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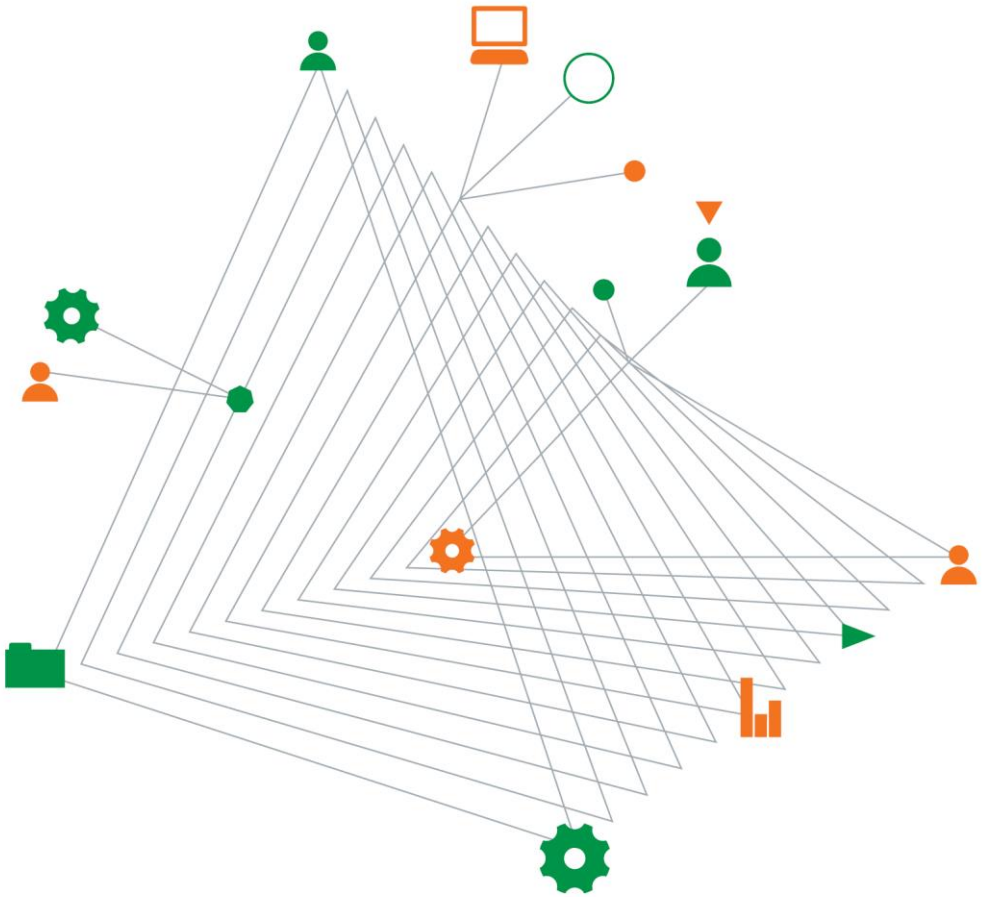
The Lakes (2012) Ltd

The Lakes - Stage 3CD

Geotechnical Completion Report

11 April 2016



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The Lakes - Stage 3CD

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For and on behalf of Coffey

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1. Introduction and Scope

This Geotechnical Completion Report (GCR) has been prepared by Coffey Geotechnics (NZ) Ltd (Coffey) for the Lakes (2012) Limited following completion of earthworks for Stages 3C and 3D of the Lakes subdivision and in general accordance with the conditions of Council resource consent number RC21332. These stages are collectively known as Stage 3CD.

This report also covers Lots 104 to 106 in Stage 3A which were excluded from the previous GCR due to on-going settlement monitoring at the time that report was issued.

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

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

2. Excluded Lots

Lots 236 to 239 in Stage 3D have been excluded from this GCR due to ongoing settlement of the filling below this area. These lots will need to be assessed in a subsequent GCR report.

3. Description of Subdivision

Stages 3CD of the Lakes subdivision are located near the intersection of Takitimu Drive (SH36) and Pyes Pa Road in Pyes Pa, Tauranga. The site location and original ground contours are shown on Figure 1.

Before work began, the majority of the site consisted of an elevated, flat or gently rolling north-south oriented plateau at approximately RL 60m (Moturiki Datum, 1953). Three steeply sided gullies were located along the south-western boundary of this plateau. The Northern Gully (shown on the attached plans) is largely located outside the subject area although it does include Lots 104 to 106 in Stage 3A. The Central Gully extends from the southern end of Stage 3C and into 3D near the middle of the site. The Southern Gully is located at the southern corner of the site above Takitimu Drive.

The eastern margin of the site was defined by an approximately 30m high, steep to very steep natural slope.

During the 2007 to 2008 earthworks season, major works were undertaken within the Lakes area and to form the Takitimu Drive road alignment (State Highway SH36) which runs along the site's south-western and southern boundaries. These earthworks included excavation on the elevated plateau and filling within each of the three gullies mentioned above. Contours of the works completed are shown on Figure 2. The finished ground surface (surveyed in 2012) is shown on Figure 3.

In 2012 ownership of the Lakes subdivision passed from Grasshopper Farms Ltd to The Lakes (2012) Ltd. Further earthworks were completed including additional excavation on the plateau and filling within the northern and central gullies during the 2013-2014 work season and filling of the southern gully in the 2014-2015 season. Excavations were also undertaken at the south-eastern corner of the site to form a two-lane collector road to service later stages of the subdivision. Cut/fill contours for the 2013-2014 and 2014-2015 earthworks are shown on Figure 4 Appendix A.

Civil infrastructure for these stages of the subdivision was installed in 2015 and 2016. The finished (March 2016) ground surface is shown on Figure 5.

4. Related Reports

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

1. *'Pyes Pa West Urbanisation Development, Tauranga – Geotechnical Assessment Report'*, report prepared by S&L Consultants Ltd (Ref: 16944, dated October 2003).
2. *'Detailed Site Investigation for the Lakes Subdivision Stage 3, Takitimu Drive, Tauranga',* report prepared by Coffey Environments (Ref: ENNZAUCK51132AA, dated 21 March 2013).
3. *'Geotechnical Investigation Report for the Lakes Subdivision – Stage 3 (Phase 1) at Pyes Pa, Tauranga',* report prepared by Coffey (Ref: GENZTAUC13086AF-AA, dated 29 April 2013).
4. *'Summary of Works Report, The Lakes, Stage 3, Tauranga*' report prepared by Coffey Environments (Ref: ENNZAUCK51132AB, dated 7 April 2014).
5. *'The Lakes Subdivision Stage 3 Zone 1 Earthworks Completion Report'*, report prepared by Coffey (Ref: GENZTAUC13086AF-AE, dated 15 August 2014).

Key conclusions of the main documents are summarised below.

4.1. Geotechnical Assessments

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

With regard to the Stage 3CD area, S&L determined that the slopes to the south-west of the site had been affected by previous instability. The report recommended that future buildings be set back from the crest of these slopes or that the slope profiles should be modified by earthworks to improve their stability. Within Stage 3CD these slopes have been re-graded as part of the earthworks described in this GCR and in accordance with the previous recommendations.

The subsequent geotechnical investigation report by Coffey in April 2013 summarised additional and more detailed 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. In addition to the western and south-western slopes, Coffey concluded that the slope to the east of Stage 3 had also been affected by past instability. Coffey recommended that buildings adjacent to this slope also be set back from the crest (see Section 9.3 below).

4.2. Contaminated Soils Reports

Due to the presence of farm buildings and facilities on the original site, Coffey was also engaged to complete an environmental assessment of the proposed development area. The results of this assessment were described in the Coffey Environments report of March 2013 (Section 4, reference 2). This report identified isolated areas of possibly contaminated soil at the sites of a (suspected) pre-existing sheep dip, an above-ground fuel storage tank and a diary effluent pond.

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

4.3. Earthworks Completion Report

The August 2014 Earthworks Completion Report (ECR) concluded that the bulk earthworks undertaken in 2007-2008 and 2013-2014 were generally completed in accordance with the relevant standards and guidelines including NZS 4431 (Code of Practice for Earth Fill for Residential Development) and the Tauranga City Council Infrastructure Development Code (TCC IDC). The report did however identify several areas that needed to be re-visited in this GCR. These were:

1. Some of the fill materials placed towards the end of the 2013-2014 season did not pass the required Nuclear Density Meter (NDM) tests. The failed tests were attributed to the highly variable source materials being used (silts, sands and clays) which resulted in fills that could not be easily assessed with a NDM. It was therefore decided that the affected fill would be re-tested using hand-auger boreholes with undrained shear strength measurements and/or Dynamic Cone Penetrometer (DCP) testing as appropriate for the individual soils.
2. The ECR recommended that static settlements below filled areas should continue to be monitored post-earthworks and the data should be reviewed and assessed prior to issuing the GCR.
3. The ECR also commented on the presence of undocumented filling that was encountered during excavations in 2013 within the central and southern gullies in Stage 3C and 3D. This filling is understood to have been placed between 2010 and 2012, when works on site were not closely managed by either Grasshopper Farms Ltd or The Lakes (2012) Ltd.
4. Finally, the ECR recommended that the stability of the eastern slope should be reassessed in the GCR and an appropriate Building Restriction Line (BRL) be defined for lots along the crest of this slope.

These issues are addressed in the following sections of this report.

5. 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.

- Five machine boreholes drilled to depths of up to 20m near the Western Batter in 2007 (S&L Consultants, MB34 to MB38 on Figure 1);
- Seven test pits excavated in 2012 within or near the subject stages to maximum depths of up to 5m to assess shallow ground conditions before the 2013-2014 work season (Coffey, TP01 –TP05 and TP09 – TP10 on Figure 3);
- Ten Cone Penetration Tests (CPTs) in 2013 to 20m depth to assess ground conditions beneath the 2007-2008 filling within Stages 3C and 3D (Coffey, CPT01 to CPT10 on Figure 3);

- Four hand-auger boreholes drilled in November 2013 to assess the undocumented filling identified within the central gully in Stage 3C (Coffey, HA01 to HA04 on Figure 2);
- Eight hand-auger boreholes completed in October 2014 to assess the compaction of the variable filling placed within Stage 3C towards the end of the 2013-2014 work season (Coffey, HA301 to HA308 on Figure 4).

On completion of the bulk and minor earthworks, Coffey drilled a total of 132 hand-auger boreholes to a target depth of 1.5m to 2m on lots underlain by natural (cut) soils and approximately every third lot underlain by engineered fill. The location of each borehole is shown on Figure 6. Although not shown on the plan, the boreholes are numbered according to the relevant stage and lot number. For example, the borehole on Lot 209 in Stage 3D is referred to as HA3D-209. Logs of these boreholes are included in Appendix D.

6. Overview of Geological Conditions

The majority of the subject area is located on an elevated, gently sloping plateau. Below the topsoil layer, the pre-development soil profile across this plateau comprised approximately 10m of volcanic ashes including the Hamilton Ash and Rotoehu Ash. This ash sequence is common throughout the Tauranga area. At this location the volcanic ashes overlie ancient alluvial deposits of the Matua Sub-Group and weakly cemented pumice sands of the Te Ranga Ignimbrite.

Excavations in 2007-2008 and 2013-2014 reduced the thickness of the volcanic ashes across most of the plateau by up to 10m. The subsoils below many of the finished lots therefore comprise volcanic ash silts but in some areas excavations have penetrated through the ash layers and the finished lots are underlain by variable Matua Sub-Group soils. These include silts, sands and clays which can be highly sensitive to reworking. Soils with relatively low undrained shear strengths (i.e. < 50kPa) have also been observed in these materials.

7. Earthworks Operations

7.1. Plant

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

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

7.2. Construction Programme

7.2.1. 2007 – 2008 Earthworks Season

Earthworks in 2007 and 2008 summer included excavations of up to 9m depth on the main plateau as shown on Figure 2. Excavated material was used for filling up to approximately 11m deep within the three gullies and up to 17m deep below the highway embankment along the site's south-western boundary.

The filling of the northern gully was observed and tested by Coffey. It is understood the filling within the central and southern gullies was overseen and tested by Beca as part of the highway construction works.

As shown on Figure 2, subsoil drains were installed beneath the filling where shallow groundwater or seepages were encountered.

7.2.2. 2010 – 2012

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

As mentioned in Section 4.3, excavations during 2013 encountered apparently non-engineered fill in the central gully. Comparison of survey data from 2008 and 2012 indicated this filling is approximately 4m deep and overlies the engineered fill placed in the gully in 2007-2008.

During late 2014, excavations in the southern gully also encountered fill materials that did not appear to have been placed under engineer supervision. These soils consisted of highly sensitive silts and clays with a relatively high moisture content and low undrained shear strength.

Based on investigations completed by Coffey including HA01 to HA04 within the central gully (Figure 2) and a series of unlogged test pits within the southern gully it was considered that the non-engineered filling could remain in place provided the later fill in these areas was placed appropriately and that static settlements were monitored and reviewed prior to issue of the GCR. This later filling is discussed in more detail below.

7.2.3. 2013 – 2014 & 2014 – 2015 Earthworks Seasons

During this period the remaining earthworks were completed to form the current ground surface, including placement of up to 11m of additional engineered filling within the central and southern gully areas and excavation of up to 8m depth on the rest of the plateau. Cut and fill contours for this period are shown on Figure 4 and the finished ground surface is shown on Figure 6.

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

Other works completed during this earthworks phase included the excavation and infilling of an approximately 4m deep sub-surface erosion feature (‘tomo’) that was identified on site in late 2014. The tomo was undercut by JMC and backfilled with compacted earthfill under Coffey supervision. The extent of the tomo excavation and back filling is shown on Figure 4.

8. Quality Control

8.1. Site Preparation Observations

Prior to filling within the gullies in 2007-2008, gully cleaning, topsoil stripping and partial removal of soft or unsuitable soils was periodically observed by Coffey and Beca. Subsoil drains were installed where wet ground was encountered.

During 2013-2014 and 2014-2015, Coffey undertook regular observations of fill areas to ensure topsoil, vegetation or unsuitable materials had been removed before filling.

8.2. Fill Control

The filling placed in the northern gully in 2007-2008 was tested by Coffey using in-situ density (NDM), undrained shear strength and water content measurements. The locations of all tests are shown on Figure 2. It is understood the filling in the central and southern gullies was observed by Beca as part of the SH36 highway construction. The results of their testing were unavailable at the time this GCR was issued.

In the 2013-2014 and 2014-2015 seasons, Nuclear Density Meter (NDM), laboratory moisture content and undrained shear strength tests were carried out by Geotechnics Ltd. The locations of the tests completed are shown on Figure 4.

As previously discussed, Coffey also drilled a series of hand-auger boreholes with field shear vane readings and DCP testing to assess variable sandy and silty fill placed in 2014 which could not be practically testing with a NDM. These boreholes are also shown on Figure 4.

8.2.1. 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.

The hand-auger boreholes drilled to test filling in the central gully in 2014 used field shear vane measurements and/or DCP testing, depending on the type of fill encountered. In cohesive fills the target results for the shear vane tests were as above. In granular fills the target test value was five blows or more per 100mm DCP penetration.

8.2.2. Test Results

Summary tables showing the results of the laboratory fill tests for the two stages of bulk earthworks 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.

Two tests during the 2007-2008 season in the vicinity of the subject lots did not meet the required values, with test numbers 826 and 827 being deemed to have failed due to high % air voids values. However, the hand-auger boreholes drilled on these lots in 2016 indicate the fill at this location contained layers of pumiceous sand with DCP results of 5 to 11 blows per 100mm penetration. It is considered that the high % air voids values are likely the result of the pumiceous sands and do not accurately represent the compaction the fill at this location. Based on the DCP results the, sand fills were assessed as meeting or exceeding the required compaction standard.

A total of ten tests failed to meet the required specification during the 2013-2014 season. Tests 06, 12, 22 and 84 failed due to low undrained shear strength readings. The fill in near tests 06, 12 and 22 was re-worked and re-tested with the later results passing specification. The fill near 84 was re-tested in-situ (test 84R) and passed, indicating the failed result was either due to an incorrect test value or

an isolated pocket of filling. As these tests were superseded by later testing, the failed results are not shown on the site plan.

Tests 41, 65, 86, 121, 130 and 157 all failed due to low undrained shear strength measurements. The fill around test 86 was observed on site and the low result was attributed to a significant portion of sand within the fill at this location. The remaining failed results were investigated with hand-auger boreholes in October 2014. The logs of these boreholes (HA301 to HA308) indicate the finished fill comprised layered silts and sands. The low shear strength readings are therefore attributed to sandy soils. DCP testing undertaken with each borehole indicates the sand layers had generally been adequately compacted with DCP results of 5 blows of more per 100mm penetration being recorded.

Fill tests met specifications in the subject area during the 2014-2015 season.

9. Engineering Evaluation and Recommendations

9.1. 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 in 2007-2008, 2013-2014 and 2014-2015. As noted above however, the completion data from Beca for the central and southern gully filling in 2007-2008 were not available at the time of writing.

It is noted that the post-development investigations on lots 175 and 176 encountered organic soils that are not considered adequate for certified fill or ‘good ground’ per NZS 3604. Specific recommendations for development on these lots are given in Section 9.5 below.

9.2. Static Settlement

9.2.1. Northern and Central Gullies

Static settlements below the 2013-2014 filling within the northern and central gullies were monitored at 11 locations shown as SM1 to SM6 and PZ1 to PZ5 on Figure 5. The monitoring pins consisted of steel rods attached to plates installed at the base of the filling. The data from these pins are presented graphically in Appendix F. Measured settlements ranged from less than 100mm to over 1100mm, depending on the thickness of fill and underlying soils at each location.

The data show the majority of consolidation settlement below the main areas of 2013-2014 filling occurred within 2 to 4 months of earthworks being completed. Within the central gully however, monitoring points SM1 to SM5 and PZ1 showed that after consolidation was effectively complete, settlement entered a long term ‘creep’ phase. Extrapolating the data out for a period of 50 years indicated that lots in this area may be affected by up to 200mm of future creep settlement over the assumed life of the proposed dwellings, with a high risk of differential settlement due to the significant differences in fill depth below many lots.

To reduce the risk of differential settlements, parts of the central gully filling were pre-loaded with 2.0m of topsoil. The extent of the pre-loaded area is shown on Figure 5 and the points at which pre-load was added to the respective settlement monitoring points are marked on the plots in Appendix F. Three additional monitoring points referred to as ‘SM-Lot 169’, ‘SM-Lot 189’ and ‘SM-Lot 278’ were also installed at the locations shown on Figure 5.

The pre-load was added in two stages, with lots within Stage 3C being surcharged from February to March 2015 and lots within Stage 3D from July to August 2015. On-going monitoring of the points

within the pre-loaded area indicated that the surcharge induced an additional 100mm to 150mm of consolidation settlement over the monitoring period.

Settlement monitoring of most of the points within the central gully ended in August 2015 when calculations indicated that consolidation settlements below the original filling and pre-load were at least 90% complete (i.e. 'T90'). Monitoring continued at SM1 and SM-Lot 278 within Stage 3D until December 2015 when calculations indicated this area had also reached T90.

9.2.2. Southern Gully

Data for monitoring points SM15 and SM28 within the southern gully are plotted separately in Appendix F. The graphs show that settlement is continuing at this location, particularly at SM28 where calculations using the Asaoka method indicate that consolidation is approximately 65% complete after 10 months of monitoring.

Given the on-going consolidation and potential for future long-term creep settlement in the southern gully, it has been recommended that the lots above this feature be excluded from this GCR. Settlement will need to be continually monitored at SM15 and SM28 until calculations confirm it has reached an acceptable level and a later GCR for these lots can be issued.

9.3. Slope Stability

While the proposed lots within Stages 3CD are generally gently or moderately sloping, the lots around the southern and eastern perimeter of the development are located above steeper slopes.

Lots 148 to 162 in Stage 3C, 240 to 254 in 3D and also 105 to 106 in 3A are located above a 1V:3H batter that falls down to Takitimu Drive. This batter is formed from natural soils and engineered fill. The 1V:3H gradient is considered to be an adequately stable slope angle for these materials and a specific Building Restriction Line (BRL) has therefore not been proposed for these lots. It is considered that the 1.5m yard setback from the property's rear boundaries as required by the TCC city plan will provide sufficient protection for new development on these sites.

Along the eastern boundary of the development, Lots 217, 221 to 224 and 229 are located above a 1V:2.5H batter which has been cut from natural soils. The relic landslide study conducted for the Tauranga area in 2000[1] indicates that this gradient should be adequately stable for residential development. However, given the height of this batter (up to 25m) it is recommended that a BRL be defined along the crest of this slope to reduce the risk posed to the development by shallow slumping or erosion. The BRL is shown on Figure 6, and is set back 3m to 5m from the crest of the batter.

At the northern end of Stage 3D, Lots 342 to 349 and 351 are located above an approximately 30m high natural slope with a gradient of up to 1V:1.6H. Slope angles steeper than 1V:2H are commonly considered to be marginally stable in the Tauranga area and are not adequate for residential development. A BRL is therefore also recommended on these lots as shown on Figure 6. The BRL has been defined by either projecting a 1V:2.5H line from the toe of the steepest adjacent slope, or by measuring 15m back from the slope crest, whichever is smaller. The proposed setback distance is considered adequate for the residential development in this area.

Further recommendations for lots affected by a BRL are discussed in Section 9.4 below.

[1] D H Bell *et-al, "Relic Slip Verification Study – Tauranga District",* 2000.

9.4. Development on Lots with a BRL

It should be understood that the inclusion of a BRL on a lot does not specifically preclude development beyond the restriction line. However, any development between the BRL and slope will require specific geotechnical input and may need additional slope protection works such as retaining walls, deepened foundations, etc. The following restrictions are recommended for these lots:

- Any part of a dwelling or structure which extends beyond the BRL must be reviewed and approved by a TCC Category 1 Geo-Professional prior to the building consent application. A geotechnical report must be provided including the specific design of any mitigation works proposed.
- Any filling between the BRL and slope must be reviewed and approved by a TCC Category 1 Geo-Professional with a report to be provided to Council before work begins.
- Any filling of more than 1.5m depth within the lot irrespective of its relation to the BRL must be reviewed and approved by a TCC Category 1 Geo-Professional to assess its effect on slope stability.
- Stormwater from any paved or impermeable surfaces including roofs and driveways on these lots must be collected and piped to the site's stormwater system. Stormwater must not be disposed via ground soakage on these lots and any concentration of runoff over the slope must be avoided.

9.5. Lots 175 & 176

As shown on the log for HA3C-176, the post-subdivision borehole drilled on Lot 176 encountered a layer of buried topsoil or highly organic material between 1.1m and 1.4m depth. Subsequent test pits (logs not presented) confirmed the presence of up to three layers organic soils below Lot 176 and extending across the boundary to Lot 175. HAC-175 however did not encounter these soils near the middle of Lot 175.

The soils observed do not meet the requirements of 'good ground' as defined by NZS 3604. The depth and extent of the organic layers will therefore need to be assessed prior to construction on these lots and remedial actions taken to remove or replace unsuitable soils. These works will need to be completed under the observation and to the satisfaction of a chartered engineer (CPEng) or TCC Category 2 Geo-Professional. A note has been added for these lots on the Geotechnical Data Summary table (Form G3) in Appendix B.

9.6. Lots 253 & 254

These lots are adjacent to a stormwater main that collects water from Stage 3D. The main has been designed to accept flows from a 1 in 50 year rainfall event or smaller, with flows from larger storms being directed over-land via the road to the north-west of the lots to Lakes Boulevard.

The finished ground surface within Lots 253 and 254 has been formed to provide approximately 200mm freeboard above overland flow levels within the road reserve. It is important that the ground at the front of these lots is maintained at this level so that storm flows are not directed through the lots.

The ground level within the 3m front yard of these sites must therefore be maintained so that a continuous barrier at at least RL55.20m (Moturiki Datum) is formed across the full width of these properties. This will include gardens, driveways, paths or other paved areas.

A note has been added to the Geotechnical Data Summary table (Form G3) in Appendix B.

9.7. Foundation Design & Bearing Capacity

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

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

The ground conditions beneath building platforms underlain by at least 2m of engineered fill should be adequate for standard foundations designed per NZS 3604 using a geotechnical ultimate bearing capacity of 300kPa. It should be understood that excavations on sites underlain by filling will reduce the depth of fill below the building platform. Ground conditions beneath building platforms that are to be excavated more than 1m below current ground level should therefore be confirmed before the foundation type is selected.

The subsoil conditions beneath specific lots are summarised in Table 1below.

Table 1: Site Subsoil Conditions

Subsoil Condition	Lot Numbers
Natural Soils or <2m Engineered Filling	105, 106, 155, 156, 163 – 166, 170 – 184, 187, 189 – 280, 282 - 351
>2m Engineered Filling	104, 148 – 154, 157 – 162, 167 – 169, 185 – 186, 188, 281,

9.8. 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. Conclusion

Based on the test data and observations presented in this report it is concluded that the earthworks and subdivision of Stages 3C and 3D (and Lots 104 to 106 within 3A) have been completed in general accordance with the our previous recommendations, Tauranga City Council Infrastructure Development Code and New Zealand standards.

This report presents site-specific recommendations including Building Restriction Lines (BRLs) on some lots located above steeper slopes. Provided these recommendations are followed and prudent development practices are adopted, it is considered that the finished lots are at low risk of erosion, falling debris, subsidence, inundation or liquefaction and these sites should therefore be adequate for residential development without the need for Section 72 restrictions under the New Zealand Building Act.

Development outside the BRL (i.e. between the restriction line and the slope) is subject to further geotechnical input per Section 9.4 of this report and the need for a Section 72 restriction on affected lots will need to be re-assessed at the building consent stage.

11. 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 laboratory testing, boreholes, CPTs 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.

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

Important information about your **Coffey** Report

Interpretation by other design professionals

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

Data should not be separated from the report*

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

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

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.
Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

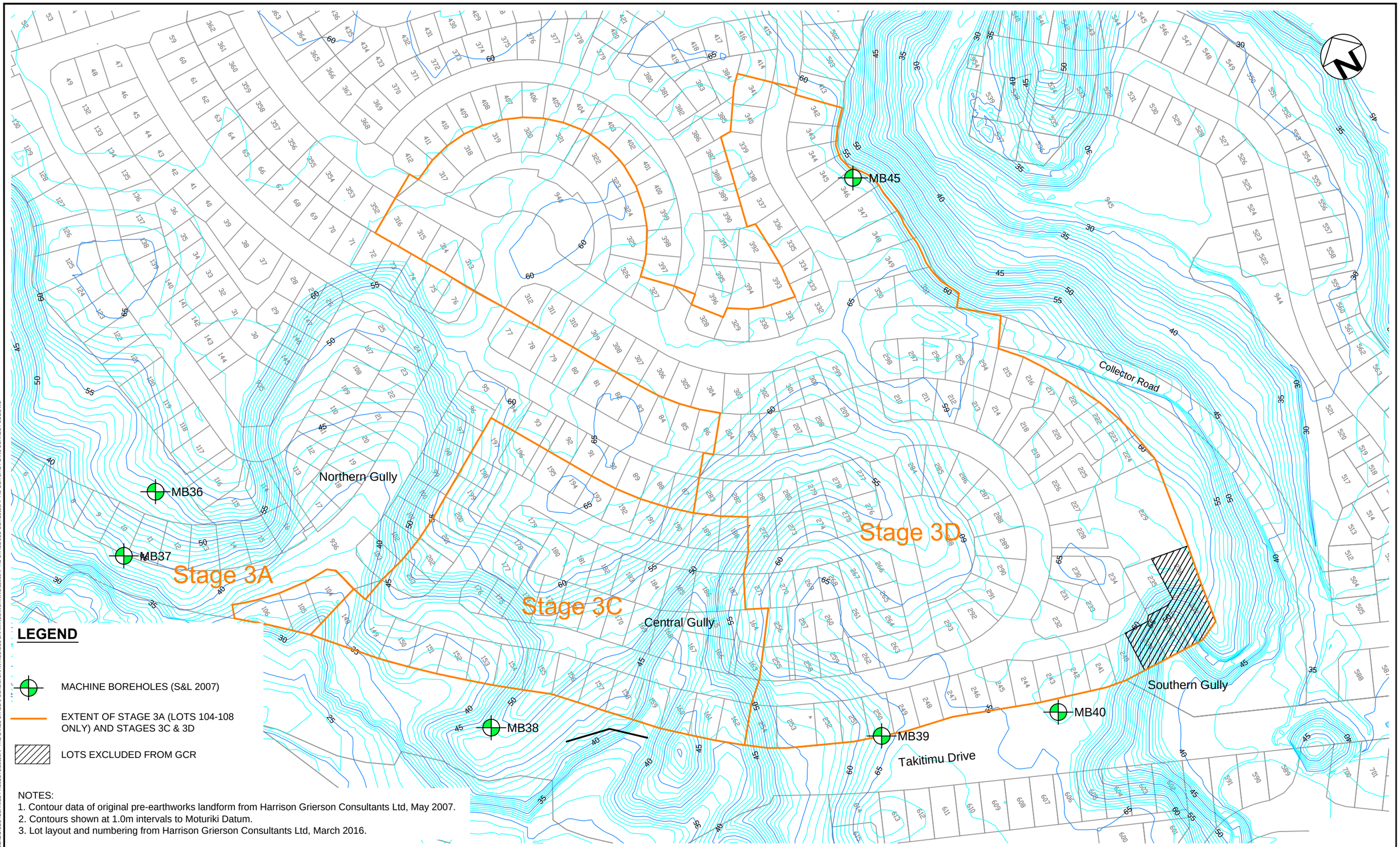
Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As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

Responsibility

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

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

Appendix A - Figures



LEGEND

- MACHINE BOREHOLES (S&L 2007)
- EXTENT OF STAGE 3A (LOTS 104-108 ONLY) AND STAGES 3C & 3D
- LOTS EXCLUDED FROM GCR

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

revision	no.	description	drawn	approved	date
	A				

25 0 50 100

Horizontal Scale (metres) 1:2500

drawn	RBT
approved	DAS
date	1/4/2016
scale	1:2500
original size	A3

coffey
A TETRA TECH COMPANY

client: The Lakes (2012) Ltd

project: The Lakes Stages 3CD
Geotechnical Completion Report

title: Original Site Contour Plan

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

PLOT DATE: 7/04/2016 10:25:06 a.m. DWG FILE: F:\LGEN2\L GEOTECHNICS PROJECTS\13086AP THE LAKES STAGE 3 GCR\S\6. DRAWINGS\SIGQL DRAWINGS\WORKING\13086AP-AG STAGE 3CD GCR\13086AP-AG GCR SITE PLANS CORRECT UCS.DWG

Northern Gully

Central Gully

Southern Gully

Stage 3A

Stage 3C

Stage 3D

HA01

HA02

HA03

HA04

Collector Road

Takitimu Drive

LEGEND

- CUT CONTOURS
- FILL CONTOURS
- SUBSOIL DRAIN
- HAND-AUGER BOREHOLE LOCATION
- NDM TEST LOCATION (PASSED)
- NDM TEST LOCATION (FAILED)
- EXTENT OF STAGE 3A (LOTS 104-108 ONLY) AND STAGES 3C & 3D
- LOTS EXCLUDED FROM GCR

NOTES:

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

revision	no.	description	drawn	approved	date
	A				

25 0 50 100

Horizontal Scale (metres) 1:2500

drawn	RBT
approved	DAS
date	1/4/2016
scale	1:2500
original size	A3

coffey
A TETRA TECH COMPANY

client:	The Lakes (2012) Ltd
project:	The Lakes Stages 3CD Geotechnical Completion Report
title:	2007-2008 Earthworks Contour Plan
project no: 13086AP-AG	figure no: 2 rev: A

TP01
TP09
TP02
TP10
TP03
TP04
TP05
TP06
TP07
CPT01
CPT02
CPT05
CPT06
CPT07
CPT08
CPT09
CPT10
Northern Gully
Central Gully
Southern Gully
Collector Road
Takitimu Drive
Stage 3A
Stage 3C
Stage 3D

LEGEND

- CPT LOCATION (COFFEY 2013)
- TEST PIT LOCATION (COFFEY 2012)
- EXTENT OF STAGE 3A (LOTS 104-108 ONLY) AND STAGES 3C & 3D
- LOTS EXCLUDED FROM GCR

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

revision	no.	description	drawn	approved	date
	A				

25 0 50 100
Horizontal Scale (metres) 1:2500

drawn	RBT
approved	DAS
date	1/4/2016
scale	1:2500
original size	A3

coffey
A TETRA TECH COMPANY

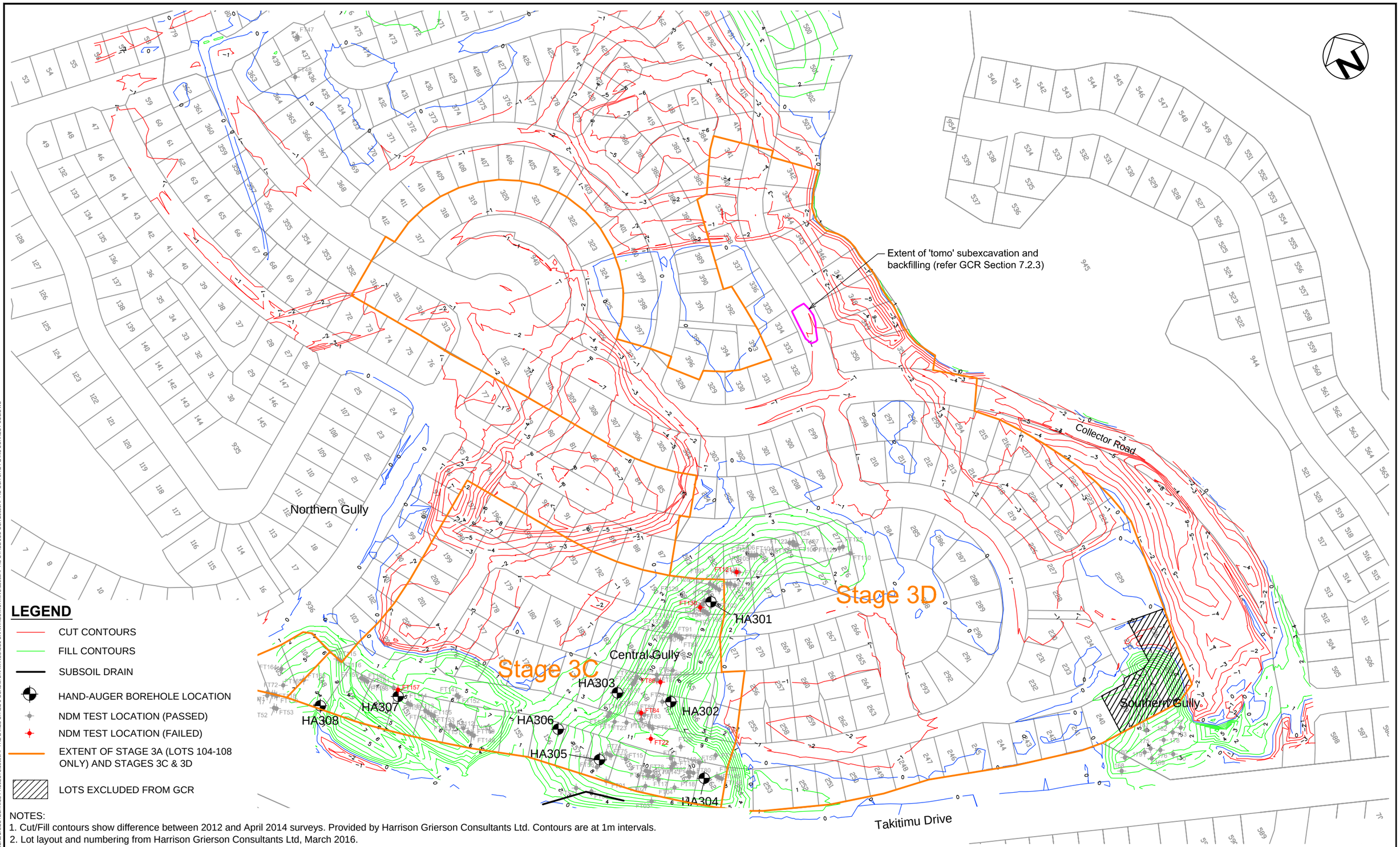
client: The Lakes (2012) Ltd

project: The Lakes Stages 3CD
Geotechnical Completion Report

title: 2012 Contour Plan

project no: 13086AP-AG | figure no: 3 | rev: A

PLOT DATE: 7/04/2016 10:26:19 a.m. DWG FILE: F:\1GEN\21 GEOTECH\NCS PROJECTS\13086AP THE LAKES STAGE 3 GCR\6. DRAWING\SI\CGL DRAWING\SWORKING\13086AP-AG STAGE 3CD GCR\13086AP-AG GCR SITE PLANS CORRECT UCS.DWG



LEGEND

- CUT CONTOURS
- FILL CONTOURS
- SUBSOIL DRAIN
- HAND-AUGER BOREHOLE LOCATION
- NDM TEST LOCATION (PASSED)
- NDM TEST LOCATION (FAILED)
- EXTENT OF STAGE 3A (LOTS 104-108 ONLY) AND STAGES 3C & 3D
- LOTS EXCLUDED FROM GCR

NOTES:
1. Cut/Fill contours show difference between 2012 and April 2014 surveys. Provided by Harrison Grierson Consultants Ltd. Contours are at 1m intervals.
2. Lot layout and numbering from Harrison Grierson Consultants Ltd, March 2016.

revision	no.	description	drawn	approved	date
	A				

25 0 50 100
Horizontal Scale (metres) 1:2500

drawn	RBT
approved	DAS
date	1/4/2016
scale	1:2500
original size	A3

coffey
A TETRA TECH COMPANY

client: The Lakes (2012) Ltd

project: The Lakes Stages 3CD Geotechnical Completion Report

title: 2013 - 2015 Earthworks Contour Plan

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

PLOT DATE: 11/04/2016 10:45:4 p.m. DWG FILE: F:\1GENZ\1 GEOTECH\NCS PROJECTS\13086AP THE LAKES STAGE 3 GCR\6. DRAWING\S\CGL DRAWING\SWORKING\13086AP-AG STAGE 3CD GCR13086AP-AG GCR SITE PLANS CORRECT UCS.DWG

Northern Gully

Central Gully

Southern Gully

Collector Road

Takitimu Drive

Stage 3A

Stage 3C

Stage 3D

SM01

SM-Lot 278

SM-Lot 189

SM02

SM03

SM04

SM05

SM06

SM-Lot 169

SM15

SM28

PZ01

PZ02

PZ03

PZ04

PZ05

LEGEND

- CUT CONTOURS
- FILL CONTOURS
- SUBSOIL DRAIN
- SETTLEMENT MONITORING POINTS
- EXTENT OF 2m PRELOAD
- EXTENT OF STAGE 3A (LOTS 104-108 ONLY) AND STAGES 3C & 3D
- LOTS EXCLUDED FROM GCR

NOTES:
1. Cut/Fill contours show difference between 2012 and April 2014 surveys. Provided by Harrison Grierson Consultants Ltd. Contours are at 1m intervals.
2. Lot layout and numbering from Harrison Grierson Consultants Ltd, March 2016.

revision	no.	description	drawn	approved	date
	A				

25 0 50 100

Horizontal Scale (metres) 1:2500

drawn	RBT
approved	DAS
date	1/4/2016
scale	1:2500
original size	A3

coffey
A TETRA TECH COMPANY

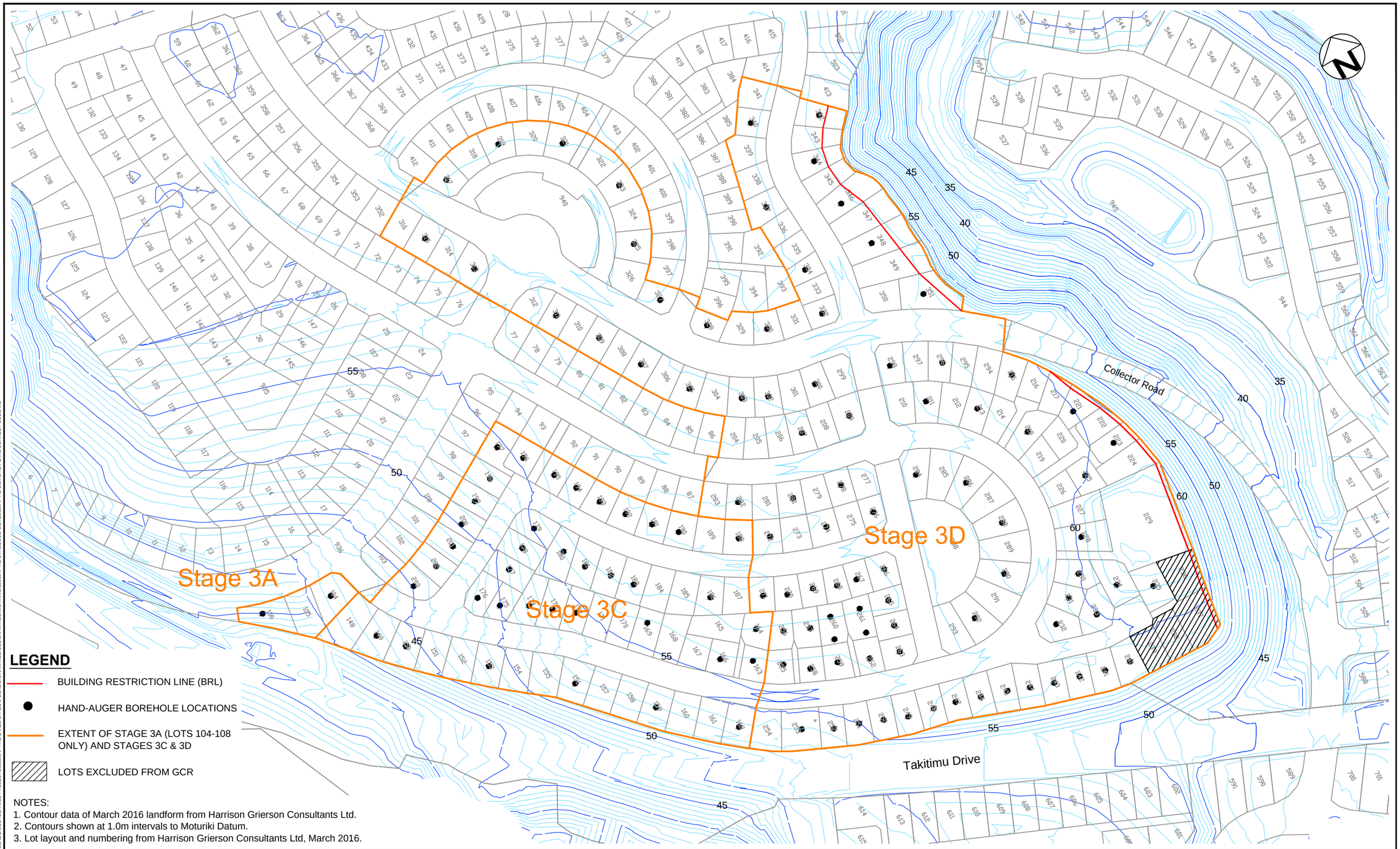
client: The Lakes (2012) Ltd

project: The Lakes Stages 3CD
Geotechnical Completion Report

title: 2013 - 2015 Settlement Monitoring Plan

project no: 13086AP-AG | figure no: 5 | rev: A

PLOT DATE: 7/04/2016 10:29:13 a.m. DWG FILE: P:\1.GENZ\1.GEOTECH\NCS PROJECT\13086AP THE LAKES STAGE 3 GCR\5\6. DRAWINGS\CGL DRAWINGS\WORKING\13086AP-AG STAGE 3CD GCR\13086AP-AG GCR SITE PLANS CORRECT UCS.DWG



LEGEND

- BUILDING RESTRICTION LINE (BRL)
- HAND-AUGER BOREHOLE LOCATIONS
- EXTENT OF STAGE 3A (LOTS 104-108 ONLY) AND STAGES 3C & 3D
- LOTS EXCLUDED FROM GCR

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

revision	no.	description	drawn	approved	date
	A				

25 0 50 100

Horizontal Scale (metres) 1:2500

drawn	RBT
approved	DAS
date	1/4/2016
scale	1:2500
original size	A3

coffey
A TETRA TECH COMPANY

client: The Lakes (2012) Ltd

project: The Lakes Stages 3CD
Geotechnical Completion Report

title: 2016 Contour Plan

project no: 13086AP-AG | figure no: 6 | rev: A

PLOT DATE: 7/04/2016 10:33:10 a.m. DWG FILE: F:\LGEN2\1.GEOTECHNICS PROJECT\13086AP THE LAKES STAGE 3 GCR\5\6. DRAWINGS\CGL DRAWINGS\WORKING\13086AP-AG STAGE 3CD GCR\13086AP-AG GCR SITE PLANS CORRECT UCS.DWG

Appendix B - Geotechnical Suitability Statement & Geotechnical Data Summary Table

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

NAME OF SUBDIVISION	The Lakes Subdivision – Stages 3C & 3D + Stage 3A Lots 104-106
COUNCIL FILE NUMBER RC No:	RC21332
ENGINEER RESPONSIBLE FOR DEVELOPMENT	Peter Marchant
QUALIFICATIONS:	MIPENZ, CPEng (Reg. No. 69408), TCC Category 1 Geotechnical Engineer

I, Peter Marchant of Coffey Geotechnics Ltd, 96 Cameron Road, Tauranga, hereby confirm that:

1) I am a professional person, appropriately qualified with experience in geomechanics to ascertain the suitability of the land for building development and was retained as the Soils Engineer to the above development.
2) An appropriate level of site investigation and construction supervision has been carried out under my direction and is described in our development evaluation report dated 29 April 2013.
3) In my professional opinion, not to be construed as a guarantee, I consider that;
   a) The areas shown in my report dated 11 April 2016 of each new allotment are suitable for the erection thereon of the building types appropriate to the zoning of the land, provided that reference is made to my Geotechnical Completion Report Ref. GENZTAUC13086AP-AG, dated 11 April 2016.
   b) The earth fills shown on the attached Plans ref Figure 02 & Figure 04 have been placed in general accordance with the requirements of the Infrastructure Development Code.
   c) The completed works give due regard to all land slope and foundation stability considerations.
   d) The filled ground is suitable for the erection thereon of residential buildings not requiring specific design subject to the recommendations presented in my Geotechnical Completion Report Ref. GENZTAUC13086AP-AG, dated 11 April 2016.
   e) The original ground not affected by filling is suitable for the erection thereon of residential buildings requiring specific design subject to the recommendations presented in my Geotechnical Completion Report Ref. GENZTAUC13086AP-AG, dated 11 April 2016.
4) This professional opinion is furnished to the Council and the owner for their purposes alone, on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection for any dwelling.

Signed P.G. Marchant

Date: 11 April 2016

DP No:	Lot 1001 DP486181 & Lot 6 DP 348694	Property Address	279 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										
104	721	>240	Y	10	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	Suitable for standard foundations designed in accordance with NZS 3604, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
105	664	NT	Y	11	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
106	669	>183	Y	7	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
148	869	NT	Y	11	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	Suitable for standard foundations designed in accordance with NZS 3604, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
149	714	133	Y	11	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
150	653	>240	Y	4	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
151	608	NT	Y	7	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
152	613	NT	Y	8	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
153	600	>183	Y	8	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
154	608	NT	Y	8	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	

DP No:	Lot 1001 DP486181 & Lot 6 DP 348694	Property Address	279 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										
155	657	NT	Y	6	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
156	644	>240	Y	4	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
157	600	NT	Y	7	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	Suitable for standard foundations designed in accordance with NZS 3604, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
158	600	NT	Y	11	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
159	611	>183	Y	16	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
160	612	NT	Y	16	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
161	613	NT	Y	12	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
162	610	>240	Y	12	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
163	429	>240	Y	4	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
164	499	151	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
165	649	NT	Y	11	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	

DP No:	Lot 1001 DP486181 & Lot 6 DP 348694	Property Address	279 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										
166	481	>183	Y	11	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
167	468	NT	Y	16	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	Suitable for standard foundations designed in accordance with NZS 3604, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
168	649	NT	Y	16	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
169	602	>240	Y	9	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
170	546	NT	Y	3	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
171	544	NT	Y	2	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
172	548	>240	Y	1	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
173	587	>183	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	
174	596	215	Y	5	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	

DP No:	Lot 1001 DP486181 & Lot 6 DP 348694	Property Address	279 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										
175	418	N/A	Y	5	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG. Organic soils underlying building platform to be assessed and/or remediated before development per Section 9.5 of GCR.
176	526	>183	Y	5	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
177	582	N/A	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
178	576	114	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	
179	610	>240	N	-	N	Y	10	N	Y	N	N	N	Y	N	N	N	N	Y	
180	711	120	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	
181	629	111	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
182	587	133	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
183	571	N/A	Y	3	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
184	573	NT	Y	5	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	

DP No:	Lot 1001 DP486181 & Lot 6 DP 348694	Property Address	279 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										
185	592	NT	Y	13	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	Suitable for standard foundations designed in accordance with NZS 3604, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
186	531	>240	Y	13	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	
187	484	NT	Y	7	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
188	514	>240	Y	10	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	Suitable for standard foundations designed in accordance with NZS 3604, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
189	514	NT	Y	9	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
190	514	>183	Y	3	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
191	514	>240	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
192	514	>183	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
193	515	136	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	

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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										
194	450	175	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
195	450	86	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	
196	499	>183	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	
197	621	N/A	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	
198	540	176	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	
199	540	N/A	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	
200	543	N/A	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	
201	556	233	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	
202	555	N/A	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
203	587	>183	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
204	488	NT	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	

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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										
205	470	NT	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
206	488	NT	Y	1	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
207	488	103	Y	1	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
208	510	NT	Y	1	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
209	640	109	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
210	590	NT	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	
211	544	165	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	
212	537	NT	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	
213	513	111	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
214	506	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	

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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										
215	540	>240	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
216	443	NT	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
217	444	NT	N	-	N	Y	4	N	Y	Y	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG. Development subject to BRL restrictions per Section 9.4 of GCR.
218	632	215	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
219	455	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
220	421	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
221	526	>240	N	-	N	Y	4	N	Y	Y	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG. Development subject to BRL restrictions per Section 9.4 of GCR.
222	501	NT	N	-	N	Y	4	N	Y	Y	N	N	Y	N	N	N	N	Y	
223	518	215	N	-	N	Y	4	N	Y	Y	N	N	Y	N	N	N	N	Y	
224	720	NT	N	-	N	Y	4	N	Y	Y	N	N	Y	N	N	N	N	Y	

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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										
225	459	>240	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
226	453	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
227	708	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
228	756	123	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
229	3525	NT	N	-	N	Y	1	N	Y	Y	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG. Development subject to BRL restrictions per Section 9.4 of GCR.
230	543	N/A	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
231	463	>240	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
232	619	N/A	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	

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Lot No:	Area (m^2)	Subsurface data						Foundations		Building Restriction Line	S/W Specific Design	S/W Soakage	S/W Reticulate	Designated Building Platform	Minimum Building Platform	Compressible Soils	On-Site Effluent Disposal	Consent Notice	Comments
		Shear Strength (kPa) at 0.5m depth	Subdivision Filling		Natural Topography Unworked	Natural Topography Earthworked		Conventional Shallow Foundation to NZS 3604:2011	Specific Design										
			Y/N	Depth (m)	Y/N	Y/N	Depth (m)	Y/N/NA	Y/N/NA										
233	653	>183	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
234	700	196	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
235	654	>183	Y	4	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
240	578	>240	Y	4	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
241	551	120	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
242	544	>183	Y	0.7	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
243	542	>183	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
244	580	>240	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
245	585	147	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
246	546	N/A	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	
247	515	72	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	

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Lot No:	Area (m^2)	Subsurface data						Foundations		Building Restriction Line	S/W Specific Design	S/W Soakage	S/W Reticulate	Designated Building Platform	Minimum Building Platform	Compressible Soils	On-Site Effluent Disposal	Consent Notice	Comments
		Shear Strength (kPa) at 0.5m depth	Subdivision Filling		Natural Topography Unworked	Natural Topography Earthworked		Conventional Shallow Foundation to NZS 3604:2011	Specific Design										
			Y/N	Depth (m)	Y/N	Y/N	Depth (m)	Y/N/NA	Y/N/NA										
248	520	>240	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
249	543	156	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	
250	535	N/A	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	
251	552	>183	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	
252	541	233	N	-	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
253	834	>183	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG. Ground level in front 3m yard to be maintained at least RL55.2m (Moturiki Datum) per Section 9.6 of GCR.
254	615	NT	Y	10	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
255	473	N/A	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
256	436	176	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	
257	526	215	Y	0.6	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	

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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										
258	444	>240	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
259	507	120	N	-	N	Y	10	N	Y	N	N	N	Y	N	N	N	N	Y	
260	547	103	N	-	N	Y	10	N	Y	N	N	N	Y	N	N	N	N	Y	
261	593	83	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	
262	461	176	N	-	N	Y	10	N	Y	N	N	N	Y	N	N	N	N	Y	
263	526	>183	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	
264	450	166	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	
265	445	62	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
266	520	N/A	N	-	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
267	402	120	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
268	417	196	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	

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		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										
269	449	160	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
270	462	>240	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	
271	451	>240	Y	2	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
272	514	100	Y	8	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
273	514	NT	Y	4	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
274	515	176	Y	1	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
275	450	NT	Y	3	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
276	413	>240	Y	4	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
277	461	NT	Y	4	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
278	453	220	Y	5	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
279	458	NT	Y	5	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	

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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										
280	462	>240	Y	6	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
281	464	NT	Y	7	N	N	-	Y	N	N	N	N	Y	N	N	N	N	N	Suitable for standard foundations designed in accordance with NZS 3604, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
282	466	>240	Y	6	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
283	466	NT	Y	3	N	N	-	N	Y	N	N	N	Y	N	N	N	N	Y	
284	659	>240	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
285	674	NT	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
286	675	>183	Y	1	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
287	679	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
288	683	>183	Y	0.7	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	

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		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										
289	685	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
290	682	>240	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
291	676	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
292	675	>240	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
293	663	NT	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	
294	540	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
295	490	NT	N	-	N	Y	8	N	Y	N	N	N	Y	N	N	N	N	Y	
296	479	>240	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	
297	496	NT	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	
298	542	101	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	
299	531	NT	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	

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		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										
300	507	N/A	Y	0.75	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
301	511	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
302	538	196	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
303	537	>183	Y	0.5	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
304	561	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
305	536	196	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
306	532	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
307	513	>183	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
308	513	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
309	513	>240	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
310	485	NT	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	

DP No:	Lot 1001 DP486181 & Lot 6 DP 348694	Property Address	279 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										
311	485	>183	Y	1.25	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
312	527	NT	N	-	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
313	616	172	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
314	542	NT	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
315	542	N/A	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
316	542	NT	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
317	525	N/A	Y	1	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
318	568	NT	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
319	566	147	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	
320	573	NT	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	

DP No:	Lot 1001 DP486181 & Lot 6 DP 348694	Property Address	279 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										
321	587	>240	N	-	N	Y	1	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
322	583	NT	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
323	566	>183	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
324	562	NT	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
325	553	215	N	-	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
326	580	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
327	480	83	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
328	411	>240	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
329	481	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
330	451	92	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
331	460	NT	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	

DP No:	Lot 1001 DP486181 & Lot 6 DP 348694	Property Address	279 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										
332	426	196	N	-	N	Y	7	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
333	386	NT	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
334	382	176	N	-	N	Y	6	N	Y	N	N	N	Y	N	N	N	N	Y	
335	444	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	
336	439	NT	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
337	556	N/A	N	-	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
338	495	NT	N	-	N	Y	3	N	Y	N	N	N	Y	N	N	N	N	Y	
339	569	NT	N	-	N	Y	2	N	Y	N	N	N	Y	N	N	N	N	Y	
340	461	>240	N	-	N	Y	4	N	Y	N	N	N	Y	N	N	N	N	Y	
341	516	NT	N	-	N	Y	5	N	Y	N	N	N	Y	N	N	N	N	Y	

DP No:	Lot 1001 DP486181 & Lot 6 DP 348694	Property Address	279 Lakes Boulevard, Pyes Pa	RC No:	21332

Lot No:	Area (m^2)	Subsurface data						Foundations		Building Restriction Line	S/W Specific Design	S/W Soakage	S/W Reticulate	Designated Building Platform	Minimum Building Platform	Compressible Soils	On-Site Effluent Disposal	Consent Notice	Comments
		Shear Strength (kPa) at 0.5m depth	Subdivision Filling		Natural Topography Unworked	Natural Topography Earthworked		Conventional Shallow Foundation to NZS 3604:2011	Specific Design										
			Y/N	Depth (m)	Y/N	Y/N	Depth (m)	Y/N/NA	Y/N/NA										
342	596	>240	N	-	N	Y	3	N	Y	Y	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG. Development subject to BRL restrictions per Section 9.4 of GCR.
343	561	NT	N	-	N	Y	4	N	Y	Y	N	N	Y	N	N	N	N	Y	
344	559	106	N	-	N	Y	4	N	Y	Y	N	N	Y	N	N	N	N	Y	
345	595	NT	N	-	N	Y	4	N	Y	Y	N	N	Y	N	N	N	N	Y	
346	839	225	N	-	N	Y	4	N	Y	Y	N	N	Y	N	N	N	N	Y	
347	944	NT	N	-	N	Y	4	N	Y	Y	N	N	Y	N	N	N	N	Y	
348	1020	>240	Y	0.5	N	Y	6	N	Y	Y	N	N	Y	N	N	N	N	Y	
349	1108	NT	N	-	N	Y	7	N	Y	Y	N	N	Y	N	N	N	N	Y	

DP No:	Lot 1001 DP486181 & Lot 6 DP 348694	Property Address	279 Lakes Boulevard, Pyes Pa	RC No:	21332

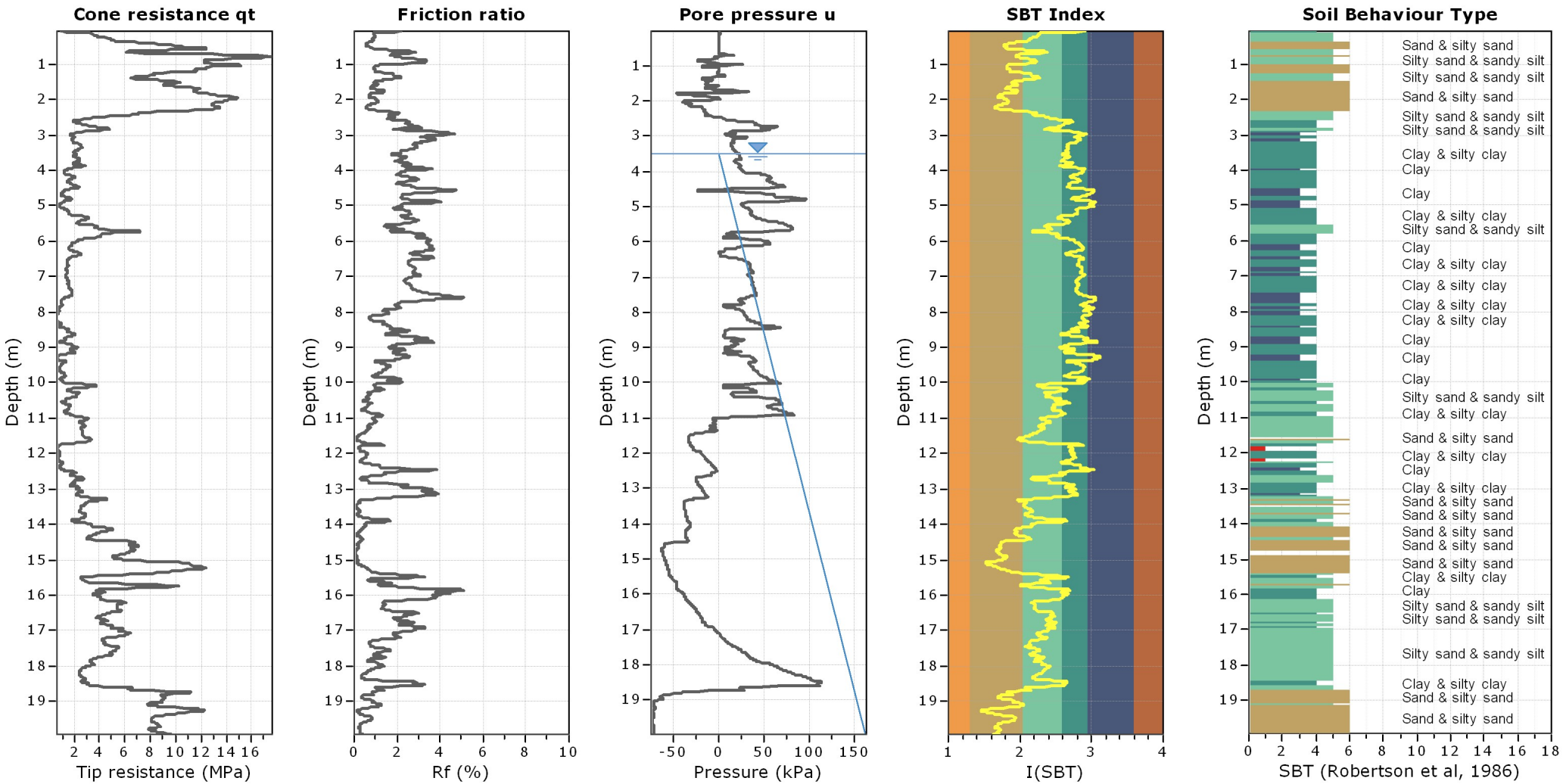
Lot No:	Area (m^2)	Subsurface data						Foundations		Building Restriction Line	S/W Specific Design	S/W Soakage	S/W Reticulate	Designated Building Platform	Minimum Building Platform	Compressible Soils	On-Site Effluent Disposal	Consent Notice	Comments
		Shear Strength (kPa) at 0.5m depth	Subdivision Filling 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										
350	541	NT	N	-	N	Y	9	N	Y	N	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG.
351	980	149	N	-	N	Y	9	N	Y	Y	N	N	Y	N	N	N	N	Y	Pod-raft type foundations specifically designed for geotechnical ultimate bearing capacity 200kPa, subject to Section 9.7 of Coffey GCR ref: GENZTAUC13086AP-AG. Development subject to BRL restrictions per Section 9.4 of GCR.

Appendix C - Pre Development Investigation Data

Coffey Geotechnics (NZ) Ltd
141 Cameron Road, Tauranga
PO Box 13145 Tauranga 3141

CPT: CPT-01
Total depth: 19.93 m, Date: 28/03/2013
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

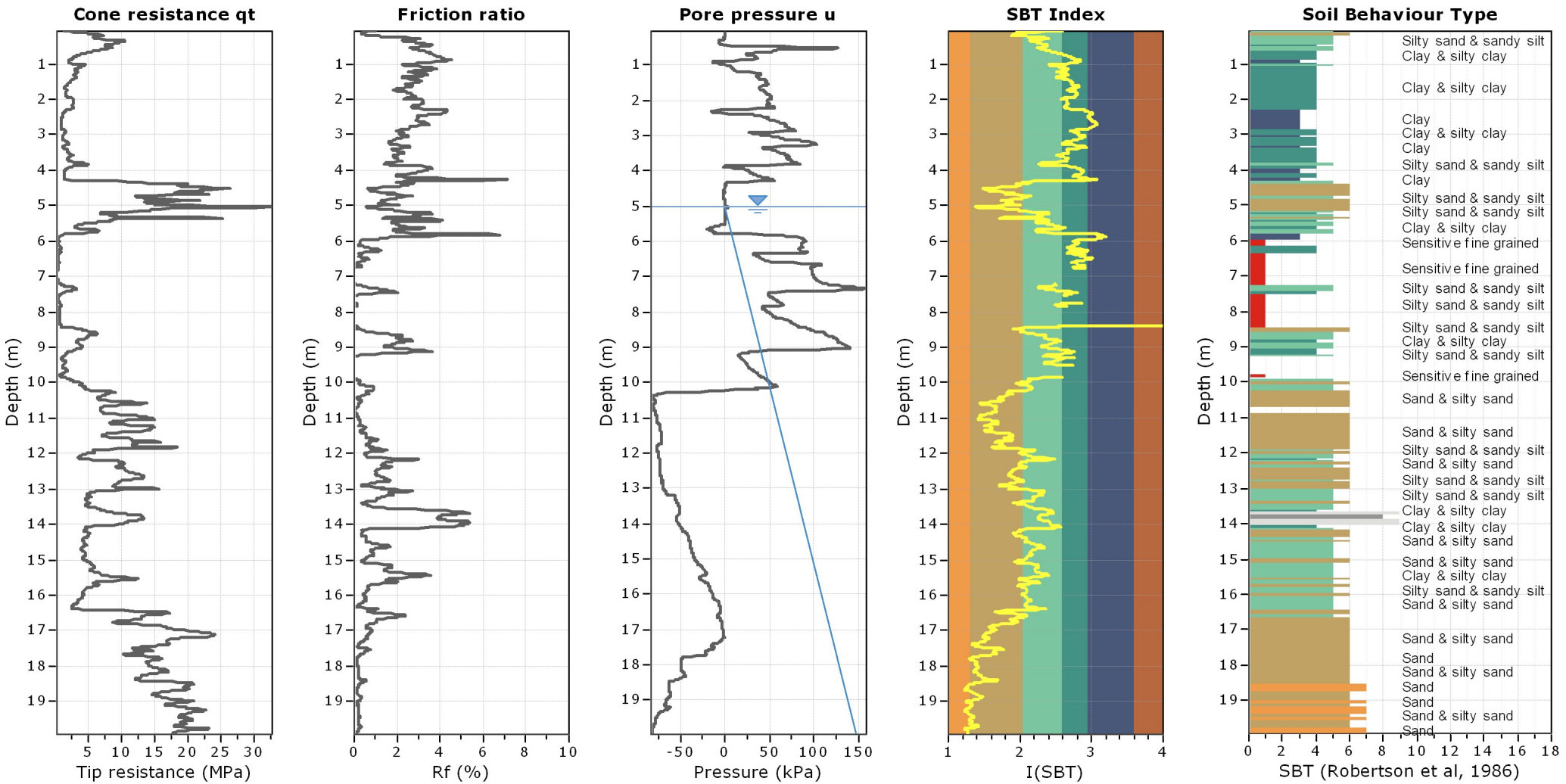
Project: **GENZTAUC13086AF - The Lakes Stage 3**
Location: **The Lakes, Pyes Pa**



Coffey Geotechnics (NZ) Ltd
141 Cameron Road, Tauranga
PO Box 13145 Tauranga 3141

CPT: CPT-02
Total depth: 19.93 m, Date: 28/03/2013
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

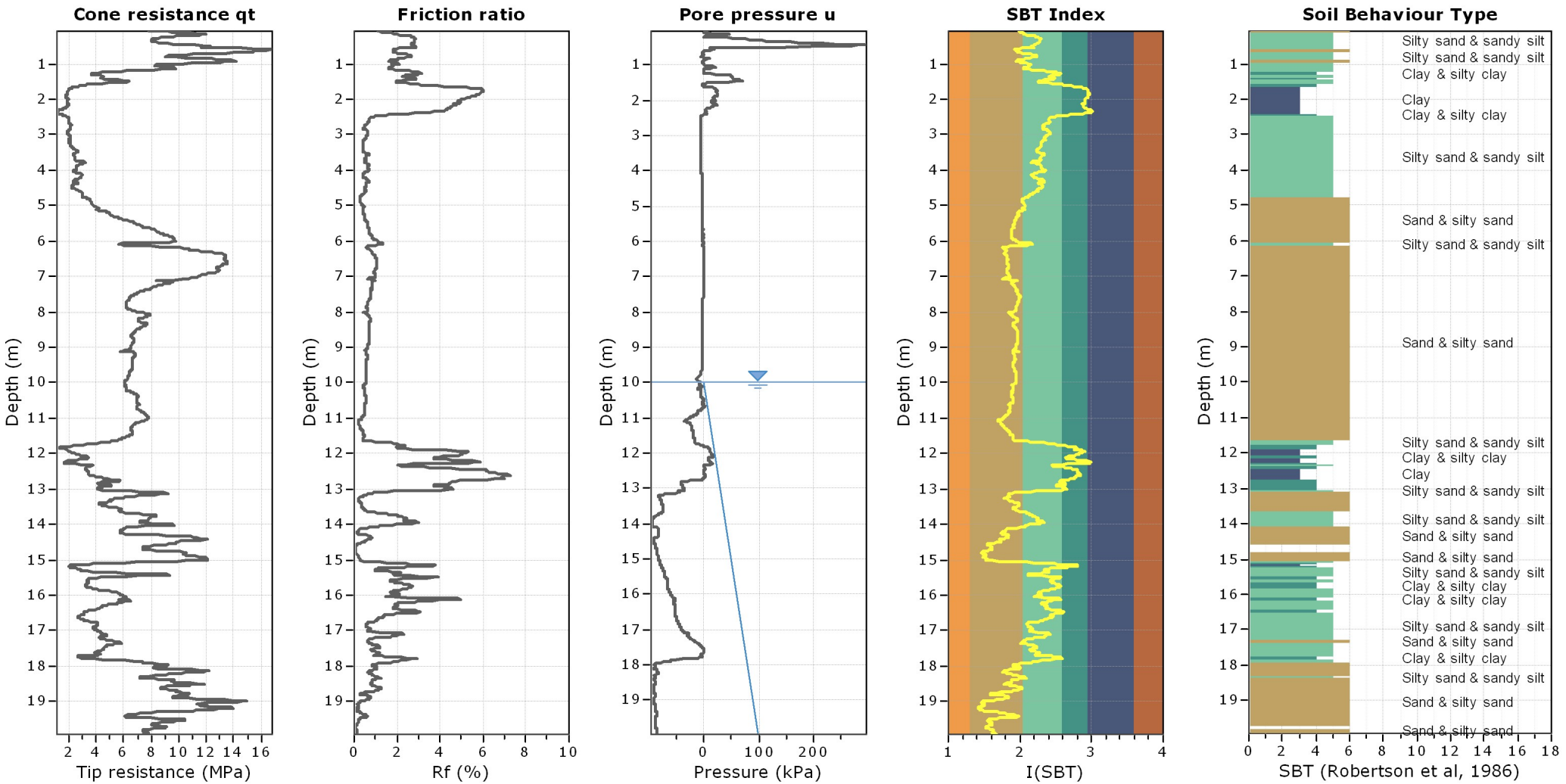
Project: **GENZTAUC13086AF - The Lakes Stage 3**
Location: **The Lakes, Pyes Pa**



Coffey Geotechnics (NZ) Ltd
141 Cameron Road, Tauranga
PO Box 13145 Tauranga 3141

CPT: CPT-05
Total depth: 19.93 m, Date: 28/03/2013
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

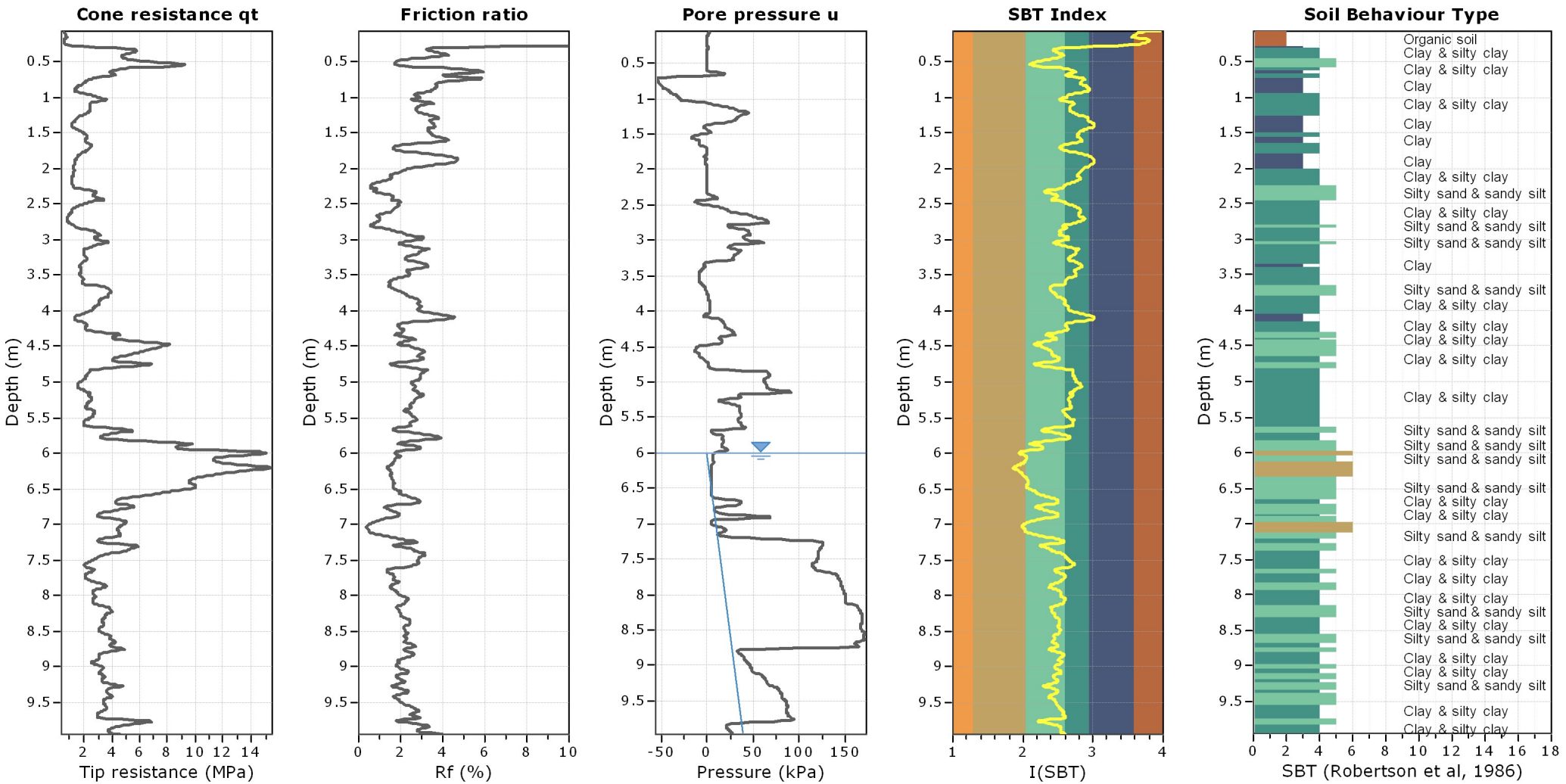
Project: **GENZTAUC13086AF - The Lakes Stage 3**
Location: **The Lakes, Pyes Pa**



Coffey Geotechnics (NZ) Ltd
141 Cameron Road, Tauranga
PO Box 13145 Tauranga 3141

CPT: CPT-06
Total depth: 9.95 m, Date: 28/03/2013
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

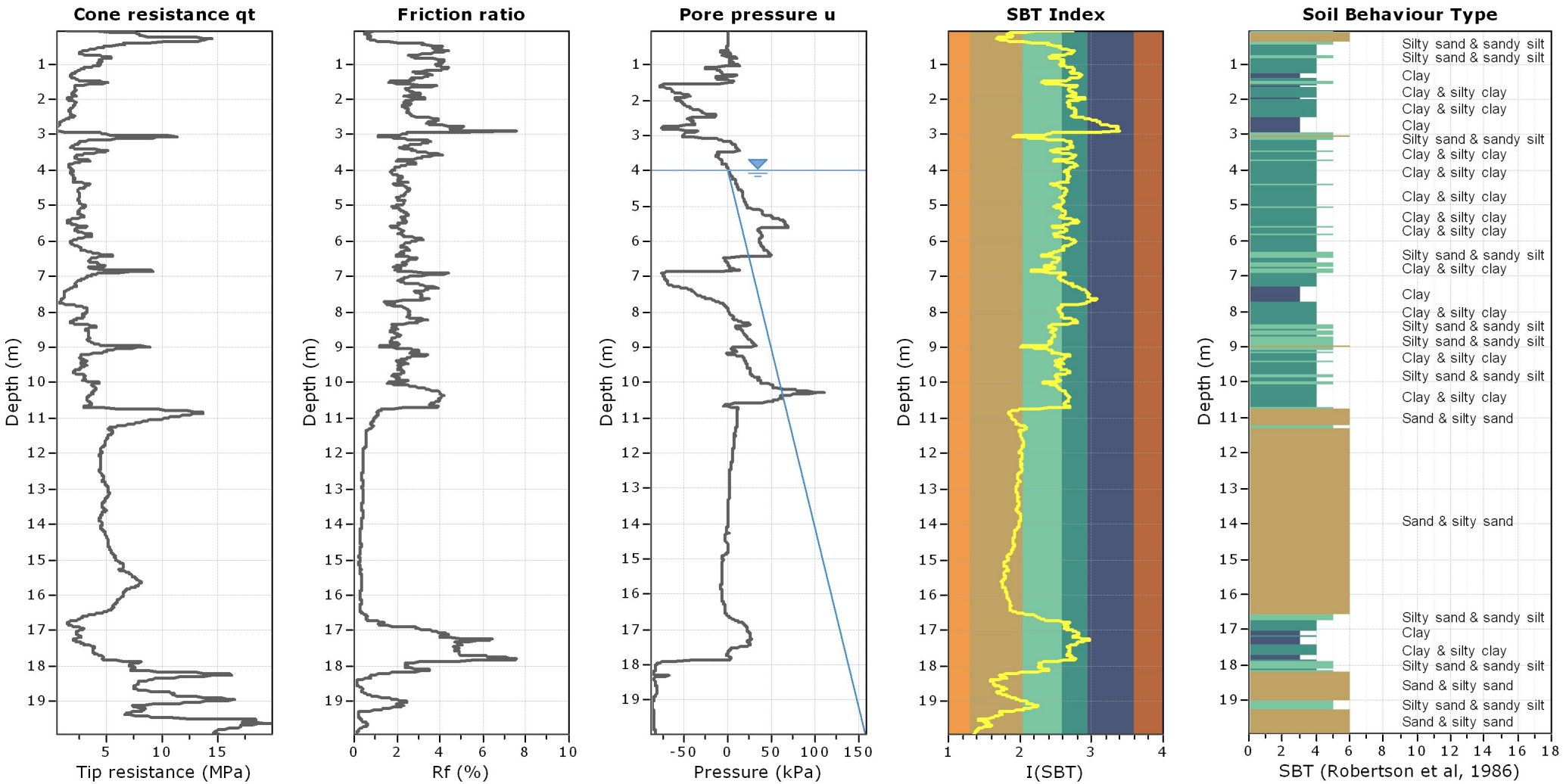
Project: **GENZTAUC13086AF - The Lakes Stage 3**
Location: **The Lakes, Pyes Pa**



Coffey Geotechnics (NZ) Ltd
141 Cameron Road, Tauranga
PO Box 13145 Tauranga 3141

CPT: CPT-07
Total depth: 19.93 m, Date: 5/04/2013
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

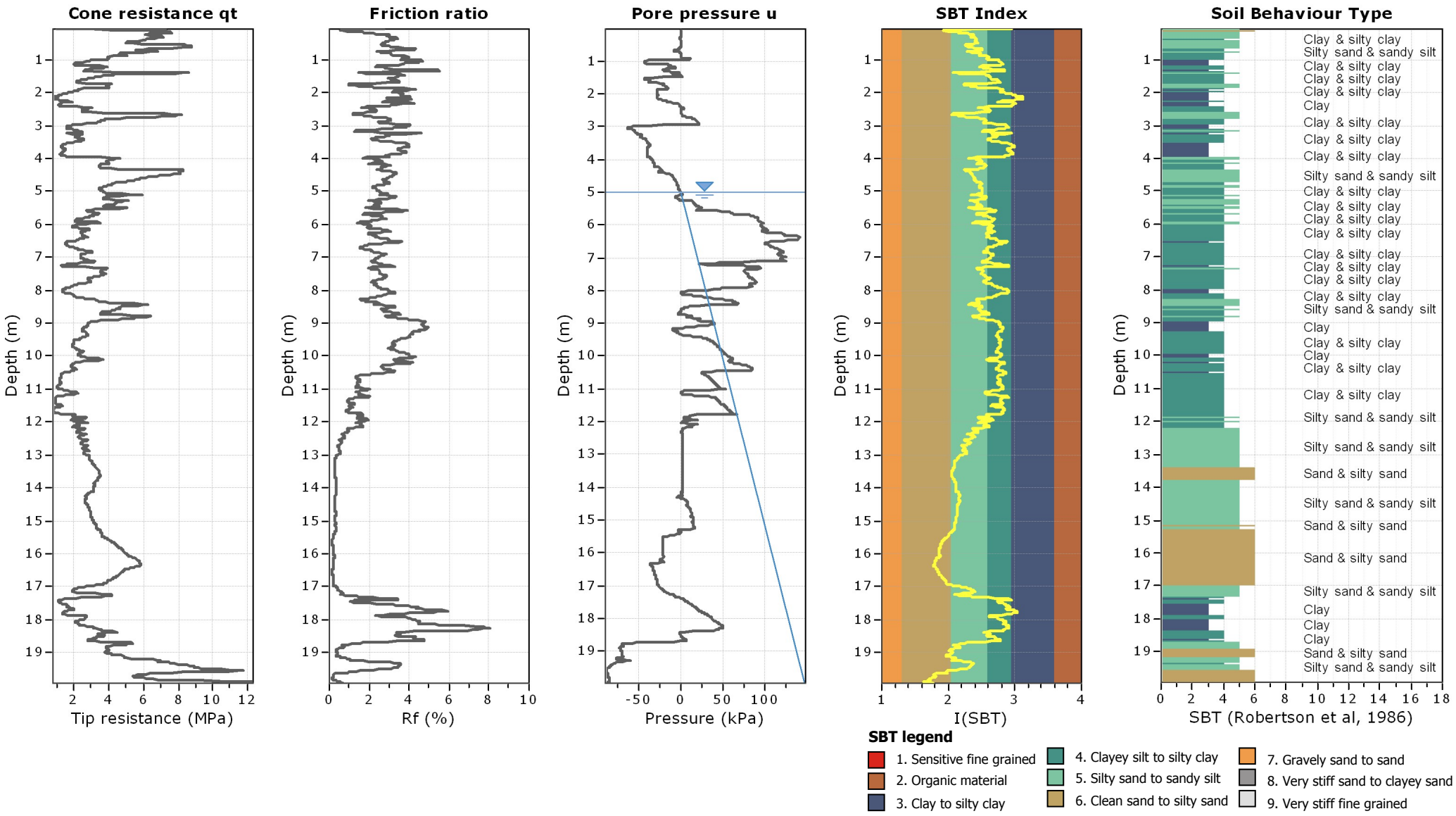
Project: **GENZTAUC13086AF - The Lakes Stage 3**
Location: **The Lakes, Pyes Pa**



Coffey Geotechnics (NZ) Ltd
141 Cameron Road, Tauranga
PO Box 13145 Tauranga 3141

CPT: CPT-08
Total depth: 19.93 m, Date: 5/04/2013
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

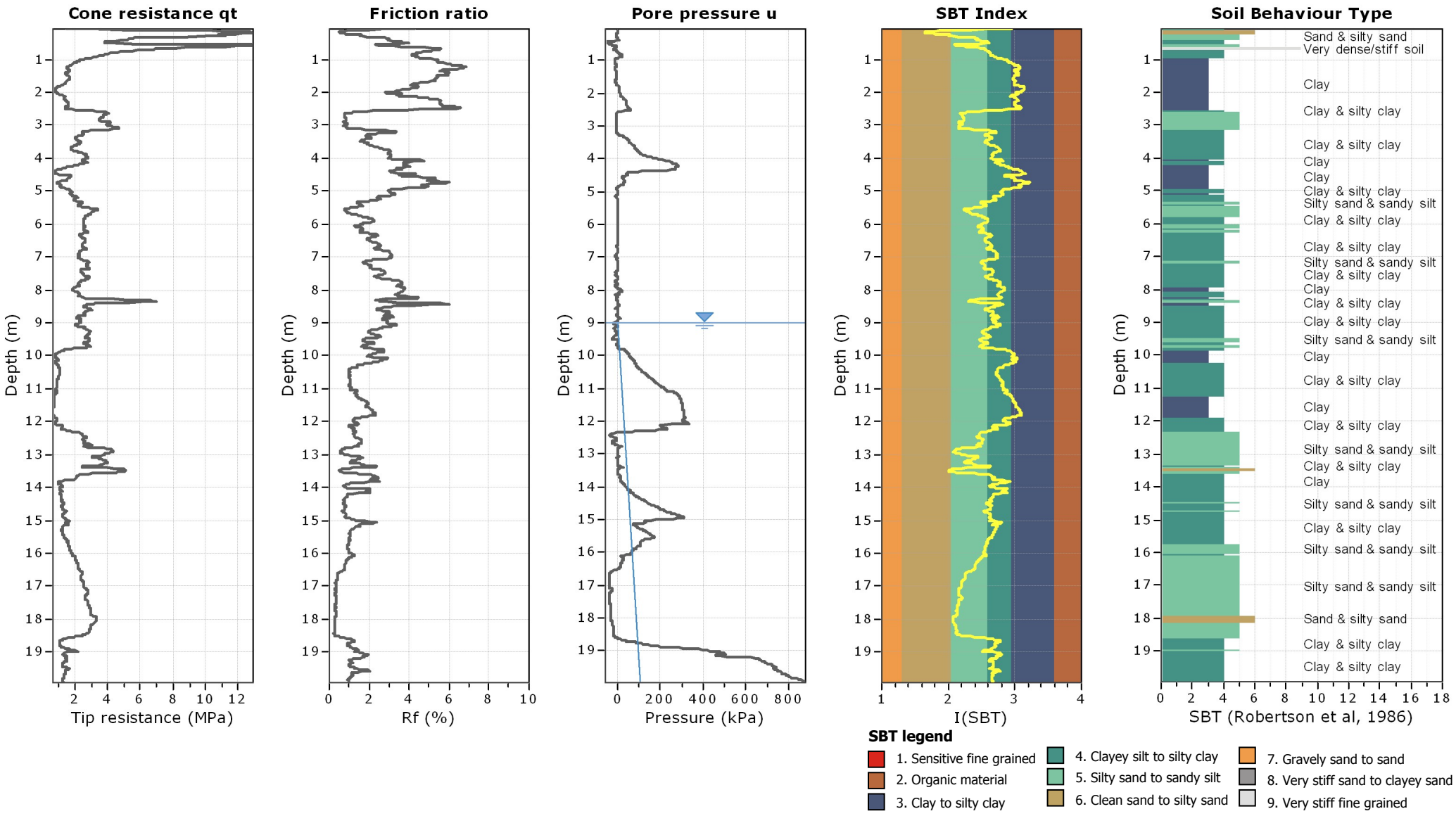
Project: **GENZTAUC13086AF - The Lakes Stage 3**
Location: **The Lakes, Pyes Pa**



Coffey Geotechnics (NZ) Ltd
141 Cameron Road, Tauranga
PO Box 13145 Tauranga 3141

CPT: CPT-09
Total depth: 19.93 m, Date: 5/04/2013
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

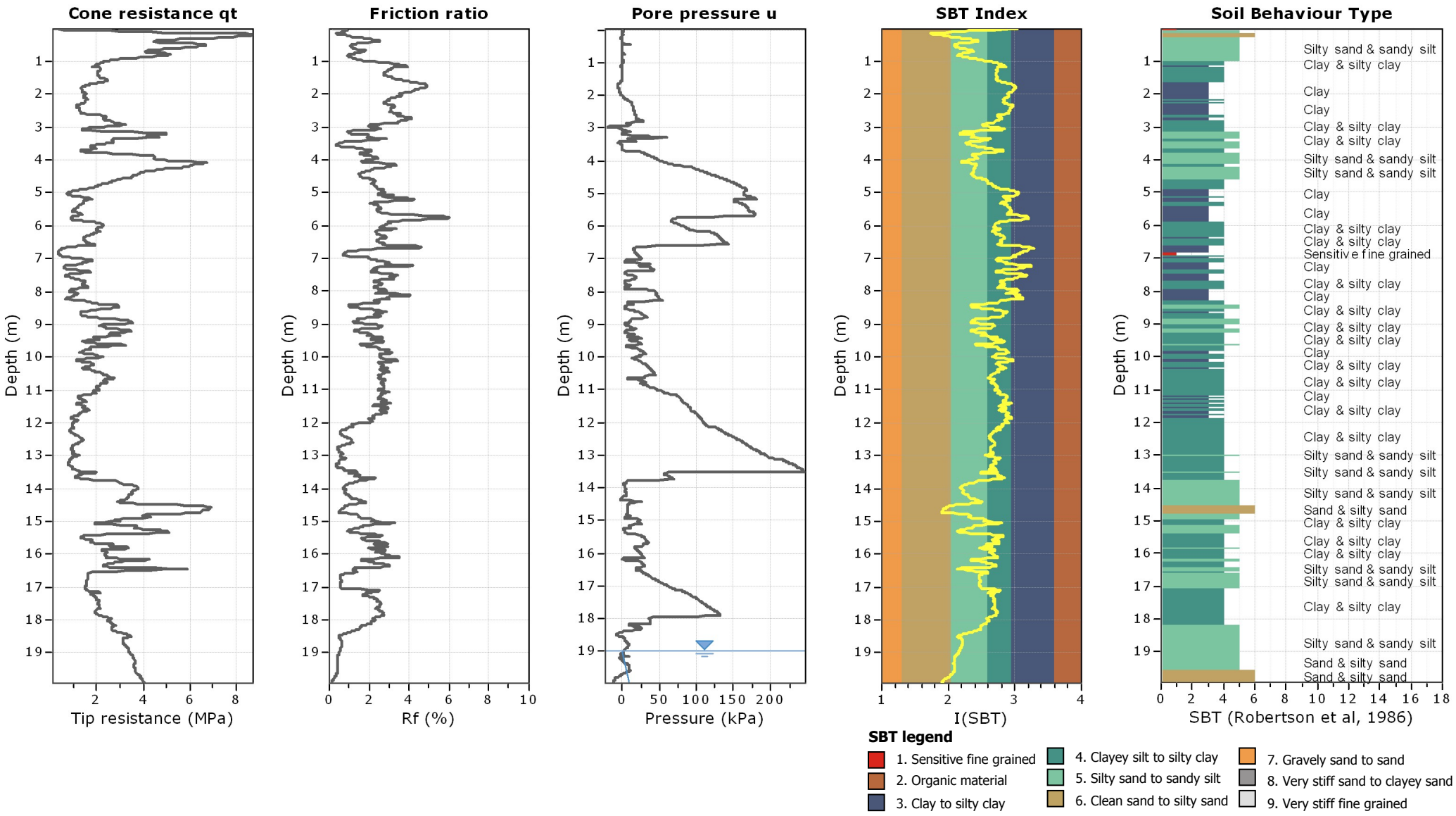
Project: **GENZTAUC13086AF - The Lakes Stage 3**
Location: **The Lakes, Pyes Pa**



Coffey Geotechnics (NZ) Ltd
141 Cameron Road, Tauranga
PO Box 13145 Tauranga 3141

CPT: CPT-10
Total depth: 19.93 m, Date: 5/04/2013
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **GENZTAUC13086AF - The Lakes Stage 3**
Location: **The Lakes, Pyes Pa**



coffey geotechnics

Engineering Log - Hand Auger

Hand Auger No. **HA01**

Sheet 1 of 1

Project No: **GENZTAUC13086AF**

Client: **THE LAKES 2012 LTD**

Date started: **11.11.2013**

Principal:

Date completed: **11.11.2013**

Project: **THE LAKES STAGE 3 CONSTRUCTION**

Logged by: **KMJ**

Hand Auger Location: **Proposed Lot 186**

Checked by: **RBT**

Vane No: DR4523 | Easting: 368545 m | Slope: -90° | R.L. Surface: m

Hole diameter: 50 mm | Northing: 799609 m | Bearing: | Datum:

drilling information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components, additional information.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
FILL				0.0		SP	Silty SAND, fine to medium grained, brown with black & white inclusions, sensitive.	S	VSt		
				0.5		ML	Sandy SILT, low to medium plasticity, orange-brown; sand is fine grained.		St-Vst	>>×	
				1.0		SP / ML	Silty SAND, fine grained, orange-brown with white inclusions. Sandy SILT, low to medium plasticity, orange-brown, sand is fine grained. - medium grained dark blue gravels		H	>>×	
				1.5			EOBH @ 1.2m, refusal on auger. Note: water ponding at 0.5m below ground Borehole HA01 terminated at 1.2 metres.				
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							
				5.5							

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 13086AF INVESTIGATION DATA.GPJ COFFEY.GDT 15.3.16

Form GEO 5.1 Rev.6

coffey geotechnics

Engineering Log - Hand Auger

Hand Auger No. **HA02**

Sheet 1 of 1

Project No: **GENZTAUC13086AF**

Client: **THE LAKES 2012 LTD**

Date started: **12.11.2013**

Principal:

Date completed: **12.11.2013**

Project: **THE LAKES STAGE 3 CONSTRUCTION**

Logged by: **GJN**

Hand Auger Location: **Proposed Lot 166**

Checked by: **RBT**

Vane No: DR2244 | Easting: 368512 m | Slope: -90° | R.L. Surface: m

Hole diameter: 50 mm | Northing: 799583 m | Bearing: | Datum:

drilling information					material substance						
stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components, additional information.	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			0.5		ML	SILT, no plasticity, orange-brown.	D-M	St-Vst	● ×	
				1.0			- 50mm layer of sand, fine grained, white			●×	
				1.5		GP	GRAVEL, fine to medium grained, angular, black/blue.			>>×	
						ML	SILT, no plasticity, brown-orange, moist, trace of gravel.		H		
				2.0				M		>>×	
										>>×	
										>>×	
				2.5			EOBH @ 2.3m, unable to auger, gravels encountered Borehole HA02 terminated at 2.3 metres.				
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							
				5.5							

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 13086AF INVESTIGATION DATA.GPJ COFFEY.GDT 15.3.16

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coffey geotechnics

Engineering Log - Hand Auger

Hand Auger No. **HA03**

Sheet 1 of 1

Project No: **GENZTAUC13086AF**

Client: **THE LAKES 2012 LTD**

Date started: **11.11.2013**

Principal:

Date completed: **11.11.2013**

Project: **THE LAKES STAGE 3 CONSTRUCTION**

Logged by: **KMJ/GJN**

Hand Auger Location: **Proposed Lot 162**

Checked by: **RBT**

Vane No: DR4523&2244 | Easting: 368500 m | Slope: -90° | R.L. Surface: m

Hole diameter: 50 mm | Northing: 799548 m | Bearing: | Datum:

drilling information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components, additional information.	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			0.5		ML	SILT, non to low plasticity, brown-orange.	M	St-VSt		
				1.0							
				1.5			- fine to medium gravels, dark blue-grey, angular				
						ML	Gravelly SILT, low plasticity, orange-brown; gravel is fine to medium grained, angular.		H		
				2.0		ML	SILT, non to low plasticity, brown orange, with minor fine to coarse gravels.				
				2.5		ML	Sandy SILT, no plasticity, white-brown; sand is fine grained, pumiceous. - becoming orange brown				
				3.0			- becoming moist to wet	W	St-VSt		
				3.5			- decreasing sand content				
				4.0		ML	SILT, no plasticity, brown, with minor fine sand & gravels.		H		
				4.5			- white sand lenses				
				5.0							
				5.5			EOBH = Target Depth Borehole HA03 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 13086AF INVESTIGATION DATA.GPJ COFFEY.GDT 15.3.16

Form GEO 5.1 Rev.6

coffey geotechnics

Engineering Log - Hand Auger

Hand Auger No. **HA04**

Sheet 1 of 1

Project No: **GENZTAUC13086AF**

Client: **THE LAKES 2012 LTD**

Date started: **11.11.2013**

Principal:

Date completed: **11.11.2013**

Project: **THE LAKES STAGE 3 CONSTRUCTION**

Logged by: **GJN/KMJ**

Hand Auger Location: **Proposed Lot 159**

Checked by: **RBT**

Vane No: DR4523&2244 | Easting: 368480 m | Slope: -90° | R.L. Surface: m

Hole diameter: 50 mm | Northing: 799568 m | Bearing: | Datum:

drilling information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components, additional information.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa	structure and additional observations
FILL	Groundwater not encountered			0.0		ML	SILT, non to low plasticity, orange-brown.	M	St-VSt		
				0.5			- black staining - white inclusions				
				1.0			- orange staining, minor sand inclusions - fine to medium grained gravels, grey-black, angular, difficult to auger from 1.2 to 1.4m		VSt-H		
				1.5		ML	Sandy SILT, now plasticity, pale brown.			>>x	
						SP	- fine to medium black gravels. GRAVEL, fine to coarse grained, blue-grey, angular, with minor fine sand.	D-M		>>x	
				2.0		ML	Sandy SILT, no plasticity, mottled orange-brown. - becoming light brown			>>x	
				2.5			- becoming moist to wet; orange-brown with black specks			x	
				3.0						x	
										>>x	
				3.5						x	
						SP	Silty SAND, fine grained, uniform grain size, white.	W-S	H	x	
				4.0		ML	Sandy SILT, no plasticity, brown with black specks.	M-W		>>x	
				4.5						>>x	
				5.0						>>x	
							EOBH @ 5.0m, target depth. Note: Perched water table from 3.5 to 3.6m Borehole HA04 terminated at 5 metres.			>>x	
				5.5							

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 13086AF INVESTIGATION DATA.GPJ COFFEY.GDT 15.3.16

Form GEO 5.1 Rev.6

coffey

Engineering Log - Hand Auger

Borehole ID.	***HA301***
sheet:	1 of 1
project no.	***GENZTAUC13086AF***
client:	***THE LAKES LIMITED (2012)***
date started:	***30 Sep 2014***
principal:	
date completed:	***30 Sep 2014***
project:	***THE LAKES STAGE 3 CONSTRUCTION***
logged by:	***SLC***
location:	***BOREHOLE LOCATED IN LOT 88***
checked by:	***RBT***

position: E: 368593; N: 799638 (BOPC2000) surface elevation: Not Specified angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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, black mottled orange brown, some fine to medium grained sand.	M	H	⊙		**TOPSOIL FILL**
													VS 230 kPa
					0.5			**Silty SAND**: fine grained, uniform, pale grey.		MD to D			**FILL**
								Sandy SILT: low liquid limit, pale grey mottled pale orange brown, sand is medium grained.	D to M	H			VS UTP
								Silty SAND: fine grained, uniform, pale grey.		MD			
					1.0			**Sandy SILT**: non plastic to low liquid limit, orange brown mottled pale brown, sand is fine to medium grained.	M	H	⊕ ⊙		VS 213/ 42 kPa
													VS 230 kPa
					1.5								VS 230 kPa
													VS 230 kPa
					2.0								VS 230 kPa
								Silty SAND: fine grained, uniform, pale grey.		D			
					2.5			Hand Auger HA301 terminated at 2.5 m Target depth					
					3.0								
					3.5								
					4.0								
					4.5								
					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.	***HA302***
sheet:	1 of 1
project no.	***GENZTAUC13086AF***
client: ***THE LAKES LIMITED (2012)***	date started: ***01 Oct 2014***
principal:	date completed: ***01 Oct 2014***
project: ***THE LAKES STAGE 3 CONSTRUCTION***	logged by: ***SLC***
location: ***BOREHOLE LOCATED IN LOT 167***	checked by: ***RBT***

position: E: 368534; N: 799589 (BOPC2000) surface elevation: Not Specified angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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 liquid limit, black mottled orange brown.	M	F			**TOPSOIL FILL**
													VS 38/ 12 kPa
					0.5			**Sandy SILT**: low liquid limit, orange brown mottled brown.		VSt to H			**FILL**
													VS 130/ 37 kPa
													VS 140/ 41 kPa
								0.8 m: becoming pale brown mottled brown.					
					1.0								VS 230 kPa
								1.1 m: becoming dry to moist.	D to M				
													VS 230 kPa
								1.35 m: becoming brown mottled pale grey and orange brown.	M				
					1.5								VS 142/ 32 kPa
													VS 124/ 35 kPa
					2.0								VS 131/ 41 kPa
													VS 172/ 33 kPa
					2.5								VS 117/ 41 kPa
													VS 187/ 44 kPa
					3.0								VS 206/ 62 kPa
													VS 204/ 46 kPa
					3.5								VS 146/ 41 kPa
													VS 200/ 46 kPa
					4.0								VS 230 kPa
								4.2 m: becoming pale brown grey.					VS UTP
								Silty SAND: fine to medium grained, pale grey.	M to W	MD to D			
					4.5			Hand Auger HA302 terminated at 4.5 m Target depth					
					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.	***HA303***
sheet:	1 of 1
project no.	***GENZTAUC13086AF***
client: ***THE LAKES LIMITED (2012)***	date started: ***01 Oct 2014***
principal:	date completed: ***01 Oct 2014***
project: ***THE LAKES STAGE 3 CONSTRUCTION***	logged by: ***SLC***
location: ***BOREHOLE LOCATED IN LOT 169***	checked by: ***RBT***

position: E: 368501; N: 799613 (BOPC2000) surface elevation: Not Specified angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak (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, black mottled pale grey and orange brown.	D	VSt			**TOPSOIL**
													VS 122/ 27 kPa
								Sandy SILT: low liquid limit, brown with pale grey specks, sand is fine to medium grained.	D to M	VSt			**FILL**
					0.5								VS 148/ 29 kPa
								0.8 m: becoming pale grey brown with pale grey mottles and minor black specks.	M				VS 142/ 28 kPa
					1.0								VS 176/ 24 kPa
													VS 104/ 23 kPa
					1.5			**Silty SAND**: fine to medium grained, poorly graded, pale grey, minor 20-30mm sandy silt inclusions.		MD			VS 230 kPa
		▶						1.55 m: becoming pale brown with grey specks.		H			VS 230 kPa
								Sandy SILT: non plastic to low liquid limit, brown with black specks, minor orange brown mottles. Sand is medium grained.	W	MD			VS 220/ 51 kPa
					2.0			**Silty SAND**: fine to medium grained, poorly graded, pale brown and pale grey.	M	VSt			VS 180/ 50 kPa
								1.8 m: groundwater inflow within silty sand lense. Very slow inflow rate.					VS 140/ 37 kPa
					2.5			**Sandy SILT**: non plastic, brown with orange brown and black specks, sand is medium grained. Minor clay, minor fine grained angular gravels..					VS 170/ 42 kPa
					3.0								VS 126/ 54 kPa
										St			VS 83/ 31 kPa
					3.5					VSt to H			VS 230 kPa
													VS 137/ 41 kPa
					4.0								VS UTP
								4.3 m: becoming pale grey.					VS UTP
					4.5			Hand Auger HA303 terminated at 4.5 m Target depth					VS UTP
					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.	***HA304***
sheet:	1 of 1
project no.	***GENZTAUC13086AF***
client:	***THE LAKES LIMITED (2012)***
date started:	***30 Sep 2014***
principal:	
date completed:	***30 Sep 2014***
project:	***THE LAKES STAGE 3 CONSTRUCTION***
logged by:	***SLC***
location:	***BOREHOLE LOCATED IN LOT 161***
checked by:	***RBT***

position: E: 368512; N: 799539 (BOPC2000) surface elevation: Not Specified angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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, black mottled orange brown.	M	St	⊕ ⊙		**TOPSOIL FILL** VS 97/ 31 kPa
					0.5			**Sandy SILT**: low liquid limit, orange brown mottled pale brown, occasional 20-30mm silty sand pockets.		H			**FILL** VS 230 kPa
					1.0								VS 230 kPa VS 230 kPa
					1.5					VSt H	⊕ ⊙		VS 150/ 24 kPa VS 230 kPa
					2.0			2.1 m: 50mm silty sand lense (pale grey, fine to medium grained).					VS 230 kPa VS UTP VS UTP
					2.5								VS UTP
					3.0			2.7 m: 50mm silty sand lense (pale grey, fine to medium grained), UTP with shear vane. 2.75 m: becoming pale brown with orange brown mottles. Minor orange brown silt inclusions 20-30mm.					VS UTP VS UTP VS 230 kPa
					3.5			Hand Auger HA304 terminated at 3.5 m Target depth					VS 230 kPa
					4.0								
					4.5								
					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.	**HA305**
sheet:	1 of 1
project no.	**GENZTAUC13086AF**
client:	**THE LAKES LIMITED (2012)**
date started:	**30 Sep 2014**
principal:	
date completed:	**30 Sep 2014**
project:	**THE LAKES STAGE 3 CONSTRUCTION**
logged by:	**SLC**
location:	**BOREHOLE LOCATED IN LOT 159**
checked by:	**RBT**

position: E: 368476; N: 799568 (BOPC2000) surface elevation: Not Specified angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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 liquid limit, black mottled orange brown, some medium to coarse sand.	M	VSt			**TOPSOIL FILL**
								Sandy SILT: low liquid limit, orange brown mottled brown, sand is medium grained.		VSt to H			VS 140/ 11 kPa
					0.5			0.5 m: becoming brown with orange brown and pale brown specks.					**FILL** VS 140/ 29 kPa
													VS 187/ 40 kPa
					1.0								VS 113/ 18 kPa
								1.25 m: non plastic, becoming dry to moist.	D to M				VS 230 kPa
					1.5								VS UTP
													VS 230 kPa
					2.0								VS 137/ 33 kPa
													VS 230 kPa
					2.5								VS UTP
								Silty SAND: fine grained, uniform, pale grey.	D	D			
								Sandy SILT: low liquid limit, pale grey brown mottled pale brown, sand is medium grained.	M	St to H			VS 99/ 25 kPa
					3.0			2.9 m: 50mm wet lense.	W				VS 230 kPa
								3.0 m: becoming orange brown speckled pale brown and black.	M				VS UTP
					3.5			Hand Auger HA305 terminated at 3.5 m Target depth					VS 206 kPa
					4.0								
					4.5								
					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.	***HA306***
sheet:	1 of 1
project no.	***GENZTAUC13086AF***
client:	***THE LAKES LIMITED (2012)***
date started:	***30 Sep 2014***
principal:	
date completed:	***30 Sep 2014***
project:	***THE LAKES STAGE 3 CONSTRUCTION***
logged by:	***SLC***
location:	***BOREHOLE LOCATED IN LOT 156***
checked by:	***RBT***

position: E: 368446; N: 799613 (BOPC2000) surface elevation: Not Specified angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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 liquid limit, black mottled pale grey.	M	St			**TOPSOIL FILL**
								Sandy SILT: low liquid limit, orange brown mottled brown, sand is fine to medium grained.		St to H			**FILL**
					0.5								VS 142/ 31 kPa VS 160/ 28 kPa
													VS 89/ 19 kPa
					1.0			1.0 m: becoming brown with pale brown mottles, minor clay.					VS 230 kPa
													VS 113/ 33 kPa
					1.5								VS 158/ 31 kPa
								1.8 m: becoming dry.	D				VS 213/ 51 kPa
					2.0								VS UTP
								2.15 m: 100mm silty sand lense (fine grained, pale grey).					VS UTP
					2.5								VS 230 kPa
													VS 230 kPa
					3.0								VS UTP
													VS 230 kPa
					3.5			**Silty SAND**: medium grained, uniform, yellow brown.		D			
								Hand Auger HA306 terminated at 3.5 m Target depth					
					4.0								
					4.5								
					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.	***HA307***
sheet:	1 of 1
project no.	***GENZTAUC13086AF***
client: ***THE LAKES LIMITED (2012)***	date started: ***01 Oct 2014***
principal:	date completed: ***01 Oct 2014***
project: ***THE LAKES STAGE 3 CONSTRUCTION***	logged by: ***SLC***
location: ***BOREHOLE LOCATED IN LOT 151***	checked by: ***RBT***

position: E: 368366; N: 799693 (BOPC2000) surface elevation: Not Specified angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear ⊕ remoulded ⊙ peak (kPa) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA N					0.0			**ORGANIC SILT**: low liquid limit, black.	M	St			**TOPSOIL FILL**
								Sandy SILT: non plastic, brown mottled pale grey, sand is fine to medium grained.	D to M	H			**FILL** VS 230 kPa
					0.5								VS 230 kPa
								0.6 m: becoming orange brown mottled brown, moist.	M				VS 230/ 59 kPa
					1.0								VS 230 kPa
													VS 211/ 59 kPa
					1.5								VS 219 kPa
													VS 230/ 38 kPa
					2.0			**Silty SAND**: fine grained, uniform, pale grey. 2.2 m: with silt inclusions <30mm.		D			VS 230/ 46 kPa
													VS UTP
					2.5			**Sandy SILT**: non plastic, pale grey with black specks, minor orange brown mottles, sand is medium grained.		VSt to H			VS UTP
													VS UTP
					3.0			2.9 m: 200mm silty sand lense (medium grained, pale grey). 3.1 m: becoming orange brown mottled brown, low plasticity.	M to W				VS 230 kPa
													VS 230 kPa
					3.5								VS 137/ 37 kPa
													VS 137/ 38 kPa
					4.0								VS 174/ 42 kPa
													VS 162/ 50 kPa
					4.5			Hand Auger HA307 terminated at 4.5 m Target depth					VS 230 kPa
					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.	***HA308***
sheet:	1 of 1
project no.	***GENZTAUC13086AF***
client: ***THE LAKES LIMITED (2012)***	date started: ***01 Oct 2014***
principal:	date completed: ***01 Oct 2014***
project: ***THE LAKES STAGE 3 CONSTRUCTION***	logged by: ***SLC***
location: ***BOREHOLE LOCATED ON LOT 148 & 146 BOUNDARY***	checked by: ***RBT***

position: E: 368303; N: 799714 (BOPC2000) surface elevation: Not Specified angle from horizontal: 90° DCP id.:

drill model: Hand Auger hole diameter : 50 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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, black mottled orange brown.	W	St			**TOPSOIL FILL**
					0.5			**Sandy SILT**: low liquid limit, brown mottled pale brown, sand is medium grained.	M	VSt to H			**FILL** VS 73/ 0 kPa
								becoming pale grey brown.					VS 154/ 20 kPa
					1.0								VS 128/ 28 kPa
													VS 191/ 37 kPa
					1.5								VS 230 kPa
													VS 230 kPa
					2.0								VS 150/ 33 kPa
													VS 230 kPa
					2.5								VS 193/ 46 kPa
													VS 137/ 49 kPa
					3.0			poor recovery below 2.9m due to groundwater inflow from 0.3 meters.					VS 230 kPa
										St / St to H			VS 97/ 25 kPa
					3.5			Hand Auger HA308 terminated at 3.5 m Target depth					VS 230 kPa
					4.0								
					4.5								
					5.0								

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 - Trial Pit

Trial Pit No. ***TP01***

Sheet 1 of 1

Project No: ***GENZTAUC13086AF***

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

Date started: ***15.3.2013***

Principal:

Date completed: ***15.3.2013***

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

Logged by: ***RBT***

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

Checked by:

Equipment type:

Pit Orientation:

Easting: 368192.6 m

R.L. Surface:

Excavation dimensions: m long m wide

Vane No: DR2244

Northing: 799930.2 m

Datum:

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
Fill	Groundwater not encountered					OL	Organic SILT; dark greyish brown, numerous rootlets.	M			
						ML	SILT with minor clay, mottled orange. Stiff, non plastic, moist.			● at 25; × at 175	
				1		ML	SILT with minor very fine sand, mottled yellow/brown. Friable, moist.				
						ML	- possible underfill drain.			UTP	
Younger Ash				2		ML	SILT with trace to minor clay, orange brown. Slightly plastic, hard, moist.				
				3		ML	SILT with minor very fine sand, brownish orange. Very stiff to hard, moist.				
				4		ML	Sandy SILT; brownish orange, sand is fine to coarse grained.				
RA						SP	Fine to medium SAND with minor silt; orange brown.				
				5		ML	SILT; pale yellow/grey with black flecks. Firm and cohesive insitu but becomes soft and slightly greasy when reworked. (Target depth) RA = Rotoehu Ash Test pit TP01 terminated at 5 metres.				
				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		

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coffey geotechnics

Engineering Log - Trial Pit

Trial Pit No. ***TP02***

Sheet 1 of 1

Project No: ***GENZTAUC13086AF***

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

Date started: ***15.3.2013***

Principal:

Date completed: ***15.3.2013***

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

Logged by: ***RBT***

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

Checked by:

Equipment type: | Pit Orientation: | Easting: 368275 m | R.L. Surface:

Excavation dimensions: m long m wide | Vane No: DR2244 | Northing: 799811.2 m | Datum:

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
Younger Ash	Groundwater not encountered			1		OL	Organic SILT; greyish brown, numerous rootlets.	D-M			
						ML	SILT with trace clay; yellowish brown. Hard, friable, dry to moist.			UTP	
						ML	SILT with trace clay and trace fine sand; brownish yellow. Stiff in-situ, firm when reworked, non plastic. Occasional fine rootlets.			● ×	
				2		ML	SILT with minor clay; yellowish brown. Very stiff and non plastic in-situ. Reworks to firm, greasy clay/silt.	M-W			
				3		ML	Sandy SILT with trace clay; pale grey with black flecks. Firm to stiff, non plastic, moist.	M			
Rotoehu Ash				4		SP	Grading to silty fine to medium SAND; grey with black flecks. Cohesive in-situ but granular when reworked. - trace to minor silt below 3.6m. - trace silt below 4.1m.				
				5 6			(max. reach of excavator) Test pit TP02 terminated at 4.8 metres.				

Sketch

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

notes, samples, tests

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

vane shear (kPa)

●	remoulded
×	peak
>>×	peak greater than 200kPa
UTP	unable to penetrate

water

▼	10/1/98 water level on date shown
►	water inflow
◄	water outflow

moisture

D	dry
M	moist
W	wet
S	saturated

consistency/ density index

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

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Engineering Log - Trial Pit

Trial Pit No. **TP03**

Sheet 1 of 1

Project No: **GENZTAUC13086AF**

Client: **THE LAKES 2012 LTD**

Date started: **14.3.2013**

Principal:

Date completed: **14.3.2013**

Project: **THE LAKES STAGE 3 CONSTRUCTION**

Logged by: **KB**

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

Checked by:

Equipment type:

Pit Orientation:

Easting: 368541.5 m

R.L. Surface:

Excavation dimensions: m long m wide

Vane No: DR2244

Northing: 799781.1 m

Datum:

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
	Groundwater not encountered	Sample 6		0		OL	TOPSOIL.	D		● ×	
Younger Ash						ML	SILT; light brown, minor rootlets, friable, dry.				
		Sample 7		1			- becoming orange brown and moist.	M		● ×	
		Sample 8				ML	SILT with trace sand and clay, orange brown, occasional rootlets. Greasy when reworked.				
				2		ML	SILT with trace to minor sand; orange. Slightly cohesive.				
RA				3		SP	Fine to coarse SAND with minor silt, orange brown, pumiceous. Well graded. - becoming light brown/white.				
		Sample 9				ML	Clayey SILT; brown. Medium plasticity and greasy when reworked.			UTP	
HA				4							
		Sample 10					- becoming orange brown.				
				5			(max. reach of excavator) RA = Rotoehu Ash HA = Hamilton Ash Test pit TP03 terminated at 4.7 metres.				
				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		

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Engineering Log - Trial Pit

Trial Pit No. ***TP04***

Sheet 1 of 1

Project No: ***GENZTAUC13086AF***

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

Date started: ***14.3.2013***

Principal:

Date completed: ***14.3.2013***

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

Logged by: ***RBT***

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

Checked by:

Equipment type: | Pit Orientation: | Easting: 368588.5 m | R.L. Surface:

Excavation dimensions: m long m wide | Vane No: DR2244 | Northing: 799726.9 m | Datum:

excavation information | **material substance**

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

Sketch

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

notes, samples, tests

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

vane shear (kPa)

●	remoulded
×	peak
>>×	peak greater than 200kPa
UTP	unable to penetrate

water

▼	10/1/98 water level on date shown
►	water inflow
◄	water outflow

moisture

D	dry
M	moist
W	wet
S	saturated

consistency/ density index

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

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Engineering Log - Trial Pit

Trial Pit No. ***TP05***

Sheet 1 of 1

Project No: ***GENZTAUC13086AF***

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

Date started: ***14.3.2013***

Principal:

Date completed: ***14.3.2013***

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

Logged by: ***KB***

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

Checked by:

Equipment type:

Pit Orientation:

Easting: 368587.6 m

R.L. Surface:

Excavation dimensions: m long m wide

Vane No: DR2244

Northing: 799812.3 m

Datum:

excavation information | **material substance**

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

Test pit TP05 terminated at 6 metres.

Sketch

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

notes, samples, tests

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

vane shear (kPa)

●	remoulded
×	peak
>>×	peak greater than 200kPa
UTP	unable to penetrate

water

▼	10/1/98 water level on date shown
►	water inflow
◄	water outflow

moisture

D	dry
M	moist
W	wet
S	saturated

consistency/ density index

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

TRIAL PIT TEST PITS 150313.GPJ COFFEY.GDT 28.3.13

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Engineering Log - Trial Pit

Trial Pit No. **TP06**

Sheet 1 of 1

Project No: **GENZTAUC13086AF**

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

Date started: ***14.3.2013***

Principal:

Date completed: ***14.3.2013***

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

Logged by: ***KB***

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

Checked by:

Equipment type:

Pit Orientation:

Easting: 368704.4 m

R.L. Surface:

Excavation dimensions: m long m wide

Vane No: DR2244

Northing: 799943.7 m

Datum:

excavation information | **material substance**

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

Sketch

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

notes, samples, tests

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

vane shear (kPa)

●	remoulded
×	peak
>>×	peak greater than 200kPa
UTP	unable to penetrate

water

▼	10/1/98 water level on date shown
►	water inflow
◄	water outflow

moisture

D	dry
M	moist
W	wet
S	saturated

consistency/ density index

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

TRIAL PIT TEST PITS 150313.GPJ COFFEY.GDT 28.3.13

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Engineering Log - Trial Pit

Trial Pit No. **TP07**

Sheet 1 of 1

Project No: **GENZTAUC13086AF**

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

Date started: ***14.3.2013***

Principal:

Date completed: ***14.3.2013***

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

Logged by: ***KB***

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

Checked by:

Equipment type:

Pit Orientation:

Easting: 368767.5 m

R.L. Surface:

Excavation dimensions: m long m wide

Vane No: DR2244

Northing: 799923.9 m

Datum:

excavation information | **material substance**

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

Sketch

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

notes, samples, tests

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

vane shear (kPa)

●	remoulded
×	peak
>>×	peak greater than 200kPa
UTP	unable to penetrate

water

▼	10/1/98 water level on date shown
►	water inflow
◄	water outflow

moisture

D	dry
M	moist
W	wet
S	saturated

consistency/ density index

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

TRIAL PIT TEST PITS 150313.GPJ COFFEY.GDT 28.3.13

Form GEO 5.5 Rev.6

coffey geotechnics

Engineering Log - Trial Pit

Trial Pit No. ***TP08***

Sheet 1 of 1

Project No: ***GENZTAUC13086AF***

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

Date started: ***15.3.2013***

Principal:

Date completed: ***15.3.2013***

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

Logged by: ***RBT***

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

Checked by:

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

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

excavation information | **material substance**

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

Sketch

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

notes, samples, tests

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

vane shear (kPa)

●	remoulded
×	peak
>>×	peak greater than 200kPa
UTP	unable to penetrate

water

▼	10/1/98 water level on date shown
►	water inflow
◄	water outflow

moisture

D	dry
M	moist
W	wet
S	saturated

consistency/ density index

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

TRIAL PIT TEST PITS 150313.GPJ COFFEY.GDT 28.3.13

Form GEO 5.5 Rev.6

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Engineering Log - Trial Pit

Trial Pit No. ***TP09***

Sheet 1 of 1

Project No: ***GENZTAUC13086AF***

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

Date started: ***30.5.2013***

Principal:

Date completed: ***30.5.2013***

Project: ***STAGE 3***

Logged by: ***RBT***

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

Checked by: ***RBT***

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

Excavation dimensions: m long m wide | Vane No: | Northing: m | Datum: MOTURIKI 1953

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
Fill	Groundwater not encountered			1		SP	SAND with minor silt, pale grey, fine to medium grained. Occasional bricks and constructional debris (fill).	D-M			
BT						OL	Highly organic SILT, dark brown (buried topsoil).				
Younger Ashes				2		ML	SILT with some clay and fine sand, orange brown, firm to stiff, moist.	M			
				3							
				4							
RA						SP	- Grades to very fine silty SAND, becoming brownish grey.				
HA				5		MH	SILT with some clay and trace sand, chocolate brown, hard, sand is fine grained, moist (Hamilton Ash). 5m, becoming dark orange brown.				
				6			EOBH, target depth BT=Burried Topsoil RA=Rotoehu Ash HA= Hamilton Ash Test pit TP09 terminated at 5.2 metres.				

Sketch

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

notes, samples, tests

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

vane shear (kPa)

●	remoulded
×	peak
>>×	peak greater than 200kPa
UTP	unable to penetrate

water

▼	10/1/98 water level on date shown
►	water inflow
◄	water outflow

moisture

D	dry
M	moist
W	wet
S	saturated

consistency/ density index

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

TRIAL PIT TEST PITS 300513.GPJ COFFEY.GDT 6.6.13

Form GEO 5.5 Rev.6

coffey geotechnics

Engineering Log - Trial Pit

Trial Pit No. ***TP10***

Sheet 1 of 1

Project No: ***GENZTAUC13086AF***

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

Date started: ***30.5.2013***

Principal:

Date completed: ***30.5.2013***

Project: ***STAGE 3***

Logged by: ***RBT***

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

Checked by: ***RBT***

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

Excavation dimensions: m long m wide | Vane No: | Northing: m | Datum: MOTURIKI 1953

excavation information | **material substance**

stratigraphy	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: Soil - Soil type; colour, structure. Grading; bedding; plasticity, sensitivity. Secondary and minor components. Rock - Colour, fabric, rock type; discontinuities, additional information.	moisture condition	consistency/ density index	vane shear (remoulded /peak) kPa (25 50 75 100 125 150 175)	structure and additional observations
TS						OL	Topsoil, highly organic silt (Fill).	M			
Matua Subgroup	Groundwater not encountered			1		ML	SILT with trace sand, pale orange grey, firm insitu but becomes soft and greasy when re-worked, sand is fine to medium grained, moist.				
				2							
				3							
				4		MH	Sandy SILT/Silty SAND, pale grey with black flecks, firm to stiff insitu, silty portion becoming firm and slightly plastic when re-worked, sand is fine to medium grained, moist to wet.	M-W			
							- Increasing sand content below 4.5m. Grading to SAND with some silt-silty sand.				
				5			EOBH, target depth TS=Topsoil Test pit TP10 terminated at 4.5 metres.				
				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 TEST PITS 300513.GPJ COFFEY.GDT 6.6.13

Form GEO 5.5 Rev.6

Appendix D - Post Development Investigation Data

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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3A-104***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, brown, with minor fine to medium grained sand. At 0.1m: becoming orange brown with minor clay, trace fine to coarse grained sand, trace medium grained angular gravel.	D	H			**FILL** VS >240 kPa
					0.5		ML	**SILTY SAND**: fine to medium grained, yellow brown.	M				VS >240 kPa
							SP	**SAND**: fine to medium grained, pale pink, with some silt.		VD			UTP
							SM	**SILTY SAND**: fine to medium grained, white.		H			
					1.0								UTP
							SP	**SAND**: fine to medium grained, white, with minor silt.		D			UTP
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine to coarse grained sand.		H			
					1.5								VS >240 kPa
							SP	**SAND**: fine to coarse grained, white, with minor silt.		D			VS >240 kPa
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine to coarse grained sand.		H			
					2.0			Hand Auger HA3A-104 terminated at 2.0 m Target depth					VS >240 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

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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3A-106***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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, dark brown, with trace fine to coarse sand.	D	VSt			**TOPSOIL**
								0.35 to 0.6 m: becoming mottled orange brown			⊙		VS >183 kPa
					0.5			**SILT**: non plastic to low plasticity, pale brown, with some fine to coarse sand and trace sub-rounded fine to coarse gravel. 0.5 to 0.6 m: becoming mottled pale grey					**FILL**
									D to M		⊙		VS >183 kPa
								0.9 to 1.0 m: trace clay			⊙		VS >183 kPa
					1.0			**SAND**: fine to coarse grained, pale brown, with some silt.		MD	⊙		VS >183 kPa
								Sandy SILT: non plastic, orange brown, sand is fine to coarse. With trace clay.		VSt			
								SAND: fine to coarse grained, pale brown, with some silt. 1.3 to 1.85 m: trace fine to medium gravel		D			UTP
					1.5			1.75 to 1.85 m: trace clay					
								SILT: non plastic, orange brown, with minor sand and trace clay. 1.9 to 2.0 m: becoming mottled dark brown and pink		VSt	⊙		VS >183 kPa
					2.0			Hand Auger HA3A-106 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

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Engineering Log - Hand Auger

Borehole ID.	***HA3C-149***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA N		Not Encountered			0.0			**SILT**: non plastic, brown, with trace fine grained sand.	D	VSt	⊙ 50 100 150 200	2 4 6 8 10	**TOPSOIL** VS >183 kPa
					0.5			**SILT**: low plasticity, orange brown, with minor clay and trace fine to coarse sand.	M		⊕ ⊙		**FILL** VS 133/ 25 kPa
								0.6 m: white specks present					
								0.8 m: becomes mottled grey. Presence of trace red medium to coarse gravel that break down easily when manipulated.			⊙		VS >183 kPa
					1.0			1.0 m: trace fine to coarse pumiceous gravel			⊙		VS >183 kPa
								1.1 m: sand becomes minor and clay becomes trace			⊕ ⊙		VS 133/ 54 kPa
					1.5						⊙		VS >183 kPa
								1.6 m: becoming mottled pale pink . Clay becomes minor.					
											⊙		VS >183 kPa
					2.0			Hand Auger HA3C-149 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

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Engineering Log - Hand Auger

Borehole ID.	***HA3C-150***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: non plastic, brown, with trace fine grained sand.	D	H			**FILL**
													VS >240 kPa
							ML	**SILT**: low plasticity, orange brown mottled brown, with minor clay, trace fine to medium grained sand.					
					0.5								VS >240 kPa
								At 0.6m: becoming flecked white.	M				
								At 0.7m: becoming minor fine to coarse grained sand.					VS >240 kPa
					1.0								VS >240 kPa
													VS >240 kPa
					1.5								VS >240 kPa
								At 1.75m: becoming orange brown with trace fine to coarse grained sand.					VS >240 kPa
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine to medium grained sand.					**RESIDUAL SOIL**
					2.0			Hand Auger HA3C-150 terminated at 2.0 m Target depth					VS >240 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

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Engineering Log - Hand Auger

Borehole ID.	***HA3C-153***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, brown, with trace fine grained sand.	D	VSt			**TOPSOIL**
								SILT: low plasticity, orange brown, with minor clay and trace fine sand.	D to M		⊕ ⊙		**FILL** VS 180/ 21 kPa
					0.5						⊙		VS >183 kPa
											⊙		VS >183 kPa
					1.0						⊙		VS >183 kPa
								1.2 m: clay becomes trace 1.3 m: sand becomes minor and is fine-coarse			⊙		VS >183 kPa
					1.5						⊙		VS >183 kPa
								SAND: fine to coarse grained, orange to orange brown, with trace silt.					
								SILT: low plasticity, orange brown, with minor clay, trace fine-coarse sand and trace fine gravel.			⊙		VS >183 kPa
					2.0			Hand Auger HA3C-153 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

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Engineering Log - Hand Auger

Borehole ID.	***HA3C-156***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***07 Mar 2016***
principal:	***-***
date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***NM***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: non plastic to low plasticity, dark brown mottled orange, flecked white, with minor fine grained sand, trace clay.	D	H			**FILL**
													VS >240 kPa
					0.5		ML	**SILT**: low plasticity, orange brown, with minor fine to medium grained sand, trace clay.					VS >240 kPa
													VS >240 kPa
					1.0								VS >240 kPa
													VS >240 kPa
					1.5			At 1.7m: becoming grey mottled brown.					VS >240 kPa
								At 1.8m: becoming orange brown.					VS >240 kPa
					2.0			Hand Auger HA3C-156 terminated at 2.0 m Target depth					VS >240 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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
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Engineering Log - Hand Auger

		Borehole ID.	***HA3C-159***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, brown, with trace fine grained sand.	D	VSt			**TOPSOIL**
					0.5			**SILT**: low plasticity, orange brown, with some clay and trace fine sand.	D to M				**FILL** VS >183 kPa
					1.0			1.15 to 1.25 m: becomes dark brown					VS >183 kPa
					1.5			**SILT**: low plasticity, orange brown with mottled dark brown, with minor fine to coarse sand and minor clay.					VS >183 kPa
					2.0			Hand Auger HA3C-159 terminated at 2.0 m Target depth					VS >183 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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.	***HA3C-162***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***07 Mar 2016***
principal:	***-***
date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***NM***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, dark brown flecked white and orange, with minor fine grained sand, trace clay.	D	H			**FILL**
											⊙		VS >240 kPa
					0.5						⊙		VS >240 kPa
							ML	**SILT**: non plastic to low plasticity, orange brown flecked white, with some fine to medium grained sand, trace clay.			⊙		VS >240 kPa
					1.0		ML-MH	**SILT**: low to medium plasticity, orange brown flecked white, with some fine to medium grained sand, some clay.			⊕ ⊙		VS 233/ 54 kPa
											⊙		VS >240 kPa
					1.5		ML	**Sandy SILT**: non plastic, grey mottled black, with fine to medium grained sand.		VSt to H	⊕ ⊙		VS 196/ 33 kPa
								At 1.7m becoming orange brown mottled white.			⊙		VS >240 kPa
					2.0			Hand Auger HA3C-162 terminated at 2.0 m Target depth			⊙		VS >240 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3C-163***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic, pale brown, with minor fine to medium grained sand, trace clay.	D	H			**FILL**
							ML	**Sandy SILT**: non plastic to low plasticity, orange brown streaked white, with trace clay.			⊙		VS >240 kPa
					0.5						⊙		VS >240 kPa
							ML-MH	**CLAYEY SAND**: low to medium plasticity, pale yellow brown, with trace fine sand.		St	⊕ ⊙		VS 86/ 25 kPa
							SP	**SAND**: fine to medium grained, white, with minor silt.	D to M				
					1.0		ML	**SILT**: low plasticity, orange brown, with minor fine to medium grained sand, trace clay.		VSt			**YOUNGER ASH**
							ML-MH	**Clayey SILT**: low to medium plasticity, orange brown, with trace fine grained sand.	M		⊕ ⊙		VS 123/ 25 kPa
					1.5						⊕ ⊙		VS 125/ 25 kPa
											⊕ ⊙		VS 156/ 39 kPa
					2.0			Hand Auger HA3C-163 terminated at 2.0 m Target depth			⊕ ⊙		VS 156/ 34 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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.	***HA3C-164***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	**-**	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA N		Not Encountered			0.0			**SILT**: non plastic, brown, with trace fine grained sand.	D	VSt			**TOPSOIL**
								Clayey SILT: low plasticity, orange brown.	M				**YOUNGER ASH**
													VS >183 kPa
					0.5								VS 151/ 31 kPa
													VS 126/ 22 kPa
								0.8 to 1.3 m: becomes orange and has trace fine-coarse sand					
					1.0					St			VS 96/ 21 kPa
										VSt			VS 138/ 19 kPa
								1.3 to 2.0 m: becomes orange brown and has trace fine sand					
					1.5					St			VS 94/ 19 kPa
										VSt			VS 107/ 19 kPa
					2.0			Hand Auger HA3C-164 terminated at 2.0 m Target depth					VS 121/ 14 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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
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Engineering Log - Hand Auger

		Borehole ID.	***HA3C-166***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, brown, with trace fine grained sand.	D	VSt	⊙		**TOPSOIL** VS >183 kPa
					0.5			**SILT**: non plastic to low plasticity, orange brown, with minor clay and trace fine sand.	D to M		⊙		**FILL** VS >183 kPa
					1.0						⊙		VS >183 kPa
								1.2 m: clay becomes trace and sand becomes minor			⊙		VS >183 kPa
					1.5			1.5 to 1.6 m: becomes mottled light grey			⊙		VS >183 kPa
								1.6 m: clay becomes minor and sand becomes trace			⊕ ⊙		VS 120/ 14 kPa
					2.0			Hand Auger HA3C-166 terminated at 2.0 m Target depth			⊙		VS >183 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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
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Engineering Log - Hand Auger

Borehole ID.	***HA3C-169***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, brown mottled orange, with minor fine to medium grained sand, minor clay.	D	H			**FILL**
								At 0.2m: becoming streaked black.			⊙		VS >240 kPa
							ML	**Sandy SILT**: low plasticity, orange brown, with minor fine to medium grained sand, minor clay.					
					0.5						⊙		VS >240 kPa
								At 0.6m: becoming trace pockets of low plasticity, white, sandy silt.					
											⊙		VS 240 kPa
							ML-MH	**CLAYEY SAND**: low plasticity, pale orange grey, with fine to coarse grained sand, trace clay.	M	VSt			
					1.0		ML	**SILT**: low plasticity, pale orange grey, with some fine to coarse grained sand, trace clay.		H	⊕ ⊙		VS 196/ 20 kPa
											⊕ ⊙		VS 233/ 25 kPa
					1.5						⊙		VS 240 kPa
							ML-MH	**Clayey SILT**: low plasticity, orange grey, with fine to coarse grained sand, trace clay.	M to W				
											⊙		VS 240 kPa
					2.0			Hand Auger HA3C-169 terminated at 2.0 m Target depth			⊙		VS 240 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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.	**HA3C-172**		
sheet:	1 of 1		
project no.	**GENZTAUC13086AP-A(**		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	**-**	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information						material substance								
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown mottled orange, with minor fine to medium grained sand, trace organics.	D	H			**TOPSOIL** VS >240 kPa
					0.5		ML	**Sandy SILT**: low plasticity, pale grey, with fine to coarse grained sand.					**YOUNGER ASH** VS >240 kPa
							SP	**SAND**: fine to medium grained, pale grey, with minor silt.		L			
					1.0		ML-MH	**CLAYEY SAND**: low to medium plasticity, orange brown.		VSt to H	⊕ ⊙		VS 196/ 54 kPa VS >240 kPa
					1.5		ML	**SILT**: low plasticity, orange brown, with minor fine to medium grained sand, trace clay. At 1.6m: becoming some fine grained sand.	M		⊕ ⊙		VS 196/ 25 kPa VS >240 kPa
							ML-MH	**Clayey SILT**: low to medium plasticity, orange brown, with trace fine sand.		VSt			
					2.0			Hand Auger HA3C-172 terminated at 2.0 m Target depth			⊕ ⊙		VS 196/ 40 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3C-173***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-AG***
location:	*Stage 3C & Stage 3D*	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: low plasticity, brown mottled orange, with minor fine to medium grained sand, trace organics.	D	VSt			**TOPSOIL**
								Sandy SILT: non plastic to low plasticity, orange brown, with trace clay. Sand is fine to coarse.	D to M		⊙		**YOUNGER ASH** VS >183 kPa
					0.5			0.3 m: trace fine gravel become present			⊙		VS >183 kPa
								0.7 to 0.8 m: becoming dark brown			⊙		VS >183 kPa
								SILT: non plastic to low plasticity, orange brown, with minor fine sand and trace clay.	M		⊕ ⊙		VS 151/ 33 kPa
					1.0			**Clayey SILT**: low plasticity, orange brown, with trace of fine sand.			⊕ ⊙		VS 154/ 36 kPa
					1.5			**Silty CLAY**: low plasticity, orange brown.			⊕ ⊙		VS 151/ 43 kPa
											⊕ ⊙		VS 112/ 31 kPa
					2.0			Hand Auger HA3C-173 terminated at 2.0 m Target depth			⊙		VS >183 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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.	***HA3C-174***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic, dark brown mottled orange, with some fine to medium grained sand, minor organics.	D	H			**TOPSOIL**
													VS >=240 kPa
							ML	**Sandy SILT**: non plastic to low plasticity, pale orange flecked white, with fine to coarse grained sand.					**YOUNGER ASH**
					0.5				M				VS >215/ 45 kPa
													VS >240 kPa
					1.0								VS >240 kPa
							SP	**SAND**: fine to coarse grained, pale orange brown, with some silt.					
							ML	**SILT**: low plasticity, orange brown, with some fine to coarse grained sand.		VSt to H			VS 142/ 25 kPa
					1.5								VS 156/ 28 kPa
													VS >240 kPa
								At 1.8m: becoming trace pockets of orange brown sandy SILT, non plastic.					
					2.0			Hand Auger HA3C-174 terminated at 2.0 m Target depth					VS 196/ 54 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3C-175***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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, with trace fine grained sand.	D	VSt	⊕ ⊙		**TOPSOIL** VS 110/ 21 kPa
					0.5			**SAND**: fine to coarse grained, pale brown, with minor silt and trace fine-coarse sub-rounded to sub-angular gravel. 0.5 m: trace gravel become fine 0.65 m: becoming mottled dark brown 0.9 to 1.1 m: silt becomes some 1.45 m: trace clay	D to M	MD			**FILL**
					1.0								
					1.5			**SILT**: low plasticity, brown, with some clay and trace fine-coarse sand.	M	St	⊕⊙		**YOUNGER ASH** VS 65/ 24 kPa
					2.0			Hand Auger HA3C-175 terminated at 2.0 m Target depth			⊕ ⊙		VS 101/ 39 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3C-176***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with trace fine to coarse sand.	D	VSt			**TOPSOIL**
					0.5			**SILT**: non plastic to low plasticity, orange brown with mottled dark brown, with some clay and trace fine sand. 0.6 to 1.1 m: becoming mottled pale brown	D to M		⊙		**FILL** VS >183 kPa
											⊙		VS >183 kPa
					1.0					St	⊕ ⊙		VS 128/ 43 kPa
								SILT: non plastic, dark brown, with trace fine sand and trace clay.			⊕ ⊙		**BURIED TOPSOIL** VS 92/ 41 kPa
					1.5			**SILT**: non plastic, brown, with minor fine to medium sand and trace clay.	M				**FILL**
								SILT: low plasticity, orange brown, with minor clay and minor fine to medium sand.			⊕ ⊙		**YOUNGER ASH** VS 84/ 37 kPa
											⊕ ⊙		VS 43/ 22 kPa
					2.0			Hand Auger HA3C-176 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.	***HA3C-177***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***07 Mar 2016***
principal:	***-***
date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***NM***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic, dark brown flecked orange, with minor fine grained sand, trace organics.	D	VSt	⊕ ⊙		**TOPSOIL**
													VS 149/ 40 kPa
							ML	**SILT**: low plasticity, orange brown, with some fine to coarse grained sand, trace clay.		H			**MATUA SUBGROUP**
					0.5		ML	**Sandy SILT**: non plastic, pale grey mottled orange, with fine to coarse grained sand.					UTP
												⊙	VS >240 kPa
					1.0		SP	**SAND**: fine to coarse grained, pale grey, with minor silt.					N/A
							ML	**Sandy SILT**: non plastic, pale grey mottled orange, with fine to coarse grained sand.	M	H			
												⊙	VS >240 kPa
								At 1.4m: becoming low plasticity, orange brown with minor clay.	D				
					1.5							⊙	VS >240 kPa
									M	VSt	⊕ ⊙		
													VS 196/ 40 kPa
					2.0			Hand Auger HA3C-177 terminated at 2.0 m Target depth			⊕ ⊙		VS 116/ 25 kPa

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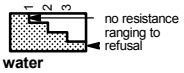
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

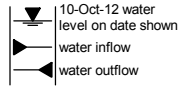
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



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.	***HA3C-178***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with trace fine to coarse sand.	D	VSt			**TOPSOIL**
								SILT: non plastic to low plasticity, pale brown with black specks and mottled dark brown, with some fine to coarse sand and trace clay.	D to M				**MATUA SUBGROUP** VS >183 kPa
					0.5			0.5 m: trace manganese	M				VS 114/ 15 kPa
								SILT: low plasticity, pale brown with black specks and mottled dark brown, with minor clay and trace fine to coarse sand. Is "sticky".					VS 115/ 27 kPa
					1.0								VS 107/ 31 kPa
								SILT: low plasticity, pale brown with black specks and mottled dark brown, with some clay and trace fine to coarse sand. Is "sticky". 1.25 to 2.0 m: becoming pinky brown					VS 130/ 68 kPa
					1.5								VS 133/ 55 kPa
					2.0			Hand Auger HA3C-178 terminated at 2.0 m Target depth					VS 101/ 38 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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
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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3C-179***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic, dark brown mottled orange, with some fine to medium grained sand.	D	VSt	⊕ ⊙		**TOPSOIL**
													VS 196/ 40 kPa
							ML	**SILT**: low plasticity, orange brown, with some fine to coarse grained sand, trace clay.		H			**MATUA SUBGROUP**
					0.5						⊙		VS >240 kPa
										VSt			
											⊕ ⊙		VS 186/ 40 kPa
							ML	**Sandy SILT**: non plastic, pale orange mottled white, with fine to coarse grained sand, minor pockets of pure fine to coarse grained sand.	D to M				
					1.0						⊕ ⊙		VS 129/ 40 kPa
								At 1.2m: sand pockets become absent.	M				
											⊕ ⊙		VS 120/ 25 kPa
					1.5						⊕ ⊙		VS 103/ 33 kPa
											⊕ ⊙		VS 118/ 40 kPa
					2.0			Hand Auger HA3C-179 terminated at 2.0 m Target depth			⊕ ⊙		VS 106/ 10 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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.	***HA3C-180***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								Clayey SILT: low plasticity, orange brown with mottled pink and mottled dark brown, with trace fine sand.	M		⊕ ⊙		**MATUA SUBGROUP** VS 140/ 27 kPa
								SILTY SAND: fine to coarse grained, brown, with trace clay.					
					0.5			**Clayey SILT**: low plasticity, orange, with trace fine sand. 0.7 to 0.8 m: becoming orange brown and is "sticky"			⊕ ⊙		VS 120/ 25 kPa
								Silty CLAY: low plasticity, orange brown, with trace fine sand. Is "sticky".		St	⊕ ⊙		VS 81/ 19 kPa
					1.0			1.2 m: silt becomes some and sand is absent			⊕ ⊙		VS 68/ 16 kPa
								1.4 m: silt becomes minor. Is "sticky"			⊕ ⊙		VS 77/ 32 kPa
					1.5					VSt	⊕ ⊙		VS 123/ 28 kPa
					2.0			Hand Auger HA3C-180 terminated at 2.0 m Target depth			⊕ ⊙		VS 160/ 43 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3C-181***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: non plastic, dark brown flecked orange, with minor fine to coarse grained sand.	D	H			**TOPSOIL** VS >240 kPa
					0.5		ML	**SILT**: low plasticity, orange, with minor fine grained sand, trace clay, trace green sand.		VSt			**MATUA SUBGROUP** VS 111/ 18 kPa
								At 0.7m: becoming pale pink mottled orange with minor clay, minor organics, trace fine grained sand.	M	St to F			VS 142/ 25 kPa
					1.0			At 0.9m: becoming minor pockets of orange low plasticity silt.					VS 78/ 18 kPa
								At 1.2m: becoming pink brown with some clay. Pockets of orange silt become absent.					VS 94/ 25 kPa
					1.5								VS 40/ 14 kPa
							ML	**Sandy SILT**: non plastic, orange brown mottled white and dark brown, with fine to coarse grained sand, trace fine grained angular gravel.		VSt			VS 103/ 40 kPa
					2.0			Hand Auger HA3C-181 terminated at 2.0 m Target depth					VS 111/ 33 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

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Engineering Log - Hand Auger

Borehole ID.	***HA3C-182***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with minor fine to medium grained sand.	D	VSt	⊙		**TOPSOIL** VS >183 kPa
					0.5			**Silty CLAY**: low plasticity, orange brown, with trace fine sand.	D to M		⊕ ⊙		**MATUA SUBGROUP** VS 133/ 49 kPa
								0.7 to 1.1 m: becomes low to medium plasticity			⊕ ⊙		VS 125/ 33 kPa
					1.0						⊙		VS >183 kPa
					1.5			Hand Auger HA3C-182 terminated at 1.2 m Target depth					
					2.0								

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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

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Engineering Log - Hand Auger

Borehole ID.	***HA3C-183***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-A(***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	**-**	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information						material substance							
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with minor fine to medium grained sand.	D		⊙		**TOPSOIL** VS >183 kPa
					0.5			**SAND**: fine to coarse grained, pale brown, with some silt and trace fine gravel.					**FILL**
								SILT: non plastic to low plasticity, orange brown, with minor clay and trace fine to coarse sand.	M		⊙		**YOUNGER ASH** VS >183 kPa
											⊙		VS >183 kPa
					1.0						⊙		VS >183 kPa
					1.5			Hand Auger HA3C-183 terminated at 1.2 m Target depth					
					2.0								

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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

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Engineering Log - Hand Auger

Borehole ID.	***HA3C-186***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, dark brown mottled orange brown, with minor fine to medium grained sand, trace clay.	D	VSt	⊙		**FILL**
								At 0.3m: becoming flecked white and black.					VS >240 kPa
					0.5		ML	**SILT**: low plasticity, orange brown, with minor fine to medium grained sand, trace clay.	M	H	⊙		VS >240 kPa
								At 0.7m: becoming some pockets of white and pink low plasticity silt.			⊙		VS >240 kPa
								At 0.8m: white and pink silt pockets become absent.					
					1.0			At 1.1m: becoming trace specks of white.			⊙		VS >240 kPa
					1.5			Hand Auger HA3C-186 terminated at 1.2 m Target depth			⊙		VS >240 kPa
					2.0								

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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

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Engineering Log - Hand Auger

client:	***The Lakes 2012 ltd***	Borehole ID.	***HA3C-188***
principal:	**-**	sheet:	1 of 1
project:	***The Lakes Stage 3 GCR***	project no.	***GENZTAUC13086AP-AG***
location:	***Stage 3C & Stage 3D***	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, dark black brown mottled orange, red and white, with trace fine grained sand, trace clay.	D	H			**FILL** VS >240 kPa VS >240 kPa VS >240 kPa
					1.0		ML	**Sandy SILT**: non plastic, pale grey, with fine to coarse grained sand.					VS >240 kPa
					1.5			Hand Auger HA3C-188 terminated at 1.2 m Target depth					VS >240 kPa
					2.0								

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3C-190***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0			**TOPSOIL: SILT**: non plastic, dark brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								Clayey SILT: low plasticity, orange brown-orange, with trace fine sand.	M		⊙		**FILL** VS >183 kPa
					0.5			**SAND**: fine to coarse grained, pale brown, with trace fine gravel and trace silt.		MD	⊙		VS >183 kPa
										VSt			
					1.0			**SILT**: non plastic, orange brown, with minor fine sand and trace clay. 0.9 to 1.2 m: becoming mottled orange and dark brown 1.0 to 1.2 m: clay becomes minor			⊙		**YOUNGER ASH** VS >183 kPa
											⊙		VS >183 kPa
					1.5			Hand Auger HA3C-190 terminated at 1.2 m Target depth					
					2.0								

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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

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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3C-191***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-AG***
location:	*Stage 3C & Stage 3D*	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic, dark brown mottled orange, with some fine to coarse grained sand.	D	H			**TOPSOIL**
													VS >240 kPa
							ML	**SILT**: non plastic to low plasticity, orange brown, with some fine grained sand, trace clay.					**MATUA SUBGROUP**
					0.5								VS >240 kPa
								At 0.7m: becoming minor fine grained sand with minor clay.	M	VSt	⊕ ⊙		VS 103/ 23 kPa
					1.0						⊕ ⊙		VS 156/ 25 kPa
								At 1.1m: becoming flecked white.					
								Hand Auger HA3C-191 terminated at 1.2 m Target depth			⊕ ⊙		VS 138/ 28 kPa
					1.5								
					2.0								

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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
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Engineering Log - Hand Auger

Borehole ID.	***HA3C-192***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***07 Mar 2016***
principal:	***-***
date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***ODS***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA N		Not Encountered			0.0			**SILT**: non plastic, dark brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								Clayey SILT: low plasticity, orange brown-orange, with trace fine sand.	D to M				**YOUNGER ASH** VS >183 kPa
					0.5								VS >183 kPa
					1.0								VS >183 kPa
					1.5			Hand Auger HA3C-192 terminated at 1.2 m Target depth					VS >183 kPa
					2.0								

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:09

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
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Engineering Log - Hand Auger

client:	***The Lakes 2012 ltd***	Borehole ID.	***HA3C-193***
principal:	**-**	sheet:	1 of 1
project:	***The Lakes Stage 3 GCR***	project no.	***GENZTAUC13086AP-AG***
location:	***Stage 3C & Stage 3D***	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, dark brown mottled orange, with minor fine to medium grained sand.	D	H	⊕ ⊙		**TOPSOIL**
													VS 215/ 47 kPa
							ML	**SILT**: non plastic to low plasticity, orange brown, with minor fine to medium grained sand, trace clay.		VSt			**MATUA SUBGROUP**
					0.5		ML-MH	**SILT**: low to medium plasticity, orange brown, with some clay, trace fine grained sand, trace fine grained angular black gravel.	M		⊕ ⊙		VS 136/ 25 kPa
											⊕ ⊙		VS 176/ 33 kPa
					1.0			At 1.0m: becoming pale orange brown with minor fine to medium grained sand.	D to M		⊕ ⊙		VS 156/ 25 kPa
					1.5			Hand Auger HA3C-193 terminated at 1.2 m Target depth			⊕ ⊙		VS 138/ 25 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3C-194***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								SILTY SAND: fine to coarse grained, pale brown.	D to M				**MATUA SUBGROUP**
					0.5			**Silty CLAY**: low plasticity, orange brown, with trace fine to coarse sand. 0.5 m: trace black manganese	M		⊕ ⊙		VS 175/ 36 kPa VS 160/ 28 kPa
					1.0			**SILT**: low plasticity, pale grey with mottled orange brown and brown, with some clay and minor fine to coarse sand. 1.0 m: clay becomes minor and sand becomes some			⊕ ⊙		VS 140/ 28 kPa
					1.5			Hand Auger HA3C-194 terminated at 1.2 m Target depth			⊕ ⊙		VS 151/ 61 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3C-195***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***07 Mar 2016***
principal:	***-***
date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***NM***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, dark brown, with minor fine to medium grained sand.	D				**TOPSOIL**
							CL-ML	**Clayey SILT**: low plasticity, orange brown, with trace fine grained angular black gravel.	M	H			**MATUA SUBGROUP** VS >240 kPa
								At 0.4m: becoming low plasticity to medium plasticity.	M to W	St			
					0.5								VS 86/ 14 kPa
													VS 86/ 18 kPa
					1.0								VS 103/ 25 kPa
													VS 103/ 18 kPa
					1.5								VS 120/ 33 kPa
							ML	**Sandy SILT**: non plastic to low plasticity, dark orange brown, with medium to coarse grained sand, trace fine grained angular gravel.	D to M				VS 176/ 25 kPa
								At 1.95m: becoming white.		VSt			
					2.0			Hand Auger HA3C-195 terminated at 2.0 m Target depth					VS 196/ 25 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

		Borehole ID.	***HA3C-196***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								SILT: non plastic to low plasticity, orange brown, with minor fine sand and trace clay.	D to M		⊙		**MATUA SUBGROUP** VS >183 kPa
								SILT: non plastic, pale brown to pale grey with mottled black and orange, with minor fine to coarse sand and trace clay.			⊙		VS >183 kPa
					0.5								
								0.8 m: sand becomes some			⊕ ⊙		VS 140/ 22 kPa
					1.0			1.1 m: sand becomes minor and clay becomes minor	M		⊕ ⊙		VS 173/ 43 kPa
								1.2 m: trace manganese					
											⊕ ⊙		VS 133/ 31 kPa
					1.5								
											⊕ ⊙		VS 132/ 55 kPa
								SILTY SAND: non plastic, pale brown, with trace clay.					
					2.0			Hand Auger HA3C-196 terminated at 2.0 m Target depth			⊕ ⊙		VS 126/ 37 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

		Borehole ID.	***HA3C-197***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic to low plasticity, brown mottled orange, flecked white, with minor fine to coarse grained sand, trace clay.	D	H	⊕ ⊙		**TOPSOIL**
													VS 224/ 33 kPa
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand.					**MATUA SUBGROUP**
					0.5								UTP
								At 07m: becoming some fine to coarse grained sand.	M		⊕ ⊙		VS 231/ 31 kPa
							ML	**Sandy SILT**: non plastic to low plasticity, orange brown, with fine grained sand.		VSt			
					1.0			At 1.0m: becoming flecked white and black with trace fine grained angular gravel.			⊕ ⊙		VS 166/ 25 kPa
								At 1.2m: minor pockets of fine to coarse grained orange brown sand.			⊕ ⊙		VS 111/ 33 kPa
					1.5						⊕ ⊙		VS 111/ 33 kPa
										St			
											⊕ ⊙		VS 70/ 25 kPa
										VSt			
					2.0			Hand Auger HA3C-197 terminated at 2.0 m Target depth			⊕ ⊙		VS 120/ 40 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3C-198***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-A(***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
					0.5			**Silty CLAY**: low plasticity, orange brown, with trace fine sand.	D to M				**MATUA SUBGROUP** VS >183 kPa
					1.0			1.0 m: black specks are present					VS 176/ 19 kPa
													VS 114/ 14 kPa
					1.5			**SILTY SAND**: fine to coarse grained, yellow brown, with trace clay.					VS 151/ 28 kPa
													VS 133/ 61 kPa
					2.0			Hand Auger HA3C-198 terminated at 2.0 m Target depth					VS 111/ 50 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3C-199***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-A(***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	**-**	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, dark brown, with minor fine to medium grained sand.	D	VSt	⊕ ⊙		**TOPSOIL**
													VS 186/ 25 kPa
					0.5		SM	**SILTY SAND**: fine to coarse grained, orange brown mottled grey, with fine to medium grained sand.		D			**MATUA SUBGROUP**
										MD			
					1.0		SP	**SAND**: fine to medium grained, grey, with minor silt.	M				
								At 1.0m: becoming trace silt.		D			
					1.5					MD			
					2.0			Hand Auger HA3C-199 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
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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3C-200***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with minor fine to medium grained sand.	D	MD			**TOPSOIL**
								SAND: fine to coarse grained, pale grey.					**MATUA SUBGROUP**
					0.5								
					1.0			1.0 m: trace fine sub-rounded gravel present					
								1.2 m: trace fine to coarse pumiceous gravel					
					1.5								
					2.0			Hand Auger HA3C-200 terminated at 2.0 m Target depth					

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:10

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

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3C-201***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, dark brown, with minor fine to coarse grained sand.	D				**TOPSOIL**
							SM	**SILTY SAND**: fine to medium grained, orange brown.	M	MD			**MATUA SUBGROUP** UTP
					0.5		ML	**Sandy SILT**: low plasticity, orange brown, with fine to medium grained sand, trace clay.		H to VSt	⊕ ⊙		VS 233/ 33 kPa
											⊕ ⊙		VS 138/ 23 kPa
										VSt			
					1.0						⊕ ⊙		VS 94/ 28 kPa
											⊕ ⊙		VS 94/ 40 kPa
										H			
					1.5			At 1.6m: becoming grey mottled orange with trace fine, angular, black gravel.			⊕ ⊙		VS 103/ 28 kPa
											⊕ ⊙	6/200 mm	VS 129/ 43 kPa
					2.0			Hand Auger HA3C-201 terminated at 2.0 m Target depth			⊕ ⊙		VS 111/ 28 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
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Engineering Log - Hand Auger

client:	***The Lakes 2012 ltd***	Borehole ID.	***HA3C-202***
principal:	**-**	sheet:	1 of 1
project:	***The Lakes Stage 3 GCR***	project no.	***GENZTAUC13086AP-A(***
location:	***Stage 3C & Stage 3D***	date started:	***07 Mar 2016***
		date completed:	***09 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, dark brown mottled orange, with minor fine to medium grained sand.	D	VSt	⊕ ⊙		**TOPSOIL** VS 166/ 10 kPa
					0.5		SP	**SAND**: fine to medium grained, pale grey mottled brown, with minor silt. At 0.6m: becoming pale grey with trace silt.	M	MD			**MATUA SUBGROUP**
					1.0								
					1.5								
					2.0			Hand Auger HA3C-202 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
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Engineering Log - Hand Auger

Borehole ID.	***HA3C-203***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***07 Mar 2016***
principal:	***-***	date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, some fine sand.	D	VSt			**TOPSOIL**
								Sandy SILT: non plastic, orange brown, sand is fine to medium. With trace clay and trace manganese.			⊙		**YOUNGER ASH** VS >183 kPa
					0.5						⊙		VS >183 kPa
								SILT: non plastic to low plasticity, orange brown with mottled orange and black specks, with minor clay and trace fine to coarse sand and trace manganese.	M				
								0.8 m: sand becomes minor					
								SILT: low plasticity, orange brown, with some fine to coarse sand and minor clay.			⊕ ⊙		VS 175/ 28 kPa
					1.0			1.1 m: sand becomes minor and clay becomes some			⊕ ⊙		VS 169/ 16 kPa
								1.4 m: becomes very moist			⊕ ⊙		VS 169/ 31 kPa
					1.5			1.6 m: becomes low-medium plasticity					
								1.7 m: sand becomes trace			⊕ ⊙		VS 151/ 125 kPa
					2.0			Hand Auger HA3C-203 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

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Engineering Log - Hand Auger

		Borehole ID.	***HA3D-207***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***04 Apr 2016***
principal:	**-**	date completed:	***04 Apr 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (remoulded / peak) (kPa)	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0			**SILT**: non plastic to low plasticity, orange brown with mottled grey and brown, with trace fine to coarse sand.	M	St			**FILL**
													VS 96/ 54 kPa
					0.5					VSt			VS 103/ 54 kPa
								0.75 m: sand becomes some		St			VS 89/ 70 kPa
								SAND: fine to coarse grained, pale brown, with trace silt.					
					1.0			**SILT**: non plastic to low plasticity, dark brown, with trace fine to coarse sand.					
								Hand Auger HA3D-207 terminated at 1.0 m Refusal					
					1.5								
					2.0								

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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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-209***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***04 Apr 2016***
principal:	***-***
date completed:	***04 Apr 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***ODS***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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, orange brown, with trace fine sand.	D to M	St			**YOUNGER ASH**
											⊙		VS 70/ 43 kPa
					0.5					VSt	⊙		VS 109/ 70 kPa
										St	⊙		VS 65/ 58 kPa
					1.0			1.0 m: becoming "greasy"	M		⊙		VS 70/ 49 kPa
										VSt	⊙		VS 121/ 86 kPa
					1.5			Hand Auger HA3D-209 terminated at 1.5 m Target depth			⊙		VS 176/ 86 kPa
					2.0								

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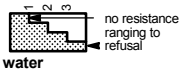
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

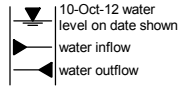
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



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.	***HA3D-211***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***14 Mar 2016***
principal:	***-***
date completed:	***09 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***ODS***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0			**SILT**: low plasticity, pale brown, with minor fine grained sand, trace fine grained angular gravel.	D	VSt			**TOPSOIL**
								SILT: low plasticity, orange brown, with minor clay.	M				**YOUNGER ASH**
													VS >183 kPa
					0.5								VS 165/ 28 kPa
													VS 101/ 15 kPa
					1.0			1.1 m: clay becomes some		St			VS 68/ 13 kPa
													VS 99/ 14 kPa
					1.5					VSt			
								Hand Auger HA3D-211 terminated at 1.5 m Target depth					VS 108/ 16 kPa
					2.0								

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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

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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-213***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-AG***
location:	*Stage 3C & Stage 3D*	date started:	***17 Mar 2016***
		date completed:	***17 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0		ML	**TOPSOIL: SILT**: low plasticity, dark brown, with minor fine to coarse grained gravel, minor fine grained sand.	D	VSt			**TOPSOIL**
													VS 129/ 25 kPa
							ML	**SILT**: low plasticity, orange brown, with minor clay, minor pockets of manganese.					**YOUNGER ASH**
					0.5			0.5 m: becoming orange with pockets of low plasticity pink silt present.					VS 111/ 25 kPa
									M	F			VS 103/ 25 kPa
					1.0			1.0 m: pink silt pockets and manganese becomes absent.					VS 78/ 14 kPa
													VS 70/ 14 kPa
								1.3 m: 50mm pink silt pocket with minor manganese present.		VSt			
					1.5			Hand Auger HA3D-213 terminated at 1.5 m Target depth					VS 120/ 25 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-215***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-A(***		
client:	***The Lakes 2012 ltd***	date started:	***17 Mar 2016***
principal:	***-***	date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, brown, with minor organic silt, minor fine to medium grained sand.	D	H			**MATUA SUBGROUP**
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand.	M				VS >240 kPa
					0.5								VS >240 kPa
							SP	**SAND**: fine to medium grained, pale pink.	D	D			
					1.0			1.0 m: becoming orange.					
							ML	**SILT**: low plasticity, grey, with some fine to medium grained sand.	M	H			
					1.5			Hand Auger HA3D-215 terminated at 1.5 m Target depth			⊕ ⊙		VS 215/ 62 kPa
					2.0								

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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
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Engineering Log - Hand Auger

Borehole ID.	***HA3D-218***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***17 Mar 2016***
principal:	***-***	date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor fine grained sand, trace organic silt.	D	H			**TOPSOIL** VS >240 kPa
					0.5		ML	**SILT**: low plasticity, orange brown, with minor clay, minor fine grained sand.	M	VSt			**MATUA SUBGROUP** VS 215/ 37 kPa VS 176/ 40 kPa
					1.0		ML	**SILT**: low plasticity. 1.4 m: becoming fine to medium grained sand (greasy).		VSt to H VSt			VS 215/ 49 kPa VS 196/ 40 kPa
					1.5			Hand Auger HA3D-218 terminated at 1.5 m Target depth					VS 166/ 33 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-221***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***16 Mar 2016***
principal:	***-***
date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***NM***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with trace organic silt, trace fine to medium grained sand.	M	H	⊙		**TOPSOIL**
													VS >240 kPa
							ML	**SILT**: low plasticity, orange brown, with minor clay, minor fine grained sand.					**YOUNGER ASH**
					0.5						⊙		VS >240 kPa
											⊙		VS >240 kPa
					1.0						⊙		VS >240 kPa
									M to W		⊕ ⊙		VS 233/ 40 kPa
										VSt			
					1.5			Hand Auger HA3D-221 terminated at 1.5 m Target depth			⊕ ⊙		VS 176/ 37 kPa
					2.0								

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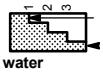
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

* 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



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.	***HA3D-223***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***29 Mar 2016***
principal:	***-***	date completed:	***29 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with minor fine to coarse sand.	D	VSt			**TOPSOIL**
								SILT: low plasticity, orange brown, with trace clay and trace fine sand.	M				**YOUNGER ASH**
													VS >240 kPa
					0.5						⊕ ⊙		VS 215/ 51 kPa
													VS >240 kPa
					1.0						⊕ ⊙		VS 168/ 51 kPa
								1.2 m: clay becomes minor			⊕ ⊙		VS 147/ 33 kPa
					1.5			Hand Auger HA3D-223 terminated at 1.5 m Target depth			⊕ ⊙		VS 156/ 28 kPa
					2.0								

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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
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Engineering Log - Hand Auger

client:	***The Lakes 2012 ltd***	Borehole ID.	***HA3D-225***
principal:	**-**	sheet:	1 of 1
project:	***The Lakes Stage 3 GCR***	project no.	***GENZTAUC13086AP-AG***
location:	***Stage 3C & Stage 3D***	date started:	***16 Mar 2016***
		date completed:	***16 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: non plastic, brown, with minor organic silt, trace fine grained sand.	M	H	⊙		**TOPSOIL** VS >240 kPa
							ML	**SILT**: low plasticity, orange brown, with minor clay, minor fine grained sand.	M - D		⊙		**YOUNGER ASH** VS >240 kPa
					0.5					VSt	⊕ ⊙		VS 147/ 40 kPa
					1.0		ML	**SILT**: low plasticity, orange, with minor clay, trace fine grained sand, trace pockets of manganese (semi greasy). 1.4 m: becoming bright orange with some fine to medium grained sand.			⊕ ⊙		VS 196/ 40 kPa VS 176/ 40 kPa
					1.5			Hand Auger HA3D-225 terminated at 1.5 m Target depth			⊕ ⊙		VS 172/ 34 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-228***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***16 Mar 2016***
principal:	***-***	date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor fine to medium grained sand, trace fine grained angular gravel.	D	H			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand.					**MATUA SUBGROUP**
											⊕ ⊙		VS 233/ 62 kPa
										VSt			
					0.5			At 0.5m: becoming minor fine grained sand, trace clay.			⊕ ⊙		VS 123/ 28 kPa
											⊕ ⊙		VS 123/ 33 kPa
								0.8m: becoming trace fine to medium grained sand.	M				
					1.0						⊕ ⊙		VS 138/ 40 kPa
											⊕ ⊙		VS 147/ 25 kPa
							ML	**SILT**: low plasticity, orange, with minor clay, trace fine grained sand (greasy).		St			
					1.5						⊕ ⊙		VS 70/ 14 kPa
										VSt			
								1.8m: becoming pale orange, not greasy.			⊕ ⊙		VS 158/ 25 kPa
					2.0			Hand Auger HA3D-228 terminated at 2.0 m Target depth			⊕ ⊙		VS 120/ 30 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-230***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-A(***		
client:	***The Lakes 2012 ltd***	date started:	***16 Mar 2016***
principal:	***-***	date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: low plasticity, brown, with minor fine to medium grained sand, trace fine grained angular gravel.	D	MD			**TOPSOIL**
					0.5			**SAND**: fine to medium grained, pink brown to pale brown, with minor silt. 0.35 m: trace manganese becomes present 0.65 m: trace clay becomes present					**MATUA SUBGROUP**
					1.0			**SILT**: low plasticity, pale brown to pale pink, with minor clay, trace fine sand and trace manganese (dark brown).	M	VSt	⊕ ⊙		VS 117/ 30 kPa
								1.3 m: becoming mottled dark brown			⊙		VS >183 kPa
					1.5						⊕ ⊙		VS 97/ 31 kPa
											⊕ ⊙		VS 103/ 31 kPa
					2.0			Hand Auger HA3D-230 terminated at 2.0 m Target depth			⊕ ⊙		VS 92/ 28 kPa

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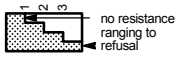
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

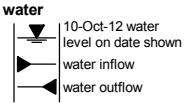
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



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.	***HA3D-231***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***16 Mar 2016***
principal:	***-***	date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor fine to medium grained sand, trace fine to medium grained angular gravel.	D	H			**TOPSOIL**
											⊙		VS >240 kPa
							ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, trace clay.					**YOUNGER ASH**
					0.5						⊙		VS >240 kPa
								0.7 m: becoming minor clay.					
											⊙		VS >240 kPa
					1.0						⊕ ⊙		VS 215/ 40 kPa
									M	VSt			
											⊕ ⊙		VS 138/ 28 kPa
									M to W	St			
					1.5						⊕ ⊙		VS 70/ 25 kPa
							ML	**SILT**: low plasticity, orange.		VSt	⊕ ⊙		VS 111/ 33 kPa
					2.0			Hand Auger HA3D-231 terminated at 2.0 m Target depth			⊕ ⊙		VS 111/ 40 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
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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-232***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***16 Mar 2016***
		date completed:	***16 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0			**SILT**: low plasticity, brown, with minor fine to medium grained sand, trace fine grained angular gravel.	D	VSt			**TOPSOIL**
					0.5			**SILTY SAND**: fine to coarse grained, orange brown.	M	MD			**YOUNGER ASH** VS >183 kPa
								Silty: low plasticity, orange brown, with trace fine sand and trace clay.		VSt			VS 163/ 28 kPa
					1.0			1.0 m: clay becomes minor					
								1.2 m: becomes "greasy"					VS 154/ 31 kPa
					1.5								VS 152/ 26 kPa
								1.7 m: becomes orange					VS 165/ 31 kPa
					2.0			Hand Auger HA3D-232 terminated at 2.0 m Target depth					VS 143/ 14 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-233***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***16 Mar 2016***
principal:	***-***
date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***ODS***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA N		Not Encountered			0.0			**SILT**: low plasticity, brown, with minor fine to medium grained sand, trace fine grained angular gravel.	D	VSt			**TOPSOIL**
								SILT: low plasticity, orange brown, with minor clay and trace fine sand.	M				**YOUNGER ASH** VS >183 kPa
					0.5			0.6 m: clay becomes trace					VS >183 kPa
					1.0			1.3 m: clay becomes minor and sand is absent					VS >183 kPa
					1.5			1.6 m: trace fine sand becomes present and is "greasy"					VS 151/ 41 kPa VS 140/ 31 kPa VS 120/ 41 kPa VS >183 kPa
					2.0			Hand Auger HA3D-233 terminated at 2.0 m Target depth					VS 175/ 31 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

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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-234***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-AG***
location:	*Stage 3C & Stage 3D*	date started:	***16 Mar 2016***
		date completed:	***16 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor fine grained sand, trace fine to medium grained angular gravel.	D	H			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, trace clay.					**YOUNGER ASH** VS 215/ 50 kPa
										VSt			
					0.5								VS 196/ 40 kPa
									M				
								At 0.8m: becoming some fine grained sand.					VS 129/ 25 kPa
							ML	**Sandy SILT**: non plastic, orange brown, with fine to medium grained sand.	D	VSt to MD			
					1.0								VS 120/ 18 kPa
													VS 129/ 25 kPa
							ML	**SILT**: low plasticity, pale pink, with trace fine grained sand, trace manganese pockets.	M	H to MD			
					1.5		ML	**Sandy SILT**: non plastic, pale yellow, with fine grained sand.					VS 233/ 54 kPa
										F to MD			
							ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, trace clay.		H			VS 70/ 40 kPa
					2.0			Hand Auger HA3D-234 terminated at 2.0 m Target depth					VS 215/ 23 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
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Engineering Log - Hand Auger

Borehole ID.	***HA3D-235***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-A(***		
client:	***The Lakes 2012 ltd***	date started:	***16 Mar 2016***
principal:	**-**	date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information						material substance							
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	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			**SILT**: low plasticity, brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								SILT: non plastic to low plasticity, orange brown with black specks, with trace fine to medium sand and trace clay.	D to M				**YOUNGER ASH** VS >183 kPa
					0.5								VS >183 kPa
								0.7 m: trace sand becomes fine					VS 151/ 28 kPa
					1.0								VS 172/ 28 kPa
													VS 134/ 28 kPa
								Sandy SILT: non plastic to low plasticity, orange brown, with trace clay.					VS >183 kPa
					1.5			**SAND**: fine to coarse grained, orange brown, with some silt.		MD			
								Sandy SILT: non plastic to low plasticity, pale brown, sand is fine to coarse.		St			VS 96/ 39 kPa
					2.0			Hand Auger HA3D-235 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

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Engineering Log - Hand Auger

client:	***The Lakes 2012 ltd***	Borehole ID.	***HA3D-236***
principal:	**-**	sheet:	1 of 1
project:	***The Lakes Stage 3 GCR***	project no.	***GENZTAUC13086AP-A(***
location:	***Stage 3C & Stage 3D***	date started:	***16 Mar 2016***
		date completed:	***16 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor fine grained sand, trace fine grained angular gravel.	D	H			**TOPSOIL**
							ML	**SILT**: non plastic to low plasticity, orange brown, with some fine grained sand.	D to M	VSt			**YOUNGER ASH** VS >240 kPa
					0.5								VS 147/ 40 kPa
							ML	**Sandy SILT**: non plastic, orange brown, with fine to medium grained sand.					VS 111/ 25 kPa
					1.0		SP	**SILTY SAND**: fine to medium grained, orange brown.		MD to D			VS 103/ 25 kPa
							ML	**Sandy SILT**: low plasticity, pale pink, with lenses of fine to medium gained pale pink sand.		St			VS 78/ 18 kPa
					1.5		SP	**SAND**: fine to medium grained, orange brown. At 1.6m: becoming white.		MD			
							ML	**SILT**: low plasticity, orange brown, with trace fine grained sand.		H			
					2.0			Hand Auger HA3D-236 terminated at 2.0 m Target depth					VS 206/ 40 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

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Engineering Log - Hand Auger

Borehole ID.	**HA3D-237**		
sheet:	1 of 1		
project no.	**GENZTAUC13086AP-A(**		
client:	***The Lakes 2012 ltd***	date started:	***16 Mar 2016***
principal:	**-**	date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information						material substance							
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	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			**SILT**: low plasticity, brown mottled pink, white and orange, with minor fine grained sand, trace fine to medium grained angular gravel.	D	MD			**TOPSOIL**
					0.5			**SILTY SAND**: fine to coarse grained, brown with mottled pink brown, with trace fine to medium gravel. 0.7 m: becoming mottled dark brown					**FILL**
					1.0			**SILT**: non plastic, orange brown, with some fine to medium sand. 1.0 m: sand becomes trace and plasticity becomes low	D to M	VSt	⊙		VS >183 kPa
					1.5			1.25 m: becoming mottled pink			⊙		VS >183 kPa
								SILT: low plasticity, orange brown, with trace fine sand. 1.85 m: becoming mottled pale pink and dark brown			⊙		VS >183 kPa
					2.0			Hand Auger HA3D-237 terminated at 2.0 m Target depth			⊙		VS >183 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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-238***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***16 Mar 2016***
principal:	***-***	date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, brown mottled pink, white and orange, with minor fine grained sand, trace fine to medium grained angular gravel.	D	VSt			**FILL**
							ML	**SILT**: low plasticity, orange brown mottled brown, with trace fine grained sand, trace pockets of sandy silt.			⊕ ⊙		VS 176/ 33 kPa
					0.5		ML	**SILT**: non plastic, pale orange, with some fine to medium grained sand.		H	⊙		VS >240 kPa
											⊙		VS >240 kPa
					1.0		ML	**Sandy SILT**: non plastic, pale brown mottled white and orange, streaked black, with fine to medium grained sand..			⊙		VS >240 kPa
					1.5						⊙		VS >240 kPa
											⊙		VS >240 kPa
							ML	**SILT**: low plasticity, orange brown, with trace fine grained sand, trace clay.					
					2.0			Hand Auger HA3D-238 terminated at 2.0 m Target depth			⊙		VS >240 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

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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-239***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***16 Mar 2016***
		date completed:	***16 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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**: low plasticity, brown mottled pink, white and orange, with minor fine grained sand, trace fine to medium grained angular gravel.	D	VSt	⊙		**TOPSOIL** VS >183 kPa
					0.5			**SILT**: non plastic to low plasticity, orange brown with mottled pale pink, with trace clay and trace fine sand. 0.5 m: trace gravel becoming present- are grey, medium to coarse and angular	D to M		⊙ ⊙		**FILL** VS >183 kPa VS >183 kPa
								SILT: low plasticity, pink with mottled dark brown, with trace clay and trace to minor manganese.			⊙		**MATUA SUBGROUP** VS >183 kPa
					1.0			**SAND**: fine to coarse grained, pale brown, with some silt. 1.0 m: silt becomes trace 1.1 m: becomes brown 1.2 m: silt becomes minor		MD			
					1.5			**SILT**: non plastic to low plasticity, orange brown, with some sand.			⊙		VS >183 kPa
								SILTY SAND: fine to coarse grained, orange brown with mottled pale brown.			⊙		VS >183 kPa
					2.0			Hand Auger HA3D-239 terminated at 2.0 m Target depth			⊙		VS >183 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-240***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***16 Mar 2016***
principal:	***-***
date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***NM***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, brown, with minor fine grained sand, trace fine to medium grained angular gravel.	D	H			**FILL**
							ML	**SILT**: low plasticity, orange brown mottled brown and white, with trace fine to medium grained sand.			⊙		VS >240 kPa
					0.5						⊙		VS >240 kPa
								At 0.7m: becoming trace fine to medium grained gravel, trace asphalt.			⊙		VS >240 kPa
								At 0.9m: becoming minor pockets of orange brown low plasticity sandy silt. Asphalt absent.			⊙		VS >240 kPa
					1.0		ML	**Sandy SILT**: non plastic, pale orange grey, with fine to medium grained sand.			⊕ ⊙		VS 215/ 25 kPa
					1.5		ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, trace clay.	M	H or VSt	⊙		VS >240 kPa
								At 1.8m: becoming minor fine to medium grained sand.			⊕ ⊙		VS 176/ 25 kPa
					2.0			Hand Auger HA3D-240 terminated at 2.0 m Target depth			⊙		VS >240 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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-241***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***16 Mar 2016***
principal:	***-***	date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with trace fine to coarse sand.	D	VSt			**TOPSOIL**
								SILT: low plasticity, orange brown with mottled dark brown and pink, with trace-minor clay, trace fine sand, trace fine to coarse sub-angular gravel and trace manganese.	D to M		⊙		**MATUA SUBGROUP** VS >183 kPa
					0.5						⊕ ⊙		VS 120/ 25 kPa
											⊕ ⊙		VS 145/ 33 kPa
					1.0			**SAND**: fine to coarse grained, brown, with some silt. 1.0 m: becomes mottled grey and pink			⊙		VS >183 kPa
								SILT: non plastic, orange brown with mottled pink and grey, with minor sand, trace clay, trace fine sub-rounded gravel.			⊙		VS >183 kPa
								SILT: low plasticity, pink with black speckles, with some clay.					
					1.5			Hand Auger HA3D-241 terminated at 1.5 m Target depth			⊕ ⊙		VS 136/ 31 kPa
					2.0								

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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
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Engineering Log - Hand Auger

		Borehole ID.	***HA3D-242***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***16 Mar 2016***
principal:	***-***	date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**.	D	VSt			**TOPSOIL**
					0.5			**SILT**: low plasticity, orange brown with mottled pale pink, with minor fine to coarse sand and trace clay.	D to M				**FILL** VS >183 kPa
								GRAVEL: medium to coarse grained, grey, sub-angular.					
								SILT: non plastic to low plasticity, orange brown, with trace fine sand. Is "greasy".	M				**YOUNGER ASH** VS 161/ 48 kPa
					1.0								VS 152/ 33 kPa
								1.3 m: trace clay becomes present					VS 165/ 45 kPa
					1.5								VS >183 kPa
								1.65 m: trace manganese becomes present					VS 125/ 45 kPa
					2.0			Hand Auger HA3D-242 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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-243***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***16 Mar 2016***
principal:	***-***
date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***ODS***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
					0.0			**SILT**: low plasticity, pale brown, with minor fine to medium grained sand, trace fine to medium grained angular gravel..	D				**TOPSOIL**
								SILT: non plastic to low plasticity, orange brown with mottled orange, with trace clay and trace fine sand.	D to M				**YOUNGER ASH** VS >183 kPa
		Not Encountered			0.5			**SILTY SAND**: fine grained, orange brown.					VS >183 kPa
								SILT: low plasticity, orange brown, with minor-some clay. Is "greasy".					VS >183 kPa
					1.0			1.2 to 1.5 m: has black speckles					VS >183 kPa
					1.5			Hand Auger HA3D-243 terminated at 1.5 m Target depth					VS >183 kPa
					2.0								

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 ltd***	Borehole ID.	***HA3D-244***
principal:	**-**	sheet:	1 of 1
project:	***The Lakes Stage 3 GCR***	project no.	***GENZTAUC13086AP-AG***
location:	***Stage 3C & Stage 3D***	date started:	***16 Mar 2016***
		date completed:	***16 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, brown, with fine to medium grained sand, trace fine to coarse grained angular gravel.	D	H			**TOPSOIL**
					0.5		ML	**Clayey SILT**: low plasticity, orange brown, with trace fine grained sand (Hard).					**MATUA SUBGROUP** VS 240 kPa
							ML	**SILT**: low plasticity, pale orange, with minor fine to medium grained sand, minor clay, trace black sand.					VS 240 kPa
					1.0		ML	**SILT**: low plasticity, pink, with minor pockets of manganese, trace fine grained sand, trace clay.	M				VS 240 kPa
					1.5								VS 233/ 25 kPa
													VS 215/ 40 kPa
					2.0								VS 215/ 25 kPa
								Hand Auger HA3D-244 terminated at 2.0 m Target depth					VS 215/ 25 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

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Engineering Log - Hand Auger

		Borehole ID.	**HA3D-245**
		sheet:	1 of 1
		project no.	**GENZTAUC13086AP-AG**
client:	**The Lakes 2012 ltd**	date started:	**14 Mar 2016**
principal:	**-**	date completed:	**14 Mar 2016**
project:	**The Lakes Stage 3 GCR**	logged by:	**NM**
location:	**Stage 3C & Stage 3D**	checked by:	**RBT**

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, pale brown, with minor fine to medium grained sand, trace fine to medium grained angular gravel..	D	H			**TOPSOIL**
											⊙ 240		VS >240 kPa
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand.	M	VSt			**MATUA SUBGROUP**
					0.5						⊕ ⊙		VS 147/ 25 kPa
											⊕ ⊙		VS 120/ 23 kPa
								At 0.8m: becoming orange with minor fine grained sand.					
					1.0						⊕ ⊙		VS 103/ 18 kPa
											⊕ ⊙		VS 111/ 25 kPa
										H			
					1.5						⊕ ⊙		VS 215/ 40 kPa
					2.0			Hand Auger HA3D-245 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

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Engineering Log - Hand Auger

Borehole ID.	**HA3D-246**
sheet:	1 of 1
project no.	**GENZTAUC13086AP-A(**
client:	**The Lakes 2012 ltd**
date started:	**14 Mar 2016**
principal:	**-**
date completed:	**14 Mar 2016**
project:	**The Lakes Stage 3 GCR**
logged by:	**ODS**
location:	**Stage 3C & Stage 3D**
checked by:	**RBT**

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear ⊕ remoulded ⊙ peak (kPa) 50 100 150 200	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
					0.0			**SILT**: low plasticity, pale brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								SAND: fine to coarse grained, brown, with trace fine to coarse sub-angular gravel and trace silt. 0.3 m: becoming pale brown		MD			**MATUA SUBGROUP**
					0.5			**SILTY SAND**: fine to coarse grained, brown with mottled pink, with trace fine to coarse sub-angular gravel and trace clay.					
		Not Encountered						**SILT**: low plasticity, pink with mottled orange brown, with minor fine to coarse sand, trace clay and trace manganese inclusions.	M		⊙		VS >183 kPa
					1.0			1.0 m: sand becomes trace and manganese becomes minor			⊕ ⊙		VS 151/ 20 kPa
											⊙		VS >183 kPa
								1.4 m: clay becomes minor to some					
					1.5						⊙		VS >183 kPa
											⊙		VS >183 kPa
										St			
					2.0			Hand Auger HA3D-246 terminated at 2.0 m Target depth			⊕ ⊙		VS 82/ 25 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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-247***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***14 Mar 2016***
principal:	***-***	date completed:	***14 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: low plasticity, pale brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								Clayey SILT: low plasticity, orange brown with black specks, with trace fine sand and trace manganese. Is soft and sticky.	M				**MATUA SUBGROUP** VS 169/ 34 kPa
					0.5					St			VS 72/ 24 kPa
													VS 99/ 19 kPa
					1.0			**SILT**: low plasticity, orange, with minor clay and trace fine sand. Is "greasy".		VSt			VS 117/ 15 kPa
													VS 115/ 26 kPa
					1.5			Hand Auger HA3D-247 terminated at 1.5 m Target depth					VS >183 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-248***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***16 Mar 2016***
principal:	***-***	date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, brown, with minor fine grained sand, trace fine to medium grained angular gravel.	D	H			**TOPSOIL**
							ML	**SILT**: low plasticity, pink flecked white, with trace fine grained, trace clay, trace pockets of manganese.					**MATUA SUBGROUP**
													VS >240 kPa
					0.5								VS >240 kPa
													VS >240 kPa
									M				
					1.0								VS >240 kPa
								At 1.1m: white specks become absent.	M to W	F			VS 58/ 14 kPa
									S				
					1.5								VS 138/ 18 kPa
							ML	**SILT**: low plasticity, orange brown, with trace fine grained sand, trace clay.		St			VS 147/ 25 kPa
					2.0			Hand Auger HA3D-248 terminated at 2.0 m Target depth					VS 138/ 25 kPa

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:11

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
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Engineering Log - Hand Auger

client:	***The Lakes 2012 ltd***	Borehole ID.	***HA3D-249***
principal:	**-**	sheet:	1 of 1
project:	***The Lakes Stage 3 GCR***	project no.	***GENZTAUC13086AP-AG***
location:	***Stage 3C & Stage 3D***	date started:	***16 Mar 2016***
		date completed:	***16 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic, pale brown mottled orange, with minor fine grained sand, trace fine to medium grained angular gravel.	D	H			**TOPSOIL**
													VS >240 kPa
							ML	**SILT**: low plasticity, pink flecked white, with minor pockets of manganese, trace fine to medium grained sand, trace clay.		VSt			**MATUA SUBGROUP**
													VS 156/ 33 kPa
					0.5								VS 103/ 24 kPa
								At 0.7m: White specks become absent.	W to S	St			
													VS 58/ 14 kPa
					1.0								VS 106/ 14 kPa
										VSt			
													VS 142/ 18 kPa
					1.5								VS 111/ 33 kPa
					2.0			Hand Auger HA3D-249 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

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-250***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***16 Mar 2016***
		date completed:	***16 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, pale brown mottled orange, with minor fine grained sand, trace fine to medium grained angular gravel.	D	VSt			**TOPSOIL**
								SILT: non plastic, pink with mottled brown and orange brown, with trace clay. trace fine to coarse sand and trace manganese.			⊙		**FILL** VS >183 kPa
					0.5			**SAND**: fine to coarse grained, pale brown, with trace fine to coarse sub-angular gravel and trace silt.	D to M	MD			
					1.0			0.6 m: becoming mottled dark brown. Trace manganese becomes present					
					1.5			1.6 m: silt and gravel become absent					
					2.0			Hand Auger HA3D-250 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.	***HA3D-251***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***16 Mar 2016***
principal:	***-***	date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: low plasticity, pale brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								SILT: low plasticity, orange brown with mottled pink, with trace fine sand and trace fine-coarse angular gravel.	D to M		⊙		**FILL** VS >183 kPa
					0.5						⊙		VS >183 kPa
											⊙		VS >183 kPa
								0.9 to 1.3 m: trace organics and sand becomes minor					
					1.0						⊙		VS >183 kPa
								1.25 to 1.4 m: becomes non-plastic and sand becomes some	M		⊕ ⊙		VS 161/ 41 kPa
					1.5			Hand Auger HA3D-251 terminated at 1.5 m Target depth			⊕ ⊙		VS 161/ 24 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

client:	***The Lakes 2012 ltd***	Borehole ID.	***HA3D-252***
principal:	**-**	sheet:	1 of 1
project:	***The Lakes Stage 3 GCR***	project no.	***GENZTAUC13086AP-AG***
location:	***Stage 3C & Stage 3D***	date started:	***16 Mar 2016***
		date completed:	***16 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA N		Not Encountered			0.0		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor fine to medium grained sand, trace fine to medium sub-angular to angular gravel.	D	H			**TOPSOIL**
							ML	**SILT**: low plasticity, brown mottled pink, with minor clay, trace fine to medium grained sand.					**YOUNGER ASH** VS 240 kPa
					0.5								VS 233/ 54 kPa
													VS 240 kPa
							ML	**SILT**: low plasticity, orange brown, with some fine to medium grained sand, trace clay.	M				VS 240 kPa
					1.0			1.1 m: becoming fine grained sand.		VSt			VS 147/ 25 kPa
					1.5		ML	**Sandy SILT**: non plastic, orange, with fine to medium grained sand.		St			VS 78/ 24 kPa
							ML	**SILT**: low plasticity.		VSt			VS 111/ 14 kPa
					2.0			Hand Auger HA3D-252 terminated at 2.0 m Target depth					VS 176/ 53 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-253***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***16 Mar 2016***
principal:	***-***
date completed:	***16 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***ODS***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0			**SILT**: low plasticity, pale brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								SILT: low plasticity, brown with mottled pink, with trace clay, trace fine sand and trace fine-coarse angular gravel.	D to M		⊕ ⊙		**FILL** VS 172/ 42 kPa
					0.5			0.5 to 1.5 m: becomes mottled dark brown			⊙		VS >183 kPa
								0.75 to 0.95 m: pockets of pink, low plasticity, clayey silt			⊕ ⊙		VS 134/ 27 kPa
					1.0						⊙		VS >183 kPa
											⊙		VS >183 kPa
					1.5			Hand Auger HA3D-253 terminated at 1.5 m Target depth			⊙		VS >183 kPa
					2.0								

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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
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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-255***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***16 Mar 2016***
		date completed:	***16 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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**: low plasticity, pale brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								SILT: non plastic to low plasticity, orange brown, with trace clay and trace fine sand.			⊕ ⊙		**MATUA SUBGROUP** VS 119/ 21 kPa
					0.5			**SILTY SAND**: fine to coarse grained, orange brown with mottled dark brown and pale brown. 0.6 to 0.7 m: pockets of pale orange clayey silt become present	D to M	L			
					1.0			1.0 to 1.2 m: pockets of pale orange clayey silt become present		MD			
								SAND: fine to coarse grained, brown with mottled pale brown, with trace silt and trace fine to coarse gravel.					
					1.5			Hand Auger HA3D-255 terminated at 1.5 m Target depth					
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-256***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***17 Mar 2016***
principal:	***-***
date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***NM***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor fine grained sand, trace fine grained angular gravel, trace organics.	D	H			**TOPSOIL / FILL**
							ML	**SILT**: low plasticity, brown mottled orange and pink, with minor clay, trace fine grained sand.			⊙		VS >240 kPa
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand.		VSt			**YOUNGER ASH**
					0.5						⊕ ⊙		VS 176/ 25 kPa
								0.6 m: becoming minor fine grained sand.	M				
											⊕ ⊙		VS 156/ 25 kPa
								0.9 m: becoming some fine grained sand.		H			
					1.0		ML	**Sandy SILT**: non plastic, orange, with fine grained sand.			⊕ ⊙		VS 215/ 33 kPa
											⊙		VS >240 kPa
							ML	**SILT**: low plasticity, orange, with minor clay, trace fine grained sand (greasy and easily compressible).	W	VSt			
					1.5			Hand Auger HA3D-256 terminated at 1.5 m Target depth			⊕ ⊙		VS 138/ 25 kPa
					2.0								

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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
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Engineering Log - Hand Auger

Borehole ID.	***HA3D-257***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***11 Mar 2016***
principal:	***-***
date completed:	***11 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***NM***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: non plastic, pale brown, with minor fine grained sand.	D	H			**FILL**
							ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, trace organics.	M		⊕ ⊙		VS 215/ 37 kPa
					0.5			0.5 m: becoming some fine to medium grained sand mottled dark brown.			⊕ ⊙		VS 215/ 37 kPa
							ML	**Sandy SILT**: non plastic, brown mottled pale yellow, with fine to coarse grained sand, trace black sand.		VSt			**YOUNGER ASH**
											⊕ ⊙		VS 156/ 24 kPa
					1.0			1.0 m: becoming pale yellow.			⊕ ⊙		VS 170/ 33 kPa
								1.2 m: becoming grey.			⊕ ⊙		VS 174/ 36 kPa
					1.5			Hand Auger HA3D-257 terminated at 1.5 m Target depth			⊕ ⊙		VS 176/ 40 kPa
					2.0								

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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

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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-258***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***17 Mar 2016***
		date completed:	***17 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90° | DCP id.:
drill model: Hand Auger | drilling fluid: | hole diameter : 0 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor fine grained sand, trace fine grained angular gravel.	M	H			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown mottled pink and orange, with trace pockets of manganese, trace clay, trace fine grained sand..					**YOUNGER ASH** VS >240 kPa
					0.5		SP	**SAND**: fine to medium grained, pale grey, with some silt. 0.8 m: becoming trace silt.	D	MD			VS >240 kPa
					1.0		ML	**Sandy SILT**: low plasticity, grey, with fine to medium grained sand.	M	VSt			
					1.5			Hand Auger HA3D-258 terminated at 1.5 m Target depth					VS 138/ 40 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-259***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***17 Mar 2016***
principal:	***-***	date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: low plasticity, pale brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
					0.5			**Silty CLAY**: low plasticity, pink brown.	M				**MATUA SUBGROUP** VS >183 kPa VS 120/ 26 kPa
					1.0			**SILT**: low plasticity, orange brown, with some clay and trace fine sand. 1.0 to 1.5 m: clay becomes minor					VS 142/ 31 kPa VS >183 kPa VS 163/ 48 kPa
					1.5			Hand Auger HA3D-259 terminated at 1.5 m Target depth					VS 169/ 59 kPa
					2.0								

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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
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Engineering Log - Hand Auger

Borehole ID.	***HA3D-260A***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***17 Mar 2016***
principal:	***-***
date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***NM***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor organic silt, trace fine grained sand.	D	VSt			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown mottled pink and white, with minor clay.	M				**MATUA SUBGROUP**
								0.3 m: becoming pale pink with trace fine grained sand, minor pockets of manganese.	W to S		⊕ ⊙		VS 176/ 28 kPa
					0.5						⊕ ⊙		VS 103/ 14 kPa
											⊕ ⊙		VS 103/ 17 kPa
								0.9 m: becoming minor fine to medium grained sand.			⊕ ⊙		VS 166/ 18 kPa
											⊕ ⊙		VS 147/ 14 kPa
										St			
					1.5			Hand Auger HA3D-260A terminated at 1.5 m Target depth			⊕ ⊙		VS 62/ 14 kPa
					2.0								

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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
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Engineering Log - Hand Auger

Borehole ID.	***HA3D-260B***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***17 Mar 2016***
principal:	***-***	date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with trace fine grained sand, trace fine grained angular gravel.	D	H			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown mottled pink, with minor clay, trace fine grained sand.					**MATUA SUBGROUP**
								0.3 m: 100mm layer of sandy silt, non plastic, pink flecked white with fine to medium grained sand, trace pockets of manganese.			⊙		VS 240 kPa
								0.4 m: becoming pale pink with minor pockets on manganese, trace clay.	M	VSt	⊕ ⊙		VS 103/ 14 kPa
					0.5			0.7 m: becoming pink flecked white.			⊕ ⊙		VS 160/ 14 kPa
								0.9 m: 100mm layer of pale pink fine to medium grained sand.	D				
					1.0			1.0 m: becoming pink with trace pockets of manganese (compressible).	S	St	⊕ ⊙		VS 70/ 18 kPa
								1.2 m: becoming minor fine to medium grained sand.		VSt	⊕ ⊙		VS 103/ 14 kPa
							ML-MH	**SILT**: medium plasticity, grey, with some clay, trace fine grained sand.					
					1.5			Hand Auger HA3D-260B terminated at 1.5 m Target depth			⊕ ⊙		VS 176/ 24 kPa
					2.0								

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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
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Engineering Log - Hand Auger

Borehole ID.	***HA3D-261A***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***17 Mar 2016***
principal:	***-***
date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***NM***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with trace organic silt, trace fine grained sand.	D	St			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand (compressible).	S				**MATUA SUBGROUP**
											⊕⊙		VS 83/ 15 kPa
					0.5						⊕⊙		VS 83/ 14 kPa
								0.6 m: becoming minor fine grained sand, minor pockets of manganese.					
											⊕⊙		VS 91/ 14 kPa
									W				
					1.0						⊕⊙		VS 99/ 14 kPa
									S				
								1.2 m: pockets of manganese become trace.			⊕⊙		VS 76/ 14 kPa
										VSt			
					1.5			Hand Auger HA3D-261A terminated at 1.5 m Target depth			⊕⊙		VS 109/ 40 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-261B***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***11 Mar 2016***
principal:	***-***	date completed:	***11 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic, pale brown, minor fine grained sand.	D	St to VSt			**TOPSOIL**
							ML	**SILT**: low plasticity, orange, with minor fie grained sand, minor clay (greasy).			⊕ ⊙		**MATUA SUBGROUP** VS 79/ 28 kPa
					0.5						⊕ ⊙		VS 129/ 25 kPa
							ML	**SILT**: low plasticity, pale pink, with minor clay, minor pockets of manganese, trace fine grained sand.	M	VSt	⊕ ⊙		VS 103/ 18 kPa
					1.0						⊕ ⊙		VS 138/ 28 kPa
										St	⊕ ⊙		VS 89/ 14 kPa
					1.5			**Sandy SILT**: non plastic, orange brown, with fine to coarse grained sand.		H	⊙		VS >240 kPa
								Hand Auger HA3D-261B terminated at 1.7 m Target depth					
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-262***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***17 Mar 2016***
principal:	***-***	date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor fine grained sand, minor organic silt.	D	H			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown mottled pink and white, with trace clay, trace fine grained sand, trace pockets of manganese.					**MATUA SUBGROUP**
											⊙		VS >240 kPa
								0.4 m: becoming orange brown with manganese pockets absent.		VSt			
					0.5						⊕ ⊙		VS 176/ 28 kPa
								0.65 m: becoming pink flecked white with minor pockets of manganese.	S				
											⊕ ⊙		VS 103/ 14 kPa
								0.9 m: becoming mottled orange brown with minor fine to medium grained sand.	D				
					1.0						⊕ ⊙		VS 196/ 33 kPa
								1.1 m: becoming pale pink.	S				
											⊕ ⊙		VS 186/ 28 kPa
								1.4 m: becoming grey.	M				
					1.5			Hand Auger HA3D-262 terminated at 1.5 m Target depth					UTP
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-263***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***17 Mar 2016***
principal:	***-***
date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***ODS***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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**: low plasticity, pale brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								SILT: non plastic, orange brown, with pockets of pink clayey silt, trace clay and trace fine sand.	M		⊙		**MATUA SUBGROUP** VS >183 kPa
								0.4 m: trace manganese becomes present					
					0.5						⊙		VS >183 kPa
								SILT: low plasticity, pink brown, with trace clay and trace manganese.			⊙		VS >183 kPa
								SILT: low plasticity, pink to pale brown with mottled orange, with minor manganese, trace fine sand and trace-minor clay.			⊕ ⊙		VS 119/ 41 kPa
											⊙		VS >183 kPa
					1.5			Hand Auger HA3D-263 terminated at 1.5 m Target depth			⊙		VS >183 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-264***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***17 Mar 2016***
principal:	***-***	date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor organic silt, trace fine to medium grained sand.	D	VSt			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, trace clay.					**MATUA SUBGROUP**
									M		⊕ ⊙		VS 138/ 33 kPa
					0.5						⊕ ⊙		VS 166/ 33 kPa
								0.7 m: becoming some fine to medium grained sand, trace streaks of manganese.			⊕ ⊙		VS 120/ 25 kPa
								0.9 m: becoming minor fine grained sand, manganese absent.			⊕ ⊙		VS 120/ 25 kPa
										St	⊕ ⊙		VS 86/ 25 kPa
					1.5			Hand Auger HA3D-264 terminated at 1.5 m Target depth			⊕ ⊙		VS 70/ 18 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-265***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***11 Mar 2016***
principal:	***-***	date completed:	***11 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, pale brown, with minor fine to medium grained sand.	D	VSt			**MATUA SUBGROUP**
											⊕ ⊙		VS 138/ 33 kPa
							ML	**SILT**: low plasticity, orange, with trace fine grained sand, minor clay (greasy).	M	St			
					0.5						⊕⊙		VS 62/ 25 kPa
							ML	**SILT**: low plasticity, pale orange, with trace fine grained sand, trace clay (non greasy).		VSt			
											⊕ ⊙		VS 176/ 41 kPa
					1.0						⊕ ⊙		VS 176/ 47 kPa
							ML	**SILT**: non plastic to low plasticity, pale pink and orange, with some fine to medium grained sand, trace manganese pockets.					
											⊕ ⊙		VS 129/ 25 kPa
					1.5			Hand Auger HA3D-265 terminated at 1.5 m Target depth			⊕ ⊙		VS 129/ 33 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-266***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-A(***		
client:	***The Lakes 2012 ltd***	date started:	***17 Mar 2016***
principal:	***-***	date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor organic silt, trace fine grained sand.	M	VSt			**TOPSOIL**
							SP	**SAND**: fine to medium grained, orange brown.	D	MD	⊕ ⊙		**MATUA SUBGROUP** VS 138/ 40 kPa
					0.5								
					1.0								
							ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, trace clay.	M	H			
					1.5			Hand Auger HA3D-266 terminated at 1.5 m Target depth			⊕ ⊙		VS 215/ 25 kPa
					2.0								

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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

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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-267***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-AG***
location:	*Stage 3C & Stage 3D*	date started:	***11 Mar 2016***
		date completed:	***11 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0		ML	**SILT**: non plastic, pale brown, with minor fine grained sand, minor fine to medium grained angular gravel.	D	H			**TOPSOIL**
							ML-MH	**SILT**: low to medium plasticity, orange brown, with trace clay, trace fine grained sand, trace black sand.	M	VSt			**MATUA SUBGROUP** VS >240 kPa
					0.5		ML	**SILT**: low plasticity, pale pink mottled orange, with minor fine grained sand, trace clay, trace pockets of manganese.					VS 120/ 40 kPa
									M to W	St			VS 54/ 25 kPa
					1.0			1.0 m: becoming minor fine to medium grained sand.		VSt			VS 120/ 24 kPa
							ML	**Sandy SILT**: low plasticity, pale pink mottled orange, with fine to medium grained sand, trace pockets of manganese.					VS 129/ 25 kPa
					1.5			Hand Auger HA3D-267 terminated at 1.5 m Target depth					VS 129/ 33 kPa
					2.0								

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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

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Engineering Log - Hand Auger

		Borehole ID.	***HA3D-268***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***17 Mar 2016***
principal:	***-***	date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, brown, with minor organic silt.	D	H			**TOPSOIL**
											⊙		VS >240 kPa
							ML	**SILT**: low plasticity, pink mottled orange brown and white, with minor clay, minor pockets of manganese.		VSt			**MATUA SUBGROUP**
					0.5						⊕ ⊙		VS 196/ 54 kPa
							ML	**Sandy SILT**: low plasticity, pink flecked with, with fine to medium grained sand, minor lenses of pink low plasticity silt.	M		⊕ ⊙		VS 166/ 25 kPa
					1.0		ML	**SILT**: low plasticity, pink flecked white, with minor fine grained sand.	S		⊕ ⊙		VS 121/ 25 kPa
											⊕ ⊙		VS 140/ 25 kPa
					1.5			Hand Auger HA3D-268 terminated at 1.5 m Target depth			⊕ ⊙		VS 129/ 27 kPa
					2.0								

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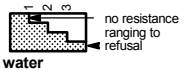
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

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

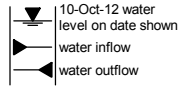
support
- M mud
- C casing
- N nil

penetration



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.	***HA3D-269***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***17 Mar 2016***
principal:	***-***	date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0			**SILT**: low plasticity, pale brown, with minor fine to medium grained sand.	D	VSt			**TOPSOIL**
								SILT: non plastic, orange brown, with pockets of pink clayey silt, trace clay and trace fine sand.	D to M				**MATUA SUBGROUP** VS >183 kPa
					0.5			**SILT**: low plasticity, pink to pale brown with mottled orange, with minor manganese, trace fine sand and trace-minor clay.					VS 160/ 16 kPa
					1.0			**SILT**: low plasticity, orange, with minor clay and trace fine sand.					VS 152/ 55 kPa
								SILT: low plasticity, pink brown, with minor clay and trace fine sand. 1.3 m: trace manganese becomes present	M				VS 136/ 19 kPa
					1.5			Hand Auger HA3D-269 terminated at 1.5 m Target depth					VS 151/ 33 kPa
					2.0								VS 133/ 43 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
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Engineering Log - Hand Auger

Borehole ID.	***HA3D-270***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***17 Mar 2016***
principal:	***-***	date completed:	***17 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, brown, with minor fine grained sand, trace organic silt, trace fine angular gravel.	D	H			**TOPSOIL**
							ML	**SILT**: low plasticity, brown mottled pink and orange, with trace clay.					**MATUA SUBGROUP**
											⊙		VS >240 kPa
					0.5			0.4 m: becoming trace pockets of manganese.			⊙		VS >240 kPa
							ML	**SILT**: low to medium plasticity, orange brown, with some clay, minor fine grained sand.	M	VSt	⊕ ⊙		VS 186/ 40 kPa
								0.9 m: becoming low plasticity, trace clay.					
					1.0				M to W	St	⊕ ⊙		VS 156/ 25 kPa
											⊕ ⊙		VS 86/ 14 kPa
					1.5			Hand Auger HA3D-270 terminated at 1.5 m Target depth			⊕ ⊙		VS 99/ 24 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	**HA3D-271**
sheet:	1 of 1
project no.	**GENZTAUC13086AP-AG**
client:	**The Lakes 2012 ltd**
date started:	**14 Mar 2016**
principal:	**-**
date completed:	**14 Mar 2016**
project:	**The Lakes Stage 3 GCR**
logged by:	**NM**
location:	**Stage 3C & Stage 3D**
checked by:	**RBT**

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0		ML	**SILT**: non plastic, pale brown, with minor fine grained sand, trace fine to medium angular gravel..	D	H			**FILL**
							ML	**SILT**: low plasticity, orange brown, with trace fine grained sand, trace clay.					**MATUA SUBGROUP**
											⊙ 50 100 150 200	2 4 6 8 10	VS >240 kPa
					0.5						⊙		VS >240 kPa
								At 0.6m: becoming minor fine grained sand.					
								At 0.7m: becoming minor fine to medium grained sand.	M	VSt	⊕ ⊙		VS 111/ 33 kPa
								At 0.9m: becoming some fine to medium grained sand.					
					1.0						⊕ ⊙		VS 103/ 25 kPa
							ML	**Sandy SILT**: non plastic, orange brown, with fine to medium grained sand, trace clay.		H to VSt			
											⊙		VS >240 kPa
					1.5			Hand Auger HA3D-271 terminated at 1.5 m Target depth			⊕ ⊙		VS 86/ 25 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-272***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***04 Apr 2016***
principal:	***-***	date completed:	***04 Apr 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0			**Sandy SILT**: non plastic, orange brown with mottled grey and dark brown, sand is fine to coarse.	M	St			**FILL**
											⊕⊙		VS 99/ 70 kPa
					0.5								VS UTP
								0.7 m: becoming orange brown (no mottling)			⊕⊙		VS 103/ 58 kPa
					1.0						⊕⊙		VS 78/ 58 kPa
								SAND: fine to medium grained, pale brown, with trace fine gravel.					
					1.5			Hand Auger HA3D-272 terminated at 1.5 m Target depth					
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-274***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***04 Apr 2016***
principal:	***-***	date completed:	***04 Apr 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILTY SAND**: fine to coarse grained, pale brown with mottled orange brown.	D to M	VSt			**FILL**
								SILT: non plastic to low plasticity, orange brown with mottled grey and brown, with trace fine to coarse sand.			⊕ ⊙		VS 233/ 46 kPa
					0.5						⊕ ⊙		VS 176/ 43 kPa
								SAND: fine to medium grained, yellow brown with mottled grey and brown, with some silt.					
								SILT: non plastic, orange brown with mottled pale brown, with minor fine to coarse sand.	M		⊕ ⊙		VS 231/ 54 kPa
					1.0			**SILT**: low plasticity, orange brown, with trace fine sand.			⊕ ⊙		**YOUNGER ASH** VS 136/ 38 kPa
					1.5			Hand Auger HA3D-274 terminated at 1.5 m Target depth			⊕ ⊙		VS 103/ 31 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-276***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***04 Apr 2016***
principal:	***-***	date completed:	***04 Apr 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0			**Sandy SILT**: non plastic, orange brown with mottled grey to dark brown, sand is fine to coarse.	D to M	VSt			**FILL**
								SILTY SAND: fine to coarse grained, orange brown with mottled grey to dark brown.					VS UTP
					0.5			**SILT**: non plastic, orange brown with mottled brown and pink brown, with some fine to coarse sand. 0.85 to 0.9 m: trace manganese is present	M				VS >240 kPa
					1.0			0.95 m: sand becomes trace					VS 160/ 46 kPa
								1.2 to 1.5 m: pockets of pink clayey silt (low plasticity)					VS 170/ 44 kPa
					1.5			Hand Auger HA3D-276 terminated at 1.5 m Target depth					VS 178/ 40 kPa
					2.0								

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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
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Engineering Log - Hand Auger

client:	***The Lakes 2012 ltd***	Borehole ID.	***HA3D-278***
principal:	**-**	sheet:	1 of 1
project:	***The Lakes Stage 3 GCR***	project no.	***GENZTAUC13086AP-AG***
location:	***Stage 3C & Stage 3D***	date started:	***04 Apr 2016***
		date completed:	***04 Apr 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			0.5			**SILT**: non plastic, orange brown with mottled grey and brown, with trace fine to coarse sand and trace fine to medium gravel.	D to M	VSt			**FILL** VS >240 kPa VS 220/ 24 kPa VS 103/ 70 kPa
					1.0			1.0 m: gravels become absent		St			VS 70/ 58 kPa
					1.5			Hand Auger HA3D-278 terminated at 1.5 m Target depth					VS 93/ 54 kPa
					2.0								

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:12

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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-280***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***04 Apr 2016***
principal:	***-***	date completed:	***04 Apr 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**Sandy SILT**: non plastic, orange brown with mottled brown and orange, sand is fine to coarse. Trace fine to medium gravel.	M	VSt			**FILL**
											⊙		VS >240 kPa
					0.5						⊙		VS >240 kPa
											⊙		VS >240 kPa
					1.0						⊙		VS >240 kPa
											⊙		VS >240 kPa
								1.4 m: sand becomes trace					
					1.5			Hand Auger HA3D-280 terminated at 1.5 m Target depth			⊕ ⊙		VS 156/ 44 kPa
					2.0								

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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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-282***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***04 Apr 2016***
principal:	***-***
date completed:	***04 Apr 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***ODS***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILTY SAND**: fine to coarse grained, orange brown with mottled grey.	M	VSt			**FILL**
								SILT: non plastic, orange brown, with some fine to coarse sand.			⊙		VS >240 kPa
					0.5						⊙		VS >240 kPa
								SAND: fine to coarse grained, grey.					
					1.0			**SILT**: non plastic, orange brown with mottled grey and dark brown, with minor fine to coarse sand.			⊙		VS >240 kPa
					1.5			Hand Auger HA3D-282 terminated at 1.4 m Target depth					
					2.0								

CDF_0_9_06_LIBRARY.GLB rev:AN Log COF BOREHOLE: NON CORED + DCP GCR HA - 09-03-2016 ODS.GPJ <<DrawingFile>> 11/04/2016 12:12

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
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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-284***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***14 Mar 2016***
		date completed:	***14 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic, pale brown, with minor fine to medium grained sand, trace fine to medium grained angular gravel.	D	H		excavated	**TOPSOIL** excavated
							ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, trace clay.	D to M			f600 mm	**MATUA SUBGROUP** VS >240 kPa
					0.5			At 0.6m: becoming some fine to medium grained sand.					VS >240 kPa
											⊕ ⊙		VS 156/ 25 kPa
							ML	**Sandy SILT**: non plastic, yellow brown, with fine to medium grained sand.		H to MD			
					1.0				W				VS >240 kPa
							SP	**SAND**: fine to medium grained, grey.	M	MD			
										H			
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand.					
					1.5			Hand Auger HA3D-284 terminated at 1.5 m Target depth					VS >240 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

		Borehole ID.	***HA3D-286***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***14 Mar 2016***
principal:	***-***	date completed:	***14 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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, dark brown, with trace fine sand.	D	VSt			**TOPSOIL**
								SILT: non plastic, brown with mottled grey, with some fine sand.	D to M		⊙		**FILL** VS >183 kPa
					0.5			**SILT**: non plastic to low plasticity, brown with mottled orange brown and dark brown, with trace fine sand and trace clay.			⊙		VS >183 kPa
								0.7 to 0.85 m: becomes mottled pink			⊙		VS >183 kPa
					1.0			**SILT**: low plasticity, orange, with minor clay and trace fine sand. Is "greasy".	M		⊕ ⊙		**MATUA SUBGROUP** VS 151/ 34 kPa
											⊕ ⊙		VS 124/ 22 kPa
					1.5			Hand Auger HA3D-286 terminated at 1.5 m Target depth			⊕ ⊙		VS 140/ 26 kPa
					2.0								

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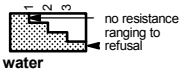
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

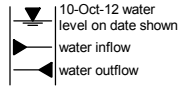
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



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.	***HA3D-288***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***14 Mar 2016***
principal:	***-***	date completed:	***14 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with trace fine sand.	D	VSt			**TOPSOIL**
					0.5			**SILT**: non plastic, brown with mottled orange-brown and grey, with minor fine sand and trace clay.			⊙		**FILL** VS >183 kPa
											⊙		VS >183 kPa
								Sandy SILT: non plastic, brown, sand is fine to coarse.			⊙		**MATUA SUBGROUP** VS >183 kPa
					1.0			**SILT**: low plasticity, orange, with minor clay and trace fine sand. Is "greasy".	M		⊕ ⊙		VS 104/ 33 kPa
											⊙		VS >183 kPa
					1.5			Hand Auger HA3D-288 terminated at 1.5 m Target depth			⊙		VS >183 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-290***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***14 Mar 2016***
principal:	***-***	date completed:	***14 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, pale brown, with minor fine to medium grained sand, trace fine to medium angular gravel.	D	H	⊕ ⊙		**TOPSOIL** VS 215/ 40 kPa
					0.5		ML	**SILT**: low to medium plasticity, brown, with minor fine grained sand, minor clay.	M		⊙		**MATUA SUBGROUP** VS >240 kPa
								At 0.6m: becoming orange brown.		VSt			
							ML	**SILT**: low plasticity, orange brown, with minor fine grained sand.		H	⊕ ⊙		VS 176/ 47 kPa
					1.0						⊕ ⊙		VS 215/ 34 kPa
											⊕ ⊙		VS 215/ 34 kPa
					1.5			Hand Auger HA3D-290 terminated at 1.5 m Target depth			⊕ ⊙		VS 233/ 33 kPa
					2.0								

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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
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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-292***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-AG***
location:	*Stage 3C & Stage 3D*	date started:	***14 Mar 2016***
		date completed:	***14 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: low plasticity, pale brown, with minor fine to medium grained sand, trace fine to medium grained angular gravel (friable).	D	H	⊙		**TOPSOIL**
													VS >240 kPa
							ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, minor clay.					**MATUA SUBGROUP**
					0.5						⊙		VS >240 kPa
								At 0.6m: becoming pale orange with fine to medium grained sand, trace manganese.	M	VSt	⊕ ⊙		
													VS 156/ 33 kPa
					1.0		ML	**SILT**: low plasticity, pale orange brown, with minor clay, trace fine to medium grained sand, trace manganese.	M to W	St	⊕ ⊙		VS 176/ 25 kPa
											⊕ ⊙		VS 94/ 14 kPa
								At 1.3m: becoming orange brown with manganese absent.		VSt			
					1.5			Hand Auger HA3D-292 terminated at 1.5 m Target depth			⊕ ⊙		VS 176/ 25 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-296***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***29 Mar 2016***
principal:	***-***	date completed:	***29 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0		ML	**SILT**: low plasticity, pale brown, with minor fine grained sand, trace fine grained angular gravel.	D	VSt			**TOPSOIL**
								SILT: non plastic, brown with mottled pink brown, with minor fine to coarse sand.			⊙		**MATUA SUBGROUP** VS >240 kPa
					0.5			0.5 m: trace manganese becomes present			⊙		VS >240 kPa
											⊕ ⊙		VS 103/ 17 kPa
								SILT: low plasticity, orange brown with mottled dark brown, with minor clay and trace fine sand. Is "sticky".		St	⊕ ⊙		VS 94/ 15 kPa
										VSt	⊕ ⊙		VS 106/ 25 kPa
					1.5			Hand Auger HA3D-296 terminated at 1.5 m Target depth			⊕ ⊙		VS 145/ 33 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-298***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-AG***
location:	*Stage 3C & Stage 3D*	date started:	***14 Mar 2016***
		date completed:	***14 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, pale brown, with minor fine grained sand, trace fine grained angular gravel.	D	H			**TOPSOIL**
							ML	**SILT**: low plasticity, pink flecked white, with minor clay, trace manganese.	M	VSt			**MATUA SUBGROUP** VS >240 kPa
					0.5								VS 101/ 14 kPa
									W	St			VS 86/ 14 kPa
								At 0.8m: becoming some fine to medium grained sand.					
								AT 0.9m: sand becomes absent.		VSt			VS 111/ 25 kPa
					1.0			At 1.1m: becoming some fine to medium grained sand.		St			VS 86/ 14 kPa
							SP	**SAND**: fine to medium grained, orange brown.					
							ML	**SILT**: low plasticity, pink, with minor clay, trace manganese.		VSt			
					1.5			Hand Auger HA3D-298 terminated at 1.5 m Target depth					VS 103/ 25 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-300***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-A(***		
client:	***The Lakes 2012 ltd***	date started:	***14 Mar 2016***
principal:	***-***	date completed:	***14 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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, dark brown, with trace fine sand.	D	VL			**TOPSOIL**
										MD			
								SAND: fine to medium grained, yellow brown, with trace silt.					**FILL**
					0.5			**SAND**: fine to coarse grained, pale yellow brown.					
								SILT: low plasticity, brown, with trace-minor clay.	D to M	VSt	⊙		**YOUNGER ASH** VS >183 kPa
								0.9 to 1.5 m: clay becomes trace and trace fine sand becomes present					
					1.0			1.0 m: becoming orange brown			⊙		VS >183 kPa
											⊙		VS >183 kPa
					1.5			Hand Auger HA3D-300 terminated at 1.5 m Target depth			⊙		VS >183 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	**HA3D-302**
sheet:	1 of 1
project no.	**GENZTAUC13086AP-AG**
client:	**The Lakes 2012 ltd**
date started:	**14 Mar 2016**
principal:	**-**
date completed:	**14 Mar 2016**
project:	**The Lakes Stage 3 GCR**
logged by:	**NM**
location:	**Stage 3C & Stage 3D**
checked by:	**RBT**

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic to low plasticity, brown mottled orange and black, with minor fine grained sand, trace fine to medium angular gravel.	D	H			**TOPSOIL**
					0.5		ML-MH	**Clayey SILT**: low to medium plasticity, orange brown, with trace fine grained sand.		VSt	VS >240 kPa VS 196/ 40 kPa		**MATUA SUBGROUP**
					1.0		ML	**SILT**: low plasticity, orange brown, with minor fine grained sand, minor clay.	M		VS 147/ 25 kPa VS 138/ 33 kPa		
					1.5		ML	**SILT**: low plasticity, pink, with minor clay, trace manganese pockets.	W		VS 103/ 2 kPa		
					2.0			Hand Auger HA3D-302 terminated at 1.5 m Target depth			VS 111/ 14 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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-303***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***14 Mar 2016***
		date completed:	***14 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with trace fine to coarse sand.	D	VSt			**TOPSOIL**
								SILTY SAND: fine grained, brown.		MD			**FILL**
					0.5			**SILT**: low plasticity, orange brown, with trace fine sand and trace clay.	D to M	VSt	⊙		**YOUNGER ASH** VS >183 kPa
											⊙		VS >183 kPa
					1.0						⊕⊙		VS 81/ 28 kPa
								SILT: low plasticity, orange brown, with minor clay.			⊕⊙		VS 76/ 21 kPa
					1.5			Hand Auger HA3D-303 terminated at 1.5 m Target depth			⊕⊙		VS 120/ 19 kPa
					2.0								

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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
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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-305***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-AG***
location:	*Stage 3C & Stage 3D*	date started:	***14 Mar 2016***
		date completed:	***14 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, brown, with minor fine to medium grained sand, trace fine grained angular gravel.	D	H			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand (greasy).	M	VSt			**YOUNGER ASH**
													VS 240 kPa
					0.5								VS 196/ 38 kPa
													VS 156/ 27 kPa
					1.0								VS 196/ 33 kPa
										H			
													VS 215/ 25 kPa
										VSt			
					1.5			Hand Auger HA3D-305 terminated at 1.5 m Target depth					VS 138/ 40 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-307***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***14 Mar 2016***
principal:	***-***	date completed:	***14 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with trace fine to coarse sand.	D	VSt			**TOPSOIL**
								SILT: low plasticity, orange-brown, with trace-minor fine sand and trace clay.			⊙		**YOUNGER ASH** VS >183 kPa
					0.5				D to M		⊙		VS >183 kPa
											⊕ ⊙		VS 133/ 16 kPa
								SILT: low plasticity, orange to orange-brown, with trace clay. Is "greasy".					
					1.0				M		⊙		VS >183 kPa
								1.3 m: clay becomes minor			⊕ ⊙		VS 107/ 33 kPa
					1.5			Hand Auger HA3D-307 terminated at 1.5 m Target depth			⊕ ⊙		VS 97/ 19 kPa
					2.0								

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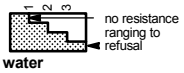
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

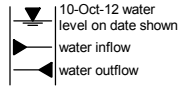
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



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.	***HA3D-309***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***14 Mar 2016***
principal:	***-***	date completed:	***14 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic, brown, with minor fine grained sand, trace fine to medium grained angular gravel.	D	H			**TOPSOIL**
											⊙		VS >240 kPa
							ML	**Sandy SILT**: non plastic, orange brown, with fine to medium grained sand.					**YOUNGER ASH**
					0.5						⊙		VS >240 kPa
											⊙		VS >240 kPa
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand.	M	VSt	⊕ ⊙		VS 129/ 38 kPa
					1.0			From 1.1 to 1.5m: Easily compressible soil.	M to W	St	⊕ ⊙		VS 70/ 19 kPa
					1.5			Hand Auger HA3D-309 terminated at 1.5 m Target depth			⊕ ⊙		VS 78/ 25 kPa
					2.0								

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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
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Engineering Log - Hand Auger

Borehole ID.	***HA3D-311***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***14 Mar 2016***
principal:	***-***	date completed:	***14 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with trace fine to coarse sand.	D	VSt			**TOPSOIL**
					0.5			**SILT**: non plastic, brown, with some fine sand.			⊙		**FILL** VS >183 kPa
								SAND: fine to medium grained, orange brown, with trace silt.					
					1.0			**SAND**: fine to coarse grained, pale brown, with trace sub-rounded fine gravel.					
								SILT: low plasticity, brown, with trace clay.	D to M		⊕ ⊙		**YOUNGER ASH** VS 120/ 16 kPa
					1.5			Hand Auger HA3D-311 terminated at 1.5 m Target depth			⊕ ⊙		VS 169/ 41 kPa
					2.0								

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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
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Engineering Log - Hand Auger

client:	***The Lakes 2012 ltd***	Borehole ID.	***HA3D-313***
principal:	**-**	sheet:	1 of 1
project:	***The Lakes Stage 3 GCR***	project no.	***GENZTAUC13086AP-AG***
location:	***Stage 3C & Stage 3D***	date started:	***23 Mar 2016***
		date completed:	***23 Mar 2016***
		logged by:	***NM***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA, N		Not Encountered			0.0		ML	**TOPSOIL: SILT**: non plastic, dark brown, with some organic silt.	M	H			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown, with minor fine grained sand,minor clay.					**MATUA SUBGROUP** VS >240 kPa
										VSt			
					0.5								VS 172/ 47 kPa
								0.6 m: becoming trace clay.					
													VS 156/ 28 kPa
										H			
					1.0				M to W				VS 233/ 47 kPa
								1.1 m: becoming some fine grained sand with trace pockets of manganese (slightly greasy).					VS >240 kPa
								1.3 m: becoming some fine to medium grained sand.		VSt			
								1.4 m: 200mm layer of some manganese pockets.					
					1.5			Hand Auger HA3D-313 terminated at 1.5 m Target depth					VS 123/ 47 kPa
					2.0								

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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

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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-315***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***29 Mar 2016***
		date completed:	***29 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with some organic silt.	D	MD			**TOPSOIL**
								SAND: fine to coarse grained, yellow brown, with minor silt and trace fine-medium gravel.	D to M				**MATUA SUBGROUP**
					0.5			**SILT**: non plastic to low plasticity, pale brown, with trace fine-coarse sand.					
								SAND: fine to coarse grained, pale brown, trace fine gravel and trace silt.					
								SILTY SAND: fine grained, pale brown.					
								SILT: non plastic to low plasticity, pale brown, with minor fine sand.		VSt	⊕ ⊙		VS 123/ 54 kPa
					1.0			**SAND**: fine to coarse grained, yellow brown, with trace fine gravel.		MD			
								SILT: low plasticity, brown, with trace fine sand.	M	VSt			VS >240 kPa
					1.5			Hand Auger HA3D-315 terminated at 1.5 m Target depth					VS >240 kPa
					2.0								

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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
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Engineering Log - Hand Auger

Borehole ID.	***HA3D-317***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-A(***		
client:	***The Lakes 2012 ltd***	date started:	***23 Mar 2016***
principal:	***-***	date completed:	***23 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: low plasticity, dark brown, with trace fine sand and trace clay.	D	MD			**TOPSOIL**
					0.5			**SAND**: fine to coarse grained, yellow brown, with minor silt.					**FILL**
								SILT: low plasticity, pink brown, with trace fine sand and trace clay.	D to M	VSt			VS 153/ 22 kPa
								Sandy SILT: non plastic, pale grey, sand is fine grained.					VS >183 kPa
								SAND: fine to coarse grained, pale brown, with trace silt.					
					1.0			**SILT**: low plasticity, brown, with some clay and trace fine sand.					**YOUNGER ASH**
													VS >183 kPa
													VS >183 kPa
					1.5			Hand Auger HA3D-317 terminated at 1.5 m Target depth					VS >183 kPa
					2.0								

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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

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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-319***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***23 Mar 2016***
		date completed:	***23 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: low plasticity, dark brown, with trace fine sand and trace clay.	D to M	L to MD			**TOPSOIL**
								SILT: low plasticity, orange brown, with trace clay and trace fine sand.			⊕ ⊙		**MATUA SUBGROUP** VS 147/ 26 kPa
					0.5			**SAND**: fine to coarse grained, orange brown, with minor silt. 0.6 m: silt becomes some					
					1.0			**SAND**: fine grained, pale brown, with minor silt. 1.4 m: silt becomes some					
					1.5			Hand Auger HA3D-319 terminated at 1.5 m Target depth					
					2.0								

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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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-321***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***23 Mar 2016***
principal:	***-***	date completed:	***23 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic, dark brown, with minor organic silt.	D	St			**TOPSOIL**
							ML	**SILT**: non plastic, orange brown, with some fine to coarse grained sand, trace clay.	M	St	⊕ ⊙		**YOUNGER ASH** VS >86/ 14 kPa
										H			
					0.5			becoming low plasticity, mottled white with minor clay, trace fine grained sand.			⊙		VS >240 kPa
								becoming yellow grey with fine sand.					UTP
					1.0		SP	**SAND**: fine to medium grained, yellow grey.					
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand.	D to M		⊙		**MATUA SUBGROUP** VS >240 kPa
					1.5			Hand Auger HA3D-321 terminated at 1.5 m Target depth			⊙		VS >240 kPa
					2.0								

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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

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Engineering Log - Hand Auger

		Borehole ID.	***HA3D-323***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***23 Mar 2016***
principal:	***-***	date completed:	***23 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: low plasticity, dark brown, with trace fine sand and trace clay.	M	VSt			**TOPSOIL**
								SILT: non plastic to low plasticity, brown with mottled pink and dark brown, with minor fine to coarse sand and trace clay.			⊙		**YOUNGER ASH** VS >183 kPa
					0.5						⊙		VS >183 kPa
								SILT: low plasticity, orange brown, with trace clay and trace fine sand.			⊕ ⊙		VS 165/ 45 kPa
								SILTY SAND: fine grained, orange brown.					
								SILT: low plasticity, brown, with minor clay and trace fine sand.			⊕ ⊙		VS 156/ 25 kPa
					1.0			1.2 m: becoming orange brown		St	⊕ ⊙		VS 65/ 13 kPa
					1.5			Hand Auger HA3D-323 terminated at 1.5 m Target depth			⊕⊙		VS 50/ 19 kPa
					2.0								

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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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-325***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-A(***		
client:	***The Lakes 2012 ltd***	date started:	***23 Mar 2016***
principal:	***-***	date completed:	***23 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**SILT**: non plastic, dark brown, with minor organic silt, minor fine grained sand.	M	H to VSt			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown mottled dark brown and black, with trace fine grained sand.			⊕ ⊙		**MATUA SUBGROUP** VS 176/ 33 kPa
					0.5						⊕ ⊙		VS 215/ 54 kPa
							SM	**SAND**: fine to coarse grained, orange brown. 0.8 m: becoming pale yellow with minor silt.	D to M	MD			
					1.0		ML	**SILT**: non plastic, grey, with fine to coarse grained sand and pockets of pure fine to coarse grained sand. 1.2 m: becoming yellow grey with sand pockets absent.	M	St to VSt	⊕ ⊙ ⊕ ⊙		VS 70/ 25 kPa VS 147/ 33 kPa
							SW	**SAND**: fine to coarse grained, grey.		MD			
					1.5			Hand Auger HA3D-325 terminated at 1.5 m Target depth					
					2.0								

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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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-327***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***29 Mar 2016***
principal:	***-***	date completed:	***29 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with minor organic silt, minor fine grained sand.	D	VSt			**TOPSOIL**
								SILT: low plasticity, orange brown, with minor clay and trace fine sand.	M	St			**MATUA SUBGROUP** VS 160/ 24 kPa
					0.5			0.6 m: becoming "sticky"					VS 83/ 14 kPa
													VS 76/ 14 kPa
					1.0			1.2 m: becoming orange and "greasy"					VS 61/ 14 kPa
										VSt			VS 120/ 24 kPa
					1.5			Hand Auger HA3D-327 terminated at 1.5 m Target depth					VS 116/ 25 kPa
					2.0								

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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

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Engineering Log - Hand Auger

		Borehole ID.	***HA3D-328***
		sheet:	1 of 1
		project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***	date started:	***29 Mar 2016***
principal:	***-***	date completed:	***29 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with minor organic silt, minor fine grained sand.	D	VSt			**TOPSOIL**
								SILT: low plasticity, orange brown, with trace clay and trace fine sand.	M		⊙		**MATUA SUBGROUP** VS >240 kPa
					0.5						⊙		VS >240 kPa
								0.65 m: becoming orange and is "greasy"			⊕ ⊙		VS 190/ 40 kPa
					1.0						⊕ ⊙		VS 170/ 25 kPa
											⊕ ⊙		VS 176/ 33 kPa
					1.5			Hand Auger HA3D-328 terminated at 1.5 m Target depth			⊕ ⊙		VS 196/ 40 kPa
					2.0								

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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

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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-330***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-AG***
location:	*Stage 3C & Stage 3D*	date started:	***23 Mar 2016***
		date completed:	***23 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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**: low plasticity, dark brown, with trace fine sand and trace clay.	M	St			**TOPSOIL**
					0.5			**Silty CLAY**: low plasticity, orange brown, with trace fine sand. Is "sticky".			⊕⊙		**MATUA SUBGROUP** VS 92/ 25 kPa
											⊕⊙		VS 78/ 21 kPa
					1.0			**Clayey SILT**: low plasticity, orange, with trace fine sand.			⊕⊙		VS 70/ 9 kPa
											⊕⊙		VS 74/ 16 kPa
					1.5			**SILT**: low plasticity, pink with mottled dark brown, with minor clay, trace fine to coarse sand and trace manganese. Is "sticky".					
								Hand Auger HA3D-330 terminated at 1.5 m Target depth			⊕⊙		VS 81/ 19 kPa
					2.0								

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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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-332***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***29 Mar 2016***
principal:	***-***
date completed:	***29 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***ODS***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA N		Not Encountered			0.0			**SILT**: non plastic to low plasticity, dark brown, with trace fine sand and trace clay.	D	VSt			**TOPSOIL**
								SILT: non plastic to low plasticity, orange brown, with trace fine to coarse sand.	M				**MATUA SUBGROUP** VS >240 kPa
					0.5								VS 196/ 33 kPa
													VS 120/ 25 kPa
								Clayey SILT: low plasticity, orange brown, with trace fine sand.		St			
					1.0								VS 62/ 14 kPa
													VS 67/ 14 kPa
					1.5			Hand Auger HA3D-332 terminated at 1.5 m Target depth					VS 64/ 25 kPa
					2.0								

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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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-334***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-A(***		
client:	***The Lakes 2012 ltd***	date started:	***23 Mar 2016***
principal:	***-***	date completed:	***23 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***NM***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: non plastic, dark brown, with some organic silt (very soft).	M to W	VS			**TOPSOIL**
					0.5		ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand.	M	H to VSt	⊕ ⊙		**MATUA SUBGROUP** VS >240 kPa VS 176/ 43 kPa
								0.8 m: becoming orange with minor fine grained sand (greasy).			⊕ ⊙		VS 196/ 40 kPa
					1.0					H	⊕ ⊙		VS 215/ 51 kPa
											⊕ ⊙		VS 215/ 40 kPa
					1.5			Hand Auger HA3D-334 terminated at 1.5 m Target depth			⊙		VS >240 kPa
					2.0								

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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
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Engineering Log - Hand Auger

client:	*The Lakes 2012 ltd*	Borehole ID.	***HA3D-337***
principal:	*-*	sheet:	1 of 1
project:	*The Lakes Stage 3 GCR*	project no.	***GENZTAUC13086AP-A(***
location:	*Stage 3C & Stage 3D*	date started:	***23 Mar 2016***
		date completed:	***23 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic to low plasticity, dark brown, with trace fine sand.	D	VSt			**TOPSOIL**
								SILT: low plasticity, brown, with trace fine to coarse sand.			⊕ ⊙		**YOUNGER ASH** VS 110/ 28 kPa
					0.5			**SAND**: fine to coarse grained, pale brown.					
					1.0			**SILT**: low plasticity, brown, with trace clay.	D to M		⊙		VS >183 kPa
											⊙		VS >183 kPa
								1.1 m: trace sand becomes present			⊕ ⊙		VS 178/ 18 kPa
					1.5			Hand Auger HA3D-337 terminated at 1.5 m Target depth			⊕ ⊙		VS 160/ 28 kPa
					2.0								

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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
A TETRA TECH COMPANY

Engineering Log - Hand Auger

Borehole ID.	***HA3D-340***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***23 Mar 2016***
principal:	***-***
date completed:	***23 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***NM***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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		ML	**TOPSOIL: SILT**: low plasticity, dark brown, with minor organic silt , trace fine grained sand.	D	H			**TOPSOIL**
							ML	**SILT**: low plasticity, orange brown, with minor clay, trace fine grained sand.			⊙		**YOUNGER ASH**
													VS >240 kPa
					0.5						⊙		VS >240 kPa
								0.6 m: becoming some clay.					
									M				
											⊙		VS >240 kPa
								0.9 m: becoming some fine grained sand, minor to trace clay.					
					1.0						⊙		VS >240 kPa
								1.2 m: becoming minor clay, trace fine grained sand.	M to W		⊙		VS >240 kPa
										VSt			
					1.5			Hand Auger HA3D-340 terminated at 1.5 m Target depth			⊕ ⊙		VS 176/ 40 kPa
					2.0								

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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

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Engineering Log - Hand Auger

client:	***The Lakes 2012 ltd***	Borehole ID.	***HA3D-342***
principal:	**-**	sheet:	1 of 1
project:	***The Lakes Stage 3 GCR***	project no.	***GENZTAUC13086AP-AG***
location:	***Stage 3C & Stage 3D***	date started:	***23 Mar 2016***
		date completed:	***23 Mar 2016***
		logged by:	***ODS***
		checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	vane shear (kPa) ⊕ remoulded ⊙ peak	DCP (blows/ 100 mm)	structure and additional observations
HA N		Not Encountered			0.0			**SILT**: non plastic, dark brown, with trace fine to coarse sand.	D to M	VSt			**TOPSOIL**
													VS 236/ 75 kPa
								SILTY SAND: fine grained, pale brown.					**MATUA SUBGROUP**
					0.5								VS >240 kPa
								SILT: non plastic to low plasticity, brown, with trace clay.					VS >240 kPa
					1.0								VS >240 kPa
													VS 192/ 17 kPa
					1.5			Hand Auger HA3D-342 terminated at 1.5 m Target depth					VS >240 kPa
					2.0								

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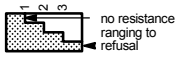
method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- HA hand auger

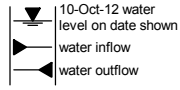
* bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration



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.	***HA3D-344***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***29 Mar 2016***
principal:	***-***	date completed:	***29 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with trace fine to coarse sand.	D	VSt			**TOPSOIL**
					0.5			**SILT**: low plasticity, orange brown, with trace clay and trace fine sand.	M		⊙		**YOUNGER ASH** VS >240 kPa
											⊕ ⊙		VS 106/ 17 kPa
					1.0						⊕ ⊙		VS 147/ 40 kPa
											⊕ ⊙		VS 156/ 31 kPa
					1.5			Hand Auger HA3D-344 terminated at 1.5 m Target depth			⊕ ⊙		VS 153/ 33 kPa
					2.0								

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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
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Engineering Log - Hand Auger

Borehole ID.	***HA3D-346***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***23 Mar 2016***
principal:	***-***	date completed:	***23 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with trace fine to coarse sand.	D to M	VSt			**TOPSOIL**
								SILT: low plasticity, brown, with trace fine sand.					**MATUA SUBGROUP** VS 213/ 31 kPa
					0.5			0.6 m: sand becomes minor					VS 225/ 23 kPa
													VS 180/ 23 kPa
					1.0			**Sandy SILT**: non plastic, brown, with trace manganese.		St			VS 79/ 34 kPa
								SAND: fine to coarse grained, pale brown, with minor silt.		VSt			VS 129/ 37 kPa
					1.5			Hand Auger HA3D-346 terminated at 1.5 m Target depth					
					2.0								

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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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-348***
sheet:	1 of 1
project no.	***GENZTAUC13086AP-AG***
client:	***The Lakes 2012 ltd***
date started:	***29 Mar 2016***
principal:	***-***
date completed:	***29 Mar 2016***
project:	***The Lakes Stage 3 GCR***
logged by:	***ODS***
location:	***Stage 3C & Stage 3D***
checked by:	***RBT***

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

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with trace fine to coarse sand.	D	VSt			**TOPSOIL**
								SILT: non plastic to low plasticity, brown with mottled orange brown, with trace fine to coarse sand.	D to M		⊙		**FILL** VS >240 kPa
					0.5			**SILT**: low plasticity, orange brown, with trace clay and trace fine sand.	M		⊙		**YOUNGER ASH** VS >240 kPa
											⊙		VS >240 kPa
					1.0						⊕ ⊙		VS 196/ 47 kPa
											⊕ ⊙		VS 233/ 44 kPa
					1.5			Hand Auger HA3D-348 terminated at 1.5 m Target depth			⊕ ⊙		VS 131/ 23 kPa
					2.0								

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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

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Engineering Log - Hand Auger

Borehole ID.	***HA3D-351***		
sheet:	1 of 1		
project no.	***GENZTAUC13086AP-AG***		
client:	***The Lakes 2012 ltd***	date started:	***23 Mar 2016***
principal:	***-***	date completed:	***23 Mar 2016***
project:	***The Lakes Stage 3 GCR***	logged by:	***ODS***
location:	***Stage 3C & Stage 3D***	checked by:	***RBT***

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

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	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			**SILT**: non plastic, dark brown, with trace fine to coarse sand.	M				**TOPSOIL**
								SILT: low plasticity, orange brown with mottled pink, some clay, trace fine to medium sub-angular gravel and trace fine to coarse sand.		VSt			**MATUA SUBGROUP** VS 186/ 31 kPa
					0.5								VS 149/ 28 kPa
										St			VS 153/ 25 kPa
								0.9 m: becoming mottled pale grey					
					1.0					VSt			VS 109/ 25 kPa
								1.1 m: trace manganese becomes present					
								SILT: low plasticity, pink, with minor clay and trace manganese.					VS 182/ 25 kPa
					1.5			Hand Auger HA3D-351 terminated at 1.5 m Target depth					VS 206/ 40 kPa
					2.0								

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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

Appendix E – Fill Test Summary Tables

FILL TEST RESULTS FROM 2007 / 2008 EARTHWORKS PERIOD						
Summary of earthfill test data						
Test Number	Date	Test RL (m)	Result			Pass/Fail
			Air Voids (%)	Shear Vane (kPa)	Scala (blows per 100mm)	
151	19/11/2007	20.7	9.3	204	-	Pass
152		53.0	2.6	177	-	Pass
153		48.8	0.1	217+	-	Pass
154		53.8	4.8	217+	-	Pass
155		53.6	1.5	217+	-	Pass
156		51.6	2.1	217+	-	Pass
157		48.8	4.5	208	-	Pass
158		46.4	0.0	217+	-	Pass
159		40.5	0.0	197	-	Pass
160		43.2	0.0	216	-	Pass
161		44.1	0.8	217+	-	Pass
162		48.5	0.7	231+	-	Pass
163		51.3	1.5	217+	-	Pass
164		46.2	0.3	225	-	Pass
165		43.1	0.0	231+	-	Pass
204	28/11/2007	41.4	1.4	231+	-	Pass
205		43.5	2.1	217+	-	Pass
206		45.6	0.1	231+	-	Pass
207		47.9	8.8	217+	-	Pass
208		48.0	0.0	231+	-	Pass
209		51.1	2.1	217+	-	Pass
210		51.0	3.4	228+	-	Pass
211		53.8	7.3	217+	-	Pass
212		52.6	6	231+	-	Pass
213		53.9	2.5	217+	-	Pass
214		55.4	4.6	231+	-	Pass
215		54.2	2	217+	-	Pass
216		48.2	6.6	231+	-	Pass
217		52.1	4.1	217+	-	Pass
218		44.8	3.4	231+	-	Pass
219		50.8	5.8	217+		Pass
295	27/12/2007	40.3	2.0	232+	-	Pass
296		38.0	0.0	243+	-	Pass
297	28/12/2007	38.1	0.0	243+	-	Pass
298		36.5	0.0	222+	-	Pass
299		36.6	4.1	243+	-	Pass
300		35.8	0.0	218+	-	Pass
301		37.3	0.0	243+	-	Pass
302		40.1	0.0	235+	-	Pass
303		36.8	0.7	243+	-	Pass
304		35.7	0.0	223+	-	Pass
305		36.3	0.0	243+	-	Pass
306		41.1	0.0	243+	-	Pass
307		41.2	0.0	243+	-	Pass
308		43.4	0.0	221+	-	Pass
309		43.2	0.0	221+	-	Pass
310		43.6	1.5	243+	-	Pass
311		45.6	0.0	243+	-	Pass
312		47.0	4.0	243+	-	Pass
313		47.4	0.0	239+	-	Pass
314		44.9	2.0	205+	-	Pass
315		43.5	3.5	233+	-	Pass
316		43.1	6.2	243+	-	Pass
317		42.7	12.0	237+	-	Pass
318		41.4	1.1	243+	-	Pass
319		40.3	2.9	243+	-	Pass
320		40.1	3.2	219+	-	Pass
321		40.7	4.8	207	-	Pass
322		40.3	0.0	222+	-	Pass
323		40.5	4.3	243+	-	Pass
324		41.9	5.2	243+	-	Pass
325	7/01/2008	33.4	4.8	214+	-	Pass
373	28/12/2007	54.3	5.1	220+	-	Pass
374		55.9	3.4	243+	-	Pass
375		55.6	0.4	194	-	Pass
376		56.9	0.0	222+	-	Pass
377		55.7	0.0	243+	-	Pass
378		56.6	5.7	243+	-	Pass
379		55.4	0.0	202+	-	Pass
380		56.1	2.4	243+	-	Pass
381		52.3	3.3	243+	-	Pass

Test Number	Date	Test RL (m)	Result			Pass/Fail
			Air Voids (%)	Shear Vane (kPa)	Scala (blows per 100mm)	
382	8/01/2008	53.1	1.9	243+	-	Pass
383		52.2	0.0	243+	-	Pass
384		53.1	1.5	243+	-	Pass
385		53.4	0.6	180	-	Pass
386		50.6	12.0	243+	-	Pass
387		51.5	4.9	170	-	Pass
388		49.4	6.6	243+	-	Pass
389		50.4	1.1	243+	-	Pass
390		48.4	5.2	243+	-	Pass
391		49.3	8.2	243+	-	Pass
392		50.3	5.7	243+	-	Pass
393		51.1	0.0	205+	-	Pass
394		45.9	0.1	243+	-	Pass
395		46.7	0.0	243+	-	Pass
396		46.0	2.3	243+	-	Pass
397		46.4	0.0	243+	-	Pass
398		46.2	2.2	243+	-	Pass
399		46.7	2.2	243+	-	Pass
400		47.4	8.9	243+	-	Pass
401		47.8	4.5	243+	-	Pass
402		48.2	0.0	243+	-	Pass
403		47.9	13.0	243+	-	Fail on air voids
404		43.6	0.0	243+	-	Pass
405		44.0	0.7	243+	-	Pass
406		39.8	1.7	243+	-	Pass
407		40.4	0.0	207+	-	Pass
408		42.1	4.9	243+	-	Pass
409		42.7	0.0	243+	-	Pass
808	20/02/2008	51.5	5.4	231+	-	Pass
809		50.6	0.0	231+	-	Pass
810		49.8	11.0	231+	-	Pass
811		49.9	0.0	224+	-	Pass
812		48.8	5.9	231+	-	Pass
813		45.4	9.3	231+	-	Pass
814		44.8	1.3	231+	-	Pass
815		44.3	7.4	231+	-	Pass
816		42.0	3.2	197	-	Pass
825	29/2/09	35.4	9.5	180	-	Pass
826		34.8	15.0	219	-	Fail - to be retested
827		35.5	16.0	183	-	Fail - to be retested
843	11/03/2008	39.6	0.0	200	-	Pass
844		40.8	0.0	250+	-	Pass
845		41.0	3.2	250+	-	Pass
846		37.9	5.2	175	-	Pass
847		38.3	0.0	195	-	Pass
848		37.4	1.3	250+	-	Pass
849		56.9	0.0	250+	-	Pass
850		56.6	0.0	250+	-	Pass
851		54.6	8.3	250+	-	Pass
852		54.2	0.0	250+	-	Pass
853		50.5	0.0	250+	-	Pass
854	12/03/2008	55.7	2.7	250+	-	Pass
855		55.4	6.7	218+	-	Pass
856		55.4	0.3	250+	-	Pass
857		53.2	1.1	250+	-	Pass
858		52.7	0.2	207	-	Pass
859		52.1	0.0	207+	-	Pass
860		48.5	3.8	250+	-	Pass
861		46.5	0.0	216	-	Pass
862		45.8	0.2	227+	-	Pass
863		48.2	0.0	243+	-	Pass
864		49.2	5.5	231+	-	Pass
865		47.2	0.0	250+	-	Pass
866		49.9	7.2	222	-	Pass
867		42.5	0.0	250+	-	Pass
868		42.2	3.8	250+	-	Pass
869		42.7	2.6	250+	-	Pass
870		52.7	4.8	250+	-	Pass
871		52.9	0.0	250+	-	Pass
872		52.3	0.0	250+	-	Pass
873		52.3	4.4	250+	-	Pass
938	20/03/2008	39.6	7.1	214+	-	Pass
939		41.8	7.2	214+	-	Pass
940		41.7	7.8	214+	-	Pass
941		38.6	0.1	204+	-	Pass
942		37.9	7.8	214+	-	Pass
943		39.5	2.6	214+	-	Pass
944		42.3	2.4	214+	-	Pass

Test Number	Date	Test RL (m)	Result			Pass/Fail
			Air Voids (%)	Shear Vane (kPa)	Scala (blows per 100mm)	
945		44.2	0.0	214+	-	Pass
946		49.9	0.0	214+	-	Pass
947		48.1	0.0	214+	-	Pass
956	4/04/2008	17.6	0.2	203+	-	Pass
957		18.4	5.8	214+	-	Pass
958		18.9	4.5	214+	-	Pass
959		19.4	4.7	187+	-	Pass
960		19.9	1.4	214+	-	Pass
961		20.4	1.8	207+	-	Pass
962		20.2	5.5	167	-	Pass
963		20.5	8.7	201+	-	Pass
964		14.1	2.1	214+	-	Pass
965		14.6	1.7	214+	-	Pass
966		14.1	1.2	214+	-	Pass
967		14.6	1.7	214+	-	Pass
968		14.5	4.9	214+	-	Pass
969		14.0	8.9	214+	-	Pass
970		13.9	3.5	214	-	Pass
971		13.4	6.5	190+	-	Pass
1086	10/04/2008	15.9	2.2	218+	-	Pass
1087		16.6	2.5	218+	-	Pass
1088		17.3	2.3	218+	-	Pass
1089		16.2	4.5	198+	-	Pass
1090		16.6	3.4	191+	-	Pass
1091		17.0	4.9	183+	-	Pass
1092		13.7	4.1	188	-	Pass
1093		13.8	2.3	179	-	Pass
1094		13.0	1.6	218+	-	Pass
1095		12.8	0	175	-	Pass
1096		13.1	6.5	218+	-	Pass
1097		14.9	10	218+	-	Pass
1098		20.6	8.2	173	-	Pass
1099		21.9	1.7	180	-	Pass
1100		39.2	0.5	218+	-	Pass
1101		37.7	3.4	218+	-	Pass
1102		38.5	0	170	-	Pass
1103		38.5	1.4	206+	-	Pass
1104		43.3	0	198+	-	Pass
1105		42.7	7	200+	-	Pass
1106		42.3	4.1	218+	-	Pass
1107		41.4	8.9	203+	-	Pass
1108		43.7	3.9	211+	-	Pass
1109		41.2	0	218+	-	Pass
1110		42.0	6.7	218+	-	Pass
1111		43.0	1.8	218+	-	Pass
1112		41.4	3.2	218+	-	Pass
1113		38.9	4.3	218+	-	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 target Soilds Density of 2.4 t/m³ was assumed for pumice sand fill, 2.6 t/m³ for silt/ash fill and 2.5 t/m³ for blended fills.

3 UTP = Unable to Penetrate

FILL TEST RESULTS FROM 2013 - 2015 EARTHWORKS PERIOD						
Summary of earthfill test data						
Test Number	Date	Test RL (m)	Result			Pass/Fail
			Air Voids (%)	Shear Vane (kPa)	Scala (blows per 100mm)	
1	18/10/2013	45.61	8.2	176	-	Pass
2		46.95	0.0	UTP	-	Pass
3		46.53	0.0	164	-	Pass
4		47.53	3.1	UTP	-	Pass
5		58.44	0.8	127	-	Fail - area reworked
6		58.83	2.2	209	-	Pass
7		58.91	0.4	UTP	-	Pass
8		58.38	2.7	236+	-	Pass
9		59.09	1.9	UTP	-	Pass
10		58.77	3.8	236+	-	Pass
11		58.51	4.3	176	-	Pass
12		58.71	3.5	86	-	Fail - to be retested
13		58.08	3.7	UTP	-	Pass
14	22/10/2013	46.97	0.7	183	-	Pass
15		47.13	0.0	142	-	Pass
16		45.61	0.6	159	-	Pass
17		47.47	0.0	175	-	Pass
18		47.76	3.5	UTP	-	Pass
19		47.81	0.0	191	-	Pass
20		47.98	0.0	203	-	Pass
21		47.99	0.0	200	-	Pass
22		47.42	0.0	128	-	Fail - area reworked
23		46.99	0.0	184	-	Pass
24		47.11	0.3	200	-	Pass
25		47.72	0.0	179	-	Pass
26		47.22	6.5	173	-	Pass
29	30/10/2013	28.83	1.6	UTP	-	Pass
30		59.33	2.6	236+	-	Pass
31		58.46	1.6	149	-	Pass
32		59.00	0.0	180	-	Pass
33		58.32	4.4	171	-	Pass
34		58.81	0.0	220	-	Pass
35		58.22	0.8	138	-	Marginal Pass
36		58.67	0.3	UTP	-	Pass
37		58.01	0.0	236+	-	Pass
38		58.50	0.0	236+	-	Pass
39		57.76	0.0	195	-	Pass
40		58.28	5.6	UTP	-	Pass
41		58.18	0.0	97	-	Fail - to be retested
42		58.24	4.9	UTP	-	Pass
43		58.24	0.5	205	-	Pass
44		58.53	0.0	197	-	Pass
45		58.86	6.3	236+	-	Pass
46		59.58	3.0	138	-	Marginal Pass
47		59.43	1.3	9999	-	Pass
48		59.23	5.8	236+	-	Pass
49		31.39	3.2	236+	-	Pass
50		31.77	6.2	164	-	Pass
51		32.42	2.7	159	-	Pass
52		31.71	0.0	175	-	Pass
53		32.27	0.8	189	-	Pass
54	22/11/2013	44.70	0.5	185	-	Pass
55		45.35	5.2	164	-	Pass
56		46.85	1.3	UTP	-	Pass
57		47.21	0	UTP	-	Pass
58		48.40	0.2	UTP	-	Pass
59		49.14	0	236+	-	Pass
60		47.93	1.0	201	-	Pass
61		48.64	0.0	236+	-	Pass
62		49.78	3.5	236+	-	Pass
63		50.26	0.7	UTP	-	Pass
64		51.63	0.0	UTP	-	Pass
65		50.53	6.0	111	-	Fail - to be retested
66		52.63	1.7	186	-	Pass
67		55.64	0.0	UTP	-	Pass
68		56.21	0.8	UTP	-	Pass
69		54.38	0.7	164	-	Pass
70		52.72	7.2	UTP	-	Pass
71		32.63	2.9	194	-	Pass
72		33.34	1.6	215	-	Pass

Test Number	Date	Test RL (m)	Result			Pass/Fail
			Air Voids (%)	Shear Vane (kPa)	Scala (blows per 100mm)	
73		33.25	0.6	UTP	-	Pass
74	10/01/2014	47.37	4.0	UTP	-	Pass
75		48.13	1.6	UTP	-	Pass
76		49.88	4.1	UTP	-	Pass
77		47.40	0.9	174	-	Pass
78		48.14	0.0	186	-	Pass
79		48.86	0.0	210+	-	Pass
80		48.12	3.5	UTP	-	Pass
81		48.85	0.0	UTP	-	Pass
82		50.03	0.0	188	-	Pass
83		47.98	0.9	191	-	Pass
84		48.71	4.5	68	-	Fail - retested 84R
84R	18/02/2014	48.67	0.0	UTP	-	Retest of 84 - Pass
85	10/01/2014	49.45	0.0	197	-	Pass
86		48.85	6.6	119	-	Fail on SV (see note 4)
87		49.63	3.1	UTP	-	Pass
88		49.62	3.1	UTP	-	Pass
89		50.39	0.0	UTP	-	Pass
90		51.11	0.0	UTP	-	Pass
91		52.06	0.0	182	-	Pass
92		50.88	0.0	UTP	-	Pass
93		51.67	3.1	UTP	-	Pass
94		52.27	6.1	UTP	-	Pass
95		52.85	0.0	195	-	Pass
96		51.37	0.0	UTP	-	Pass
97		52.24	0.0	UTP	-	Pass
98		52.91	0	210+	-	Pass
99		53.47	0	210+	-	Pass
100	15/01/2014	52.16	0	UTP	-	Pass
101		53.05	1	236+	-	Pass
102		53.96	5.6	198	-	Pass
103		53.14	0	UTP	-	Pass
104		53.83	0	UTP	-	Pass
105		54.50	0	UTP	-	Pass
106		55.34	4.1	UTP	-	Pass
107		54.03	0.5	UTP	-	Pass
108		54.79	1.8	UTP	-	Pass
109		55.57	3.9	236+	-	Pass
110		55.58	1.4	UTP	-	Pass
111		40.23	2.3	UTP	-	Pass
112		41.61	0	236+	-	Pass
113		40.65	5.6	UTP	-	Pass
114		41.54	0	236+	-	Pass
115		39.42	1.7	UTP	-	Pass
116		40.22	6.4	UTP	-	Pass
117		34.04	2.6	219	-	Pass
118		34.58	0	159	-	Pass
119		35.27	3.4	236+	-	Pass
120	17/02/2014	55.96	3.3	180	-	Pass
121		56.39	2.2	75	-	Fail - to be retested
122		56.91	0.4	172	-	Pass
123		55.81	0	210+	-	Pass
124		56.46	0	185	-	Pass
125		56.17	0.8	UTP	-	Pass
126		56.68	0	170	-	Pass
127		53.83	15	197	-	Pass
128		54.42	3.5	UTP	-	Pass
129		54.88	1.8	199	-	Pass
130		55.70	6.7	113	-	Fail - to be retested
131		53.10	6.5	UTP	-	Pass
132		53.56	3.6	UTP	-	Pass
133		54.22	3.4	UTP	-	Pass
134	18/02/2014	50.39	0	219	-	Pass
135		50.93	0	174	-	Pass
136		51.36	2	UTP	-	Pass
137		51.93	3.7	UTP	-	Pass
138		50.75	2.7	UTP	-	Pass
139		49.36	0	UTP	-	Pass
140		50.48	0	UTP	-	Pass
141		49.58	0	225+	-	Pass
142		50.11	0	225+	-	Pass
143		50.82	11.9	186	-	Pass
144		50.15	0.1	225+	-	Pass
145		50.67	1.1	UTP	-	Pass
146		51.20	19.4	UTP	-	Pass
147		45.22	5.7	UTP	-	Pass
148		44.75	5.9	UTP	-	Pass
149		43.92	5.8	UTP	-	Pass

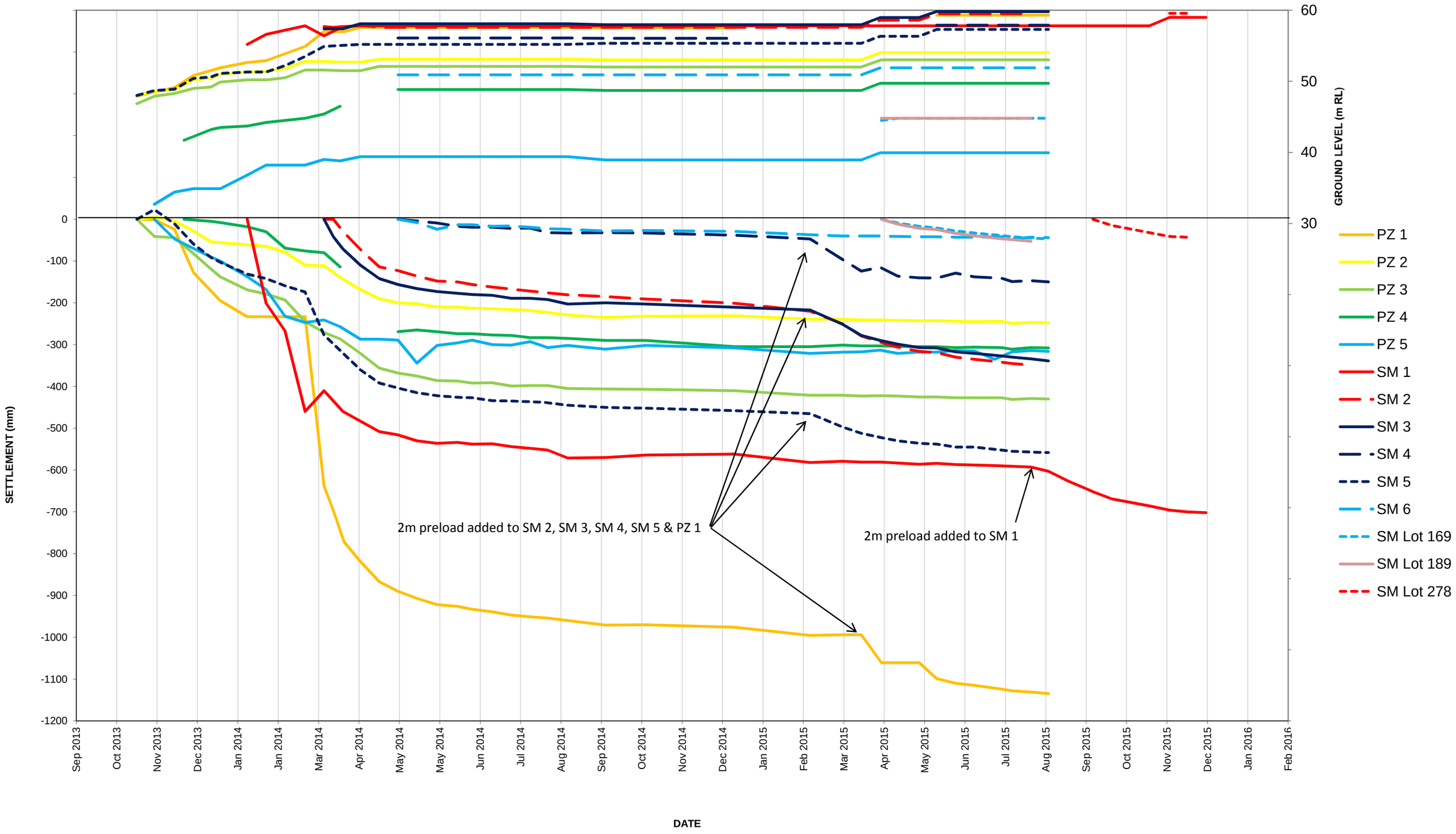
Test Number	Date	Test RL (m)	Result			Pass/Fail
			Air Voids (%)	Shear Vane (kPa)	Scala (blows per 100mm)	
150	10/03/2014	43.07	3.9	UTP	-	Pass
151		44.89	3.7	UTP	-	Pass
152		44.35	1.7	UTP	-	Pass
153		44.84	0	UTP	-	Pass
154		44.19	3.4	UTP	-	Pass
155		42.79	0	UTP	-	Pass
156		43.92	2.2	UTP	-	Pass
157		42.10	0	131	-	Fail - to be retested
158		43.66	5.8	UTP	-	Pass
159		42.73	6	UTP	-	Pass
160		41.94	2.2	UTP	-	Pass
161		41.21	5.6	UTP	-	Pass
162		42.51	3.5	UTP	-	Pass
163		38.95	5.2	UTP	-	Pass
164		38.93	6.4	UTP	-	Pass
165		38.64	4	UTP	-	Pass
168	16/02/2015	46.99	5	232	-	Pass
169		45.83	1.5	231	-	Pass
170		45.35	3.8	230	-	Pass
175	20/02/2015	49.28	-2.9	224	-	Pass
176		48.50	1.5	210	-	Pass
177	24/02/2015	48.99	1.8	220	-	Pass
178		48.76	7.7	225	-	Pass
179		49.55	0.8	203	-	Pass
180		50.17	1.3	232	-	Pass
181	26/02/2015	47.50	1.4	232	-	Pass
182		47.00	4.4	195	-	Pass
183		34.00	4.4	219	-	Pass

Notes

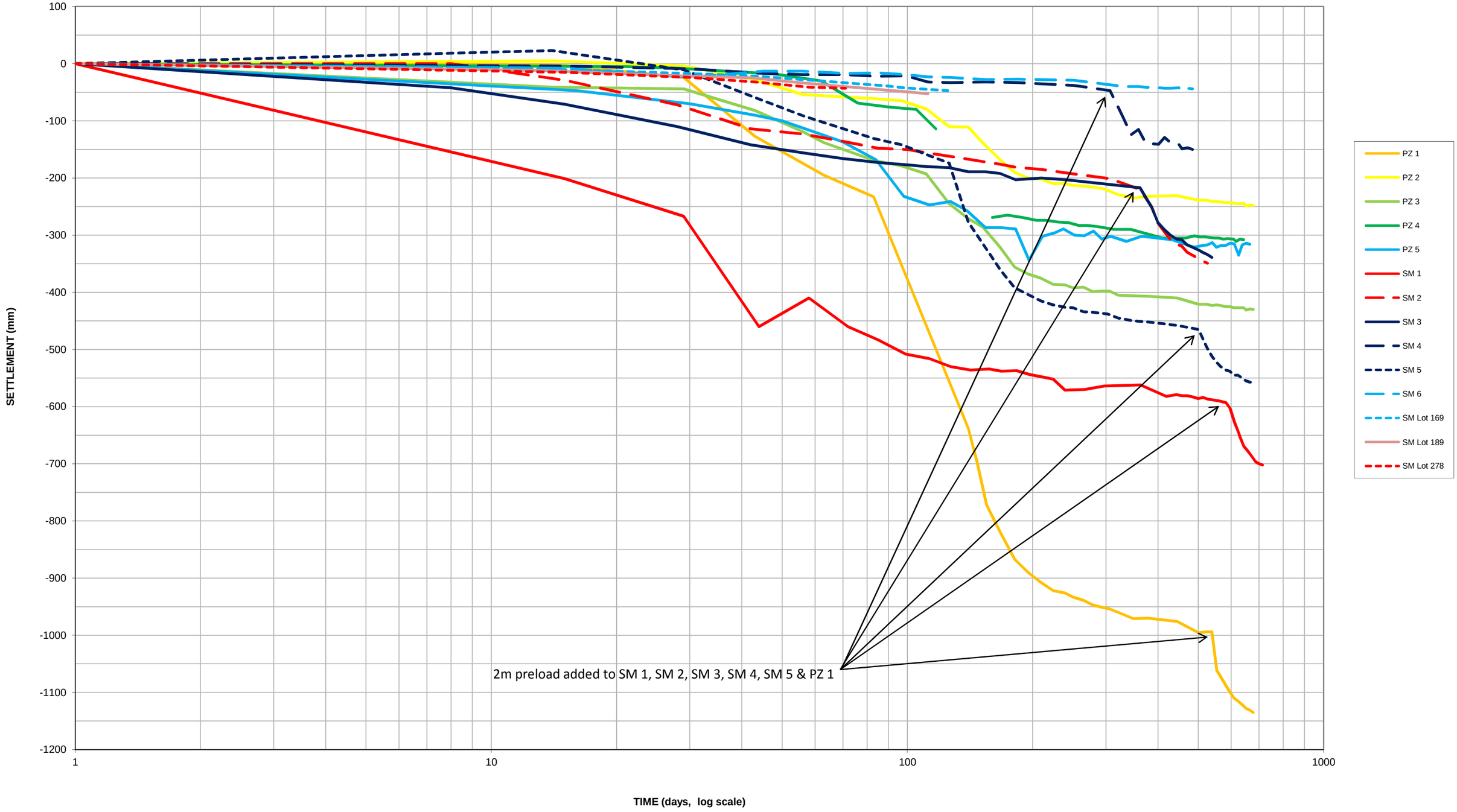
1 Shear strength for NDM tests calculated from average of 4 vane tests at each test location.
2 A target Soilds Density of 2.44 t/m³ was assumed for silt/ash fill.
3 UTP = Unable to Penetrate
4 Test FT86 failed on shear vane likely due to sandy soils. Adjacent tests passed and failed fill 8.0m below finished ground surface.

Appendix F – Static Settlement Results

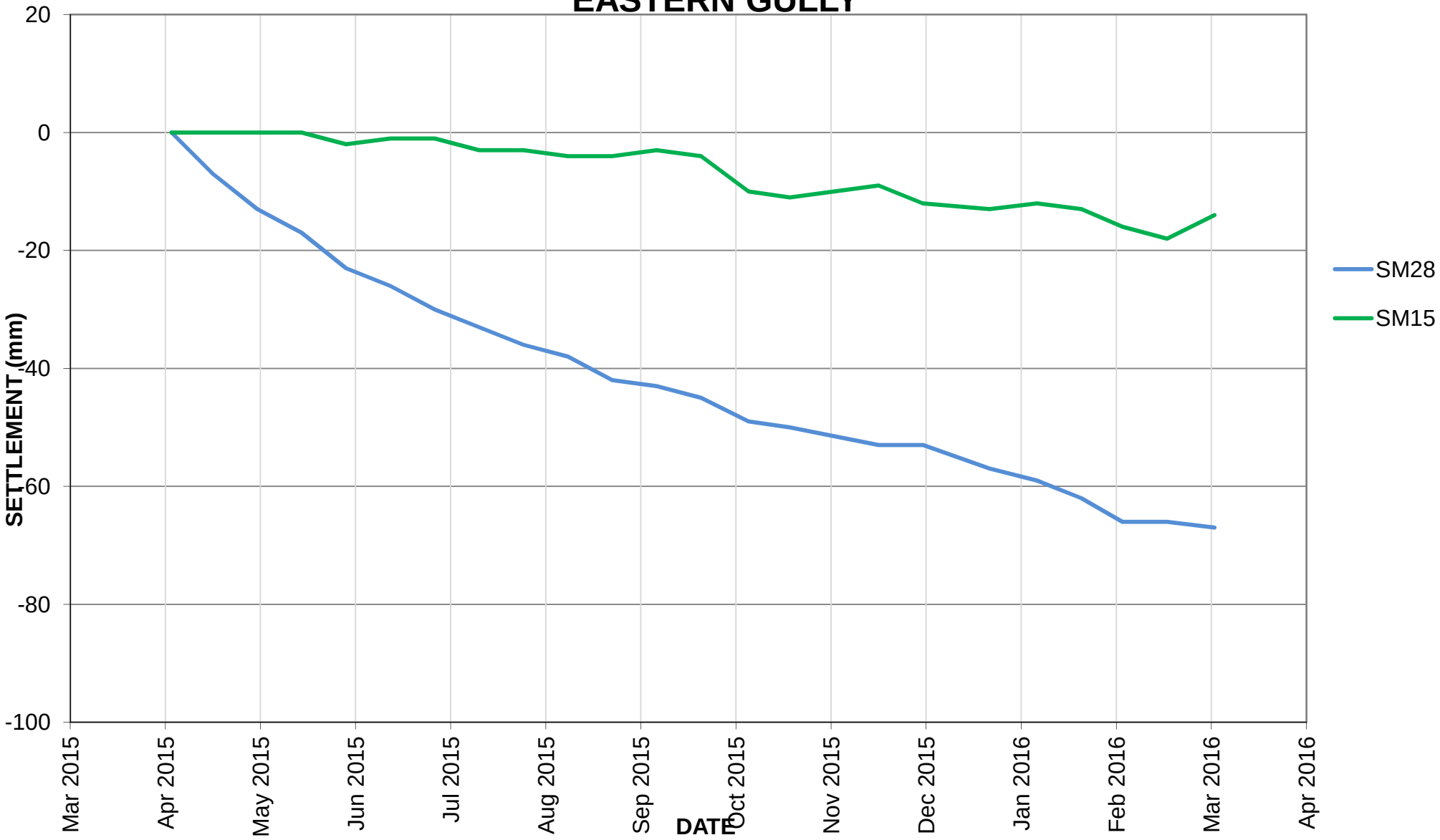
SETTLEMENT VS TIME
WESTERN AND CENTRAL GULLIES

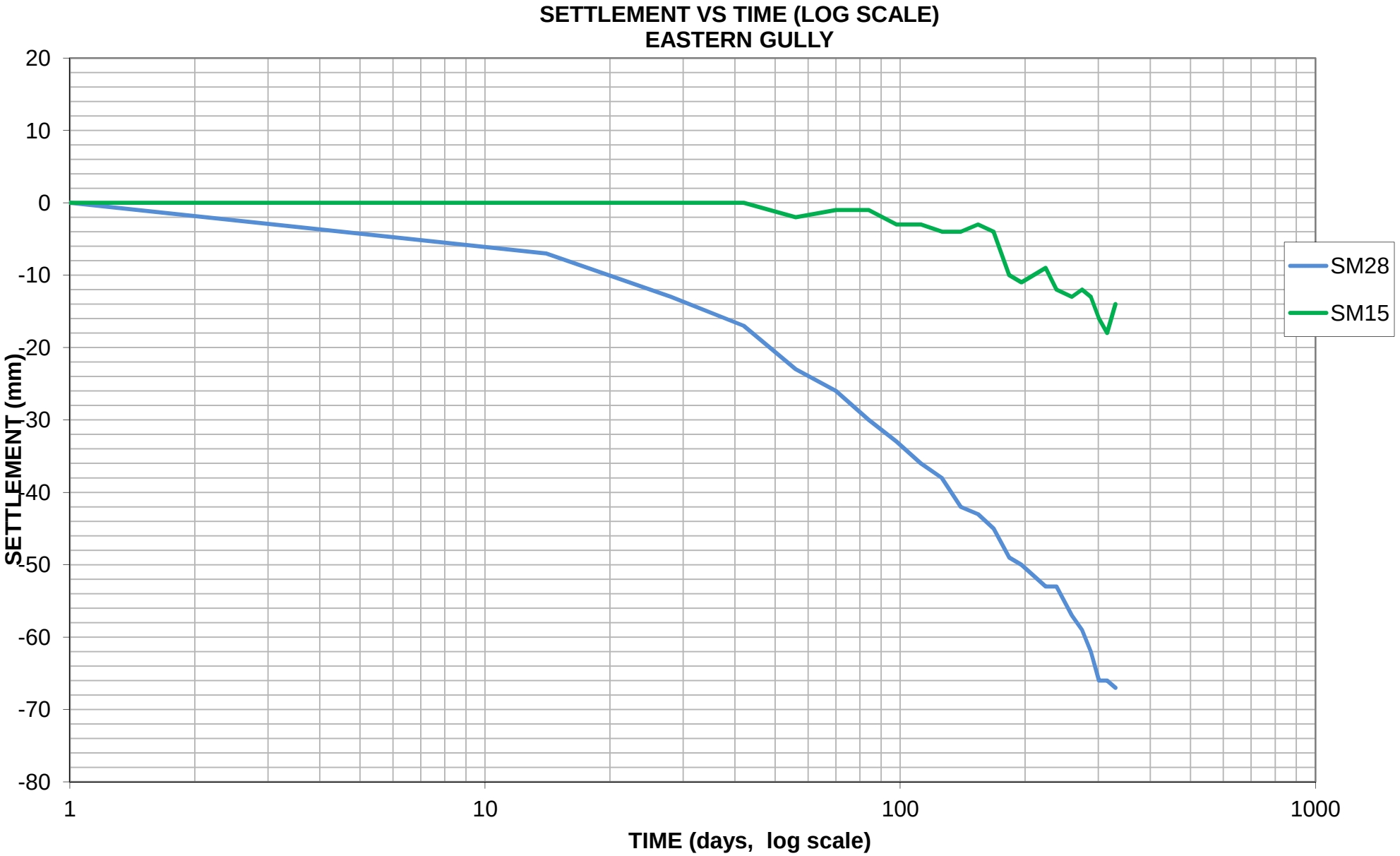


SETTLEMENT VS TIME (LOG SCALE)
WESTERN AND CENTRAL GULLIES



SETTLEMENT VS TIME
EASTERN GULLY




SETTLEMENT VS TIME (LOG SCALE)
EASTERN GULLY
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
SETTLEMENT (mm)
1
10
100
1000
TIME (days, log scale)
SM28
SM15