		2.5			**Silty CLAY**: medium plasticity, dark brown mottled orange black blue, trace fine to medium grained sand.					
			VS 116/ 61 kPa										
			VS 114/ 58 kPa		3.0			Hand Auger HAL564-565 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL565***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***10 Oct 2017***
principal:	date completed: ***10 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***CENTRE OF LOT 565***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH1447

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 144/ 29 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
								Clayey SILT: non plastic, pale brown, minor fine grained sand.		VSt to H	⊕ ⊙		**FILL**
			VS 140/ 25 kPa		0.5			**Clayey SILT**: low plasticity, brown mottled pale brown.			⊕ ⊙		
			VS UTP		1.0			**SILT**: non plastic, brown, minor fine to medium grained sand.			VS UTP		
			VS 166/ 39 kPa		1.5			**Clayey SILT**: low plasticity, brown mottled pale brown.			⊕ ⊙		
			VS UTP		2.0						VS UTP		
			VS UTP		2.5						VS UTP		
			VS UTP		3.0						VS UTP		
			VS UTP					Hand Auger HAL565 terminated at 3.0 m Target depth			VS UTP		
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL565-566***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***10 Oct 2017***
principal:	
date completed:	***10 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 565 AND 566***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH4523

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 149/ 42 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS 140/ 35 kPa		0.5			**Clayey SILT**: low to medium plasticity, brown orange mottled white black grey.	M	VSt			**FILL**
			VS 143/ 42 kPa										
			VS 172/ 60 kPa		1.0			**Silty CLAY**: low to medium plasticity, brown orange mottled black white.					
			VS 224 kPa		1.5			**SILT**: non plastic, brown orange.		H			
			VS 224 kPa		2.0			Hand Auger HAL565-566 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL566***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***12 Oct 2017***
principal:	date completed: ***12 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***CENTRE OF LOT 566***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS UTP		0.5			**Clayey SILT**: low plasticity, pale brown.	M	H	VS UTP		**FILL**
			VS UTP					**SILTY SAND**: fine to medium grained, grey-brown.		MD to D	VS UTP		
					1.0			refusal on gravel					
								Hand Auger HAL566 terminated at 1.0 m Refusal					DCP REFUSAL
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL567***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***12 Oct 2017***
principal:	date completed: ***12 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 567***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH4523

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 140/ 37 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS 224 kPa		0.5			**Clayey SILT**: non plastic to low plasticity, brown orange mottled black white.	M	VSt / H	⊕ ⊙ ⊙ VS UTP		**FILL**
			VS UTP		1.0			1.0 m: Refused at 3 different locations due to gravel hardfill Hand Auger HAL567 terminated at 1.0 m Refusal					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL567-568***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***12 Oct 2017***
principal:	
date completed:	***12 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 567 AND 568***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 UTP		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	M	H	VS UTP		**TOPSOIL**
			VS UTP		0.5			**Clayey SILT**: low plasticity, brown.			VS UTP		**FILL**
			VS UTP		1.0						VS UTP		
			VS UTP		1.5						VS UTP		
			VS UTP		2.0			Hand Auger HAL567-568 terminated at 2.0 m Target depth			VS UTP		
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL568-569***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***12 Oct 2017***
principal:	
date completed:	***12 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 568 AND 569***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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 UTP VS UTP		0.5			**ORGANIC SILT**: non plastic, black.	D to M	H			**TOPSOIL**
								SILT: non plastic, pale grey brown, with minor fine grained sand and with trace clay.	M		VS UTP VS UTP		**FILL**
					1.0			1.0 m: Refusal due to gravel obstruction in hole Hand Auger HAL568-569 terminated at 1.0 m Refusal					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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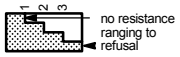
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

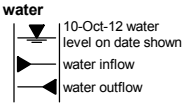
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- 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.	**HAL569**
sheet:	1 of 1
project no.	**773-GENZTAUC13086AP**
client:	**THE LAKES (2012) LIMITED**
date started:	**11 Oct 2017**
principal:	
date completed:	**11 Oct 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**ODS**
location:	**CENTRE OF LOT 569**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 >213 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	D to M				**TOPSOIL**
			VS >213 kPa		0.5			**SILT**: non plastic, orange mottled brown, with trace clay and trace fine to medium grained sand.		H			**FILL**
			VS >213 kPa		1.0								
			VS 175/ 63 kPa		1.5								
			VS 106/ 37 kPa		2.0			**SILT**: non plastic, black mottled orange-brown, with trace fine grained sand, no rootlets but trace organic odour. **SILT**: non plastic, orange mottled brown, with trace clay and trace fine to medium grained sand.	M	VSt			
			VS 188/ 61 kPa		2.5			**SILT**: low plasticity, orange-brown, with trace fine grained sand, with trace clay.		H			
			VS 208/ 46 kPa		3.0			Hand Auger HAL569 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL569-570***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***12 Oct 2017***
principal:	
date completed:	***12 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 569 AND 570***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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**: non plastic, dark brown black.	D to M				**TOPSOIL**
					0.5			**SILTY SAND**: fine to medium grained, brown orange.	M	L to MD			**FILL**
					1.0			1.2 m: becoming pale brown					
					1.5								
					2.0			Hand Auger HAL569-570 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	**HAL570**
sheet:	1 of 1
project no.	**773-GENZTAUC13086A**
client:	**THE LAKES (2012) LIMITED**
date started:	**12 Oct 2017**
principal:	
date completed:	**12 Oct 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**PRM**
location:	**CENTRE OF LOT 570**
checked by:	**DBC**

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.:

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			0.5			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
								Clayey SILT: non plastic, pale orange brown, minor fine grained sand.	M				**FILL**
					1.0								BOUNCING/DCP REFUSAL
								1.2 m: Refused at 3 different locations due to gravel hardfill Hand Auger HAL570 terminated at 1.2 m Refusal					
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL570-571***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client: ***THE LAKES (2012) LIMITED***	date started: ***12 Oct 2017***
principal:	date completed: ***12 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***BOUNDARY OF LOT 570 AND 571***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH4523

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 224 kPa VS 175/ 36 kPa VS UTP		0.5			**ORGANIC SAND**: non plastic, dark brown black.	D to M				**TOPSOIL**
								Clayey SILT: low plasticity, brown orange mottled dark brown white black, trace fine to medium grained sand.	M	VSt to H	VS UTP		**FILL**
					1.0			1.0 m: Refused at 3 different locations due to gravel hardfill Hand Auger HAL570-571 terminated at 1.0 m Refusal					BOUNCING/DCP REFUSAL
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL571***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***11 Oct 2017***
principal:	
date completed:	***11 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***CENTRE OF LOT 571***
checked by:	***DBC***

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

drill model: Hand Auger | 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 >213 kPa		0.0			**ORGANIC SAND**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS >213 kPa		0.5			**SILT**: low plasticity, orange mottled brown, with minor clay, and trace fine grained sand.		H			**FILL**
			VS 161/ 46 kPa		1.0					VSt			
			VS 147/ 37 kPa		1.5								
			VS >213 kPa		2.0					H			
			VS >213 kPa		2.5								
			VS >213 kPa		3.0			Hand Auger HAL571 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL571-572***
sheet:	1 of 1
project no.	***773-GENZTAUC13086A***
client:	***THE LAKES (2012) LIMITED***
date started:	***12 Oct 2017***
principal:	
date completed:	***12 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 571 AND 572***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : | vane id.:

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
		Not Encountered			0.0			0.0 m: Refusal on gravel after 3 tries Hand Auger HAL571-572 terminated at 0.0 m Refusal					
					0.5								
					1.0								
					1.5								
					2.0								
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL572***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***12 Oct 2017***
principal:	
date completed:	***12 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***CENTRE OF LOT 572***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SV1447

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	VS UTP		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
			VS UTP		0.5			**Clayey SILT**: low plasticity, brown mottled orange brown, trace fine grained sand.		H	VS UTP		**FILL**
			VS UTP		1.0						VS UTP		
			VS UTP		1.5						VS UTP		
			VS UTP		2.0			**Silty CLAY**: low plasticity, pale orange mottled orange, minor fine grained sand. **Clayey SILT**: low plasticity, brown mottled orange brown, trace fine grained sand.			VS UTP		
			VS UTP		2.5						VS UTP		
			VS UTP		3.0						VS UTP		
			VS 231/ 51 kPa					Hand Auger HAL572 terminated at 3.0 m Target depth			⊕ ⊙		
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL572-573***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***12 Oct 2017***
principal:	
date completed:	***12 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 572 AND 573***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: VH4523

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 194/ 41 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS 198/ 35 kPa		0.5			**SILT**: non plastic to low plasticity, brown orange mottled white dark brown black, trace clay, trace fine to medium grained sand.	M	VSt to H			**FILL**
			VS 190/ 37 kPa		1.0								
			VS 136/ 32 kPa		1.5								
			VS 211/ 55 kPa										
			VS 211/ 47 kPa		2.0			**Clayey SILT**: low plasticity, pale orange brown, trace fine grained sand.					
			VS >224 kPa					2.0 m: becoming mottled pink					
			VS >224 kPa		2.5								
			VS >224 kPa		3.0			Hand Auger HAL572-573 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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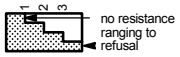
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

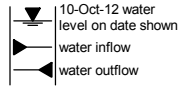
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- 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.	***HAL573***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***12 Oct 2017***
principal:	
date completed:	***12 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***CENTRE OF LOT 573***
checked by:	***DBC***

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

drill model: Hand Auger | 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 >213 kPa		0.5			**ORGANIC SILT**: non plastic, dark brown black.	D to M	H			**TOPSOIL**
								SILT: low plasticity, orange-brown mottled brown, with trace to minor clay, and trace fine grained sand.					**FILL**
			VS >213 kPa										
			VS >213 kPa		1.0			**Sandy SILT**: non plastic, grey, sand is fine to medium grained.	M				
			VS >213 kPa		1.5			1.7 m: becoming mottled clayey SILT: low plasticity, pink					
			VS 147/ 43 kPa		2.0			Hand Auger HAL573 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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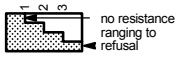
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

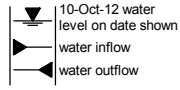
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- 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.	***HAL573-574***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***13 Oct 2017***
principal:	
date completed:	***13 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 573 AND 574***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 UTP		0.5			**Clayey SILT**: non plastic, brown.	M	H	VS UTP		**FILL**
			VS UTP					0.7 m: becoming slightly plastic			VS UTP		
			VS UTP		1.0						VS UTP		
			VS 176/ 30 kPa		1.5			**Sandy SILT**: non plastic, pale grey-brown, sand is fine to medium grained.	M to W	VSt	⊕ ⊙		**MATUA SUBGROUP**
			VS 176/ 21 kPa		2.0			**Silty CLAY**: non plastic, white-grey, with minor fine grained sand.	W		⊕ ⊙		
								Hand Auger HAL573-574 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL574***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***13 Oct 2017***
principal:	date completed: ***13 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 574***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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	VS >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS >247 kPa		0.5			**Clayey SILT**: low plasticity, brown orange mottled black white grey. 0.4 m: becoming slightly to moderately plastic 0.6 m: with trace fine to medium grained sand	M	VSt to H			**FILL**
			VS 196/ 61 kPa		1.0								
			VS >247 kPa					**SILT**: non plastic to low plasticity, brown orange, minor fine to medium grained sand.					
			VS >247 kPa		1.5			**CLAY**: medium plasticity, brown orange, trace silt. **Clayey SILT**: low plasticity, brown orange, trace fine to medium grained sand.					
			VS >247 kPa		2.0			**Sandy SILT**: non plastic, pale brown grey mottled white black, trace clay.	W				**MATUA SUBGROUP**
			VS >247 kPa		2.5								
			VS 179/ 42 kPa		3.0			Hand Auger HAL574 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL574-575***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***13 Oct 2017***
principal:	
date completed:	***13 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 574 AND 575***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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	VS UTP		0.5			**Clayey SILT**: low plasticity, brown, with trace fine grained sand.	M	H	VS UTP		**FILL**
			VS >247 kPa										
			VS 179/ 45 kPa		1.0			**Silty CLAY**: low plasticity, pale orange, with minor fine grained sand.		VSt			
			VS 213/ 32 kPa		1.5			**Sandy SILT**: non plastic, white-grey-brown, sand is fine to medium grained.		H			
			VS UTP								VS UTP		
			VS UTP		2.0			**Silty CLAY**: low plasticity, pale grey-brown, with minor fine to medium grained pumiceous sand.			VS UTP		**MATUA SUBGROUP**
			VS 231/ 58 kPa		2.5			**SILTY SAND**: fine to medium grained, grey, with minor clay.					
			VS >247 kPa										
					3.0			Hand Auger HAL574-575 terminated at 2.8 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	**HAL575**
sheet:	1 of 1
project no.	**773-GENZTAUC13086AP**
client:	**THE LAKES (2012) LIMITED**
date started:	**13 Oct 2017**
principal:	
date completed:	**13 Oct 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**SBG**
location:	**CENTRE OF LOT 575**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 213/ 42 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS 196/ 45 kPa					**Clayey SILT**: non plastic, pale brown yellow mottled dark brown, trace fine to medium grained sand.	M	VSt to H			**FILL**
			VS 129/ 42 kPa		0.5			**SILT**: low plasticity, brown orange, trace fine to medium grained sand.					
			VS >247 kPa		1.0			**SILT**: non plastic to low plasticity, brown orange mottled black white, trace fine to medium grained sand, trace clay.					
			VS >247 kPa		1.5								
			VS 213/ 42 kPa					**Sandy SILT**: non plastic, brown orange mottled pale brown black, sand is fine to medium grained, trace clay.					
			VS 231/ 42 kPa		2.0								
			VS >247 kPa					**Sandy SILT**: non plastic, brown orange mottled white black, minor clay.					
			VS >247 kPa		2.5								
			VS >247 kPa		3.0			Hand Auger HAL575 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:12

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
S saturated
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.	***HAL575-576***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***13 Oct 2017***
principal:	
date completed:	***13 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 575 AND 576***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
			VS >247 kPa		0.5			**SILT**: non plastic, brown orange mottled black grey white, trace fine to medium grained sand.		VSt to H			**FILL**
			VS 142/ 45 kPa		1.0								
			VS >247 kPa										
			VS >247 kPa		1.5			**Sandy SILT**: non plastic, pale grey brown mottled dark brown black, sand fine to medium grained, trace clay.					
			VS >247 kPa										
			VS >247 kPa		2.0								
			VS 217/ 42 kPa		2.5			**SILT**: non plastic, brown orange mottled black white grey, minor fine to medium grained sand, minor clay.					
			VS 234/ 42 kPa										
			VS >247 kPa		3.0			Hand Auger HAL575-576 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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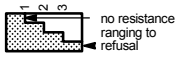
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

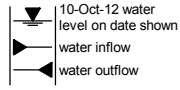
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- S saturated
- 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.	**HAL576**
sheet:	1 of 1
project no.	**773-GENZTAUC13086AP**
client:	**THE LAKES (2012) LIMITED**
date started:	**13 Oct 2017**
principal:	
date completed:	**13 Oct 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**SBG**
location:	**CENTRE OF LOT 576**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 >247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS 209/ 42 kPa		0.5			**SILT**: non plastic to low plasticity, brown orange mottled black grey white, trace fine to medium grained sand.	M	VSt to H			**FILL**
			VS 134/ 29 kPa		1.0								
			VS >247 kPa					**Sandy SILT**: non plastic, pale grey brown mottled black white, sand fine to medium grained.					
			VS >247 kPa		1.5			1.6 m: becoming slightly plastic 1.61 m: becoming pale brown orange mottled black white	W				
			VS >247 kPa										
			VS >247 kPa		2.0			**SILT**: non plastic, brown orange mottled black white grey, trace fine to medium grained sand, trace clay.	M				
			VS >247 kPa										
			VS 213/ 39 kPa		2.5								
			VS 188/ 45 kPa		3.0			Hand Auger HAL576 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL576b***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***13 Oct 2017***
principal:	date completed: ***13 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***EASTERN BOUNDARY OF LOT 576***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 213 kPa		0.0			**SILT**: non plastic, brown, with minor fine grained sand.	D to M				**FILL**
					0.5			**SILTY SAND**: fine to medium grained, grey.					
			VS UTP					**SILT**: non plastic, brown, with trace fine to medium grained sand.	M	VSt to H	VS UTP		
			VS >247 kPa		1.0			1.1 m: becoming brown mottled orange	W to S				
			VS 231/ 25 kPa		1.5								
			VS 213/ 29 kPa		2.0			**Clayey SILT**: low plasticity, brown mottled orange-pink, with trace fine grained sand.					**MATUA SUBGROUP**
			VS 173/ 32 kPa		2.5			**Silty CLAY**: low plasticity, orange mottled pale orange, sensitive, greasy, with trace fine grained sand.					
			VS >247 kPa					**SILT**: non plastic, brown.					
					3.0			Hand Auger HAL576b terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	**HAL577**
sheet:	1 of 1
project no.	**773-GENZTAUC13086AP**
client:	**THE LAKES (2012) LIMITED**
date started:	**13 Oct 2017**
principal:	
date completed:	**13 Oct 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**SBG**
location:	**CENTRE OF LOT 577**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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	VS 234/ 42 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS 247 kPa		0.5			**SILT**: low plasticity, brown orange mottled pale orange, trace fine to medium grained sand. 0.5 m: becoming brown orange	M	St to H			**FILL**
			VS 196/ 39 kPa		1.0			**Sandy SILT**: non plastic, pale brown grey mottled white.					
			VS >247 kPa					**SILT**: low plasticity, pale brown orange, trace clay.					
			VS >247 kPa		1.5								
			VS 213/ 61 kPa										
			VS 114/ 39 kPa		2.0			**Clayey SILT**: medium plasticity, brown orange.					
			VS 138/ 37 kPa		2.5								
			VS 134/ 39 kPa										
			VS 138/ 42 kPa		3.0			Hand Auger HAL577 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL577-578***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***13 Oct 2017***
principal:	
date completed:	***13 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 577 AND 578***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 138/ 39 kPa VS 144/ 42 kPa VS 158/ 39 kPa VS 247 kPa VS 247 kPa VS 247 kPa		0.5 1.0 1.5 2.0			**Clayey SILT**: low plasticity, brown orange mottled white black pink. 0.9 m: becoming brown orange	M	VSt H			**FILL**
					2.5 3.0 3.5 4.0 4.5			2.1 m: Refused at 3 different locations due to gravel hardfill Hand Auger HAL577-578 terminated at 2.1 m Refusal					

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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
S saturated
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.	***HAL577C***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***13 Oct 2017***
principal:	
date completed:	***13 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***CORNER OF LOT 577***
checked by:	***DBC***

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

drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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		water table encountered	VS UTP		0.5			**Clayey SILT**: non plastic, brown mottled white / dark brown/ pink.	M	St to H	VS UTP		**FILL**
			VS 81/ 10 kPa										
			VS 196/ 25 kPa		1.0				S				
			VS 183/ 61 kPa		1.5								
			VS 179/ 61 kPa		2.0								
			VS 196/ 42 kPa		2.5			Hand Auger HAL577C terminated at 2.5 m Squeezing					
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL578***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***13 Oct 2017***
principal:	date completed: ***13 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***CENTRE OF LOT 578***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 213 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	M				**TOPSOIL**
			VS 213 kPa		0.5			**SILT**: low plasticity, orange brown mottled brown pale brown, trace fine grained sand, some clay.		VSt to H			**FILL**
			VS 213 kPaUTP		1.0						VS UTP		
			VS 213 kPa										
			VS 187/ 75 kPa		1.5			1.5 m: poor recovery					
			VS 213 kPa		2.0			Hand Auger HAL578 terminated at 2.0 m Squeezing					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL579***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***15 Oct 2017***
principal:	
date completed:	***15 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***CENTRE OF LOT 579***
checked by:	***DBC***

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

drill model: Hand Auger | 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 >213 kPa		0.0			**ORGANIC SILT**: non plastic, black.	D to M				**FILL**
			VS 197/ 65 kPa		0.5			**SILT**: non plastic, orange brown mottled brown, with trace fine grained sand.		VSt to H			
			VS >213 kPa		1.0								
			VS >213 kPa		1.5								
			VS 190/ 64 kPa		2.0			Hand Auger HAL579 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL579-580***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***16 Oct 2017***
principal:	date completed: ***16 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***BOUNDARY OF LOT 579 AND 580***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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	VS 125/ 39 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
								SILT: non plastic, brown orange mottled dark brown, trace fine to medium grained sand.		VSt			**FILL**
			VS 179/ 42 kPa		0.5			0.5 m: becoming slightly plastic 0.51 m: with trace clay					
			VS 247 kPa		1.0			**Sandy SILT**: non plastic, pale brown mottled orange black, sand is fine to medium grained, trace clay.					
			VS 247 kPa		1.5			**SILT**: non plastic to low plasticity, brown orange.		H			
			VS 247 kPa		2.0								
			VS 247 kPa		2.5								
			VS 247 kPa		3.0			Hand Auger HAL579-580 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL580***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***13 Oct 2017***
principal:	date completed: ***13 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***CENTRE OF LOT 580***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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**: non plastic, dark brown-black.	M				**TOPSOIL**
			VS 213/ 35 kPa		0.5			**Clayey SILT**: low plasticity, brown mottled pale brown, with trace fine to medium grained sand.		St to H	⊕ ⊙		**FILL**
			VS 109/ 69 kPa		1.0			becoming orange mottled brown from 0.7m to 0.9m			⊕ ⊙		
			VS 193/ 75 kPa								⊕ ⊙		
			VS 162/ 42 kPa		1.5						⊕ ⊙		
			VS 213/ 25 kPa		2.0			1.8 m: becoming moderately plastic			⊕ ⊙		
			VS 213/ 25 kPa		2.5						⊕ ⊙		
			VS UTP						M to W		VS UTP		
			VS UTP		3.0			Hand Auger HAL580 terminated at 3.0 m Target depth			VS UTP		
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL580-581***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***15 Oct 2017***
principal:	
date completed:	***15 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***BOUNDARY OF LOT 580 AND 581***
checked by:	***DBC***

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

drill model: Hand Auger | 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 >213 kPa		0.5			**SILT**: non plastic, brown mottled grey.	D to M	H			**FILL**
			VS >213 kPa		1.0								
			VS >213 kPa		1.5								
			VS >213 kPa		2.0								
			VS >213 kPa					Hand Auger HAL580-581 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
- S saturated
- 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.	***HAL581***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***16 Oct 2017***
principal:	
date completed:	***16 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***CENTRE OF LOT 581***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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	VS 231/ 58 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
								SILT: low plasticity, brown orange mottled black, trace clay.	M	H			**FILL**
			VS 82/ 38 kPa		0.5								
								Clayey SILT: low to medium plasticity, brown orange mottled white black.		VSt			
			VS 88/ 35 kPa		1.0								
								Silty CLAY: low to medium plasticity, brown orange, trace fine to medium grained sand.	M to W	H			
			VS 143/ 61 kPa		1.5								
									W				
			VS 179/ 61 kPa		2.0								
					2.5								
					3.0			Hand Auger HAL581 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL581-582***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***15 Oct 2017***
principal:	
date completed:	***15 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***BOUNDARY OF LOT 581 AND 582***
checked by:	***DBC***

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

drill model: Hand Auger | 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		15/10/17 ▽	VS 161/ 35 kPa VS 161/ 32 kPa VS >213 kPa VS >213 kPa VS >213 kPa VS >213 kPa VS >213 kPa VS >213 kPa		0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5			**SILT**: non plastic, brown mottled grey.		VSt H	⊕ ⊙		**FILL**
								Hand Auger HAL581-582 terminated at 3.0 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
- S saturated
- 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.	***HAL582-583***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***16 Oct 2017***
principal:	
date completed:	***16 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 582 AND 583***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS 247 kPa		0.5			**SILT**: low plasticity, brown orange mottled black pink, trace clay.	M	H			**FILL**
			VS 197/ 46 kPa		1.0			**Sandy SILT**: non plastic, pale brown mottled orange black white, sand is fine to medium grained.		VSt			
			VS >247 kPa		1.5			**Clayey SILT**: low to medium plasticity, brown orange mottled dark brown.		H			
			VS >247 kPa		2.0			Hand Auger HAL582-583 terminated at 2.0 m Target depth					
					2.5								
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL583***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***13 Oct 2017***
principal:	date completed: ***13 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***PRM***
location: ***CENTRE OF LOT 583***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL588, SL817

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		Water table encountered	VS >213 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown-black.	M				**TOPSOIL**
			VS >213/ 42 kPa		0.5			**SILT**: low plasticity, brown mottled pale orange-brown, with trace fine grained sand, some clay.		VSt to H			**FILL**
			VS 191/ 64 kPa		1.0			**Clayey SILT**: low plasticity, orange-brown mottled pale orange, with trace fine to medium sand.		St			
			VS 173/ 31 kPa		1.5			1.6 m: becoming dark brown mottled brown	M to W S	VSt to H			
			VS 213/ 45 kPa		2.0								
			VS 213/ 48 kPa		2.5								
			VS 222/ 86 kPa		3.0			Hand Auger HAL583 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL583-584***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***16 Oct 2017***
principal:	
date completed:	***16 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***PRM***
location:	***BOUNDARY OF LOT 583 AND 584***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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		water table encountered	VS 196/ 25 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
								Clayey SILT: low plasticity, brown mottled pale brown, with trace fine grained sand.		VSt to H			**FILL**
			VS >247 kPa		0.5								
			VS UTP		1.0						VS UTP		
			VS 186/ 29 kPa		1.5			1.4 m: becoming brown mottled pale brown/ orange-brown/ dark brown	S				
			VS >247 kPa		2.0								
			VS UTP		2.5						VS UTP		
			VS UTP		3.0			Hand Auger HAL583-584 terminated at 3.0 m Target depth			VS UTP		
			VS UTP		3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL584***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***16 Oct 2017***
principal:	date completed: ***16 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 584***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 144/ 63 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
			VS 213/ 63 kPa		0.5			**Clayey SILT**: low to medium plasticity, brown orange mottled pale brown black white, trace fine to medium grained sand. 0.6 m: with minor fine to medium grained sand	M	VSt / H			**FILL**
			VS 247 kPa		1.0								
			VS 247 kPa		1.5								
			VS 222/ 90 kPa		2.0			**Sandy SILT**: non plastic to low plasticity, pale brown grey mottled black white orange, sand is fine to medium grained, minor clay.	W				
			VS 247 kPa		2.5				M				
			VS 247 kPa		3.0			Hand Auger HAL584 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL584-585***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***26 Oct 2017***
principal:	
date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***BOUNDARY OF LOT 584 AND 585***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 122/ 26 kPa VS 213 kPa VS 156/ 43 kPa VS 147/ 48 kPa VS 213 kPa		0.5 1.0 1.5 2.0			**SILT**: non plastic, orange mottled brown.	D to M	VSt to H			**FILL**
					2.0			Hand Auger HAL584-585 terminated at 2.0 m Target depth					
					2.5 3.0 3.5 4.0 4.5								

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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
S saturated
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.	**HAL585**
sheet:	1 of 1
project no.	**773-GENZTAUC13086AP**
client:	**THE LAKES (2012) LIMITED**
date started:	**16 Oct 2017**
principal:	
date completed:	**16 Oct 2017**
project:	**THE LAKES, STAGE 3I GCR**
logged by:	**SBG**
location:	**CENTRE OF LOT 585**
checked by:	**DBC**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 247 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	D to M				**TOPSOIL**
								SILT: non plastic to low plasticity, brown orange mottled black white.	M				**FILL**
					0.5					VSt to H			
			VS 196/ 47 kPa					0.6 m: becoming slightly plastic with trace clay			⊕ ⊙		
					1.0			**Clayey SILT**: low to medium plasticity, brown orange mottled black white.					
			VS 134/ 55 kPa								⊕ ⊙		
			VS 247 kPa		1.5						⊙		
			VS 222/ 50 kPa		2.0						⊕ ⊙		
								2.1 m: with trace fine to medium grained sand	W				
			VS 167/ 51 kPa								⊕ ⊙		
					2.5			**Sandy SILT**: non plastic to low plasticity, pale brown grey mottled black white orange, minor clay.	M				
			VS 218/ 69 kPa								⊕ ⊙		
					3.0			Hand Auger HAL585 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL585-586***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***16 Oct 2017***
principal:	
date completed:	***16 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***ODS***
location:	***BOUNDARY OF LOT 585 and 586***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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			VS 83/ 16 kPa		0.0			**ORGANIC SILT**: non plastic, dark brown black.	M				**TOPSOIL**
								SILT: low plasticity, orange mottled brown, with minor clay, and trace fine grained sand.		St			**FILL**
		16/10/17, perched water table	VS 84/ 20 kPa		0.5				S				
			VS 213 kPa		1.0								
			VS >213 kPa		1.5			1.5 m: with pale pink clayey silt inclusions		H			
			VS >213 kPa		2.0								
			VS >213 kPa		2.5								
			VS >213 kPa		3.0			Hand Auger HAL585-586 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL586***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***16 Oct 2017***
principal:	date completed: ***16 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 586***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: 1447

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**: non plastic, dark brown black.	M				**TOPSOIL**
			VS UTP		0.5			**Clayey SILT**: low plasticity, brown mottled pale brown/pink/orange-brown, with trace fine to medium grained sand.		H	VS UTP		**FILL**
			VS >209/ 39 kPa		1.0								
			VS >247/ 39 kPa										
			VS 227/ 39 kPa		1.5			1.5 m: with trace black charcoal inclusions (no organic odour) 1.6 m: no black charcoal inclusions					
			VS 213/ 35 kPa		2.0								
			VS >247 kPa		2.5								
			VS >247 kPa										
			VS >247 kPa		3.0			Hand Auger HAL586 terminated at 3.0 m Target depth					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL586-587***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***
date started:	***16 Oct 2017***
principal:	
date completed:	***16 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***
logged by:	***SBG***
location:	***BOUNDARY OF LOT 586 AND 587***
checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 50 mm | vane id.: SL817

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 222/ 50 kPa		0.5			**ORGANIC SILT**: non plastic, dark brown black.	D to M		⊕ ⊙		**TOPSOIL**
			VS 183/ 25 kPa					**SILT**: non plastic to low plasticity, brown orange mottled white black dark brown, trace fine to medium grained sand, trace clay. 0.7 m: becoming pale brown orange mottled black white	M	VSt to H	⊕ ⊙		**FILL**
			VS 247 kPa		1.0			**Sandy SILT**: non plastic, pale brown grey mottled black brown white, sand fine to medium grained.			⊙		
			VS 247 kPa		1.5			**SILT**: low plasticity, brown orange, trace fine to medium grained sand.			⊙		
					2.0			**SILTY SAND**: fine to medium grained, pale grey mottled black brown.					**MATUA SUBGROUP**
					2.5			Hand Auger HAL586-587 terminated at 2.0 m Target depth					
					3.0								
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL587***		
sheet:	1 of 1		
project no.	***773-GENZTAUC13086AP***		
client:	***THE LAKES (2012) LIMITED***	date started:	***16 Oct 2017***
principal:		date completed:	***16 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***	logged by:	***ODS***
location:	***CENTRE OF LOT 587***	checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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	VS >213 kPa		0.5			**ORGANIC SILT**: non plastic, dark brown black.	D to M	H			**TOPSOIL**
			VS >213 kPa					**SILT**: non plastic to low plasticity, brown orange mottled white black dark brown, trace fine to medium grained sand, trace clay.					**FILL**
			VS 182/ 40 kPa		1.0					VSt to H			
			VS >213 kPa		1.5				M				
			VS 157/ 40 kPa		2.0								
			VS >213 kPa										
			VS >213 kPa		2.5								
					3.0			Hand Auger HAL587 terminated at 2.7 m Squeezing					
					3.5								
					4.0								
					4.5								

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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
S saturated
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.	***HAL587-588***
		sheet:	1 of 1
		project no.	***773-GENZTAUC13086AP***
client:	***THE LAKES (2012) LIMITED***	date started:	***26 Oct 2017***
principal:		date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***	logged by:	***SBG***
location:	***BOUNDARY OF LOT 587 AND 588***	checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 >182 kPa VS 141/ 43 kPa VS 92/ 37 kPa VS >182 kPa VS >182 kPa VS >182 kPa VS >182 kPa		0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5			**ORGANIC SILT**: non plastic, dark brown black. **SILT**: non plastic, brown orange, trace fine to medium grained sand. **Clayey SILT**: low plasticity, brown orange, trace fine to medium grained sand. **SILT**: non plastic, brown orange mottled pink, trace clay, trace fine to medium grained sand. **Silty CLAY**: low to medium plasticity, brown orange mottled black. Hand Auger HAL587-588 terminated at 3.0 m Target depth	M	VSt to H St VSt to H			**TOPSOIL** **FILL**

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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
S saturated
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.	***HAL588***
sheet:	1 of 1
project no.	***773-GENZTAUC13086AP***
client: ***THE LAKES (2012) LIMITED***	date started: ***26 Oct 2017***
principal:	date completed: ***26 Oct 2017***
project: ***THE LAKES, STAGE 3I GCR***	logged by: ***SBG***
location: ***CENTRE OF LOT 588***	checked by: ***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 >182 kPa VS >182 kPa VS >182 kPa VS >182 kPa VS >182 kPa		0.5 1.0 1.5 2.0			**Clayey SILT**: low plasticity, orange brown mottled brown, with trace fine grained sand.	M	VSt	⊙ ⊙ ⊙ ⊙ ⊙		**FILL**
					2.0			Hand Auger HAL588 terminated at 2.0 m Target depth					
					2.5 3.0 3.5 4.0 4.5								

CDF_0_9_06_LIBRARY.GLB rev:AT Log COF BOREHOLE: NON CORED + DCP 13086AP_STAGE 31 GCR_MASTER.GPJ <<DrawingFile>> 08/12/2017 15:13

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
S saturated
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.	***HAL588c***		
sheet:	1 of 1		
project no.	***773-GENZTAUC13086AP***		
client:	***THE LAKES (2012) LIMITED***	date started:	***26 Oct 2017***
principal:		date completed:	***26 Oct 2017***
project:	***THE LAKES, STAGE 3I GCR***	logged by:	***PRM***
location:	***CORNER OF LOT 588***	checked by:	***DBC***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | 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 107/ 25 kPa		0.5			**SILT**: non plastic, brown orange mottled black white, minor fine to medium grained sand.	M	VSt to H	⊕ ⊙		**FILL**
			VS >247 kPa		1.0					H			
			VS >247 kPa		1.5								
			VS >247 kPa		2.0								
			VS 151/ 81 kPa		2.5			2.4 m: shear vane possibly slipping on gravel Hand Auger HAL588c terminated at 2.5 m Target depth					
					3.0								
					3.5								
					4.0								
					4.5								

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
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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
S saturated
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

Appendix E – Fill Test Summary Tables

FILL TEST RESULTS						
Summary of earthfill test data						
Test Number	Date	Test RL (m)	Result			Pass/Fail
			Air Voids (%)	Shear Vane (kPa)	Scala (blows per 100mm)	
A-295	27/12/2007	40.3	2.0	232+	-	Pass
A-296		38.0	0.0	243+	-	Pass
A-297	28/12/2007	38.1	0.0	243+	-	Pass
A-298		36.5	0.0	222+	-	Pass
A-299		36.6	4.1	243+	-	Pass
A-300		35.8	0.0	218+	-	Pass
A-301		37.3	0.0	243+	-	Pass
A-302		40.1	0.0	235+	-	Pass
A-303		36.8	0.7	243+	-	Pass
A-304		35.7	0.0	223+	-	Pass
A-305		36.3	0.0	243+	-	Pass
B-23	5/11/2014	45.03	-	209	-	Pass
B-24		46.32	-	211	-	Pass
B-25		43.47	-	190	-	Pass
B-34	27/11/2014	30.46	1	199	-	Pass
B-35		30.04	3.6	199	-	Pass
B-36		30.09	-1.3	216	-	Pass
B-37		29.44	2	125	-	Fail - Area Reworked
B-38		28.65	7.8	174	-	Pass
B-39		29.44	9.8	177	-	Pass
B-40		29.56	8.5	179	-	Pass
B-41		30.20	-1.3	162	-	Pass
B-42		30.02	1.4	200	-	Pass
B-43		30.38	2.7	186	-	Pass
B-44		30.04	4.9	185	-	Pass
B-45		29.62	-2.7	124	-	Fail
B-46		29.74	2.8	210	-	Pass
B-47			4.1	196	-	Pass
B-60A	11/02/2015	46.70	14.8	232	-	Fail - Area Reworked
B-61A		48.39	10.9	232	-	Fail - Area Reworked
B-62A		46.20	4	232	-	Pass
B-63A		45.12	8.3	232	-	Pass
B-64A		44.61	14.9	120	-	Fail - Area Reworked
B-65A		45.78	2.5	232	-	Pass
B-66		43.35	5.7	232	-	Pass
B-67		42.65	5.3	220	-	Pass
B-68		42.71	6	215	-	Pass
B-69		43.57	6.2	231	-	Pass
B-70			1.9	107	-	Fail - Area Reworked
B-71		31.90	11.5	114	-	Fail - Area Reworked
B-72		32.03	2.1	232	-	Pass
B-73		31.69	2.3	232	-	Pass
B-74		32.09	3.4	198	-	Pass
B-75		32.01	1.3	206	-	Pass
B-76	12/02/2015	33.01	3.7	196	-	Pass
B-77		32.18	1.6	159	-	Pass
B-78		32.42	-0.4	194	-	Pass
B-79		33.61	-1.3	230	-	Pass
B-80		32.90	-1.5	177	-	Pass
B-81		31.97	4.7	162	-	Pass
B-82		32.80	8.2	200	-	Pass
B-83		31.82	4	232	-	Pass
B-84		32.69	6.8	158	-	Pass
B-85		31.67	0.4	201	-	Pass
B-86		32.34	2.2	159	-	Pass
B-87		31.70	-2.2	225	-	Pass
B-88		32.00	0	195	-	Pass
B-89		30.96	-0.5	232	-	Pass
B-90		31.87	3.4	232	-	Pass
B-91		30.49	10.4	196	-	Pass
B-92		31.19	5.5	232	-	Pass
B-93		32.30	2.7	183	-	Pass
B-94		32.55	3.6	210	-	Pass
B-95		31.72	5.4	232	-	Pass
B-96		32.84	4.1	220	-	Pass
B-97		31.62	-3.8	220	-	Pass
B-98		31.71	8.4	232	-	Pass
B-99		32.63	0.3	196	-	Pass
B-100		32.31	3.2	222	-	Pass
B-101		31.61	3.5	213	-	Pass
B-102		32.76	0.9	219	-	Pass
B-103		31.23	2.4	UTP	-	Pass

Test Number	Date	Test RL (m)	Result			Pass/Fail
			Air Voids (%)	Shear Vane (kPa)	Scala (blows per 100mm)	
B-104		32.74	9.7	232	-	Pass
B-105		31.77	2.1	232	-	Pass
B-106		32.80	0.4	232	-	Pass
B-107		31.94	0.3	219	-	Pass
B-108		32.66	3.7	232	-	Pass
B-109		31.72	6.5	230	-	Pass
B-130	13/02/2015	32.12	0.3	149	-	Pass
B-131		31.54	3	232	-	Pass
B-132		32.30	-0.5	188	-	Pass
B-133		31.49	2.1	227	-	Pass
B-134		32.10	-2	172	-	Pass
B-135		31.17	6.1	203	-	Pass
B-136		31.66	2	213	-	Pass
B-137		30.82	12.4	110	-	Fail
B-138		32.17	-0.4	190	-	Pass
B-139		31.61	1.4	225	-	Pass
B-141		32.50	2.6	228	-	Pass
B-142	16/02/2015	31.62	2.6	232	-	Pass
B-143		32.56	1.2	225	-	Pass
B-144		31.48	0.5	157	-	Pass
B-145		32.28	0	189	-	Pass
B-146		31.02	0.2	229	-	Pass
B-147		31.74	7.1	232	-	Pass
B-148		30.22	4.7	232	-	Pass
B-149		31.32	6.2	232	-	Pass
B-150		30.03	7.6	218	-	Pass
B-151		30.51	-0.9	194	-	Pass
B-152		29.09	7.1	178	-	Pass
B-153		29.66	3.7	232	-	Pass
B-154		29.20	6.7	198	-	Pass
B-155		30.00	2.8	224	-	Pass
B-156		29.46	4.6	212	-	Pass
B-157		30.63	7	232	-	Pass
B-158		30.09	-2.1	194	-	Pass
B-159		31.91	0.4	207	-	Pass
B-160		31.01	-0.2	232	-	Pass
B-161		29.96	2.6	213	-	Pass
B-162		30.49	3.5	232	-	Pass
B-163		31.05	3.7	230	-	Pass
B-164		30.67	6.1	232	-	Pass
B-165		31.67	6.6	232	-	Pass
B-166		30.80	4.8	232	-	Pass
B-167		30.64	1.7	231	-	Pass
B-218	9/10/2015	43.92	4.3	206	-	Pass
B-219		43.51	3.4	183	-	Pass
B-249	18/12/2015	29.59	8.0	206	-	Pass
B-250		29.94	3.5	206	-	Pass
B-251		30.29	-0.2	206	-	Pass
B-255	2/02/2016	32.18	Relative Compaction=97%	-	2 - 7	Fail
B-256		32.43	Relative Compaction= 96.2%	-	> 5	Pass
B-257		32.39	Relative Compaction=105.3%	-	> 5	Pass
B-258		31.57	Relative Compaction=91.7%	-	> 5	Pass
B-259		32.70	Relative Compaction=94%	-	> 3	Fail
B-260		31.58	Relative Compaction=89.5%	-	> 4	Fail
B-261		32.01	Relative Compaction=93.2%	-	> 5	Pass
B-263		28.50	Relative Compaction=94.7%	-	1 - 4	Fail
B-264		29.40	11.6	UTP		Pass
B-265		29.33	-1.8	202		Pass
B-266		31.36	5.4	202		Pass
B-267		31.67	5.4	UTP		Pass
B-268		31.50	10.0	202		Pass
B-269		31.92	11.1	202		Pass
B-270		31.12	-7.9	202		Pass
B-271		31.46	-0.7	201		Pass
B-272		31.28	2.3	UTP		Pass
B-273		31.66	8.6	202		Pass
B-274		31.50	0.7	202		Pass
B-275		31.11	-0.4	202		Pass
B-276		30.91	0.0	152		Pass
B-277		30.53	6.3	143		Pass
B-278		31.52	7.7	-	> 5	Pass
B-279		31.20	-0.3	192		Pass
B-280		31.54	6.9	202		Pass
B-281		31.22	0.4	202		Pass
B-282		31.48	5.4	UTP		Pass
B-283		31.19	5.0	202		Pass
B-284		31.40	1.2	202		Pass
B-285		31.08	-2.4	202		Pass

Test Number	Date	Test RL (m)	Result			Pass/Fail
			Air Voids (%)	Shear Vane (kPa)	Scala (blows per 100mm)	
B-286	26/02/2016	31.33	2.7	UTP		Pass
B-287		30.96	6.6	190		Pass
B-288		31.28	0.7	UTP		Pass
B-289		30.92	2.4	202		Pass
B-290		31.62	0.7	128		Fail
B-291		31.14	-2.8	157		Pass
B-292		31.47	-3.8	138		Fail
B-293		31.12	-2.8	202		Pass
B-294		31.43	1.5	159		Pass
B-295		31.14	-0.7	202		Pass
B-296		31.61	0.9	201		Pass
B-297		31.21	-2.8	179		Pass
B-298		31.06	1.3	198		Pass
B-299		30.76	5.3	UTP		Pass
B-300		31.04	6.8	169		Pass
B-301		30.79	7.1	169		Pass
B-302		31.53	1.2	202		Pass
B-303		31.15	1.8	202		Pass
B-304		31.61	2.5	UTP		Pass
B-305		31.21	0.2	202		Pass
B-306		32.08	1.3	UTP		Pass
B-307		31.81	7.2	202		Pass
B-308		31.60	-1.2	198		Pass
B-309		31.25	4.3	196		Pass
B-321	9/11/2016	36.70	2.0	153		Pass
B-322		35.73	2.0	169		Pass
B-323		37.74	3.0	178		Pass
B-324		35.20	2.0	159		Pass
B-325		33.61	0.0	202		Pass
B-330		38.17	7.0	186		Pass
B-336	5/12/2016	41.51	7.0	202		Pass
B-337		40.98	4.0	149		Pass
B-338		41.03	5.0	202		Pass
B-339		43.27	8.0	197		Pass
B-340		41.86	2.0	162		Pass
B-341		42.58	1.0	168		Pass
B-342		43.88	2.0	171		Pass
B-343		36.13	2.0	193		Pass
B-344		37.62	0.0	195		Pass
B-345		40.43	5.0	202		Pass
B-346		37.42	11.0	193		Pass
B-347		36.25	-2.0	198		Pass
B-348		35.90	3.0	172		Pass
B-349	14/12/2016	43.97	9.0	202		Pass
B-350		43.80	7.0	183		Pass
B-351		42.84	4.0	184		Pass
B-352		44.49	7.0	187		Pass
B-353		37.27	6.0	185		Pass

Notes

1 Shear strength for NDM tests calculated from average of 4 vane tests at each test location. UTP = unable to penetrate.

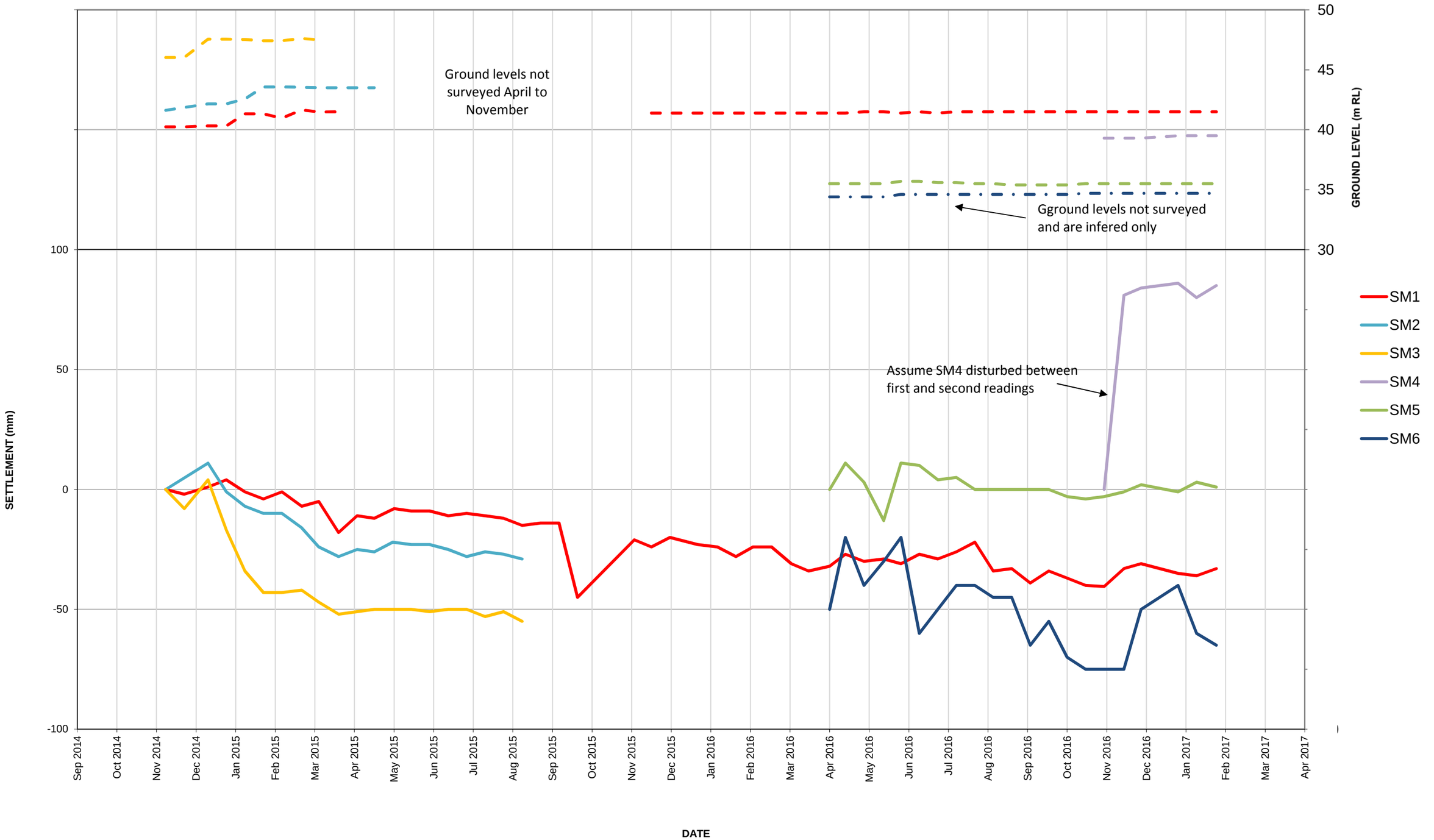
2 A Solid Density of between 2.4 t/m³ and 2.6 t/m³ was assumed for fills depending on source material.

3 All test locations and elevations surveyed by JMC Ltd.

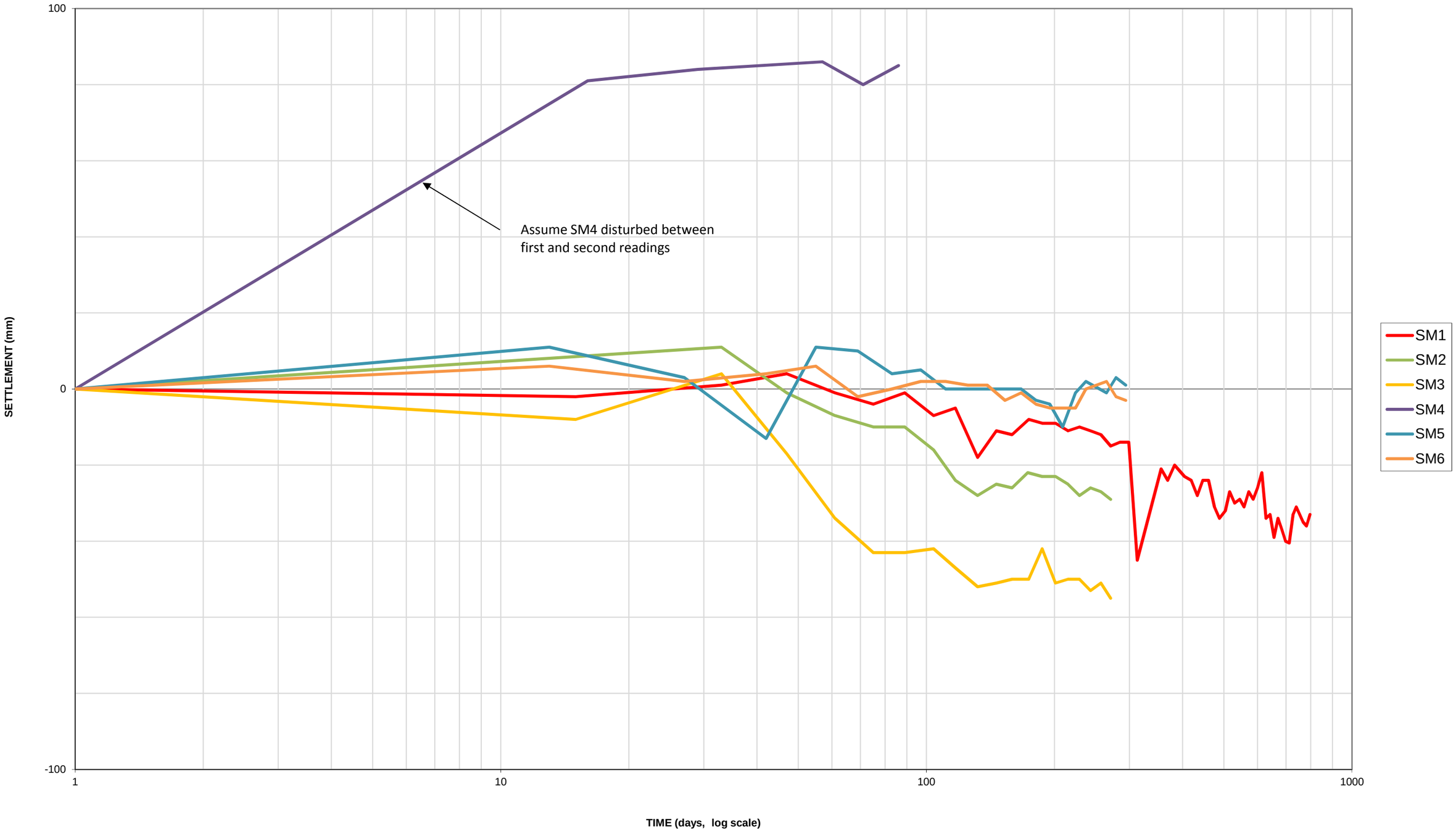
4 For failed test results, refer to Section 6.2.2 of Coffey GCR ref: GENZTAUC13086AP-AM

Appendix F – Static Settlement Results

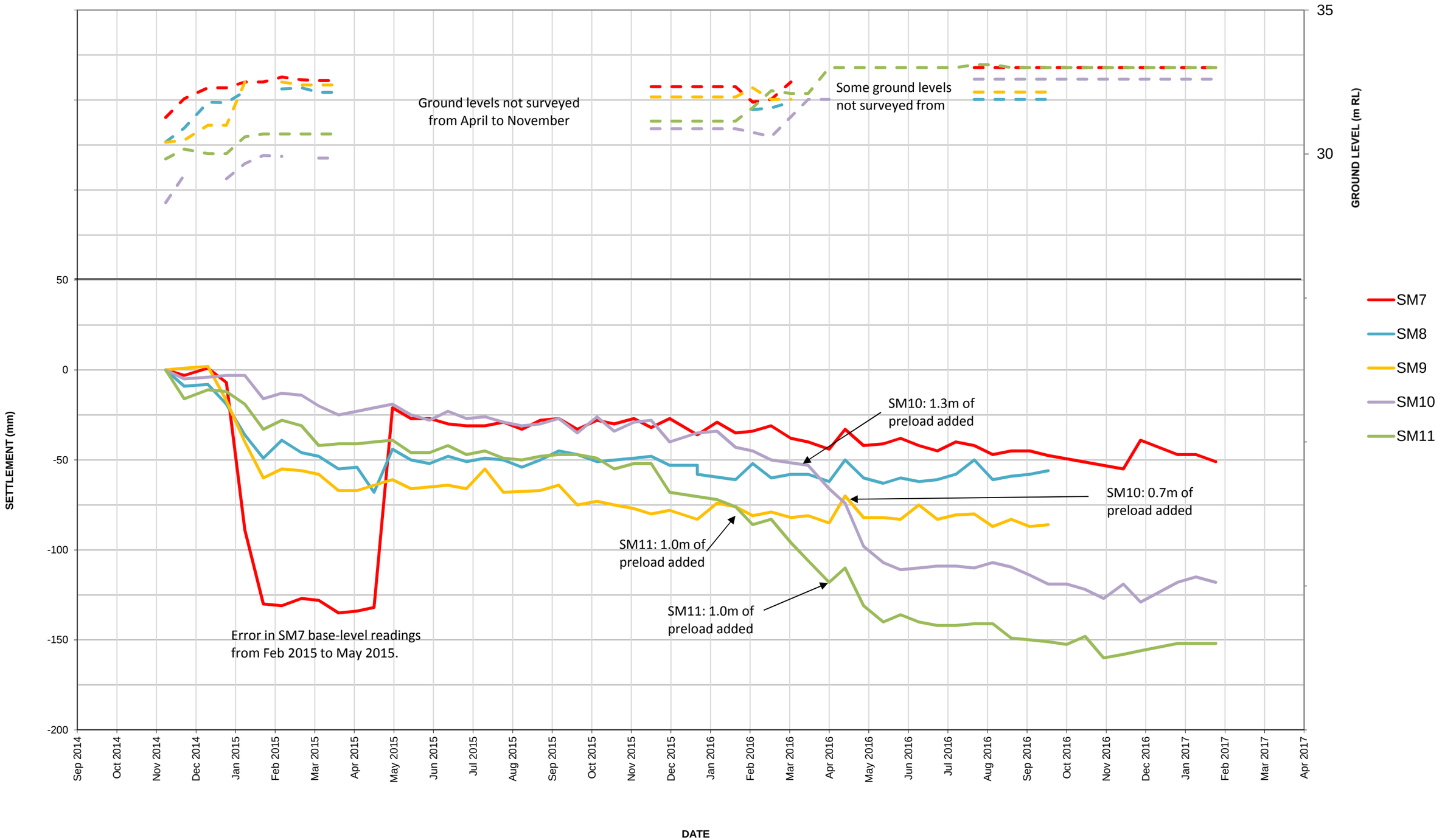
SETTLEMENT VS TIME



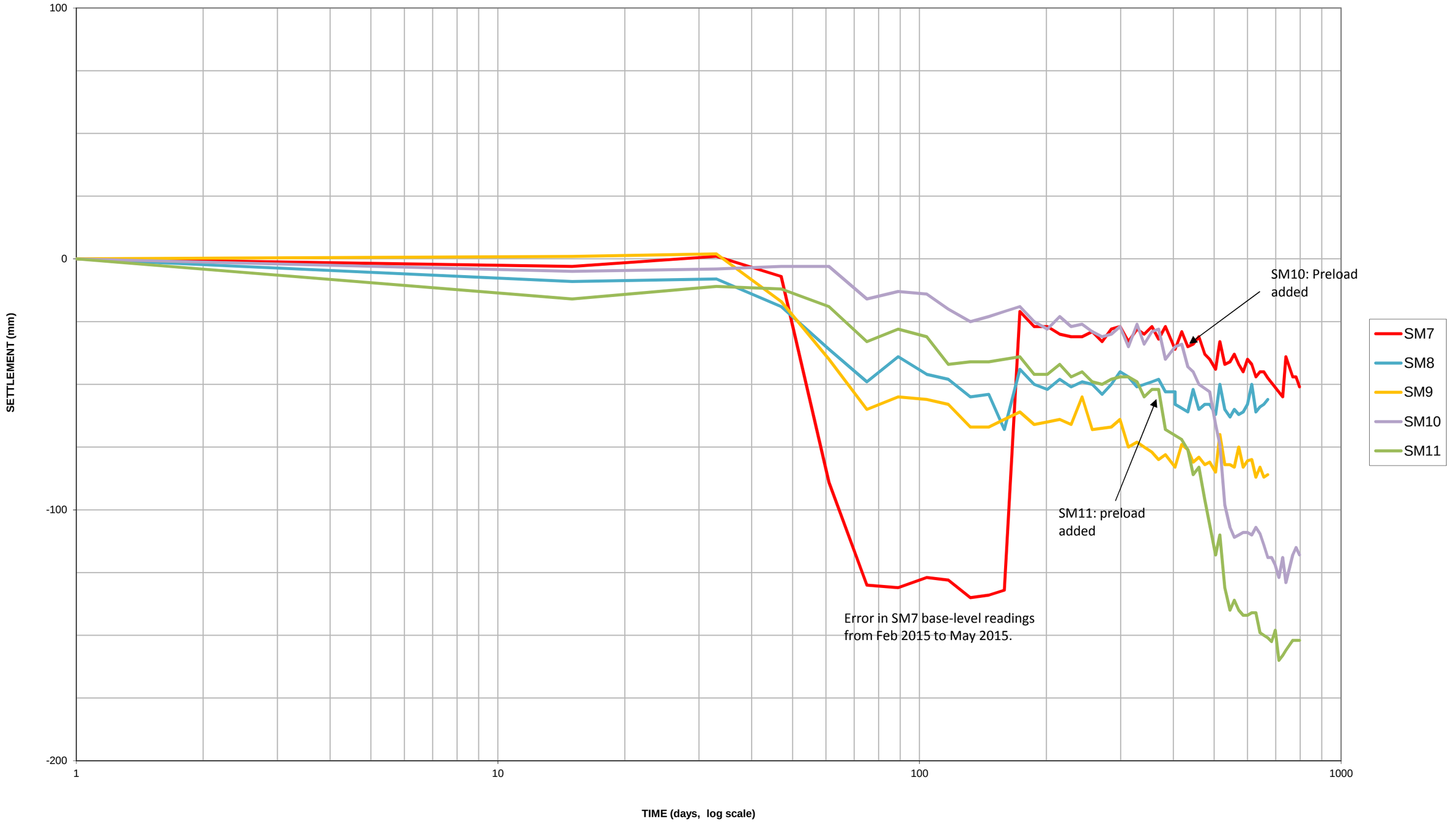
SETTLEMENT VS TIME (LOG SCALE)



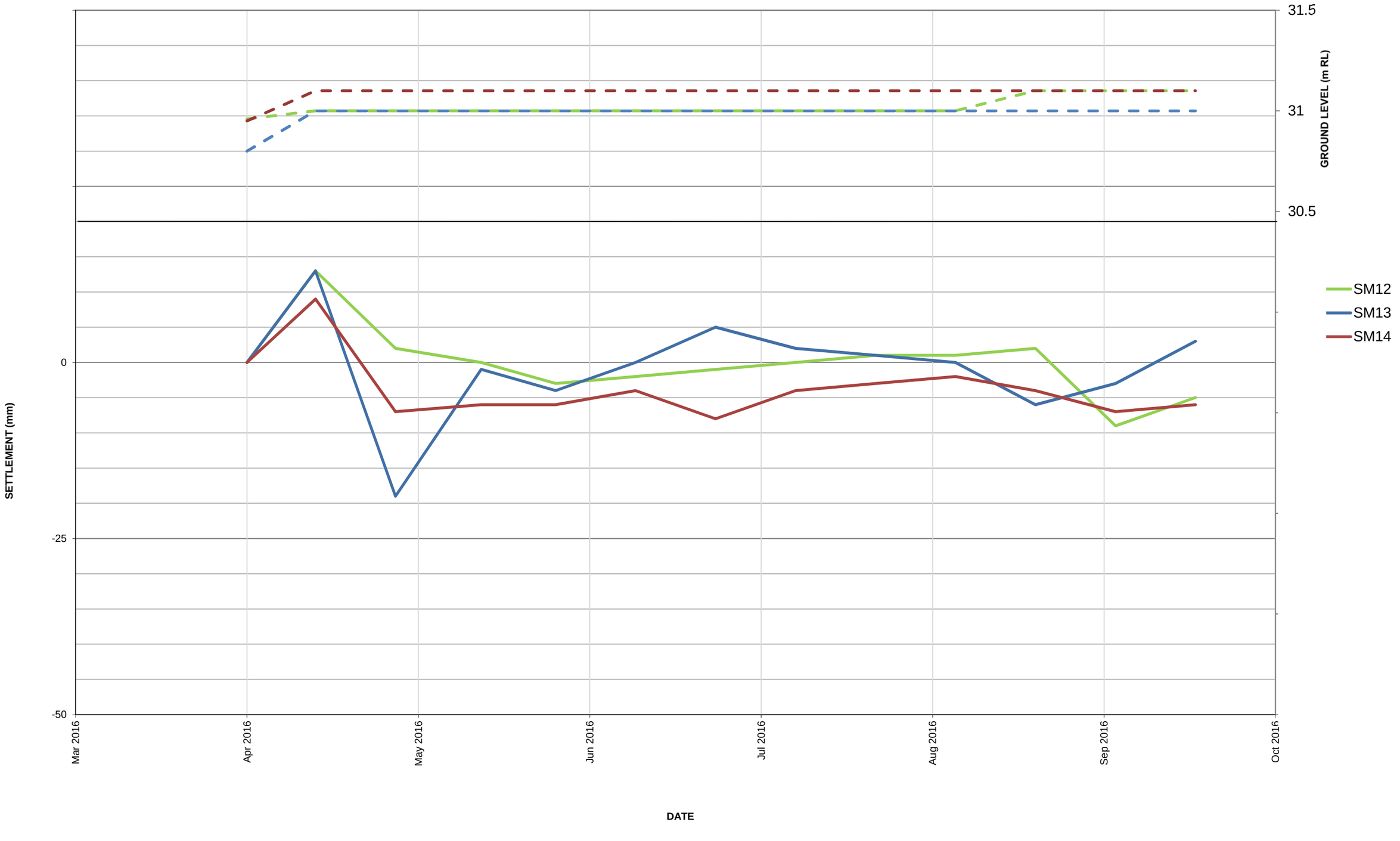
SETTLEMENT VS TIME



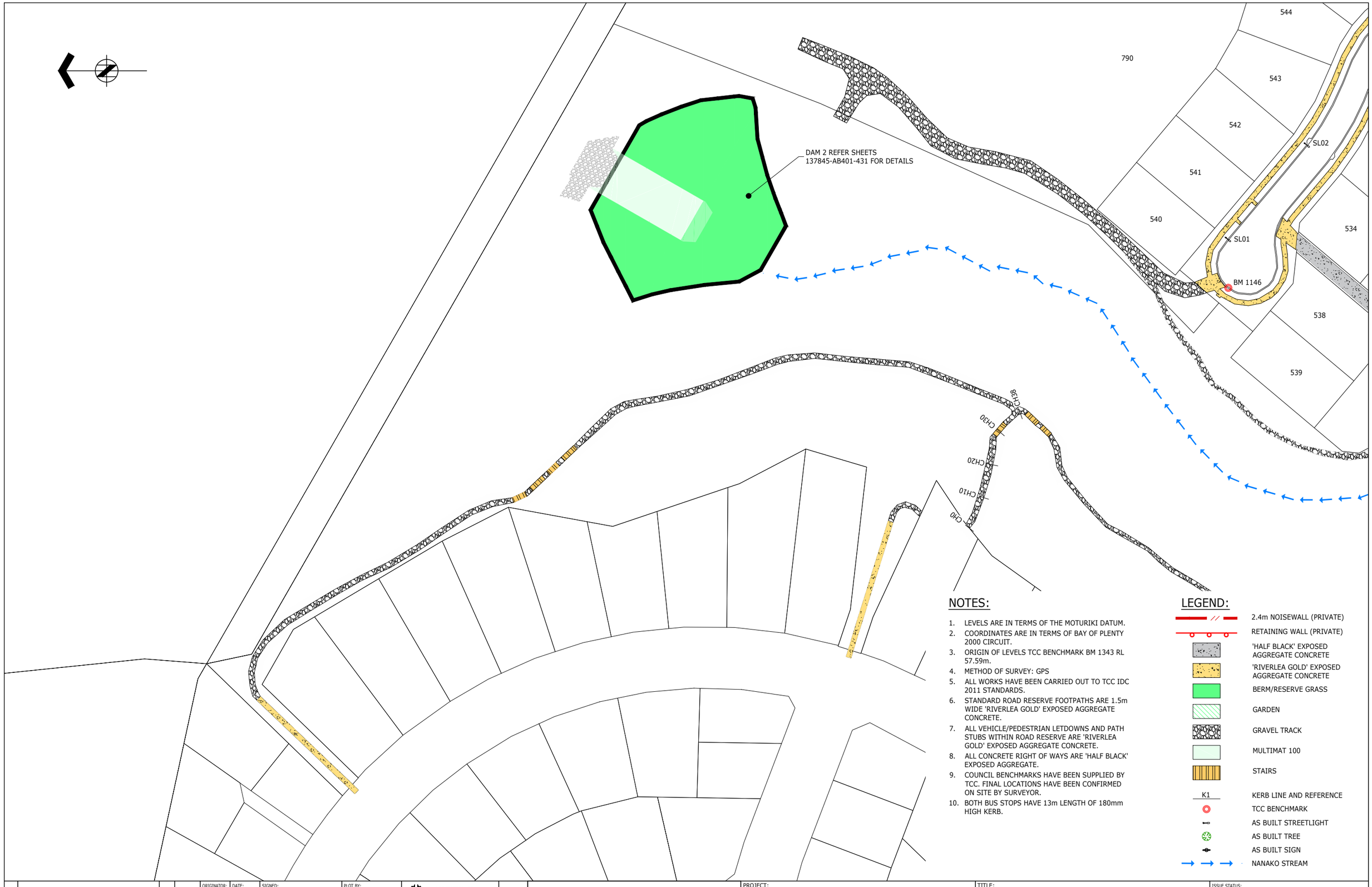
SETTLEMENT VS TIME (LOG SCALE)



SETTLEMENT VS TIME



Appendix G – Harrison Grierson Drawings



NOTES:

1. LEVELS ARE IN TERMS OF THE MOTURIKI DATUM.
2. COORDINATES ARE IN TERMS OF BAY OF PLENTY 2000 CIRCUIT.
3. ORIGIN OF LEVELS TCC BENCHMARK BM 1343 RL 57.59m.
4. METHOD OF SURVEY: GPS
5. ALL WORKS HAVE BEEN CARRIED OUT TO TCC IDC 2011 STANDARDS.
6. STANDARD ROAD RESERVE FOOTPATHS ARE 1.5m WIDE 'RIVERLEA GOLD' EXPOSED AGGREGATE CONCRETE.
7. ALL VEHICLE/PEDESTRIAN LETDOWNS AND PATH STUBS WITHIN ROAD RESERVE ARE 'RIVERLEA GOLD' EXPOSED AGGREGATE CONCRETE.
8. ALL CONCRETE RIGHT OF WAYS ARE 'HALF BLACK' EXPOSED AGGREGATE.
9. COUNCIL BENCHMARKS HAVE BEEN SUPPLIED BY TCC. FINAL LOCATIONS HAVE BEEN CONFIRMED ON SITE BY SURVEYOR.
10. BOTH BUS STOPS HAVE 13m LENGTH OF 180mm HIGH KERB.

LEGEND:

- 2.4m NOISEWALL (PRIVATE)
- RETAINING WALL (PRIVATE)
- 'HALF BLACK' EXPOSED AGGREGATE CONCRETE
- 'RIVERLEA GOLD' EXPOSED AGGREGATE CONCRETE
- BERM/RESERVE GRASS
- GARDEN
- GRAVEL TRACK
- MULTIMAT 100
- STAIRS
- K1 — KERB LINE AND REFERENCE
- TCC BENCHMARK
- AS BUILT STREETLIGHT
- AS BUILT TREE
- AS BUILT SIGN
- NANAKO STREAM

REF		BY	DATE
D	TRACK AND STAIRS CHAINAGES ADDED	TCH	19.01.18
C	FINAL AS BUILT	TCH	18.01.18
B	DRAFT AS BUILTS	TCH	16.01.18
A	DRAFT AS BUILT	TCH	22.12.17

ORIGINATOR: TCH — DATE: 22.12.17 — SIGNED:
DRAWN: TRS — DATE: 22.12.17 — SIGNED:
CHECKED: TCH — DATE: 19.01.18 — SIGNED:
APPROVED: GPR — DATE: 19.01.18 — SIGNED:

PLOT BY: TRS
PLOT DATE: 19.01.18
SURVEY BY: -
SURVEY DATE: -

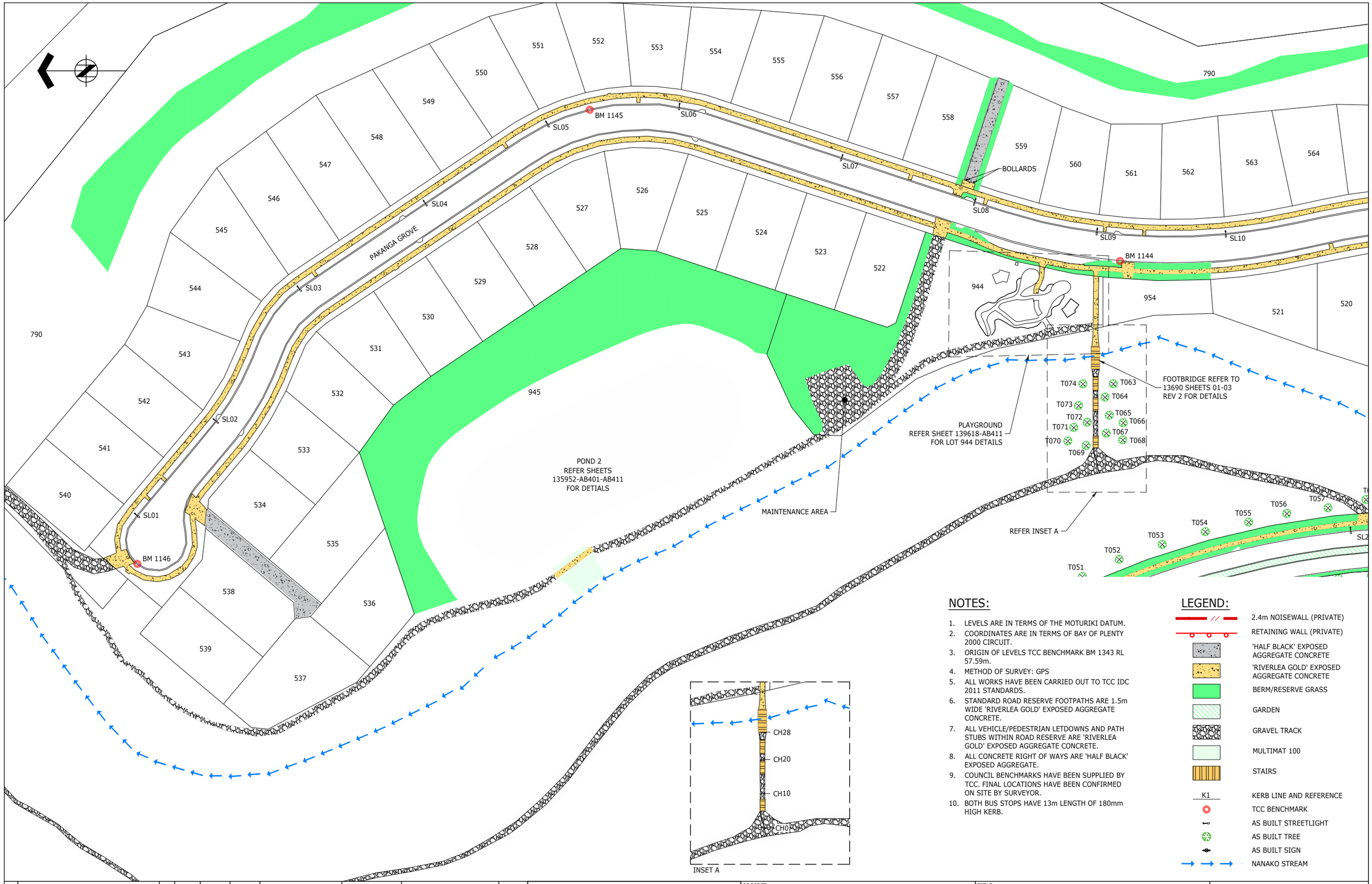
ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND — ISO 9001 QUALITY ASSURED

HG
TAURANGA OFFICE
LEVEL 1, 60 SPRING STREET
TAURANGA 3110
T +64 7 578 0023
W www.harrisongrierson.com

PROJECT:
Summit
THE LAKES (2012) LIMITED

TITLE:
STAGE 3I
STREETSCAPE/TRANSPORTATION AS BUILT PLANS
SHEET 1
TCC IP 101782

ISSUE STATUS: FINAL AS BUILT
PROJECT No: 1520-139618-01
SCALES: 1:500 - A1, 1:1000 - A3
A1
DRAWING No: 139618-AB401
REV D



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- BERM/RESERVE GRASS
- GARDEN
- GRAVEL TRACK
- MULTIMAT 100
- STAIRS
- K1 — KERB LINE AND REFERENCE
- TCC BENCHMARK
- AS BUILT STREETLIGHT
- AS BUILT TREE
- AS BUILT SIGN
- NANAKO STREAM

REF	REVISIONS	BY	DATE
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B	DRAFT AS BUILTS	TCH	16.01.18
A	DRAFT AS BUILT	TCH	22.12.17

ORIGINATOR: TCH — DATE: 22.12.17 — SIGNED:
DRAWN: PSJ — DATE: 22.12.17 — SIGNED:
CHECKED: TCH — DATE: 19.01.18 — SIGNED:
APPROVED: GPR — DATE: 19.01.18 — SIGNED:

PLOT BY: TRS
PLOT DATE: 19.01.18
SURVEY BY: -
SURVEY DATE: -

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND — ISO 9001 QUALITY ASSURED

TAURANGA OFFICE
LEVEL 1, 60 SPRING STREET
TAURANGA 3110
T +64 7 578 0023
W www.harrisongrierson.com

PROJECT: Summit
THE LAKES (2012) LIMITED

TITLE:
STAGE 3I
STREETSCAPE/TRANSPORTATION AS BUILT PLANS
SHEET 2
TCC IP 101782

ISSUE STATUS: FINAL AS BUILT
PROJECT No: 1520-139618-01
SCALES: 1:500 - A1, 1:1000 - A3
A1
DRAWING No: 139618-AB402
REV D

REFER INSET D

790

790

790

PAKANGA GROVE

PAKANGA GROVE

REFER SHEETS 137845
AB401-AB431 FOR DAM
DETAILS

POND 2

945

944

954

943

TE RANGA MEMORIAL DRIVE

TAKITIMU DRIVE (SH36)

522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 579 580 581 582 583 584 585 586 587 588

504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521

CH0 CH20 CH40 CH60 CH80 CH100 CH120 CH140 CH160 CH180 CH200 CH220 CH240 CH260 CH280 CH300 CH320 CH340 CH360 CH380 CH400 CH420 CH440 CH460 CH480 CH500 CH520 CH540 CH560 CH580 CH600 CH620

REFER
INSET C

REFER SHEETS
135952-AB401-AB411
FOR POND DETAILS

INSET C

CH620 CH640 CH660 CH680 CH700 CH720 CH740 CH757

INSET D

573 575 576 577 578 579

LEGEND:

- 2.4m NOISEWALL (PRIVATE)
- RETAINING WALL (PRIVATE)
- 'HALF BLACK' EXPOSED AGGREGATE CONCRETE
- 'RIVERLEA GOLD' EXPOSED AGGREGATE CONCRETE
- BERM/RESERVE GRASS
- GARDEN
- GRAVEL TRACK
- AREA 1A PLANTING
- AREA 1B PLANTING
- AREA 1C PLANTING
- AREA 3 PLANTING
- POND 2 PLANTING
- LOT 943 PLANTING

NOTES:

1. LEVELS ARE IN TERMS OF THE MOTURIKI DATUM.
2. COORDINATES ARE IN TERMS OF BAY OF PLENTY 2000 CIRCUIT.
3. ORIGIN OF LEVELS TCC BENCHMARK BM 1343 RL 57.59m OR BM 1342 RL 56.71.
4. METHOD OF SURVEY: GPS
5. ALL WORKS HAVE BEEN CARRIED OUT TO TCC IDC 2011 STANDARDS.

				ORIGINATOR: TCH	DATE: 22.12.17	SIGNED:	PLOT BY: TRS	
				DRAWN: PSJ	DATE: 22.12.17	SIGNED:	PLOT DATE: 19.01.18	
D	TRACK AND STAIRS CHAINAGES ADDED	TCH	19.01.18	CHECKED: TCH	DATE: 19.01.18	SIGNED:	SURVEY BY: -	
C	FINAL AS BUILT	TCH	18.01.18	APPROVED: GPR	DATE: 19.01.18	SIGNED:	SURVEY DATE: -	
B	DRAFT AS BUILTS	TCH	16.01.18					
A	DRAFT AS BUILT	TCH	22.12.17					
REF	REVISIONS	BY	DATE					

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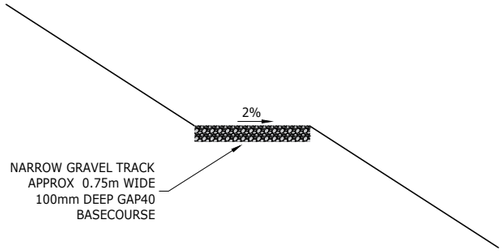
PROJECT:
Summit
THE LAKES (2012) LIMITED

TITLE:
STAGE 3I
STREETSCAPE/TRANSPORTATION AS BUILT PLANS
SHEET 4
TCC IP 101782

ISSUE STATUS: FINAL AS BUILT

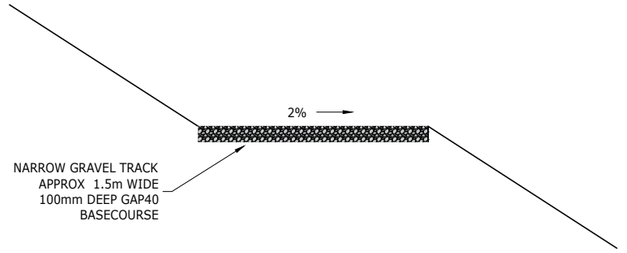
PROJECT No: 1520-139618-01
SCALES: 1:1000 - A1, 1:2000 - A3
A1

DRAWING No: 139618-AB404
REV D



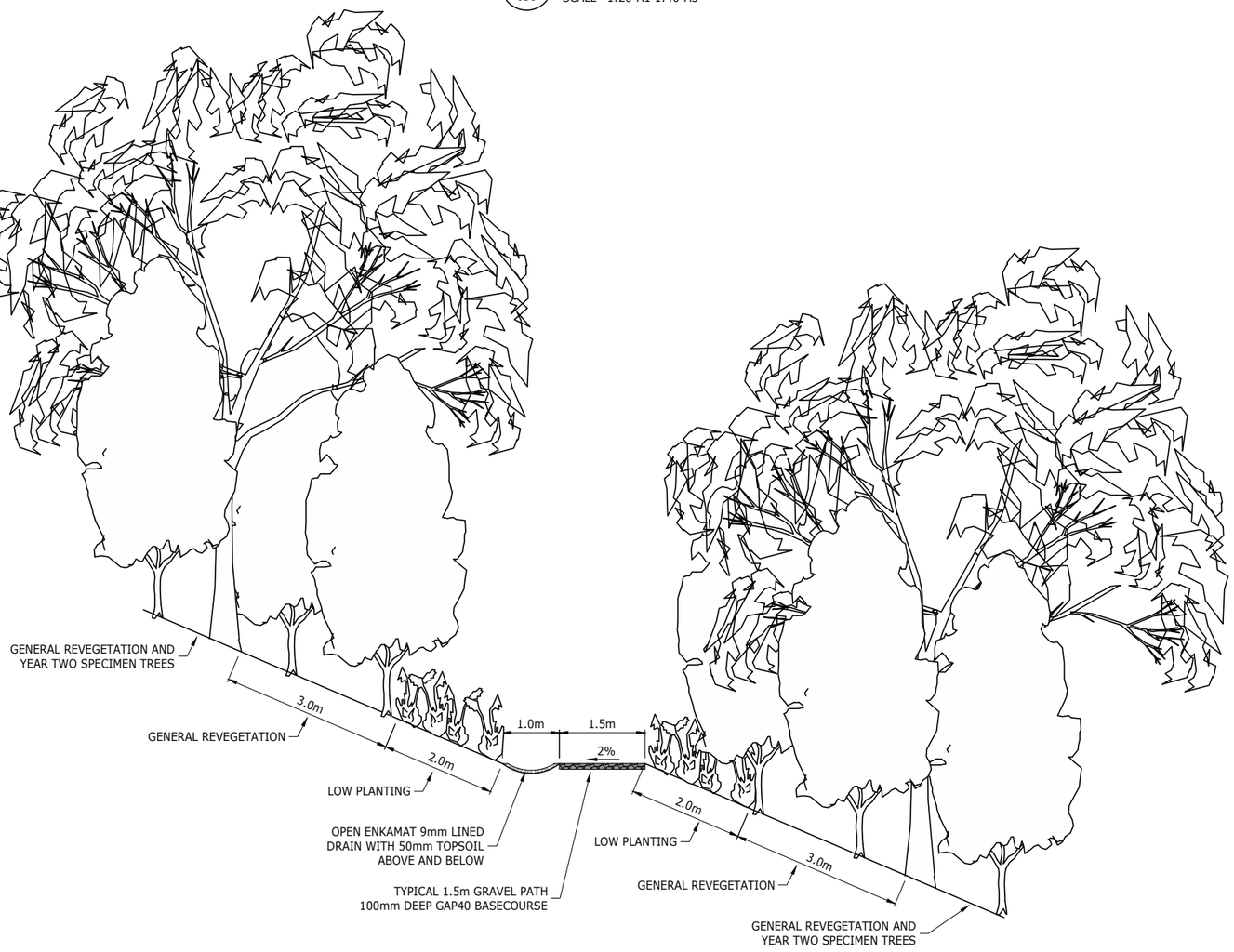
B 650 NARROW TRACK TYPICAL CROSS SECTION

SCALE 1:20-A1 1:40-A3



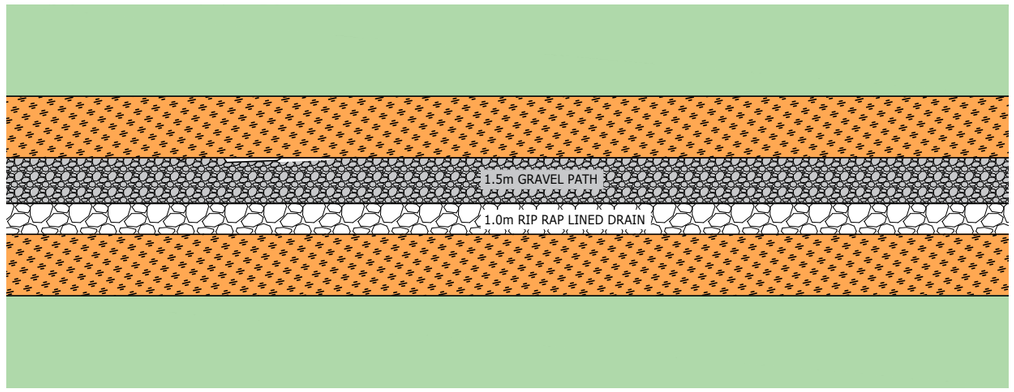
C 651 STANDARD TRACK TYPICAL CROSS SECTION

SCALE 1:20-A1 1:40-A3



A 650 1.5m GRAVEL PATH TYPICAL CROSS SECTION

SCALE 1:50-A1 1:100-A3



NOTES:

1. GRAVEL TRACKS TO BE 100mm DEEP GAP40 BASECOURSE MATERIAL TO BE WELL GRADED ANGULAR STONE WITH CLAY CONTENT OF 3-5%. SURFACE FINISH TO BE SMOOTH AND IMPERMEABLE.
2. CONTRACTOR TO PROVIDE GRADING CURVE TO ENGINEER FOR APPROVAL.
3. REFER TO TCC TRACKS MANUAL FOR STEP DETAILS

REF	REVISIONS	BY	DATE
2	ADDED DETAIL C	GPR	23.02.17
1	ISSUED FOR CONSTRUCTION	GPR	31.01.17

ORIGINATOR: GPR | DATE: 01.12.16 | SIGNED: | PLOT BY: TRS
DRAWN: HEH | DATE: 01.12.16 | SIGNED: | PLOT DATE: 24.02.17
CHECKED: RJM | DATE: 23.02.17 | SIGNED: | SURVEY BY:
APPROVED: GPR | DATE: 23.02.17 | SIGNED: | SURVEY DATE:

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

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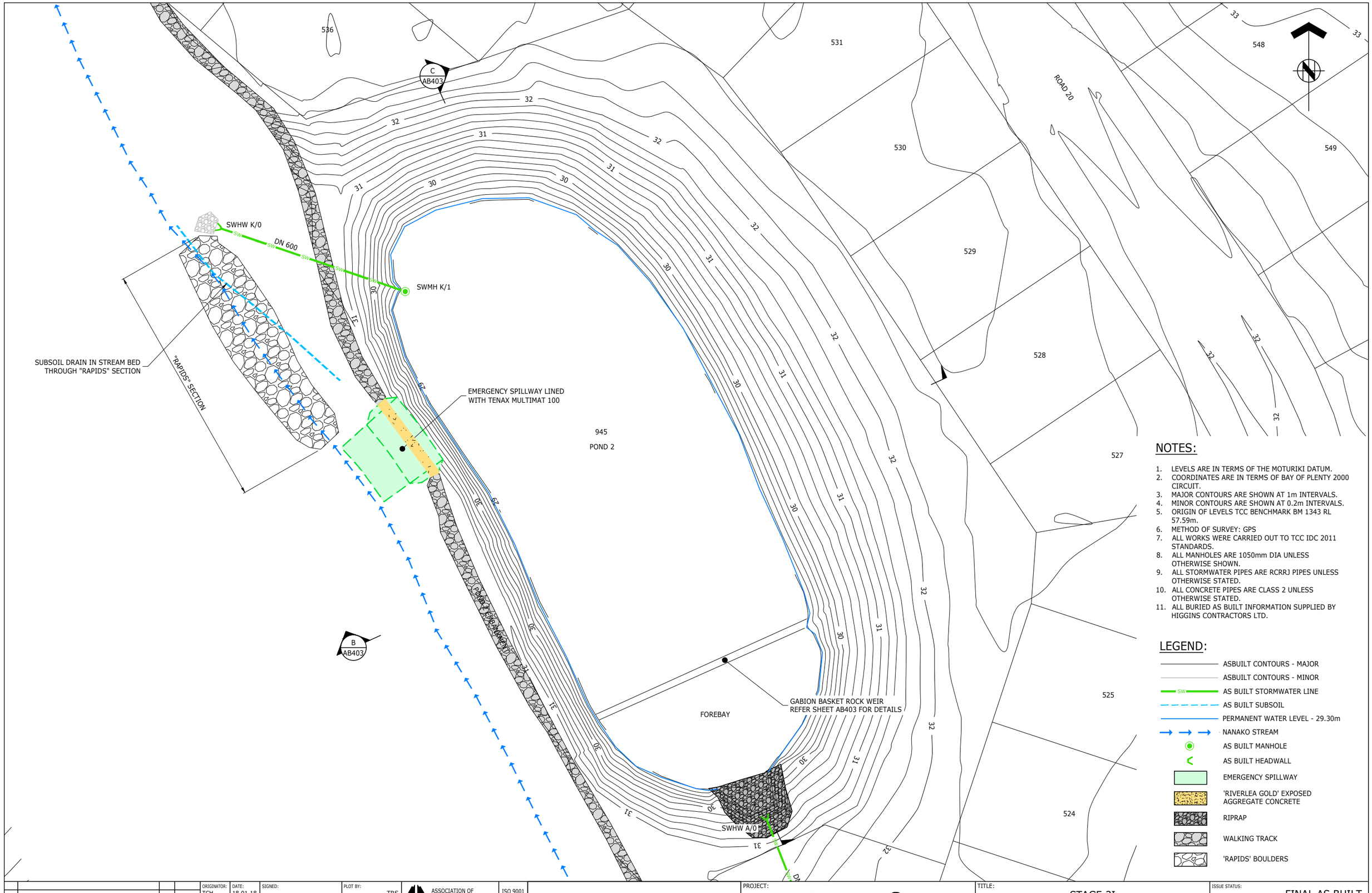
PROJECT: THE LAKES (2012) LTD TAURANGA

TITLE: STAGE 3 (ZONE 3) EARTHWORKS EASTERN GULLY RESERVE TYPICAL CROSS SECTIONS SHEET

ISSUE STATUS: CONSTRUCTION

PROJECT No: 1510-137845-01 | SCALES: AS SHOWN | A1

DRAWING No: 137845-01-668 | REV B



NOTES:

1. LEVELS ARE IN TERMS OF THE MOTURIKI DATUM.
2. COORDINATES ARE IN TERMS OF BAY OF PLENTY 2000 CIRCUIT.
3. MAJOR CONTOURS ARE SHOWN AT 1m INTERVALS.
4. MINOR CONTOURS ARE SHOWN AT 0.2m INTERVALS.
5. ORIGIN OF LEVELS TCC BENCHMARK BM 1343 RL 57.59m.
6. METHOD OF SURVEY: GPS
7. ALL WORKS WERE CARRIED OUT TO TCC IDC 2011 STANDARDS.
8. ALL MANHOLES ARE 1050mm DIA UNLESS OTHERWISE SHOWN.
9. ALL STORMWATER PIPES ARE RCRRJ PIPES UNLESS OTHERWISE STATED.
10. ALL CONCRETE PIPES ARE CLASS 2 UNLESS OTHERWISE STATED.
11. ALL BURIED AS BUILT INFORMATION SUPPLIED BY HIGGINS CONTRACTORS LTD.

LEGEND:

- ASBUILT CONTOURS - MAJOR
- ASBUILT CONTOURS - MINOR
- AS BUILT STORMWATER LINE (SW)
- AS BUILT SUBSOIL
- PERMANENT WATER LEVEL - 29.30m
- NANAKO STREAM
- AS BUILT MANHOLE
- AS BUILT HEADWALL
- EMERGENCY SPILLWAY
- 'RIVERLEA GOLD' EXPOSED AGGREGATE CONCRETE
- RIPRAP
- WALKING TRACK
- 'RAPIDS' BOULDERS

REF	REVISIONS	BY	DATE
C	FINAL AS BUILT	TCH	19.01.18
B	FINAL AS BUILT	TCH	19.01.18
A	DRAFT AS BUILT	TCH	18.01.18

ORIGINATOR: TCH — DATE: 18.01.18 — SIGNED: — PLOT BY: TRS
DRAWN: TRS — DATE: 18.01.18 — SIGNED: — PLOT DATE: 19.01.18
CHECKED: TCH — DATE: 19.01.18 — SIGNED: — SURVEY BY: -
APPROVED: GPR — DATE: 19.01.18 — SIGNED: — SURVEY DATE: -

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND — ISO 9001 QUALITY ASSURED

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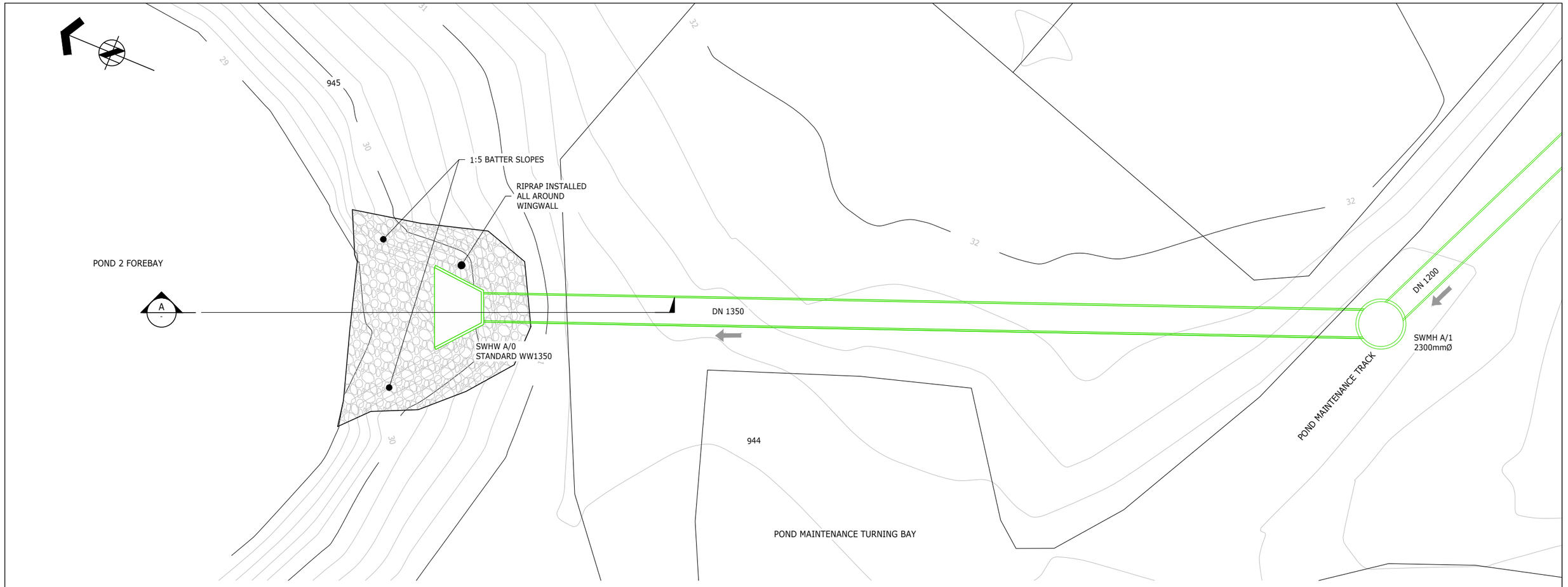
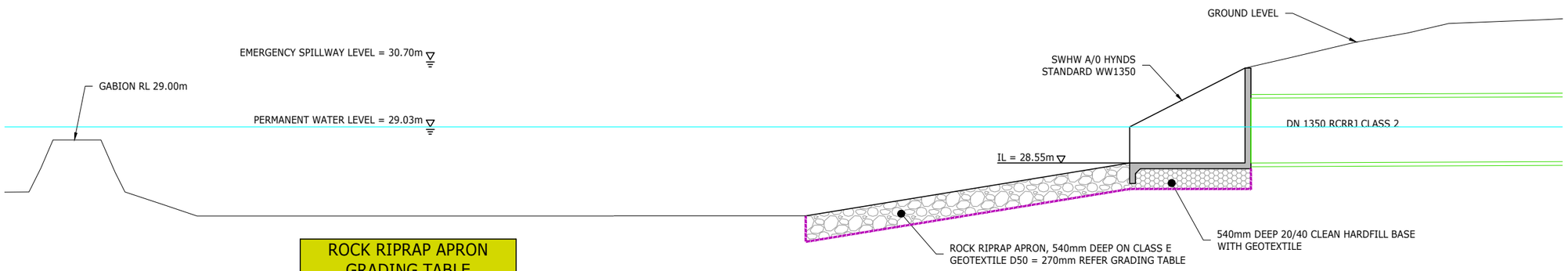
W www.harrisongrierson.com

PROJECT: Summit
THE LAKES (2012) LIMITED

TITLE:
STAGE 3I
POND 2 AS BUILT LAYOUT PLAN
TCC IP 101782

ISSUE STATUS: FINAL AS BUILT
PROJECT No: 1520-139618-01
SCALES: 1:250 - A1, 1:500 - A3
A1
DRAWING No: 135952-AB401
REV C





ROCK RIPRAP APRON GRADING TABLE	
SIEVE SIZE (mm)	MINIMUM PERCENTAGE OF ROCK LARGER THAN
410-460	100
330-380	85
270-380	50
120-160	15

NOTES:

1. LEVELS ARE IN TERMS OF THE MOTURIKI DATUM.
2. COORDINATES ARE IN TERMS OF BAY OF PLENTY 2000 CIRCUIT.
3. ORIGIN OF LEVELS TCC BENCHMARK BM 1343 RL 57.59m.
4. METHOD OF SURVEY: GPS
5. ALL WORKS WERE CARRIED OUT TO TCC IDC 2011 AND ALL SUBSEQUENT AMENDMENTS.
6. ALL STORMWATER PIPES ARE RCRRJ PIPES.
7. ALL CONCRETE PIPES ARE CLASS 2.
8. ALL BURIED AS BUILT INFORMATION SUPPLIED BY HIGGINS CONTRACTORS LTD.

LEGEND:

AS BUILT STORMWATER
10 MAJOR CONTOUR
MINOR CONTOUR
RIPRAP

A - STORMWATER OUTLET A/0 - A/1

SCALE 1:50 - A1, 1:100 - A3

REF	REVISIONS	BY	DATE
C	FINAL AS BUILT	TCH	19.01.18
B	FINAL AS BUILT	TCH	19.01.18
A	DRAFT AS BUILT	TCH	18.01.18

ORIGINATOR: TCH DATE: 18.01.18 SIGNED: PLOT BY: TRS
DRAWN: PSJ DATE: 18.01.18 SIGNED: PLOT DATE: 19.01.18
CHECKED: GPR DATE: 19.01.18 SIGNED: SURVEY BY:
APPROVED: GPR DATE: 19.01.18 SIGNED: SURVEY DATE:

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

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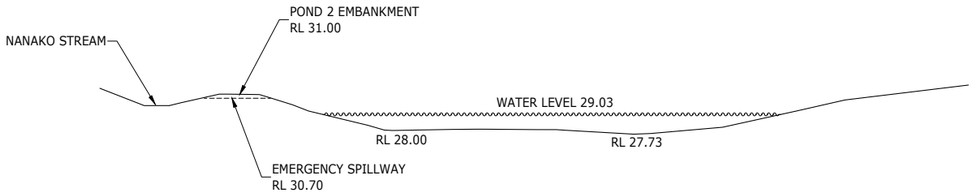
PROJECT: Summit
THE LAKES (2012) LIMITED, TAURANGA

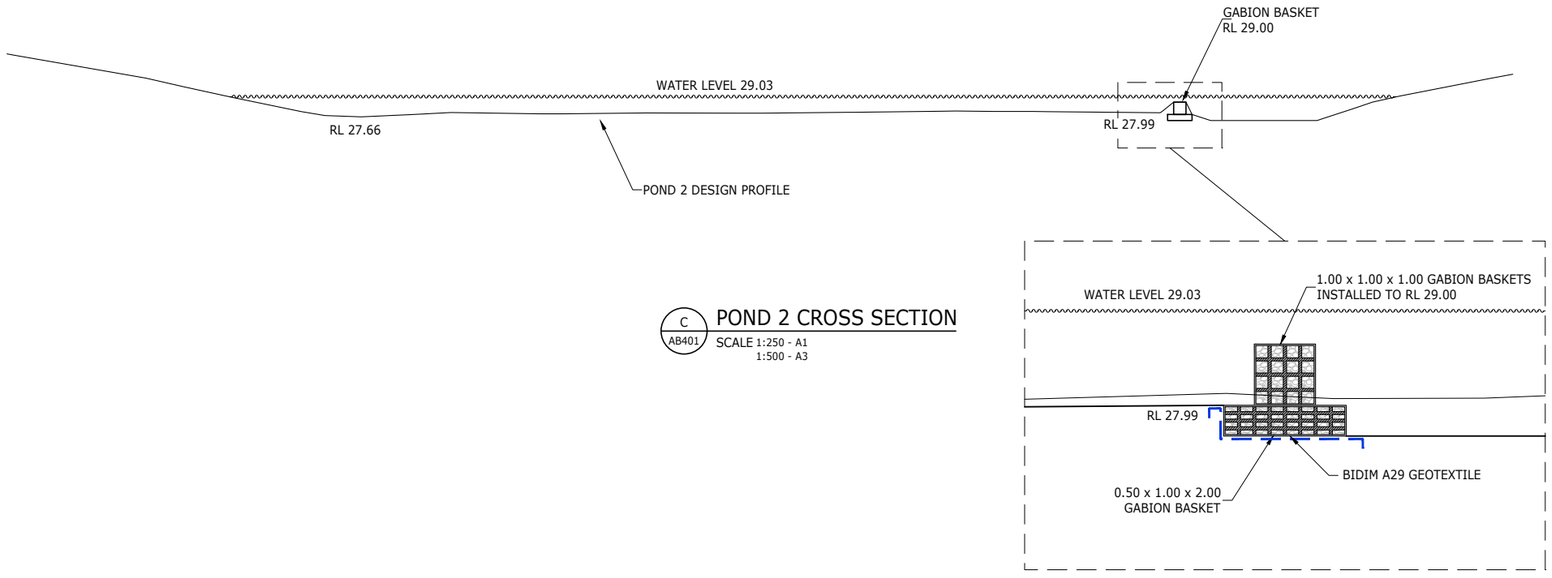
TITLE:
STAGE 3I
POND 2 AS BUILT OUTLET DETAILS
TCC IP 101782

ISSUE STATUS: FINAL AS BUILT
PROJECT No: 1520-139618-01
SCALES: 1:100 - A1, 1:200 - A3
A1
DRAWING No: 135952-AB402
REV C



B AB401 **POND 2 CROSS SECTION**

SCALE 1:250 - A1
1:500 - A3



C AB401 **POND 2 CROSS SECTION**

SCALE 1:250 - A1
1:500 - A3

				ORIGINATOR: TCH	DATE: 18.01.18	SIGNED:	PLOT BY: TRS	ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND	ISO 9001 QUALITY ASSURED
				DRAWN: PSJ	DATE: 18.01.18	SIGNED:	PLOT DATE: 19.01.18		
C	FINAL AS BUILT	TCH	19.01.18	CHECKED: GPR	DATE: 19.01.18	SIGNED:	SURVEY BY:		
B	FINAL AS BUILT	TCH	19.01.18						
A	DRAFT AS BUILT	TCH	18.01.18	APPROVED: GPR	DATE: 19.01.18	SIGNED:	SURVEY DATE:		
REF	REVISIONS	BY	DATE						

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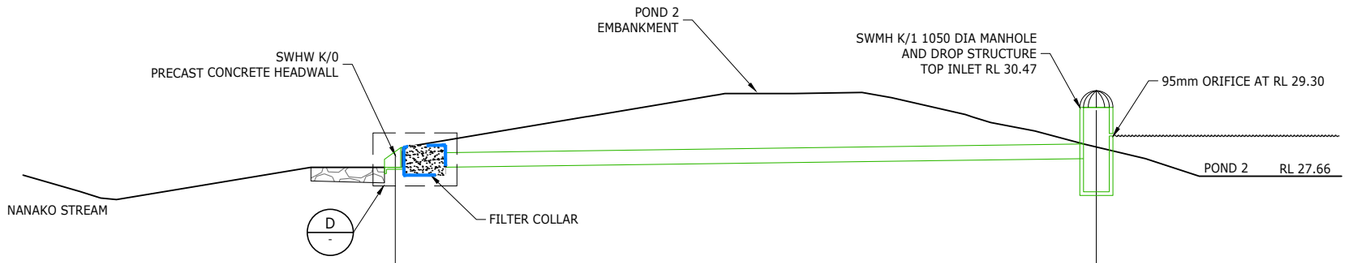
PROJECT:
Summit
THE LAKES (2012) LIMITED, TAURANGA

TITLE:
STAGE 3I
POND 2 AS BUILT CROSS SECTIONS
TCC IP 101782

ISSUE STATUS: FINAL AS BUILT

PROJECT No: 1520-139618-01
SCALES: 1:100 - A1, 1:200 - A3
A1

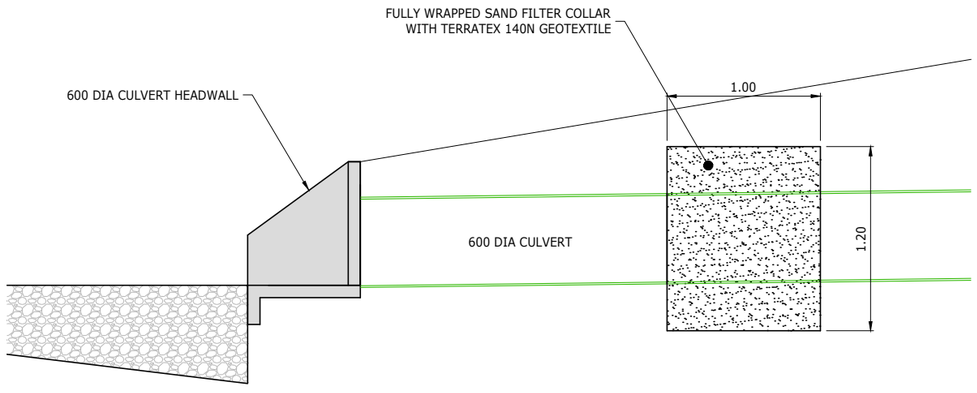
DRAWING No: 135952-AB403
REV C



DATUM R.L. 15.00		
FINISHED LEVEL		
INVERT LEVEL	28.00	28.38
DEPTH TO INVERT		
GRADIENT & PIPE SIZES	1.33% DN 600 CLASS 4 RCRRJ	
CHAINAGE (m)	0.00 28.59	28.59

STORMWATER LINE C LONGSECTION

SCALE 1:125 - A1, 1:250 - A3



D FILTER COLLAR DETAIL

SCALE 1:20 - A1, 1:40 - A3

				ORIGINATOR: TCH	DATE: 18.01.18	SIGNED:	PLOT BY: TRS	ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND	ISO 9001 QUALITY ASSURED
				DRAWN: TRS	DATE: 18.01.18	SIGNED:	PLOT DATE: 19.01.18		
C	FINAL AS BUILT	TCH	19.01.18	CHECKED: TCH	DATE: 19.01.18	SIGNED:	SURVEY BY: -		
B	FINAL AS BUILT	TCH	19.01.18						
A	DRAFT AS BUILT	TCH	18.01.18	APPROVED: GPR	DATE: 19.01.18	SIGNED:	SURVEY DATE: -		
REF	REVISIONS	BY	DATE						

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TAURANGA 3110
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W www.harrisongrierson.com

PROJECT:
Summit
THE LAKES (2012) LIMITED

TITLE:
STAGE 3I
POND 2 AS BUILT STORMWATER LONG SECTION
TCC IP 101782

ISSUE STATUS: FINAL AS BUILT

PROJECT No: 1520-139618-01 | SCALES: AS SHOWN | A1

DRAWING No: 135952-AB411 | REV C