PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT





2011 GEOTECHNICAL SITE INVESTIGATION

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PEBBLE LIMITED PARTNERSHIP
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2011 GEOTECHNICAL SITE INVESTIGATION
DATA REPORT
(REF. NO. VA101-176/38-3)

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EXECUTIVE SUMMARY

Knight Piésold Ltd. (KP) was retained by the Pebble Limited Partnership (PLP) in 2011 to undertake geotechnical site investigations at the Pebble Project; this data report presents findings from the 2011 KP geotechnical site investigation program.

The Pebble Project area has been subdivided into general reference areas; some of these reference areas were investigated during the 2011 geotechnical site investigation program including:

- West Deposit Area (Potential Crusher Location)
- Upper Talarik Creek Area (Potential Crusher Location and Seepage Management System)
- Area A (Potential Seepage Management System), and
- Area E (Potential Mill Site Location and Seepage Management System).

The key objectives of the program were to assess and/or update the geotechnical conditions in these areas to support future design phases for the Pebble Project. The 2011 KP geotechnical site investigation program included:

- Drilling and logging of vertical geotechnical and exploration drillholes
- Laboratory testing of select samples from the geotechnical drillholes
- Packer hydraulic conductivity (Lugeon method) testing
- The installation of standpipe piezometers
- Pressure transducer piezometer response testing (falling/rising head tests), and
- Reduction/compilation of the collected data.

The 2011 KP geotechnical site investigation program was conducted between June and October 2011. A total of 25 geotechnical drillholes (GH11-229 to GH11-243, GH11-245 to GH11-247, GH11-274, GH11-277, GH11-281, GH11-287, GH11-293, GH11-294, and GH11-296) were completed using helicopter portable diamond drill rigs. Geotechnical data was also collected from one exploration drillhole (11534). KP logged the overburden and completed detailed geotechnical logging of the core with the exception of 11534, where the geotechnical logging of the core was completed by Pebble Limited Partnership technicians in Iliamna. Geotechnical/hydrogeological testing and standpipe piezometer installations were also completed, where possible. Overburden and bedrock samples were collected for laboratory analysis.

Concurrent geotechnical and hydrogeological site investigation programs were conducted by SRK Consulting (SRK) and Schlumberger Water Services (SWS). The findings of the concurrent site investigation programs will be found in each company's respective 2011 site investigation report.

A summary of the geotechnical conditions encountered in each reference area drilled in 2011 folllows:

West Deposit Area

The 2011 KP geotechnical site investigation program included one drillhole (GH11-233) to investigate a potential crusher location in the north central portion of the West Deposit Area. Details of the geotechnical conditions at the potential crusher location are provided in a separate KP preliminary geotechnical assessment report (Ref. No. VA101-176/38-1 Rev 0).

The overburden is 39 ft thick at this location and is generally comprised of glacial drift deposits. The bedrock consists of Cretaceous granodiorite with an average RQD of 11% and an average RMR value of 44 indicating FAIR rock quality (Bieniawski, 1989). Fractured/veined granodiorite was encountered to the total depth in GH11-233 and it was difficult to find pieces of core that met the minimum length requirements for UCS testing; one sample sent for laboratory UCS testing yielded a value of 85 MPa.

The groundwater depth was 15 ft below ground surface. Packer hydraulic conductivity testing was not conducted in the bedrock as it was too fractured to seat the packer bladder. Falling/rising head response testing in the bedrock indicated hydraulic conductivity values in the order of 10^{-5} cm/s.

Upper Talarik Creek Area

The 2011 KP geotechnical site investigation program included seven drillholes (GH11-229 to GH11-232, GH11-243, GH11-245, and GH11-246) in the eastern portion of the Upper Talarik Creek Area to investigate a potential seepage management system and one drillhole (GH11-274) to investigate a potential crusher location in the west. The geotechnical conditions at the potential crusher location are provided in a separate KP preliminary geotechnical assessment report (Ref. No. VA101-176/38-1 Rev 0).

The overburden thickness in the drillholes in the east Upper Talarik Creek Area ranges from 3 to 80 ft and the overburden is predominantly composed of glacial drift and glaciolacustrine deposits. The overburden thickness at the potential crusher location (GH11-274) was 21 ft thick and the materials largely consisted of glacial drift.

Frozen materials were encountered in the eastern portion of the Upper Talarik Creek Area; near surface and in some SPTs at depth. The near surface frozen material is part of the active layer. Frozen materials were encountered in the SPT samples from 24 to 39 ft in GH11-232; the SPT conducted at 29 ft contained some thin discrete ice lenses. Frozen materials were also encountered at depths between 15 and 20 ft in GH10-228, northeast of Koktuli Mountain in 2010. The frozen material encountered at depth is thought to be lenses of relict permafrost; these two drillholes encountered thick glaciolacustrine deposits which would allow frozen materials to persist longer. It is recommended that thermistors be installed in this area to evaluate the extent of relict permafrost conditions.

Weathered bedrock ranges up to 26 ft thick in the eastern 2011 drillholes and 11 ft thick in the west. Bedrock encountered in the 2011 drillholes in the eastern portion of the area consists of Tertiary sedimentary, volcaniclastic, and intrusive units. Average RQD ranged from 36 to 75%. Average estimated UCS values ranged from 57 to 137 MPa. Average RMR values ranged from 45 to 68, indicating FAIR to GOOD rock quality (Bieniawski, 1989). Bedrock encountered at the potential crusher location consisted of Cretaceous granodiorite and diorite with some Tertiary Basalt intrusions. The

average RQD was 35%; average estimated UCS values was 48 MPa; and average RMR value was 42, indicating FAIR rock quality (Bieniawski, 1989).

The groundwater depth in the east ranged from artesian conditions to approximately 58 ft below ground surface. Packer hydraulic conductivity test results in the bedrock ranged in the order of 10^{-7} to 10^{-6} cm/s. Falling head response tests completed at the overburden/bedrock contact yielded hydraulic conductivities in the order of 10^{-6} to 10^{-4} cm/s and 10^{-7} to 10^{-6} cm/s in the bedrock. The groundwater was encountered 13 ft below ground surface at the potential crusher location. Hydraulic conductivity response testing in the bedrock at the potential crusher site yielded a hydraulic conductivity value of 10^{-7} cm/s.

Area A

Area A is located south of the West Deposit Area. One geotechnical drillhole (GH11-238) was completed in the southern Valley Bottom of this area in 2011. The Valley Bottom consists of the valley south of the East and West Deposit Areas extending to the southern end of Frying Pan Lake. The eastern and western extents of the Valley Bottom are governed by the elevation rise on the side slopes. Overburden thickness was 159 ft in the drillhole on the western side of the valley and consisted of glacial drift, glaciolacustrine, and glaciofluvial.

Weathered bedrock was 87 ft thick in GH11-238. Tertiary rhyolite, and volcaniclastic breccia/conglomerate were the bedrock types encountered with an average RQD of 10%. The average estimated UCS was 37 MPa and the average RMR value was 37 indicating POOR rock quality (Bieniawski, 1989).

The groundwater depth was up to 33 ft below the ground surface. Results of packer hydraulic conductivity testing conducted in the bedrock were in the order of 10^{-4} cm/s. A falling head response test yielded results in the order of 10^{-7} cm/s at the overburden/bedrock contact.

The Lower/Mid Side slopes refer to the lower and middle elevations of the side slopes of the valley in the northern half of Area A. Four drillholes (GH11-239 to GH11-242) were completed south of Frying Pan Lake in this area during the 2011 KP geotechnical site investigation program to collect information on a potential seepage management system.

The overburden thickness on the Lower/Mid Side slopes varied from 79 to 329 ft; and typically consisted of glacial drift, glaciolacustrine, and glaciofluvial materials.

Weathered bedrock ranged from 9 to 36 ft thick in these drillholes. The types of bedrock encountered included Cretaceous andesitic siltstone, gabbro; and Tertiary monzonite, volcaniclastic breccia/conglomerate, and basalt. Average RQD values ranged from 10 to 51%. Average estimated UCS values of the bedrock ranged from 44 to 131 MPa. Average RMR values ranged from 42 to 53, indicating FAIR rock quality (Bieniawski, 1989).

The groundwater depth ranged from 59 ft to approximately 100 ft below ground surface. Packer hydraulic conductivity tests were conducted in the bedrock yielding results in the 10^{-6} cm/s range. Falling head response test hydraulic conductivity values in the bedrock ranged from 10^{-8} to 10^{-7} cm/s; and 10^{-7} to 10^{-6} cm/s for the overburden/bedrock contact.

Area E

Area E is situated immediately west of the West Deposit Area and includes the broad valley between the West Deposit Area and Area G. The 2011 KP geotechnical site investigation program in this area included 5 drillholes (GH11-234 to GH11-237, and GH11-247) at a potential seepage management system and 6 drillholes (GH11-277, GH11-281, GH11-287, GH11-293, GH11-294, and GH11-296) for a potential mill site location. Geotechnical information was also collected for the overburden and weathered bedrock in exploration drillhole 11534 at the potential mill site location. More information on the suitability of the potential mill site can be found in the preliminary geotechnical assessment report by KP (Ref. No. VA101-176/38-1 Rev 0).

Overburden thicknesses ranging from 28 to 104 ft were encountered in the drillholes situated in the middle of the valley. GH11-247 did not reach bedrock due to artesian conditions; the overburden thickness in this drillhole is greater than 67 ft. The bedrock in this area is overlain by glacial drift; (predominantly sands and gravels with varying amounts of silt) with colluvium and frost shattered rock (felsenmeer) on the ridges. Overburden depths of up to 9 ft were encountered on the tops of the knolls at the potential mill site in eastern Area E.

Weathered bedrock varied in thickness from 5 to 50 ft in the drillholes in the middle valley and 5 to 40 ft at the potential mill site location. Cretaceous bedrock types encountered were granodiorite, diorite, basalt, gabbro, and andesitic siltstone. Tertiary bedrock encountered in the 2011 drilling in this area included basalt intrusions. The average RQD for the mid valley drillholes ranged from 11 to 47%. Average estimated UCS values ranged from 36 to 98 MPa. Lower UCS values are thought to be attributed to weathered or veined bedrock. Average RMR values ranged from 35 to 50 indicating POOR to FAIR rock quality (Bieniawski, 1989). The average RQD of the rock in the potential mill site location was sometimes low due to fracturing associated with veining, small faults, and shears and ranged from 1 to 83%. Average estimated UCS values ranged from 45 to 134 MPa. Average RMR values ranged from 41 to 61 indicating FAIR to GOOD rock quality (Bieniawski, 1989). Laboratory UCS values for Cretaceous bedrock at the potential mill site ranged from 39 to 176 MPa for wacke/siltstone/mudstone, 65 MPa for diorite, and 91 to 241 MPa for an andesitic siltstone/wacke unit.

The groundwater in the middle valley drillholes ranged from artesian conditions to 37 ft below ground surface. Artesian flows of approximately 80 gpm were encountered in GH11-247; a piezometer could not be installed. Packer hydraulic conductivity test results in the bedrock were in the order of 10^{-7} to 10^{-5} cm/s. Hydraulic conductivity response test results in the overburden ranged from 10^{-7} to 10^{-5} cm/s at the overburden/bedrock contact, and were in the order of 10^{-6} cm/s in the bedrock. The groundwater depth at the potential mill site location ranged from 13 to 29 ft below ground surface. Packer hydraulic conductivity tests were not conducted in these drillholes. Hydraulic conductivity response test results were in the order of 10^{-8} to 10^{-6} cm/s in the bedrock.

The results of the geotechnical site investigation program for the potential seepage management systems in Area A, the Upper Talarik Creek Area, and Area E are being incorporated in the seepage assessments conducted by SWS.

This report is a compilation of this geotechnical site work completed to date by KP for the Pebble Project. The Pebble Project has continually evolved and additional site work has been required to provide

sufficient information to support various revised mine plans. Tables 4.1 to 4.4 present information from all of the KP site investigation programs from 2004 to 2011 for each of the reference areas. Geologic sections presented in this report supersede any issued in previous site investigation reports and must be updated to include future geotechnical site investigation results.

Additional geotechnical and hydrogeological information is required to support the 2011 Prefeasibility Study (PFS) design phases and the permitting process. Future geotechnical site investigation programs collecting hydrogeological and geotechnical information for potential mine infrastructure including waste dumps, seepage management systems, recycle ponds, sediment control ponds, water transfer ponds, tailings storage facilities, and the mill site etc.

The additional geotechnical site investigation programs required to support the permitting phase are expected to take place over a two year period and are scheduled to commence in 2012. The continued use of a specialist geotechnical drilling contractor with helicopter portable equipment is appropriate for future investigations. Maximizing drilling recovery of overburden materials is an important goal of the future geotechnical investigation programs. KP recommends that a hybrid sonic/coring helicopter portable drill rig be considered for drilling, as the sonic drilling method allows for significantly improved overburden recovery for characterization and laboratory samples when compared to conventional mud rotary drilling methods. The ability to switch the sonic head to a conventional mud rotary coring head would allow the drill rig to core the bedrock at the drillhole location and allow for hydraulic conductivity testing of the bedrock.

A significant amount of geotechnical and hydrogeological data has been collected during the various site investigation programs for the Pebble Project over the years. It would be prudent to consider the use of an integrated data management system such as the web-based FULCRUM system being developed by KP. The geotechnical data management aspects of this system will provide a central location for optimal data storage in one location and allow for easy access by multiple consultants for design studies and project permitting.

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PEBBLE LIMITED PARTNERSHIP
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SECTION 1.0 - INTRODUCTION

1.1 PROJECT DESCRIPTION AND BACKGROUND

The Pebble Project is a potential mining development of a large copper-gold-molybdenum deposit, located in the Bristol Bay region of southwestern Alaska. The project site is situated approximately 238 miles southwest of Anchorage and 17 miles northwest of the village of Iliamna, as illustrated on Figure 1.1. The mineral deposit is located on a drainage divide; the Upper Talarik Creek drains to the east and south, the North Fork Koktuli River drains to the west, and the South Fork Koktuli River drains to the southwest.

Pebble Limited Partnership (PLP) has completed extensive exploration drilling in the project area and retained specialized consultants to conduct comprehensive baseline environmental and engineering studies which have been on-going since 2004. Knight Piésold Ltd. (KP) has been actively involved in a number of these studies, including studies related to the advancement of potential Mine Development Concepts (MDCs) for the Pebble Project. Each MDC is composed of different combinations of options for the mill site, crusher, waste rock storage and Tailings Storage Facilities (TSFs), along with associated infrastructure, including roads and pipelines. The 2011 KP geotechnical site investigation program was designed to provide geotechnical information to support the 2011 pre-feasibility engineering study.

The Pebble Project has been divided into ten reference areas on a geographical basis. The reference areas are shown on Figure 1.2, and include the West Deposit Area, the East Deposit Area, the Upper Talarik Creek Area, Area E, the North Fork Koktuli River Area, Area G, Area L, the South Fork Koktuli River Area, Area J and Area A. Area A has been further divided into sub-areas as shown on Figure 1.3. Area names and geographical boundaries have been updated from those described in prior reports; the reference areas in this report should be used in subsequent studies. The 2011 KP geotechnical site investigation program was primarily completed in four of these geographical areas: the West Deposit Area, the Upper Talarik Creek Area, Area A, and Area E.

1.2 SCOPE OF REPORT

The scope of this data report is to present the results of the KP 2011 geotechnical site investigation program for the Pebble Project. This report expands on and updates previous geotechnical and hydrogeological information collected by KP for the project during 2004 to 2008 and 2010. Details of the previous site investigations (drillhole logs, test pit logs, hydrogeological information, seismic refraction survey information and an interpretation of the surficial geology completed by Hamilton and Klieforth) are available in the following KP reports.

- 2004 Geotechnical Site Investigation Data Report (Reference No. – VA101-176/8-3, Volumes I & II)
- 2005 Geotechnical Site Investigation Data Report (Reference No. – VA101-176/8-6)
- 2006 Geotechnical Site Investigation Data Report (Reference No. – VA101-176/8-9, Volumes I & II)

- 2007 Geotechnical Site Investigation Data Report (Reference No. – VA101-176/20-4)
- 2008 Geotechnical Site Investigation Data Report (Reference No. – VA101-176/23-4 Volumes I, II & III), and
- 2010 Geotechnical Site Investigation Data Report (Reference No. – VA101-176/35-1 Volumes I & II).

The 2011 KP geotechnical site investigation program included:

- Advancement, logging, and sampling of geotechnical drillholes
- Logging the overburden and weathered bedrock of exploration drillhole 11534
- Hydraulic conductivity testing
- Standpipe piezometer installation, and
- Laboratory testing of select samples from the geotechnical drillholes.

1.3 GEOMORPHOLOGY OVERVIEW

The Pebble Project is situated in an area that has been extensively modified by multiple glaciations and by freeze-thaw processes such as solifluction, frost wedging and frost shattering. Surficial materials include extensive deposits of glacial drift, glaciofluvial, glaciolacustrine, organic soils and zones of frost modified bedrock.

The glacial deposits have been extensively reworked and transported downstream from the source areas. Four major glacial advances from the Alaska Range to the northeast have modified the majority of the lower lying surficial deposits in this area. Multiple glaciations, with ice sheets of varying thickness, covered the area for varying lengths of time, and have resulted in a complex depositional history. Numerous glacial advances and retreats resulted in reworking of the glacially derived sediments along with the burial of old stream channels and ponds. Vast amounts of debris were flushed rapidly down the valleys during periods of glaciation, and the lower lying surficial deposits are comprised mainly of glacial drift or till (ground moraine, terminal moraine and ablation deposits), outwash plains and modified moraine (terraces). Glacier dammed lakes facilitated the development of broad regions of poorly drained material, glaciofluvial sediments and glaciolacustrine sediments. Other low lying soil deposits that occur in the region include swamp, landslide and solifluction deposits.

Higher elevation areas have not been heavily modified by glacial processes. Extensive surface exposures of frost shattered bedrock (felsenmeer) are present at higher elevations where bedrock tends to be coincident or very near surface. Felsenmeer is translated as ‘sea of rocks’ and consists of angular clasts of fractured bedrock that typically extend from the surface to a depth of up to approximately 15 ft. Felsenmeer is formed by frost shattering and frost wedging of the bedrock from the repeated freeze-thaw cycles in the active layer. This zone of highly fractured bedrock material is extensive over the area, frequently exposed on the surface, and beneath the overburden. Colluvium and solifluction deposits are typically encountered in the higher elevation areas.

The Pebble Project is located within a zone of sporadic permafrost based on the permafrost map of Alaska (Ferrians, 1965). Indications of relict permafrost have been identified during the site investigation programs in the Upper Talarik Creek Area; in the active layer and small relict ice lenses at greater depth.

The current climate does not support the aggradation of permafrost and the ice lenses encountered are thought to be remnants from the last period of glaciation.

SECTION 2.0 - PREVIOUS GEOTECHNICAL AND HYDROGEOLOGICAL SITE WORK

SRK conducted a geotechnical site investigation program at the Pebble Project in 1991 and supplemental drillholes in the deposit area in 2004. Drillhole logs from the SRK 1991 and 2004 site investigation programs are appended to the KP 2004 Geotechnical Site Investigation Data Report. SRK conducted open pit oriented drilling programs from 2006 to 2008; results of these studies are not included in this document.

KP has excavated 423 test pits; advanced 228 geotechnical drillholes, conducted various hydraulic conductivity testing; installed standpipe and vibrating wire piezometers, WestBay^{TM} systems; and facilitated laboratory testing of core and soil samples in prior site investigation programs from 2004 to 2010. The discussion and complete findings of the prior KP geotechnical site investigation programs are included in the KP Geotechnical Site Investigation Data Report for the corresponding year. KP also conducted open pit oriented drilling geotechnical site investigations in 2004 and 2005; results of the open pit oriented drilling studies are not included in this document.

SWS acquired Water Management Consultants (WMC), who conducted hydrogeological site investigations in conjunction with SLR Consulting (SLR) in 2004 through 2008. The hydrogeological site investigation programs included the advancement and logging of 235 drillholes and the installation of piezometers, monitoring and pumping wells. SWS/WMC/SLR also completed response tests, collected water levels, and conducted pumping tests. A summary of the hydrogeological site investigations completed by SWS/WMC/SLR is included in the appendices of the KP Geotechnical Site Investigation Data Report for the corresponding year.

A seismic refraction survey was completed in 1991 by Cooksley Geophysics in conjunction with the 1991 SRK geotechnical site investigation. Details of the 1991 seismic refraction survey are included in the appendices of the KP 2004 Geotechnical Site Investigation Data Report.

Frontier Geosciences Inc. (Frontier) completed seismic refraction surveys at the Pebble Project in 2004, 2005, 2006 and 2010. A total of 49 seismic refraction survey lines (seismic lines) were completed by Frontier up to the end of 2010. The Frontier seismic refraction survey reports are included in the appendices of the KP Geotechnical Site Investigation Data Report for the corresponding year.

Data collected by the various consultants was shared and, where appropriate, used by KP to assist with geotechnical characterization.

SECTION 3.0 - 2011 GEOTECHNICAL SITE INVESTIGATION PROGRAM

3.1 GENERAL DESCRIPTION

The 2011 KP geotechnical site investigation program was carried out from June to October of 2011 and included the following activities:

- The drilling and logging of vertical geotechnical drillholes
- Logging of the overburden and weathered bedrock of exploration drillhole 11534
- Packer hydraulic conductivity (Lugeon method) testing
- Pressure transducer piezometer response testing (falling head tests)
- The installation of standpipe piezometers, and
- Laboratory testing of select samples.

Concurrent geotechnical and hydrogeological site investigation programs were conducted by SRK and SWS. Details of these studies can be found in their respective 2011 site investigation reports.

3.2 TEST PITTING

Test Pits were not excavated during the 2011 KP geotechnical site investigation program. Test pitting was completed in prior site investigation programs and the locations of the test pits are shown on Figures 3.1 and 3.2. Detailed test pit logs and photographs can be found in the appendices of the KP Geotechnical Site Investigation Data Report for the corresponding year.

3.3 DRILLING

Drillhole locations were selected by KP, based on the preliminary arrangement of the mine facilities for the 2011 engineering study, existing knowledge of ground conditions, and with the objective to develop a more comprehensive understanding of geotechnical conditions at the site.

3.3.1 General

A total of 25 geotechnical drillholes (GH11-229 to GH11-243, GH11-245 to GH11-247, GH11-274, GH11-277, GH11-281, GH11-287, GH11-293, GH11-294, and GH11-296) were advanced in 2011 by Foundex Pacific Inc. (Foundex) under the technical supervision, direction, and with the assistance of KP field personnel. Drilling was completed using an HT-700 Mud Rotary diamond drill capable of coring both overburden and bedrock. Ground conditions encountered in the drillholes were monitored, logged and recorded in the field during the drilling process. Information was also collected on the hydrogeological characteristics such as groundwater depths and flow rates. The geological logging of the bedrock core was conducted in Iliamna by PLP geologists and technicians. Each drillhole site was reclaimed by PLP personnel after completion of the drilling operations.

Field observations included the classification of the materials encountered in the drill core and the materials recovered from Standard Penetration Tests (SPTs) and Shelby tube samples. SPTs (ASTM D1586-84) were conducted at regular intervals in the overburden, where possible. Shelby

tube samples (ASTM D1587-94) were collected in the fine grained overburden materials in select drillholes. Selected SPTs, Shelby tubes and overburden core samples were sent to the KP geotechnical laboratory in Denver, Colorado for analysis.

Drillholes were advanced far enough into bedrock to provide reasonable zones for packer hydraulic conductivity (Lugeon method) testing. Packer hydraulic conductivity tests or pressure transducer response tests were conducted at select intervals in the bedrock of select drillholes. Installation of standpipe piezometers and response testing were also completed in select drillholes. Unconfined Compressive Strength (UCS) samples were collected in the bedrock of select drillholes and sent to the University of British Columbia geomechanical laboratory for analysis.

A summary of the 2011 KP geotechnical drillhole locations, drillhole size, depth, piezometer installations, hydraulic conductivity test results and geology is presented in Table 3.1. Overburden laboratory test results are summarized in Table 3.2. Geotechnical drillhole locations are shown on Figures 3.3 and 3.4.

A cumulative summary of the 2004 to 2011 KP geotechnical drilling programs is discussed in Section 4 and the corresponding 2011 geotechnical and hydrogeological drillhole data is presented in Appendices A and B. A selection of 2011 drill site photographs, SPT photographs and core photographs are included in Appendix C. Details of the geotechnical drilling program methodology are discussed below.

3.3.2 Overburden Drilling

The overburden was cored using PW, PQ or HWT casing and PQ3 or HQ3 bits. Biodegradable drilling mud additives; Pur-Vis, 133X Poly-drill or Bentonite Quik-Gel; were added to the drilling water to assist in keeping the drillholes open in the overburden. Recovery length and soil descriptions were recorded for each drill run. Core recovery was generally better when drilling with PQ3 as compared to HQ3, although, in sandier materials, the fines tended to be washed away. The cored overburden was collected in aluminum split tubes, logged, put into core boxes, and photographed at the drill site; samples with suitable recovery were identified for possible laboratory testing. Representative samples were selected from the cored overburden and sent to the KP geotechnical laboratory in Denver, Colorado for analysis.

Cored overburden samples were analyzed for:

- Particle size distributions (ASTM D422-63)
- Hydrometer analysis (ASTM D422-63)
- Atterberg Limits (ASTM D4318-84)
- Natural moisture content (ASTM D2216-90), and
- Bulk density.

SPTs are completed to estimate the density and strength of the soil and to collect soil samples in areas of poor overburden drilling recovery. SPTs are generally conducted in overburden materials, but also sometimes utilized to sample highly weathered bedrock materials. The

following information was routinely recorded for each SPT sample prior to double bagging the samples for subsequent laboratory analysis:

- SPT number
- Depth of test interval
- Date taken
- Blow counts for each 6 inch interval
- 'N' value
- Recovery length
- Soil description, and
- Photographs.

SPTs were generally conducted at 5 ft intervals for the first 50 ft and then every 10 ft thereafter, where ground conditions permitted or at 5 ft intervals if materials were washed away during drilling. A cathead hammer was used to advance the SPT split spoon sampler. The number of blows required for every 6 inch increment of advancement was recorded until the sampler was driven to a total of 18 inches. The SPT 'N' value is the number of blows required to advance the sampler through the last two 6 inch intervals (the last 12 inches). Most of the soil units within the Pebble Project area contain a high proportion of gravel and cobbles, which sometimes resulted in artificially high SPT 'N' values.

SPT samples were analyzed for:

- Natural moisture content (ASTM D2216-90)
- Particle size distribution (ASTM D422-63)
- Hydrometer analysis (ASTM D422-63)
- Atterberg Limits (ASTM D4318-84), and
- Specific gravity (ASTM D854).

Shelby tube samples were collected in some drillholes to provide information on the density and shear strength of finer grained materials. A thin walled sampling tube was pushed into the formation at the bottom of the drillhole and carefully removed by the driller. The field engineer then measured the amount of sample collected in the tube and sealed the Shelby tube at both ends. The Shelby tubes were kept upright during transport and storage. These samples were also protected from extreme temperatures.

Shelby tube samples were analyzed for:

- Natural moisture content (ASTM D2216-90)
- Particle size distribution (ASTM D422-63)
- Hydrometer analysis (ASTM D422-63)
- Atterberg Limits (ASTM D4318-84)
- Specific gravity (ASTM D854), and
- Triaxial compression testing (ASTM D4767 – Method A).

2011 KP geotechnical drillhole logs are presented in Appendix A1. Laboratory test results are summarized in Table 3.2; individual test results can be found in Appendix A3.

3.3.3 Bedrock Drilling

Geotechnical drillholes were advanced into the bedrock to various depths depending on the objectives of the drillhole and the ground conditions encountered. PQ3, HQ3 and NQ3 bits were utilized to core the bedrock. The drill return was observed for indications of material change and loss of circulation.

Geotechnical logging was conducted to characterize the bedrock and estimate rock mass quality. The following information was routinely collected for each drill run:

- Depth interval
- Run length
- Core recovery length
- Rock Quality Designation (RQD)
- Lithological description
- Number of discontinuities
- Discontinuity/joint condition (roughness, aperture, alteration, infilling, etc.)
- Rock material weathering
- Estimate of Unconfined Compressive Strength (UCS), and
- Collection of core samples for UCS laboratory testing.

The Rock Mass Rating (RMR) system, developed by Bieniawski (1989), has been used to classify the bedrock condition. RMR is frequently employed in geotechnical engineering to describe general rock mass conditions and identify potential zones of weakness where further investigation may be required. The RMR system is based on determining values for the following five key rock mass parameters:

- Intact rock hardness and Unconfined Compressive Strength (UCS) - The rock hardness andintact rock strength were estimated in the field and measured in the laboratory for selected samples from some of the drillholes.
- RQD - The RQD value was determined for each core run by summing up the lengths of all core pieces greater than 4 inches long and presenting this as a percentage of the drill run length.
- Fracture spacing - An estimate of fracture spacing was determined by counting the number of natural fractures encountered per length of drill run.
- Fracture condition - The fracture condition is based on an evaluation of fracture persistence, roughness, infilling, aperture and weathering. The persistence has been conservatively assumed to have an RMR rating of 0, indicating high persistence. The roughness, infilling, aperture and weathering were evaluated by examining the drill core.
- Groundwater condition - A constant groundwater rating of 15, which corresponds to dry conditions, was used to calculate the RMR. This allows the RMR values to be consistent with Geological Strength Index (GSI) values (Hoek et al, 1995) that can be used to estimate rock mass strengths at the Pebble Project.

RMR values range from near 0 to 100 and are broken into five major rock mass classes summarized as follows:

- VERY GOOD rock. RMR: 81 – 100.
- GOOD rock. RMR: 61 – 80.
- FAIR rock. RMR: 41 – 60.
- POOR rock. RMR: 21 – 40.
- VERY POOR rock. RMR <20.

The geotechnical drillhole logs included in Appendix A1 contain summaries of the bedrock geology and RQD values. Detailed bedrock geotechnical drillhole logging data sheets are included in Appendix A2. The logging data sheets contain additional information regarding specific bedrock characteristics for every drill run. The RMR rock mass classification system is included in Table A2.1 along with a legend of the PLP bedrock lithology codes in Table A2.2. UCS laboratory results are included in the report in Appendix A4. All core was geologically logged and photographed by PLP geologists and technicians.

Depths to bedrock for KP geotechnical holes drilled on the Pebble Property are shown on Figures 3.5 and 3.6. PLP exploration drillhole depths were not utilized because tricone drilling methods often extend into weathered or fractured bedrock and may overestimate the overburden thickness.

3.3.4 Piezometer Installation

A total of 23 standpipe piezometers were installed during the KP 2011 geotechnical site investigation program. Piezometers were not installed into two drillholes; GH11-230 and GH11-247. Bentonite bridged in the rods during the installation attempt at GH11-230, causing the piezometer to break as the rods were extracted from the drillhole. Artesian flows of approximately 80 gpm were encountered during drilling in GH11-247 and the drillhole was abandoned and plugged.

The procedure for standpipe piezometer installation involved the following steps:

- Selecting the desired zone to install the well screen.
- Installing a Van Ruth plug to seat the bottom bentonite seal. Bentonite chips/pellets or sand were used when the completion zone was near the bottom of the drillhole.
- Installing a bottom seal of ¾" coated bentonite pellets, typically 5 ft thick, immediately above the bottom plug or backfilled material.
- Installing a layer of filter sand (usually 10/20 silica sand), approximately 3 to 5 ft thick above the bentonite seal. This isolates the well screen from the lower bentonite seal.
- Placing the bottom end cap of the slotted PVC screen and PVC riser pipe assembly upon the filter sand layer.
- Installing a sufficient volume of filter sand to fully encompass the PVC screen plus approximately 3 to 5 ft of the riser pipe above the well screen.
- Installing an upper bentonite seal on top of the filter sand to form the top of the completion zone.

- Filling the open annulus above the upper bentonite seal with cement grout, slough or another suitable backfill material.

The location of each zone during the piezometer installation was monitored by continuous depth measurements using a weighted tape. PVC top caps and a steel protective casing or monument were installed over the exposed pipes of all standpipe piezometers. A surface mound was constructed using cement to seat the steel protective cover and prevent surface water from percolating down the piezometer installation. Monuments are often marked with a snow pole. Piezometers were not developed subsequent to installation.

The depth of the piezometer completion zone was selected based on a zone of interest identified in the overburden, bedrock or at the overburden/bedrock interface during drilling. The static depth to groundwater was also taken into consideration so that the completion zone was installed below the observed water table.

A summary of the 2011 geotechnical drillhole and piezometer information is provided in Table 3.1. Well completion details for each piezometer are included in Appendix B1.

3.3.5 Hydraulic Conductivity Testing

Two types of hydraulic conductivity tests were completed during the geotechnical site investigation program; packer testing in the bedrock and response testing in the standpipe piezometer installations.

Hydraulic conductivity tests using the Lugeon method were completed at select depths in some of the geotechnical drillholes to estimate the hydraulic conductivity of the bedrock. These tests are frequently referred to as 'packer tests' and consist of seating an inflatable bladder (packer) in competent bedrock to isolate a test interval. Water is then pumped (under controlled test pressures) down the drill rods into the isolated test zone. The flow rate is measured over time. Three ascending and two descending test pressure stages are applied for each packer test. Inflatable Packers International Pty Ltd. (IPI) hydraulic inflated packer systems were used on site during the 2011 KP geotechnical site investigation program.

Hydraulic conductivity response tests were conducted in conjunction with the hydraulic inflated packer tests using a specially designed pressure transducer housing unit that was affixed to the packer system. These tests were completed using the falling head test method after the packer was inflated. The drill string was filled with water and the water level response was monitored. Pressure transducer hydraulic conductivity response data provided a reference point for the hydraulic conductivity values derived from packer testing.

Pressure transducer and manual hydraulic conductivity response tests were also conducted in the standpipe piezometers using the falling head test method. Water is added to the standpipe piezometers and monitored while recovering to the initial groundwater level. These hydraulic conductivity tests were analyzed using the Hvorslev method. Hydraulic conductivity response testing can provide hydraulic conductivity data for the overburden or broken zones in the bedrock,

where completing a packer test is not possible. The falling head tests involved the addition of water to the piezometer or drill pipe, and then recording the subsequent recovery in water levels.

The results of the hydraulic conductivity tests are presented in Table 3.1. Individual packer test calculation sheets are included in Appendix B2 and individual response test calculation sheets are included in Appendix B3.

3.3.6 Artesian Conditions

Artesian conditions were encountered in many locations throughout the Pebble Project site. Artesian conditions occur when the piezometric groundwater level is above the ground surface at that specific location. Standpipe piezometers installed in drillholes in these areas often have a piezometric groundwater level within approximately 3 ft (inside the piezometer stickup) above the ground surface. Drillholes with higher piezometric levels exhibit flowing conditions, though some standpipe piezometers may be intermittently artesian as there is seasonal variation in the groundwater table.

SECTION 4.0 - GEOTECHNICAL CONDITIONS

4.1 GENERAL

This section provides a general overview of the geotechnical conditions encountered at the Pebble Project based on all of the KP geotechnical site investigation programs to date. The project site has been divided into ten reference areas, as shown on Figure 1.2; sub-areas of Area A are shown on Figure 1.3.

Past KP geotechnical site investigation programs included geotechnical drillholes, test pits, and seismic lines which are divided into the various reference areas in Table 4.1. Geotechnical information was collected by KP in the following areas during the 2011 KP geotechnical site investigation program:

- West Deposit Area
- Upper Talarik Creek Area
- Area E, and
- Area A.

A total of 25 geotechnical drillholes (GH11-229 to GH11-243, GH11-245 to GH11-247, GH11-274, GH11-277, GH11-281, GH11-287, GH11-293, GH11-294, and GH11-296) were completed to investigate various potential mine infrastructure locations; potential seepage management systems, two potential crusher locations, and a potential mill site location. Geotechnical information was also collected for the overburden and the weathered bedrock in PLP exploration drillhole 11534 at the potential mill site location. Additional information on geotechnical conditions of the potential mill site can be found in the preliminary geotechnical assessment report by KP (Ref. No. VA101-176/38-1 Rev 0).

Geologic sections have been updated using the results of the 2011 KP geotechnical site investigation program. Some of the geologic sections include results of the seismic refraction surveys completed by Frontier. Figures 4.1a and 4.1b show the locations of the geologic sections, with individual geologic sections illustrated on Figures 4.2a to 4.53. Table 4.1 annotates the geologic section figures by reference area. Drillholes completed in previous years appear on these sections; logs of these drillholes are included in Appendix A5. Geologic sections will require revision based on future geotechnical site investigations.

4.2 TOPSOIL

Topsoil was encountered at surface over most of the Pebble Project area. The topsoil was typically dark brown, moist and contained varying quantities of silt, sand and gravel. Thickness of the topsoil varied from a thin veneer at higher elevations to 5 ft thick. The topsoil is mixed with felsenmeer (frost shattered bedrock) in some locations. Lower lying areas generally contained a higher amount of fines in some areas. Peat was also encountered in large and localized swampy areas throughout the area. Peat thicknesses ranged up to 10ft thick. Table 4.2 provides information on the depth range of topsoil and peat deposits in each reference area.

4.3 OVERBURDEN

The Pebble Project area has been subjected to various periods of glaciation. Terraces, kettle lakes, moraine, and outwash features are common to the area. The West Deposit Area is terraced and includes many small ponds within kettled moraine resulting from the Brooks Lake glaciation (Detterman and Reed, 1973). The Southern Upland Area (south of Frying Pan Lake and west of the South Fork Koktuli River) is kettled and characterized by deep deposits of moraine and outwash of the Brooks Lake glaciation (Detterman and Reed, 1973).

The overburden generally consists of glaciofluvial, glaciolacustrine, and glacial drift deposits; varying in thickness from a thin veneer to over 300 ft deep in the South Fork Koktuli Area and Area A. Bedrock outcrops on hilltops, ridges, mountains, and along some creeks. The overburden thickness generally increases southward with some deep overburden also occurring at locations in Area A and the East Deposit Area. Table 4.2 details the ranges of overburden thickness for each reference area. Variability in the overburden thickness and composition is thought to be a result of numerous glaciations and localized depositional environments. The glacial deposits generally consist of sand and silt with varying amounts of gravel, cobbles, and clay. The stratigraphy is complex with rapidly changing material composition and numerous interlayers which are not easily extrapolated between drillholes. Core recovery was often poor in the sandy units because the fines were washed away but the recovery was generally good in the glaciolacustrine deposits and silt rich units.

Fine grained materials are typically found in low energy depositional environments, such as glaciolacustrine or very low-gradient stream reaches (i.e. oxbows). Glacial lake transgression and regression cycles have resulted in the deposition of interlayered glaciolacustrine and glacial drift materials. This type of interlaying is encountered in the Upper Talarik Creek Area and Area A. Relict beaches evident along the sides of the valley in Area A indicate the elevation of the glacial lake in this area was approximately 1000 ft.

Glaciofluvial materials are often deposited in streams adjacent to the glaciers or by meltwater channels during glacial wasting. Gradational layering and particle orientation, consistent with fluvial deposition, were noted in some coarser-grained deposits in Area J. The overburden in the Southern Upland Area of Area A is composed of glacial drift and glaciofluvial deposits, with some more recent sorting consistent with reworking by water. Some thin, discontinuous silt and/or clay layers were also encountered.

Colluvium and felsenmeer deposits are also present in many of the reference areas. Large boulder size fragments of felsenmeer occur at the surface in some locations. Minor frost sorting of the loose colluvium on the surface has produced thin solifluction lobes in some areas.

Frozen materials were encountered in the eastern portion of the Upper Talarik Creek Area; near surface and in some SPTs at depth. The near surface frozen material is part of the active layer. Frozen materials were encountered in the SPT samples from 24 to 39 ft in GH11-232; the SPT conducted at 29 ft contained some thin discrete ice lenses. Frozen materials were also encountered at depths between 15 and 20 ft in GH10-228, northeast of Koktuli Mountain. The frozen material encountered at depth is thought to be lenses of relict permafrost; these two drillholes encountered thick glaciolacustrine deposits

which would allow frozen materials to persist longer. It is recommended that thermistors be installed in this area to evaluate the extent of relict permafrost conditions.

Lower SPT 'N' values were generally recorded in near surface materials or attributed to peat, slough, and heaving sands in the drillholes. Higher SPT 'N' values and refusals were largely due to the abundant gravel and cobble materials prevalent in glacial deposits. Table 4.2 provides the range of Atterberg Limit test Liquid and Plastic Limits; some of the materials tested were non-plastic. Material density estimates from other laboratory tests including Standard Proctor, Shelby Tubes, and cored overburden samples are also shown in Table 4.2.

4.4 BEDROCK

Cretaceous and Tertiary bedrock types were encountered in this area. Most of the Tertiary rock was encountered in the east as the Cretaceous Kaskanak Batholith dominates the lithology of the west. Table 4.3 details the types of bedrock encountered in the geotechnical drillholes in each reference area and average estimated strength and rock mass quality. Laboratory rock strength test results are also included. Average RQD of the bedrock ranged from 0 to 92, corresponding to highly fractured to very competent rock. The average estimated UCS values of the bedrock ranged from 8 to 205 MPa. Laboratory UCS values ranged from 14 to 241 MPa. Average RMR values ranged from 29 to 68 indicating POOR to GOOD rock quality (Bieniawski, 1989). Rock strength and RMR values were highly variable between drillholes. Some of the POOR rock was encountered in drillholes that ended in weathered bedrock or in drillholes with a large amount of fracturing/veining, small faults, and shears. The bedrock conditions of the West Deposit Area have also been generally described in the KP 2004 and 2005 Open Pit Geotechnical Investigation Reports (Ref. Nos. VA101-00176/8-2 and VA101-00176/8-5).

4.5 GROUNDWATER

Table 4.4 presents the range of groundwater depths and the artesian flow rates encountered in the drillholes in each reference area. The groundwater depth is variable, ranging from artesian conditions to approximately 290 ft below ground surface. Groundwater depth was often coincident with the top of the fractured bedrock. Swampy areas indicate that the groundwater is at or very near the ground surface as the wet, boggy areas are indicative of a groundwater discharge zone. Groundwater was observed seeping into many of the test pits. There are some small seasonal lakes and rocky depressions which indicate that areas are fairly well drained. Deeper groundwater was encountered in the southern portion of Area A and the South Fork Koktuli River Area. Portions of the South Fork Koktuli River flow subsurface through the more permeable sand and gravel strata during the drier months.

The groundwater was measured at a depth of 292 ft below ground surface in GH08-170 in Area L using a vibrating wire piezometer. This was considerably deeper than the groundwater depths in nearby drillholes and it was thought that the vibrating wire was faulty, however, the data appears to be following a normal pattern. Two other drillholes were subsequently completed nearby to try to verify the 292 ft groundwater depth. A WestBay™ installation and four vibrating wire piezometers were installed in these drillholes and the groundwater depths were observed to be 25 ft below ground surface. The deeper water level measurement is inconsistent and it is recommended that this GH08-170 is twinned to verify that the instrumentation is working properly.

Artesian conditions occur when drillholes intersect a confined aquifer where a lower permeability deposit overlies higher permeability materials such as fractured bedrock or sand and gravel deposits. Artesian flows ranging from 1 to 300 gpm have been encountered. Piezometers were generally installed into geotechnical drillholes with artesian conditions, however if the flow could not be controlled with a Margo plug, the piezometers were pressure grouted after installation. If the flow was high enough to impede the drilling process, the drillhole was abandoned and plugged. A packer was inflated down the drillhole and grouted in place to stop the flowing conditions. Some piezometers were installed and later became artesian, these piezometers were pressure grouted or plugged in subsequent field seasons. Some piezometers exhibited temporary artesian conditions which then ceased.

4.6 HYDRAULIC CONDUCTIVITY

Packer hydraulic conductivity tests were conducted in bedrock at selected geotechnical drillholes. Hydraulic conductivity values for the bedrock range from 10^{-8} to 10^{-2} cm/s. The range of packer hydraulic conductivity test results in the bedrock of each reference area is presented in Table 4.4. The aim of the packer testing is to obtain continuous hydraulic conductivity data for the bedrock. However, packer testing is generally not conducted in the highly weathered and fractured materials often encountered at the bedrock surface due to the difficulty of getting the packer to seal the test interval. Packer testing does not generally commence until somewhat competent bedrock is encountered, but is conducted in fractured and faulted zones where possible. Fault zones may exhibit hydraulic conductivities in the same order of magnitude as that of the host bedrock, but the hydraulic conductivity can also be higher or lower than the surrounding host rock due to clay gouge or fracture density.

Response falling/rising head hydraulic conductivity testing was conducted in most of the piezometers. Piezometer completion zones were located in the overburden, bedrock, and at the overburden/bedrock contact. A fractured/weathered bedrock zone generally observed at the contact of the overburden and the bedrock with generally higher hydraulic conductivity than the underlying bedrock. Response testing indicated hydraulic conductivity values ranging from 10^{-6} to 10^{-2} cm/s in the overburden, 10^{-7} to 10^{-2} cm/s at the overburden/bedrock contact, and 10^{-7} to 10^{-2} cm/s in the bedrock. Ranges of response hydraulic conductivity test results in the overburden, bedrock, and at the overburden/bedrock contact of each reference area are presented in Table 4.4.

Areas with higher hydraulic conductivity values are generally underlain by sand and gravel deposits or highly fractured bedrock. Drilling the overburden was difficult in sandy areas as there was loss of circulation of the drilling fluids in the more permeable overburden material. Response hydraulic conductivity tests were attempted in these materials; however, the groundwater recovery was often too rapid to obtain accurate results without the use of a pressure transducer. Hydraulic conductivity was estimated to be in the order of 10^{-3} to 10^{-2} cm/s in response tests with rapid recovery.

SECTION 5.0 - CONSTRUCTION MATERIALS

Overburden materials and Non-Potentially Acid Generating (NPAG) waste rock that will be stripped from within the proposed open pit footprint can potentially be used as construction materials during the development of other mine facilities such as roads, embankments, concrete foundations, etc. A pre-feasibility construction materials evaluation will be conducted using the data from the 2011 SRK geotechnical sonic drilling program and any other soil laboratory test results from within the West and East Deposit Areas once all of the data is finalized.

The West Deposit Area has been roughly divided into three zones (West, Central, and East) based on material types encountered in these areas. Finer-grained glacial drift deposits that will be suitable for use as a low permeability fill (core zone/low permeability blanket) are found in the eastern and western extents of the West Deposit Area. These materials consist of silt and sand with varying amounts of gravel.

Glaciofluvial deposits of sand and gravel have been identified in the central portion of the West Deposit Area, extending into the Upper Talarik Creek Area to the north and Area A to the south. Some of these deposits have lower fines contents and may provide the materials required for the filter and drainage zones of embankments. These materials will require processing to meet gradation requirements. Material in the central portion of the West Deposit Area is also a potential source of concrete aggregate. Test pit samples in this location had Standard Proctor maximum dry densities ranging from 114 to 130 lb/ft^3 and a range of optimum moisture contents from 8 to 13% (ASTM D698). The natural moisture contents of these materials ranged from 2% below optimum to 10% wet of optimum. However, near surface test pit materials could have higher moisture contents due to freeze-thaw processes which tend to loosen the in-situ soils and results in higher moisture content as compared to similar materials at a greater depth. Specialized concrete aggregate test work has not yet been conducted.

Proctor density testing and determinations of natural moisture content should be completed on deeper glacial materials to determine the moisture-density characteristics of the overburden materials. Deeper glacial materials have been consolidated by glacial ice. Numerous samples of deeper dense materials have been recovered in the West Deposit Area as these dense overburden materials have been successfully cored using HQ3 and PQ3 diamond drilling methods. Examples of cored dense overburden in the West Deposit Area and East Deposit Areas are shown on Figures 5.1 through 5.5.

Glacial drift and glaciofluvial materials may also be suitable as structural fill for embankments, roads and foundations provided that the natural moisture content is sufficiently low. Tertiary waste rock may also be considered for use as a construction material. Vertical and lateral continuity of materials in the West Deposit Area need to be verified using the available information to provide better estimates of the material types and volumes available. Additional laboratory testing of the various overburden materials will also be required to define material strength, permeability, compaction characteristics, etc. The final results of the 2011 SRK geotechnical sonic drilling program and subsequent laboratory testing should increase the understanding of the materials and their suitability for use as potential construction materials.

SECTION 6.0 - SUMMARY AND RECOMMENDATIONS

6.1 SUMMARY OF 2011 PROGRAM

KP has conducted several geotechnical site investigation programs from 2004 to 2011. A number of additional consulting firms have also conducted geotechnical and hydrogeological site investigation programs at the Pebble Project. Previous KP geotechnical site investigations supported various mine development concepts that have progressively evolved over the last several years. Data has been shared by the various firms involved where possible.

Field work for the 2011 KP geotechnical site investigation was performed between June and October 2011 and incorporated geotechnical drilling, hydraulic conductivity testing, standpipe piezometer installations, and sample collection for laboratory analyses in Area E, the Upper Talarik Creek Area, West Deposit Area, and Area A. A total of 25 drillholes were completed during the 2011 KP geotechnical site investigation program. Geotechnical data was also collected for the overburden and weathered bedrock of exploration drillhole 11534. Geological logging of all drill core was conducted by PLP geologists.

New drilling results have updated and confirmed site conditions previously reported in prior years, especially in areas where little to no data was previously available. This report represents the cumulative KP geotechnical site investigation results and incorporates data collected from 2004 to 2011.

The overburden at the project site generally ranges in thickness from approximately 0 to 250 ft, with depths to bedrock of more than 300 ft in Area A and in the South Fork Koktuli River Area. The overburden materials are comprised of a sequence of glaciolacustrine, glaciofluvial, glacial drift and colluvium deposits of varying compositions. Higher elevation areas tend to have shallower overburden, but the overburden can also be up to approximately 100 ft deep in these areas.

Frost wedged and frost shattered bedrock (felsenmeer) is often exposed on surface at higher elevations. A broken rock layer with highly fractured and weathered rock is generally found at the contact between the overburden and the underlying bedrock. This fractured rock at the overburden/bedrock contact may be pre-glacial felsenmeer. The competency of the bedrock generally increases with depth. Major bedrock types at the Pebble Project consist of Tertiary and Cretaceous sediments, volcanics, and intrusives.

Piezometric groundwater levels generally range from above ground surface to about 200 ft below ground surface. Groundwater in mountainous areas is generally deeper due to the higher elevation, though some perched groundwater exists. Groundwater at 292 ft below surface (GH08-170) was recorded on a ridge in Area L, this value could be anomalous as the 2010 WestBay^{TM} installation and the vibrating wires installed adjacent to this drillhole in 2010 had much shallower groundwater depths ranging from 6 to approximately 25 ft deep. Additonal drilling in this area is required to confirm the depth to groundwater. Artesian conditions are frequently present where the fractured bedrock zone is overlain by lower hydraulic conductivity materials. Artesian flows were encountered in the East Deposit Area on the western side of Koktuli Mountain, in Area G, Area E, Upper Talarik Creek Area, and Area A.

Packer hydraulic conductivity testing in bedrock has provided measurements in the order of 10^{-8} (no take) to 10^{-2} cm/s, with most values in the order of 10^{-5} cm/s. Intervals with high take were assumed to have a hydraulic conductivity in the order of 10^{-2} cm/s. Falling/rising head hydraulic conductivity testing in the overburden and the bedrock also indicate hydraulic conductivity values in the order of 10^{-8} to 10^{-2} cm/s, with most values in the order of 10^{-5} cm/s.

Suitable overburden materials and NPAG waste rock that will be stripped from within the proposed West Deposit Area can potentially be used as construction material during the development of mine facilities such as roads, embankments, concrete foundations, etc. The vertical and lateral continuity of materials in the East and West Deposit Areas will need to be verified in future studies to provide a better estimate of the material types and volumes available. Natural moisture contents of test pit samples in this area ranged from 2% dry to 10% wet of the Standard Proctor optimum moisture contents. The natural moisture contents of near surface test pit materials (active layer) are generally expected to have higher moisture contents as these materials are loosened by freeze-thaw processes. Future evaluation should incorporate the final results of the 2011 SRK geotechnical sonic drilling program and further laboratory testing of the various overburden materials in the East and West Deposit Areas is recommended to define material strength, permeability, compaction characteristics, etc., particularly for dense overburden samples collected from depths below the active layer.

The results of the geotechnical site investigation program for the seepage management systems in Area A, the Upper Talarik Creek Area, and Area E are being incorporated in the seepage assessments by SWS. The locations of the potential seepage management systems are deemed to be suitable at this point and will be reviewed during the seepage assessments currently being completed by SWS.

Drilling at a potential crusher location in the West Deposit Area encountered fractured/veined granodiorite and another potential crusher location was drilled in the Upper Talarik Creek Area. Six drillholes were completed at the potential mill site to provide additional information on the geotechnical conditions. The geotechnical conditions at the potential mill site and crusher locations are provided in a separate KP preliminary geotechnical assessment report (Ref. No. VA101-176/38-1 Rev 0).

This report is a compilation of this geotechnical site work completed to date by KP for the Pebble Project. The Pebble Project has continually evolved and additional site work has been required to provide sufficient information to support various revised mine plans. Tables 4.1 to 4.4 present information from all of the KP site investigation programs from 2004 to 2011 for each of the reference areas. Geologic sections presented in this report supersede any issued in previous site investigation reports and must be updated to include future geotechnical site investigation results.

6.2 RECOMMENDATIONS FOR FUTURE WORK

Geotechnical site investigation programs were previously completed to collect general information on the geology and geotechnical conditions. Additional geotechnical and hydrogeological information is required to support the 2011 Prefeasibility Study (PFS) design phases and the permitting process. Future geotechnical site investigation programs collecting hydrogeological and geotechnical information for potential mine infrastructure including waste dumps, seepage management systems, recycle ponds, sediment control ponds, water transfer ponds, tailings storage facilities, and the mill site etc.

The additional geotechnical site investigation programs required to support the permitting phase are expected to take place over a two year period and are scheduled to commence in 2012. The continued use of a specialist geotechnical drilling contractor with helicopter portable equipment is appropriate for future investigations. Maximizing drilling recovery of overburden materials is an important goal of the future geotechnical investigation programs. KP recommends that a hybrid sonic/coring helicopter portable drill rig be considered for drilling, as the sonic drilling method allows for significantly improved overburden recovery for characterization and laboratory samples when compared to conventional mud rotary drilling methods. The ability to switch the sonic head to a conventional mud rotary coring head would allow the drill rig to core the bedrock at the drillhole location and allow for hydraulic conductivity testing of the bedrock.

A significant amount of geotechnical and hydrogeological data has been collected during the various site investigation programs for the Pebble Project over the years. It would be prudent to consider the use of an integrated data management system such as the web-based FULCRUM system being developed by KP. The geotechnical data management aspects of this system will provide a central location for optimal data storage in one location and allow for easy access by multiple consultants for design studies and project permitting.

SECTION 7.0 - REFERENCES

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SECTION 8.0 - CERTIFICATION

This report was prepared and approved by the undersigned.



May 10, 2012

Prepared by:

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Project Engineer

Reviewed by:

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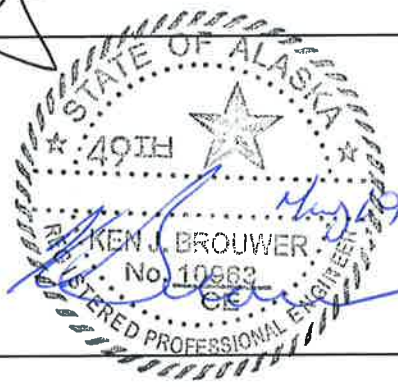

May 10 2012

Approved by:

Ken J. Brouwer, P.E.
Managing Director

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TABLE 3.1

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
GEOTECHNICAL DRILLHOLE SUMMARY INFORMATION SHEET

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Drillhole and Piezometer ID	Location	Alaska State Plane NAD 83 Coordinates			Nominal Hole Size[11]	Total Depth	Depth to Weathered Bedrock	Depth to Competent Bedrock	Hydraulic Conductivity Testing			Piezometer Information							Notes (artesian conditions, fault zones, zones with circulation loss, etc.)	Rock Type			
									Packer Test Zone		Packer Test (Lugeon)	Stickup	Size	Completion Zone		Depth to Water[6,7,8]		Hydraulic Conductivity (Rising/Falling Head)		Depth		PLP Lithocode[3]	Bedrock Type[4]
		Northing[1,2]	Easting[1,2]	Elevation[1,2]					From (ft)	To (ft)				From (ft)	To (ft)		Date Measured			From (ft)	To (ft)		
		(ft)	(ft)	(ft)		(ft)	(ft)	(ft)			(cm/s)	(ft)	(in)			(ft)		(cm/s)					
GH11-229	Upper Talarik Creek Area	2161612	1413849	804	PQ3 to 58' HQ3 to 174'	174	24	50	73	99	2×10^{-5}	3.6	1	34	54.5	-1.3	21-Jul-11	1×10^{-7}	Started on June 5. Drilled with Pur-Vis from 10.5 to 59', 129-174'. No recovery from 34 to 44' due to core tube mislatch. Artesian flow noted at ~ 154', 3.5gpm. Packer #3 artesian flow ~ 13 L/min. Packer # 4, artesian flow ~ 5 L/min, artesian flow ~19L/min, shear zones from 77.2-78.5', 81.5-82', and 95.1-112.3', bentonite chips used to grout piezometer.	24	74	TX	Tertiary Volcaniclastic Breccia/Conglomerate
									93	124	9×10^{-7}									74	77.2	TB	Tertiary Basalt
									133	154	Artesian									77.2	95.7	TC	Tertiary Conglomerate
									153	174	Artesian									95.7	112.2	TXf	Tertiary Volcaniclastic Breccia/Conglomerate
																				112.2	119	TB	Tertiary Basalt
																				119	127.8	TX	Tertiary Volcaniclastic Breccia/Conglomerate
																				127.8	133	TB	Tertiary Basalt
																				133	174	TXf	Tertiary Volcaniclastic Breccia/Conglomerate
GH11-230	Upper Talarik Creek Area	2164330	1420460	1001	PQ3 to 13' HQ3 to 173'	173	3	28	47	73	9×10^{-5}	Bentonite bridged in rods during piezometer installation, water level measured prior to piezometer installation attempt, No piezometer installed.				99.9	10-Jun-11	N/A	Started June 8. Pur-Vis used to 48', 98-150'. Weathered bedrock visible in the side of the sump. Shear zone from 118-123', Minor fault from 130.7-133', Bentonite bridged in drill rods during piezometer installation and pulled PVC up with rods.	3	173	TR	Tertiary Rhyolite
									72	98	2×10^{-4}												
									92	123	9×10^{-5}												
									127	148	6×10^{-5}												
									147	173	7×10^{-5}												
GH11-231	Upper Talarik Creek Area	2160040	1413027	821	PQ3 to 26' HQ3 to 114'	114	24	28	38	69	7×10^{-4}	3.0	1	23	42.25	3.9	25-Jul-11	5×10^{-5}	Started June 11. Pur-Vis used to 26, 39-104'. No drill return after casing was set.	24	114	TXf	Tertiary Volcaniclastic Breccia/Conglomerate
									68	94	6×10^{-5}												
									93	114	2×10^{-5}												
GH11-232	Upper Talarik Creek Area	2161848	1417674	795	PQ3 to 84' HQ3 to 156'	156	79.5	79.5	100	131	1×10^{-6}	3.5	1	61	80	7.5	25-Jul-11	4×10^{-6}	Started this drillhole on June 12. Frozen materials encountered in SPTs from 24 to 39', ice lenses in SPT at 29', Pur-Vis used to 84', 91-131', Very low flow artesian conditions noted at 30', water level was at ground surface during drilling.	79.5	156	TXf	Tertiary Volcaniclastic Breccia/Conglomerate
									130	156	3×10^{-6}												
GH11-233	West Deposit Area	2160359	1404163	1036	PQ3 to 49' HQ3 to 149'	149	39	39	No Packer Tests Performed			3.0	1	54	80	15.0	20-Jul-11	6×10^{-6}	Started drillhole on June 15. Pur-Vis used to 149', drilled in highly fractured/veined granodiorite, difficult to get a UCS sample that meets minimum length requirements.	39	149	Gs	Granodiorite
GH11-234	Area E	2165660	1391922	1205	HWT to 36', PQ3 to 28', HQ3 to 100'	100	28	36	44	75	3×10^{-6}	1.5	1	21.5	42.5	15.1	20-Jul-11	1×10^{-7}	Started this drillhole on June 16. difficulty getting casing down in sand and gravel, tricone bit was used, Pur-Vis used to 40', shear zone from 49.5 to 51', no recovery from 20 to 25', drillhole caves in from 12 to 14' and 22 to 25'.	28	35	Y?	Andesitic Siltstone?
									74	100	2×10^{-6}									35	62.5	Bp	Basalt with plagioclase phenocrysts
																				62.5	65.3	TBd	Tertiary Basalt
																				65.3	93.6	Bp	Basalt with plagioclase phenocrysts
																				93.6	96.1	TBd	Tertiary Basalt
																				96.1	100	Bp	Basalt with plagioclase phenocrysts
GH11-235	Area E	2165210	1392861	1245	PQ3 to 55', Tricone to 60', HQ3 to 86.3', NQ3 to 139'	139	60	84.5	93	119	2×10^{-7}	3.0	1	60	82.25	26.0	20-Jul-11	1×10^{-6}	Started this drillhole on June 19. Difficult drilling in sand and gravel overburden, put in PW casing to 22', Pur-Vis used to 55', then Quikgel from 55 to 85, Pur-Vis from 90 to 119', Lost circulation from 67 to 139' regained from time to time, no recovery from 56 to 60' dur to triconing, shear zone from 81-84'.	60	139	Bp	Basalt with plagioclase phenocrysts
									113	139	2×10^{-5}												

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Drillhole and Piezometer ID	Location	Alaska State Plane NAD 83 Coordinates			Nominal Hole Size[11]	Total Depth	Depth to Weathered Bedrock	Depth to Competent Bedrock	Hydraulic Conductivity Testing			Piezometer Information							Notes (artesian conditions, fault zones, zones with circulation loss, etc.)	Rock Type			
									Packer Test Zone		Packer Test (Lugeon)	Stickup	Size	Completion Zone		Depth to Water[6,7,8]		Hydraulic Conductivity (Rising/Falling Head)		Depth		PLP Lithocode[3]	Bedrock Type[4]
		Northing[1,2]	Easting[1,2]	Elevation[1,2]					From (ft)	To (ft)	(cm/s)	(ft)	(in)	From (ft)	To (ft)	(ft)	Date Measured	(cm/s)		From (ft)	To (ft)		
		(ft)	(ft)	(ft)		(ft)	(ft)	(ft)															
GH11-236	Area E	2163473	1393657	1340	PQ3 to 49', Tricone to 51.5', HQ3 to 109', NQ to 169'	169	59	109	118	144	7×10^{-6}	3.3	2.0	69.0	98.0	36.7	20-Jul-11	1×10^{-6}	Started drillhole on June 22. Difficult drilling in sand and gravel, Pur-Vis used from 0 to 49', then Pur-Vis and Quikgel used from 49 to 64', Pur-Vis used from 64 to 119', No recovery from 39-44, lost circulation and heaving sand at 44', circulation regained after casing installed to 51.5', weathered bedrock at 59 to 109', HWT casing to 51.5'.	95	115	R	Gabbro
									143	169	2×10^{-6}									115	121.1	B	Basalt
																				121.1	169	R	Gabbro
GH11-237	Area E	2163427	1391778	1306	PQ3 to 29', HQ3 to 139.5' NQ3 to 203'	203	104	109	152	178	3×10^{-5}	3.2	2	37	112.5	20.3	25-Jul-11	6×10^{-6}	Started this drillhole on June 25. Difficult drilling in sands and gravels, Pur-Vis used from 0 to 149', Lost circulation and heaving sands at 35', circulation regained when casing extended to 39', fault zones encountered at 114 to 136' and 198 to 201', piezometer completion zone naturally caved in.	109	118.8	B	Basalt
									177	203	7×10^{-6}									118.8	196.6	GK	Kaskanak Granodiorite
																				196.6	203	B	Basalt
GH11-238	Area A, Valley Bottom	2140885	1403838	975	PQ3 to 127', HQ3 to 298'	298	159	246	187	213	5×10^{-5}	3.7	2	149	175	32.8	19-Jul-11	5×10^{-7}	Started drillhole on June 28. Difficult drilling in sands and gravels, Pur-Vis used from 0-43', Quikgel used from 43 to 167', Pur-Vis used from 213 to 238' and 258 to 273', Poor to no circulation during drilling, Lost circulation between 213 to 273', shear zone 180 - 182' and 193 to 203', heaving sand at 43' and 68', no recovery from 167-168'.	162	181.7	TX	Tertiary Volcaniclastic Breccia/Conglomerate
									232	273	1×10^{-4}									181.7	197.8	TR	Tertiary Rhyolite
									260	298	2×10^{-4}									197.8	215.75	TX	Tertiary Volcaniclastic Breccia/Conglomerate
																				215.75	270.6	TR	Tertiary Rhyolite
																				270.6	298	TF	Tertiary Volcaniclastic Conglomerate
GH11-239	Area A, Lower/Mid Side Slope	2141008	1402590	1045	PQ3 to 179', HQ3 to 264'	264	173	197.5	218	239	3×10^{-5}	3.0	1	160	190	91.4	19-Jul-11	3×10^{-7}	Started this drillhole on July 5. Caving in during drilling, heaving sands at 89 and 134', Quikgel used from 0 to 179', Pur-Vis from 179 to 239', No recovery from 134 to 139', 154-159', and 199-204'.	173	264	TM	Tertiary Monzonite
									238	264	2×10^{-5}												
GH11-240	Area A, Lower/Mid Side Slope	2141559	1404684	1046	PQ3 to 104', HQ3 to 173'	173	94	103	124	148	9×10^{-6}	3.4	1	110	130	76.6	20-Jul-11	1×10^{-7}	Started drillhole on July 10. Pur-Vis and Quikgel used from 0 to 105', brief loss of circulation at 102', No recovery from 24 to 25'.	98.7	118.5	TX	Tertiary Volcaniclastic Breccia/Conglomerate
									147	173	2×10^{-5}									118.5	153	TB	Tertiary Basalt
																				153	173	TX	Tertiary Volcaniclastic Breccia/Conglomerate
GH11-241	Area A, Lower/Mid Side Slope	2140947	1401709	1050	PW to 84', PQ3 to 285', HQ3 to 349', NQ3 to 404'	404	329	339	378	404	9×10^{-7}	3.2	1	313	374.6	99.9	25-Jul-11	7×10^{-7}	Started drillhole on July 14. Difficult drilling in sands and gravels, Quikgel used from 0 to 340', Pur-Vis used from 340 to 359', Loss of circulation from 67 to 74' and 79 to 84'. Heaving sands and clayey silt lenses slow progress between 84 and 125', difficult drilling 197 to 198', Tricone used from 287 to 297'. No recovery from 86 to 95', 154 to 159', 214 to 219', and 287 to 297'.	339	404	Y	Andesitic Siltstone

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									Packer Test Zone		Packer Test (Lugeon)	Stickup	Size	Completion Zone		Depth to Water[6,7,8]		Hydraulic Conductivity (Rising/Falling Head)		Depth		PLP Lithocode[3]	Bedrock Type[4]
		Northing[1,2]	Easting[1,2]	Elevation[1,2]					From (ft)	To (ft)	(cm/s)	(ft)	(in)	From (ft)	To (ft)	(ft)	Date Measured	(cm/s)		From (ft)	To (ft)		
		(ft)	(ft)	(ft)		(ft)	(ft)	(ft)															
GH11-242	Area A, Lower/Mid Side Slope	2141281	1400539	1150	PW to 54' PQ3 to 85', HQ3 to 200'	200	79	115	149	175	9×10^{-6}	2.25	1	102	121	59.3	07-Aug-11	2×10^{-8}	Started this drillhole on July 23. Heaving sands from 30' to 60', drillhole sloughs in at 55', Quikgel used from 0 to 85', Pur-Vis used from 85 to 115'.	75.2	174.2	Y	Andesitic Siltstone
									174	200	9×10^{-6}									174.2	200	R	Gabbro
GH11-243	Upper Talarik Creek Area	2161635	1415449	828	PQ3 to 19' HQ3 to 104'	104	16	19.5	48	74	1×10^{-4}	3.3	1	19	37	18.8	08-Aug-11	4×10^{-6}	Started on July 27. Quikgel used to 19', Pur-Vis used from 29-44', intermittant lost circulation from 24 to 44' and 73 to 100'.	16	104	TF	Tertiary Volcaniclastic Conglomerate
									73	104	2×10^{-4}												
GH11-245	Upper Talarik Creek Area	2163479	1417380	908	PQ3 to 20', HQ3 to 110'	110	17.5	17.5	34	60	4×10^{-5}	2.17	1	84	104	58.2	08-Aug-11	3×10^{-6}	Started drillhole on July 30. Quikgel used to 20', then Pur-Vis from 20' to 35', Pur-Vis was also used from 97.8 to 110', Lost circulation from 97 to 110'.	17.5	110	TBv	Tertiary Basalt
									59	85	5×10^{-5}												
									84	110	2×10^{-4}												
GH11-246	Upper Talarik Creek Area	2165240	1419391	1016	PQ3 to 9', HQ3 to 144'	144	4	30	93	119	2×10^{-5}	2.83	1	49	68	27.0	08-Aug-11	2×10^{-7}	Started drillhole on Aug 1. Pur-Vis used from 0 to 54' and 108 to 119'. Lost circulation from 30 to 59' and 108 to 119'.	4	135.6	TRb	Tertiary Rhyolite (flow banded)
									123	144	9×10^{-5}									135.6	144	TXTM	Tertiary Volcaniclastic Breccia/Conglomerate / Tertiary Monzonite
GH11-247	Area E	2163507	1392555	1293	PW to 19', PQ3 to 67 '	67	Bedrock Not Reached		No Packer Tests Performed			No Piezometer							Started this drillhole on Aug 4. Lost circulation from ~10 to 19', Encountered artesian conditions between 59 and 64' in the overburden of ~30 to 40gpm, drilling to 67' increased the flow to ~75 - 80gpm and the hole was abandoned and plugged.	Did not reach the bedrock.			
GH11-274	Upper Talarik Creek Area	2162423	1403783	1078	PQ3 to 31.5' HQ3 to 179'	179	21	32	No Packer Tests Performed			2.0	1	29	49	13.3	1-Oct-11	3×10^{-7}	Started September 16. Pur-Vis used to 65', Fault zone from 54 to ~62'.	20.7	54.9	Gs	Granodiorite
																				54.9	58.7	TBd	Tertiary Basalt
																				58.7	91.2	Gs	Granodiorite
																				91.2	96.2	D	Diorite
																				96.2	140	Gs	Granodiorite
																				140	147.6	D	Diorite
																				147.6	172.3	Gs	Granodiorite
																				172.3	179	D	Diorite
GH11-277	Area E	2163203	1398102	1692	PQ3 to 18' HQ3 to 297'	297	0	13	No Packer Tests Performed			2.7	1	191	214.25	28.5	01-Oct-11	4×10^{-8}	Started September 19. Pur-Vis used to 297', No SPT's performed as fragments of frost heaved bedrock were in the sump and on surface. Lost circulation at 2.5' below surface. Circulation regained once casing is set. Zone of lost recovery from 209.25 to 269' due to core stuck in the barrel and core tubes mislatching, the drillers thought the tubes were latching. Second piezometer installed as the first one was lost.	13	297	Y	Andesitic Siltstone
GH11-281	Area E	2162779	1397396	1591	PQ3 to 19' HQ3 to 169'	169	9	17	No Packer Tests Performed			4.2	1	119.5	151.25	13.6	02-Oct-11	1×10^{-6}	Started September 23. Pur-Vis used from 0 to 164', Quikgel used from 164 to 169', No SPT's performed as fragments of frost heaved bedrock were in the sump. Hole is abandoned as the core barrel was lost down the drillhole. Hole was drilled to 174' but could not retrieve final tube of core.	9	14	D	Diorite
																				14	146.2	Y	Andesitic Siltstone
																				146.2	155.5	YZ	Fault Zone - Andesitic Siltstone
																				155.5	169	Y	Andesitic Siltstone

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TABLE 3.1

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
GEOTECHNICAL DRILLHOLE SUMMARY INFORMATION SHEET

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Drillhole and Piezometer ID	Location	Alaska State Plane NAD 83 Coordinates			Nominal Hole Size[11]	Total Depth	Depth to Weathered Bedrock	Depth to Competent Bedrock	Hydraulic Conductivity Testing			Piezometer Information							Notes (artesian conditions, fault zones, zones with circulation loss, etc.)	Rock Type			
									Packer Test Zone		Packer Test (Lugeon)	Stickup	Size	Completion Zone		Depth to Water[6,7,8]		Hydraulic Conductivity (Rising/Falling Head)		Depth		PLP Lithocode[3]	Bedrock Type[4]
		Northing[1,2]	Easting[1,2]	Elevation[1,2]					From (ft)	To (ft)	(cm/s)	(ft)	(in)	From (ft)	To (ft)	(ft)	Date Measured	(cm/s)		From (ft)	To (ft)		
		(ft)	(ft)	(ft)		(ft)	(ft)	(ft)															
GH11-287	Area E	2161591	1398646	1569	PQ3 to 35' HQ3 to 102' NQ3 to 244'	244	4	31	No Packer Tests Performed			2.9	1	76.8	96	13.0	02-Oct-11	4×10^{-8}	Started September 27. Pur-Vis used from 0 to 33' and 74' to 244'. After drilling to 244', bit and reaming shell were changed and would not advance below 130', drillhole was ended.	9	244	D	Diorite
GH11-293	Area E	2161225	1397745	1483	PQ3 to 19' HQ3 to 229'	229	4	14	No Packer Tests Performed			1.1	1	118	139	15.4	12-Oct-11	3×10^{-8}	Started October 4. Drill rig was commandeered for SRK Sonic Program Pre-Drills, Pur-Vis used from 0 to 229', No SPT's were performed as the cathead required parts, sample taken from sump.	4	135.3	D	Diorite
																				135.3	158	Z	Fault Zone
																				158	229	D	Diorite
GH11-294	Area E	2160964	1398669	1574	PQ3 to 55.5' HQ3 to 224'	224	4	44	No Packer Tests Performed			3.9	1	71	91	26.6	12-Oct-11	4×10^{-6}	Started October 6. Pur-Vis used from 0 to 124', No SPT's were performed as the cathead required parts, sample taken from sump. Core stuck in the core barrel, no recovery from 14 to 49'.	4	14	Y	Andesitic Siltstone
																				14	49	-	No Recovery
																				44	224	Y	Andesitic Siltstone
GH11-296	Area E	2160999	1399428	1647	PQ3 to 24 ' HQ3 to 239 '	239	9	14	No Packer Tests Performed			3.0	1	198	222.2	16.5	12-Oct-11	2×10^{-7}	Started October 9. Pur-Vis used to 144', No top bentonite seal in piezometer as all of the bentonite pellets on site were poured into the bottom bentonite seal and piezometer was installed on nightshift.	12.4	239	Gs	Granodiorite
11534	Area E	2161262	1398047	1509	PQ to 40', Tricone to 49', HQ to 1293', NQ to 1917.5'	1917.5	6	33	No hydraulic conductivity testing or installations were completed for this exploration drillhole.										Started June 23. Quikgel used to 34', Overburden was cored from surface to 33', bedrock is rubbly especially toward top of drillhole, several fault zones, some healed, difficulty drilling, hole was abandoned at 1917.5'.	33	320	D	Diorite
																				320	616	G	Granodiorite
																				616	647.5	D	Diorite
																				647.5	1190.2	G	Granodiorite
																				1190.2	1198.4	D	Diorite
																				1198.4	1224.8	G	Granodiorite
																				1224.8	1293	D	Diorite
																				1293	1579.8	B	Basalt
																				1579.8	1642.3	G	Granodiorite
																				1642.3	1860	B	Basalt
																				1860	1917.5	R	Gabbro

M:\1\01\00176\38\A\Report\3 - 2011 SI Report\Tables\[Table 3.1 2011 GH Drillhole Summary.xlsx]Table 3.3 GH Summary

NOTES:

1. COORDINATE SYSTEM: NAD 83, ALASKA STATE PLANE - ZONE 5 (ft).
2. DRILLHOLE COORDINATES PROVIDED BY PLP.
3. LITHOCODES PROVIDED BY PLP.
4. DETAILED GEOTECHNICAL DRILLHOLE DATA IS INCLUDED IN APPENDIX A AND B.
5. PACKER HYDRAULIC CONDUCTIVITY TESTS (LUGEON METHOD) WERE COMPLETED IN THE BEDROCK. RESPONSE RISING/FALLING HEAD TESTS (HVORSLEV METHOD) WERE CONDUCTED IN THE OVERBURDEN, BEDROCK, AND AT THE OVERBURDEN/BEDROCK CONTACT DEPENDING ON THE PIEZOMETER COMPLETION ZONE.
6. UNLESS OTHERWISE INDICATED, ALL DEPTH AND WATER DEPTH MEASUREMENTS ARE TAKEN WITH RESPECT TO GROUND SURFACE. POSITIVE = BELOW GROUND LEVEL, NEGATIVE = ABOVE GROUND LEVEL.
7. STATIC WATER LEVELS VARY SEASONALLY.
8. SEE INDIVIDUAL DRILLHOLE LOGS FOR CORE SIZE DETAILS.
9. WATER LEVEL MEASURED PRIOR TO PIEZOMETER INSTALLATION ATTEMPT.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	20JAN'11	ISSUED WITH REPORT VA101-176/38-3	LS	LJG	KJB

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TABLE 3.2

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
SUMMARY OF OVERBURDEN DRILLING LABORATORY TESTING RESULTS

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Sample Type	Drillhole	Sample ID	Depth		Moisture Content (%)	Density		Specific Gravity	Total			Effective			Atterberg Limits			Particle Size Distribution											Classification
			From (ft)	To (ft)		Bulk Density (pcf)	Dry Density (pcf)		c (psf)	ϕ (°)	Tanϕ	c (psf)	ϕ (°)	Tanϕ	LL	PL	PI	Cobbles	% Gravel			% Sand				% Fines			Material Description
																			Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total	
STANDARD PENETRATION TESTS	GH11-229	1	6.0	7.5	26.3	-	-	-	-	-	-	-	-	-	50	21	29	0	0.0	0.0	0.0	3.5	3.5	5.0	12.0	42.0	46.0	88.0	CLAY and SILT, some sand, no gravel, poorly graded
		2	9.0	10.5	31.6	-	-	-	-	-	-	-	-	-	58	18	40	0	0.0	0.0	0.0	0.3	1.3	1.5	3.1	63.1	33.8	96.9	Clayey SILT, trace sand, no gravel, poorly graded
		3	14.0	15.5	27.2	-	-	-	-	-	-	-	-	-	40	14	26	0	19.1	17.0	36.1	7.3	11.1	9.8	28.2	21.6	14.1	35.7	Sandy, silty GRAVEL, some clay, well graded
	GH11-231	1	9.0	10.5	18.6	-	-	-	-	-	-	-	-	-	36	17	19	0	0.0	19.7	19.7	5.8	10.3	13.5	29.6	37.9	12.8	50.7	Sandy SILT, some gravel, some clay, well graded
		3	19.0	20.5	28.4	-	-	-	-	-	-	-	-	-	43	20	23	0	2.8	7.7	10.5	2.0	3.2	4.0	9.2	54.0	26.3	80.3	Clayey SILT, some gravel, trace sand, poorly graded
	GH11-232	2	9.0	10.5	25.0	-	-	-	-	-	-	-	-	-	36	19	17	0	3.6	14.2	17.8	4.6	8.2	8.6	21.4	44.6	16.2	60.8	Sandy SILT, some gravel, some clay, well graded
		3	14.0	15.5	18.2	-	-	-	-	-	-	-	-	-	34	17	17	0	3.1	12.9	16.0	4.5	8.4	10.4	23.3	44.0	16.7	60.7	Sandy SILT, some clay, some gravel, well graded
		5	24.0	25.5	24.1	-	-	-	-	-	-	-	-	-	32	17	15	0	0.0	19.7	19.7	4.8	13.6	8.2	26.6	39.7	14.0	53.7	Sandy SILT, some gravel, some clay, well graded
		8	39.0	40.5	31.7	-	-	-	-	-	-	-	-	-	51	15	36	0	5.7	1.2	6.9	1.7	3.5	6.6	11.8	44.1	37.2	81.3	SILT and CLAY, some sand, trace gravel, poorly graded
		12	59.0	60.5	22.5	-	-	-	-	-	-	-	-	-	26	24	2	0	3.4	6.2	9.6	2.8	7.1	14.1	24.0	55.6	10.8	66.4	Sandy SILT, some clay, trace gravel, poorly graded
		14	69.0	70.5	12.3	-	-	-	-	-	-	-	-	-	30	18	12	0	0.0	8.3	8.3	15.2	24.5	17.1	56.8	27.0	7.9	34.9	Silty SAND, trace gravel, trace clay, well graded
	GH11-233	1	4.0	5.5	21.6	-	-	-	-	-	-	-	-	-	37	17	20	0	0.0	22.1	22.1	10.3	14.3	14.4	39.0	28.7	10.2	38.9	Silty, Gravelly SAND, some clay, well graded
		3	14.0	15.5	16.7	-	-	-	-	-	-	-	-	-	36	16	20	0	12.2	17.5	29.7	6.1	7.5	12.8	26.4	32.0	11.9	43.9	Gravelly, Sandy SILT, some clay, well graded
		5	24.0	25.5	13.3	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	23.1	32.6	55.7	11.4	14.0	8.8	34.2	8.6	1.5	10.1	Sandy GRAVEL, trace silt, trace clay, well graded
		6	29.0	30.5	16.2	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	20.1	20.0	40.1	12.9	18.8	11.5	43.2	14.6	2.1	16.7	SAND and GRAVEL, some silt, trace clay, well graded
	GH11-234	2	10.0	11.5	12.0	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	11.8	29.5	41.3	10.1	25.8	10.5	46.4	10.0	2.3	12.3	SAND and GRAVEL, some sand, trace clay, well graded
		3	15.0	16.5	11.5	-	-	-	-	-	-	-	-	-	-	-	-	0	28.4	23.2	51.6	12.4	14.6	10.5	37.5	8.8	2.1	10.9	GRAVEL and SAND, trace silt, trace clay, well graded
		5	25.0	26.5	15.3	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	4.4	36.6	41.0	20.8	24.0	4.5	49.3	9.7		9.7	SAND and GRAVEL, trace silt/clay, poorly graded
	GH11-235	1	4.5	6.0	14.2	-	-	-	-	-	-	-	-	-	25	17	8	0	13.0	22.4	35.4	11.6	13.9	12.5	38.0	21.2	5.4	26.6	Silty SAND and GRAVEL, trace clay, well graded
		2	9.0	10.5	13.2	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	20.1	32.1	52.2	15.8	14.7	7.8	38.3	9.5		9.5	GRAVEL and SAND, trace silt/clay, poorly graded
		4	19.0	20.5	14.0	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	19.6	22.3	41.9	8.2	13.5	13.3	35.0	17.2	5.9	23.1	GRAVEL and SAND, some silt, trace clay, well graded
		7	34.5	36.0	15.9	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	16.3	16.0	32.3	7.0	28.7	19.4	55.1	10.0	2.6	12.6	Gravelly SAND, some silt, trace clay, well graded
		9	44.5	46.0	22.5	-	-	-	-	-	-	-	-	-	24	20	4	0	6.1	8.2	14.3	4.3	31.0	24.9	60.2	19.5	6.0	25.5	SAND, some silt, some gravel, trace clay, poorly graded
		10	50.0	51.5	18.4	-	-	-	-	-	-	-	-	-	31	23	8	0	0.0	21.0	21.0	12.0	13.0	15.1	40.1	31.0	7.9	38.9	Silty, Gravelly SAND, trace clay, well graded
	GH11-236	1	4.0	5.5	12.7	-	-	-	-	-	-	-	-	-	26	17	9	0	4.6	25.4	30.0	9.4	16.4	14.6	40.4	21.5	8.1	29.6	Gravelly, Silty SAND, trace clay, well graded
		3	14.0	15.5	11.7	-	-	-	-	-	-	-	-	-	26	14	12	0	13.8	27.9	41.7	8.2	11.2	12.5	31.9	17.3	9.1	26.4	Sandy GRAVEL, some silt, trace clay, well graded
		5	24.0	25.5	12.7	-	-	-	-	-	-	-	-	-	28	15	13	0	13.6	22.5	36.1	12.5	14.4	12.6	39.5	19.4	5.0	24.4	SAND and GRAVEL, some silt, trace clay, well graded
		7	34.0	35.5	12.8	-	-	-	-	-	-	-	-	-	23	NP	NP	0	26.3	23.7	50.0	19.8	13.4	8.6	41.8	6.0	2.2	8.2	GRAVEL and SAND, trace silt, trace clay, well graded
		10	49.0	50.5	25.8	-	-	-	-	-	-	-	-	-	32	20	12	0	0.0	18.7	18.7	5.3	7.8	18.7	31.8	43.0	6.5	49.5	Sandy SILT, some gravel, trace clay, well graded
		12	59.5	61.0	22.7	-	-	-	-	-	-	-	-	-	31	23	8	0	1.8	16.5	18.3	6.3	6.4	14.2	26.9	44.2	10.6	54.8	Sandy SILT, some gravel, some clay, well graded
		15	74.0	75.5	25.6	-	-	-	-	-	-	-	-	-	33	27	6	0	3.2	13.4	16.6	5.6	8.9	12.3	26.8	47.0	9.6	56.6	Weathered Bedrock: Sandy SILT, some gravel, trace clay, well graded

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TABLE 3.2

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
SUMMARY OF OVERBURDEN DRILLING LABORATORY TESTING RESULTS

Print May/10/2012 14:26:43

Sample Type	Drillhole	Sample ID	Depth		Moisture Content (%)	Density		Specific Gravity	Total			Effective			Atterberg Limits			Particle Size Distribution											Classification
			From (ft)	To (ft)		Bulk Density (pcf)	Dry Density (pcf)		c (psf)	ϕ (°)	Tanϕ	c (psf)	ϕ (°)	Tanϕ	LL	PL	PI	Cobbles	% Gravel			% Sand				% Fines			Material Description
																			Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total	
STANDARD PENETRATION TESTS	GH11-237	2	9.0	10.5	8.4	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	32.3	32.0	64.3	12.1	13.2	5.4	30.7	4.9	0.1	5.0	Sandy GRAVEL, trace silt, trace clay, poorly graded
		6	29.0	30.5	10.7	-	-	-	-	-	-	-	-	-	22	NP	NP	0	23.5	39.8	63.3	12.6	13.1	5.6	31.3	3.7	1.7	5.4	Sandy GRAVEL, trace silt, trace clay, poorly graded
		10	49.0	50.5	12.1	-	-	-	-	-	-	-	-	-	24	14	10	0	8.5	26.6	35.1	12.5	14.0	12.1	38.6	17.8	8.5	26.3	SAND and GRAVEL, some silt, trace clay, well graded
		11	54.0	55.5	11.6	-	-	-	-	-	-	-	-	-	25	14	11	0	10.0	23.4	33.4	9.1	12.8	14.2	36.1	23.2	7.3	30.5	Gravelly, Silty SAND, trace clay, well graded
		12	59.0	60.5	11.4	-	-	-	-	-	-	-	-	-	25	14	11	0	17.6	21.3	38.9	8.1	13.0	13.1	34.2	22.0	4.9	26.9	Sandy, Silty GRAVEL, trace clay, well graded
		16	79.0	80.5	12.6	-	-	-	-	-	-	-	-	-	29	15	14	0	0.0	28.2	28.2	8.5	12.9	16.1	37.5	27.8	6.5	34.3	Gravelly, Silty SAND, trace clay, well graded
		17	84.0	85.5	15.6	-	-	-	-	-	-	-	-	-	27	15	12	0	9.7	26.7	36.4	7.2	15.0	12.8	35.0	22.6	6.0	28.6	Silty GRAVEL and SAND, trace clay, well graded
		19	94.0	95.5	10.9	-	-	-	-	-	-	-	-	-	24	19	5	0	23.9	20.0	43.9	7.6	13.4	11.9	32.9	17.2	6.0	23.2	Sandy GRAVEL, some silt, trace clay, well graded
		21	104.0	105.5	16.5	-	-	-	-	-	-	-	-	-	24	NP	NP	0	0.0	17.5	17.5	21.4	20.1	14.0	55.5	22.4	4.6	27.0	Silty SAND, some gravel, trace clay, well graded
	GH11-238	1	3.0	4.5	29.1	-	-	-	-	-	-	-	-	-	28	NP	NP	0	0.0	22.1	22.1	6.1	9.5	20.2	35.8	35.6	6.5	42.1	Gravelly SAND and SILT, trace clay, well graded
		5	23.0	24.5	18.5	-	-	-	-	-	-	-	-	-	23	16	7	0	5.3	24.8	30.1	6.5	15.0	16.8	38.3	23.9	7.7	31.6	Gravelly, Silty SAND, trace clay, well graded
		7	33.0	34.5	18.3	-	-	-	-	-	-	-	-	-	25	19	6	0	0.0	12.5	12.5	5.1	7.8	11.7	24.6	52.2	10.7	62.9	Sandy SILT, some gravel, some clay, poorly graded
		8	38.0	39.5	13.1	-	-	-	-	-	-	-	-	-	26	21	5	0	22.3	29.9	52.2	11.8	15.7	8.9	36.4	8.8	2.6	11.4	GRAVEL and SAND, trace silt, trace clay, well graded
		10	48.0	49.5	14.8	-	-	-	-	-	-	-	-	-	28	NP	NP	0	10.0	36.9	46.9	14.8	19.8	9.8	44.4	6.1	2.6	8.7	GRAVEL and SAND, trace silt, trace clay, well graded
		14	68.0	69.5	9.8	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	7.9	48.7	56.6	13.9	12.9	8.7	35.5	7.9		7.9	GRAVEL and SAND, trace silt/clay, poorly graded
		16	78.0	79.5	14.8	-	-	-	-	-	-	-	-	-	34	29	5	0	15.8	38.9	54.7	10.6	16.5	7.4	34.5	10.4	0.4	10.8	Sandy GRAVEL, some silt, trace clay, well graded
		17	83.0	84.5	12.0	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	27.1	21.8	48.9	12.7	17.5	7.6	37.8	11.5	1.8	13.3	GRAVEL and SAND, some silt, trace clay, well graded
		20	98.0	99.5	14.8	-	-	-	-	-	-	-	-	-	22	NP	NP	0	0.0	39.9	39.9	15.4	21.2	14.0	50.6	9.5		9.5	SAND and GRAVEL, trace silt/clay, poorly graded
		21	103.0	104.5	20.6	-	-	-	-	-	-	-	-	-	29	22	7	0	13.5	23.9	37.4	6.2	9.6	13.9	29.7	28.6	4.3	32.9	Sandy, Silty GRAVEL, trace clay, well graded
		22	108.0	109.5	17.0	-	-	-	-	-	-	-	-	-	28	20	8	0	1.9	49.9	51.8	11.5	12.8	7.2	31.5	14.1	2.6	16.7	Sandy GRAVEL, some silt, trace clay, well graded
		26	128.0	129.5	9.9	-	-	-	-	-	-	-	-	-	26	16	10	0	0.0	33.8	33.8	11.2	14.8	12.6	38.6	16.9	10.7	27.6	Gravelly SAND, some silt, some clay, well graded
		29	143.0	144.5	11.7	-	-	-	-	-	-	-	-	-	24	20	4	0	4.6	44.5	49.1	15.4	16.9	8.7	41.0	9.9		9.9	GRAVEL and SAND, trace silt/clay, poorly graded
	GH11-239	1	4.0	5.5	23.7	-	-	-	-	-	-	-	-	-	30	19	11	0	3.6	7.9	11.5	6.1	8.1	11.2	25.4	48.6	14.5	63.1	Sandy SILT, some clay, some gravel, well graded
		5	24.0	25.5	18.4	-	-	-	-	-	-	-	-	-	37	17	20	0	3.6	12.4	16.0	7.8	9.8	9.3	26.9	38.9	18.2	57.1	Sandy SILT, some clay, some gravel, well graded
		6	29.0	30.5	8.8	-	-	-	-	-	-	-	-	-	27	22	5	0	33.1	31.5	64.6	2.7	15.2	7.4	25.3	7.5	2.6	10.1	Sandy GRAVEL, trace silt, trace clay, well graded
		11	54.0	55.5	10.3	-	-	-	-	-	-	-	-	-	31	15	16	0	22.0	18.8	40.8	7.4	10.8	11.8	30.0	20.5	8.7	29.2	Sandy, Silty GRAVEL, trace clay, well graded
		12	59.0	60.5	9.5	-	-	-	-	-	-	-	-	-	27	20	7	0	4.1	34.7	38.8	12.8	25.0	9.3	47.1	9.9	4.2	14.1	SAND and GRAVEL, trace silt, trace clay, well graded
		14	69.0	70.5	15.4	-	-	-	-	-	-	-	-	-	28	23	5	0	9.3	34.3	43.6	13.9	19.2	9.3	42.4	11.1	2.9	14.0	GRAVEL and SAND, some silt, trace clay, well graded
		16	79.0	80.5	13.1	-	-	-	-	-	-	-	-	-	28	22	6	0	2.6	28.9	31.5	15.1	25.9	11.7	52.7	13.2	2.6	15.8	Gravelly SAND, some silt, trace clay, well graded
		18	89.0	90.5	13.9	-	-	-	-	-	-	-	-	-	26	NP	NP	0	0.0	43.2	43.2	16.8	19.3	9.9	46.0	7.9	2.9	10.8	SAND and GRAVEL, trace silt, trace clay, well graded
		20	99.0	100.5	14.6	-	-	-	-	-	-	-	-	-	-	-	-	0	13.5	40.3	53.8	14.4	14.5	6.9	35.8	7.1	3.3	10.4	GRAVEL and SAND, trace silt, trace clay, well graded
		21	104.0	105.5	10.2	-	-	-	-	-	-	-	-	-	23	NP	NP	0	23.4	25.8	49.2	11.5	15.0	13.2	39.7	8.2	2.9	11.1	GRAVEL and SAND, trace silt, trace clay, well graded
		23	114.0	115.5	10.8	-	-	-	-	-	-	-	-	-	26	20	6	0	11.3	35.9	47.2	13.0	16.3	10.3	39.6	9.2	4.0	13.2	GRAVEL and SAND, trace silt, trace clay, well graded
		25	124.0	125.5	11.1	-	-	-	-	-	-	-	-	-	25	19	6	0	11.2	30.3	41.5	14.1	19.3	11.1	44.5	10.6	3.4	14.0	SAND and GRAVEL, some silt, trace clay, well graded

Knight Piésold CONSULTING

TABLE 3.2

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION

SUMMARY OF OVERBURDEN DRILLING LABORATORY TESTING RESULTS

Print May/10/2012 14:26:43

STANDARD PENETRATION TESTS

Sample Type	Drillhole	Sample ID	Depth		Moisture Content (%)	Density		Specific Gravity	Total			Effective			Atterberg Limits			Particle Size Distribution											Classification
			From (ft)	To (ft)		Bulk Density (pcf)	Dry Density (pcf)		c (psf)	ϕ (°)	Tanϕ	c (psf)	ϕ (°)	Tanϕ	LL	PL	PI	Cobbles	% Gravel			% Sand				% Fines			Material Description
																			Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total	
		29	149.0	150.5	12.1	-	-	-	-	-	-	-	-	-	23	NP	NP	0	12.4	29.8	42.2	14.7	19.3	13.1	47.1	9.1	1.6	10.7	SAND and GRAVEL, trace silt, trace clay, well graded
	GH11-239	31	159.0	160.5	12.6	-	-	-	-	-	-	-	-	-	20	NP	NP	0	12.2	28.0	40.2	8.9	16.0	22.9	47.8	8.9	3.1	12.0	SAND and GRAVEL, trace silt, trace clay, well graded
		33	169.0	170.5	14.9	-	-	-	-	-	-	-	-	-	29	19	10	0	5.4	21.8	27.2	11.9	16.3	18.5	46.7	20.3	5.8	26.1	Gravelly, Silty SAND, trace clay, well graded
	GH11-240	2	8.0	9.5	21.0	-	-	-	-	-	-	-	-	-	35	19	16	0	0.0	28.2	28.2	11.3	10.5	12.2	34.0	27.2	10.6	37.8	Gravelly, Silty SAND, some clay, well graded
		4	18.0	19.5	19.3	-	-	-	-	-	-	-	-	-	35	17	18	0	16.9	13.1	30.0	6.6	11.1	12.5	30.2	26.9	12.9	39.8	Silty SAND and GRAVEL, some clay, well graded
		5	23.0	24.5	16.3	-	-	-	-	-	-	-	-	-	32	17	15	0	12.3	14.8	27.1	5.9	8.5	11.4	25.8	34.5	12.6	47.1	Gravelly, Sandy SILT, some clay, well graded
		8	38.0	39.5	11.2	-	-	-	-	-	-	-	-	-	29	15	14	0	13.8	24.2	38.0	8.5	11.5	11.6	31.6	19.9	10.5	30.4	Sandy GRAVEL, some silt, some clay, well graded
		11	53.0	54.5	9.2	-	-	-	-	-	-	-	-	-	22	NP	NP	0	9.2	40.8	50.0	13.5	17.1	8.5	39.1	8.2	2.7	10.9	GRAVEL and SAND, trace silt, trace clay, well graded
		12	58.0	59.5	9.3	-	-	-	-	-	-	-	-	-	22	19	3	0	8.1	41.6	49.7	17.6	16.9	6.6	41.1	8.0	1.2	9.2	GRAVEL and SAND, trace silt, trace clay, well graded
		14	68.0	69.5	14.1	-	-	-	-	-	-	-	-	-	32	16	16	0	29.2	20.2	49.4	6.9	9.3	8.3	24.5	16.9	9.2	26.1	Sandy GRAVEL, some silt, trace clay, well graded
		17	83.0	84.5	12.2	-	-	-	-	-	-	-	-	-	25	NP	NP	0	5.3	36.9	42.2	18.6	23.8	6.9	49.3	6.1	2.4	8.5	GRAVEL and SAND, trace silt, trace clay, poorly graded
		18	88.0	89.5	15.3	-	-	-	-	-	-	-	-	-	29	21	8	0	19.0	15.5	34.5	17.1	16.4	11.5	45.0	16.5	4.0	20.5	Gravelly SAND, some silt, trace clay, well graded
		19	93.0	94.5	28.1	-	-	-	-	-	-	-	-	-	37	28	9	0	10.0	1.0	11.0	10.4	15.1	14.0	39.5	40.2	9.3	49.5	SILT and SAND, some gravel, trace clay, well graded
	GH11-241	1	4.0	5.5	15.2	-	-	-	-	-	-	-	-	-	33	17	16	0	7.4	18.7	26.1	8.7	10.8	14.2	33.7	28.8	11.4	40.2	Silty, Gravelly SAND, some clay, well graded
		3	14.0	15.5	14.5	-	-	-	-	-	-	-	-	-	32	15	17	0	5.6	14.5	20.1	6.8	12.4	17.8	37.0	30.3	12.6	42.9	Silty, Gravelly SAND, some clay, well graded
		5	29.0	30.5	17.4	-	-	-	-	-	-	-	-	-	26	19	7	0	10.9	17.2	28.1	5.9	6.7	19.0	31.6	31.4	8.9	40.3	Gravelly SAND and SILT, trace clay, poorly graded
		9	49.0	50.5	17.2	-	-	-	-	-	-	-	-	-	30	15	15	0	0.0	19.8	19.8	8.3	13.1	16.8	38.2	31.5	10.5	42.0	Silty SAND, some gravel, some clay, well graded
		11	59.0	60.5	12.8	-	-	-	-	-	-	-	-	-	23	NP	NP	0	0.0	33.3	33.3	21.8	18.5	14.5	54.8	9.0	2.9	11.9	Gravelly SAND, trace silt, trace clay, well graded
		15	79.0	80.5	23.4	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	2.6	0.3	2.9	0.0	0.5	48.7	49.2	40.9	7.0	47.9	SAND and SILT, trace gravel, trace clay, poorly graded
		16	84.0	85.5	25.6	-	-	-	-	-	-	-	-	-	33	19	14	0	0.0	0.0	0.0	0.3	0.8	20.5	21.6	57.1	21.3	78.4	Sandy, Clayey SILT, no gravel, poorly graded
		17	90.0	91.5	24.7	-	-	-	-	-	-	-	-	-	30	20	10	0	0.0	5.4	5.4	1.7	3.5	7.6	12.8	64.1	17.7	81.8	SILT, some clay, some sand, trace gravel, poorly graded
		18	95.0	96.5	26.3	-	-	-	-	-	-	-	-	-	29	24	5	0	3.4	2.6	6.0	0.3	1.0	8.9	10.2	70.9	12.9	83.8	SILT, some clay, some sand, trace gravel, poorly graded
		25	129.0	130.5	12.7	-	-	-	-	-	-	-	-	-	24	19	5	0	12.6	29.8	42.4	13.6	18.8	11.4	43.8	11.0	2.8	13.8	SAND and GRAVEL, some silt, trace clay, well graded
		26	134.0	135.5	15.1	-	-	-	-	-	-	-	-	-	27	19	8	0	6.5	27.2	33.7	15.2	22.5	11.4	49.1	14.9	2.3	17.2	Gravelly SAND, some silt, trace clay, well graded
		32	169.0	170.5	18.8	-	-	-	-	-	-	-	-	-	26	22	4	0	4.8	12.9	17.7	8.9	17.0	16.3	42.2	35.5	4.6	40.1	SAND and SILT, some gravel, trace clay, well graded
		37	194.0	195.5	13.7	-	-	-	-	-	-	-	-	-	24	14	10	0	0.0	19.0	19.0	7.0	12.8	23.7	43.5	28.0	9.5	37.5	Silty SAND, some gravel, trace clay, well graded
		39	204.0	205.5	16.7	-	-	-	-	-	-	-	-	-	27	21	6	0	0.0	21.5	21.5	11.7	13.9	11.8	37.4	35.8	5.3	41.1	Gravelly SAND and SILT, trace clay, well graded
		45	239.0	240.5	12.6	-	-	-	-	-	-	-	-	-	25	19	6	0	8.0	35.0	43.0	16.4	22.7	8.6	47.7	8.6	0.7	9.3	SAND and GRAVEL, trace silt, trace clay, well graded
		54	329.0	330.5	19.6	-	-	-	-	-	-	-	-	-	25	NP	NP	0	0.0	14.6	14.6	11.9	28.2	25.0	65.1	18.1	2.2	20.3	SAND, some silt, some gravel, trace clay, well graded
	GH11-242	2	10.0	11.5	14.7	-	-	-	-	-	-	-	-	-	27	17	10	0	25.5	14.1	39.6	9.2	12.0	11.9	33.1	21.1	6.2	27.3	Sandy, Silty GRAVEL, trace clay, well graded
		5	25.0	26.5	10.5	-	-	-	-	-	-	-	-	-	26	17	9	0	17.5	28.2	45.7	12.2	17.0	9.5	38.7	11.5	4.1	15.6	GRAVEL and SAND, some silt, trace clay, well graded
		6	30.0	31.5	13.1	-	-	-	-	-	-	-	-	-	30	15	15	0	7.6	24.2	31.8	8.4	15.4	14.6	38.4	20.8	9.0	29.8	Gravelly, Silty SAND, trace clay, well graded
		11	55.0	56.5	10.6	-	-	-	-	-	-	-	-	-	25	19	6	0	8.8	35.1	43.9	14.8	14.6	7.5	36.9	15.8	3.4	19.2	GRAVEL and SAND, some silt, trace clay, well graded
		13	65.0	66.5	23.3	-	-	-	-	-	-	-	-	-	44	23	21	0	6.6	2.3	8.9	3.9	23.5	21.2	48.6	29.8	12.7	42.5	Silty SAND, some clay, trace gravel, poorly graded

Knight Piésold CONSULTING

TABLE 3.2

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION

SUMMARY OF OVERBURDEN DRILLING LABORATORY TESTING RESULTS

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Sample Type	Drillhole	Sample ID	Depth		Moisture Content (%)	Density		Specific Gravity	Total			Effective			Atterberg Limits			Particle Size Distribution											Classification
			From (ft)	To (ft)		Bulk Density (pcf)	Dry Density (pcf)		c (psf)	ϕ (°)	Tanϕ	c (psf)	ϕ (°)	Tanϕ	LL	PL	PI	Cobbles	% Gravel			% Sand				% Fines			Material Description
																			Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total	
	GH11-243	1	5.5	7.0	19.3	-	-	-	-	-	-	-	-	-	36	17	19	0	0.0	15.9	15.9	10.4	17.0	13.0	40.4	28.3	15.4	43.7	Silty SAND, some gravel, some clay, well graded
		2	9.0	10.5	21.1	-	-	-	-	-	-	-	-	-	33	21	12	0	6.6	14.6	21.2	6.0	9.3	7.2	22.5	45.7	10.6	56.3	Sandy, gravelly SILT, some clay, poorly graded
STANDARD PENETRATION TESTS	GH11-245	1	5.0	6.5	48.4	-	-	-	-	-	-	-	-	-	33	NP	NP	0	0.0	1.8	1.8	2.7	7.1	27.9	37.7	56.1	4.4	60.5	SILT and SAND, trace clay, trace gravel, poorly graded
		2	15.0	16.5	36.9	-	-	-	-	-	-	-	-	-	47	36	11	0	0.0	1.3	1.3	8.0	25.0	28.0	61.0	33.1	4.6	37.7	Silty SAND, trace clay, trace gravel, well graded
	GH11-247	1	4.0	5.5	17.8	-	-	-	-	-	-	-	-	-	22	18	4	0	0.0	11.9	11.9	7.6	12.3	26.4	46.3	35.8	6.0	41.8	SAND and SILT, some gravel, trace clay, well graded
		3	14.0	15.5	12.0	-	-	-	-	-	-	-	-	-	21	NP	NP	0	26.3	20.2	46.5	10.0	11.8	11.4	33.2	16.8	3.5	20.3	Sandy GRAVEL, some silt, trace clay, well graded
		4	19.0	20.5	13.6	-	-	-	-	-	-	-	-	-	23	NP	NP	0	0.0	18.1	18.1	22.6	38.3	11.1	72.0	9.0	0.9	9.9	SAND, some gravel, some silt, trace clay, well graded
		7	34.0	35.5	9.5	-	-	-	-	-	-	-	-	-	25	13	12	0	0.0	36.5	36.5	5.7	12.1	15.4	33.2	21.1	9.2	30.3	Sandy, Silty GRAVEL, trace clay, well graded
		11	54.0	55.5	10.6	-	-	-	-	-	-	-	-	-	24	14	10	0	13.2	32.2	45.4	8.4	11.9	12.4	32.7	15.5	6.4	21.9	Sandy GRAVEL, some silt, trace clay, well graded
		13	64.0	65.5	8.8	-	-	-	-	-	-	-	-	-	24	22	2	0	18.0	31.1	49.1	10.8	13.5	8.5	32.8	16.8	1.3	18.1	Sandy GRAVEL, some silt, trace clay, well graded
	GH11-274	3	14.0	15.5	23.1	-	-	-	-	-	-	-	-	-	41	20	21	0	8.4	19.1	27.5	9.5	13.8	13.5	36.8	28.1	7.6	35.7	Silty, Gravelly SAND, trace clay, well graded
	GH11-287	1	4.0	5.5	23.9	-	-	-	-	-	-	-	-	-	26	NP	NP	0	4.8	8.7	13.5	5.1	8.8	26.5	40.4	40.9	5.2	46.1	SILT and SAND, some gravel, trace clay, poorly graded
		2	9.0	10.5	24.1	-	-	-	-	-	-	-	-	-	30	24	6	0	0.0	0.4	0.4	1.3	4.4	37.0	42.7	46.1	10.8	56.9	SILT and SAND, some clay, trace gravel, poorly graded
	GH11-296	1	4.0	5.5	13.1	-	-	-	-	-	-	-	-	-	27	19	8	0	22.1	28.2	50.3	14.3	13.8	9.2	37.3	10.6	1.8	12.4	GRAVEL and SAND, some silt, trace clay, well graded
		2	9.0	10.5	11.2	-	-	-	-	-	-	-	-	-	21	18	3	0	9.7	31.0	40.7	8.8	10.7	11.9	31.4	24.4	3.5	27.9	Sandy, Silty GRAVEL, trace clay, well graded
SHELBY TUBES	GH11-229	2	4.0	6.0	27.4	-	86.2	2.61	130	18	0.32	360	29	0.56	47	21	26	0	0.0	0.6	0.6	1.3	2.2	5.8	9.3	49.1	41.0	90.1	SILT and CLAY, trace sand, trace gravel, poorly graded
	GH11-232	2	4.0	6.0	25.1	-	90.7	2.72	0	33	0.65	50	37	0.75	29	22	7	0	0.0	1.7	1.7	2.6	3.8	5.6	12.0	71.9	14.4	86.3	SILT, some clay, trace sand, trace gravel, poorly graded
	GH11-239	2	14.0	15.5	22.0	-	97.3	2.67	930	14	0.24	490	26	0.49	49	15	34	0	4.3	9.3	13.6	5.4	8.6	11.3	25.3	34.5	26.6	61.1	Clayey, Sandy SILT, some gravel, well graded
	GH11-241	1	19.0	20.5	14.3	-	103.8	2.73	-	-	-	-	-	-	32	16	16	0	20.8	13.3	34.1	6.5	10.1	15.2	31.8	25.0	9.1	34.1	Sandy, Silty GRAVEL, trace clay, well graded
	GH11-243	1	4.0	5.5	25.7	-	80.4	2.72	1400	12	0.21	1520	17	0.31	43	20	23	0	0.0	0.0	0.0	1.8	2.1	3.6	7.5	51.1	41.4	92.5	SILT and CLAY, trace sand, no gravel, poorly graded
	GH11-245	1	10.0	10.3	15.5	-	-	-	-	-	-	-	-	-	NP	NP	NP	0	38.0	31.5	69.5	8.1	8.8	6.1	23.0	6.6	0.9	7.5	Sandy GRAVEL, trace silt, trace clay, well graded
TILL	GH11-229	1	3.0	3.8	25.2	119.1	-	-	-	-	-	-	-	-	44	17	27	0	0.0	4.4	4.4	3.1	3.6	5.4	12.1	37.2	46.3	83.5	CLAY and SILT, some sand, trace gravel, poorly graded
	GH11-231	1	4.8	5.8	23.0	122.0	-	-	-	-	-	-	-	-	37	19	18	0	0.6	2.0	2.6	3.4	3.9	11.5	18.8	49.3	29.3	78.6	Clayey SILT, some sand, trace gravel, poorly graded
		2	6.8	8.0	11.8	130.8	-	-	-	-	-	-	-	-	30	14	16	0	15.0	19.8	34.8	6.7	10.8	13.0	30.5	23.9	10.8	34.7	Sandy, Silty GRAVEL, some clay, well graded
		3	21.5	22.5	32.2	125.7	-	-	-	-	-	-	-	-	49	19	30	0	0.0	0.0	0.0	0.9	0.8	0.9	2.6	59.7	37.7	97.4	SILT and CLAY, trace sand, no gravel, poorly graded
	GH11-232	1	3.0	4.0	25.4	104.9	-	-	-	-	-	-	-	-	36	22	14	0	0.0	2.3	2.3	0.6	1.9	5.0	7.5	67.7	22.5	90.2	Clayey SILT, trace sand, trace gravel, poorly graded
		3	32.6	33.4	29.4	107.0	-	-	-	-	-	-	-	-	32	23	9	0	0.0	0.0	0.0	0.0	0.1	0.3	0.4	78.5	21.1	99.6	Clayey SILT, trace sand, no gravel, poorly graded
		4	52.0	53.0	28.8	93.3	-	-	-	-	-	-	-	-	51	15	36	0	0.0	1.9	1.9	1.9	3.3	4.1	9.3	48.7	40.1	88.8	SILT and CLAY, trace sand, trace gravel, poorly graded
		5	67.8	68.5	11.7	123.3	-	-	-	-	-	-	-	-	31	19	12	0	21.9	14.4	36.3	8.2	13.4	14.1	35.7	23.0	5.0	28.0	Silty GRAVEL and SAND, trace clay, well graded
	GH11-236	1	51.5	52.5	17.5	73.9	-	-	-	-	-	-	-	-	40	18	22	0	19.6	19.7	39.3	4.3	6.9	10.0	21.2	26.6	12.9	39.5	Silty, Sandy GRAVEL, some clay, well graded
	GH11-239	1	6.0	7.0	22.4	123.7	-	-	-	-	-	-	-	-	31	20	11	0	9.3	5.4	14.7	2.2	2.6	3.7	8.5	64.5	12.3	76.8	SILT, some gravel, some clay, trace sand, poorly graded
	GH11-241	2	82.5	83.0	22.2	172.4	-	-	-	-	-	-	-	-	32	18	14	0	1.6	7.3	8.9	4.0	7.0	19.8	30.8	40.3	20.0	60.3	Sandy, Clayey SILT, trace gravel, poorly graded
		3	213.5	214.0	27.0	152.5	-	-	-	-	-	-	-	-	40	20	20	0	0.0	0.0	0.0	0.0	0.3	2.5	2.8	77.0	20.2	97.2	Clayey SILT, trace sand, no gravel, poorly graded
		1	25.5	26.0	14.1	-	-	-	-	-	-	-	-	-	30	24	6	0	4.9	30.5	35.4	18.5	17.3	10.0	45.8	15.7	3.1	18.8	SAND and GRAVEL, some silt, trace clay, well graded

Knight Piésold CONSULTING

TABLE 3.2

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION

SUMMARY OF OVERBURDEN DRILLING LABORATORY TESTING RESULTS

Print May/10/2012 14:26:43

Sample Type	Drillhole	Sample ID	Depth		Moisture Content (%)	Density		Specific Gravity	Total			Effective			Atterberg Limits			Particle Size Distribution											Classification
			From (ft)	To (ft)		Bulk Density (pcf)	Dry Density (pcf)		c (psf)	ϕ (°)	Tanϕ	c (psf)	ϕ (°)	Tanϕ	LL	PL	PI	Cobbles	% Gravel			% Sand				% Fines			Material Description
																			Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total	
	GH11-266S	2	38.5	39.0	15.1	-	-	-	-	-	-	-	-	-	39	16	23	0	10.5	12.5	23.0	5.2	9.2	13.1	27.5	36.4	13.1	49.5	Sandy, Gravelly SILT, some clay, well graded
		3	56.5	57.0	22.1	-	-	-	-	-	-	-	-	-	28	18	10	0	6.7	15.0	21.7	5.5	8.5	17.5	31.5	34.4	12.4	46.8	Sandy, Gravelly, SILT, some clay, well graded
TILL	GH11-267S	1	7.5	8.0	11.8	-	-	-	-	-	-	-	-	-	28	18	10	0	26.9	33.0	59.9	7.6	13.0	8.2	28.8	9.6	1.7	11.3	Sandy GRAVEL, some silt, trace clay, well graded
		2	29.5	30.0	20.4	-	-	-	-	-	-	-	-	-	48	15	33	0	3.5	12.7	16.2	3.0	10.0	13.6	26.6	37.6	19.6	57.2	Sandy SILT, some clay, some gravel, well graded
		3	44.5	45.0	14.2	-	-	-	-	-	-	-	-	-	45	18	27	0	33.4	19.6	53.0	4.9	13.2	10.5	28.6	11.3	7.1	18.4	Sandy GRAVEL, some silt, trace clay, well graded
	GH11-278S	1	17.0	17.5	16.2	-	-	-	-	-	-	-	-	-	34	16	18	0	20.8	10.7	31.5	4.9	9.3	20.1	34.3	24.8	9.4	34.2	Silty, Gravelly SAND, trace clay, well graded
		2	23.7	24.0	14.4	-	-	-	-	-	-	-	-	-	46	15	31	0	2.1	13.7	15.8	7.9	12.4	15.0	35.3	32.0	16.9	48.9	Silty SAND, some clay, some gravel, well graded
		3	29.5	30.0	14.0	-	-	-	-	-	-	-	-	-	48	15	33	0	22.0	15.5	37.5	6.8	10.1	10.8	27.7	23.0	11.8	34.8	Sandy, Silty GRAVEL, some clay, well graded
	GH11-279S	1	14.0	14.5	11.6	-	-	-	-	-	-	-	-	-	30	17	13	0	20.1	19.0	39.1	6.0	15.9	12.2	34.1	20.0	6.8	26.8	Sandy, Silty GRAVEL, trace clay, well graded
		2	35.0	32.5	15.6	-	-	-	-	-	-	-	-	-	27	19	8	0	6.4	21.7	28.1	9.3	12.9	27.0	49.2	15.4	7.3	22.7	Gravelly SAND, some silt, trace clay, well graded
	GH11-289S	1	19.5	20.0	12.4	-	-	-	-	-	-	-	-	-	35	16	19	0	1.3	16.8	18.1	7.3	13.6	15.4	36.3	38.6	7.0	45.6	SILT and SAND, some gravel, trace clay, well graded
		2	25.5	26.0	18.2	-	-	-	-	-	-	-	-	-	45	16	29	0	4.0	22.3	26.3	5.1	8.1	8.8	22.0	34.0	17.7	51.7	Gravelly, Sandy SILT, some clay, well graded
		3	33.0	33.5	22.3	-	-	-	-	-	-	-	-	-	43	17	26	0	3.4	9.4	12.8	6.7	14.3	15.3	36.3	33.6	17.3	50.9	Silty SAND, some clay, some gravel, well graded
	GH11-290S	1	29.5	30.0	33.5	-	-	-	-	-	-	-	-	-	50	20	30	0	0.0	0.1	0.1	0.1	0.2	1.2	1.5	50.0	48.4	98.4	SILT and CLAY, trace sand, trace gravel, poorly graded
		2	34.0	34.5	28.8	-	-	-	-	-	-	-	-	-	31	19	12	0	0.0	0.0	0.0	1.0	2.0	56.9	59.9	32.3	7.8	40.1	Silty SAND, trace sand, no gravel, poorly graded
		3	39.5	40.0	22.0	-	-	-	-	-	-	-	-	-	21	NP	NP	0	0.0	1.1	1.1	0.1	0.3	2.0	2.4	75.1	21.4	96.5	Clayey SILT, trace sand, trace gravel, poorly graded
HAND DUG SAMPLES	GH11-293	1	2.0	3.0	12.2	-	-	-	-	-	-	-	-	-	25	23	2	0	31.4	19.2	50.6	4.5	6.5	13.9	24.9	23.1	1.4	24.5	Sandy, Silty GRAVEL, trace clay, poorly graded
	GH11-294	1	1.0	2.0	8.3	-	-	-	-	-	-	-	-	-	21	NP	NP	0	58.0	12.1	70.1	3.7	4.8	6.4	14.9	13.5	1.5	15.0	GRAVEL, some sand, some silt, trace clay, well graded

M:\1\01\00176\38\A\Report\3 - 2011 SI Report\Tables\[Table 3.2 2011 Lab Results Summary.xls]Table 3.2

NOTES:

1. ALL LABORATORY ANALYSES PERFORMED AT KNIGHT PIÉSOLD LTD. GEOTECHNICAL LABORATORY IN DENVER, CO.
2. MOISTURE CONTENTS OF THE SPT SAMPLES MAY BE ARTIFICIALLY HIGH DUE TO DRILLING MUD INFLUENCE.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	30JAN'11	ISSUED WITH REPORT VA101-176/38-3	LS	LJG	KJB

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TABLE 4.1

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
REFERENCE AREA SITE INVESTIGATION
ACTIVITIES AND GEOLOGIC SECTION SUMMARY

Print May/10/2012 14:48:34

Reference Area	Sub-Area	Site Investigation Activities			Other Section Locations	Geologic Sections
		Test Pits	Mud Rotary Drillholes	Seismic Lines		
West Deposit Area	West	TP05-140	GH10-217	SL-12		4.48b
		TP05-148 to TP05-150	GH10-218	SL-40		4.40
		TP08-190		SL-41		4.41
		TP08-192 to TP08-194				
		TP10-354				
		TP10-372				
		TP10-381 to TP10-388				
	Central	TP04-76 to TP04-77	GH10-223	SL-12		4.48a
		TP05-139	GH10-224	SL-39		4.39
		TP05-141	GH11-233	SL-40		4.40
		TP05-147		SL-41		4.41
		TP05-152		SL-42		4.42
		TP08-187 to TP08-189				
		TP08-195				
		TP10-353				
		TP10-377				
		TP10-380				
	East	TP04-78 to TP04-80	GH06-80	SL-1		4.48a, 4.48b
		TP05-133 to TP05-137	GH08-112	SL-39		4.39
		TP05-142 to TP05-143	GH08-125	SL-40		4.40
		TP05-145 to TP05-146	GH10-221	SL-41		4.41
		TP08-191	GH10-222	SL-42		4.42
		TP08-196			Frying Pan Valley	4.2a
		TP08-202				
		TP10-424				
East Deposit Area	-	TP05-116	GH05-64	SL-1		4.48a
		TP05-126 to TP05-132	GH06-78 to GH06-79	SL-25		4.19
		TP05-144	GH07-104 to GH07-111	SL-26		4.20
		TP05-153	GH08-113 to GH08-123	SL-34		4.28
		TP08-179 to TP08-183		SL-37		-
		TP08-185		SL-38		4.29
		TP08-197 to TP08-199			Frying Pan Valley	4.2a
		TP10-408				
Upper Talarik Creek Area	-	TP04-37 to TP04-41	GH04-02	SL-22		4.48b
		TP05-151	GH08-124	SL-39		4.39
		TP05-154 to TP05-155	GH08-126 to GH08-127	SL-50		4.43
		TP08-200 to TP08-201	GH08-130 to GH08-132		West	4.37
		TP08-203 to TP08-220	GH08-134		East	4.49
		TP08-222	GH08-200 to GH08-202			
		TP10-319 to TP10-334	GH10-219			
		TP10-338	GH10-227 to GH10-228			
		TP10-342 to TP10-352	GH11-229 to GH11-232			
		TP10-373 to TP10-376	GH11-243			
		TP10-378 to TP10-379	GH11-245 to GH11-246			
		TP10-405	GH11-274			

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TABLE 4.1

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
REFERENCE AREA SITE INVESTIGATION
ACTIVITIES AND GEOLOGIC SECTION SUMMARY

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Reference Area	Sub-Area	Site Investigation Activities			Other Section Locations	Geologic Sections
		Test Pits	Mud Rotary Drillholes	Seismic Lines		
Area E	-	TP04-42 to TP04-43	GH04-26 to GH04-27	SL-13		4.10
		TP04-46	GH05-57 to GH05-58	SL-14		4.11
		TP04-67 to TP04-75	GH08-128 to GH08-129	SL-15		4.12
		TP05-156 to TP05-177	GH08-165	SL-27		4.21
		TP08-221	GH08-177 to GH08-183	SL-28		4.22
		TP08-223 to TP08-231	GH08-189	SL-29		4.23
		TP08-238 to TP08-259	GH08-192	SL-30		4.24
		TP10-355	GH08-194	SL-31		4.25
		TP10-357 to TP10-360	GH08-198	SL-32		4.26
		TP10-363 to TP10-369	GH10-211 to GH10-214	SL-33		4.27
		TP10-371	GH11-234 to GH11-237	SL-43		-
		TP10-389	GH11-247	SL-44		4.46
			GH11-277	SL-45		4.45
			GH11-281	SL-46		4.52
			GH11-287		Northwest	4.36
			GH11-293 to GH11-294		North	4.50
			GH11-296		East	4.53
North Fork Koktuli River Area	-	TP04-44 to TP04-45	GH04-01	-	-	-
		TP04-47	GH07-101 to GH07-103			
		TP04-54 to TP04-57				
		TP04-107 to TP04-108				
Area L	-	TP04-35 to TP04-36	GH04-09	SL-24		4.18
		TP04-66	GH04-19 to GH04-22	SL-47		4.32a
		TP04-91 to TP04-100	GH06-65	SL-49		4.47
		TP08-287 to TP08-316	GH07-91 to GH07-94		North	4.33
			GH08-140		Mid-Valley	4.34a, 4.34b
			GH08-143			
			GH08-150			
			GH08-152			
			GH08-155			
			GH08-159 to GH08-162			
			GH08-170 to GH08-176			
			GH08-193			
			GH08-195			
			GH08-197A to GH08-197B			
			GH08-199			
			GH08-203			
			GH10-220			
			GH10-225			
Area G	North	TP04-58 to TP04-60	GH04-07	SL-23		4.17
		TP04-65	GH04-23 to GH04-25			
		TP04-105 to TP04-106	GH06-67 to GH06-69			
		TP08-260 to TP08-270	GH07-81 to GH07-82			
		TP10-341	GH10-215			
		TP10-356				
		TP10-370				
	Upstream North	TP04-104	GH08-156	SL-48		4.31b
		TP08-277	GH08-163			
			GH08-166			
			GH08-186 to GH08-188			

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TABLE 4.1

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
REFERENCE AREA SITE INVESTIGATION
ACTIVITIES AND GEOLOGIC SECTION SUMMARY

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Reference Area	Sub-Area	Site Investigation Activities			Other Section Locations	Geologic Sections
		Test Pits	Mud Rotary Drillholes	Seismic Lines		
Area G	Northwest	TP04-63	GH06-66	SL-48		4.31a
		TP08-272	GH07-83 to GH07-88			
		TP10-339 to TP10-340	GH08-136			
			GH08-138			
			GH08-141			
			GH08-144			
			GH08-146			
			GH08-148			
			GH08-151			
			GH08-158			
			GH08-168			
	Southwest	-	GH07-89 to GH07-90	SL-47		4.32a, 4.32b
			GH08-169			
	South	TP04-61 to TP04-62	GH04-08	SL-24		4.18
		TP04-64	GH10-216	SL-49		4.47
		TP08-286				
	East	TP08-237	GH07-98 to GH07-100		East	4.30
		TP10-361	GH08-164			
			GH08-167			
	Potential Borrow	TP04-101 to TP04-103	GH07-95 to GH07-97	-		-
		TP08-271	GH08-184 to GH08-185			
		TP08-273 to TP08-276				
		TP08-278 to TP08-285				
		TP10-335 to TP10-337				
South Fork Koktuli River Area	-	TP04-01 to TP04-15	GH04-03 to GH04-05	SL-6		4.7a, 4.7b
		TP04-26	GH04-10 to GH04-18	SL-7		4.8
		TP04-33	GH04-33 to GH04-40A	SL-8		4.9
		TP04-49 to TP04-53	GH05-65	SL-9		
				SL-10		
				SL-11		4.9
				SL-19		4.13
Area J	-	TP04-24 to TP04-25	GH08-135	SL-16		
		TP04-27 to TP04-28	GH08-139	SL-17		
		TP04-31 to TP04-32	GH08-142	SL-18		
		TP05-109	GH08-145		North	4.35
		TP05-178	GH08-147			
		TP08-232 to TP08-236	GH08-149			
		TP10-362	GH08-153 to GH08-154			
			GH08-157			
			GH08-190 to GH08-191			
			GH08-196			
			GH08-205 to GH08-206			
			GH08-208			

Knight Piésold CONSULTING

TABLE 4.1

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
REFERENCE AREA SITE INVESTIGATION
ACTIVITIES AND GEOLOGIC SECTION SUMMARY

Print May/10/2012 14:48:34

Reference Area	Sub-Area	Site Investigation Activities			Other Section Locations	Geologic Sections
		Test Pits	Mud Rotary Drillholes	Seismic Lines		
Area A	Valley Bottom	TP04-19 to TP04-20	GH04-06	SL-2		4.3
		TP04-86	GH04-47	SL-51		4.44
		TP04-89	GH05-61 to GH05-62		North	4.15
		TP05-115	GH06-72		South	4.51
		TP05-117	GH10-226		Frying Pan Valley	4.2a, 4.2b
		TP05-125	GH11-238			
		TP08-184				
		TP08-186				
		TP10-401 to TP10-404				
		TP10-406 to TP10-407				
		TP10-409 to TP10-412				
		TP10-414				
		TP10-422 to TP10-423				
Area A	Southern Upland Area	TP04-16 to TP04-17	GH04-28 to GH04-32	SL-3		4.4
		TP04-29 to TP04-30	GH04-41 to GH04-45A	SL-4		4.5
		TP04-34	GH05-51 to GH05-52	SL-5		4.6
		TP04-48	GH05-75 to GH05-77		Transverse	4.38
		TP05-110 to TP05-113	GH08-137		Frying Pan Valley	4.2b
	Lower/Mid Side Slopes	TP04-18	GH04-46	SL-20		4.14
		TP04-21 to TP04-23	GH04-48		North	4.15
		TP04-81 to TP04-85	GH05-56		South	4.51
		TP04-87 to TP04-88	GH05-59 to GH05-60		SL-13	4.10
		TP04-90	GH05-63			
		TP05-118 to TP05-124	GH06-70 to GH06-71A			
		TP10-390 to TP10-393	GH06-73 to GH06-74			
		TP10-395 to TP10-400	GH08-210			
		TP10-413	GH11-239 to GH11-242			
		TP10-415 to TP10-421				
	Upper Side Slopes	TP05-114	GH05-53 to GH05-55	SL-21		4.16
		TP08-317 to TP08-318	GH08-133			
		TP10-394	GH08-204			
			GH08-207			
			GH08-209			

M:\1\01\00176\38\A\Report\3 - 2011 SI Report\Tables\[Tables 4.1-4.4 2011 Reference Area Summary.xlsx]Table 4.1 SI Summary

NOTES:

1. DETAILS OF PAST SITE INVESTIGATION PROGRAMS ARE PRESENTED IN THE KP GEOTECHNICAL SITE INVESTIGATION REPORT FOR THE CORRESPONDING YEAR.

REV	DATE	DESCRIPTION	PREPD	CHK'D	APP'D
0	17APR'12	ISSUED WITH REPORT VA101-176/38-3	LS	LJG	KJB

Knight Piésold CONSULTING

TABLE 4.2

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
REFERENCE AREA OVERBURDEN SUMMARY

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Reference Area	Sub-Area	Range of Topsoil[3] Thickness (ft)		Maximum Peat Thickness[3] (ft)	Range of Overburden[3] Thickness (ft)		Presence of Frozen Material Below the Active Layer[3]	SPT 'N' Values[3]			Specific Gravity[3]		Atterberg Limits					Standard Proctor						Shelby Tube Triaxial								Cored Overburden			
													Liquid Limit[3]		Plastic Limit[3]		Non-Plastic[3]	Corrected Max Dry Density[3] (lb/ft[3])		Corrected Optimum Moisture Content[3]		Range of Natural[3] Moisture Content compared to Optimum		Dry Density[3] (lb/ft[3])		Total Cohesion[3] (lb/ft[2])		Total Friction Angle[3] (°)		Effective Cohesion[3] (lb/ft[2])		Effective Friction Angle[3] (°)		Bulk Dry Density[3] (lb/ft[3])		Natural Moisture Content[3] (%)	
		Min	Max		Min	Max		Min	Max	Refusals	Min	Max	Min	Max	Min	Max		Min	Max	Min	Max	% Dry	% Wet	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
West Deposit Area	West	0.5	1	-	74	93	-	4	84	Yes	2.6	2.7	21	45	15	26	Yes	125	128	8	10	2	8	-	-	-	-	-	-	-	-	-	-	-	112	-	13
	Central	0.5	2	-	12	43	-	9	95	Yes	-	2.7	21	37	16	20	Yes	114	130	8	13	1	10	-	-	-	-	-	-	-	-	-	-	-	113	-	12
	East	0	2	-	26	51	-	12	69	Yes	-	2.7	27	51	15	47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East Deposit Area	-	0	1	3	12	184	-	1	89	Yes	-	2.5	23	54	13	34	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Talarik Creek Area	-	0	4	3	3	120	YES	4	98	Yes	2.6	2.8	16	62	12	54	Yes	117	131	8	13	-	5	80	127	0	1400	12	33	50	1520	17	37	93	126	12	29
Area E	-	0	2	4	0	111	-	5	99	Yes	-	2.7	18	41	12	39	Yes	110	130	7	15	-	10	-	-	-	-	-	-	-	-	-	-	-	74	-	18
North Fork Koktuli River Area	-	0.2	1	-	22	148	-	10	93	Yes	-	-	21	45	11	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area L	-	0	3	-	0	105	-	7	82	Yes	-	-	18	44	15	28	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area G	North	0	2	8	2	35	-	14	98	Yes	-	2.7	21	34	17	33	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Upstream North	-	2	2	3	51	-	11	55	Yes	-	-	20	25	17	21	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Northwest	0.5	1	-	0	25	-	2	55	Yes	-	-	18	45	12	23	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Southwest	-	-	-	1	20	-	8	45	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	South	0.5	1	-	59	92	-	9	66	Yes	-	2.7	-	47	-	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	East	0.5	1	-	0	50	-	7	93	Yes	-	-	22	32	-	22	Yes	-	123	-	10	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Potential Borrow	0	1	-	1	15	-	4	94	Yes	-	2.7	19	46	19	34	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Fork Koktuli River Area	-	0	3	4	20	392	-	2	98	Yes	-	-	24	32	21	25	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area J	-	0	4	-	0	70	-	10	69	Yes	-	-	-	21	-	19	Yes	-	127	-	9	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area A	Valley Bottom	0.5	5	10	100	185	-	2	96	Yes	-	2.7	22	46	16	29	Yes	-	119	-	12	-	6	112	113	482	919	17	18	369	591	-	31	-	115		11
	Southern Upland Area	0	2	-	7	389	-	8	94	Yes	-	-	22	27	15	24	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lower/Mid Side Slopes	0	3	4	18	329	-	6	92	Yes	-	2.7	20	49	13	28	Yes	106	125	9	18	-	13	97	104	-	930	-	14	-	490	-	26	124	172	22	27
	Upper Side Slopes	0.5	2	-	10	130	-	8	99	Yes	-	-	21	94	14	24	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

M:\1\01\00176\38\A\Report\3 - 2011 SI Report\Tables\[Tables 4.1-4.4 2011 Reference Area Summary.xlsx]Table 4.2 OB Summary

NOTES:

1. DETAILED 2011 GEOTECHNICAL DRILLHOLE DATA IS INCLUDED IN APPENDIX A AND B.
2. UNLESS OTHERWISE INDICATED, ALL DEPTH AND WATER DEPTH MEASUREMENTS ARE TAKEN WITH RESPECT TO GROUND SURFACE. POSITIVE = BELOW GROUND LEVEL, NEGATIVE = ABOVE GROUND LEVEL.
3. MAXIMUM AND MINIMUM VALUES FOR EACH REFERENCE AREAS ARE BASED ON THE KP DRILLHOLES AND TEST PITS AND LABORATORY TESTING THAT HAVE BEEN COMPLETED IN THESE AREAS.
4. STANDARD PROCTOR LABORATORY TESTS WERE COMPLETED FOR TEST PIT SAMPLES.
5. SHELBY TUBE TRIAXIAL TESTS WERE TYPICALLY CONDUCTED IN FINE GRAINED MATERIALS.
6. DETAILS ON THE LABORATORY TESTING CONDUCTED CAN BE FOUND IN THE 2004 TO 2011 KP SITE INVESTIGATION DATA REPORTS FOR THE CORRESPONDING YEAR.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	17APR'12	ISSUED WITH REPORT VA101-176/38-3	LS	LJG	KJB

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TABLE 4.3

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
REFERENCE AREA BEDROCK SUMMARY

Print May/10/2012 14:53:19

Reference Area	Sub-Area	Bedrock									
		Average RQD Range		Average Estimated UCS Range		Average RMR Range		Laboratory UCS Results		Age	Bedrock Type[4]
		Min	Max	Min	Max	Min	Max	Min	Max		
West Deposit Area	West	14	28	26	65	34	42	-	-	Cretaceous	Diorite
								-	-		Monzodiorite
	Central	11	43	87	115	44	51	-	-	Cretaceous	Diorite
								-	85		Granodiorite
								-	-	Tertiary	Basalt
	East	22	78	48	116	45	67	-	-	Tertiary	Basalt
								-	-		Volcaniclastic Breccia/Conglomerate
								-	-		Basalt Breccia
								-	-		Mudstone/Siltstone/Wacke
								-	-		Conglomerate
East Deposit Area	-	0	80	8	106	31	56	-	-	Cretaceous	Bedded Andesitic Siltstone
								-	-	Tertiary	Basalt
								-	-		Basalt Breccia
								-	-		Rhyolite
								-	-		Volcaniclastic Breccia/Conglomerate
Upper Talarik Creek Area	-	8	77	8	137	29	68	-	-	Cretaceous	Bedded Andesitic Siltstone
								-	-		Diorite
								-	-		Granodiorite
								-	-	Tertiary/Cretaceous	Monzonite
								-	-	Tertiary	Rhyolite
											Monzonite
											Sandstone/Conglomerate
								20	131		Volcaniclastic Breccia/Conglomerate
								-	-		Siltstone/Wacke
								-	-		Basalt
								-	14		Conglomerate
Area E	-	1	83	27	156	30	61	-	-	Cretaceous	Monzonite
											Granodiorite
								-	65		Diorite
								-	-		Basalt
								-	-		Gabbro
								39	176		Wacke/Siltstone/Mudstone
								91	241		Bedded Andesitic Siltstone
								-	-	Tertiary	Volcaniclastic Breccia/Conglomerate
								-	-		Basalt
								-	-		Basalt Breccia
								-	-		Siltstone/Wacke
North Fork Koktuli River Area	-	1	68	18	155	36	60	-	-	Tertiary	Andesite
											Basalt
											Mudstone/Siltstone/Wacke
Area L	-	16	85	43	181	39	66	-	-	Cretaceous	Granodiorite
								-	-		Monzonite
								-	-		Monzodiorite
								-	-	Tertiary	Volcaniclastic Breccia/Conglomerate
								-	-		Dacite
								-	-		Wacke
								-	-		Andesite
								-	-		Rhyolite
								-	-		Basalt
								-	-		Basalt Breccia

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TABLE 4.3

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
REFERENCE AREA BEDROCK SUMMARY

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Reference Area	Sub-Area	Bedrock									
		Average RQD Range		Average Estimated UCS Range		Average RMR Range		Laboratory UCS Results		Age	Bedrock Type[4]
		Min	Max	Min	Max	Min	Max	Min	Max		
Area G	North	11	70	45	205	43	65	-	-	Cretaceous	Monzonite
								-	-		Gabbro
								-	-		Basalt
								-	-	Tertiary	Gabbro
								-	-		Basalt
	Upstream North	12	48	79	117	42	51	-	-	Cretaceous	Granodiorite
								-	-		Basalt
								-	-		Gabbro
	Northwest	15	86	26	134	35	66	-	-	Cretaceous	Granodiorite
											Monzonite
								-	-		Siltstone
								-	-		Pyroxenite
								-	-		Gabbro
								-	-		Sandstone/Mudstone
								-	-	Tertiary	Basalt
	Southwest Area G	33	67	72	136	44	58	-	-	Cretaceous	Monzonite
								-	-		Granodiorite
								-	-	Tertiary	Volcaniclastic Breccia/Conglomerate
								-	-		Basalt
	South Area G	40	58	36	93	46	52	-	-	Tertiary	Volcaniclastic Breccia/Conglomerate
								-	-		Sandstone/Siltstone/Conglomerate
								-	-		Siltstone/Mudstone
								-	-		Wacke
	East Area G	48	79	57	144	43	60	-	-	Cretaceous	Granodiorite
								-	-		Monzonite
								-	-	Tertiary	Volcaniclastic Breccia/Conglomerate
	Potential Borrow	31	54	61	105	42	47	-	-	Cretaceous	Granodiorite
								-	-	Tertiary	Volcaniclastic Breccia/Conglomerate
South Fork Koktuli River Area	-	11	77	13	100	39	64	-	-	Cretaceous	Granodiorite
								-	-		Monzonite
								-	-	Tertiary	Basalt
								-	-		Andesite
								-	-		Volcaniclastic Breccia/Conglomerate
								-	-		Siltstone
								-	-		Bedded Andesitic Siltstone
Area J	-	15	84	42	135	40	65	-	-	Cretaceous	Granodiorite
								-	-		Diorite
								-	-		Basalt
								-	-		Bedded Andesitic Siltstone
								-	-	Tertiary	Basalt

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TABLE 4.3

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
REFERENCE AREA BEDROCK SUMMARY

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Reference Area	Sub-Area	Bedrock									
		Average RQD Range		Average Estimated UCS Range		Average RMR Range		Laboratory UCS Results		Age	Bedrock Type[4]
		Min	Max	Min	Max	Min	Max	Min	Max		
Area A	Valley Bottom	10	47	28	80	37	49	-	-	Cretaceous	Granodiorite
								-	-		Diorite
								-	-		Bedded Andesitic Siltstone
								-	-	Tertiary	Rhyolite
								-	-		Latite
								-	-		Dacite
								-	-		Volcaniclastic Breccia/Conglomerate
	Southern Upland Area	7	71	29	152	41	63	-	-	Cretaceous	Bedded Andesitic Siltstone
								-	-		Monzodiorite
								-	-		Granodiorite
								-	-		Diorite
								-	-	Tertiary	Siltstone/Mudstone/Wacke
								-	-		Volcaniclastic Breccia/Conglomerate
								-	-		Andesite
								-	-		Basalt
								-	-		Basalt Breccia
								-	-		Latite
								-	-		Dacite
	Lower/Mid Side Slopes	9	77	39	131	40	57	-	-	Cretaceous	Granodiorite
								-	-		Diorite
								-	-		Bedded Andesitic Siltstone
								-	-		Gabbro
								-	-	Tertiary	Monzonite
								-	-		Basalt
								-	-		Basalt Breccia
								-	-		Andesite
								-	-		Dacite
								-	-		Latite
								-	-		Volcaniclastic Breccia/Conglomerate
								-	-		Siltstone/Mudstone
								-	-		Wacke
	Upper Side Slopes	41	92	63	96	44	68	-	-	Cretaceous	Granodiorite
								-	-		Monzonite
								-	-		Bedded Andesitic Siltstone
								-	-		Diorite

M:\1\01\00176\38\A\Report\3 - 2011 SI Report\Tables\[Tables 4.1-4.4 2011 Reference Area Summary.xlsx]Table 4.3 BD Summary

NOTES:

1. BEDROCK TYPE AND AGE PROVIDED BY PLP.
2. AVERAGE RQD, UCS, AND RMR VALUES HAVE BEEN CALCULATED BY DRILLHOLE AND INCLUDE WEATHERED BEDROCK AND FAULT ZONES, WEIGHTED AVERAGES HAVE NOT BEEN USED.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	17APR'12	ISSUED WITH REPORT VA101-176/38-3	LS	LJG	KJB

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TABLE 4.4

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 KP GEOTECHNICAL SITE INVESTIGATION
REFERENCE AREA GROUNDWATER SUMMARY

Print May/10/2012 14:29:19

Reference Area	Sub-Area	Groundwater											
		Groundwater Depth[5] Below Ground Surface (ft)		Maximum Artesian Flows[5] (gpm)	Bedrock Packer Testing Hydraulic Conductivity Range[3, 5] (cm/s)		Piezometer Response Hydraulic Conductivity Test Results					
							Overburden Hydraulic Conductivity Range[5] (cm/s)		Overburden/Bedrock Contact Hydraulic Conductivity Range[5] (cm/s)		Bedrock Hydraulic Conductivity Range[4, 5] (cm/s)	
		Min	Max		Min	Max	Min	Max	Min	Max	Min	Max
West Deposit Area	West	26	80	-	2×10^{-5}	1×10^{-4}	-	-	-	-	5×10^{-5}	3×10^{-4}
	Central	7	16	-	6×10^{-5}	5×10^{-5}	-	-	-	5×10^{-4}	6×10^{-6}	1×10^{-4}
	East	1	63	-	1×10^{-6}	8×10^{-5}	-	5×10^{-6}	-	-	6×10^{-6}	5×10^{-5}
East Deposit Area	-	Artesian	63	300	1×10^{-7}	4×10^{-4}	7×10^{-6}	3×10^{-4}	7×10^{-6}	3×10^{-3}	7×10^{-6}	-
Upper Talarik Creek Area	-	Artesian	100	5	2×10^{-7}	7×10^{-4}	1×10^{-5}	5×10^{-5}	1×10^{-7}	5×10^{-5}	2×10^{-7}	7×10^{-6}
Area E	-	Artesian	84	80	1×10^{-7}	9×10^{-5}	5×10^{-7}	2×10^{-5}	1×10^{-7}	2×10^{-4}	3×10^{-8}	8×10^{-5}
North Fork Koktuli River Area	-	14	31	-	8×10^{-6}	2×10^{-5}	-	-	4×10^{-6}	2×10^{-5}	8×10^{-7}	9×10^{-7}
Area L	-	Artesian	292	1	2×10^{-7}	7×10^{-4}	4×10^{-6}	1×10^{-5}	3×10^{-6}	3×10^{-4}	1×10^{-5}	1×10^{-2}
Area G	North	Artesian	49	1	1×10^{-7}	3×10^{-4}	-	-	5×10^{-6}	1×10^{-2}	8×10^{-6}	4×10^{-4}
	Upstream North	Artesian	41	1	1×10^{-7}	6×10^{-4}	-	2×10^{-4}	4×10^{-5}	1×10^{-2}	1×10^{-4}	2×10^{-4}
	Northwest	Artesian	30	1	1×10^{-7}	2×10^{-3}	-	-	5×10^{-6}	5×10^{-4}	1×10^{-6}	1×10^{-4}
	Southwest	2	7	-	4×10^{-8}	1×10^{-2}	-	-	-	-	2×10^{-6}	4×10^{-4}
	South	Artesian	22	5	4×10^{-4}	5×10^{-4}	-	-	-	4×10^{-6}	-	-
	East	4	40	-	1×10^{-7}	1×10^{-2}	-	-	3×10^{-4}	5×10^{-4}	2×10^{-7}	6×10^{-4}
	Potential Borrow	1	12	-	8×10^{-6}	1×10^{-2}	-	-	5×10^{-7}	5×10^{-5}	1×10^{-5}	4×10^{-4}
South Fork Koktuli River Area	-	4	124	-	8×10^{-5}	1×10^{-4}	-	1×10^{-2}	-	-	-	1×10^{-2}
Area J	-	Artesian	41	1	2×10^{-7}	7×10^{-5}	-	-	1×10^{-6}	7×10^{-6}	1×10^{-7}	2×10^{-4}
Area A	Valley Bottom	Artesian	33	1	1×10^{-7}	2×10^{-4}	-	-	-	5×10^{-7}	-	-
	Southern Upland Area	38	141	-	1×10^{-7}	2×10^{-4}	7×10^{-6}	2×10^{-5}	-	-	5×10^{-5}	1×10^{-2}
	Lower/Mid Side Slopes	Artesian	100	15	7×10^{-7}	3×10^{-4}	-	-	7×10^{-7}	1×10^{-3}	2×10^{-8}	1×10^{-4}
	Upper Side Slopes	2	92	-	1×10^{-6}	5×10^{-4}	-	-	4×10^{-6}	1×10^{-3}	4×10^{-5}	1×10^{-2}

M:\1\01\00176\38\A\Report\3 - 2011 SI Report\Tables\[Tables 4.1-4.4 2011 Reference Area Summary.xlsx]Table 4.4 GW Summary

NOTES:

1. UNLESS OTHERWISE INDICATED, ALL DEPTH AND WATER DEPTH MEASUREMENTS ARE TAKEN WITH RESPECT TO GROUND SURFACE. POSITIVE = BELOW GROUND LEVEL.
2. STATIC WATER LEVELS VARY SEASONALLY.
3. PACKER TESTS WITH HIGH TAKE WERE ESTIMATED TO HAVE HYDRAULIC CONDUCTIVITY WITHIN THE ORDER OF 10^{-2} cm/s.
4. RESPONSE TESTS WHERE THE RECOVERY WAS TOO RAPID WERE ESTIMATED TO HAVE HYDRAULIC CONDUCTIVITY IN THE RANGE OF 10^{-2} cm/s.
5. MAXIMUM AND MINIMUM VALUES ARE BASED ON THE KP DRILLHOLES AND HYDRAULIC CONDUCTIVITY TESTING THAT HAVE BEEN COMPLETED IN THESE REFERENCE AREAS.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	17APR'12	ISSUED WITH REPORT VA101-176/38-3	LS	LJG	KJB

160°0'0"W

155°0'0"W

150°0'0"W

59°14'0"N

58°13'30"N

57°13'0"N

Red Hills

PEBBLE PROJECT

Lake Clark National Park and Preserve

Port Alsworth

Kashiagamiut

Koliganek

Nondalton

Togiak

Aleknagik

New Stuyahok

Ekwok

Iliamna

Newhalen

Lake Iliamna

Williamsport

Manokotak

Dillingham

Igiugig

Kokhanok

Levelock

Ekuk

Clarks Point

Naknek

King Salmon

Bristol Bay

Katmai National Park and Preserve

Egegik

Shelikof Strait

Pilot Point

Ugashik

Karluk

Port Lions

Kodiak

Aniakchak National Monument & Preserve

Beluga River

Tyonek

Anchorage

Kenai

Soldotna

Clam Gulch

Ninilchik

Seward

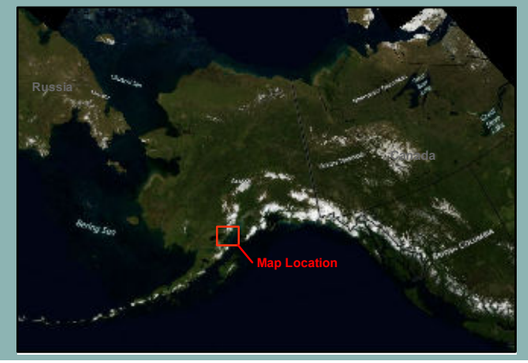
Cook Inlet

Homer

Kenai Fjords National Park

Seldovia

Gulf of Alaska



SCALE 30 15 0 30 60 Miles

SCALE 25 12.5 0 25 50 75 100 Kilometers

LEGEND:

EXISTING ROAD

NATIONAL PARK/PRESERVE BOUNDARY

NOTES:

1. BASE MAP: ESRI 150M EARTHSAT IMAGERY OBTAINED AT WWW.GEOGRAPHYNETWORK.COM

2. COORDINATE GRID IS IN METRES.
COORDINATE SYSTEM: NAD 1983 STATEPLANE ALASKA 5 FIPS 5005 FEET.

3. THIS FIGURE IS PRODUCED AT A NOMINAL SCALE OF 1:2,000,000 FOR 11X17 (TABLOID) PAPER. ACTUAL SCALE MAY DIFFER ACCORDING TO CHANGES IN PRINTER SETTINGS OR PRINTED PAPER SIZE.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30JAN'12	ISSUED WITH REPORT	AMD	AMD	LS	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

PROJECT LOCATION MAP

Knight Piésold CONSULTING

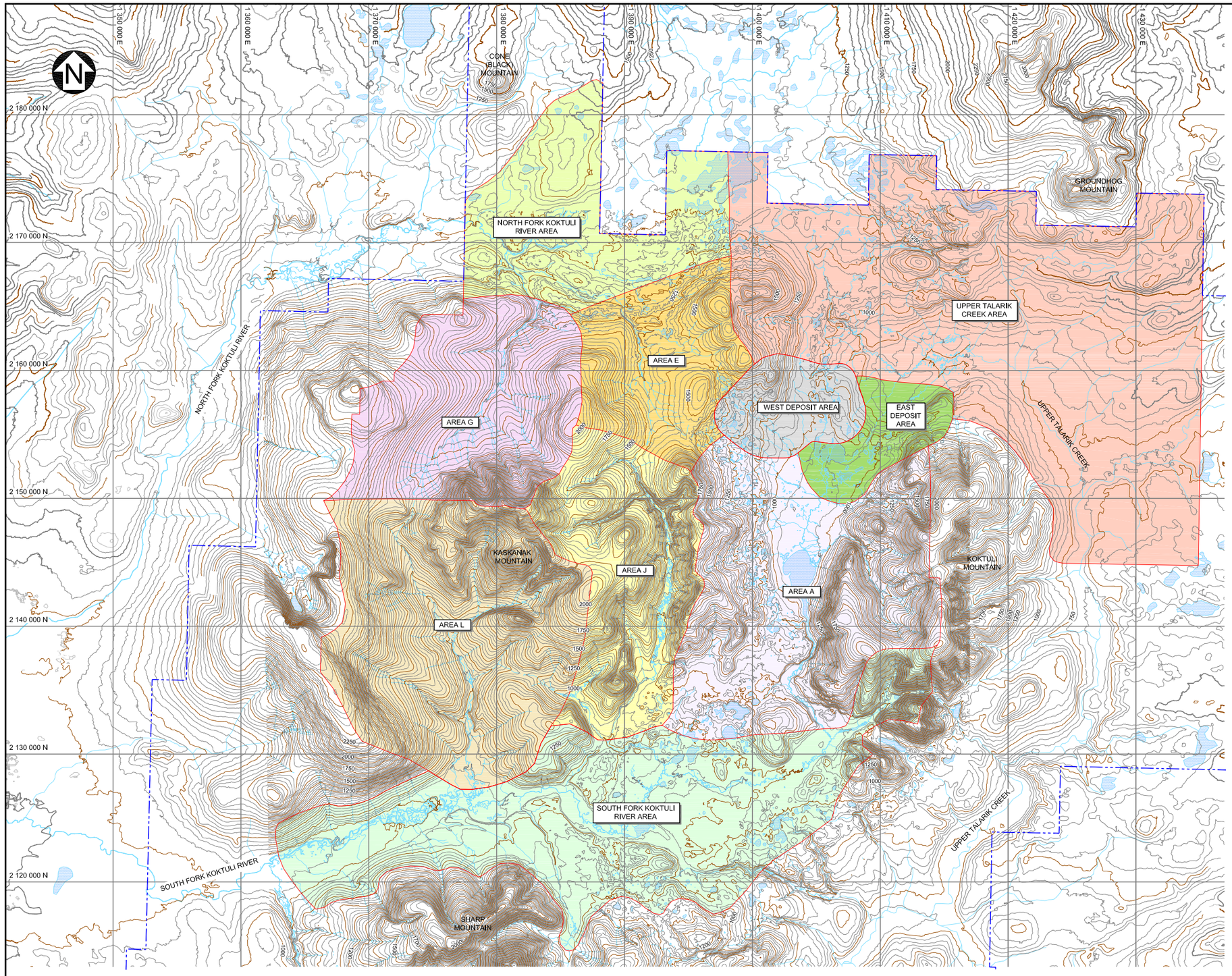
P/A NO. VA101-176/38

REF NO. 3

FIGURE 1.1

REV 0

KP FIGURE SAVED: M:\1\01\00176\38\A\GIS\Figs\Overview_Map_13Jan2012.mxd; Jan 13, 2012 9:09:48 AM adinca



LEGEND:

- PLP MINERAL CLAIM BOUNDARY
- REFERENCE AREA BOUNDARY

NOTES:

1. REFERENCE AREAS HAVE BEEN UPDATED AND RENAMED.

SCALE A: 4000 0 4000 8000 12000 16000 20000 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	PP	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

REFERENCE AREAS

Knight Piésold CONSULTING

P/A NO. VA101-176/38

REF NO. 3

FIGURE 1.2

REV 0

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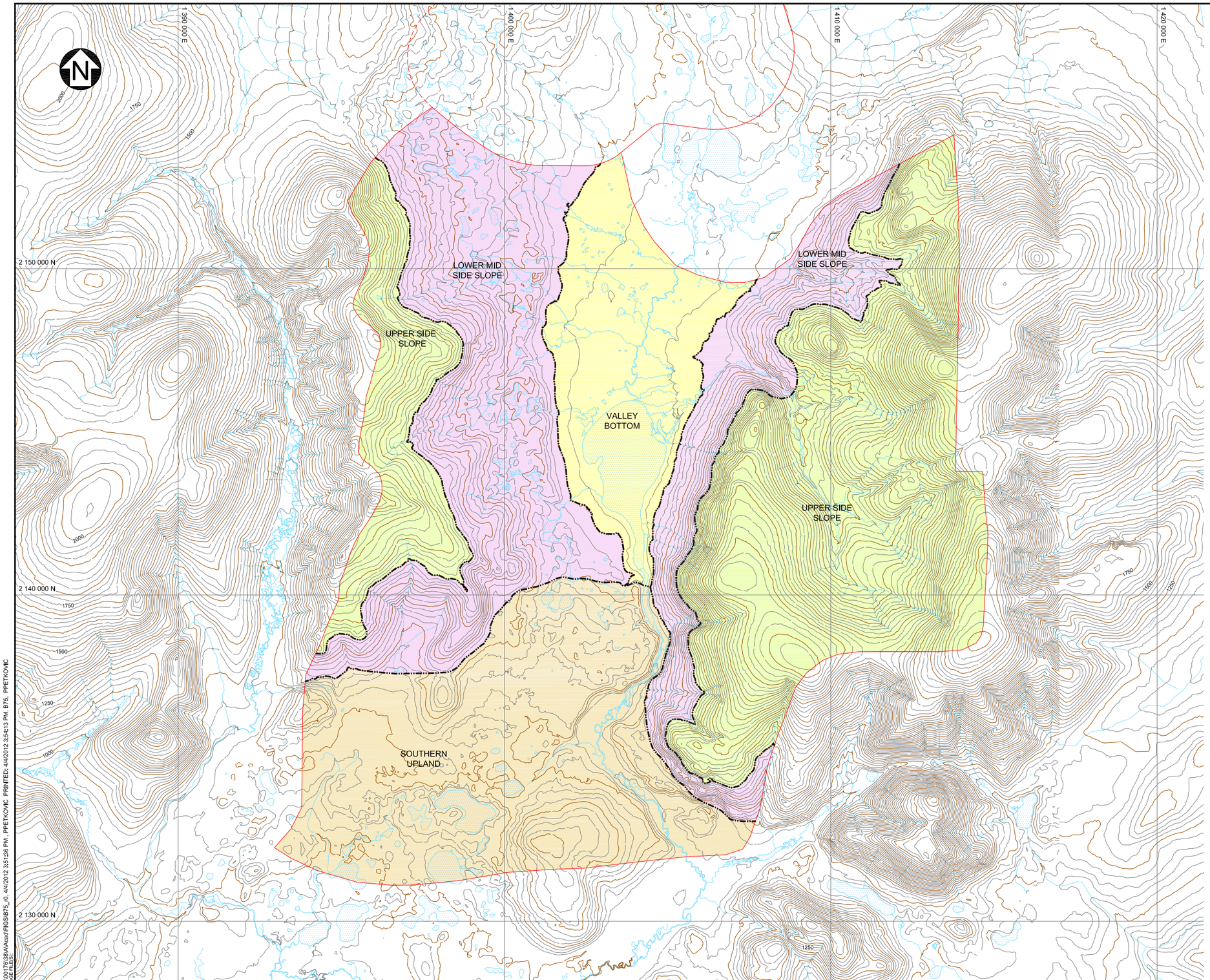

LEGEND:

REFERENCE AREA BOUNDARY

SUB - AREA BOUNDARY WITHIN REFERENCE AREA A

SCALE A 1500 0 1500 3000 4500 6000 7500 ft

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

SUB - AREAS OF REFERENCE AREA A

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P/A NO.	REF NO.
VA101-176/38	3

FIGURE 1.3 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	WAL	LJG	KJB

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XREF FILE(S): IMAGE FILE(S):

1 370 000 E
1 380 000 E
1 390 000 E
1 400 000 E
1 410 000 E
1 420 000 E
2 170 000 N
2 160 000 N
2 150 000 N
2 140 000 N
2 130 000 N
2 120 000 N
N
NORTH FORK KOKTULI RIVER
SOUTH FORK KOKTULI RIVER
UPPER TALARIK CREEK
WEST DEPOSIT AREA
FOR DETAILS SEE **FIGURE 3.2**

LEGEND:

- PLP MINERAL CLAIM BOUNDARY
- REFERENCE AREA BOUNDARY
- TP08-200 2004 TO 2011 TEST PITS

SCALE A 3000 0 3000 6000 9000 12000 15000 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	PP	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

TEST PIT LOCATION PLAN

Knight Piésold CONSULTING

P/A NO. VA101-176/38

REF NO. 3

FIGURE 3.1

REV 0

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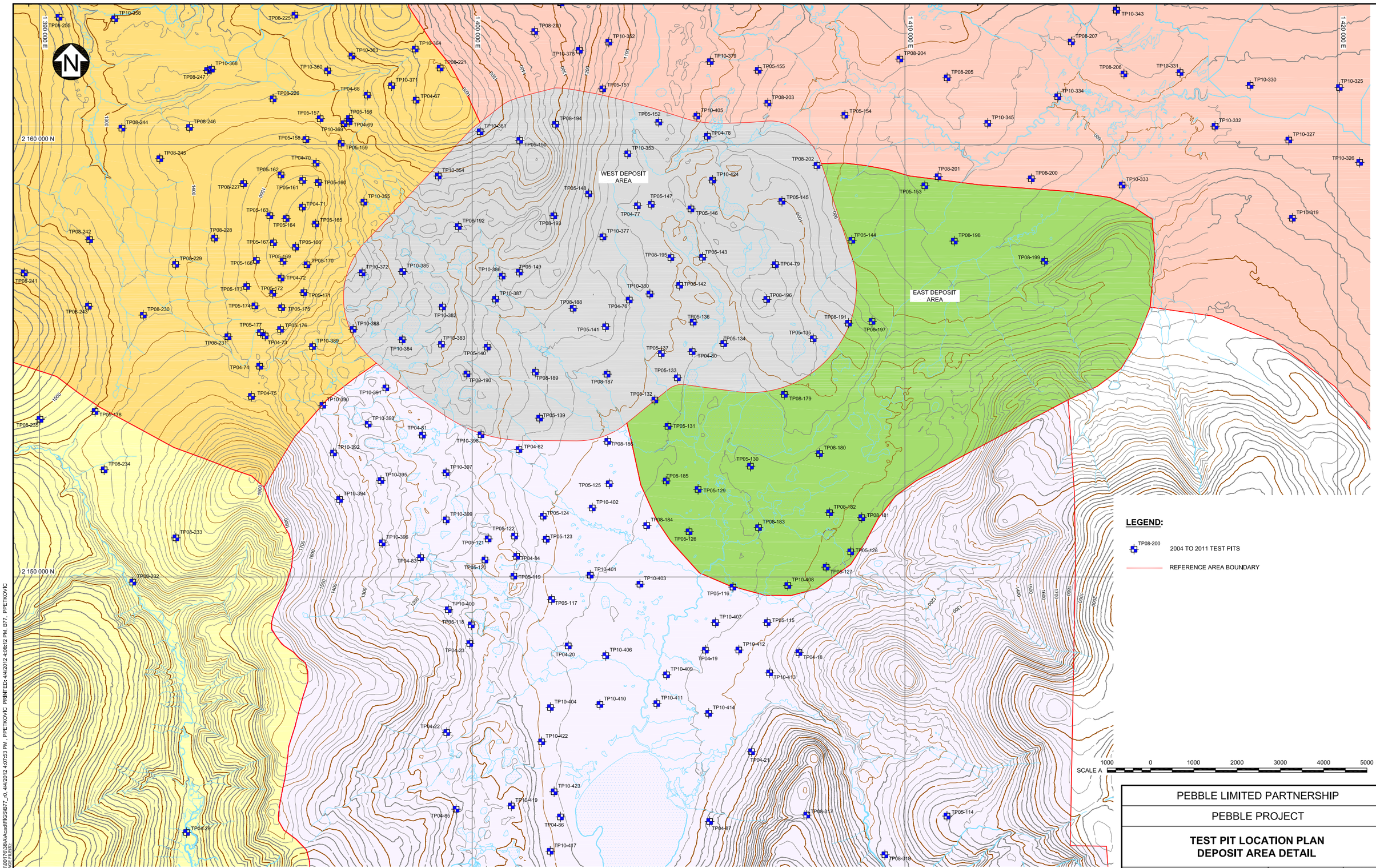

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PEBBLE PROJECT

TEST PIT LOCATION PLAN
DEPOSIT AREA DETAIL

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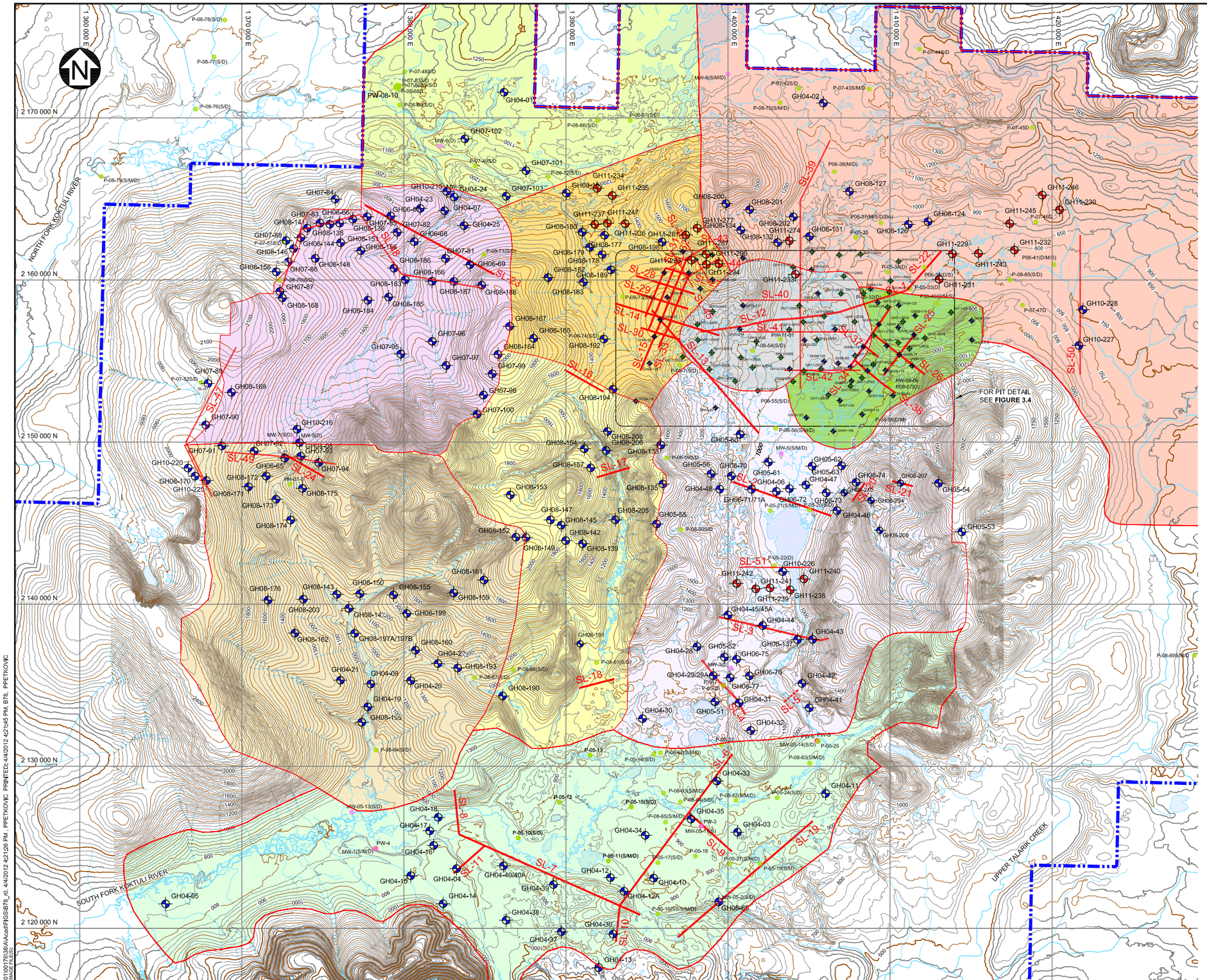
P/A NO.	REF NO.
VA101-176/38	3

FIGURE 3.2 REV 0


1 360 000 E
1 370 000 E
1 380 000 E
1 390 000 E
1 400 000 E
1 410 000 E
1 420 000 E
2 170 000 N
2 160 000 N
2 150 000 N
2 140 000 N
2 130 000 N
2 120 000 N
NORTH FORK KOKTULI RIVER
SOUTH FORK KOKTULI RIVER
UPPER TALARIK CREEK
PW08-10
GH04-01
GH04-02
MW-8(S/M/D)
GH07-102
GH07-101
GH07-103
GH04-24
GH11-234
GH08-200
GH08-201
GH08-202
GH08-127
GH11-246
GH11-230
GH11-245
GH08-124
GH08-126
GH08-131
GH11-274
GH11-277
GH08-134
GH11-287
GH11-288
GH11-289
GH11-290
GH11-294
GH11-233
GH11-229
GH11-232
GH11-243
GH11-231
GH10-228
GH10-227
GH08-180
GH08-177
GH08-179
GH08-178
GH08-182
GH08-189
GH08-183
GH08-198
GH11-236
GH11-237
GH11-247
GH08-132
GH08-138
GH08-136
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GH08-146
GH08-158
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GH08-205
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GH08-149
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GH08-139
GH08-161
GH08-159
GH08-155
GH08-150
GH08-143
GH08-176
GH08-203
GH08-199
GH08-197A/197B
GH08-160
GH08-162
GH08-193
GH08-190
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GH08-172
GH08-171
GH08-173
GH08-174
GH08-175
GH08-170
GH10-225
GH10-220
GH10-216
GH10-215
GH04-23
GH04-07
GH04-25
GH04-22
GH04-21
GH04-09
GH04-20
GH04-19
GH08-196
GH04-18
GH04-17
GH04-16
GH04-15
GH04-05
GH04-14
GH04-04
GH04-40/40A
GH04-39
GH04-38
GH04-37
GH04-13
GH04-12
GH04-12A
GH04-10
GH04-36
GH04-35
GH04-34
GH04-03
GH04-33
GH04-11
GH04-32
GH04-31
GH04-30
GH04-29/29A
GH04-28
GH04-45/45A
GH04-44
GH04-43
GH04-42
GH04-41
GH04-46
GH04-47
GH05-50
GH05-60
GH05-56
GH05-58
GH05-61
GH05-62
GH05-63
GH05-70
GH06-71/71A
GH06-72
GH06-73
GH06-74
GH08-207
GH08-204
GH08-210
GH08-209
GH05-54
GH05-53
GH05-52
GH06-75
GH06-76
GH06-77
GH05-51
GH11-242
GH11-241
GH11-239
GH11-240
GH11-238
GH10-226
GH08-137
GH08-141
GH08-156
GH08-139
GH08-196
GH08-197
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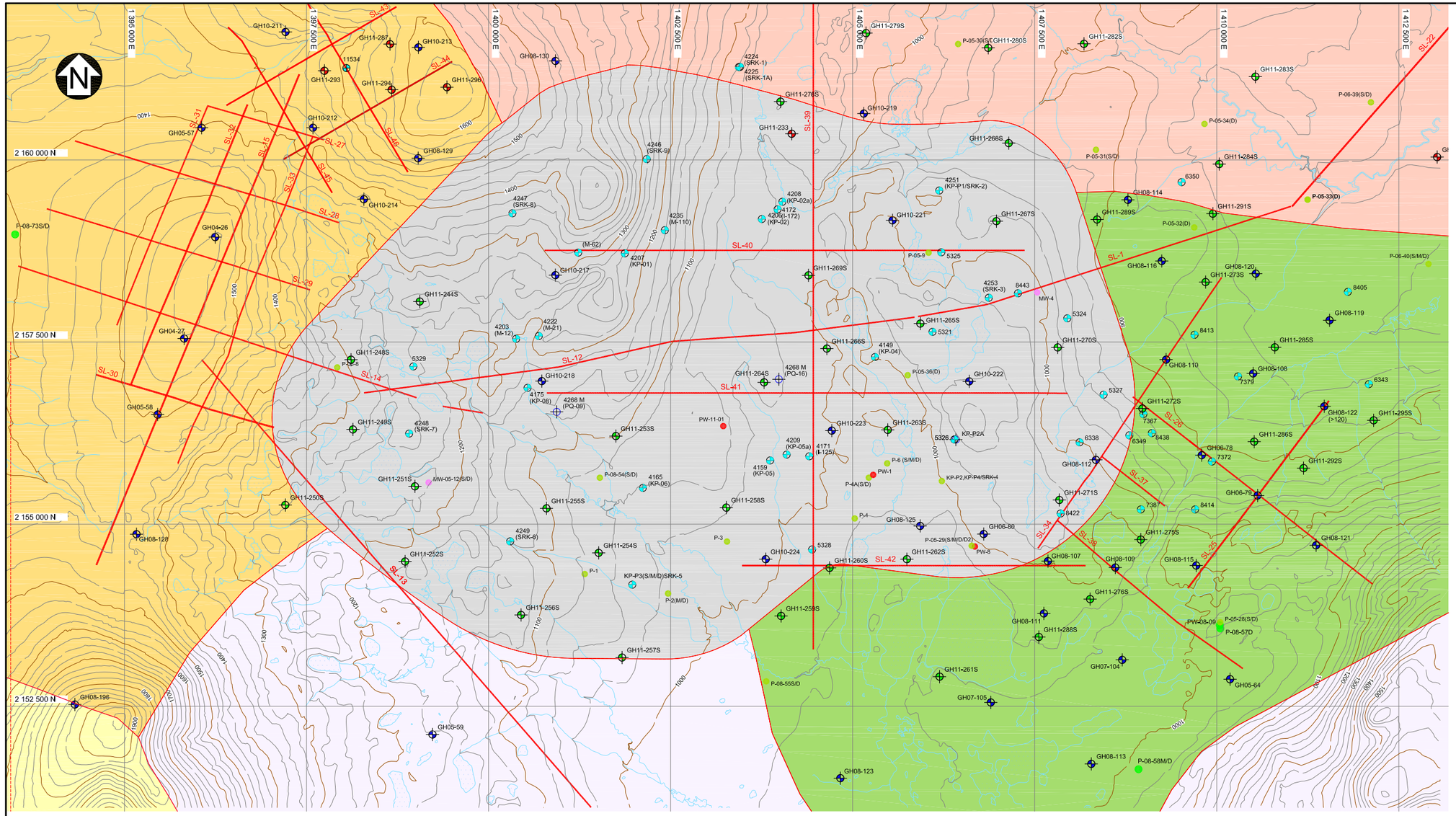

LEGEND:

PLP

- 4278 M — PLP METALLURGICAL DRILLHOLES
- 5326 — OPEN PIT GEOTECHNICAL DRILLHOLE / PLP EXPLORATION DRILLHOLE

KP

- REFERENCE AREA BOUNDARY
- GH04-01 — 2004 TO 2010 GEOTECHNICAL DRILLHOLES
- GH11-240 — 2011 GEOTECHNICAL DRILLHOLES

SRK

- GH11-286S — 2011 SRK SONIC DRILLHOLES

SWS / WMC / SLR

- P-1 — COMPLETED PIEZOMETER
- PW-1 — COMPLETED PUMPING TEST LOCATION
- MW-1 — COMPLETED BASELINE MONITORING WELLS

FRONTIER

- SEISMIC LINE

NOTES:

1. STANDPIPE PIEZOMETERS WERE INSTALLED IN ALL 2011 KP GEOTECHNICAL DRILLHOLES EXCEPT GH11-230 AND GH11-247.
2. TWO DIGITS AFTER GH DENOTE THE YEAR THE DRILLHOLE WAS COMPLETED.
3. HH-07-S WAS DRILLED BY WMC/SLR, HH IS USUALLY A PROPOSED HOLE DESIGNATION.
4. FOR FURTHER INFORMATION ON THE SRK 2011 SONIC DRILLING PROGRAM CONSULT THE SRK 2011 SITE INVESTIGATION REPORT.

SCALE A: 500 0 500 1000 1500 2000 2500 3000 ft

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PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOCATION PLAN DEPOSIT AREA

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FIGURE 3.4 | REV 0

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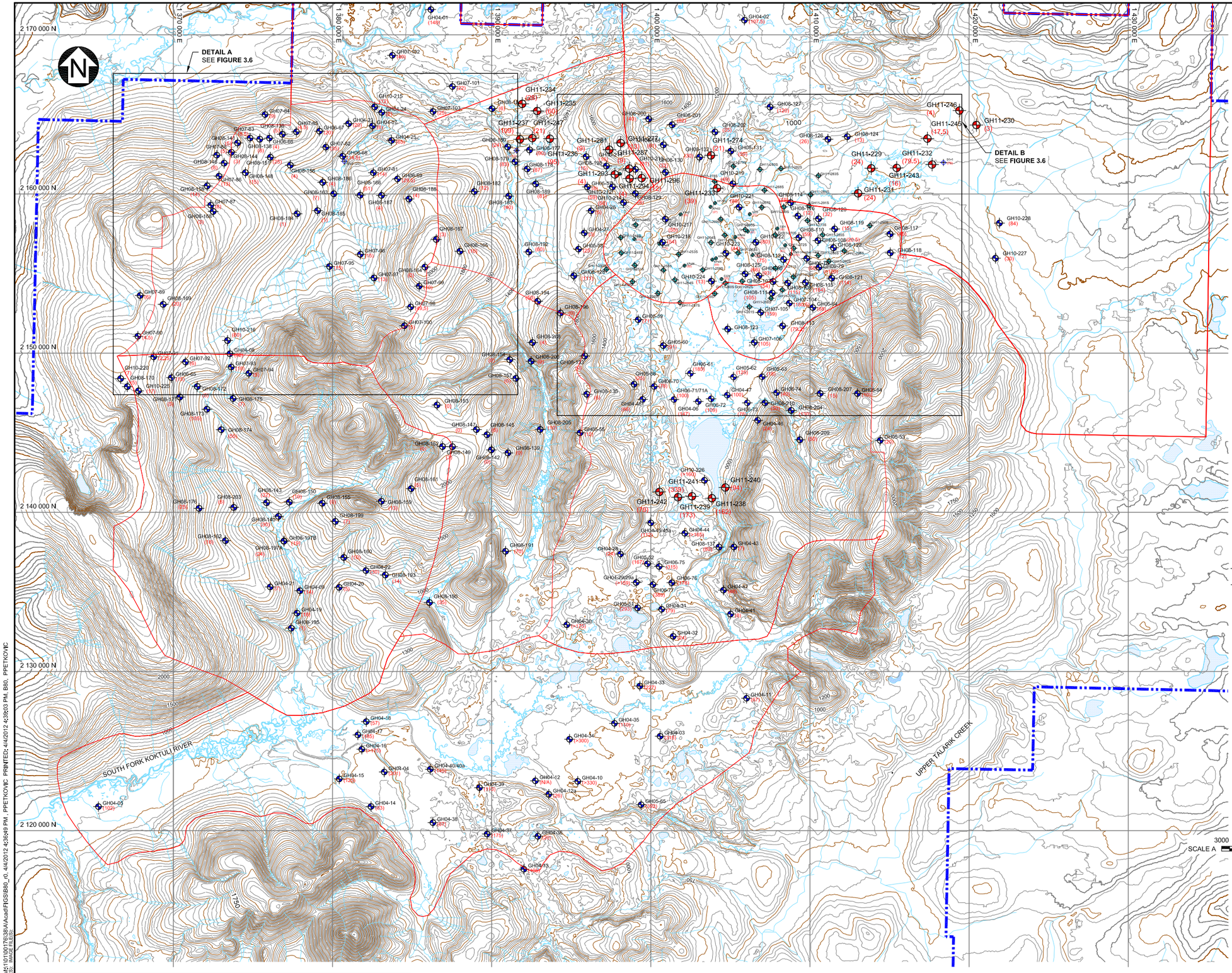

LEGEND:

PLP

PLP MINERAL CLAIM BOUNDARY

4165
KP-06
(82)
OPEN PIT GEOTECHNICAL DRILLHOLE / PLP EXPLORATION DRILLHOLE

KP

REFERENCE AREA BOUNDARY

GH11-229
(24)
2011 GEOTECHNICAL DRILLHOLES

GH04-01
(110)
2004 TO 2010 GEOTECHNICAL DRILLHOLE

NOTES:

1. STANDPIPE PIEZOMETERS WERE INSTALLED IN ALL 2011 KP GEOTECHNICAL DRILLHOLES EXCEPT GH11-230 AND GH11-247.
2. RED NUMBERS IN PARENTHESES DENOTE THE DEPTH OF THE OVERBURDEN IN FEET.

SCALE A 3000 0 3000 6000 9000 12000 15000 ft

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PEBBLE PROJECT

DEPTH TO BEDROCK

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FIGURE 3.5 | REV 0

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0	30MAR'12	ISSUED WITH REPORT	LS	PP	LJG	KJB

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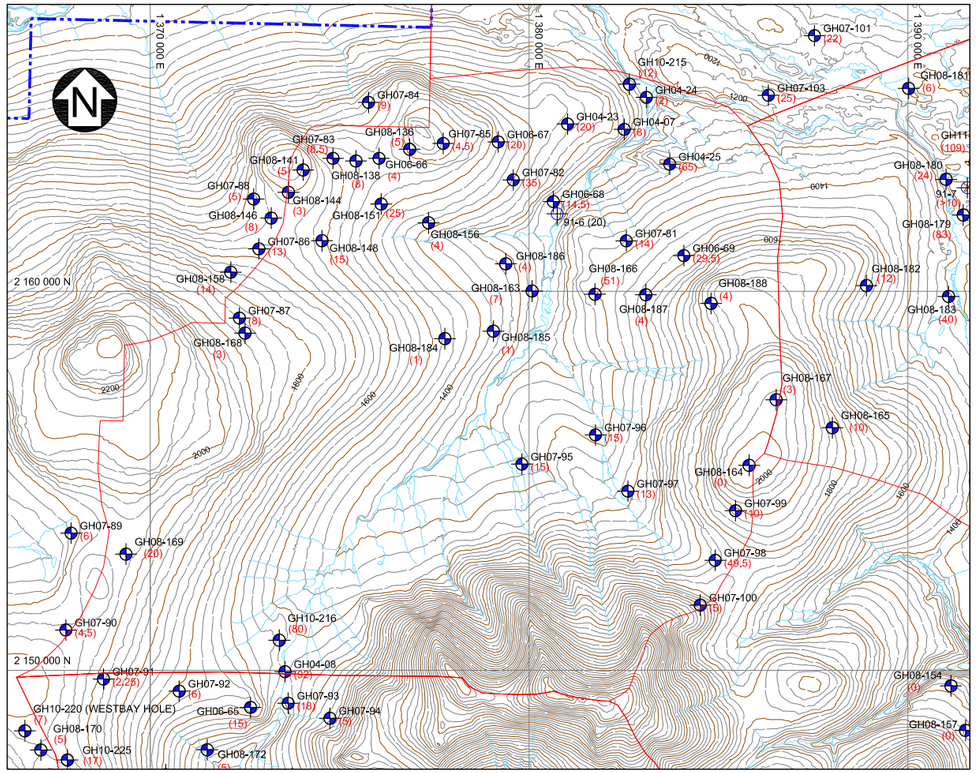
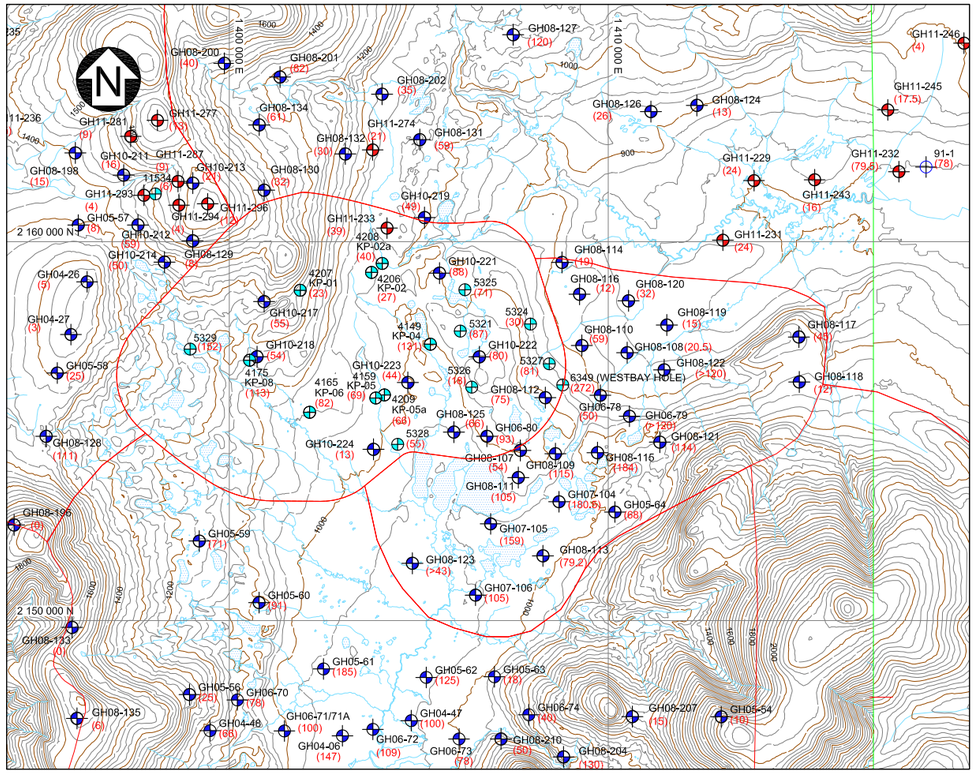


A 3,5 FIG **DETAIL** SCALE A



B 3,5 FIG **DETAIL** SCALE A

LEGEND:

PLP

PLP MINERAL CLAIM BOUNDARY

11534 (33) — OPEN PIT GEOTECHNICAL DRILLHOLE PLP EXPLORATION DRILLHOLLE

KP

REFERENCE AREA BOUNDARY

GH11-229 (24) — 2011 GEOTECHNICAL DRILLHOLES

GH04-01 (10) 4165 — 2004 TO 2010 GEOTECHNICAL DRILLHOLE

SRK

91-1 (78) — 1991 SRK DRILLHOLES

NOTES:

1. STANDPIPE PIEZOMETERS WERE INSTALLED IN ALL 2011 GEOTECHNICAL DRILLHOLES EXCEPT GH11-230 AND GH11-247.
2. RED NUMBERS IN PARENTHESES DENOTE THE DEPTH OF THE OVERBURDEN IN FEET.
3. SRK 1991 HOLE LOCATIONS ARE APPROXIMATE, NO COORDINATES ARE AVAILABLE

2000 0 2000 4000 6000 8000 10000 ft
SCALE A

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
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PEBBLE PROJECT

DEPTH TO BEDROCK DETAILS

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FIGURE 3.6 | REV 0

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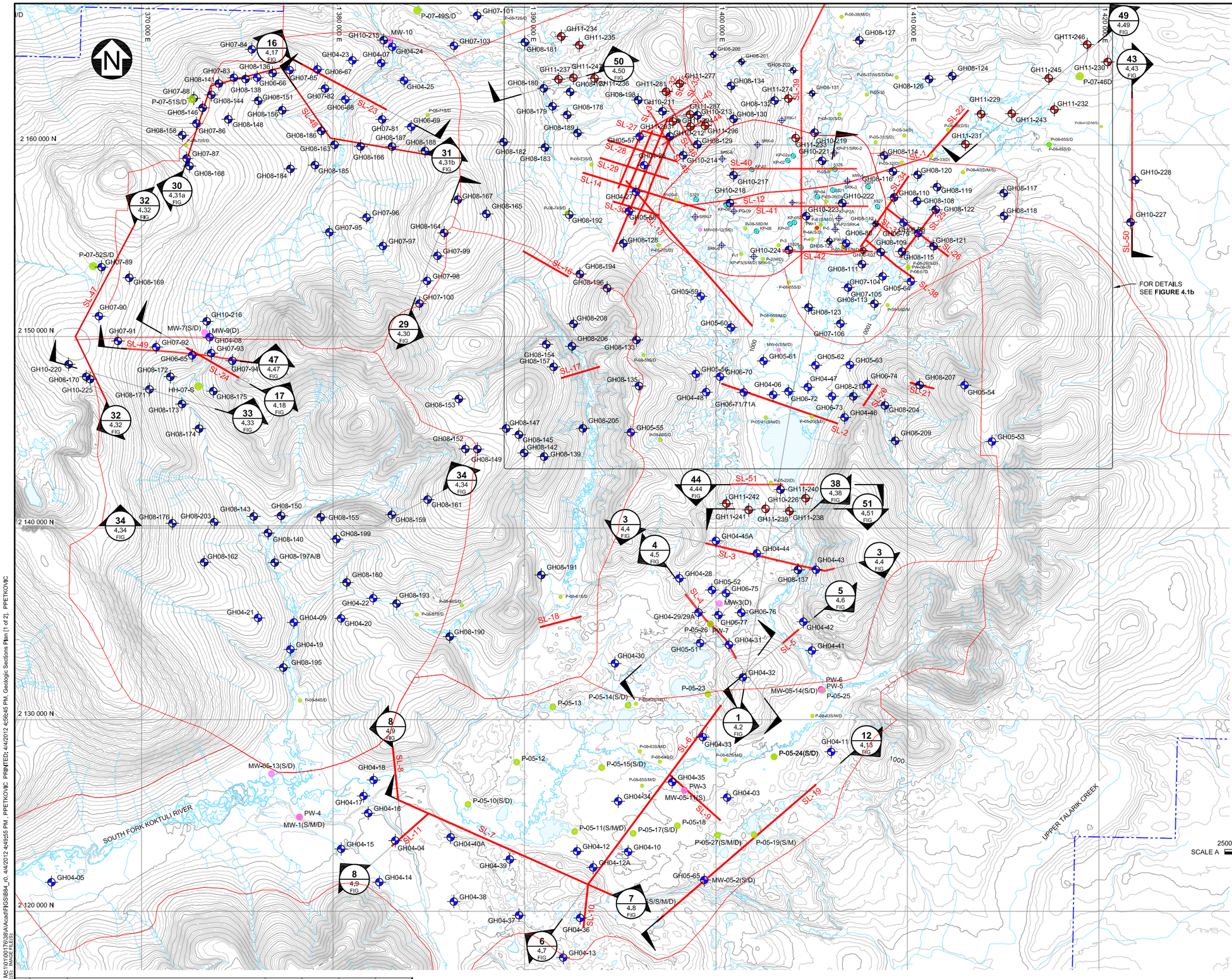

LEGEND:

PLP

- 4278 M (PQ-16) — PLP METALLURGICAL DRILLHOLE
- 11534 — OPEN PIT GEOTECHNICAL DRILLHOLE / PLP EXPLORATION DRILLHOLE
- PLP MINERAL CLAIM BOUNDARY

KP

- GH10-119 — 2004 TO 2010 GEOTECHNICAL DRILLHOLES
- GH11-239 — 2011 GEOTECHNICAL DRILLHOLES
- REFERENCE AREA BOUNDARY

WMC / SLR

- P-1 — COMPLETED PIEZOMETER
- PW-1 — COMPLETED PUMPING TEST LOCATION
- MW-1 — COMPLETED BASELINE MONITORING WELLS

FRONTIER

- SL-1 — SEISMIC LINE

NOTES:

1. STANDPIPE PIEZOMETERS WERE INSTALLED IN ALL 2011 KP GEOTECHNICAL DRILLHOLES EXCEPT GH11-230 AND GH11-247.
2. HH-07-S WAS DRILLED BY WMC/SLR, HH IS USUALLY A PROPOSED HOLE DESIGNATION.
3. TWO DIGITS AFTER GH DENOTE THE YEAR THE DRILLHOLE WAS COMPLETED.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
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PEBBLE PROJECT

GEOLOGIC SECTIONS PLAN SHEET 1 OF 2

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P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.1a | REV 0

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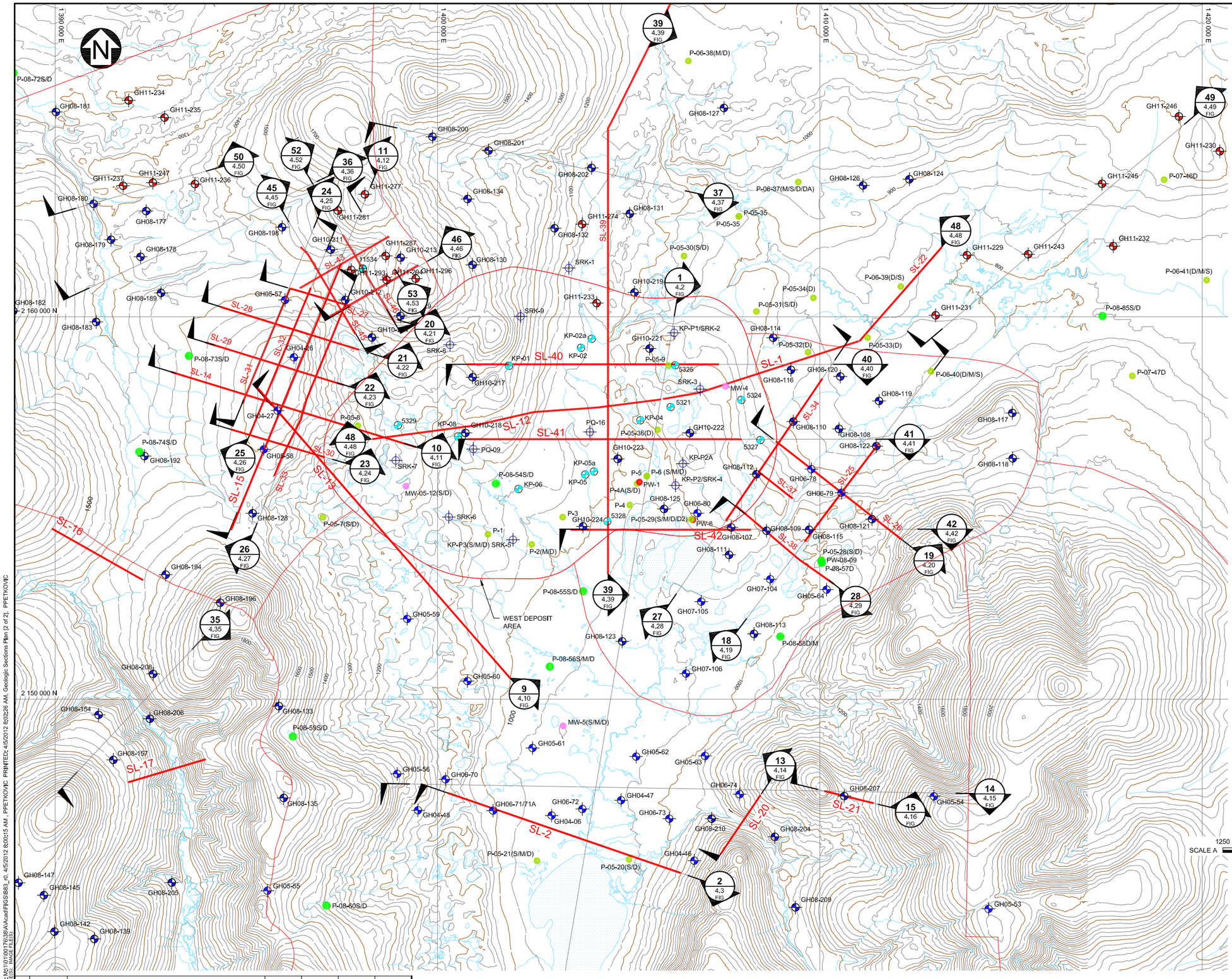

LEGEND:

PLP

- 4278 M (PQ-16) — PLP METALLURGICAL DRILLHOLE
- 4206 (KP-02) — OPEN PIT GEOTECHNICAL DRILLHOLES / PLP EXPLORATION DRILLHOLE

KP

- GH10-219 — 2004 TO 2010 KP GEOTECHNICAL DRILLHOLES
- GH11-296 — 2011 KP GEOTECHNICAL DRILLHOLES
- REFERENCE AREA BOUNDARY

WMC /SLR

- P-1 — COMPLETED PIEZOMETER
- PW-1 — COMPLETED PUMPING TEST LOCATION
- MW-1 — COMPLETED BASELINE MONITORING WELLS

FRONTIER

- SL-1 — SEISMIC LINE

NOTES:

1. STANDPIPE PIEZOMETERS WERE INSTALLED IN ALL 2011 KP GEOTECHNICALDRILLHOLES EXCEPT GH11-230 AND GH11-247.
2. TWO DIGITS AFTER GH DENOTE THE YEAR THE DRILLHOLE WAS COMPLETED.
3. HH-07-S WAS DRILLED BY WMC/SLR, HH IS USUALLY A PROPOSED HOLE DESIGNATION.

SCALE A: 1250 0 1250 2500 3750 5000 6250 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
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PEBBLE PROJECT

GEOLOGIC SECTIONS PLAN SHEET 2 OF 2

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P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.1b | REV 0

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S

ELEVATION (FT)

1300 1280 1260 1240 1220 1200 1180 1160 1140 1120 1100 1080 1060 1040 1020 1000 980 960 940 920 900 880 860 840 820 800 780 760 740 720 700

MATCH LINE - FIGURE 4.2a
MATCH LINE - FIGURE 4.2b

GH10-221 (OFFSET ~509' W)
GW @ 12.7' 24OCT10
k=4x10^{-5}cm/s
EOH 139'

GH08-125 (OFFSET ~560' E)
GW @ 1' 14MAY08
EOH 150'

GH08-123 (OFFSET 47' E)
GW @ 1' 14MAY08
EOH 42.75'

GH05-62 (OFFSET ~901' E)
EOH 245'

GH04-47 (OFFSET ~899' E)
GW @ 5.4' 18JUL06
k=1x10^{-4}cm/s
EOH 270'

GH05-72 (OFFSET 263' W)
PIEZOMETRIC LEVEL ABOVE GROUND SURFACE
GW @ 0' 28SEP06
EOH 215'

1 SECTION
4.1b FIG
THROUGH FRYING PAN VALLEY
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

GLACIAL DEPOSITS
- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM

- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
-]k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH05-62.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE PROJECT

FRYING PAN VALLEY GEOLOGIC SECTION SHEET 1 OF 2

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P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.2a | REV 0

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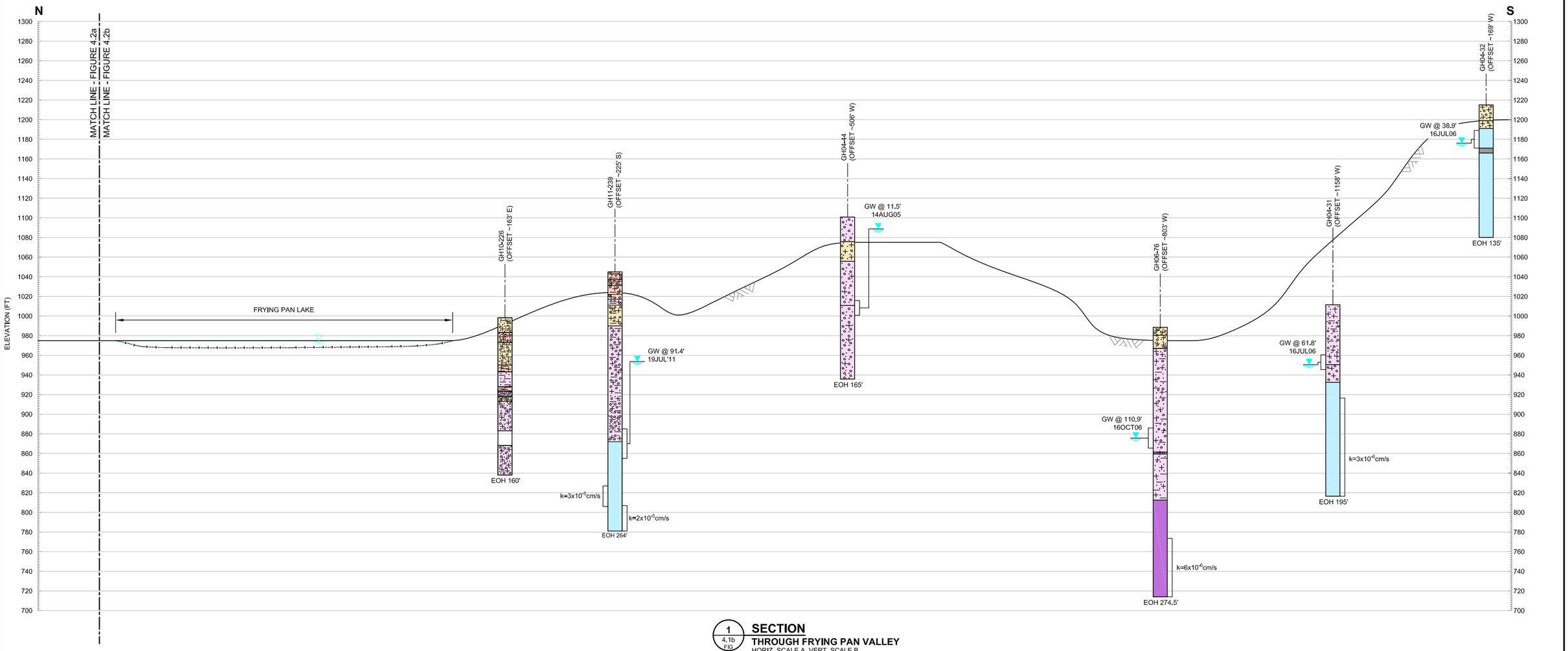

1 / 4.1b FIG **SECTION**
THROUGH FRYING PAN VALLEY
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

GLACIAL DEPOSITS
- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM

- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH10-226.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE PROJECT

FRYING PAN VALLEY GEOLOGIC SECTION SHEET 2 OF 2

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FIGURE 4.2b

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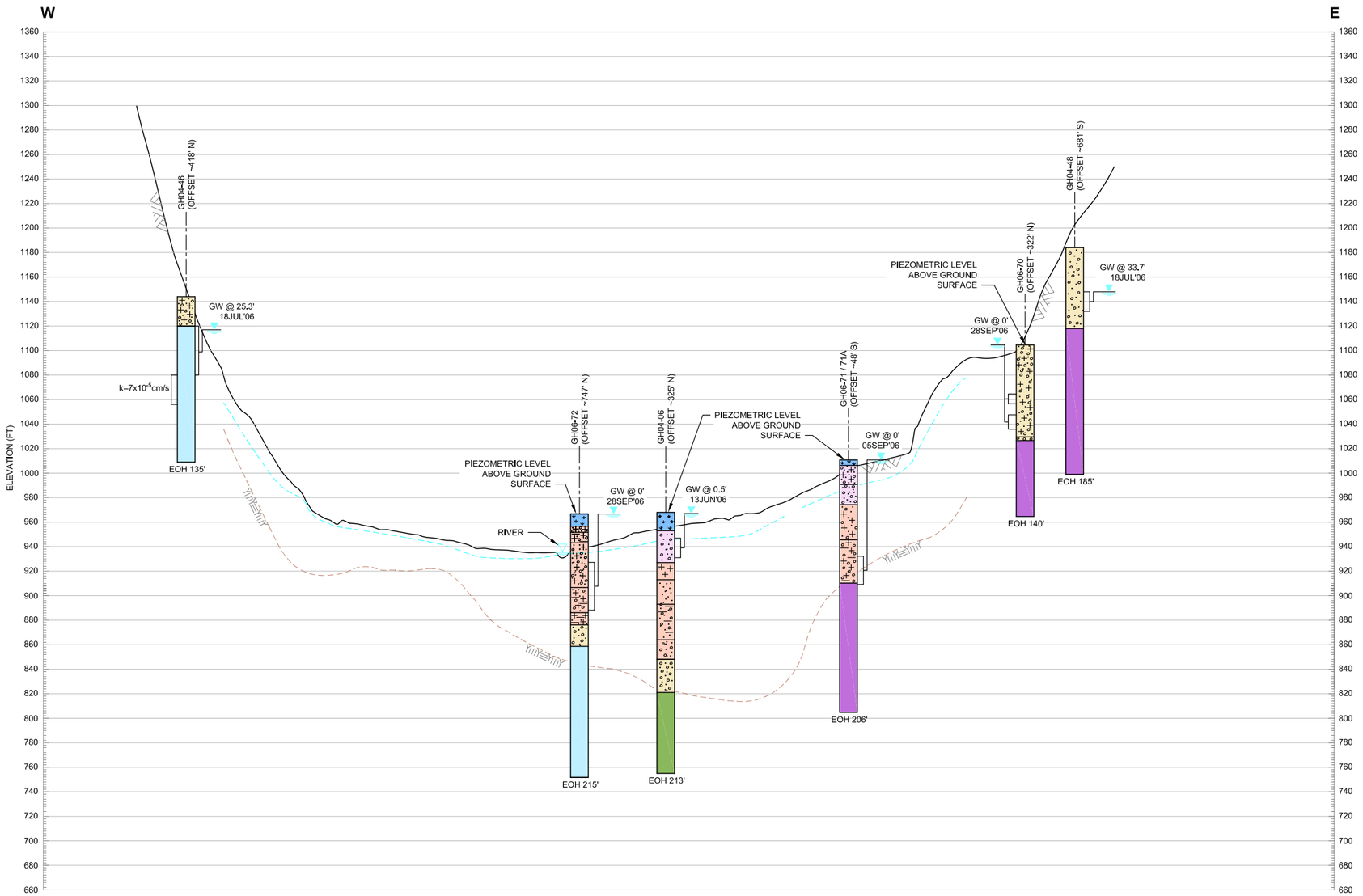

2 SECTION
ALONG SEISMIC LINE-2
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS:
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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AREA A
GEOLOGIC SECTION ALONG SEISMIC LINE-2

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FIGURE 4.3 | REV 0

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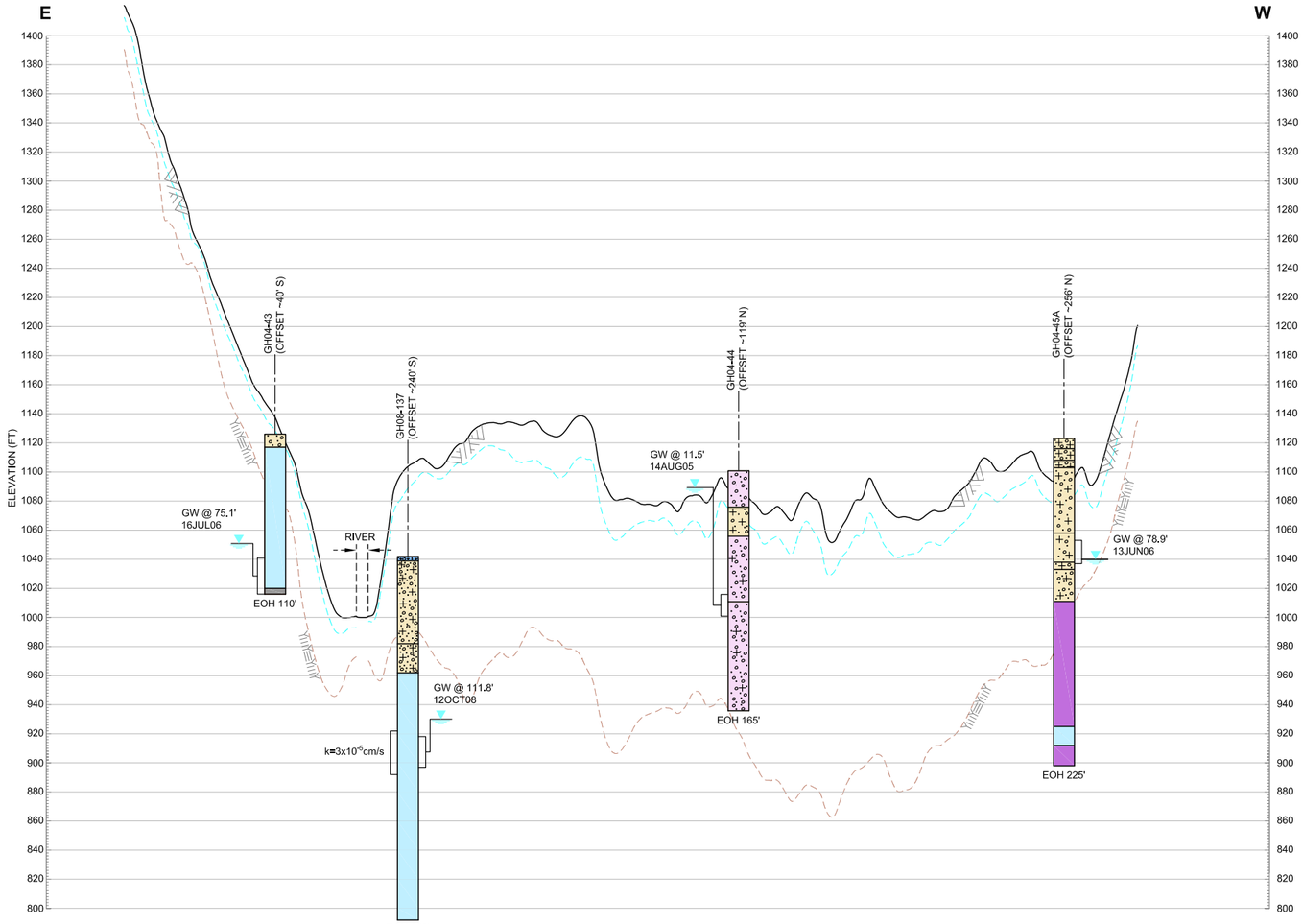

3 / 4.1a FIG **SECTION**
ALONG SEISMIC LINE-3
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS:
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

]k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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AREA A
GEOLOGIC SECTION ALONG SEISMIC LINE-3

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FIGURE 4.4

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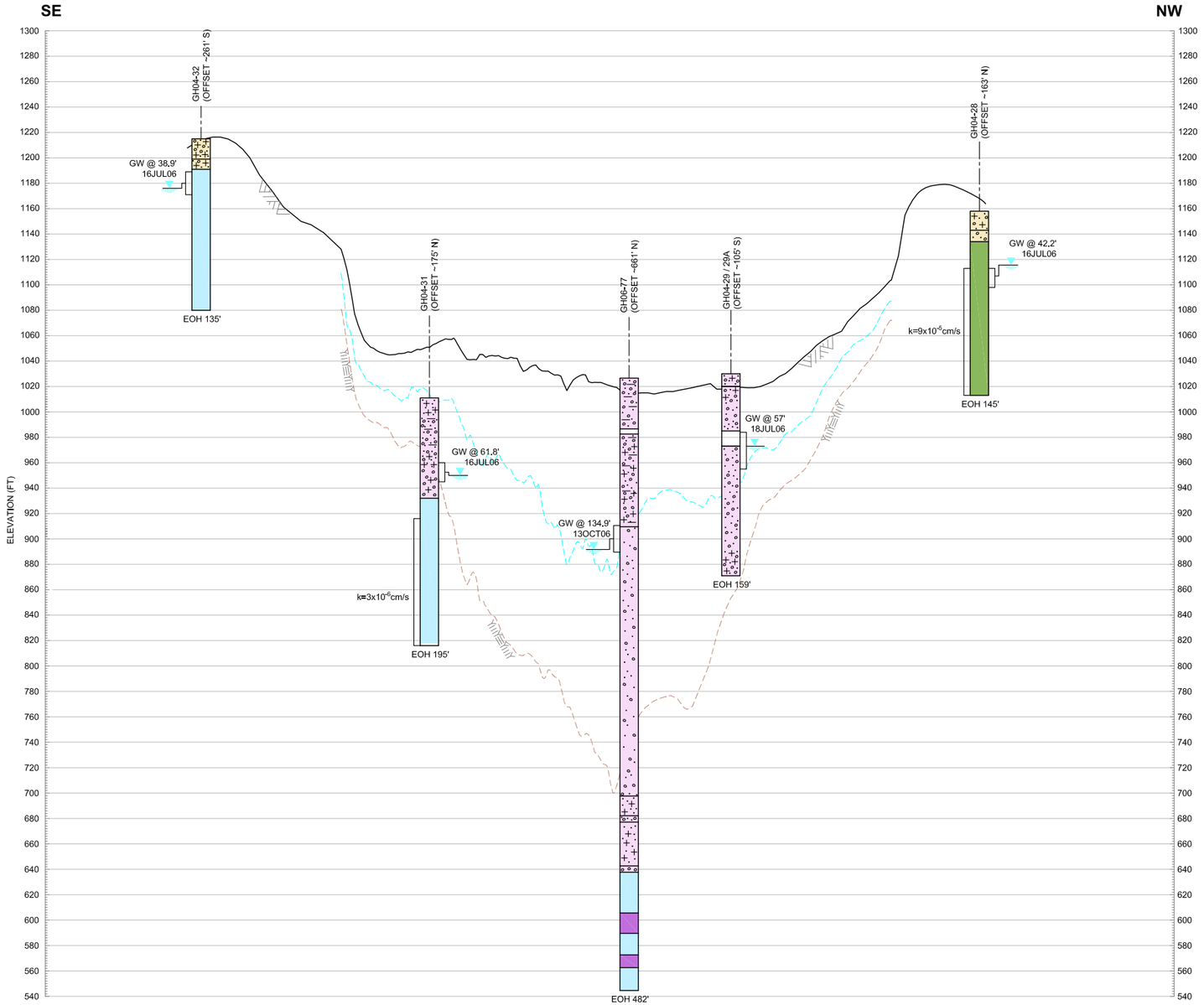

4 4.1a FIG. **SECTION ALONG SEISMIC LINE-4**
HORIZ. SCALE A, VERT.SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1,2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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AREA A
GEOLOGIC SECTION ALONG SEISMIC LINE-4

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FIGURE 4.5 | REV 0

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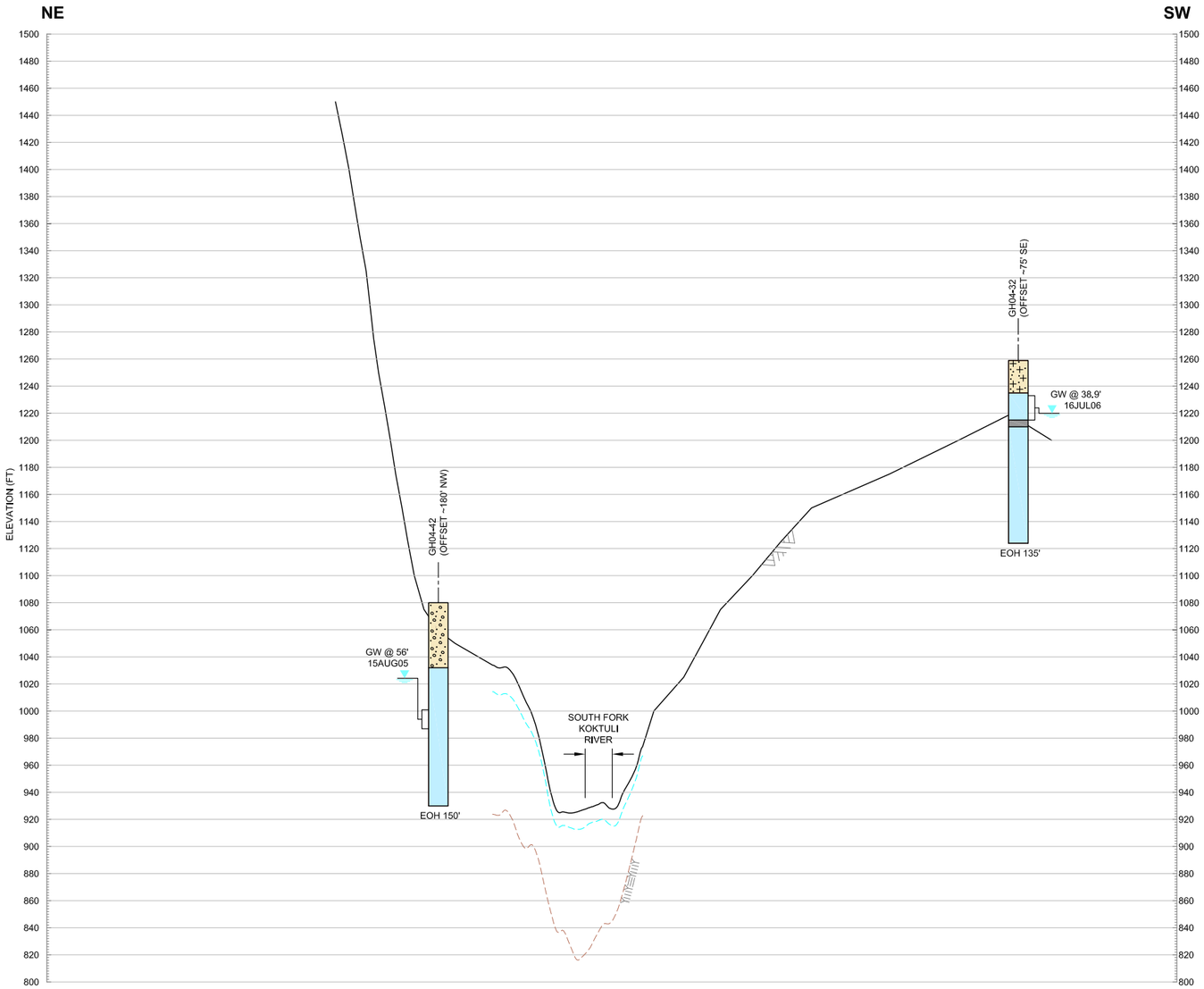

5 / 4.1a FIG

SECTION
ALONG SEISMIC LINE-5
HORIZ. SCALE A, VERT.SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1,2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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AREA A
GEOLOGIC SECTION ALONG SEISMIC LINE-5

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FIGURE 4.6 | REV 0

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SW

NE

ELEVATION (FT)

1200 1180 1160 1140 1120 1100 1080 1060 1040 1020 1000 980 960 940 920 900 880 860 840 820 800 780 760 740 720 700 680 660 640 620 600 580 560

GH04-36 (OFFSET ~717' S)

EOH 155'

GH04-12A (OFFSET ~308' N)

GW @ 29.5' 16JUL06

EOH 130'

GH04-10 (OFFSET ~668' S)

GW @ 56.3' 13JUN06

EOH 330'

MATCH LINE - FIGURE 4.7a
MATCH LINE - FIGURE 4.7b

INTERPRETED BEDROCK SURFACE

INTERPRETED BEDROCK SURFACE

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH04-36.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

6 / 4.1a FIG

SECTION
ALONG SEISMIC LINE-6
HORIZ. SCALE A, VERT.SCALE B

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PEBBLE PROJECT

SOUTH FORK KOKTULI RIVER AREA
GEOLOGIC SECTION ALONG
SEISMIC LINE-6 - SHEET 1 OF 2

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FIGURE 4.7a | REV 0

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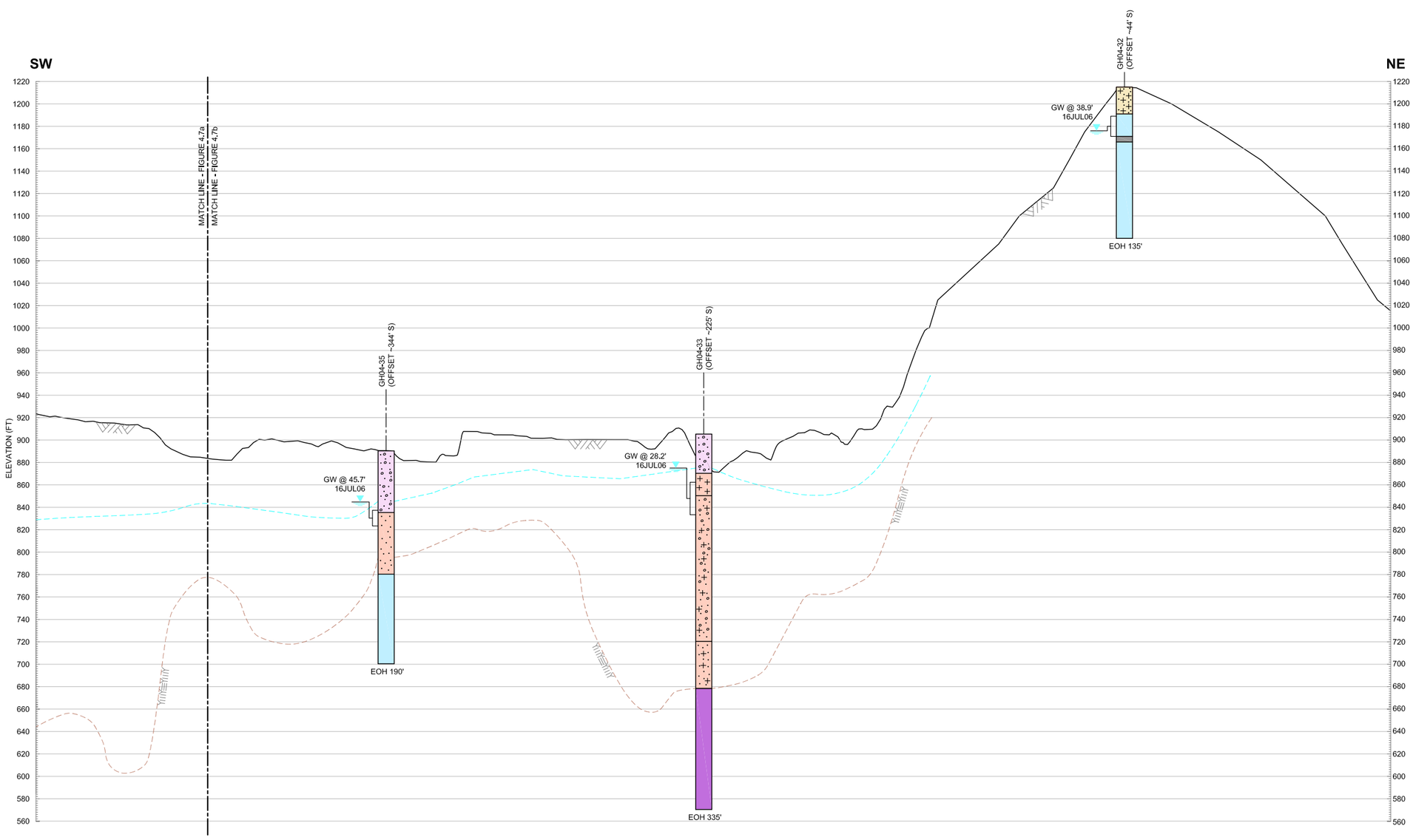

6 4.1a FIG **SECTION**
ALONG SEISMIC LINE-6
HORIZ. SCALE A, VERT.SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT (GLACIAL DEPOSITS)
- GLACIOLACUSTRINE DEPOSIT (GLACIAL DEPOSITS)
- GLACIAL DRIFT DEPOSIT (GLACIAL DEPOSITS)
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

SOUTH FORK KOKTULI RIVER AREA
GEOLOGIC SECTION ALONG
SEISMIC LINE-6 - SHEET 2 OF 2

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-176/38	3

FIGURE 4.7b REV 0

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0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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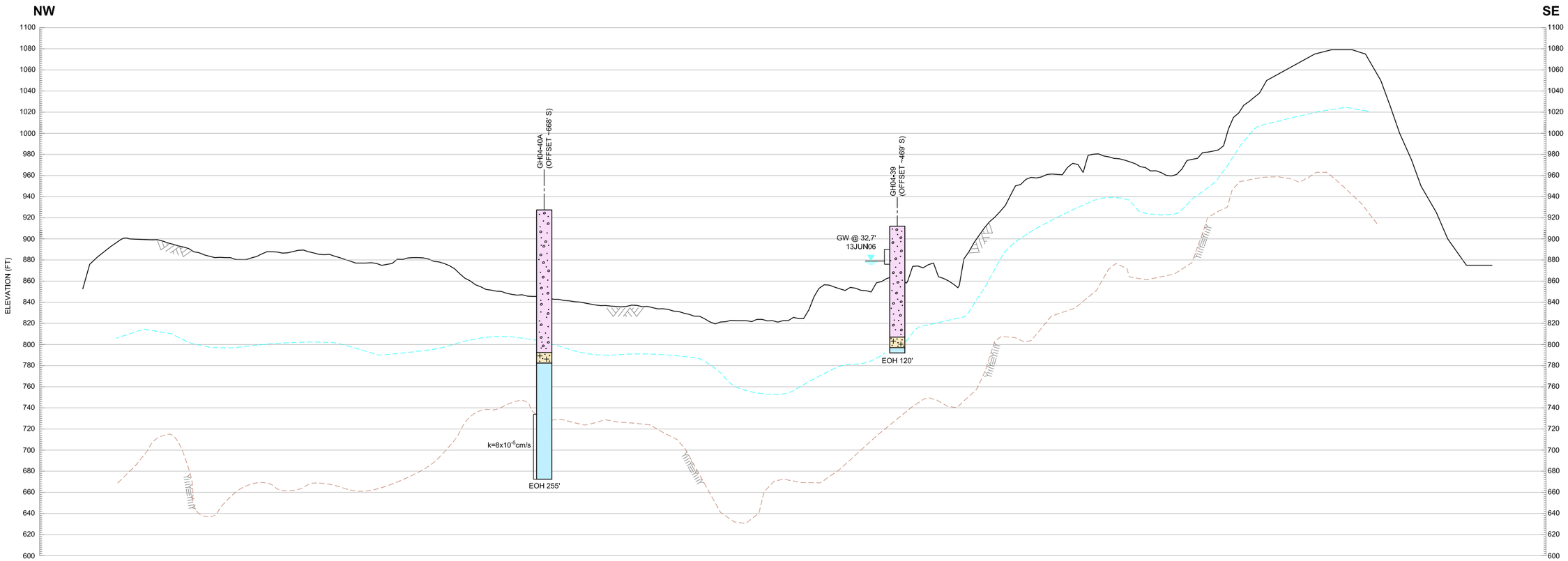

7 4.1a FIG. SECTION ALONG SEISMIC LINE-7

HORIZ. SCALE A, VERT.SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM

- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
-]k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH04-40A.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

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0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

SOUTH FORK KOKTULI RIVER AREA GEOLOGIC SECTION ALONG SEISMIC LINE-7

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.8 | REV 0

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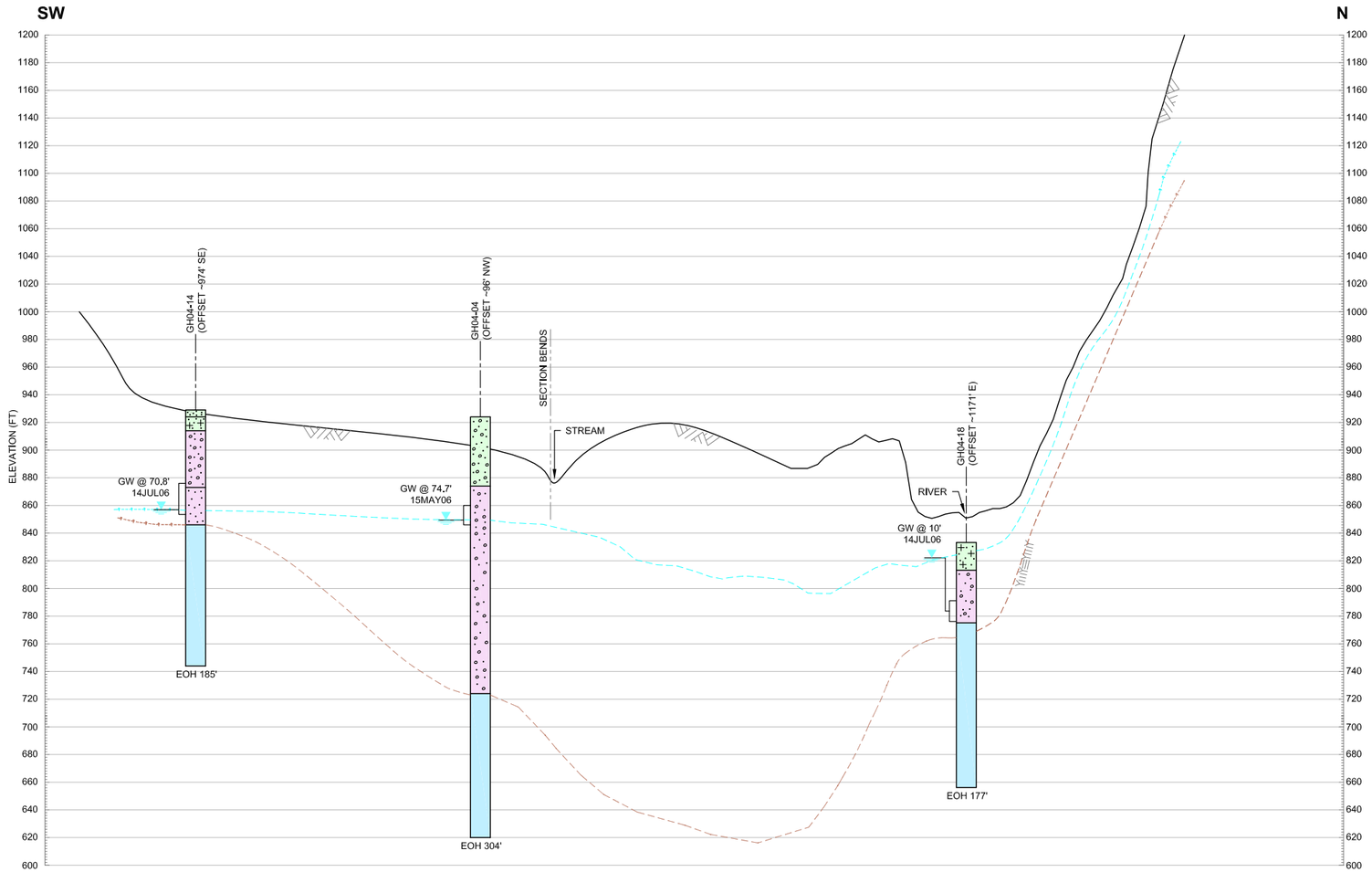

8 / 4.1a FIG

SECTION
ALONG SEISMIC LINE-8 AND 11
HORIZ. SCALE A, VERT.SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

SOUTH FORK KOKTULI RIVER GEOLOGIC SECTION ALONG SEISMIC LINE-8 AND 11

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.9 | REV 0

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9 4.1b FIG **SECTION**
ALONG SEISMIC LINE-13
HORIZ. SCALE A, VERT.SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- GLACIAL DEPOSITS
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY, THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH04-36.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE-13

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.10 | REV 0

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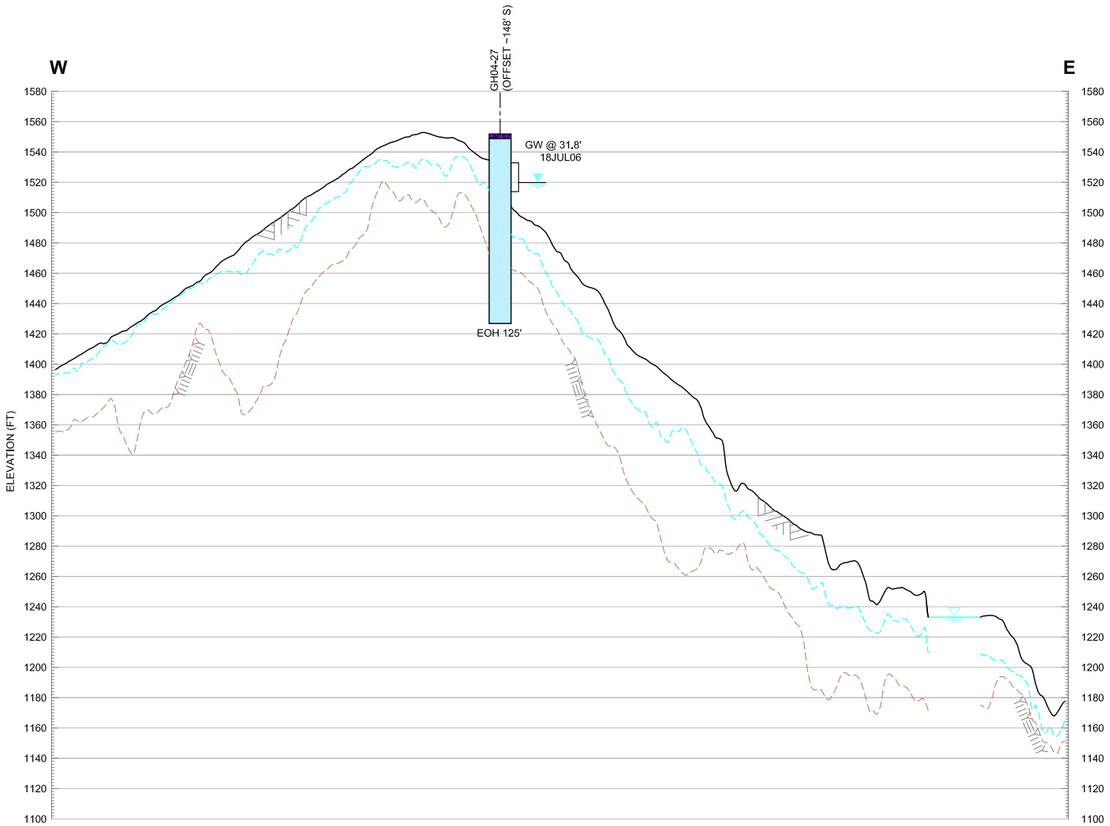

10
4.1b
FIG

SECTION
ALONG SEISMIC LINE-14
HORIZ. SCALE A, VERT.SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM

GLACIAL DEPOSITS:

- GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT

- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY, THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH04-36.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE-14

Knight Piésold CONSULTING

P/A NO. VA101-176/38
REF NO. 3

FIGURE 4.11
REV 0

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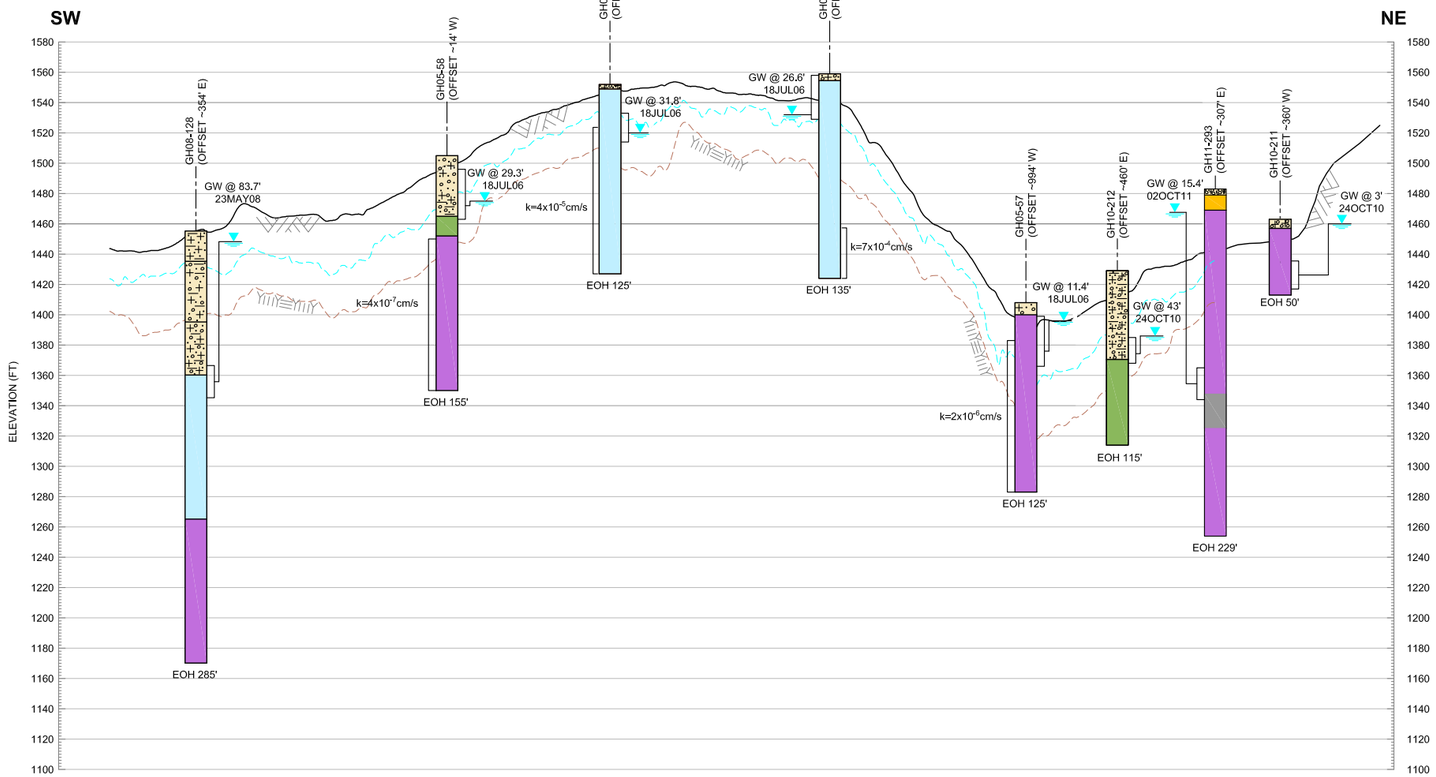

11 4.1b FIG **SECTION**
ALONG SEISMIC LINE-15
HORIZ. SCALE A, VERT.SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS:
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE-15

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FIGURE 4.12 | REV 0

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NE

SW

ELEVATION (FT)

GH04-11 (OFFSET ~774' NW)

GW @ 27.4' 07NOV05

EOH 170'

LAKE

LAKE

GH05-65 (OFFSET ~32' NW)

STREAM

SECTION BENDS

EOH 495'

SCALE B 50 0 50 100 150 200 250 ft

SCALE A 500 0 500 1000 1500 2000 2500 ft

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH05-65.

LEGEND:

GLACIAL DEPOSITS
- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM

- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

]k=1.2 x 10^{-4} cm/s HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

12 (4.1a FIG.) **SECTION ALONG SEISMIC LINE-19**
HORIZ. SCALE A, VERT.SCALE B

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

SOUTH FORK KOKTULI RIVER AREA
GEOLOGIC SECTION ALONG
SEISMIC LINE-19

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.13 | REV 0

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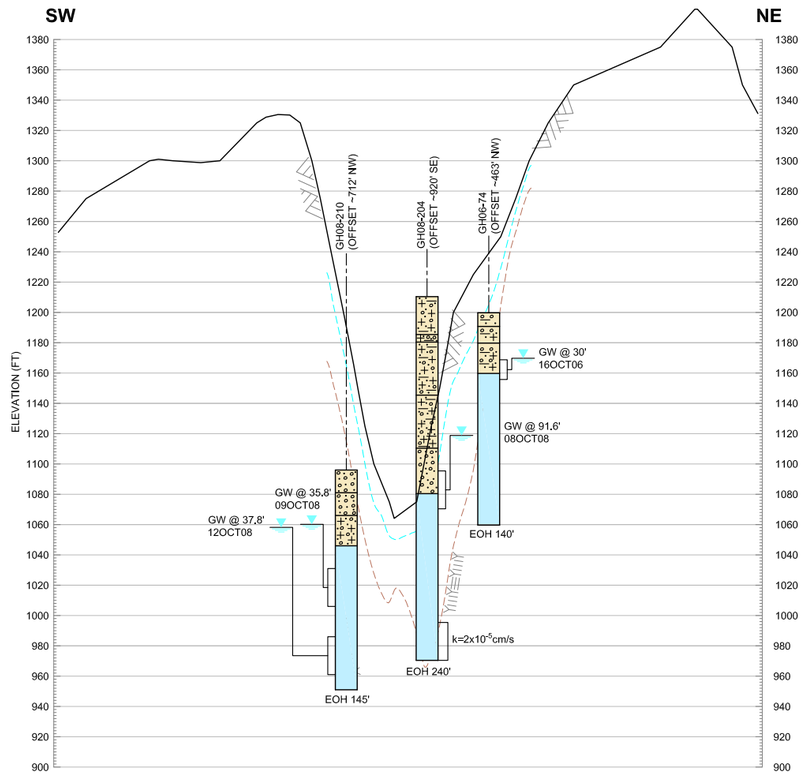

13 / 4.1b FIG

SECTION
ALONG SEISMIC LINE-20
HORIZ. SCALE A, VERT.SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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PEBBLE PROJECT

AREA A
GEOLOGIC SECTION ALONG
SEISMIC LINE-20

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.14 | REV 0

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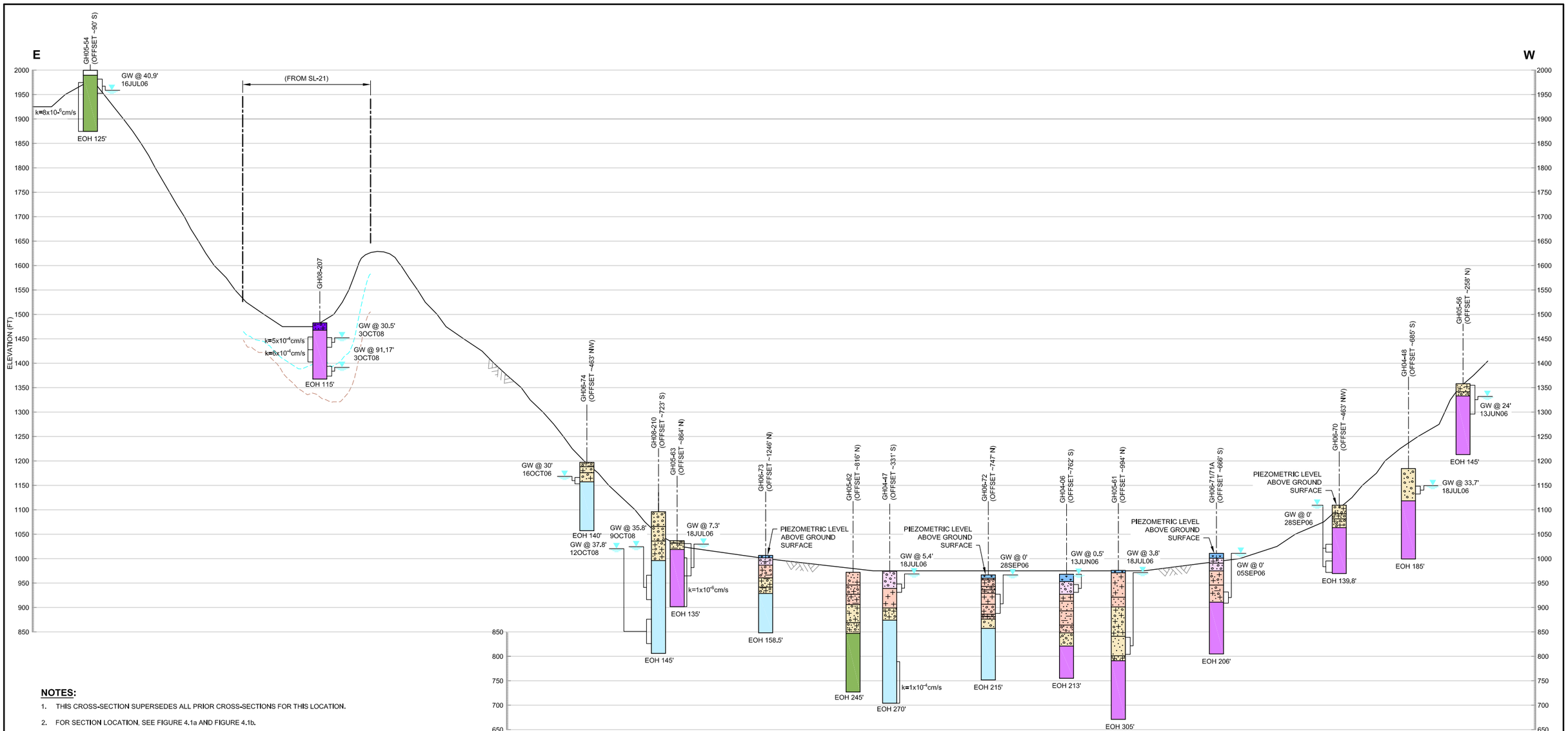

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH05-62 OR GH06-73.

14 / 4.1b FIG **SECTION**
NORTH GEOLOGIC SECTION
HORIZ. SCALE A, VERT.SCALE B

LEGEND:

GLACIAL DEPOSITS
- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM

- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10-4 cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

SCALE B: 100 0 100 200 300 400 500 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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PEBBLE PROJECT

AREA A
NORTH GEOLOGIC SECTION

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.15 | REV 0

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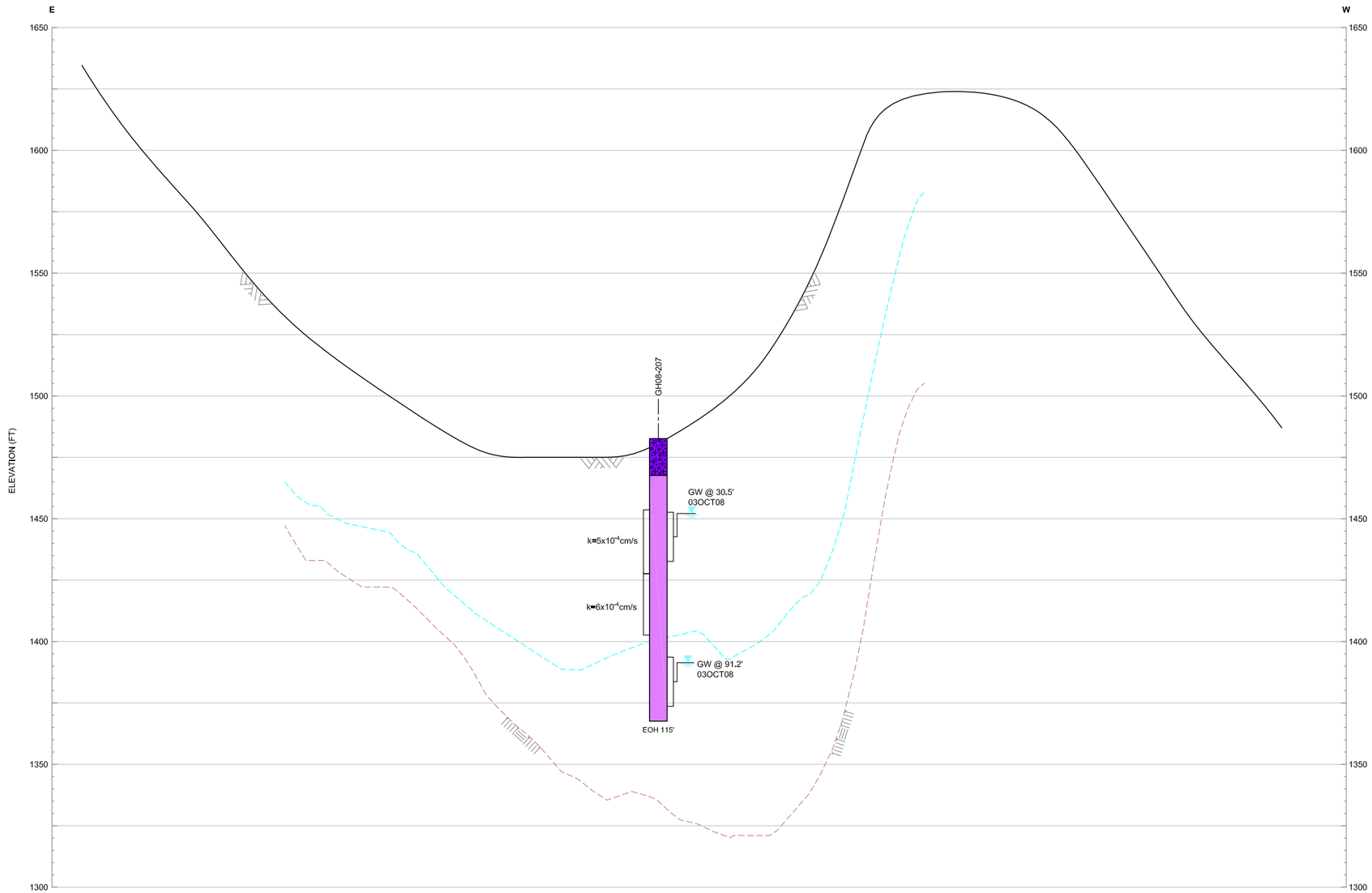

15
4.1b
FIG

SECTION
ALONG SEISMIC LINE-21
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT; GLACIOLACUSTRINE DEPOSIT; GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 25 0 25 50 75 100 125 ft
SCALE A: 125 0 125 250 375 500 625 ft

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA A
GEOLOGIC SECTION ALONG SEISMIC LINE-21

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-176/38	3

FIGURE 4.16 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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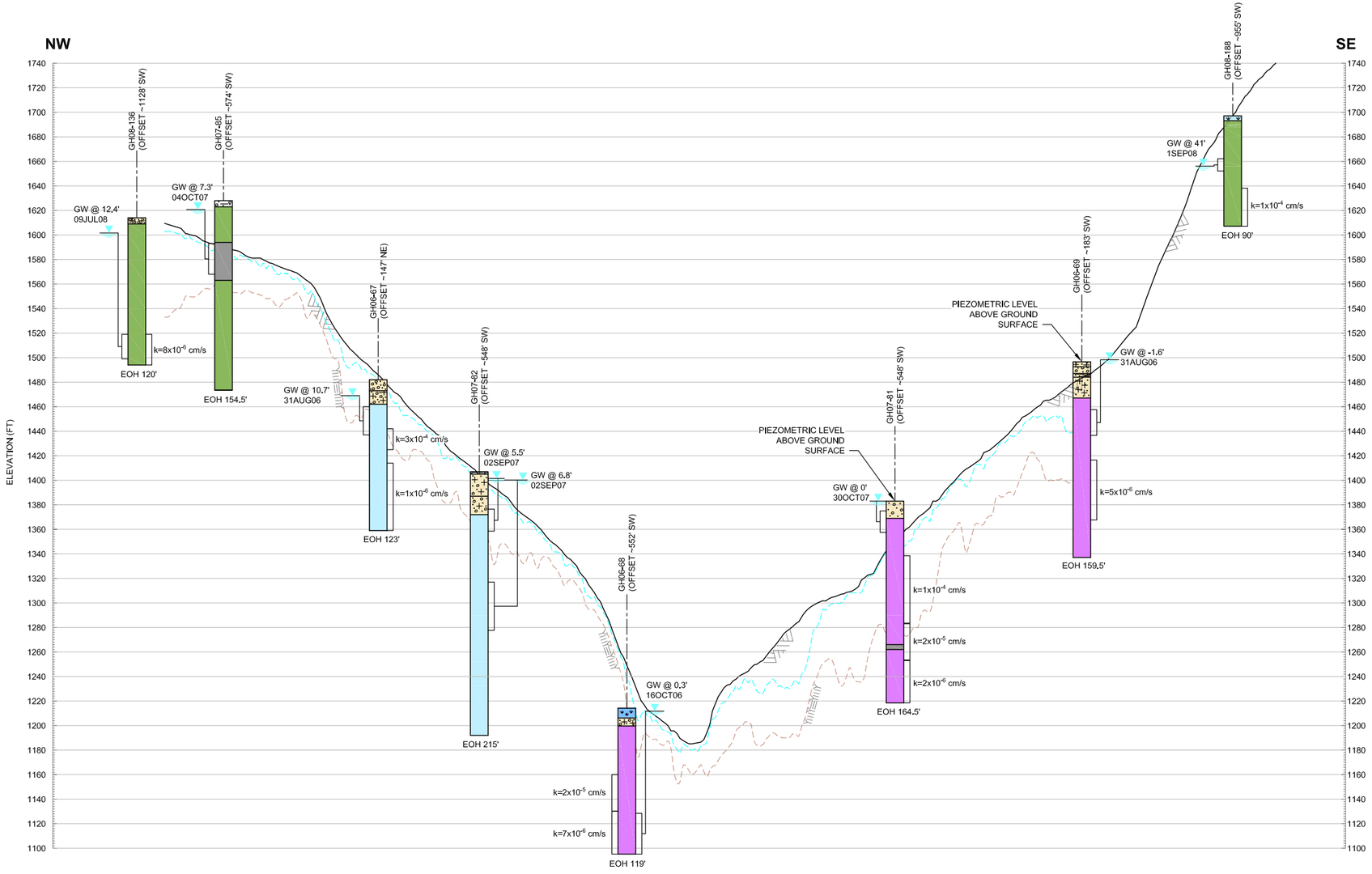

16 4.1a FIG.
SECTION
ALONG SEISMIC LINE-23
HORIZ. SCALE A, VERT.SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM

GLACIAL DEPOSITS

- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10-4 cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. BASALT WAS ENCOUNTERED IN GH08-188, GH08-36, GH06-67 AND GH07-82. THE AGE OF THIS BASALT HAS NOT BEEN DETERMINED BY CROSS CUTTING RELATIONSHIPS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE PROJECT

AREA G
GEOLOGIC SECTION ALONG SEISMIC LINE-23

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.17 | REV 0

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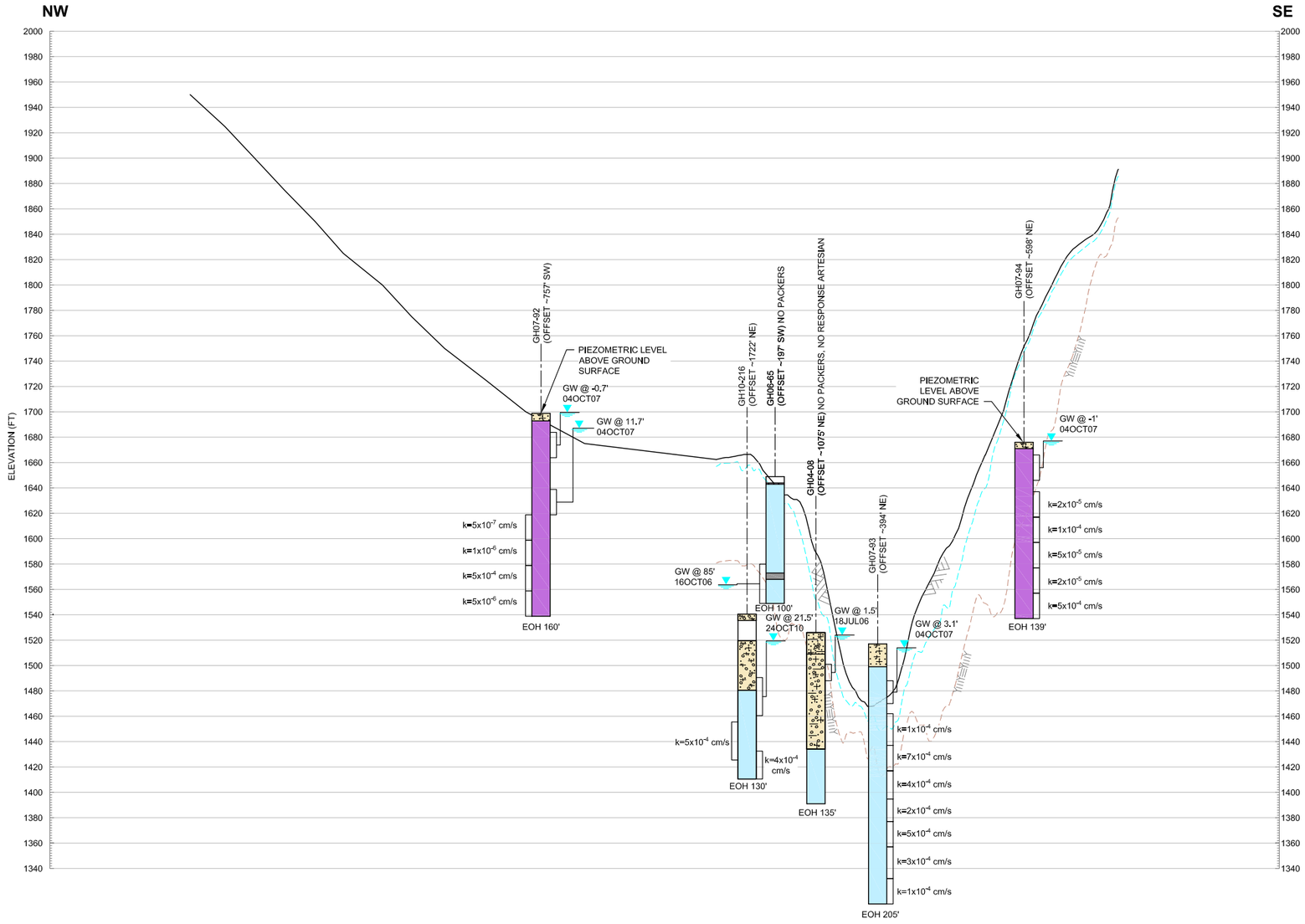

17 / 4.1a FIG **SECTION**
ALONG SEISMIC LINE-24
HORIZ. SCALE A, VERT.SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. OVERBURDEN GEOLOGY OF GH04-08 HAS BEEN UPDATED FROM THE ORGINAL 2004 DRILLHOLE LOG.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE PROJECT

AREA L
GEOLOGIC SECTION ALONG
SEISMIC LINE-24

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3 | REV 0

FIGURE 4.18

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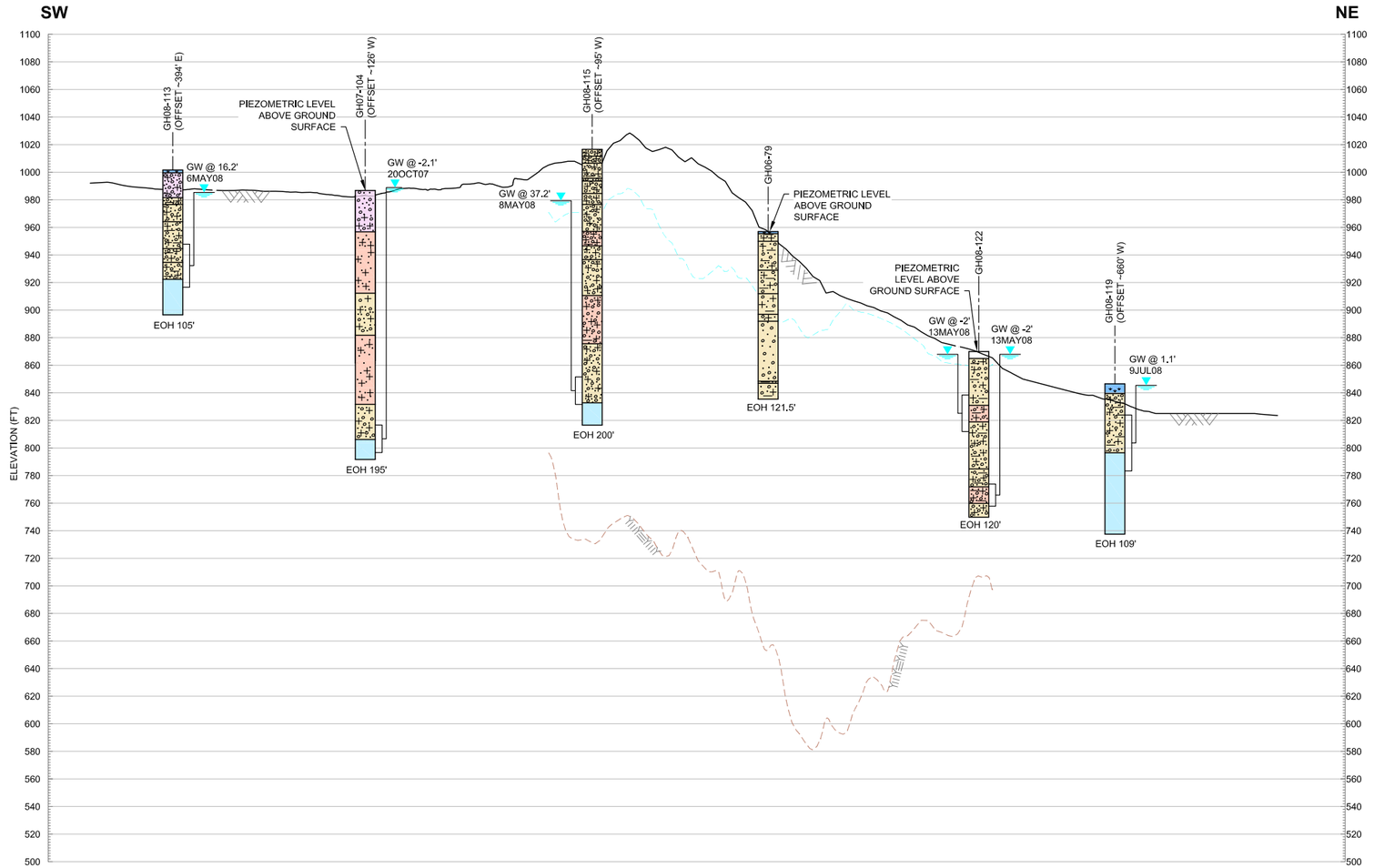

18
4.1b
FIG

SECTION
ALONG SEISMIC LINE-25
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. SEISMIC DATA FOR SL-25 MAY NEED TO BE REVISITED AS THE DIFFERENCE IN DRILLED DEPTH OF BEDROCK IS APPROXIMATELY 100ft FROM THE SEISMIC DEPTH.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

EAST DEPOSIT AREA
GEOLOGIC SECTION ALONG
SEISMIC LINE-25

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.19 | REV 0

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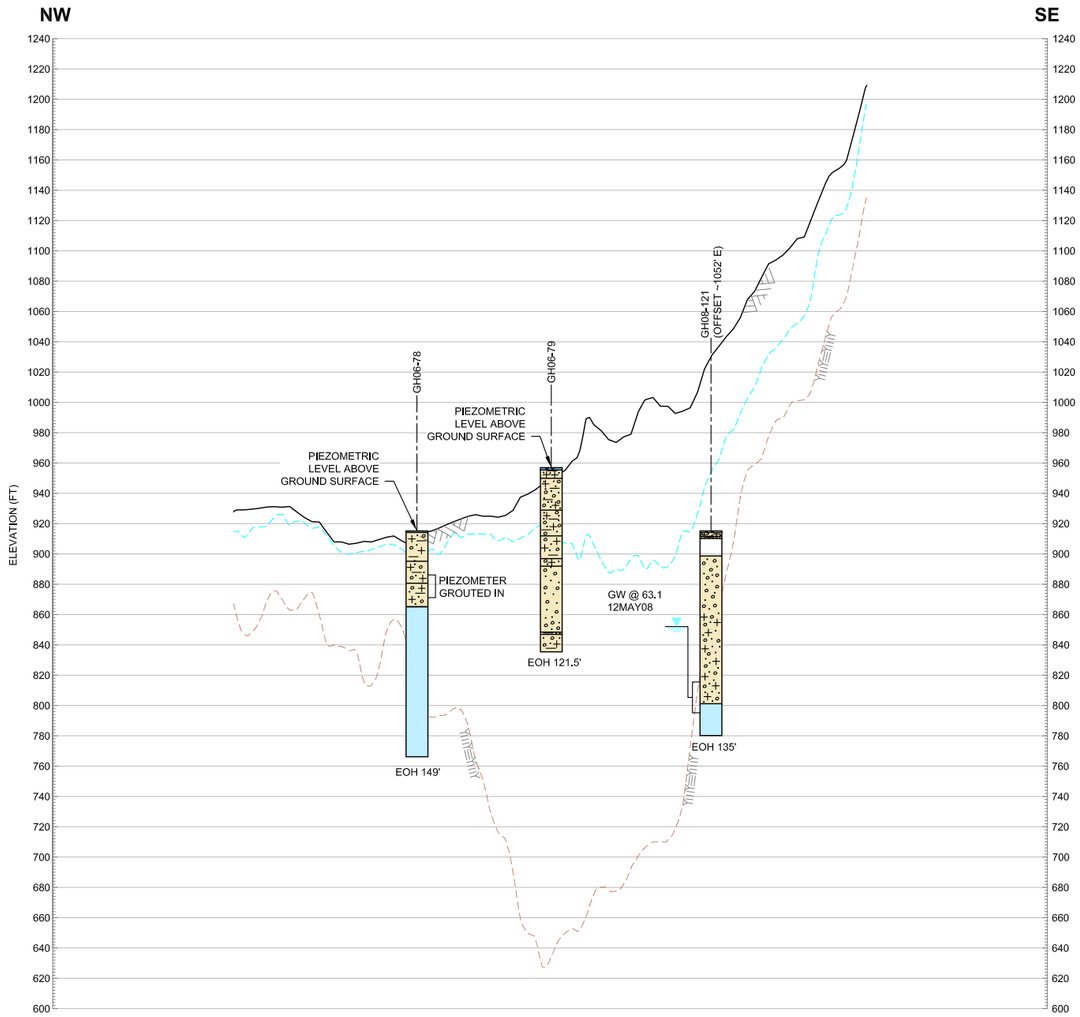

19 / 4.1b FIG **SECTION**
ALONG SEISMIC LINE-26
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS:
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH06-79.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

EAST DEPOSIT AREA
GEOLOGIC SECTION ALONG
SEISMIC LINE-26

Knight Piésold CONSULTING

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FIGURE 4.20

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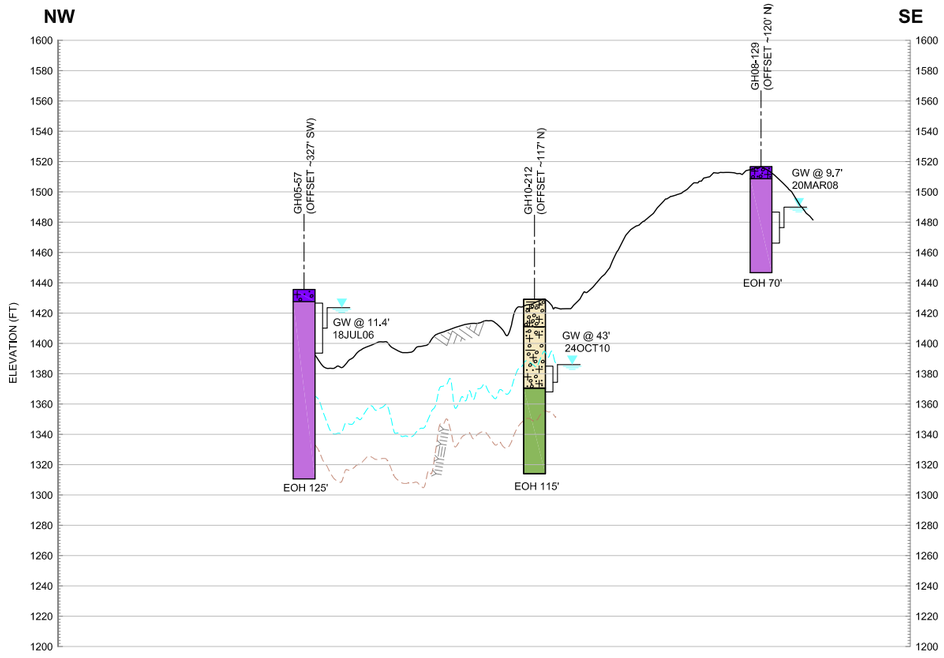

20 / 4.1b FIG **SECTION**
ALONG SEISMIC LINE-27
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS:
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE PROJECT

AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE-27

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FIGURE 4.21 | REV 0

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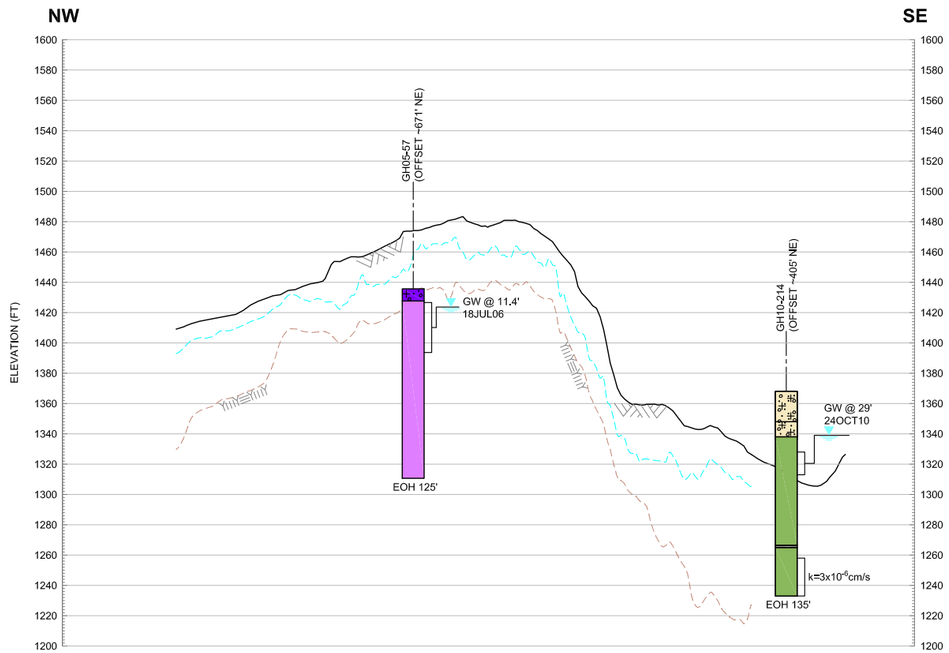

21 4.1b FIG **SECTION**
ALONG SEISMIC LINE-28
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE PROJECT

AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE-28

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FIGURE 4.22 | REV 0

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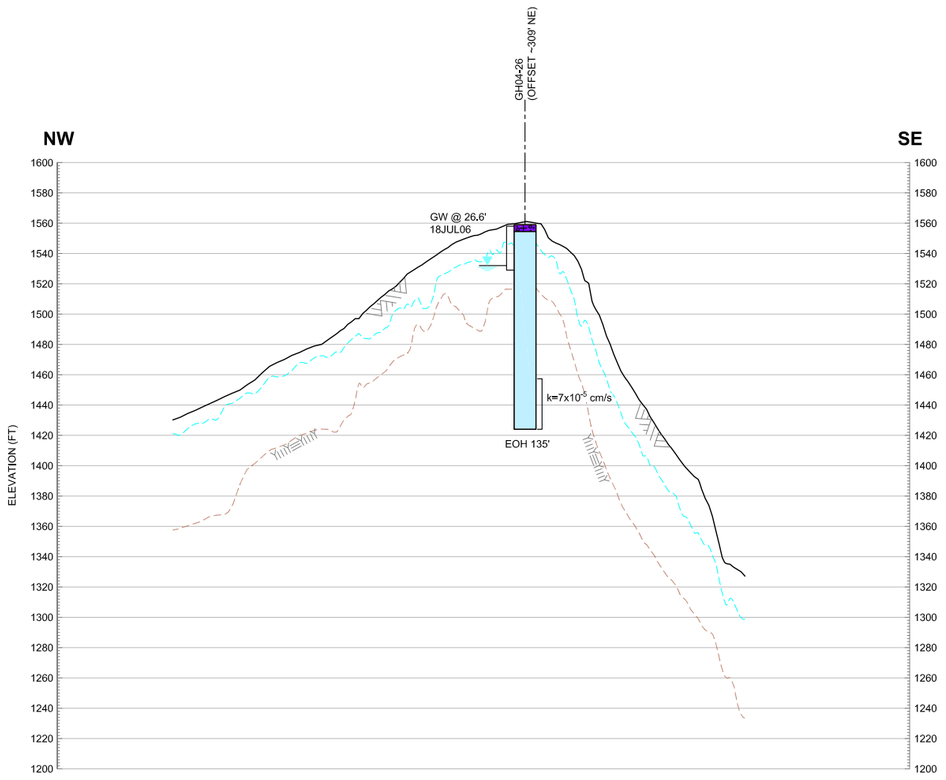

22 / 4.1b FIG — SECTION ALONG SEISMIC LINE-29
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE-29

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P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.23 | REV 0

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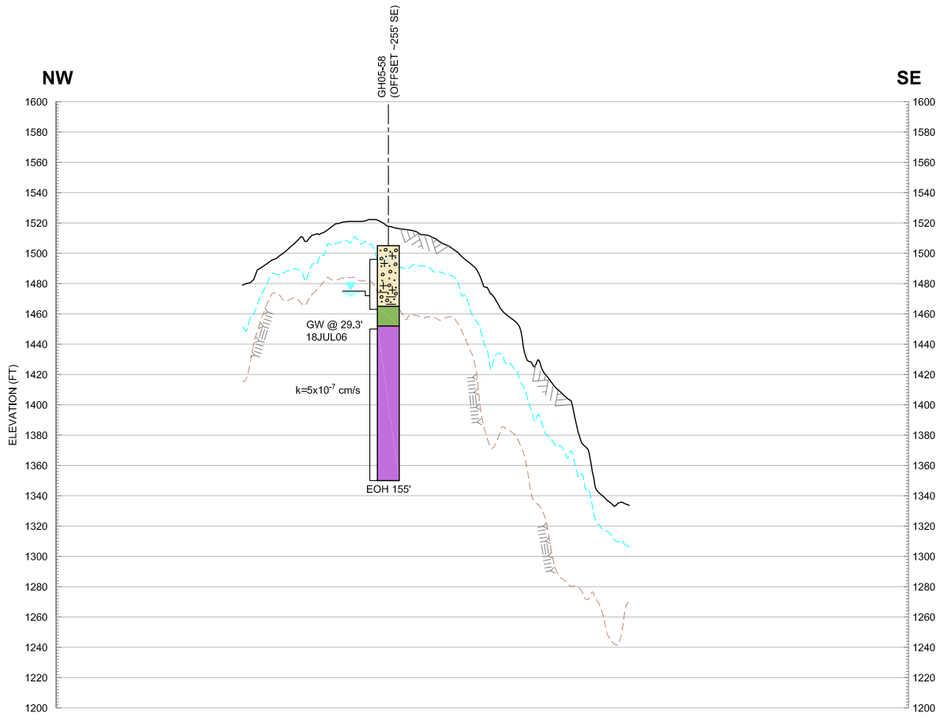

23 4.1b FIG **SECTION**
ALONG SEISMIC LINE-30
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA E
GEOLOGIC SECTION ALONG
SEISMIC LINE-30

Knight Piésold CONSULTING

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FIGURE 4.24

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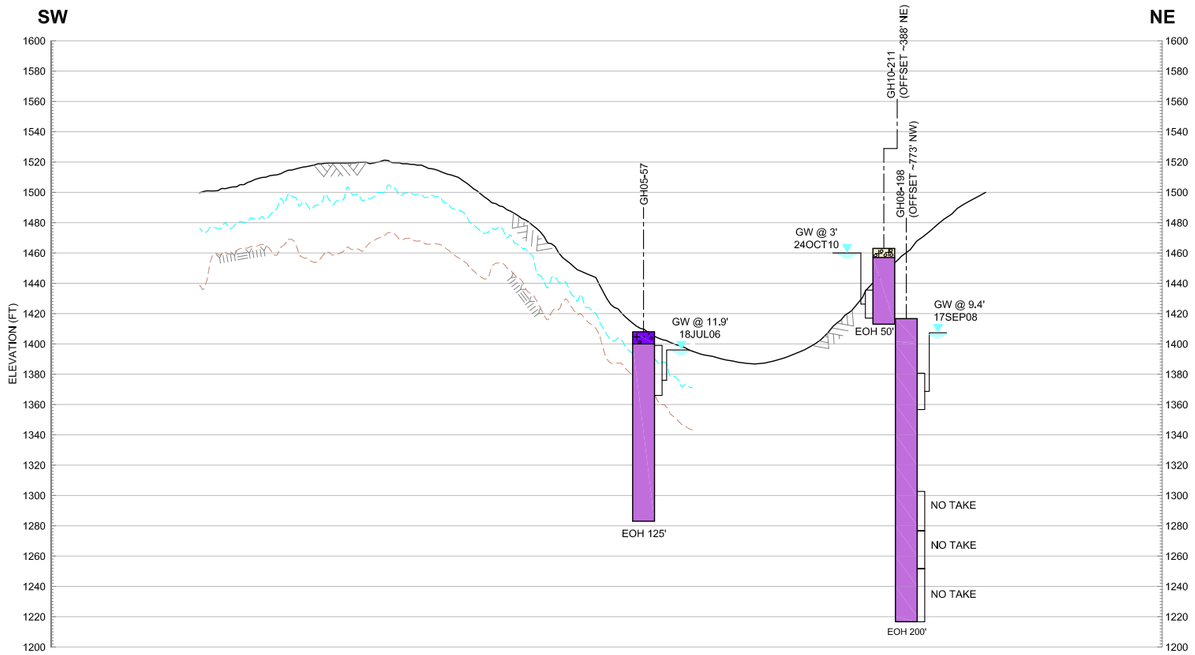

24 4.1b FIG SECTION
ALONG SEISMIC LINE-31
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE-31

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FIGURE 4.25 | REV 0

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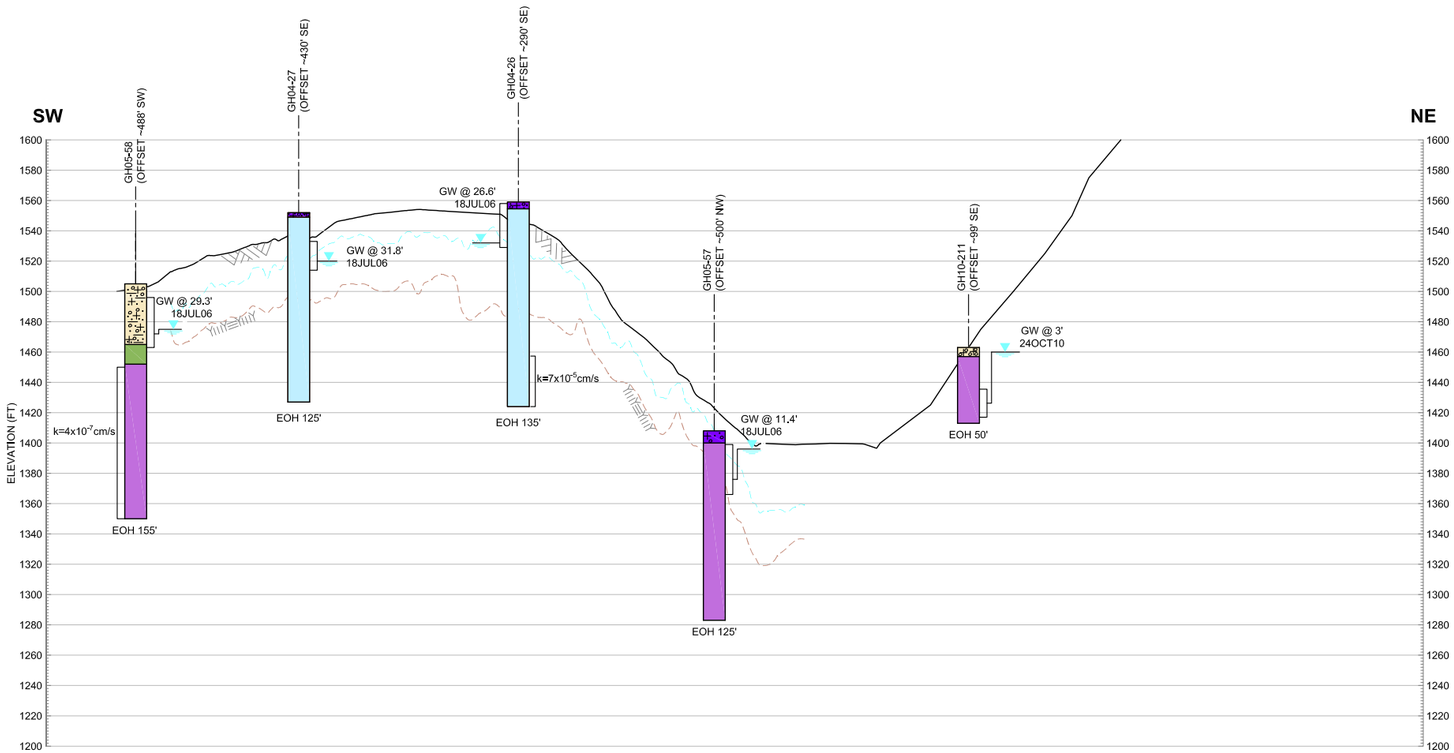

25 / 4.1b FIG **SECTION**
ALONG SEISMIC LINE-32
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE-32

Knight Piésold CONSULTING

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FIGURE 4.26 | REV 0

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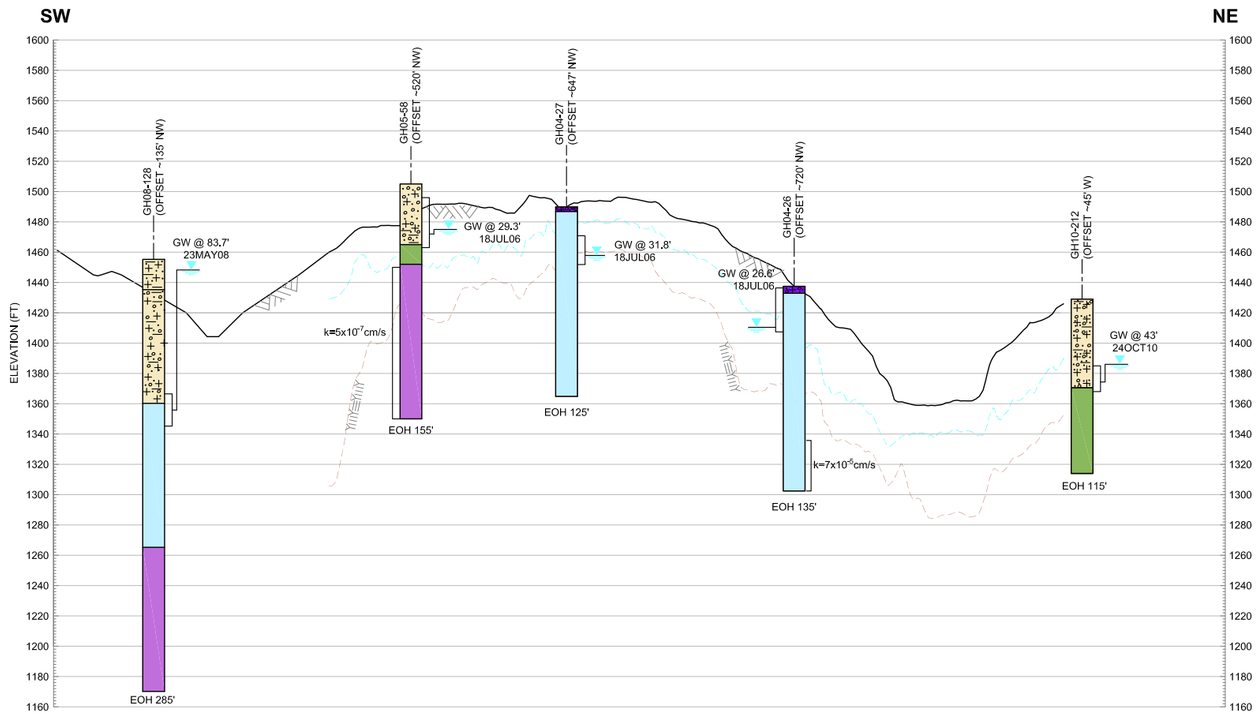

26 / 4.1b FIG.

SECTION
ALONG SEISMIC LINE-33
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS:
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE-33

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.27 | REV 0

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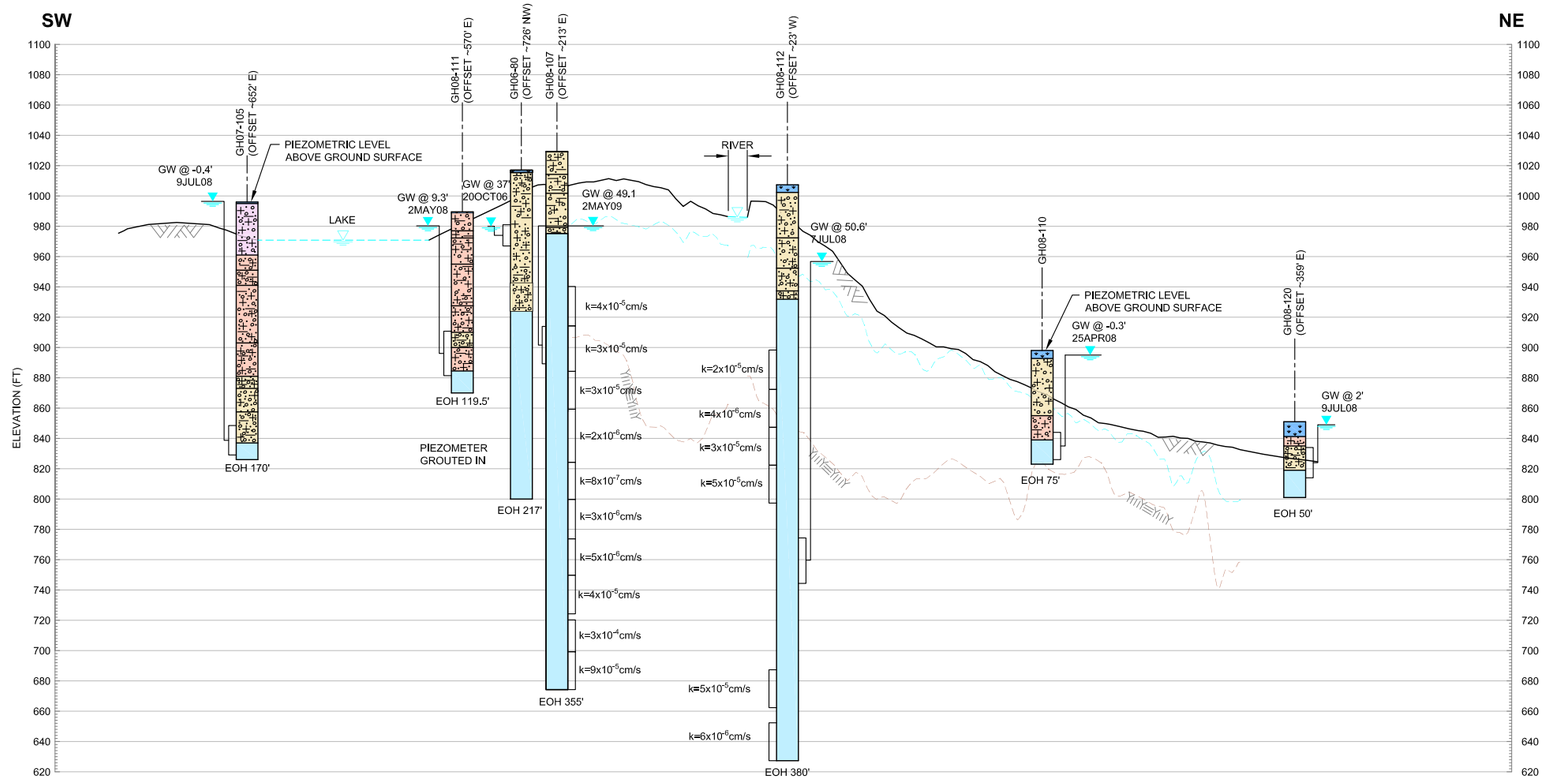

27 4.1b FIG **SECTION**
ALONG SEISMIC LINE-34
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS:
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH04-36.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE PROJECT

EAST DEPOSIT AREA
GEOLOGIC SECTION ALONG
SEISMIC LINE-34

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3 | REV 0

FIGURE 4.28

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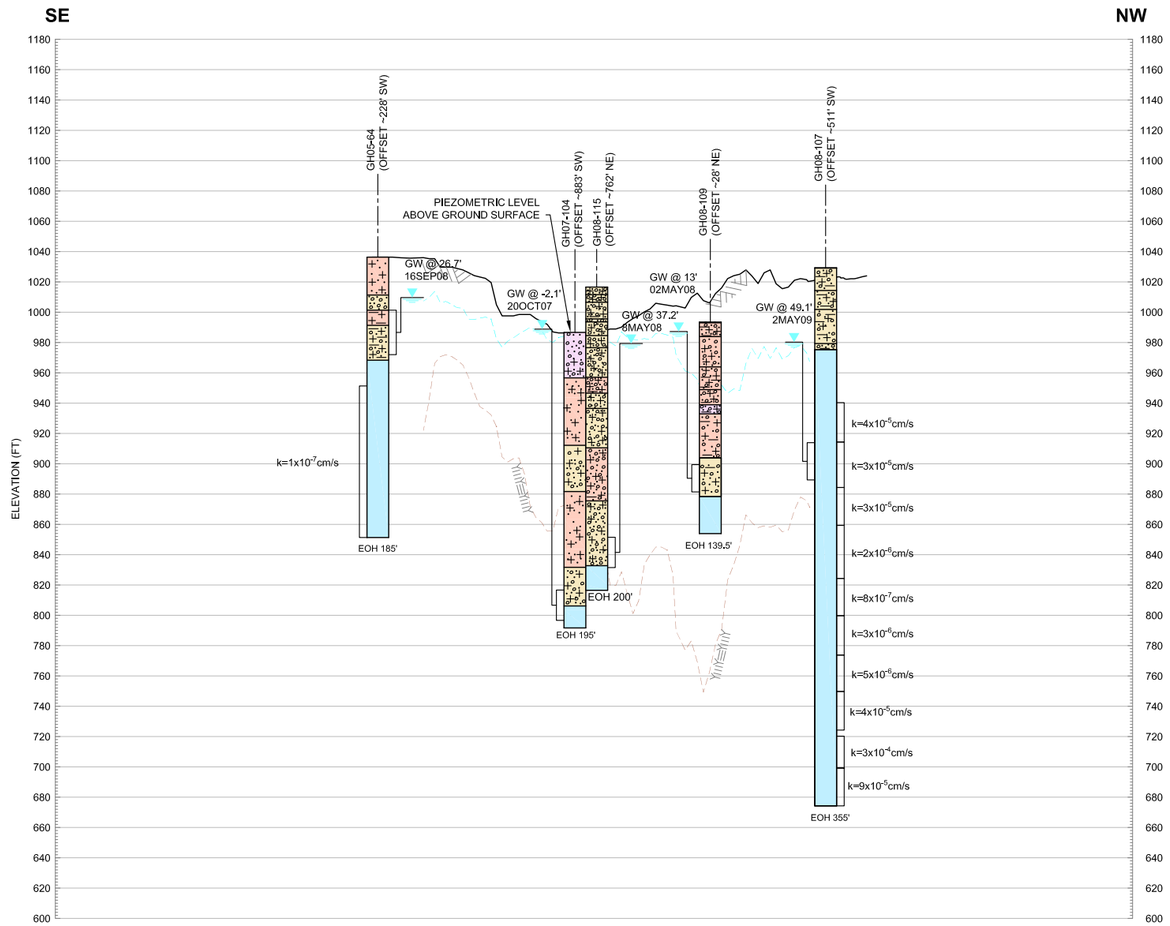

28 / 4.1b FIG **SECTION**
ALONG SEISMIC LINE-38
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10-4 cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE PROJECT

EAST DEPOSIT AREA
GEOLOGIC SECTION ALONG
SEISMIC LINE-38

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.29 | REV 0

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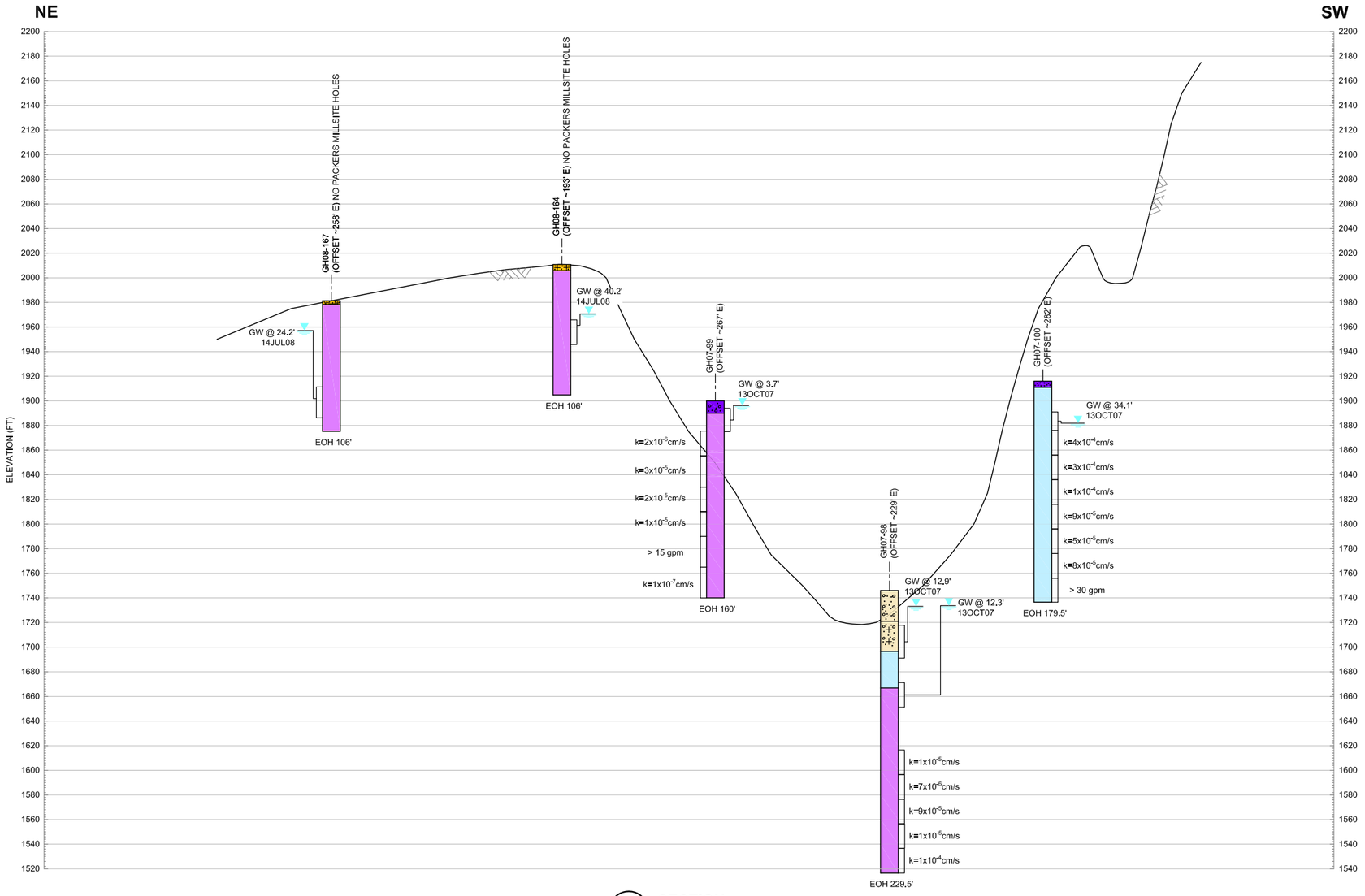

29
4.1a
FIG

SECTION
EAST GEOLOGIC SECTION
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA G
EAST GEOLOGIC SECTION

Knight Piésold CONSULTING

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FIGURE 4.30 | REV 0

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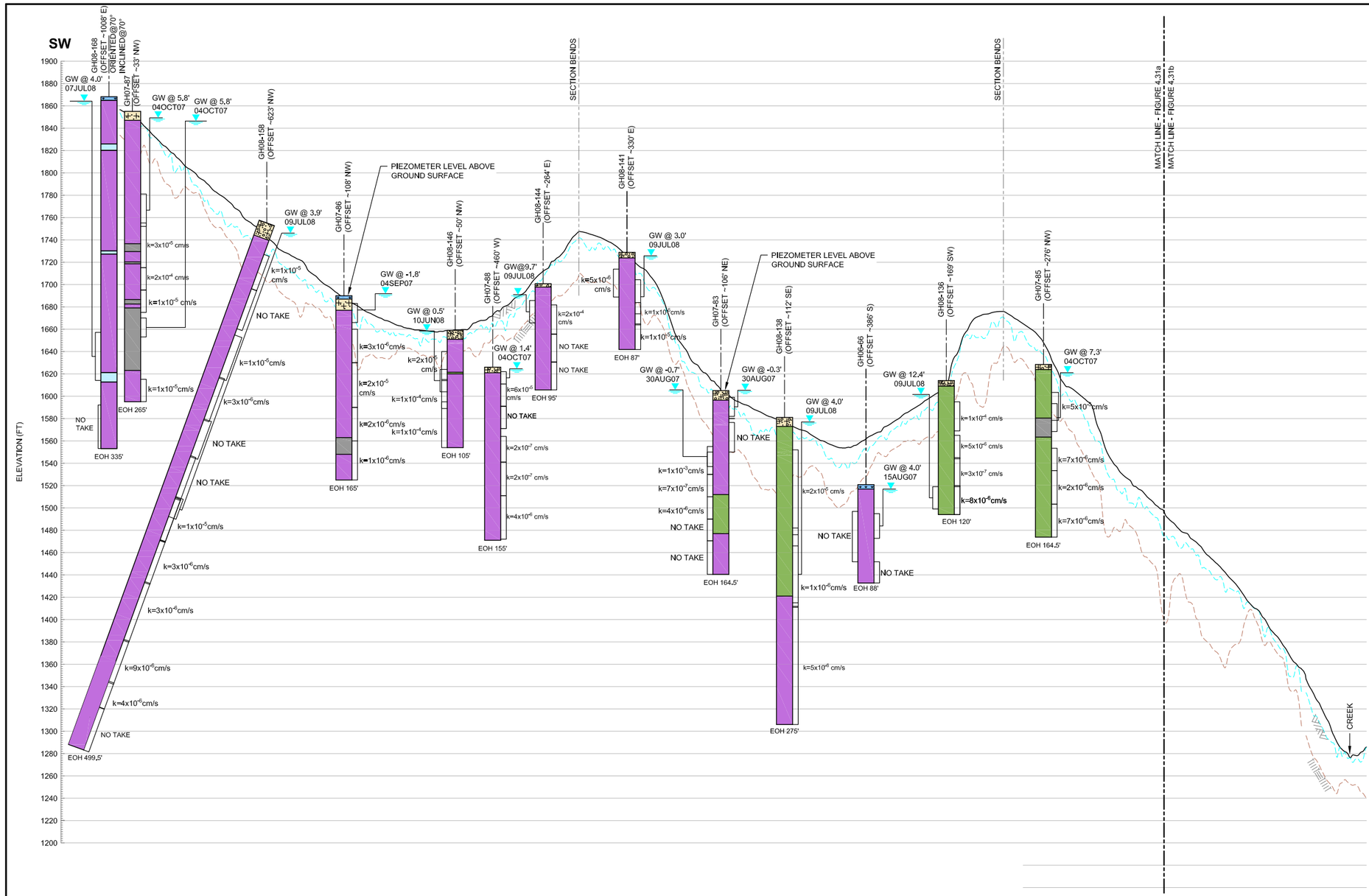

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM

GLACIAL DEPOSITS

- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
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5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

30 / 4.1a FIG.

SECTION
ALONG SEISMIC LINE-48
HORIZ. SCALE A, VERT. SCALE B

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE PROJECT

AREA G
GEOLOGIC SECTION ALONG
SEISMIC LINE-48 - SHEET 1 OF 2

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.31a | REV 0

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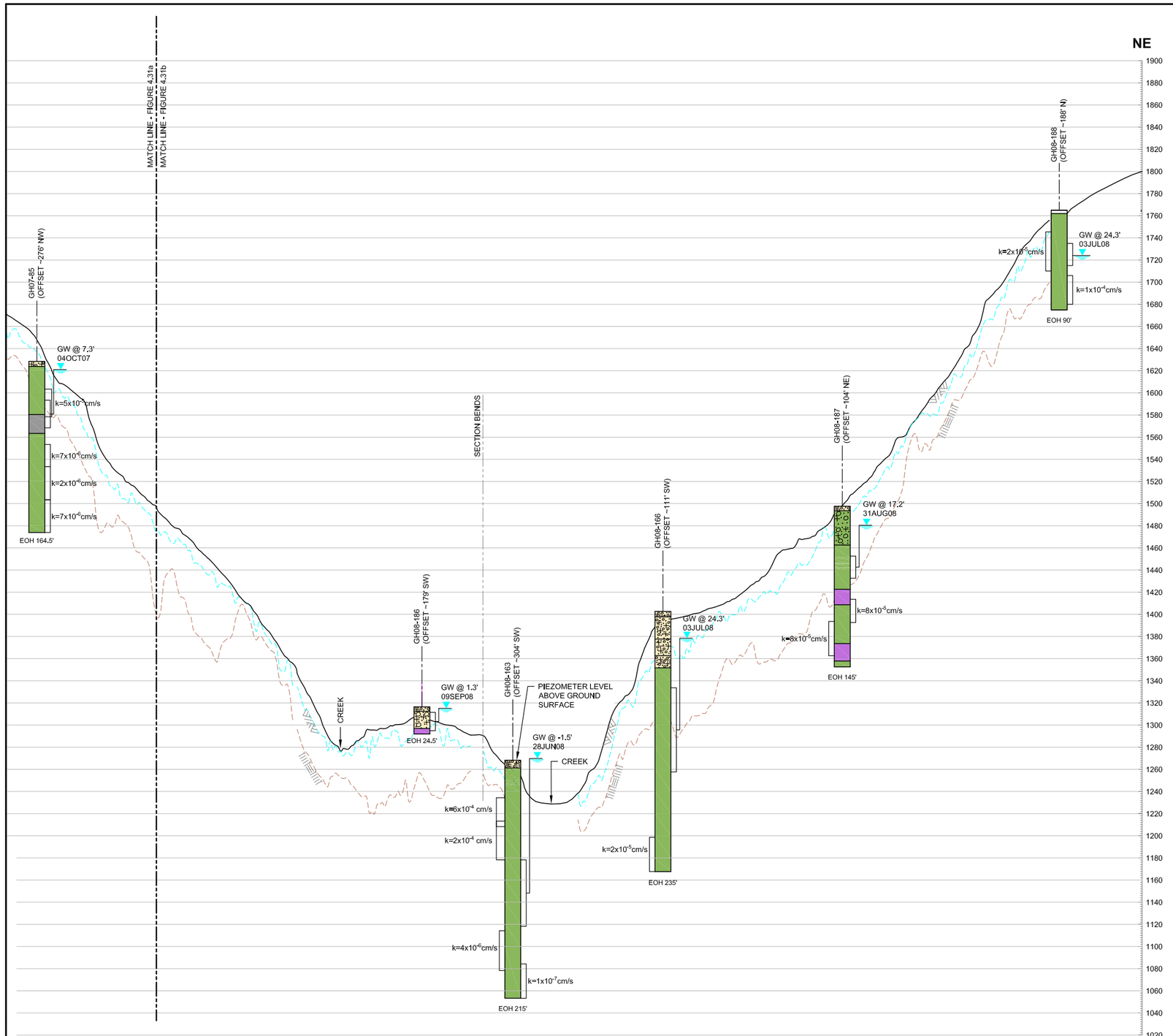

31
4.1a
FIG

SECTION
ALONG SEISMIC LINE-48
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
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7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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PEBBLE PROJECT

AREA G
GEOLOGIC SECTION ALONG
SEISMIC LINE-48 - SHEET 2 OF 2

Knight Piésold CONSULTING

P/A NO. VA101-176/38
REF NO. 3
FIGURE 4.31b
REV 0

SAVED: M:\101\10\176\38\A\Acad\FIGS\B120_r0, 5/1/2012 10:40:18 AM, PPETKOVIC PRINTED: 5/1/2012 10:40:43 AM, Sh 2 of 2, PPETKOVIC
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TABLE 1

VIBRATING WIRE GROUNDWATER LEVELS BELOW GROUND SURFACE OCT. 26, 2010	
VIBRATING WIRE	WATER LEVELS
VW15410	6'
VW15411	6'
VW15414	6'
VW15416	9'

TABLE 2

GH10-225 PACKER HYDRAULIC CONDUCTIVITY RESULTS		
FROM	TO	HYDRAULIC CONDUCTIVITY (K)
415'	600'	K=2X10^{-5}cm/s
520'	600'	k=2X10^{-7}cm/s
500'	550'	K=2X10^{-6}cm/s
450'	500'	K=2X10^{-6}cm/s

TABLE 3

GROUNDWATER LEVELS IN GH10-220 (WESTBAY$^{(TM)}$) OCT. 24, 2010			
WESTBAY ZONE	FROM	TO	GROUNDWATER LEVEL BELOW GROUND SURFACE
1	600'	580'	23'
2	575'	544.8'	23.1'
3	539.8'	514.8'	23.3'
4	509.8'	484.8'	23.4'
5	479.8'	459.8'	23.5'
6	454.8'	434.8'	23.6'
7	429.8'	409.8'	23.7'
8	404.8'	379.8'	23.9'
9	374.8'	329.7	24'
10	324.7'	299.7'	24.1'
11	294.7'	274.7'	24.2'
12	269.7'	249.7'	24.3'
13	244.7'	214.7'	24.4'
14	209.7'	181.5'	24.6'
15	176.5'	159.5'	24.8'
16	154.5'	139.5'	24.9'
17	134.5'	94.5'	25.2'
18	89.5'	69.5'	25.3'
19	64.5'	34.5'	25.4'

32 / 4.1a FIG **SECTION**
ALONG SEISMIC LINE-47
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. STATIC WATER LEVEL IN GH08-170 MAY BE DUE TO MALFUNCTION IN VIBRATING WIRE. WATER LEVEL NEEDS TO BE VERIFIED.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 100 0 100 200 300 400 500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA G / AREA L
GEOLOGIC SECTION ALONG
SEISMIC LINE-47 - SHEET 1 OF 2

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3 | REV 0

FIGURE 4.32a

SAVED: M:\101\00176\38\A\Acad\FIGS\B121_r0, 4/5/2012 1:46:18 PM PPETKOVIC PRINTED: 4/5/2012 1:51:13 PM, Fig 4.32a, PPETKOVIC
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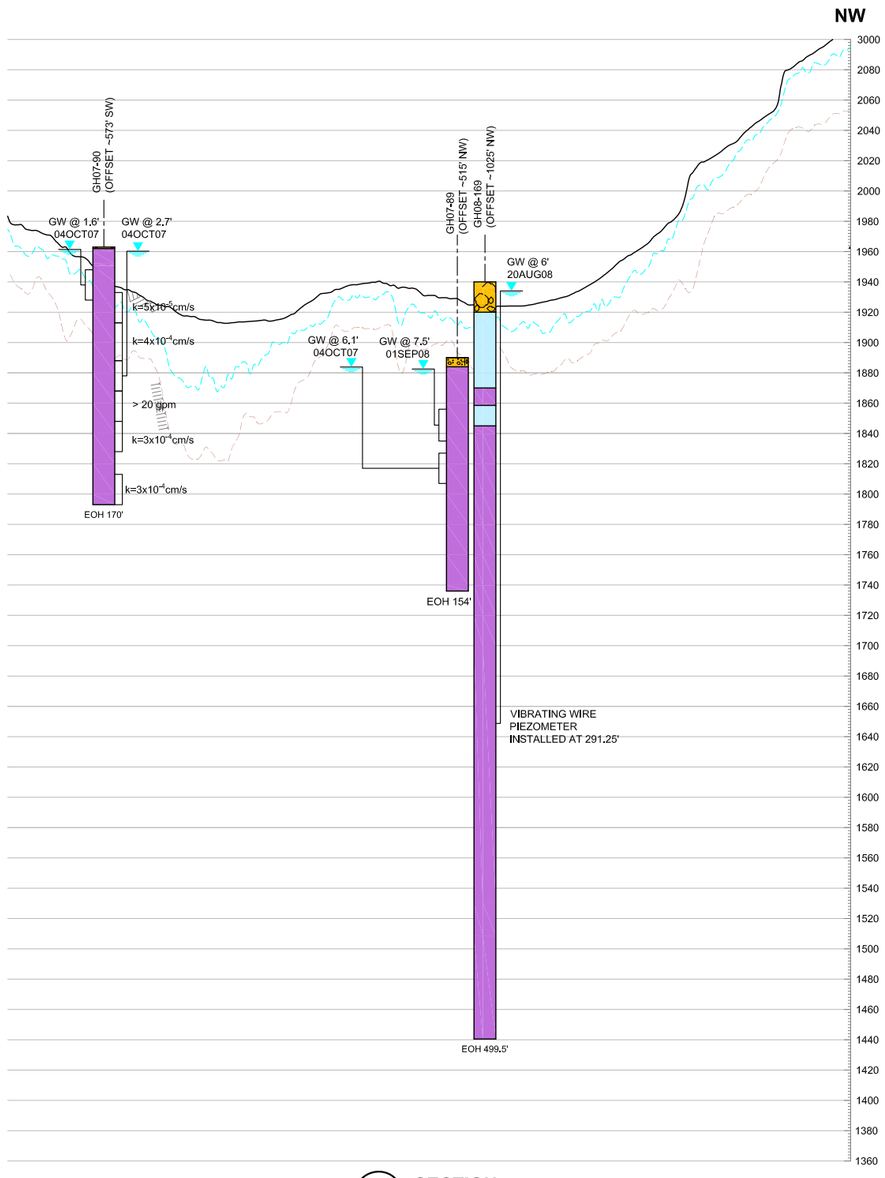

32
4.1a
FIG

SECTION
ALONG SEISMIC LINE-47
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS:
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

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2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. STATIC WATER LEVEL IN GH08-170 MAY BE DUE TO MALFUNCTION IN VIBRATING WIRE. WATER LEVEL NEEDS TO BE VERIFIED.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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PEBBLE PROJECT

AREA G
GEOLOGIC SECTION ALONG
SEISMIC LINE-47 - SHEET 2 OF 2

Knight Piésold CONSULTING

P/A NO. VA101-176/35 | REF NO. 3

FIGURE 4.32b | REV 0

SAVED: M:\101\00176\38\A\Cad\FIGS\B121_r0, 4/5/2012 1:46:18 PM, PPETKOVIC PRINTED: 4/5/2012 1:54:33 PM, Fig. 4.32b, PPETKOVIC
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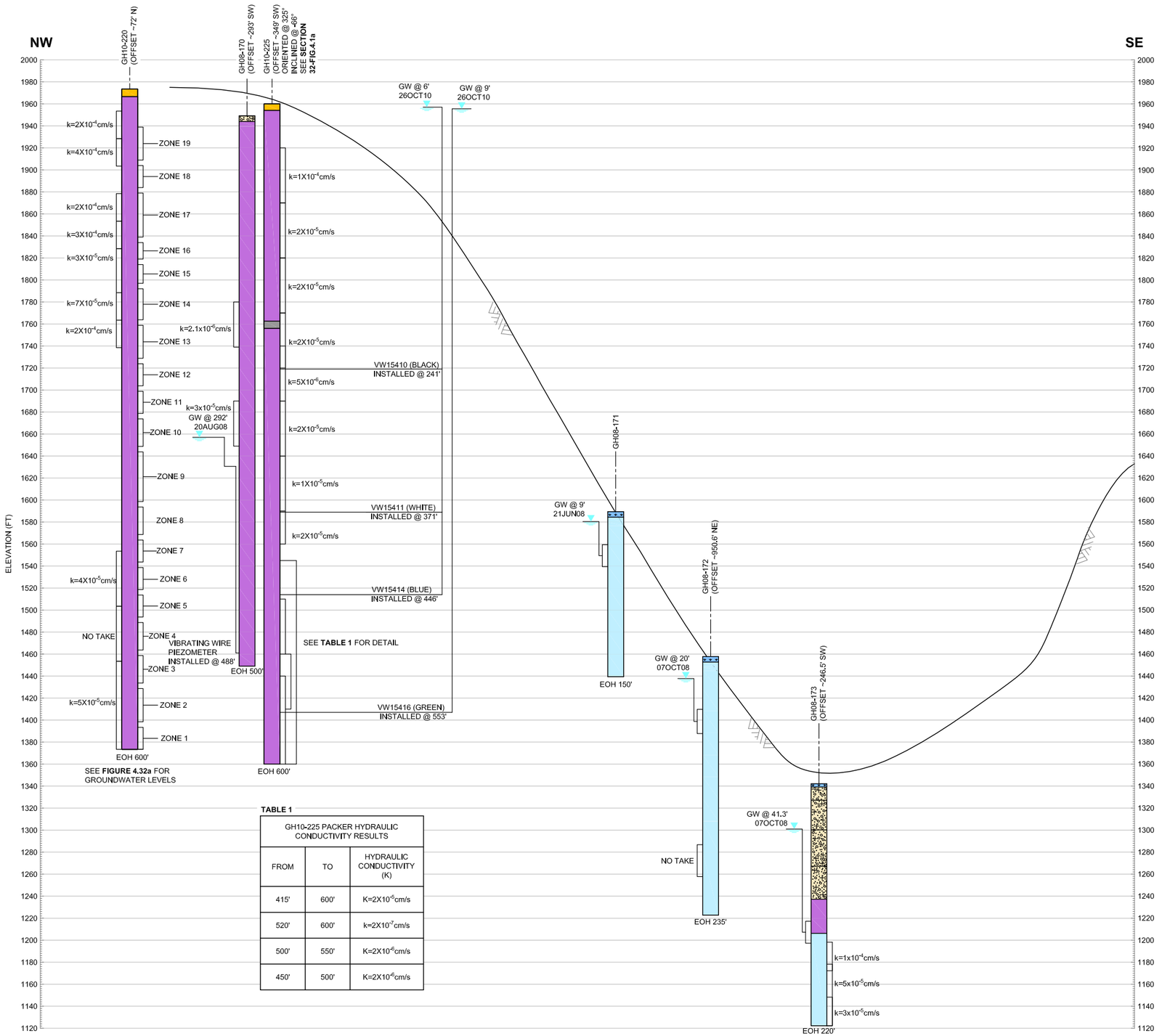

TABLE 1

GH10-225 PACKER HYDRAULIC CONDUCTIVITY RESULTS		
FROM	TO	HYDRAULIC CONDUCTIVITY (K)
415'	600'	K=2X10^{-5}cm/s
520'	600'	k=2X10^{-7}cm/s
500'	550'	K=2X10^{-6}cm/s
450'	500'	K=2X10^{-6}cm/s

33 / 4.1a FIG **SECTION**
ACROSS NORTH AREA L
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
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4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
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8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. CRETACEOUS INTRUSIVE THAT OVERLIES TERTIARY UNIT IN GH08-173 IS EITHER A LARGE BOULDER, A THRUST FAULT OR THE LITHOLOGY HAS BEEN OVERTURNEDS PROPOSED BY PLP GEOLOGISTS.
11. STATIC WATER LEVEL IN GH08-170 MAY BE DUE TO MALFUNCTION IN VIBRATING WIRE. WATER LEVEL NEEDS TO BE VERIFIED.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE PROJECT

AREA L
NORTH GEOLOGIC SECTION

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.33 | REV 0

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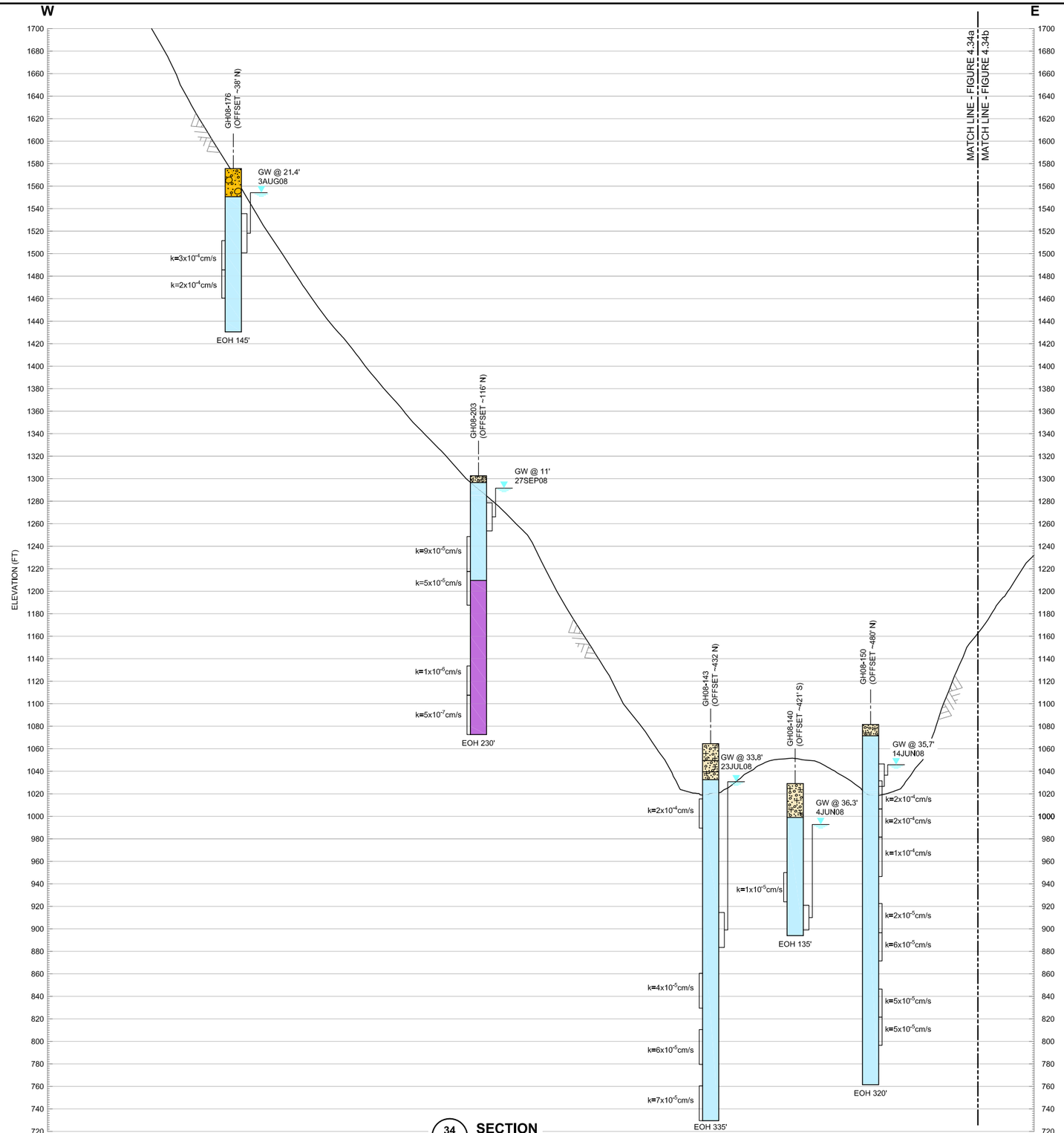

34 4.1a FIG **SECTION THROUGH AREA L**
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT (GLACIAL DEPOSITS)
- GLACIOLACUSTRINE DEPOSIT (GLACIAL DEPOSITS)
- GLACIAL DRIFT DEPOSIT (GLACIAL DEPOSITS)
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10-4 cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

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4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
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8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA L
GEOLOGIC SECTION
SHEET 1 OF 2

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-176/38	3

FIGURE 4.34a REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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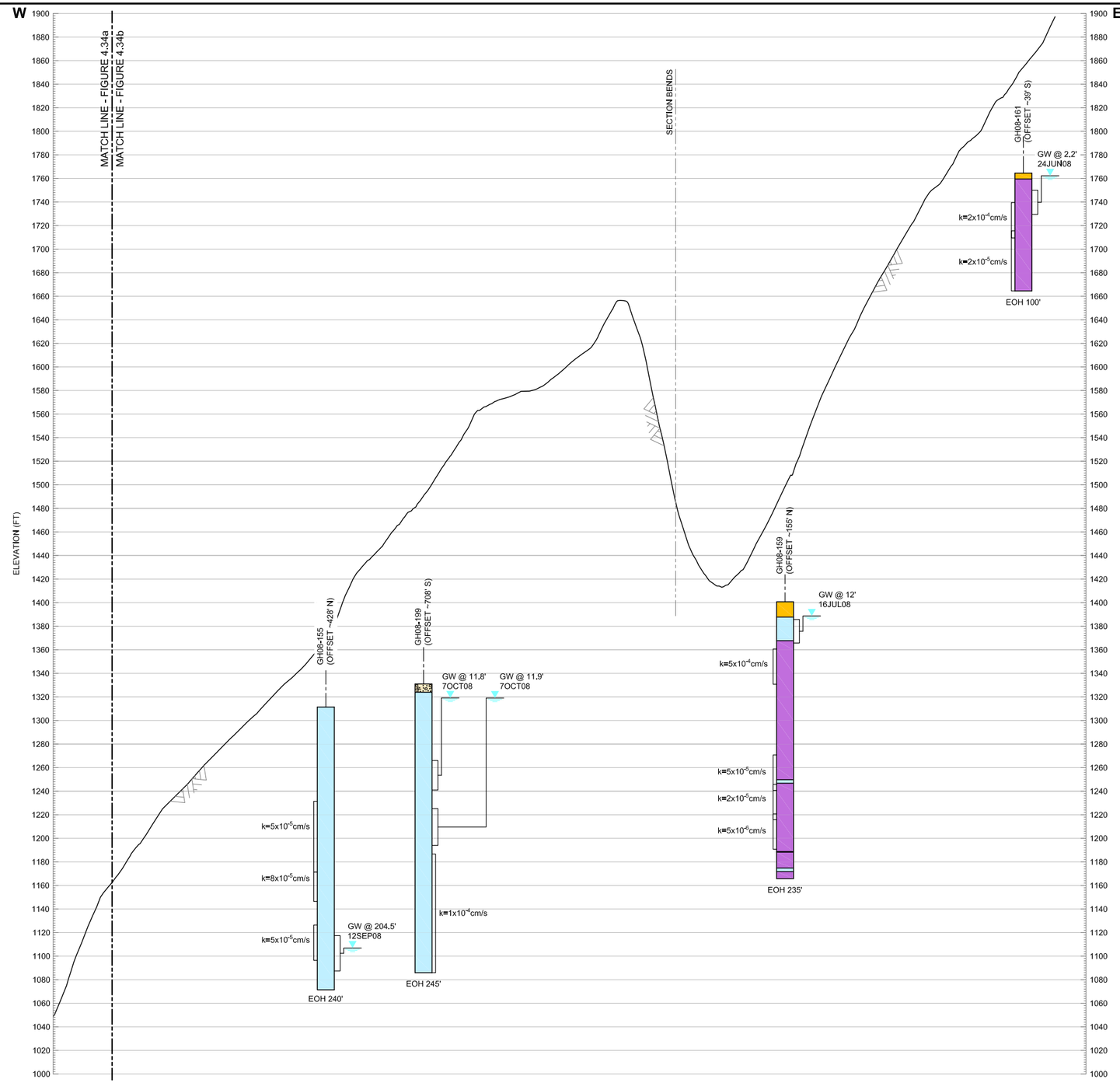

34 4.1a FIG **SECTION**
THROUGH AREA L
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT (GLACIAL DEPOSITS)
- GLACIOLACUSTRINE DEPOSIT (GLACIAL DEPOSITS)
- GLACIAL DRIFT DEPOSIT (GLACIAL DEPOSITS)
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10-4 cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

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7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA L
GEOLOGIC SECTION
SHEET 2 OF 2

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-176/38	3

FIGURE 4.34b REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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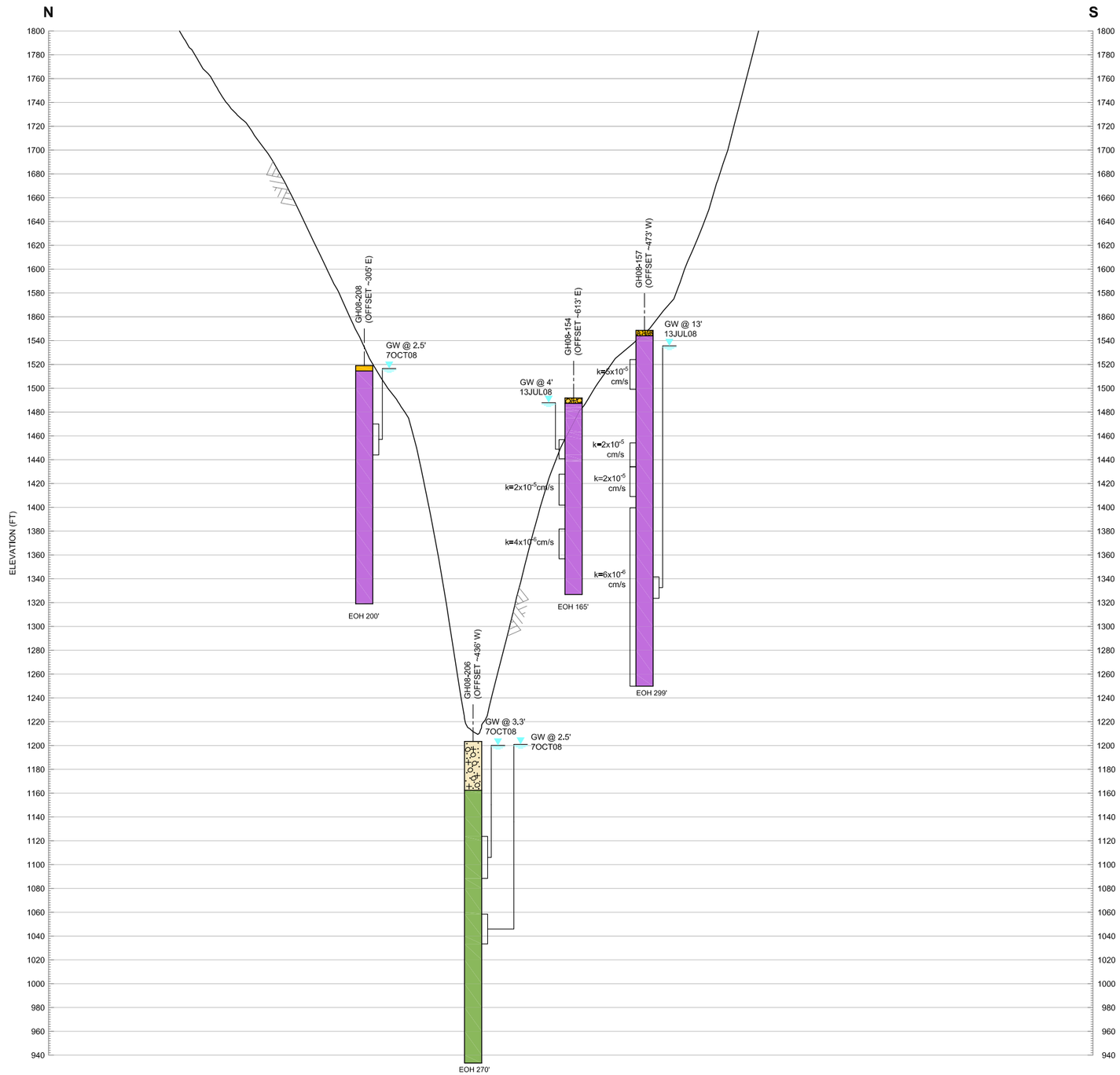

35 4.1b FIG

SECTION
ACROSS NORTH AREA J
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT; GLACIOLACUSTRINE DEPOSIT; GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

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2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
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8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA J
NORTH GEOLOGIC SECTION

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-176/38	3

FIGURE 4.35 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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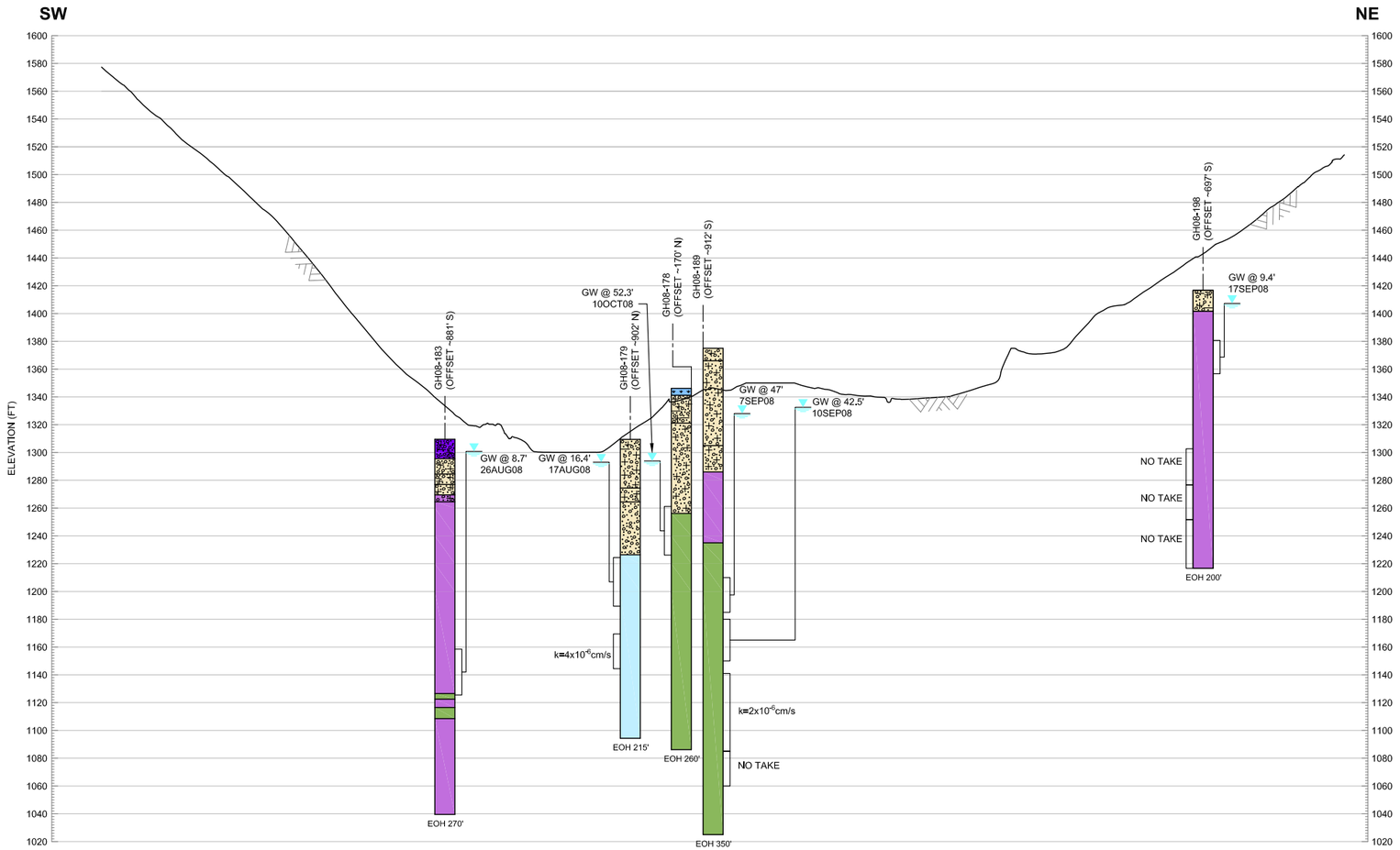

36 4.1b FIG.

SECTION
ACROSS NORTHWEST AREA E
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS, VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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PEBBLE PROJECT

AREA E
NORTHWEST GEOLOGIC SECTION

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.36 | REV 0

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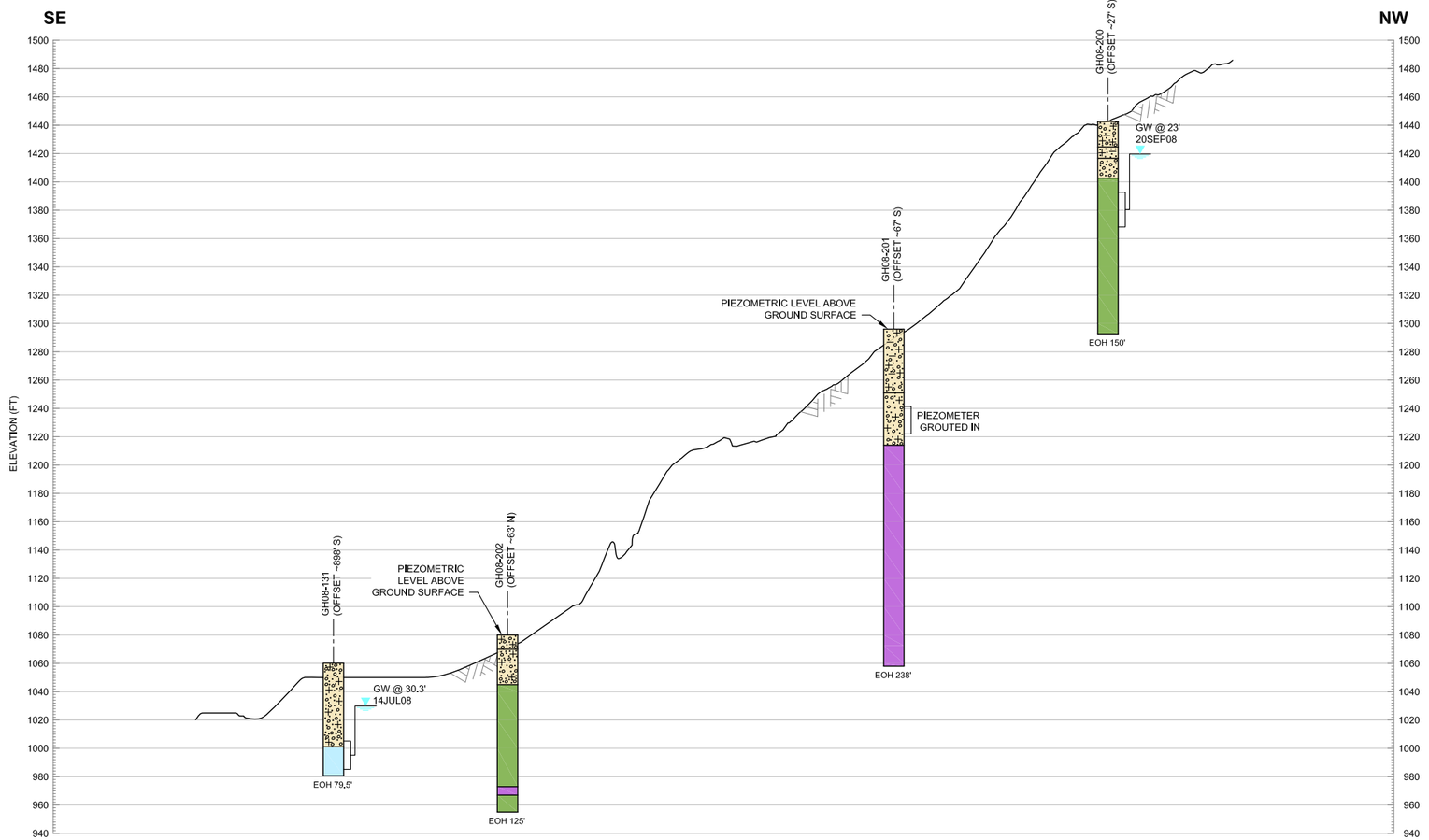

37 / 4.1b FIG **SECTION**

THROUGH WEST UPPER TALARIK CREEK AREA

HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS:
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH08-202.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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PEBBLE PROJECT

UPPER TALARIK CREEK AREA
WEST GEOLOGIC SECTION

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.37 | REV 0

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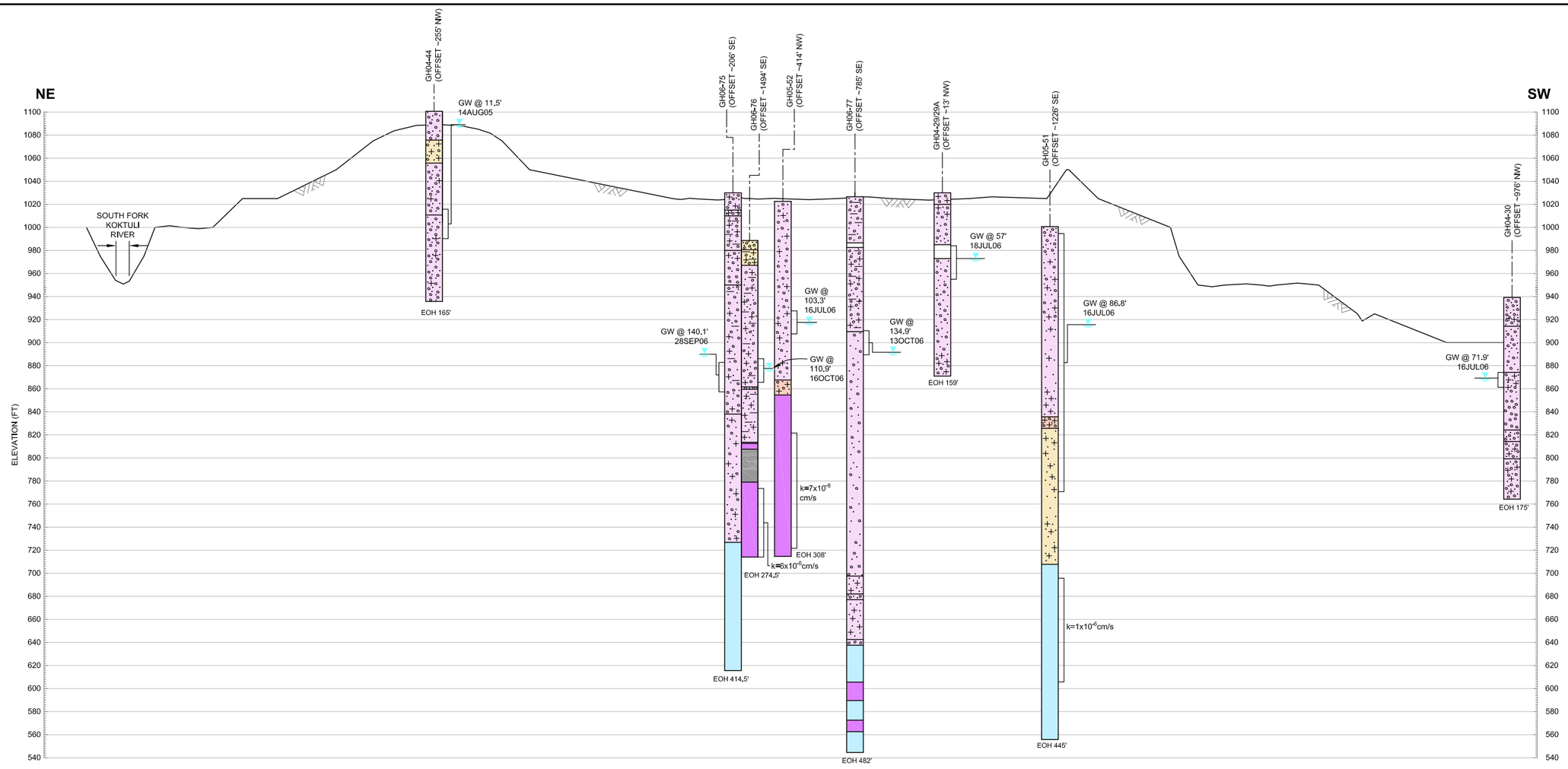

38 4.1a FIG

SECTION
SOUTHWEST TRANSVERSE GEOLOGIC SECTION
HORIZ. SCALE A, VERT. SCALE B

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
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6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

LEGEND:

GLACIAL DEPOSITS
- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM

- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10-4 cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA A
SOUTHWEST TRANSVERSE GEOLOGIC SECTION

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.38 | REV 0

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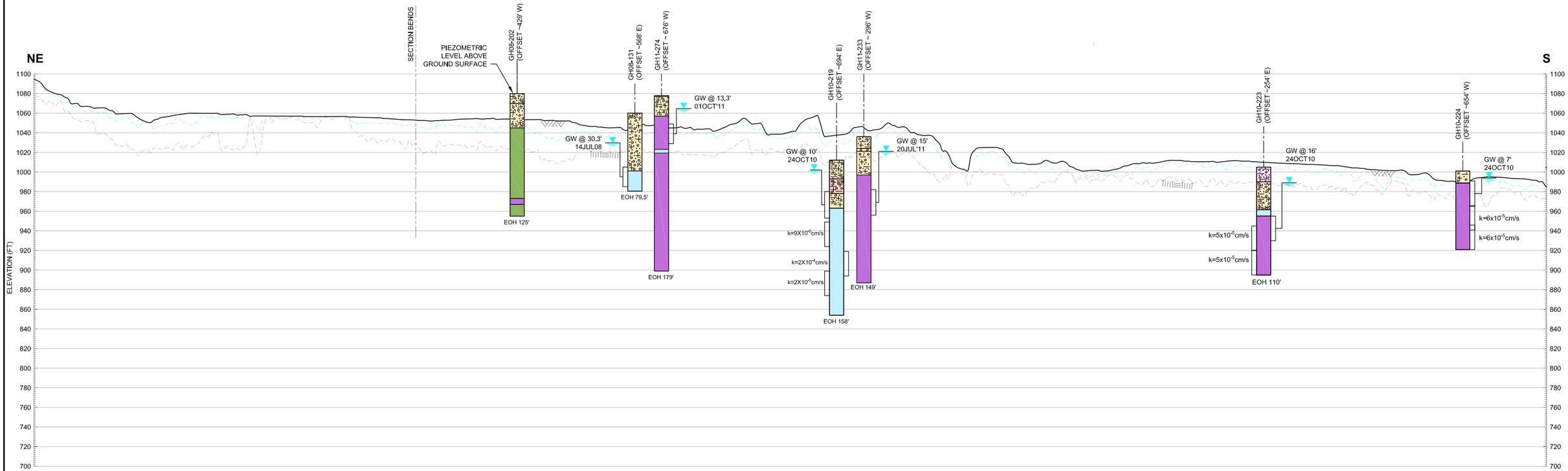

39 4.1b FIG **SECTION ALONG SEISMIC LINE-39**
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

GLACIAL DEPOSITS
- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM

- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
-]k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIZOMETER WAS INSTALLED IN GH08-202.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
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PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

WEST DEPOSIT AREA GEOLOGIC SECTION ALONG SEISMIC LINE-39

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.39 | REV 0

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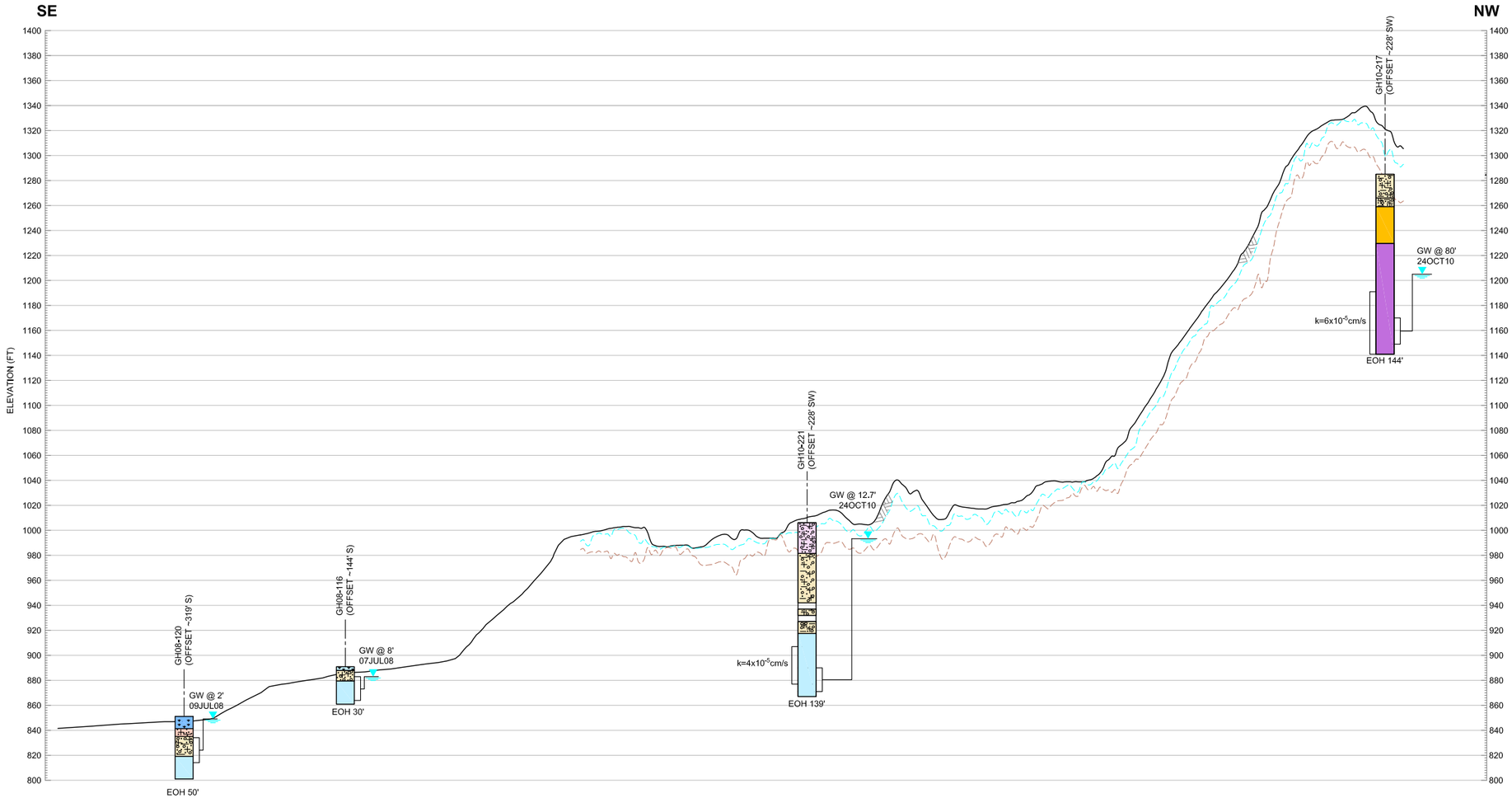

40 / 4.1b FIG **SECTION ALONG SEISMIC LINE-40**
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH04-36.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

WEST DEPOSIT AREA
GEOLOGIC SECTION ALONG
SEISMIC LINE-40

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.40 | REV 0

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NW

ELEVATION (FT)

GH08-122 (OFFSET~183' SW)

GW @ -2' 13MAY08

GW @ -2' 13MAY08

EOH 120'

GH08-108 (OFFSET~269' NW)

PIEZOMETRIC LEVEL ABOVE GROUND SURFACE

k=4x10^{-4}cm/s

EOH 75'

GH08-110 (OFFSET~459' NE)

PIEZOMETRIC LEVEL ABOVE GROUND SURFACE

GW @ -0.3' 25APR08

EOH 75'

GH10-222 (OFFSET~228' SW)

GW @ 63' 24OCT10

k=5x10^{-5}cm/s

EOH 130'

GH10-223 (OFFSET~516' S)

GW @ 16' 24OCT10

k=5x10^{-5}cm/s

k=5x10^{-5}cm/s

EOH 110'

GH10-218 (OFFSET~163' SE)

GW @ 26' 24OCT10

k=1x10^{-4}cm/s

k=2x10^{-4}cm/s

EOH 144'

41
4.1b FIG

SECTION
ALONG SEISMIC LINE-41
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

GLACIAL DEPOSITS
- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT
- GLACIOLACUSTRINE DEPOSIT
- GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM

TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.

CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.

CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.

FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

]k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
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7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

WEST DEPOSIT AREA
GEOLOGIC SECTION ALONG
SEISMIC LINE-41

Knight Piésold CONSULTING

P/A NO. VA101-176/38

REF NO. 3

REV 0

FIGURE 4.41

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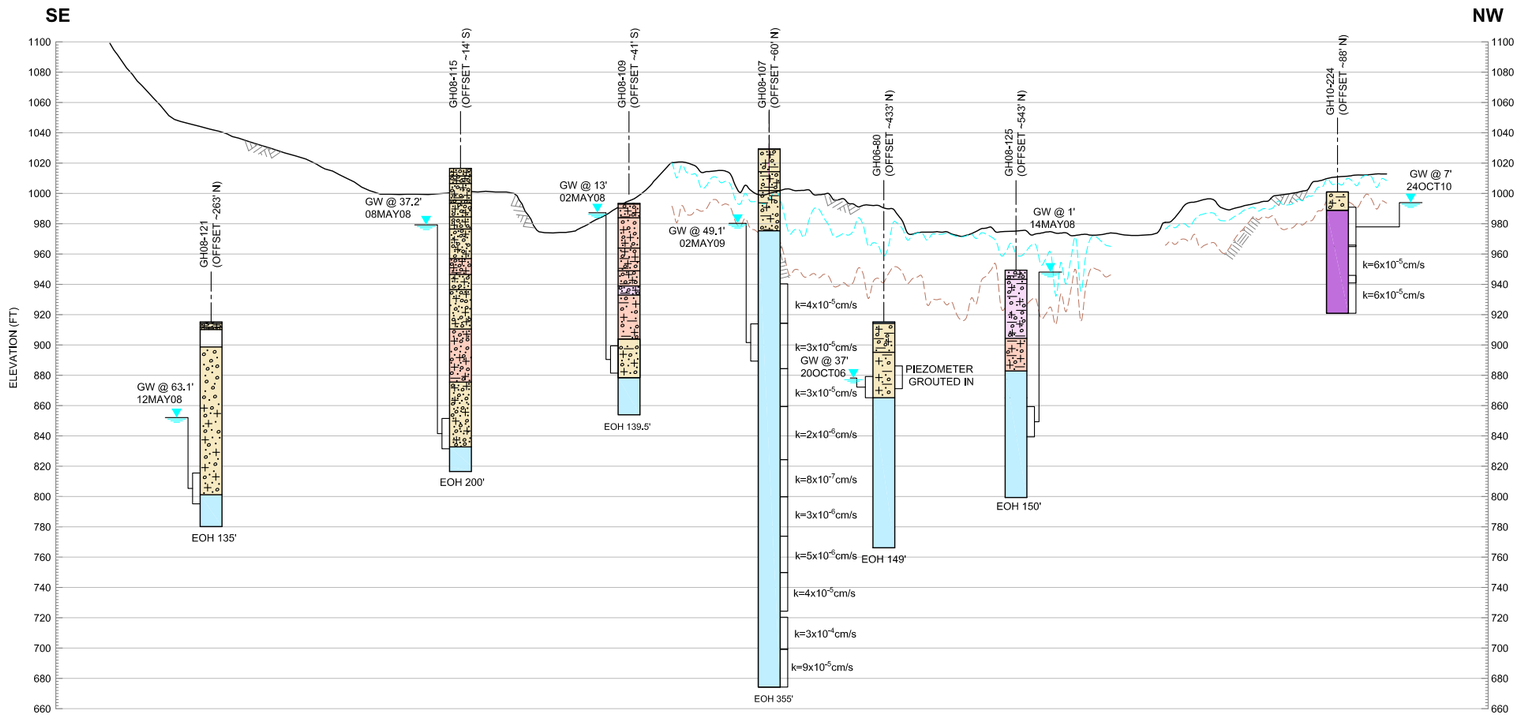

42 4.1b FIG **SECTION**
ALONG SEISMIC LINE-42
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH04-36.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

WEST DEPOSIT AREA
GEOLOGIC SECTION ALONG
SEISMIC LINE-42

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.42 | REV 0

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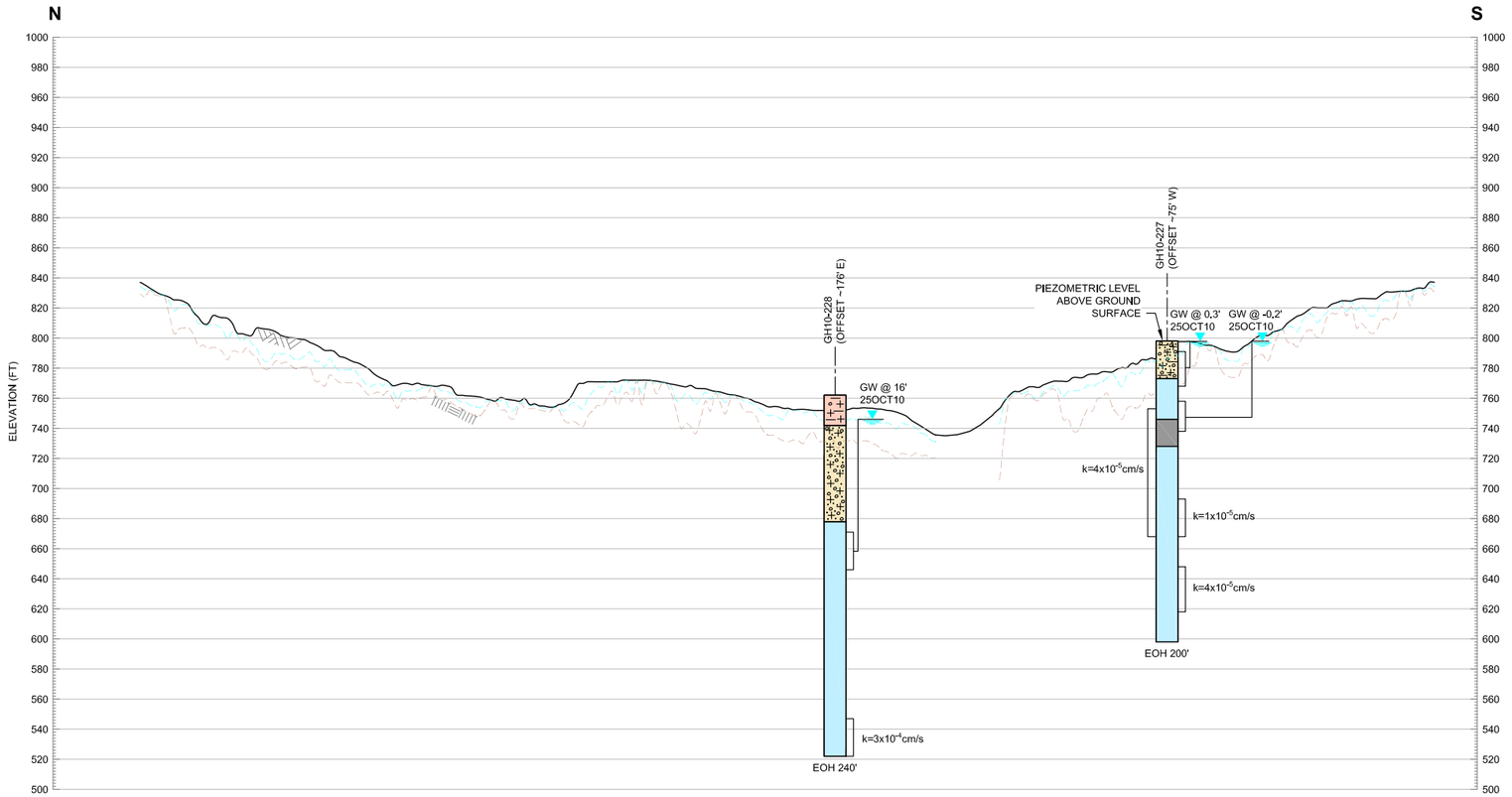

43
4.1a
FIG

SECTION
ALONG SEISMIC LINE-50
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

UPPER TALARIK CREEK AREA
GEOLOGIC SECTION ALONG
SEISMIC LINE-50

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.43 | REV 0

SAVED: M:\101\00176\38\A\Acad\FIGS\B124_r0, 4/5/2012 2:30:58 PM, PPETKOVIC PRINTED: 4/5/2012 2:32:34 PM, Layout, PPETKOVIC
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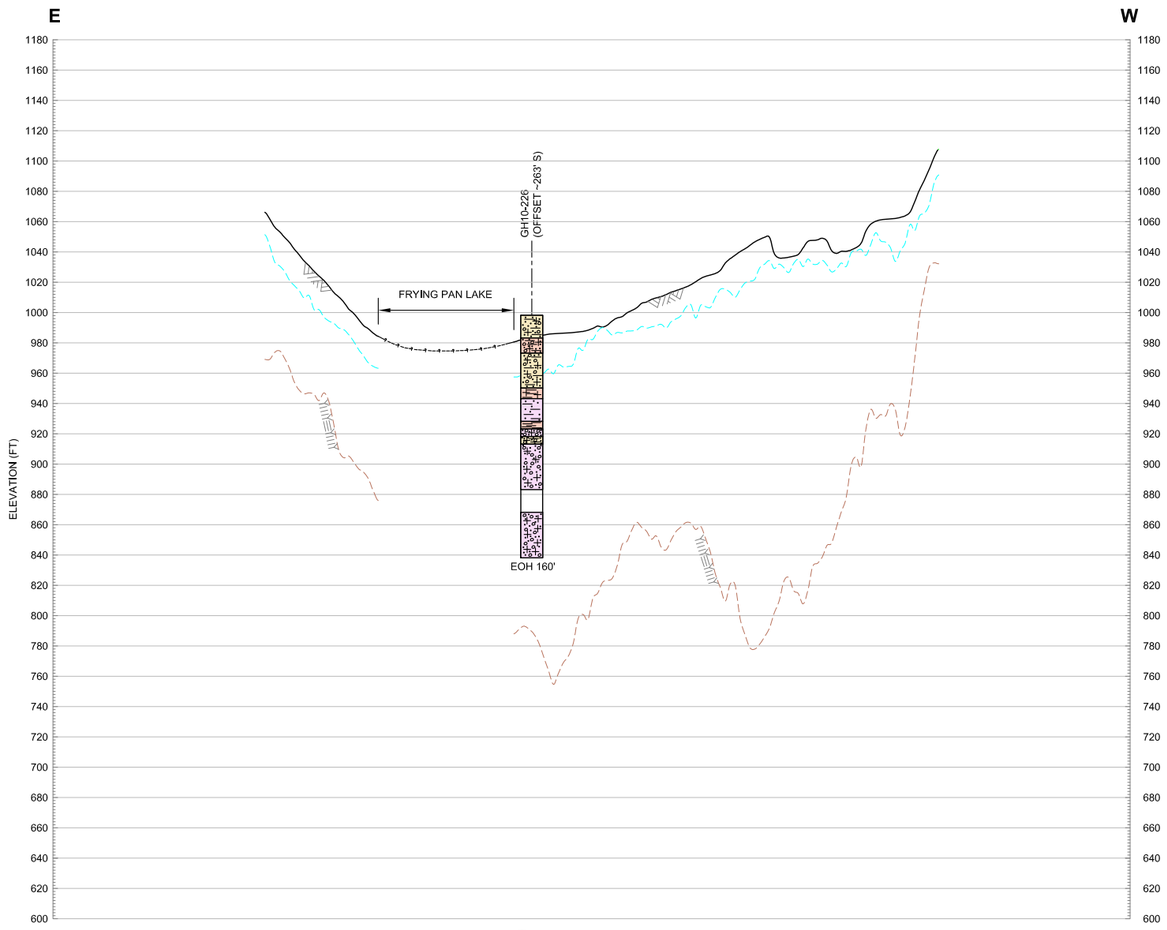

44 / 4.1a FIG — SECTION
ALONG SEISMIC LINE-51
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH10-226.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM/PP	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA A
GEOLOGIC SECTION ALONG SEISMIC LINE-51

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.44 | REV 0

SAVED: M:\101\00176\38\A\Cad\FIGS\B125_r0, 4/10/2012 7:52:03 AM, PPETKOVIC PRINTED: 4/10/2012 7:54:09 AM, FIG4.44a, PPETKOVIC
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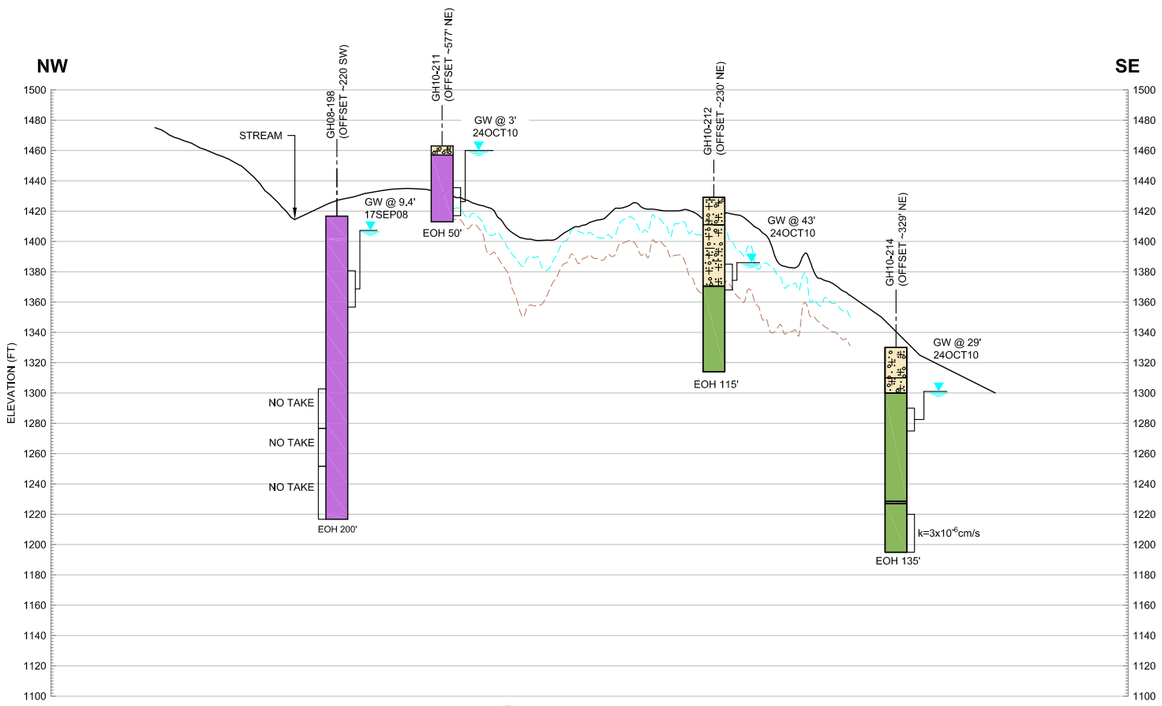

45 / 4.1b FIG **SECTION ALONG SEISMIC LINE-45**
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE-45

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.45 | REV 0

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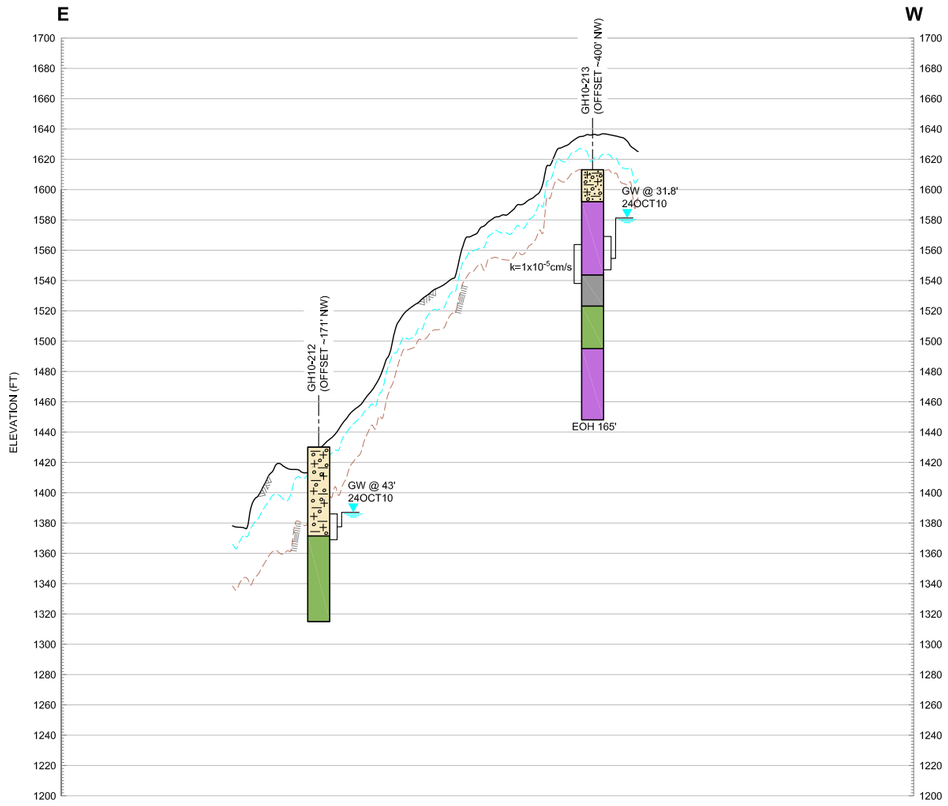

46
4.1b
FIG

SECTION
ALONG SEISMIC LINE-44
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY, THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 20 0 20 40 60 80 100 ft
SCALE A: 100 0 100 200 300 400 500 ft

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PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE-44

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.46 | REV 0

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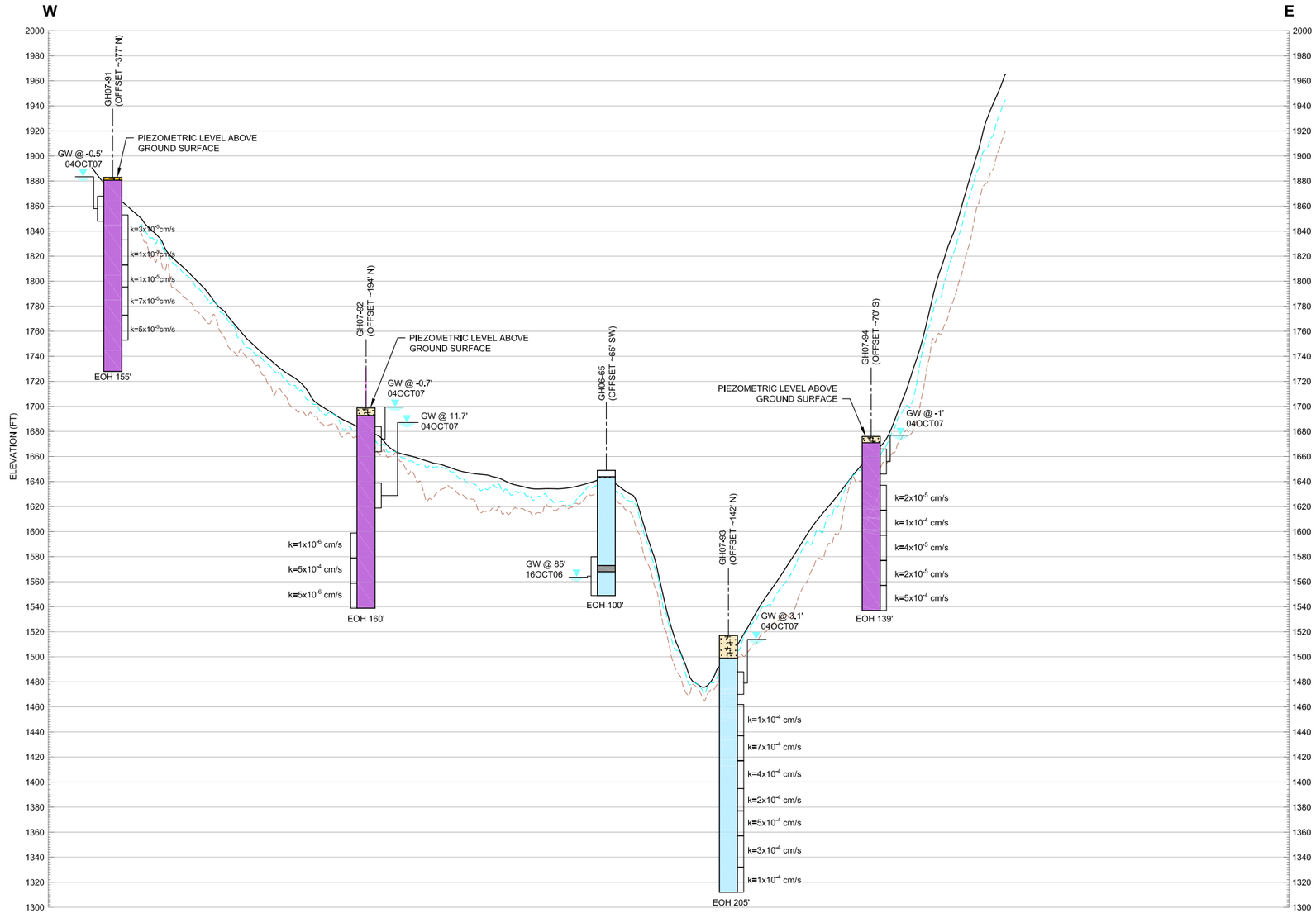

47 / 4.1a FIG

SECTION
THROUGH SOUTH AREA G
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS:
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA L
GEOLOGIC SECTION ALONG
SEISMIC LINE-49

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.47 | REV 0

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XREF FILES: IMAGE FILES:



48 / 4.1b FIG

SECTION
ALONG SEISMIC LINES-1, 12 AND 22
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS:
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH04-36.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

WEST DEPOSIT AREA
GEOLOGIC SECTION ALONG
SEISMIC LINES-1, 12, & 22 - SHEET 1 OF 2

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.48a | REV 0

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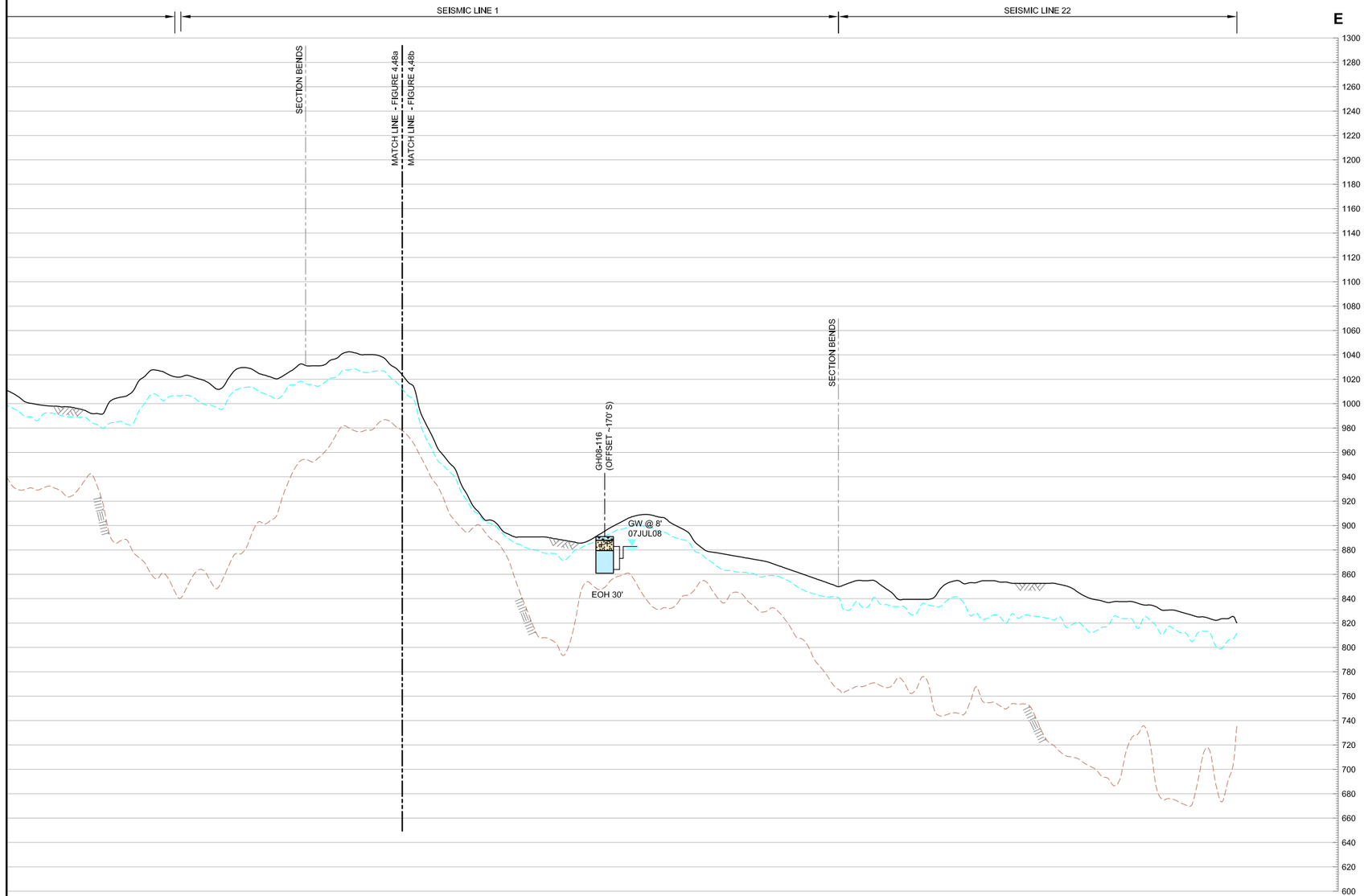

48 4.1b FIG **SECTION**
ALONG SEISMIC LINES-1, 12 AND 22
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS, REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

WEST DEPOSIT AREA
GEOLOGIC SECTION ALONG
SEISMIC LINES-1, 12, & 22 - SHEET 2 OF 2

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.48b | REV 0

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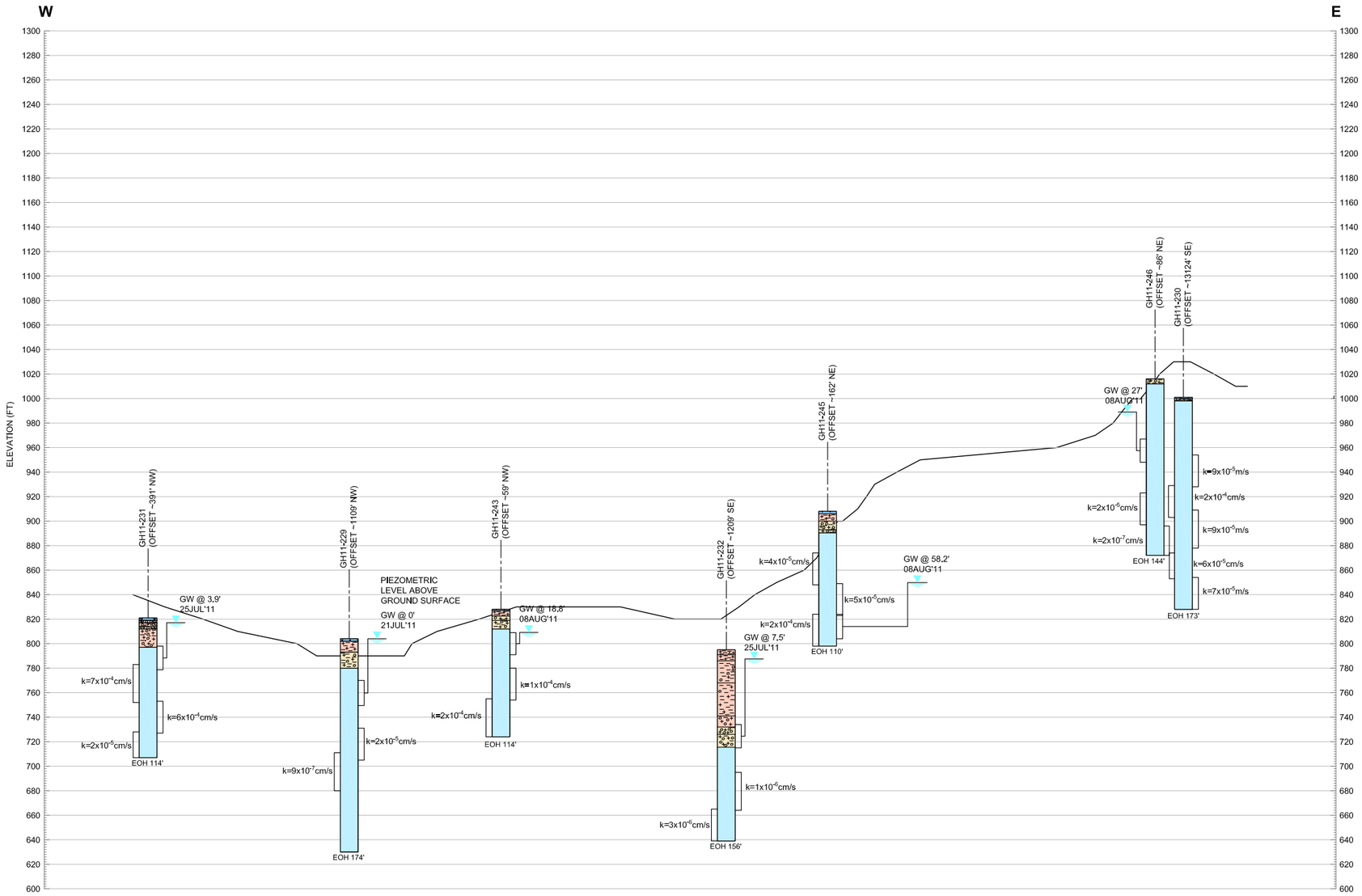

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS
  - GLACIOFLUVIAL DEPOSIT
  - GLACIOLACUSTRINE DEPOSIT
  - GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10-4 cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

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2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
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7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. ~~NO PIEZOMETER WAS INSTALLED IN GH01-35~~ NO PIEZOMETER WAS INSTALLED IN GH11-230.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

49 / 4.49 FIG

SECTION
THROUGH EASTERN UPPER TALARIK CREEK AREA
HORIZ. SCALE A, VERT. SCALE B

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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UPPER TALARIK CREEK AREA
EAST GEOLOGIC SECTION

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3 | REV 0

FIGURE 4.49

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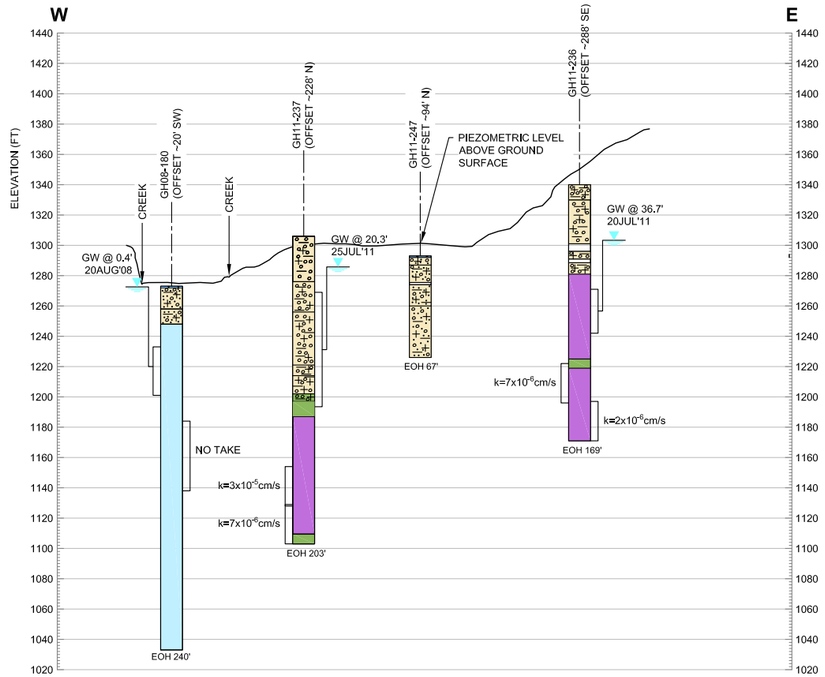

50
4.50
FIG

SECTION
THROUGH NORTH AREA E
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIOFLUVIAL DEPOSIT (GLACIAL DEPOSITS)
- GLACIOLACUSTRINE DEPOSIT (GLACIAL DEPOSITS)
- GLACIAL DRIFT DEPOSIT (GLACIAL DEPOSITS)
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

1. THIS CROSS-SECTION SUPERSEDES ALL PRIOR CROSS-SECTIONS FOR THIS LOCATION.
2. FOR SECTION LOCATION, SEE FIGURE 4.1a AND FIGURE 4.1b.
3. GROUNDWATER LEVELS MAY VARY SEASONALLY. MEASUREMENTS ARE FROM GROUND SURFACE, UNLESS OTHERWISE INDICATED.
4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
5. THE STRATIGRAPHY BETWEEN DRILLHOLES MAY VARY.
6. DETAILED DRILLHOLE DATA FOR 2004, 2005, 2006, 2007, 2008 AND 2010 IS LOCATED IN THE CORRESPONDING SITE INVESTIGATION DATA REPORTS. REF NOS. VA101-176/8-3, VA101-176/8-6, VA101-176/8-9, VA101-176/20-4, VA101-176/23-4 AND VA101-176/35-1 RESPECTIVELY.
7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH04-26.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

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PEBBLE PROJECT

AREA E
NORTH GEOLOGIC SECTION

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P/A NO.	REF NO.
VA101-176/38	3

FIGURE 4.50 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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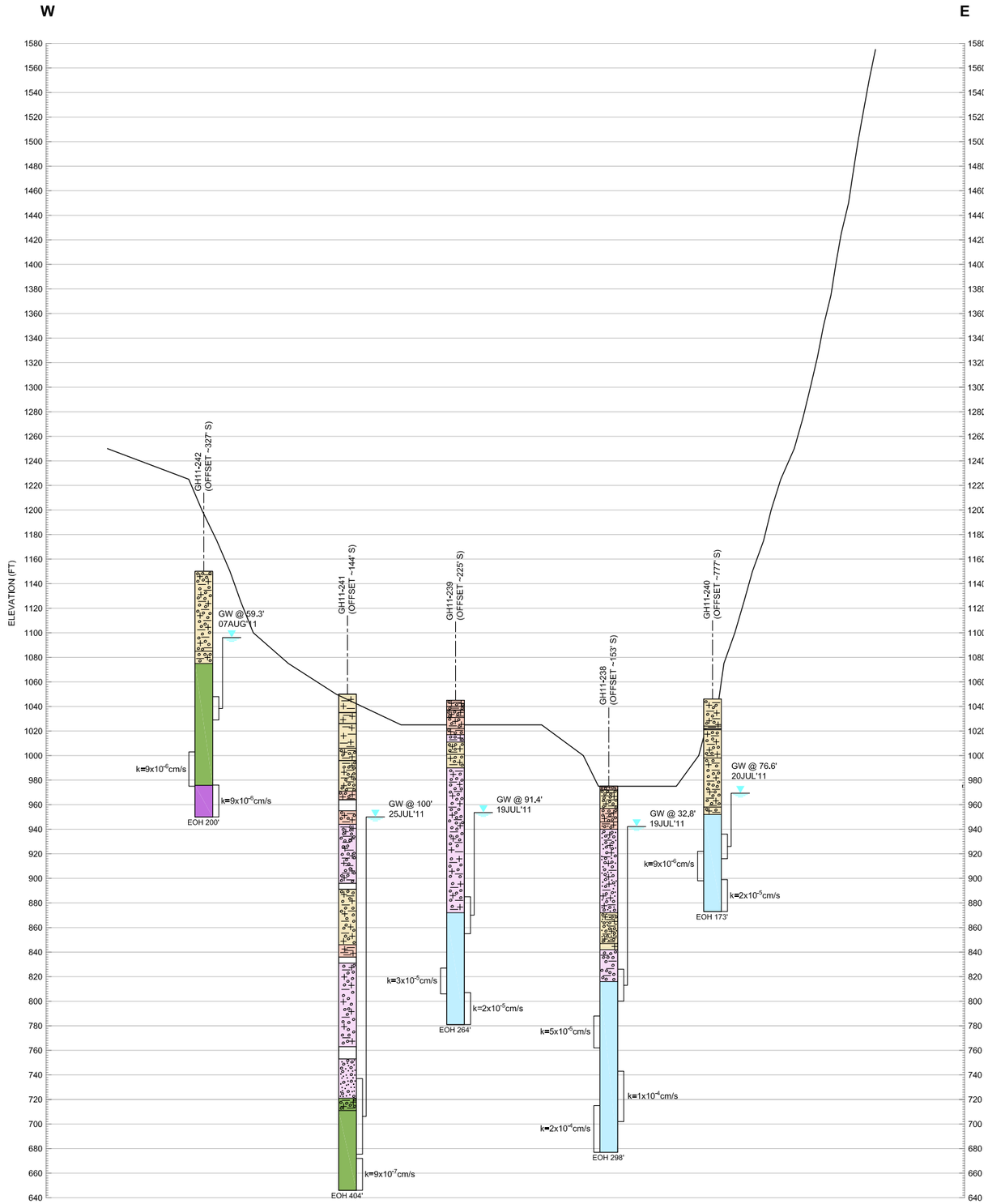

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
-]k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

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7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH04-36.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

51 / 4.51 FIG **SECTION THROUGH SOUTH AREA A**
HORIZ. SCALE A, VERT. SCALE B

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PEBBLE PROJECT

AREA A
SOUTH GEOLOGIC SECTION

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P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.51 | REV 0

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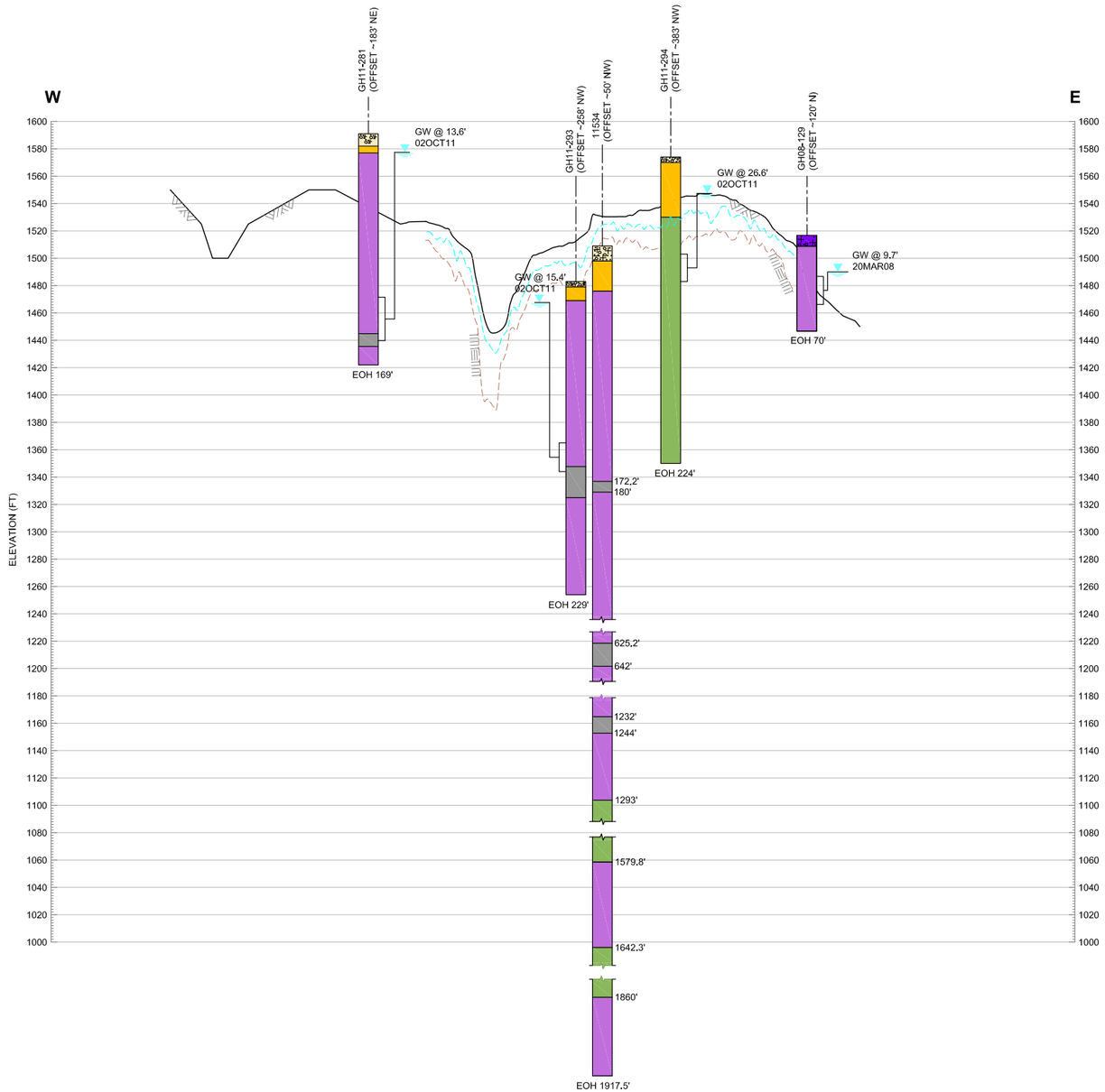

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT; GLACIOLACUSTRINE DEPOSIT; GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE
- GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT
- k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS
- GROUND SURFACE
- INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA
- INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

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7. SEISMIC DATA INTERPRETATION PROVIDED BY FRONTIER GEOSCIENCES INC.
8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN PLP EXPLORATION DRILLHOLE 11534.

SCALE B: 50 0 50 100 150 200 250 ft

SCALE A: 500 0 500 1000 1500 2000 2500 ft

52 / 4.52 FIG

SECTION
ALONG SEISMIC LINE - 46
HORIZ. SCALE A, VERT. SCALE B

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

AREA E
GEOLOGIC SECTION ALONG SEISMIC LINE 46

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-176/38	3

FIGURE 4.52 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR'12	ISSUED WITH REPORT	LS	PP	LJG	KJB

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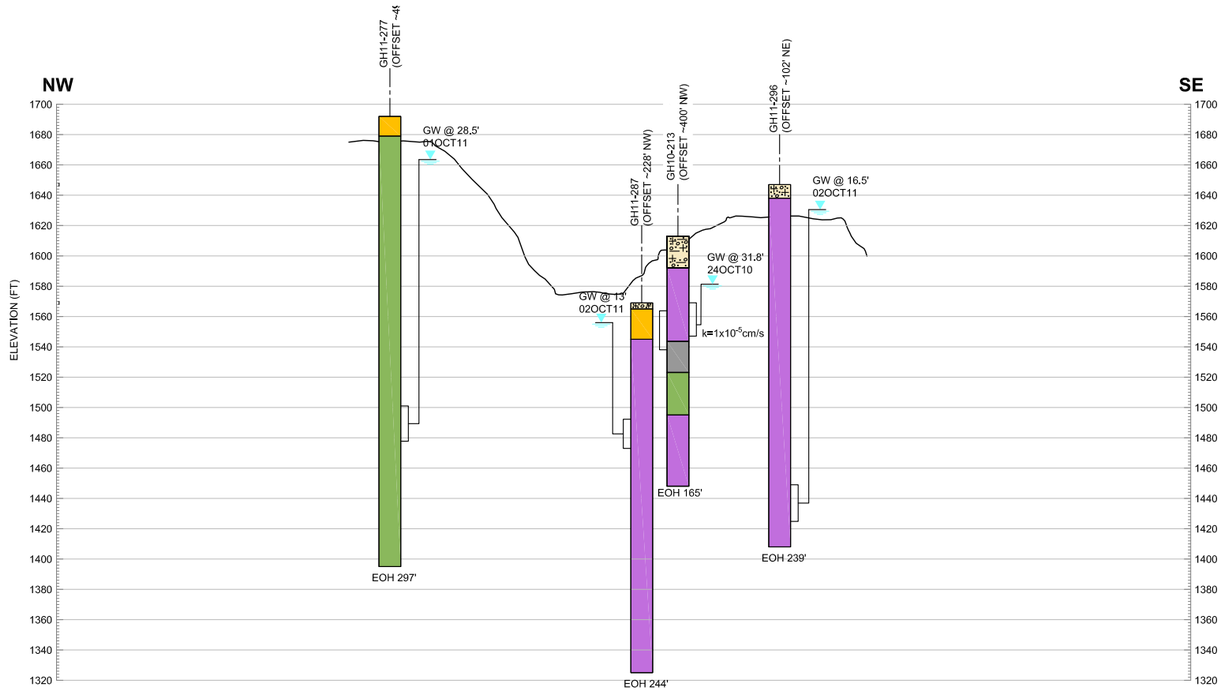

53 4.53 FIG **SECTION**
THROUGH EAST AREA E
HORIZ. SCALE A, VERT. SCALE B

LEGEND:

- GRAVEL
- SAND
- SILT
- CLAY
- ORGANIC
- ALLUVIUM
- GLACIAL DEPOSITS: GLACIOFLUVIAL DEPOSIT
- GLACIAL DEPOSITS: GLACIOLACUSTRINE DEPOSIT
- GLACIAL DEPOSITS: GLACIAL DRIFT DEPOSIT
- FELSENMEER
- COLLUVIUM
- TERTIARY SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, VOLCANICLASTIC BRECCIA, SANDSTONE, CONGLOMERATE, ANDESITE, MONZONITE, DACITE, LATITE, RHYOLITE AND BASALT.
- CRETACEOUS SEDIMENTS AND VOLCANICS: TYPICALLY CONSIST OF MUDSTONE/SILTSTONE, CONGLOMERATE, SANDSTONE AND BASALT.
- CRETACEOUS INTRUSIVE: TYPICALLY CONSIST OF GRANODIORITE, MONZONITE, MONZODIORITE, PORPHYRITIC MONZODIORITE, DIORITE AND GABBRO.
- FAULT ZONE

GW @ 5.4' 18JUL06 — PIEZOMETER COMPLETION ZONE, MEASURED GROUNDWATER LEVEL AND DATE OF MEASUREMENT

k=1.2 x 10^{-4} cm/s — HYDRAULIC CONDUCTIVITY FROM PACKER TESTS

GROUND SURFACE

INTERPRETED GROUNDWATER LEVEL FROM SEISMIC DATA

INTERPRETED BEDROCK SURFACE FROM SEISMIC AND DRILLHOLE DATA

NOTES:

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4. THE STRATA INDICATED REPRESENT THE MAJOR DEPOSIT TYPES/PARTICLE SIZES ENCOUNTERED IN THE DRILLHOLES. THE GRADATION OF THE SOILS IS ANTICIPATED TO VARY. THE CONTACT BETWEEN DEPOSIT TYPES IS APPROXIMATE; THE TRANSITION MAY BE GRADUAL.
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8. DRILLHOLE INTERVALS WITH NO COLOUR WERE TRICONED AND HAVE MINIMAL TO NO DATA AVAILABLE FROM CUTTINGS OR SPT SAMPLES; THEREFORE, THE DEPOSIT TYPE IS UNKNOWN.
9. BEDROCK GEOLOGY DEFINED BY PLP GEOLOGISTS.
10. NO PIEZOMETER WAS INSTALLED IN GH04-36.

SCALE B: 50 0 50 100 150 200 250 ft
SCALE A: 500 0 500 1000 1500 2000 2500 ft

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	30MAR12	ISSUED WITH REPORT	LS	TAM	LJG	KJB

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PEBBLE PROJECT

AREA E
EAST GEOLOGIC SECTION

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF NO. 3

FIGURE 4.53 | REV 0

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XREF FILES: IMAGE FILES:



PHOTO 1 GH07-105 120 - 141'



PHOTO 2 GH08-107 31.5 - 50'

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PEBBLE PROJECT

EXAMPLES OF CORED OVERBURDEN IN WEST AND EAST DEPOSIT AREAS
SHEET 1 OF 5

Knight Piésold CONSULTING

P/A NO. VA101-176/38 | REF. NO. 3

FIGURE 5.1 | REV 0

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	30JAN'12	ISSUED WITH REPORT	LS	LJG	KJB



PHOTO 1 GH08-108 0 - 31.5'



PHOTO 2 GH08-109 69.5 - 88.2'

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

EXAMPLES OF CORED OVERBURDEN IN WEST AND EAST DEPOSIT AREAS
SHEET 2 OF 5

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P/A NO. VA101-176/38 | REF. NO. 3

FIGURE 5.2 | REV 0

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	30JAN'12	ISSUED WITH REPORT	LS	LJG	KJB



PHOTO 1 GH08-122 0 - 29'



PHOTO 2 GH08-110 5 - 35'

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	30JAN'12	ISSUED WITH REPORT	LS	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

EXAMPLES OF CORED OVERBURDEN IN WEST AND EAST DEPOSIT AREAS
SHEET 3 OF 5

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P/A NO. VA101-176/38

REF. NO. 3

FIGURE 5.3

REV 0



PHOTO 1 GH08-112 75.8 - 95'



PHOTO 2 GH08-117 0 - 37'

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

EXAMPLES OF CORED OVERBURDEN IN WEST AND EAST DEPOSIT AREAS
SHEET 4 OF 5

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FIGURE 5.4 | REV 0

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	30JAN'12	ISSUED WITH REPORT	LS	LJG	KJB



PHOTO 1 GH08-125 30 - 55'



PHOTO 2 GH08-125 55 - 72.5'

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	30JAN'12	ISSUED WITH REPORT	LS	LJG	KJB

PEBBLE LIMITED PARTNERSHIP

PEBBLE PROJECT

EXAMPLES OF CORED OVERBURDEN IN WEST AND EAST DEPOSIT AREAS
SHEET 5 OF 5

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P/A NO. VA101-176/38

REF. NO. 3

FIGURE 5.5

REV 0

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APPENDIX A

GEOTECHNICAL DRILLHOLE DATA

Appendix A1 Geotechnical Drillhole Logs
Appendix A2 Bedrock Geotechnical Drillhole Logging Data Sheets
Appendix A3 Geotechnical Drillhole Laboratory Test Results
Appendix A4 Unconfined Compressive Strength Laboratory Report
Appendix A5 Previous Geotechnical Drillhole Logs on Sections

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APPENDIX A1

GEOTECHNICAL DRILLHOLE LOGS

- GH11-229 to GH11-243
- GH11-245 to GH11-247
- GH11-274
- GH11-277
- GH11-281
- GH11-287
- GH11-293
- GH11-294
- GH11-296
- 11534

(Pages A1-1 to A1-128)

Project:	**Pebble Project**	Drill Hole No.	**GH11-229**	Page	**1 of 4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**5 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**804 ft**	Date Completed:	**8 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**174 ft**	Logged by:	**LS/DLP/GD**
Coordinates:	**2,161,612 N, 1,413,849 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			PEAT, brown, fibrous, root inclusions, wet.	82							HWT Casing to 59'. Core Size: PQ3 to 58', HQ3 to 174'.	
			CLAY and SILT, trace to some sand, trace to no gravel, angular to subrounded clasts up to 19mm, poorly graded, medium plasticity, brownish grey, some organic material, moist (Glaciolacustrine).	56	100		GH11-229-1	//				
					50		GH11-229-2	//				
5	1			51								
	2			11 26	50		GH11-229 SPT #1	2/8/8	16		***Depths are downhole***	
10	3				53		GH11-229 SPT #2	3/2/2	4			
	4		Sandy, silty GRAVEL, fine to coarse gravel, trace to some clay, subrounded to angular clasts up to boulder size, poorly graded to gap graded, low to medium plasticity, brownish grey, moist, fines washed away from 14 to 19' (Glacial Drift).	12								
15					83		GH11-229 SPT #3	3/6/10	16		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	5			30								
20	6				6		GH11-229 SPT #4	5/6/12	18			
	7			39								
25			HIGHLY WEATHERED BEDROCK, Tertiary Volcaniclastic Breccia, highly weathered to dark brown clay with some more competent boulders, angular clasts 1-2cm diameter in fine grained red brown matrix, no recovery from 34 to 44', less weathered boulder at 44', reddish brown colour is due to oxidation of original light grey matrix.	39	0		GH11-229 SPT #5	50/-/-	Refusal		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	8			100								
	9											
30				28								
	10											
35	11			0							No Recovery from 34 to 44' due to core tube mislatch.	
40	12			0								
	13											
45	14		BEDROCK, Tertiary Volcaniclastic Breccia, matrix supported, 1-4cm angular fragments in reddish brown, fine grained matrix, original light grey matrix is oxidized, fragment size decreases with depth to 2-10mm, fragments mostly sedimentary, fragments aligned at 50° to 70°tca, moderately to slightly weathered, medium	46								
	15				100		GH11-229	50/-/-	Refusal			

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-229

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-229

Rev. 0 - Issued for Report VA101-176/38-3

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Date Revised: 7 Dec 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-229**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**5 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**804 ft**	Date Completed:	**8 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**174 ft**	Logged by:	**LS/DLP/GD**
Coordinates:	**2,161,612 N, 1,413,849 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			strong, becoming more competent with depth.	100			SPT #6					
55	16											
	17			98								
				102								
60	18											
	19			82								
65	20			100								
	21											
70	22			100								
			BEDROCK, Tertiary Basalt Dyke from 74 - 76.2 ft, basalt is fine to medium grained, dark grey, sharp lower contact at 60°tca.	100								
75	23		BEDROCK, Tertiary Conglomerate, 5-10cm rounded clasts of basalt in a matrix of small (0.5 to 1cm) angular clasts and light grey fine-grained clay/sediment/ash, lower contact is a clay rich deformation zone.									
	24			79								
80				100								
	25											
85	26			100								
	27											
90				98								
	28											
95	29			100								
	30		BEDROCK, Tertiary Volcaniclastic Breccia, matrix supported, 0.5-1cm angular fragments in light grey, fine grained matrix, some iron oxide, moderately to slightly weathered, medium strong, last 10 ft is a very clay rich structure with									

Pebble Limited Partnership
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Overburden Log For GH11-229

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Date Revised: 7 Dec 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-229**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**5 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**804 ft**	Date Completed:	**8 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**174 ft**	Logged by:	**LS/DLP/GD**
Coordinates:	**2,161,612 N, 1,413,849 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		fragments of overlying basalt, fragments are aligned 50°tca.	100								
105	32			100								
	33											
110	34			100								
			BEDROCK, Tertiary Basalt, dark green amygdaloidal basalt, chlorite and calcite amygdules, brecciated from 112.2 to 113.2 ft.									
115	35			98								
	36											
120	37		BEDROCK, Tertiary Volcaniclastic Breccia, dark blue grey breccia with few large angular basalt fragments, matrix composed of small angular clasts and fine grained blue clay, clast supported breccia at top of unit, matrix supported at end of run.	85								
125	38			98								
	39		BEDROCK, Tertiary Basalt, dark brown black, massive, fine grained, very sharp lower contact @40°tca.									
130	40			100								
			BEDROCK, Tertiary Volcaniclastic Breccia, 0.5-1cm angular fragments in light grey white, fine-grained matrix, lower 10 ft has some 20cm clasts, pink oxidation of matrix increasing downhole.									
135	41			100								
	42											
140	43			100								
	44											
145				100								
	45											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-229

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Project No.	Ref. No.	Rev.
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Date Revised: 7 Dec 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-229**	Page	**4 of 4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**5 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**804 ft**	Date Completed:	**8 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**174 ft**	Logged by:	**LS/DLP/GD**
Coordinates:	**2,161,612 N, 1,413,849 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46		BEDROCK, Tertiary Volcaniclastic Breccia, large angular fragments of sedimentary rock and basalt, rounded clasts of intrusive rock, 2-4mm white phenocrysts in a black, fine grained, groundmass, light grey matrix is strongly oxidized to dark reddish colour, first 10 ft has iron oxide staining along fractures.	100								
155	47			100							Artesian flow noted at 154', ~3.5gpm	
	48											
160	49			100								
	50											
165	51			100								
	52			100								
170	53		END OF HOLE @ 174 FT									
175	54											
	55											
180	56											
	57											
185	58											
	59											
190	60											
195												

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-229

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Date Revised: 7 Dec 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-230**	Page	**1 of 4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**8 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1001 ft**	Date Completed:	**10 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**173 ft**	Logged by:	**LS/DLP/GD**
Coordinates:	**2,164,330 N, 1,420,460 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, dark brown, root inclusions, moist.								PQ Casing to 13'. Core Size: PQ3 to 13', HQ3 to 173'. * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
			Sandy SILT, trace clay, trace gravel, angular to subrounded clasts, poorly graded, low to medium plasticity, brown, some organic material, moist (Glacial Drift).	71	58		GH11-230 SPT #1	13/17/14	31			
5	1		BEDROCK, Tertiary Rhyolite, flow banded, porphyritic, creamy white coloured, tan to dark brown iron oxides, dendritic manganese oxide, some bleached zones, minor fault from 130.7 to 133', 161.4 to 173' is friable.	59								
10	2			92								
15	3			100							***Depths are downhole***	
20	4			100								
25	5			100							***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
30	6			100								
35	7			100								
40	8			100							No piezometer installed as bentonite bridged in rods during installation.	
45	9			100								
	10											
	11											
	12											
	13											
	14											
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-230

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Project No.	Ref. No.	Rev.
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Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-230**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**8 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1001 ft**	Date Completed:	**10 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**173 ft**	Logged by:	**LS/DLP/GD**
Coordinates:	**2,164,330 N, 1,420,460 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			93								
	17											
60	18			94								
	19			100								
65	20			100								
70	21			100								
	22			100								
75	23			100								
80	24			100								
	25			100								
85	26			98								
90	27			94								
	28											
95	29											
	30											

Pebble Limited Partnership
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Overburden Log For GH11-230

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Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-230**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**8 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1001 ft**	Date Completed:	**10 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**173 ft**	Logged by:	**LS/DLP/GD**
Coordinates:	**2,164,330 N, 1,420,460 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100								
	33											
110	34			100								
	35											
115	36			100								
120	37			98								
	38											
125	39			100								
130	40			100								
	41											
135	42			98								
140	43			100								
	44											
145	45			100								

Pebble Limited Partnership
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Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-230**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**8 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1001 ft**	Date Completed:	**10 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**173 ft**	Logged by:	**LS/DLP/GD**
Coordinates:	**2,164,330 N, 1,420,460 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			96								
	47											
155				92								
	48											
160				100								
	49											
	50											
165				97								
	51											
170				100								
	52											
	53		END OF HOLE @ 173 FT									
175												
	54											
180												
	55											
	56											
185												
	57											
190												
	58											
	59											
195												
	60											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-230

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Rev. 0 - Issued for Report VA101-176/38-3

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-231**	Page	**1 of 3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**11 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**821 ft**	Date Completed:	**12 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**114 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,160,040 N, 1,413,027 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			PEAT, brown, fibrous, root inclusions, moist to wet.								PQ Casing to 27'. Core Size: PQ3 to 26', HQ3 to 114'.	
			Sandy SILT, some gravel, trace clay, subangular to subrounded clasts up to gravel size, poorly graded, low plasticity, light grey brown, moist to wet. (Glaciolacustrine)	90								
5	1		Clayey SILT, some sand, trace gravel, subangular to subrounded, clasts up to gravel size, poorly graded, low plasticity, brown to grey brown, layers of ice, moist, last foot not frozen (Glaciolacustrine).	33 83	100		GH11-231-1	//				
	2				100		GH11-231-2	//			***Depths are downhole***	
10	3		Sandy, silty GRAVEL, some clay, subrounded to subangular clasts up to cobble size, well graded, low plasticity, grey brown, moist (Glacial Drift).	26	67		GH11-231 SPT #1	2/2/4	6			
	4		SILT and CLAY, trace sand, trace gravel, trace boulders, subrounded to subangular clasts up to boulder size, poorly graded, low plasticity, grey brown, wet. (Glaciolacustrine)									
15	5			24	22		GH11-231 SPT #2	5/4/5	9		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
20	6				78		GH11-231 SPT #3	2/3/6	9			
	7			72	100		GH11-231-3	//				
25	8		BEDROCK, Tertiary Volcaniclastic Breccia, matrix supported, 0.5-5cm angular fragments in a cream coloured matrix, fine grained matrix, some fragments altered to clay, moderately to slightly weathered, medium strong, sharp upper contact @24 ft, rubble zones at 26-28 ft, 39-40 ft, 69-69.5 ft.	95	31		GH11-231 SPT #4	1/50+/-	Refusal		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
				81								
30	9			100								
	10											
35	11			95								
40	12			100							No drill return after casing was set at 27'.	
	13											
45	14			99								
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-231

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-231**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**11 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**821 ft**	Date Completed:	**12 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**114 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,160,040 N, 1,413,027 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			95								
	17			98								
60	18			98								
	19											
65	20			97								
	21											
70	22			100								
75	23			93								
	24											
80	25			100								
85	26			100								
	27											
90	28			99								
95	29			100								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-231

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-231

Rev. 0 - Issued for Report VA101-176/38-3

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-231**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**11 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**821 ft**	Date Completed:	**12 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**114 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,160,040 N, 1,413,027 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32											
				98								
	33											
110												
	34			99								
			END OF HOLE @ 114 FT									
115	35											
	36											
120												
	37											
	38											
125												
	39											
130												
	40											
	41											
135												
	42											
140												
	43											
	44											
145												
	45											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-231

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-232**	Page	**1 of 4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**12 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**795 ft**	Date Completed:	**14 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**156 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,161,848 N, 1,417,674 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Clayey SILT, trace sand, trace gravel, angular to subrounded clasts up to 5cm, poorly graded, low to medium plasticity, light brown with some orangey brown zones, some root inclusions, frozen, outer material of core is thawed due to drilling process. (Glaciolacustrine)	100	100		GH11-232-1	//			PQ Casing to 84', Core Size: PQ3 to 84', HQ3 to 156',	
5	1				100		GH11-232-2	//				
	2		SILT, some clay, trace sand, trace gravel, angular to subrounded clasts up to gravel size up to 5cm diameter, poorly graded, low to medium plasticity, light brown, moist to wet. (Glaciolacustrine)	48	50		GH11-232 SPT #1	3/4/5	9	●		
10	3		Sandy SILT, some clay, some gravel, subangular to subrounded clasts up to 10cm diameter, well graded, low to medium plasticity, light brownish grey, moist. (Glaciolacustrine)	16	61		GH11-232 SPT #2	2/4/3	7	●	***Depths are downhole***.	
	4											
15	5			20	61		GH11-232 SPT #3	2/3/4	7	●		
20	6			26	39		GH11-232 SPT #4	5/11/12	23	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	7											
25	8			48	94		GH11-232 SPT #5	8/9/11	20	●		
			SILT and CLAY, some to trace sand, trace to no gravel, angular to subrounded clasts, clasts up to 15cm diameter, poorly graded, medium plasticity, brownish grey, frozen, ice lenses visible in core and SPTs, amount of gravel decreasing with depth. (Glaciolacustrine)									
30	9			79	78		GH11-232 SPT #6	8/8/11	19	●	Very low flow artesian conditions noted at 30', water level was at ground surface during drilling.	
	10				100		GH11-232-3	//				
35	11			98	78		GH11-232 SPT #7	6/8/6	14	●	Frozen materials encountered in SPTs from 24 to 39', SPT at 29' has lenses of ice.	
40	12			83	78		GH11-232 SPT #8	4/4/5	9	●		
	13											
45	14			43	0		GH11-232 SPT #9	2/4/4	8	●		
	15				0		GH11-232	1/3/5	8	●		

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Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-232**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**12 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**795 ft**	Date Completed:	**14 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**156 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,161,848 N, 1,417,674 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
						SPT #10					
	16		62	100		GH11-232-4	//				
55	17	Sandy SILT, some clay, trace gravel, angular to subrounded clasts up to gravel size, poorly graded, low plasticity, brownish grey, moist. (Glaciolacustrine)	10	0		GH11-232 SPT #11	11/22/35	57	●		
60	18		20	83		GH11-232 SPT #12	5/10/15	25	●		
	19										
65	20	Silty GRAVEL and SAND, trace clay, subangular to subrounded clasts up to 20cm diameter, mostly gravel size, well graded, low plasticity, brownish grey, moist. (Glacial Drift)	48	33		GH11-232 SPT #13	10/15/50+	Refusal			
				100		GH11-232-5	//				
70	21	Silty SAND, trace gravel, trace clay, angular to subrounded clasts up to cobble size (10cm), well graded, low plasticity, grey brown, moist. (Glacial Drift)	16	67		GH11-232 SPT #14	43/50/-	Refusal			
75	22		20								
	23										
80	24	BEDROCK, Tertiary Volcaniclastic Breccia, maroon coloured matrix, polymictic, fragments range from 3mm to 5cm diameter, matrix supported, fine grained, some fragments are clay altered, some zones have been bleached to cream colour and have sharp contacts with maroon zones, weak calcite veining, competent.	33	22		GH11-232 SPT #15	50/-/-	Refusal		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	25		52								
85	26		79								
	27		100								
90	28		94								
95	29										
	30		98								

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Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-232**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**12 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**795 ft**	Date Completed:	**14 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**156 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,161,848 N, 1,417,674 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31			99								
	32											
110	33			98								
	34											
115	35			97								
	36			100								
120	37			100								
	38											
125	39			94								
	40			100								
130	41											
	42			98								
135	43			100								
	44											
140	45			100								
145												

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Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-232**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**12 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**795 ft**	Date Completed:	**14 Jun 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**156 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,161,848 N, 1,417,674 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46											
	47			98						■		
155			END OF HOLE @ 156 FT									
	48											
160	49											
	50											
165	51											
170	52											
	53											
175	54											
180	55											
	56											
185	57											
190	58											
	59											
195	60											

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Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-233**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**15 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1036 ft**	Date Completed:	**16 Jun 11**
Location:	**West Deposit Area**	Total Depth:	**149 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,160,359 N, 1,404,163 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, dark brown, root inclusions, moist.								PQ Casing to 47'. Core Size: PQ3 to 49', HQ3 to 149'.	
			Silty, gravelly SAND, some clay, subangular to subrounded clasts up to large cobble size, well graded, low to no plasticity, brown, moist, some fines washed away. (Glacial Drift)	21	72	☒	GH11-233 SPT #1	15/10/12	22	●		
5	1			26								
	2				0	☒	GH11-233 SPT #2	6/6/7	13	●		
10	3			33								
	4		Gravelly, sandy SILT, some clay, subrounded to subangular clasts up to cobble size, gap graded, low to medium plasticity, brown, moist. (Glacial Drift)		56	☒	GH11-233 SPT #3	5/11/15	26	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
15	5		SAND and GRAVEL, trace to some silt, trace clay, subangular to subrounded clasts up to cobble size (15cm), mostly gravel size, well graded, no plasticity, brown with orangey brown zones, moist, most fines washed away in core. (Glacial Drift)	26								
20	6				56	☒	GH11-233 SPT #4	6/8/10	18	●		
	7			16								
25	8				50	☒	GH11-233 SPT #5	12/13/15	28	●	***Depths are downhole***.	
				20								
	9				72	☒	GH11-233 SPT #6	19/25/24	49	●		
30				23								
	10				28	☒	GH11-233 SPT #7	16/50/-	Refusal			
35	11			23								
	12		BEDROCK, Cretaceous Granodiorite, grey, fine to medium grained, rubble zones, rock is highly fractured and veined, rock is competent otherwise, veins of pyrite/molybdenite/chalcopyrite, quartz/sericite and pyrite, 8% pyrite, locally up to 10% disseminated throughout the groundmass and in veins, 0.01% molybdenite, 0.1% chalcopyrite, slightly to moderately weathered, medium strong.		0	☒	GH11-233 SPT #8	50/-/-	Refusal		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
40	13											
45	14											
	15											

Pebble Limited Partnership
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Project:	**Pebble Project**	Drill Hole No.	**GH11-233**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**15 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1036 ft**	Date Completed:	**16 Jun 11**
Location:	**West Deposit Area**	Total Depth:	**149 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,160,359 N, 1,404,163 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16											
	17											
60	18											
	19											
65	20											
	21											
70	22											
	23											
75	24											
80	25											
	26											
85	27											
90	28											
	29											
95	30											

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Date Revised: 15 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-233**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**15 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1036 ft**	Date Completed:	**16 Jun 11**
Location:	**West Deposit Area**	Total Depth:	**149 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,160,359 N, 1,404,163 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31											
105	32											
	33											
110	34											
	35											
115	36											
	37											
120	38											
	39											
125	40											
	41											
130	42											
	43											
135	44											
	45											
140			END OF HOLE @ 149 FT									
145												

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Date Revised: 15 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-234**	Page	**1 of 3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**16 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1205 ft**	Date Completed:	**18 Jun 11**
Location:	**Area E**	Total Depth:	**100 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,165,660 N, 1,391,922 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		SAND and GRAVEL, trace to some silt, trace clay, angular to subrounded clasts up to 9cm diameter, mostly smaller, well graded, low to no plasticity, brown to 13 ft, then orangey brown, iron oxide on clasts after 13 ft, moist, fines washed away. (Glacial Drift)	13							PQ Casing to 28'. Core Size: PQ3 to 25', HQ3 to 100'.	
5	1				11	☒	GH11-234 SPT #1	28/50+/-	Refusal			
	2			33								
10	3				78	☒	GH11-234 SPT #2	17/30/23	53		***Depths are downhole***.	
	4			46								
15	5				44	☒	GH11-234 SPT #3	11/17/28	45			
	6			15								
20			No Recovery from 20 to 25'.		44	☒	GH11-234 SPT #4	5/9/28	37		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	7			0								
25	8				50	☒	GH11-234 SPT #5	20/50+/-	Refusal			
				66								
	9		BEDROCK, Cretaceous Andesitic Siltstone?, highly silicified, hard to determine rock type, iron oxides on fracture surfaces, pyite veinlets, visual estimate 1% disseminated and vein pyrite, some minor pyrrhotite.	98							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
30				89								
	10			100								
35	11		BEDROCK, Cretaceous Basalt, plagioclase phenocrysts, dark green, medium to coarse grained, epidote, calcite veins, disseminated pyrrhotite, chlorite and pyrite veinlets, moderate propylitic alteration, more silicified towards top of interval, visual estimate ~0.6% disseminated pyrite, shear zone from 49.5 to 51'.	89								
	12			100								
40												
	13			100								
45	14											
	15											

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Date Revised: 16 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-234**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**16 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1205 ft**	Date Completed:	**18 Jun 11**
Location:	**Area E**	Total Depth:	**100 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,165,660 N, 1,391,922 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			100								
	17											
				100								
60	18											
	19		BEDROCK, Tertiary Basalt Dyke, black, fine to medium grained, small calcite amygdules, calcite veinlets.	100								
65	20		BEDROCK, Cretaceous Basalt, similar to unit from 35 to 65.3' with similar veining, rock is weakly altered from 66.3 to 66.6', moderate propylitic alteration, visual estimate ~0.4% disseminated pyrite, minor pyrrhotite?.	98								
	21											
70	22			100								
75	23			95								
	24											
80	25			100								
85	26			99								
	27											
90	28			100								
95	29		BEDROCK, Tertiary Basalt Dyke, calcite veinlets.									
			BEDROCK, Cretaceous Basalt, similar to unit at 65.3 to 93.6', calcite veins, quartz, pyrite, disseminated pyrrhotite, chlorite and pyrite veinlets, moderate propylitic alteration, visual estimate, ~0.4% disseminated pyrite, minor	100								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-234

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-234

Rev. 0 - Issued for Report VA101-176/38-3

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 16 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-234**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**16 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1205 ft**	Date Completed:	**18 Jun 11**
Location:	**Area E**	Total Depth:	**100 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,165,660 N, 1,391,922 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		pyrrhotite?.									
			END OF HOLE @ 100 FT									
105	32											
	33											
110	34											
115	35											
	36											
120	37											
125	38											
	39											
130	40											
135	41											
	42											
140	43											
145	44											
	45											

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-234

Knight Piésold CONSULTING

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101-176/38	**3**	**0**

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Date Revised: 16 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-235**	Page	**1 of 3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**19 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1245 ft**	Date Completed:	**22 Jun 11**
Location:	**Area E**	Total Depth:	**139 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,165,210 N, 1,392,861 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Silty SAND and GRAVEL, trace clay, subangular to subrounded clasts up to gravel size, few larger clasts up to 15cm diameter, well graded, low to no plasticity, light brown, moist. (Glacial Drift)	16							PW Casing to 20', PQ Casing to 56', HQ Casing to 86' Core Size: PQ Tricone to 25', PQ3 to 56', HQ Tricone to 60', HQ3 to 86.3', NQ3 to 139'.	
5	1			26	61	☒	GH11-235 SPT #1	22/50/-	Refusal			
10	2		GRAVEL and SAND, trace to some silt, trace clay, trace cobbles, angular to subrounded clasts up to gravel size, well graded, low to no plasticity, light brown, moist, some clasts are weathered, most fines washed away in core. (Glacial Drift)	13	33	☒	GH11-235 SPT #2	12/13/16	29	●	***Depths are downhole***.	
15	3			13	22	☒	GH11-235 SPT #3	12/15/15	30	●		
20	4			20	28	☒	GH11-235 SPT #4	22/32/38	70	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
25	5			43	33	☒	GH11-235 SPT #5	14/17/21	38	●		
30	6			54	44	☒	GH11-235 SPT #6	13/40/34	74	●		
35	7			31	86	☒	GH11-235 SPT #7	13/20/37	57	●		
40	8		SAND, some silt, some gravel, trace clay, angular to subrounded clasts up to 5cm diameter, poorly graded, low plasticity, orange brown, moist. (Glacial Drift)	80	19	☒	GH11-235 SPT #8	2/4/10	14	●		
45	9			24	100	☒	GH11-235 SPT #9	1/8/50	58	●		

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-235

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Date Revised: 19 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-235**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**19 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1245 ft**	Date Completed:	**22 Jun 11**
Location:	**Area E**	Total Depth:	**139 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,165,210 N, 1,392,861 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Silty, gravelly, SAND, trace clay, subrounded to subangular clasts up to large gravel size, clasts have iron oxide on surfaces, well graded, low plasticity, light yellowish brown, moist, possible weathered bedrock, most fines washed away. (Glacial Drift)	33	89		GH11-235 SPT #10	19/50+/-	Refusal			
55	16											
	17			33	22		GH11-235 SPT #11	4/14/14	28	●		
			No Recovery from 56 - 60 ft due to HQ triconing.	0								
60	18											
	19		BEDROCK, Cretaceous Basalt, dark green, porphyritic, phenocrysts, finely disseminated pyrrhotite intergrown with pyrite, oxidized, carbonate-quartz veinlets, chlorite, pyrite and quartz veinlets, massive pyrite in veinlets, disseminated chlorite, epidote, disseminated pyrite, pyrrhotite is intergrown at constitutes ~2% of rock, shear zone 81 to 84'.	85					■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89). Lost circulation from 67 to 139', regained from time to time.	
65	20			96						■		
	21											
70	22			100						■		
75	23			100						■		
	24											
80	25			100						■		
85	26		BEDROCK, Cretaceous Basalt, dark green, porphyritic, phenocrysts, finely disseminated pyrrhotite intergrown with pyrite, carbonate-quartz veinlets, chlorite, pyrite and quartz veinlets, massive pyrite in veinlets, disseminated chlorite, epidote, disseminated pyrite, pyrrhotite is intergrown at constitutes ~2% of rock, much more competent than unit above, slightly weathered.	101						■		
	27			68						■		
90	28			98						■		
95	29			102						■		
	30			100						■		

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-235

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Date Revised: 19 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-235**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**19 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1245 ft**	Date Completed:	**22 Jun 11**
Location:	**Area E**	Total Depth:	**139 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,165,210 N, 1,392,861 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			104								
	33											
110				100								
	34											
115	35			100								
	36											
120	37			100								
	38											
125				94								
	39											
130	40			100								
	41											
135				98								
	42		END OF HOLE @ 139 FT									
140	43											
	44											
145	45											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-235

Knight Piésold CONSULTING

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Date Revised: 19 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-236**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**22 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1340 ft**	Date Completed:	**25 Jun 11**
Location:	**Area E**	Total Depth:	**169 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,473 N, 1,393,657 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Gravelly, Silty SAND, trace clay, angular to subrounded clasts up to 5cm, mostly gravel size, well graded, low to no plasticity, light brown, moist. (Glacial Drift)	4							PQ Casing to 51.5', HQ Casing to 109' Core Size: PQ3 to 49', PQ Tricone to 51.5', HQ3 to 109', NQ3 to 169'.	
5	1			30	78	☒	GH11-236 SPT #1	17/37/36	71	●		
10	3		SAND and GRAVEL, some to trace silt, trace clay, subrounded to subangular clasts up to 25cm, mostly gravel size, well graded, low to no plasticity, light brown, moist. (Glacial Drift)	22	39	☒	GH11-236 SPT #2	6/7/9	16	●	***Depths are downhole***.	
15	5			33	56	☒	GH11-236 SPT #3	15/9/10	19	●		
20	6			27	33	☒	GH11-236 SPT #4	10/24/18	42	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
25	8			24	47	☒	GH11-236 SPT #5	7/11/16	27	●		
30	9			27	92	☒	GH11-236 SPT #6	8/11/14	25	●		
35	11			33	50	☒	GH11-236 SPT #7	9/12/17	29	●		▼
40	12		No Recovery from 39 to 44', materials washed away.	0	67	☒	GH11-236 SPT #8	9/18/20	38	●		
45	14		Silty, Sandy GRAVEL, trace clay, subangular to subrounded clasts up to 2.5cm diameter, well graded, low plasticity, brown, moist. (Glacial Drift)	46	56	☒	GH11-236 SPT #9	6/9/16	25	●	Lost circulation and heaving sands at 44', circulation regained after casing installed to 51.5'.	
	15		No Recovery from 49 to 51.5 ft due to Tricone.		67	☒	GH11-236	6/20/16	36	●		

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-236

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Date Revised: 23 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-236**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**22 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1340 ft**	Date Completed:	**25 Jun 11**
Location:	**Area E**	Total Depth:	**169 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,473 N, 1,393,657 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
				0			SPT #10					
	16		Silty, Sandy GRAVEL, some clay, subangular to subrounded clasts up to boulder size, well graded, low to medium plasticity, light brown, moist. (Glacial Drift)	96	100		GH11-236-1	//				
55	17			5	22		GH11-236 SPT #11	7/4/9	13			
60	18		HIGHLY TO COMPLETELY WEATHERED BEDROCK, Sandy SILT, some gravel, some clay, angular to subangular clasts up to gravel size, well graded, low to medium plasticity, yellowish brown with orangey brown zones, moist to dry, some original rock texture present, friable, weak, highly oxidized and clay altered.	64	72		GH11-236 SPT #12	13/24/33	57		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
65	19			69	83		GH11-236 SPT #13	12/22/30	52			
70	20			56	6		GH11-236 SPT #14	5/17/50	67			
75	21			88	100		GH11-236 SPT #15	9/13/21	34			
80	23			60	100		GH11-236 SPT #16	16/24/41	65			
85	25			92	0		GH11-236 SPT #17	19/29/50+	Refusal			
90	26			72	100		GH11-236 SPT #18	14/22/48	70			
95	28			100								
	29			100								
	30				44		GH11-236	50+/-/-	Refusal			

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
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Overburden Log For GH11-236

Knight Piésold CONSULTING

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Date Revised: 23 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-236**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**22 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1340 ft**	Date Completed:	**25 Jun 11**
Location:	**Area E**	Total Depth:	**169 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,473 N, 1,393,657 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			89			SPT #19					
105	32			71								
	33		BEDROCK, Cretaceous Gabbro, dark green grey, coarse grained, moderately magnetic, chlorite amygdules, pyrite veins and veinlets, trace chalcopyrite and pyrrhotite, epidote, moderate propylitic alteration, hematite on fracture surfaces, visual estimate ~1.5% pyrite, disseminated and in veins, trace chalcopyrite on fracture surfaces.								
110	34			89								
115	35		BEDROCK, Cretaceous Basalt, dark green black, fine to medium grained, equigranular, weakly magnetic, massive, veins and veinlets of pyrite, trace chalcopyrite and pyrrhotite, epidote, calcite veins, moderate propylitic alteration, visual estimate ~1.5% pyrite, disseminated and in veins.	100								
	36											
120	37		BEDROCK, Cretaceous Gabbro, similar to interval from 107-115', pyrite veining has increased, quartz veins, epidote and clay around veins, moderate propylitic alteration, hematite on fractures and in a few veins, visual estimate 2% pyrite, disseminated and in veins, trace chalcopyrite.	96								
125	38			100								
	39											
130	40			100								
135	41			100								
	42											
140	43			94								
	44											
145	45			92								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-236

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Date Revised: 23 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-236**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**22 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1340 ft**	Date Completed:	**25 Jun 11**
Location:	**Area E**	Total Depth:	**169 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,473 N, 1,393,657 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			100								
	47											
155				98								
	48											
160				100								
	49											
	50											
165				94								
	51											
			END OF HOLE @ 169 FT									
170	52											
	53											
175												
	54											
180												
	55											
	56											
185												
	57											
190												
	58											
	59											
195												
	60											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-236

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 23 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-237**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**25 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1306 ft**	Date Completed:	**28 Jun 11**
Location:	**Area E**	Total Depth:	**203 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,427 N, 1,391,778 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Sandy GRAVEL, trace silt, trace clay, angular to subrounded clasts up to 25cm, mostly gravel size, poorly graded, low to no plasticity, light brown, moist. (Glacial Drift)	41							PQ Casing to 39', HQ Casing to 139.5' Core Size: PQ3 to 29', HQ3 to 139.5', NQ3 to 203'.	
5	1						GH11-237 SPT #1	50+/-/-	Refusal			
	2			26								
10	3				56		GH11-237 SPT #2	15/24/25	49		***Depths are downhole***.	
	4			33								
15	5				78		GH11-237 SPT #3	3/10/20	30			
				30								
20	6				22		GH11-237 SPT #4	3/2/3	5		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	7			25								
25	8				56		GH11-237 SPT #5	8/9/5	14			
				7								
30	9				61		GH11-237 SPT #6	8/15/20	35			
	10		SAND and GRAVEL, some silt, trace clay, subangular to subrounded clasts up to 10cm, mostly gravel size, well graded, low plasticity, light brown, moist. (Glacial Drift)	66								
35	11				56		GH11-237 SPT #7	7/9/7	16		Lost circulation and heaving sand at 35', regained when casing extended to 39'.	
				39								
40	12				33		GH11-237 SPT #8	5/11/7	18			
	13			35								
45	14				8		GH11-237 SPT #9	1/17/15	32			
				37								
	15				67		GH11-237	15/24/30	54			

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-237

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 26 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-237**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**25 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1306 ft**	Date Completed:	**28 Jun 11**
Location:	**Area E**	Total Depth:	**203 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,427 N, 1,391,778 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Gravelly, silty SAND, trace clay, subrounded to subangular clasts up to 15cm diameter, well graded, no to low plasticity, light brown, moist. (Glacial Drift)				SPT #10					
	16			50								
55					75		GH11-237 SPT #11	4/10/17	27			
	17			26								
	18				50		GH11-237 SPT #12	14/19/31	50			
60				34								
	19						GH11-237 SPT #13	50+/-/-	Refusal			
65	20			34								
	21						GH11-237 SPT #14	50+/-/-	Refusal			
70				46								
	22						GH11-237 SPT #15	50+/-/-	Refusal			
75	23			49								
	24				44		GH11-237 SPT #16	16/24/26	50			
80				37								
	25											
85	26		Silty, gravelly SAND, some clay, subangular to subrounded clasts up to 15cm, poorly graded, low plasticity, light brown, moist. (Glacial Drift)		59		GH11-237 SPT #17	22/47/50+	Refusal			
				68								
	27				22		GH11-237 SPT #18	1/0/20	20			
90				71								
	28		Sandy GRAVEL, some silt, trace clay, subangular to subrounded clasts up to 5cm, well graded, low plasticity, light brown, moist. (Glacial Drift)									
95	29				50		GH11-237 SPT #19	14/24/49	73			
				28								
	30				44		GH11-237	26/50+/-	Refusal			

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Date Revised: 26 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-237**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**25 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1306 ft**	Date Completed:	**28 Jun 11**
Location:	**Area E**	Total Depth:	**203 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,427 N, 1,391,778 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			37			SPT #20					
105	32		HIGHLY WEATHERED BEDROCK, Highly to completely weathered Cretaceous Basalt, soil like, Silty SAND, some gravel, trace clay, subrounded to angular clasts, iron oxide weathering.	49	67	☒	GH11-237 SPT #21	35/50+/-	Refusal		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	33											
110	34		BEDROCK, Cretaceous Basalt, dark grey, fine grained, zone of Kaskanak Granodiorite from 110.6-110.9', interval of Cretaceous Gabbro from 115.4-116.1', pyrite veinlets, minor quartz veinlets, weak propylitic alteration, disseminated and vein pyrite,~1.5% visual estimate, trace chalcopyrite, fault zone 114 to 136'.	100	22	☒	GH11-237 SPT #22	50+/-/-	Refusal			
115	35			87								
	36											
120	37		BEDROCK, Cretaceous Granodiorite (Kaskanak), dark grey, black, and pink, medium to coarse grained, brecciated, healed fault, few basalt clasts in breccia, matrix is composed of calcite, fault gouge from 118-135.5', No recovery from 139.5-144' due to core tube mislatch, pyrite veinlets, calcite, clay, weak propylitic alteration, epidote, chlorite, visual estimate of ~0.6% pyrite, disseminated and in veins.	100								
125	38			56								
	39											
130	40			13								
135	41			100								
	42											
140	43			105 / 0								
	44											
145	45			10								

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Date Revised: 26 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-237**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**25 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1306 ft**	Date Completed:	**28 Jun 11**
Location:	**Area E**	Total Depth:	**203 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,427 N, 1,391,778 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			98								
	47											
155				98								
	48											
160	49			84								
	50											
165				97								
	51											
170	52			100								
	53											
175				100								
	54											
180	55			98								
	56											
185				94								
	57											
190	58			33								
	59											
195				95								
	60		BEDROCK, Cretaceous Basalt, similar to interval 109 to 118', pyrite mineralization has decreased, epidote and pyrite veinlets, calcite veinlets, visual estimate ~0.4% pyrite, disseminated and									

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Project:	**Pebble Project**	Drill Hole No.	**GH11-237**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**25 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1306 ft**	Date Completed:	**28 Jun 11**
Location:	**Area E**	Total Depth:	**203 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,427 N, 1,391,778 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			in veins, fault zone from 198-201'.	59								
	62		END OF HOLE @ 203 FT									
205	63											
210	64											
	65											
215	66											
220	67											
	68											
225	69											
	70											
230	71											
235	72											
	73											
240	74											
	75											
245	76											

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Project:	**Pebble Project**	Drill Hole No.	**GH11-238**	Page	**1** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**28 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**975 ft**	Date Completed:	**5 Jul 11**
Location:	**Area A, Valley Bottom**	Total Depth:	**298 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,140,885 N, 1,403,838 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Gravelly SAND and SILT, trace clay, angular to subrounded clasts up to 7.5cm diameter, well graded, low to medium plasticity, brown, moist. (Glaciolacustrine)	55	58		GH11-238 SPT #1	6/4/5	9		PW Casing to 94'. Core Size: PQ3 to 127', HQ3 to 298'. Fines washed away during drilling.	
5	1		Gravelly SAND, trace silt, trace clay, fine to coarse grained sand, angular to subrounded clasts up to 8cm, clasts of various lithology, poorly graded, low to no plasticity, grey brown, moist. (Glacial Drift)	19								
	2				17		GH11-238 SPT #2	50/-/-	Refusal			
10	3			41								
	4				17		GH11-238 SPT #3	17/14/6	20			
15	5			18								
			Sandy SILT, some gravel, some clay, angular to subrounded clasts up to 7cm, well graded, low to no plasticity, light brown, moist. (Glaciolacustrine)		28		GH11-238 SPT #4	6/4/7	11		Most fines washed away. Poor to no circulation, half a tub of drilling fluid before getting return.	
20	6			14								
	7				50		GH11-238 SPT #5	22/14/11	25			
25	8			14								
					22		GH11-238 SPT #6	8/13/24	37			
	9		Sandy SILT, some gravel, some clay, angular to subrounded gravel up to 3cm, poorly graded, low plasticity, light grey brown, moist. (Glaciolacustrine)								***Depths are downhole***	
30				14								
	10				55		GH11-238 SPT #7	8/50+/-	Refusal			
35												
	11		GRAVEL and SAND, trace silt, trace clay, angular to subrounded clasts up to 20cm, mostly 2 to 4cm, well graded, low to no plasticity, brown, moist. (Glaciofluvial)	26							Fines washed away, Heaving sands at 43 ft and 68 ft.	
					72		GH11-238 SPT #8	22/45/34	79			
40	12			16								
	13				122		GH11-238 SPT #9	1/1/-	2			
45				10								
	14											
					39		GH11-238 SPT #10	5/13/21	34			
	15											

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Project:	**Pebble Project**	Drill Hole No.	**GH11-238**	Page	**2** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**28 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**975 ft**	Date Completed:	**5 Jul 11**
Location:	**Area A, Valley Bottom**	Total Depth:	**298 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,140,885 N, 1,403,838 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			10			GH11-238 SPT #11	50/-/-	Refusal			
	17			7	17		GH11-238 SPT #12	15/18/33	51			
60	18			10								
	19						GH11-238 SPT #13	50+/-/-	Refusal			
65	20			33	28		GH11-238 SPT #14	21/29/41	70			
70	21			52	94		GH11-238 SPT #15	44/40/38	78			
	22											
75	23			61	36		GH11-238 SPT #16	20/27/29	56			
80	24			30								
	25				22		GH11-238 SPT #17	11/16/19	35			
85	26			13								
	27						GH11-238 SPT #18	50+/-/-	Refusal			
90	28			43	44		GH11-238 SPT #19	14/22/20	42			
95	29			20								
	30			44			GH11-238 SPT #20	12/18/14	32			

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Project:	**Pebble Project**	Drill Hole No.	**GH11-238**	Page	**3** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**28 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**975 ft**	Date Completed:	**5 Jul 11**
Location:	**Area A, Valley Bottom**	Total Depth:	**298 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,140,885 N, 1,403,838 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		Sandy, silty GRAVEL, trace clay, subrounded to angular clasts up to 15cm, well graded, low to no plasticity, orangey brown, moist, silt content decreases with depth. (Glacial Drift)	10	33		GH11-238 SPT #21	5/1/9	10	●	Fines washed away.	
105	32			20								
	33				67		GH11-238 SPT #22	15/19/19	38	●		
110	34			13								
					33		GH11-238 SPT #23	28/50+/-	Refusal			
115	35			33								
	36						GH11-238 SPT #24	50+/-/-	Refusal			
120	37			14								
					60		GH11-238 SPT #25	50+/-/-	Refusal			
125	38			49								
	39		Gravelly SAND, some silt, some clay, angular to subrounded clasts up to 7cm, well graded, low plasticity, grey brown, very dense, moist. (Glacial Drift)		75		GH11-238 SPT #26	50+/-/-	Refusal		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
130	40			62								
			GRAVEL and SAND, trace silt, trace clay, angular to subrounded clasts up to 20cm, poorly graded, no plasticity, moist. (Glaciofluvial)		62		GH11-238 SPT #27	50+/-/-	Refusal		Most fines washed away.	
135	41			38								
	42				100		GH11-238 SPT #28	50+/-/-	Refusal			
140	43			26								
					75		GH11-238 SPT #29	18/35/50+	Refusal			
145	44			26								
	45											

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Project:	**Pebble Project**	Drill Hole No.	**GH11-238**	Page	**4** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**28 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**975 ft**	Date Completed:	**5 Jul 11**
Location:	**Area A, Valley Bottom**	Total Depth:	**298 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,140,885 N, 1,403,838 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			20								
	47			13								
155	48											
			HIGHLY WEATHERED BEDROCK, Tertiary Volcaniclastic Conglomerate, weathered to silty sand and gravel, angular clasts with iron oxide staining, clay, one 20cm clast, friable, orange brown, pervasive iron oxide staining.	39					■		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
160	49											
	50		BEDROCK, Tertiary Volcaniclastic Conglomerate, clast supported, rusty tan, highly oxidized, angular to subangular, 2mm to 6cm, monolithic clasts, poorly sorted, coarsening upward, very rubbly, no recovery from 167-168', shear zone from 180 to 182'.	95					■			
165	51			0								
	52			144					■			
170				98					■			
	53			97					■			
175	54											
	55			98					■			
180			BEDROCK, Tertiary Rhyolite, light tan with slight rusty tinge, massive, fine grained, very weak banding, weathered, bleached and oxidized, harder unit than above, rubbly, gouge like contacts, limonite veinlets, rubble zone 193 to 203'.									
	56			97					■			
185	57											
	58			96					■			
190	59										Rubble zone 193 to 203'.	
				64					■			
195	60											
			BEDROCK, Tertiary Volcaniclastic Conglomerate, pale green, clast supported,									

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Project:	**Pebble Project**	Drill Hole No.	**GH11-238**	Page	**5** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**28 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**975 ft**	Date Completed:	**5 Jul 11**
Location:	**Area A, Valley Bottom**	Total Depth:	**298 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,140,885 N, 1,403,838 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			fragmental unit, less weathered, but still oxidized and bleached, poorly sorted, 4mm to 5cm clasts, angular to subrounded, calcite veinlets, contacts are rubbly, rubble zone 193 to 203'.	100								
205	62			93								
	63											
210	64			96								
	65			50							Lost circulation from 213 to 273'.	
215	66		BEDROCK, Tertiary Rhyolite, light coloured, areas of rusty tan tinge and very pale green (246.3-264'), similar to Tertiary Rhyolite unit above, no visible flow banding, bleached and oxidized, calcite in fractures, rubbly lower contact, limonite, pyrite veinlets.	75								
220	67			85								
	68			41								
225	69			84								
230	70			94								
	71											
235	72			95								
240	73			86								
	74											
245	75			93								
	76											

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Project:	**Pebble Project**	Drill Hole No.	**GH11-238**	Page	**6** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**28 Jun 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**975 ft**	Date Completed:	**5 Jul 11**
Location:	**Area A, Valley Bottom**	Total Depth:	**298 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,140,885 N, 1,403,838 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	77			99								
255	78			100								
	79											
260	80			100								
265	81			94								
	82											
270			BEDROCK, Tertiary Volcaniclastic Conglomerate, matrix supported, green, igneous fragments, polylithic clasts, 2mm to 5cm, subangular to subrounded, poorly sorted, rare calcite veinlets.	92								
	83											
275	84			95								
	85											
280	86			98								
285	87			100								
	88											
290	89			96								
295	90			79								
	91		END OF HOLE @ 298 FT									

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Date Revised: 28 Jun 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-239**	Page	**1** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**5 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1045 ft**	Date Completed:	**10 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**264 ft**	Logged by:	**LS/DLP/SR/AA**
Coordinates:	**2,141,008 N, 1,402,590 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Sandy SILT, some clay, some gravel, subrounded to subangular clasts up to 3cm diameter, well graded, low plasticity, brown, moist (Glaciolacustrine)	45	92		GH11-239 SPT #1	10/11/12	23		PQ Casing to 179' Core Size: PQ3 to 179', HQ3 to 264'.	
5	1											
	2		SILT, some gravel, some clay, trace sand, subangular clasts up to 3cm, poorly graded, low plasticity, brown, moist. (Glaciolacustrine)	62	100		GH11-239-1	//				
			Sandy SILT, some clay, some gravel, subrounded to subangular clasts up to 3cm diameter, well graded, low plasticity, brown, moist (Glaciolacustrine)		39		GH11-239 SPT #2	3/3/3	6			
10	3			17								
	4				100		GH11-238-2	//			***Depths are downhole***	
15			Clayey, Sandy SILT, some gravel, subangular to subrounded clasts up to coarse gravel size, well graded, low to medium plasticity, brown, moist. (Glaciolacustrine)	59	36		GH11-239 SPT #3	4/3/3	6			
	5											
20	6				22		GH11-239 SPT #4	4/5/8	13			
	7			52								
			Sandy SILT, some gravel, some boulders, some clay, subangular to subrounded clasts up to 20cm, usually gravel size, well graded, low to medium plasticity, light brown, moist. (Glaciolacustrine)		39		GH11-239 SPT #5	6/9/10	19		Fines washed away from 29 to 34ft	
25	8			22								
			Sandy GRAVEL, trace silt, trace clay, subangular clasts up to 8cm, well graded, low plasticity, brown, moist. (Glaciofluvial)		33		GH11-239 SPT #6	23/24/20	44			
30	9			13								
	10											
			Sandy, gravelly SILT, some boulders, some clay, subangular to subrounded clasts up to boulder size (65cm), usually gravel size, well graded, low to medium plasticity, light brown, moist. (Glacial Drift)		8		GH11-239 SPT #7	7/14/15	29		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
35	11			34								
	12						GH11-239 SPT #8	13/15/21	36			
40				66								
	13											
			Sandy, silty GRAVEL, trace clay, subrounded to subangular clasts up to 8cm, well graded, low plasticity, light brown, moist. (Glacial Drift)		11		GH11-239 SPT #9	7/18/22	40		Fines washed away from 54 to 173ft	
45	14			20								
	15				22		GH11-239	14/31/40	71			

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-239

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-239

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Date Revised: 21 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-239**	Page	**2** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**5 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1045 ft**	Date Completed:	**10 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**264 ft**	Logged by:	**LS/DLP/SR/AA**
Coordinates:	**2,141,008 N, 1,402,590 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
							SPT #10					
				16								
55	16				44		GH11-239 SPT #11	10/21/34	55			
	17		SAND and GRAVEL, trace to some silt, trace clay, angular to subrounded clasts up to 20cm but mostly gravel size, well graded, no to low plasticity, light brown, moist. (Glaciofluvial)	13								
60	18				47		GH11-239 SPT #12	22/24/50+	Refusal			
	19			10								
65	20				60		GH11-239 SPT #13	37/47/50+	Refusal			
				16								
70	21				47		GH11-239 SPT #14	21/33/48	81			
	22			13								
75	23				56		GH11-239 SPT #15	16/19/28	47			
				13								
80	24				69		GH11-239 SPT #16	25/30/50+	Refusal			
	25			13								
85	26				45		GH11-239 SPT #17	13/50+/-	Refusal			
				20								
90	27				86		GH11-239 SPT #18	41/50+/-	Refusal			
	28			13								
95	29				30		GH11-239 SPT #19	28/50+/-	Refusal			
				30								
	30				89		GH11-239	44/50+/-	Refusal			

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Date Revised: 21 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-239**	Page	**3** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**5 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1045 ft**	Date Completed:	**10 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**264 ft**	Logged by:	**LS/DLP/SR/AA**
Coordinates:	**2,141,008 N, 1,402,590 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
							SPT #20					
	31			13								
					39	☒	GH11-239 SPT #21	21/35/32	67	●		
105	32			7								
	33											
					56	☒	GH11-239 SPT #22	40/43/32	75	●		
110	34			26								
					50	☒	GH11-239 SPT #23	17/38/50+	Refusal			
115	35			13								
	36											
					50	☒	GH11-239 SPT #24	23/45/50+	Refusal			
120	37			20								
					53	☒	GH11-239 SPT #25	21/34/50+	Refusal			
125	38			7								
	39											
					11	☒	GH11-239 SPT #26	12/14/32	46	●		
130	40			20								
			No Recovery from 134 to 139 ft									
135	41			0								
	42											
					39	☒	GH11-239 SPT #27	39/48/38	86	●		
140	43			20								
					100	☒	GH11-239 SPT #28	4/28/26	54	●		
145	44			10								
	45											
					39	☒	GH11-239	21/38/48	86	●		

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Date Revised: 21 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-239**	Page	**4** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**5 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1045 ft**	Date Completed:	**10 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**264 ft**	Logged by:	**LS/DLP/SR/AA**
Coordinates:	**2,141,008 N, 1,402,590 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			20			SPT #29					
155	47		No Recovery from 154 to 159 ft	0	17		GH11-239 SPT #30	5/17/55	72			
	48											
160	49			33	50		GH11-239 SPT #31	13/37/40	77			
	50				53		GH11-239 SPT #32	23/44/58	102			
165	51			13								
					92		GH11-239 SPT #33	27/50+/-	Refusal			
170	52			16								
	53		WEATHERED BEDROCK, Tertiary Monzonite, coarse grained, dark greenish grey, porphyritic, strong, massive, slightly weathered to highly weathered, iron oxide, very fractured.	66	55		GH11-239 SPT #34	50+/-/-	Refusal		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
175	54			39								
180	55			100								
	56											
185	57			56								
190	58			100								
	59											
195				100								
	60		BEDROCK, Tertiary Monzonite, dark green, chloritized, medium grained, 2-3mm phenocrysts, aphanitic, weakly magnetic, much									

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Date Revised: 21 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-239**	Page	**5** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**5 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1045 ft**	Date Completed:	**10 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**264 ft**	Logged by:	**LS/DLP/SR/AA**
Coordinates:	**2,141,008 N, 1,402,590 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			more competent, slightly weathered, very strong, calcite and hematite veins, trace disseminated pyrite, 0.01%. No Recovery from 199 to 204'	0								
205	62			92								
	63											
210	64			100								
	65											
215	66			100								
220	67			92								
	68											
225	69			100								
230	70			100								
	71											
235	72			98								
240	73			92								
	74											
245	75			98								
	76											

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-239

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Project No.	Ref. No.	Rev.
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Date Revised: 21 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-239**	Page	**6** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**5 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1045 ft**	Date Completed:	**10 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**264 ft**	Logged by:	**LS/DLP/SR/AA**
Coordinates:	**2,141,008 N, 1,402,590 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
255	77			100								
	78			100								
260	79			100								
	80											
265	81		END OF HOLE @ 264 FT									
	82											
270	83											
275	84											
	85											
280	86											
285	87											
	88											
290	89											
	90											
295	91											

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Date Revised: 21 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-240**	Page	**1 of 4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**10 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1046 ft**	Date Completed:	**14 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**173 ft**	Logged by:	**AA/SR**
Coordinates:	**2,141,559 N, 1,404,684 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Gravelly, Silty SAND, some clay, angular to subrounded clasts up to 10cm, well graded, low plasticity, brown, moist. (Glacial Drift)	45							PQ Casing to 104' Core Size: PQ3 to 104', HQ3 to 173'.	
5	1		Some fines washed away from 3 to 29ft	7	17		GH11-240 SPT #1	9/13/12	25	●		
10	2			49	22		GH11-240 SPT #2	2/4/5	9	●		
15	3			20	8		GH11-240 SPT #3	5/6/7	13	●		
20	4			30	56		GH11-240 SPT #4	6/10/9	19	●	***Depths are downhole***	
25	5		Gravelly, sandy SILT, some clay, angular to subangular clasts up to gravel size, well graded, low plasticity, light brown, moist. (Glacial Drift)	98	72		GH11-240 SPT #5	4/7/9	16	●		
	6		No Recovery from 24 to 25'.	0								
30	7		Sandy GRAVEL, some silt, some clay, some boulders, angular to subrounded clasts up to 20cm, mostly gravel size, well graded, low to medium plasticity, brown, moist. (Glacial Drift)	16							***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
35	8			50	33		GH11-240 SPT #6	7/7/21	28	●		
40	9			33	17		GH11-240 SPT #7	20/-/-	Refusal			
45	10			55	50		GH11-240 SPT #8	1/9/18	27	●		
	11			31	14		GH11-240 SPT #9	3/5/12	17	●		
	12			94								
	13		GRAVEL and SAND, trace silt, trace clay, subangular to subrounded clasts up to 10cm,	22	28		GH11-240 SPT #10	8/25/29	54	●	Fines washed away from 48 to 66ft	

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Pebble Project
Overburden Log For GH11-240

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Date Revised: 21 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-240**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**10 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1046 ft**	Date Completed:	**14 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**173 ft**	Logged by:	**AA/SR**
Coordinates:	**2,141,559 N, 1,404,684 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			well graded, low to no plasticity, brown, moist. (Glacial Drift)									
				25								
	16				31		GH11-240 SPT #11	14/33/33	66			
				33								
55												
	17			52								
					39		GH11-240 SPT #12	14/34/50	84			
	18											
60				39								
	19											
					44		GH11-240 SPT#13	24/42/-	Refusal			
65				80								
	20		Sandy GRAVEL, some silt, trace clay, subangular to subrounded clasts up to 5cm, well graded, low to medium plasticity, light brown, moist. (Glacial Drift)									
					53		GH11-240 SPT #14	15/34/45	79			
	21			30								
70												
	22											
			SAND and GRAVEL, trace to some silt, trace clay, angular to subrounded clasts up to 15cm, mostly gravel size, fines washed away, well graded, low to no plasticity, light brown, moist. (Glacial Drift)		11		GH11-240 SPT #15	18/42/50	92			
75				29								
	23											
					17		GH11-240 SPT #16	30/50/50	Refusal			
	24											
80				45								
	25											
					56		GH11-240 SPT #17	11/33/50	Refusal			
85				23								
	26											
	27		SILT and SAND, some gravel, trace clay, subangular to subrounded clasts up to 3cm, well graded, low plasticity, brown, moist. (Glacial Drift)		54		GH11-240 SPT #18	38/50/-	Refusal			
90				16								
	28											
					100		GH11-240 SPT #19	36/-/-	Refusal			
			WEATHERED BEDROCK, Tertiary Volcaniclastic Breccia, light green and multicoloured, angular clasts are 1 to 8cm, polylithic, wacke matrix, highly fractured, oxidized.	60							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
95	29			54								
					83		GH11-240 SPT #20	35/39/-	Refusal			
	30											

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Date Revised: 21 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-240**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**10 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1046 ft**	Date Completed:	**14 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**173 ft**	Logged by:	**AA/SR**
Coordinates:	**2,141,559 N, 1,404,684 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			80							Brief loss of circulation at 102'.	
			BEDROCK, Tertiary Volcaniclastic Breccia, light green and multicoloured, angular clasts are 1 to 8cm, polylithic, wacke matrix, white clay veinlets.									
105	32			112								
	33											
110				100								
	34											
115	35			93								
	36		BEDROCK, Tertiary Basalt, dark brown basalt flow, some flow banding, epidote alteration.									
120	37			93								
125	38			100								
	39											
130				100								
	40											
	41			100								
135												
	42											
140				94								
	43											
	44			100								
145												
	45											

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Date Revised: 21 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-240**	Page	**4 of 4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**10 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1046 ft**	Date Completed:	**14 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**173 ft**	Logged by:	**AA/SR**
Coordinates:	**2,141,559 N, 1,404,684 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			62								
			BEDROCK, Tertiary Volcaniclastic Breccia, similar to unit 103-118.5', a few basalt flows at 157-161.3', 165.2-166.2'.									
155	47			85								
	48											
160	49			100								
	50											
165				100								
	51											
170	52			100								
	53		END OF HOLE @ 173 FT									
175												
	54											
180	55											
	56											
185	57											
190	58											
	59											
195	60											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-240

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	3	0

GH11-240

Rev. 0 - Issued for Report VA101-176/38-3

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 21 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-241**	Page	**1 of 9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**14 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1050 ft**	Date Completed:	**22 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**404 ft**	Logged by:	**AA/SR/DLP/LS**
Coordinates:	**2,140,947 N, 1,401,709 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, dark brown, root inclusions, moist.								PW Casing to 84'. Core Size: PQ3 to 285', HQ3 to 349', NQ3 to 404'.	
			Silty, Gravelly SAND, some clay, trace cobbles, subangular to subrounded clasts up to cobble size, well graded, low plasticity, brown, moist. (Glacial Drift)	8	89		GH11-241 SPT #1	8/13/16	29			
5	1			20								
	2				61		GH11-241 SPT #2	4/4/6	10			
10	3			20								
	4				39		GH11-241 SPT #3	4/4/4	8		***Depths are downhole***	
15	5		Sandy, Silty GRAVEL, trace clay, subangular to subrounded clasts up to cobble size, well graded, low plasticity, brown, moist. (Glacial Drift)	17								
	6				100		GH11-241-1	//				
20	7			12								
			Gravelly SAND and SILT, trace clay, subangular to subrounded clasts up to 10cm diameter, poorly graded, low to no plasticity, brown, moist, most fines washed away. (Glacial Drift)		17		GH11-241 SPT #4	7/7/7	14		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
25	8			16								
	9				67		GH11-241 SPT #5	5/6/10	16			
30	10			23								
					19		GH11-241 SPT #6	8/9/12	21			
35	11			27								
	12				122		GH11-241 SPT #7	8/15/31	46			
40	13			13								
			Silty SAND, some gravel, some clay, subangular to subrounded clasts up to 10cm, well graded, low to no plasticity, brown, moist, most fines washed away. (Glacial Drift)		31		GH11-241 SPT #8	10/11/13	24			
45	14			20								
	15				53		GH11-241	6/13/15	28			

Pebble Limited Partnership
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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Rev. 0 - Issued for Report VA101-176/38-3

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Date Revised: 22 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-241**	Page	**2** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**14 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1050 ft**	Date Completed:	**22 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**404 ft**	Logged by:	**AA/SR/DLP/LS**
Coordinates:	**2,140,947 N, 1,401,709 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
				10			SPT #9					
	16											
55			Gravelly SAND, trace silt, trace clay, subrounded clasts up to 12cm, well graded, no to low plasticity, brown, moist, fines washed away. (Glacial Drift)		61		GH11-241 SPT #10	4/16/18	34			
	17			0								
	18				69		GH11-241 SPT #11	23/31/46	77			
60				10								
	19											
					56		GH11-241 SPT #12	15/29/37	66		Loss of circulation from 67 to 74'.	
65	20			10								
	21				33		GH11-241 SPT #13	19/14/15	29			
70				40								
	22											
					72		GH11-241 SPT #14	9/14/21	35			
75	23			7								
	24		Sandy, clayey SILT, trace gravel, subangular to subrounded clasts up to gravel size, poorly graded, low to medium plasticity, light brown, moist. (Glaciolacustrine)		83		GH11-241 SPT #15	10/15/19	34		Loss of circulation from 79 to 84'.	
80				49								
	25				100		GH11-241-2	//				
					81		GH11-241 SPT #16	6/7/9	16		Heaving sands and clayey silt lenses between 84 and 125', slow progress.	
85	26			34								
			No Recovery from 86 to 95ft.									
	27			0								
90					64		GH11-241 SPT #17	5/7/10	17			
	28			0								
95	29		SILT, some clay, some sand, trace gravel, subangular to subrounded clasts up to gravel size, poorly graded, low plasticity, light brown, moist. (Glaciolacustrine)		61		GH11-241 SPT #18	9/7/7	14			
	30			9								

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Knight Piésold CONSULTING

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Rev. 0 - Issued for Report VA101-176/38-3

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 22 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-241**	Page	**3** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**14 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1050 ft**	Date Completed:	**22 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**404 ft**	Logged by:	**AA/SR/DLP/LS**
Coordinates:	**2,140,947 N, 1,401,709 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31				67		GH11-241 SPT #19	4/6/9	15			
				26								
105	32				17		GH11-241 SPT #20	8/21/9	30			
			SAND and GRAVEL, some silt, trace clay, subrounded clasts up to boulder size, mostly gravel size, well graded, no to low plasticity, brown, moist. (Glaciofluvial)	25								
	33				53		GH11-241 SPT #21	3/14/29	43			
110				54								
	34											
	35				33		GH11-241 SPT #22	13/24/24	48			
115				25								
	36											
					19		GH11-241 SPT #23	4/14/45	59			
120	37			18								
	38				38		GH11-241 SPT #24	15/50/-	Refusal			
125				25								
	39											
					47		GH11-241 SPT #25	25/31/30	61			
130	40			20								
	41				47		GH11-241 SPT #26	45/38/-	Refusal			
135				59								
	42											
							GH11-241 SPT #27	-/-/-	Refusal			
140	43			7								
	44				50		GH11-241 SPT #28	24/-/-	Refusal			
145				7								
	45											
					82		GH11-241	-/-/-	Refusal			

Pebble Limited Partnership
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Date Revised: 22 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-241**	Page	**4** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**14 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1050 ft**	Date Completed:	**22 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**404 ft**	Logged by:	**AA/SR/DLP/LS**
Coordinates:	**2,140,947 N, 1,401,709 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			13			SPT #29					
155	47		No Recovery from 154-159'.		50	☒	GH11-241 SPT #30	-/-/-	Refusal			
	48			0								
160	49		Silty SAND, some gravel to gravelly, trace clay, subrounded clasts up to cobble size, mostly gravel size, well graded, low to no plasticity, light brown, moist. (Glacial Drift)	27								
	50				75	☒	GH11-241 SPT #31	50/-/-	Refusal			
165	51			32								
					75	☒	GH11-241 SPT #32	21/50/-	Refusal			
170	52			22								
	53				14	☒	GH11-241 SPT #33	20/50/50	Refusal			
175	54			35								
					75	☒	GH11-241 SPT #34	50/-/-	Refusal			
180	55			22								
	56				96	☒	GH11-241 SPT #35	29/50/-	Refusal			
185	57			10								
					58	☒	GH11-241 SPT #36	25/50/-	Refusal			
190	58			20								
	59				50	☒	GH11-241 SPT #37	16/44/-	Refusal		Difficult drilling from 197 to 198'.	
195	60			39								
					90	☒	GH11-241	-/-/-	Refusal			

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Date Revised: 22 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-241**	Page	**5** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**14 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1050 ft**	Date Completed:	**22 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**404 ft**	Logged by:	**AA/SR/DLP/LS**
Coordinates:	**2,140,947 N, 1,401,709 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
				39			SPT #38					
	62				22		GH11-241 SPT #39	20/25/56	81	●		
205	63		Clayey SILT, trace sand, no gravel, poorly graded, low to medium plasticity, light brown with dark brown organic inclusions thoughout (old peat bed?), moist to dry. (Glaciolacustrine)	49								
					18		GH11-241 SPT #40	16/-/-	Refusal			
210	64			13								
	65				100		GH11-241-3	//				
215			No Recovery from 214 to 219'.	0								
	66				0		GH11-241 SPT #41	-/-/-	Refusal			
220	67		SAND and GRAVEL, trace silt, trace clay, angular to subrounded clasts up to gravel size, well graded, no to low plasticity, light brown, moist. (Glacofluvial)	13								
	68				60		GH11-241 SPT #42	-/-/-	Refusal			
225	69			30								
					95		GH11-241 SPT #43	27/-/-	Refusal			
	70			30								
230	71				45		GH11-241 SPT #44	8/-/-	Refusal			
235	72			30								
					75		GH11-241 SPT #45	49/-/-	Refusal			
240	73			20								
	74				0		GH11-241 SPT #46	-/-/-	Refusal			
245	75			26								
	76											

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Date Revised: 22 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-241**	Page	**6** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**14 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1050 ft**	Date Completed:	**22 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**404 ft**	Logged by:	**AA/SR/DLP/LS**
Coordinates:	**2,140,947 N, 1,401,709 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
				20								
	77				60		GH11-241 SPT #47	-/-/-	Refusal			
255	78			33								
	79											
260				10								
	80				45		GH11-241 SPT #48	-/-/-	Refusal			
265	81			26								
	82											
270				21								
	83				75		GH11-241 SPT #49	40/50/-	Refusal			
275	84			20								
	85											
280				30								
	86											
285	87			27	20		GH11-241 SPT #50	50+/-/-	Refusal			
			No Recovery from 287 to 297 ft due to Triconing.									
	88											
290				0								
	89											
295	90											
			SAND and GRAVEL, trace silt, trace clay, angular to subrounded clasts up to gravel size, well graded, no to low plasticity, light brown,	41								
	91				50		GH11-241	50+/-/-	Refusal			

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Date Revised: 22 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-241**	Page	**7 of 9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**14 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1050 ft**	Date Completed:	**22 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**404 ft**	Logged by:	**AA/SR/DLP/LS**
Coordinates:	**2,140,947 N, 1,401,709 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			moist, iron oxide on clast surfaces. (Glaciofluvial)				SPT #51					
	92			26								
305	93			26								
	94				50		GH11-241 SPT #52	50+/-/-	Refusal			
310	95			33								
315	96			49								
	97				67		GH11-241 SPT #53	-/-/-	Refusal			
320	98			20								
325	99			20								
	100											
			HIGHLY WEATHERED BEDROCK, Cretaceous Andesitic Siltstone, Soil like, SAND, some silt, some gravel, trace clay, well graded, clay weathering, weak.		73		GH11-241 SPT #54	34/59/-	Refusal		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
330	101			46								
335	102			20								
	103											
			BEDROCK, Cretaceous Andesitic Siltstone, pale green to grey, small ~1cm wacke beds, oxidation extends to 349.4', calcite veins, cubic pyrite crystals, weak disseminated pyrite.		89		GH11-241 SPT #55	43/-/-	Refusal			
340	104			80								
345	105			100								
	106											

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Date Revised: 22 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-241**	Page	**8 of 9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**14 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1050 ft**	Date Completed:	**22 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**404 ft**	Logged by:	**AA/SR/DLP/LS**
Coordinates:	**2,140,947 N, 1,401,709 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	107			100								
	108											
355				7								
	109											
360	110			89								
	111											
365				98								
	112											
370	113			96								
	114											
375				100								
	115											
380	116			100								
	117											
385				100								
	118											
390	119			100								
	120											
395				100								
	121											

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Date Revised: 22 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-241**	Page	**9** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**14 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1050 ft**	Date Completed:	**22 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**404 ft**	Logged by:	**AA/SR/DLP/LS**
Coordinates:	**2,140,947 N, 1,401,709 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	122			100								
	123		END OF HOLE @ 404 FT									
405	124											
410	125											
	126											
415	127											
420	128											
	129											
425	130											
430	131											
	132											
435	133											
440	134											
	135											
445	136											
	137											

Pebble Limited Partnership
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Date Revised: 22 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-242**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**23 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1150 ft**	Date Completed:	**27 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**200 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,141,281 N, 1,400,539 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Gravelly, Silty SAND, trace clay, subangular to subrounded clasts up to boulder size (20cm), mostly gravel size, well graded, no to low plasticity, light brown, moist. (Glacial Drift)	7							PW Casing to 54' Core Size: PQ3 to 85', HQ3 to 200'.	
5	1			13	28	☒	GH11-242 SPT #1	33/50/38	88	●		
10	3			13	39	☒	GH11-242 SPT #2	4/7/12	19	●	***Depths are downhole***.	
15	5			20	22	☒	GH11-242 SPT #3	6/9/8	17	●		
20	6			20	0	☒	GH11-242 SPT #4	3/6/4	10	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
25	8			33	42	☒	GH11-242 SPT #5	11/19/28	47	●		
30	9			12	36	☒	GH11-242 SPT #6	7/12/13	25	●	Heaving sands from 30' to 60', hole sloughs in at 55'.	
35	11			24	0	☒	GH11-242 SPT #7	15/34/30	64	●		
40	12			18	25	☒	GH11-242 SPT #8	21/28/39	67	●		
45	14			18	28	☒	GH11-242 SPT #9	5/20/25	45	●		
	15											

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-242

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-242

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Date Revised: 24 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-242**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**23 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1150 ft**	Date Completed:	**27 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**200 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,141,281 N, 1,400,539 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			6	47		GH11-242 SPT #10	21/25/22	47			
	17			13	47		GH11-242 SPT #11	30/39/50+	Refusal			
60	18											
	19			7	47		GH11-242 SPT #12	16/30/50+	Refusal			
65	20		Silty SAND, some clay, trace to some gravel, angular to subrounded clasts up to 10cm diameter, clasts have iron oxide staining on surfaces, poorly graded, no to low plasticity, light brown, moist. (Glacial Drift)	22	88		GH11-242 SPT #13	11/50+/-	Refusal			
70	21											
	22			5	83		GH11-242 SPT #14	50+/-/-	Refusal			
75	23			27	67		GH11-242 SPT #15	50+/-/-	Refusal			
	24											
80	25		WEATHERED BEDROCK, Cretaceous Andesitic Siltstone, moderately to highly weathered, fracture/rubble zones, oxidized, hematite, limonite.	98							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
				49								
85	26			66								
	27											
90	28			91								
95	29			83								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-242

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Date Revised: 24 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-242**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**23 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1150 ft**	Date Completed:	**27 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**200 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,141,281 N, 1,400,539 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			91								
105	32											
	33			82								
110	34		BEDROCK, Cretaceous Andesitic Siltstone, dark grey, massive, slightly jigsaw brecciated below 131', breccia is cemented by prevailing vein minerals of quartz-pyrite-chlorite, minor galena and sphalerite, moderate propylitic alteration, some finely disseminated pyrite.	92								
115	35											
	36			100								
120	37			98								
125	38											
	39			100								
130	40			98								
	41											
135	42			96								
140	43			98								
	44											
145	45			98								

Pebble Limited Partnership
Pebble Project
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Date Revised: 24 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-242**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**23 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1150 ft**	Date Completed:	**27 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**200 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,141,281 N, 1,400,539 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			98								
	47											
155				100								
	48											
160				100								
	49											
	50											
165				95								
	51											
170				100								
	52											
	53		BEDROCK, Cretaceous Gabbro, dark green, medium grained, massive, fine to medium grained, pyrite-chlorite-quartz veinlets with epidote and local hematite, strong propylitic alteration, disseminated calcite, disseminated hematite, pervasive chlorite, spotty epidote, disseminated pyrite.								
175				98								
	54											
180				92								
	55											
	56											
185				99								
	57											
190				98								
	58											
	59											
195				100								
	60											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-242

Knight Piésold CONSULTING

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Date Revised: 24 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-242**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**23 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1150 ft**	Date Completed:	**27 Jul 11**
Location:	**Area A, Lower/Mid Sideslopes**	Total Depth:	**200 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,141,281 N, 1,400,539 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			END OF HOLE @ 200 FT									
	62											
205	63											
	64											
210	65											
	66											
215	67											
	68											
220	69											
	70											
225	71											
	72											
230	73											
	74											
235	75											
	76											
240												
245												

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Pebble Project
Overburden Log For GH11-242

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 24 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-243**	Page	**1 of 3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**27 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**828 ft**	Date Completed:	**29 Jul 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**104 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,161,635 N, 1,415,449 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			PEAT, fibrous, root inclusions, black brown, moist to wet.								PQ Casing to 19'. Core Size: PQ3 to 19', HQ3 to 104'.	
			SILT and CLAY, trace sand, no gravel, no clasts, poorly graded, low to medium plasticity, brown, moist. (Glaciolacustrine)	74	94		GH11-243-1	//				
5	1											
			Silty SAND, some gravel, some clay, subrounded to subangular clasts up to 10cm diameter, poorly graded, low to medium plasticity, brown to orangey brown, moist. (Glacial Drift)	10	44		GH11-243 SPT #1	9/16/12	28			
10	2											
			Sandy, gravelly SILT, trace to some clay, subangular to subrounded clast up to 7cm diameter, poorly graded, low to medium plasticity, light brown, moist. (Glacial Drift)	13	67		GH11-243 SPT #2	5/7/9	16		***Depths are downhole***.	
	3											
	4											
15				36	6		GH11-243 SPT #3	9/12/24	36			
	5		BEDROCK, Tertiary Matrix-Supported Volcaniclastic Conglomerate, dark purplish grey, angular to subangular clasts (3 to 10mm), matrix is fine grained, many clasts are elongate, polymictic clasts, oxidation is intermittant to EOH but is strongest above 42', competent, hard, moderately fractured, calcite veins, no sulphides.	93							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
20	6			97								
	7											
25				100							Intermittant lost circulation from 24 to 44'.	
	8											
	9			96								
30												
	10											
35				98							***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	11											
	12			95								
40												
	13											
45				93								
	14											
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-243

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 30 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-243**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**27 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**828 ft**	Date Completed:	**29 Jul 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**104 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,161,635 N, 1,415,449 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			100								
	17			100								
60	18			100								
	19											
65	20			100								
	21											
70	22			100								
75	23			100							Lost circulation from 73 to 100'.	
	24											
80	25			96								
85	26			87								
	27											
90	28			98								
95	29			98								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-243

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 30 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-243**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**27 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**828 ft**	Date Completed:	**29 Jul 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**104 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,161,635 N, 1,415,449 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100						■		
105	32		END OF HOLE @ 104 FT									
	33											
110	34											
	35											
115	36											
	37											
120	38											
	39											
125	40											
	41											
130	42											
	43											
135	44											
	45											
140												
145												

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-243

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 30 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-245**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**30 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**908 ft**	Date Completed:	**31 Jul 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**110 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,479 N, 1,417,380 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			PEAT, brown, fibrous, root inclusions, wet.								PQ Casing to 21'. Core Size: PQ3 to 20', HQ3 to 110'.	
	1		SILT and SAND, trace clay, trace to some gravel, subrounded to subangular clasts up to gravel size, poorly graded, low plasticity, brown, frozen to 5 ft depth, then moist. (Glaciolacustrine)	20								
5				16	56		GH11-245 SPT #1	1/2/3	5	●		
	2			13								
			Sandy GRAVEL, trace silt, trace clay, angular to subrounded clasts up to 4cm, well graded, non plastic, brown, moist, most fines washed away in this interval. (Glacial Drift)								***Depths are downhole***.	
10	3				100		GH11-245-1	//				
	4			7								
15			Silty SAND, trace clay, trace gravel, angular to subangular clasts up to 10cm diameter, well graded, no to low plasticity, brown, moist. (Glacial Drift)		78		GH11-245 SPT #2	13/27/46	73	●		
	5			52								
			BEDROCK, Tertiary Basalt, dark green black, calcite vesicles, subangular and subrounded polymictic xenoliths, massive, no flow foliations, rare small clastic intervals, clastic intervals are oxidized, minor calcite veinlets, fine-grained weakly disseminated pyrite, ~0.1%.	94							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
20	6											
	7			83								
25												
	8			98								
	9											
30				100								
	10											
35												
	11			99							***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
40	12											
	13			100								
45												
	14			94								
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-245

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 30 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-245**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**30 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**908 ft**	Date Completed:	**31 Jul 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**110 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,479 N, 1,417,380 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			100								
	17											
60	18			100								
	19			98								
65	20											
	21			98								
70	22			100								
75	23											
	24			100								
80	25											
	26			100								
85	27											
90	28			98								
	29											
95	30			96							Lost circulation from 97 to 110'.	

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-245

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Project No.	Ref. No.	Rev.
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Date Revised: 30 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-245**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**30 Jul 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**908 ft**	Date Completed:	**31 Jul 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**110 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,479 N, 1,417,380 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31			100						■		
	32											
				94						■		
	33											
110			END OF HOLE @ 110 FT									
	34											
115	35											
	36											
120	37											
	38											
125	39											
130	40											
	41											
135	42											
140	43											
	44											
145	45											

Pebble Limited Partnership
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Date Revised: 30 Jul 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-246**	Page	**1 of 3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**1 Aug 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1016 ft**	Date Completed:	**3 Aug 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**144 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,165,240 N, 1,419,391 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, dark brown, fibrous, root inclusions, moist.	12	47		GH11-246 SPT #1	3/20/49	69		PQ Casing to 9'. Core Size: PQ3 to 9', HQ3 to 144'.	
5	1		Silty, gravelly SAND, trace clay, angular to subrounded clasts, clasts up to boulder size (50cm), mostly gravel size, well graded, low to no plasticity, light brown, some organic material, moist (Glacial Drift).								* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	2		BEDROCK, Tertiary Rhyolite, light grey, creamy and iron oxide stained, moderately to strongly flow banded, porphyritic, quartz phenocrysts, clay alteration, minor dendritic manganese oxide, flow banding dominantly 50-65°tca, healed fault breccia zone from 73.7-88.4'.	52								
	3			100								
15	4										***Depths are downhole***	
	5			89								
20	6			100								
	7											
25	8			98								
	9										Lost circulation from 30 to 59'.	
30	10			100								
35	11			100								
	12										***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
40	13			98								
45	14			97								
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-246

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-246

Rev. 0 - Issued for Report VA101-176/38-3

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 4 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-246**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**1 Aug 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1016 ft**	Date Completed:	**3 Aug 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**144 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,165,240 N, 1,419,391 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	17			96								
60	18			91								
65	20			100								
70	21			98								
75	23			100								
80	24			100								
85	26			100								
90	27			100								
95	29			98								
	30											

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-246

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Rev. 0 - Issued for Report VA101-176/38-3

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Date Revised: 4 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-246**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**1 Aug 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1016 ft**	Date Completed:	**3 Aug 11**
Location:	**Upper Talarik Creek Area**	Total Depth:	**144 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,165,240 N, 1,419,391 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32										Lost circulation from 108-119'.	
				92								
	33											
110				98								
	34											
115	35			96								
	36											
120				94								
	37											
	38			89								
125												
	39											
130				70								
	40											
	41											
135			BEDROCK, Tertiary Volcaniclastic Conglomerate/Tertiary Monzonite, clast-supported conglomerate, high concentration of Tertiary Monzonite fragments, other finer polylithic fragments.	98								
	42											
140												
	43			100								
	44		END OF HOLE @ 144 FT									
145												
	45											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-246

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Date Revised: 4 Aug 11

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Project:	**Pebble Project**	Drill Hole No.	**GH11-247**	Page	**1 of 2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**4 Aug 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1293 ft**	Date Completed:	**7 Aug 11**
Location:	**Area E**	Total Depth:	**67 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,507 N, 1,392,555 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, dark brown, fibrous, root inclusions, moist.								PW Casing to 19'. Core Size: PQ3 to 67'.	
			SAND and SILT, some gravel, trace clay, angular to subrounded clasts up to 3cm diameter, well graded, low plasticity, orange brown to light brown, moist. (Glacial Drift)	25	50		GH11-247 SPT #1	3/7/12	19			
5	1											
			Gravelly SAND, some silt, trace clay, subangular to subrounded clasts up to 10cm diameter, well graded, no to low plasticity, light brown, moist, sand and gravel content is variable throughout the interval. (Glacial Drift)	20								
	2				0		GH11-247 SPT #2	14/14/18	32			
10	3			30								
	4				28		GH11-247 SPT #3	15/23/21	44			
15	5			26								
			No Recovery from 17.5 to 19 ft due to triconing.	0							***Depths are downhole***	
20	6		SAND, some gravel, some silt, some clay, angular to subrounded clasts up to 5cm, well graded, low plasticity, light brown, moist. (Glacial Drift)		44		GH11-247 SPT #4	5/8/8	16			
	7			11								
25					0		GH11-247 SPT #5	24/23/21	44			
	8			26								
	9				17		GH11-247 SPT #6	9/17/17	34		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
30				31								
	10		Sandy GRAVEL, some silt, trace clay, angular to subrounded clasts up to 10cm diameter, well graded, low to no plasticity, brown, moist. (Glacial Drift)									
35					50		GH11-247 SPT #7	8/14/38	52			
	11			23								
	12				56		GH11-247 SPT #8	10/50+/-	Refusal			
40				5								
	13				0		GH11-247 SPT #9	20/50+/-	Refusal			
45	14			16								
					17		GH11-247	10/16/30	46			
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-247

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-247**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**4 Aug 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1293 ft**	Date Completed:	**7 Aug 11**
Location:	**Area E**	Total Depth:	**67 ft**	Logged by:	**LS/DLP**
Coordinates:	**2,163,507 N, 1,392,555 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
							SPT #10					
	16			20								
55					67		GH11-247 SPT #11	8/22/41	63			
	17			13								
60	18				22		GH11-247 SPT #12	16/24/30	54			
	19			20								
65	20			11	39		GH11-247 SPT #13	12/16/34	50		Artesian flow of ~30 to 40gpm at 64', continued drilling and flow increased to ~75 to 80gpm at 67', Hole was plugged and abandoned.	
			END OF HOLE @ 67 FT									
70	21											
	22											
75	23											
	24											
80	25											
85	26											
	27											
90	28											
95	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-247

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-274**	Page	**1 of 4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**16 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1078 ft**	Date Completed:	**18 Sep 11**
Location:	**West Deposit Area**	Total Depth:	**179 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,162,423 N, 1,403,783 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, dark brown, root inclusions, moist.								PQ Casing to 31.5'. Core Size: PQ3 to 31.5', HQ3 to 179'.	
			Silty, gravelly SAND, trace clay, subangular to subrounded clasts, clasts up to 12cm, mostly gravel size, well graded, low to no plasticity, brown to yellowish brown for last 3', moist. (Glacial Drift)	16								
5	1			20	0		GH11-274 SPT #1	7/8/9	17			
10	2			23	39		GH11-274 SPT #2	6/26/15	41			
15	3			66	67		GH11-274 SPT #3	12/29/14	43			
20	4			57	61		GH11-274 SPT #4	16/15/19	34			
	5											
	6		BEDROCK, Cretaceous Granodiorite, pale green grey, fine to medium grained, porphyritic, iron oxide, calcite and clay on fracture surfaces, moderately to highly weathered, chlorite and sericite alteration, disseminated and vein pyrite, extremely weak to medium strong, some rubble zones.	71							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
25	7			66	61		GH11-274 SPT #5	19/50/50+	Refusal			
	8			75	55		GH11-274 SPT #6	28/49/50+	Refusal			
30	9			20							***Depths are downhole***	
	10			100								
35	11			77								
40	12			100								
	13										***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
45	14			100								
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-274

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-274

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SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 19 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-274**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**16 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1078 ft**	Date Completed:	**18 Sep 11**
Location:	**West Deposit Area**	Total Depth:	**179 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,162,423 N, 1,403,783 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	16			98								
55	17		BEDROCK, Tertiary Basalt Dyke, highly altered, faulted zone, no veining, chloritic slickensides, pale green with some lighter coloured zones, extremely weak, pyrite, calcite and clay in fractures, fault zone from 54 to ~62'.	94								
	18		BEDROCK, Cretaceous Granodiorite, first 1.75' is fault breccia, fine to medium grained, pale green grey with some lighter coloured zones, pyrite, calcite and chlorite veins, sericite, epidote, disseminated and vein pyrite, rubble zones, some vugs, very weak to medium strong, moderately to highly weathered, clay on fracture surfaces.									
60	19			100								
65	20			87								
	21											
70	22			96								
75	23			96								
	24											
80	25			100								
85	26			100								
	27											
90	28		BEDROCK, Cretaceous Diorite, darker grey, fine grained, slightly porphyritic, epidote and chlorite, disseminated and vein pyrite, medium strong, moderately weathered.	100								
95	29		BEDROCK, Cretaceous Granodiorite, grey to light grey, moderately to slightly weathered, medium strong, disseminated and vein pyrite, quartz veins, sericite, chalcopyrite in thin vein at	100								
	30											

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-274

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 19 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-274**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**16 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1078 ft**	Date Completed:	**18 Sep 11**
Location:	**West Deposit Area**	Total Depth:	**179 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,162,423 N, 1,403,783 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		117.1', medium to very strong, fine to medium grained, porphyritic, calcite and pyrite in fractures, breccia zones.	100								
105	32			100								
	33											
110	34			100								
115	35			98								
	36											
120	37			98								
125	38			100								
	39											
130	40			100								
135	41			100								
	42											
140	43		BEDROCK, Cretaceous Diorite, fine grained, greenish grey, uniform to slightly porphyritic, chlorite and epidote, quartz, calcite, pyrite veins, molybdenite in vein, medium strong to strong, slightly weathered, rubble zones, disseminated pyrite.	100								
145	44			100								
	45		BEDROCK, Cretaceous Granodiorite, fine to medium grained, porphyritic, grey, medium strong to very strong, moderately to slightly									

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
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Date Revised: 19 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-274**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**16 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1078 ft**	Date Completed:	**18 Sep 11**
Location:	**West Deposit Area**	Total Depth:	**179 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,162,423 N, 1,403,783 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46		weathered, sericite, calcite veins, disseminated and vein pyrite.	99								
155	47			100								
	48											
160	49			100								
	50											
165	51			100								
170	52			100								
	53		BEDROCK, Cretaceous Diorite, dark grey, fine to medium grained, uniform to slightly porphyritic, slightly weathered, very strong, calcite and pyrite on fracture surfaces, weak epidote, disseminated and vein pyrite.	100								
175	54											
			END OF HOLE @ 179 FT									
180	55											
	56											
185	57											
190	58											
	59											
195	60											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-274

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 19 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-277**	Page	**1 of 6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**19 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1692 ft**	Date Completed:	**23 Sep 11**
Location:	**Area E**	Total Depth:	**297 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,163,203 N, 1,398,102 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		FELSENMEER mixed with SAND and GRAVEL, some silt, trace clay, angular clasts of Cretaceous Siltstone, fine grained, finely laminated, dark grey with iron oxide on joint surfaces, medium strong, highly fractured/frost heaved, fragments from 2 to 20" in diameter, poorly graded, low to no plasticity, brown, moist to dry. (Felsenmeer and Glacial Drift)	0							PQ Casing to 18'. Core Size: PQ3 to 18', HQ3 to 297'.	
5	1			61							Lost circulation from 2.5 to 18'	
10	2			49								
	3			112								
	4		BEDROCK, Cretaceous Andesitic Siltstone, interbedded wackes and siltstones, metamorphosed/altered, small dykes of diorite, fine grained, equigranular, dark grey, medium strong with some weak zones, slightly to moderately weathered, laminated, iron oxide, pyrite, calcite, chlorite and clay on joint surfaces, rubble zones, some disseminated sulphides, pyrite veins, moderately fractured zones.	101							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
15	5			85								
				66								
20	6			85								
	7											
25	8			100							***Depths are downhole***	
30	9			98							***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	10											
35	11			100								
	12			100								
40	13											
45	14			100							Deeper Piezometer lost and could not be fished out, so another 1" piezometer was installed above that, the deeper one was filled in and is not visible on surface.	
	15			98								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-277

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 23 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-277**	Page	**2** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**19 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1692 ft**	Date Completed:	**23 Sep 11**
Location:	**Area E**	Total Depth:	**297 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,163,203 N, 1,398,102 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			100								
	17			100								
60	18			100								
	19											
65	20			96								
	21											
70	22			93								
75	23			93								
	24											
80	25			92								
85	26			78								
	27											
90	28			100								
95	29			100								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-277

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-277

Rev. 0 - Issued for Report VA101-176/38-3

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 23 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-277**	Page	**3** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**19 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1692 ft**	Date Completed:	**23 Sep 11**
Location:	**Area E**	Total Depth:	**297 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,163,203 N, 1,398,102 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100								
	33											
110	34			100								
	35											
115	36			100								
	37											
120	38			100								
	39											
125	40			100								
	41											
130	42			100								
	43											
135	44			100								
	45											
140				100								
145												

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-277

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-277

Rev. 0 - Issued for Report VA101-176/38-3

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 23 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-277**	Page	**4** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**19 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1692 ft**	Date Completed:	**23 Sep 11**
Location:	**Area E**	Total Depth:	**297 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,163,203 N, 1,398,102 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
155	47			100								
160	49			100								
165	51			100								
170	52			100								
175	54			100								
180	55			100								
185	57			100								
190	58			100								
195	60			100								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-277

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-277

Rev. 0 - Issued for Report VA101-176/38-3

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Date Revised: 23 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-277**	Page	**5** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**19 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1692 ft**	Date Completed:	**23 Sep 11**
Location:	**Area E**	Total Depth:	**297 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,163,203 N, 1,398,102 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100								
	63			98								
210	64		BEDROCK, NO RECOVERY from 209.25 to 269', assumed to be similar rock type to above, tube mislatch, core had fallen out of tube into core barrel.	5								
215	65			0								
	66											
220	67			0								
	68											
225	69			0								
	70											
230	71			0								
235	72			0							Deeper Piezometer lost and could not be fished out, so another 1" piezometer was installed above that, the deeper one was filled in and is not visible on surface.	
240	73			0								
	74			0								
245	75			0								
	76											

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
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Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Date Revised: 23 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-277**	Page	**6** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**19 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1692 ft**	Date Completed:	**23 Sep 11**
Location:	**Area E**	Total Depth:	**297 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,163,203 N, 1,398,102 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	77			0								
255	78			0								
	79											
260	80			0								
265	81		BEDROCK, Cretaceous Andesitic Siltstone, interbedded wackes and siltstones, metamorphosed/altered, small dykes of diorite, fine grained, equigranular, dark grey to brownish purple, medium strong, slightly weathered, laminated, pyrite, chlorite, calcite on fractures, some vugs in core, some disseminated sulphides, some slickensides, fault zone from 274.2 to 287'.	0								
	82											
270	83			91								
275	84			100								
	85											
280	86			100								
285	87			100								
	88											
290	89			100								
295	90			98								
	91		END OF HOLE @ 297 FT									

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-277

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Rev. 0 - Issued for Report VA101-176/38-3

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Date Revised: 23 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-281**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**23 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1591 ft**	Date Completed:	**26 Sep 11**
Location:	**Area E**	Total Depth:	**169 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,162,779 N, 1,397,396 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, SAND, some silt, trace gravel, trace clay, angular to subangular, clasts up to 10cm diameter, flat shaped, well graded, low to no plasticity, brown, root inclusions, moist.	25							PQ Casing to 20'. Core Size: PQ3 to 9', HQ3 to 169'.	
			Gravelly, silty SAND, trace clay, angular to subangular clasts up to 3" diameter, flat, iron oxide staining on fracture surfaces, well graded, low plasticity, brown, becoming orangey brown at 3' depth, root inclusions extend to 2' depth, moist, fines washed away during drilling. (Glacial Drift)	39 49 49 16 49 16 98							***Depths are downhole***	
10	3		BEDROCK, Cretaceous Diorite, medium grained, equigranular, greenish grey, medium strong, moderately weathered, highly fractured, iron oxide on joint surfaces, pyrite and clay also on some joint surfaces.	85					■			▼
15	5		BEDROCK, Cretaceous Andesitic Siltstone, fine to medium grained, equigranular, dark grey with some darker and lighter laminations, medium strong, slighlty to moderately weathered, hematite, pyrite, calcite and chlorite on fractures, some rubble zones, disseminated pyrite, some pyrite veins.	92					■		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
20	6			94					■			
25	8			94					■			
30	9			100					■		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
35	11			100					■			
40	12			100					■			
45	14			100					■			
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-281

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 25 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-281**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**23 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1591 ft**	Date Completed:	**26 Sep 11**
Location:	**Area E**	Total Depth:	**169 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,162,779 N, 1,397,396 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	16			98								
55	17			100								
	18											
60	19			99								
65	20			100								
	21											
70	22			99								
75	23			100								
	24											
80	25			100								
85	26			100								
	27											
90	28			100								
95	29			100								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-281

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Date Revised: 25 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-281**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**23 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1591 ft**	Date Completed:	**26 Sep 11**
Location:	**Area E**	Total Depth:	**169 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,162,779 N, 1,397,396 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100								
	33											
110	34			100								
115	35			82								
	36			82								
120	37			100								
				100								
125	38			100								
	39											
130	40			100								
135	41			88								
	42			98								
140	43			97								
				98								
145	44			49								
	45			100								
			BEDROCK, Cretaceous Andesitic Siltstone Fault Zone, clay gouge, sheared, well developed fault									

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-281

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Date Revised: 25 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-281**	Page	**4 of 4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**23 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1591 ft**	Date Completed:	**26 Sep 11**
Location:	**Area E**	Total Depth:	**169 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,162,779 N, 1,397,396 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46		breccia, weak, light and dark grey zones, some white clay, matrix supported breccia, sheared.	88						■		
	47											
155			BEDROCK, Cretaceous Andesitic Siltstone, fine to medium grained, equigranular, dark grey with some darker and lighter laminations, medium strong, slighlty to moderately weathered, hematite, pyrite, calcite, chlorite and clay on fractures, some rubble/shear zones, disseminated pyrite, some pyrite veins.	82					■			
	48											
160				100						■		
	49											
	50											
165				40					■			
	51											
			END OF HOLE @ 169 FT								Hole actually drilled to 174' but core barrel became detached from drill string and core could not be retrieved.	
170	52											
	53											
175												
	54											
180												
	55											
	56											
185												
	57											
190												
	58											
	59											
195												
	60											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-281

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 25 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-287**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**27 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1569 ft**	Date Completed:	**30 Sep 11**
Location:	**Area E**	Total Depth:	**244 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,161,591 N, 1,398,646 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, dark brown, root inclusions, moist.								PQ Casing to 33'. Core Size: PQ3 to 33', HQ3 to 102', NQ3 to 244'.	
			Gravelly, silty SAND, trace clay, subangular to subrounded clasts up to 15cm diameter, some angular, well graded, low plasticity, moist (Glacial Drift).	16								
5	1		HIGHLY WEATHERED BEDROCK, SILT and SAND, some to trace gravel, some to trace clay, angular to subangular fragments up to 10cm diameter, poorly graded, low plasticity, yellowish brown to orangey brown, loose, moist to dry.		61		GH11-287 SPT #1	3/8/12	20			
	2			13								
10	3				67		GH11-287 SPT #2	9/14/21	35			
				83								
	4											
15					33		GH11-287 SPT #3	50+/-/-	Refusal		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	5			52								
20	6											
				43								
	7											
25			BEDROCK, Cretaceous Diorite, light greenish grey, fine to medium grained, highly fractured, some pyrite and calcite, angular to subangular rubble.								* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	8			23								
30	9			139								
			BEDROCK, Cretaceous Diorite, black to dark grey with green and grey intervals, medium to fine grained, equigranular, slightly to moderately weathered, disseminated and vein sulphides, ~10% sulphides, pyrite and rare chalcopyrite, fault zones from ~80-102' and 184-210', chlorite, clay, pyrite, calcite on joint surfaces.	100								
	10			98								
35				100								
	11			82							***Depths are downhole***	
				98								
40	12			86								
	13											
45				82								
	14			89								
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-287

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 30 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-287**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**27 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1569 ft**	Date Completed:	**30 Sep 11**
Location:	**Area E**	Total Depth:	**244 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,161,591 N, 1,398,646 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			100								
	17											
60	18			100								
	19			85								
65	20			79								
	21											
70	22			100								
75	23			100								
	24											
80	25			59								
85	26			35								
	27											
90	28			97								
95	29			100								
	30											

Pebble Limited Partnership
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Date Revised: 30 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-287**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**27 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1569 ft**	Date Completed:	**30 Sep 11**
Location:	**Area E**	Total Depth:	**244 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,161,591 N, 1,398,646 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			103								
				66								
105	32			100								
	33											
110				60								
	34			100								
115	35			107								
	36			81								
120				100								
	37											
125	38			98								
	39											
130				100								
	40											
135	41			100								
	42											
140				100								
	43											
145	44			100								
	45											

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Project No.	Ref. No.	Rev.
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Date Revised: 30 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-287**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**27 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1569 ft**	Date Completed:	**30 Sep 11**
Location:	**Area E**	Total Depth:	**244 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,161,591 N, 1,398,646 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			100						>>		
	47											
155				95								
	48											
160				65								
	49											
	50											
165				100								
	51											
170				98								
	52											
	53											
175				36								
	54											
180				35								
	55											
	56			77								
185				100								
	57											
190				56								
	58											
	59											
195				93								
	60			66								

Pebble Limited Partnership
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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-287

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Date Revised: 30 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-287**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**27 Sep 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1569 ft**	Date Completed:	**30 Sep 11**
Location:	**Area E**	Total Depth:	**244 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,161,591 N, 1,398,646 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE / RQD DATA (%) (20 40 60 80)	NOTES	WELL DETAILS
				82							
	62			82							
205				100							
	63			62							
210	64			100							
	65										
215	66			100							
220	67			93							
	68										
225	69			90							
230	70			100							
	71										
235	72			89							
240	73			81							
	74										
245	75		END OF HOLE @ 244 FT							Drilling advanced to 244, rods were pulled and reaming shell replaced, rods would not go past 130' without reaming, so final depth was 244'.	
	76										

SPT TEST DATA Uncorrected 'N' values vs. depth (●)

RQD DATA (%) (■)

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Date Revised: 30 Sep 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-293**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**4 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1483 ft**	Date Completed:	**6 Oct 11**
Location:	**Area E**	Total Depth:	**229 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,161,225 N, 1,397,745 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, dark brown, fibrous, root inclusions, moist.								PQ Casing to 19'. Core Size: PQ3 to 19', HQ3 to 229'.	
	1		Sandy, silty GRAVEL, trace clay, angular to subangular clasts up to 10cm, mostly gravel size, gap graded, low to no plasticity, orangey brown, moist (Glacial Drift).	25			GH11-293-1	//				
5	2		HIGHLY WEATHERED BEDROCK, Sandy, silty GRAVEL, trace clay, angular clasts up to 4cm, gap graded, low to no plasticity, orangey, yellowish brown, moist, most material washed away, larger angular pieces of bedrock that is less weathered start occuring at approximately 13', very fractured.	13							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	3			49								
	4											
15	5		BEDROCK, Cretaceous Diorite, dark green to grey, aphanitic, medium strong to very strong, slightly to moderately weathered, disseminated sulphides and in veins, <1% pyrite increasing with depth, upper portion of bedrock is highly oxidized to 15'.	95							***Depths are downhole***	
20	6			95								
	7											
25	8			100							***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
30	9			72								
	10											
35	11			100								
				102								
40	12			100								
	13											
45	14			100								
	15											

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Project No.	Ref. No.	Rev.
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Date Revised: 1 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-293**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**4 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1483 ft**	Date Completed:	**6 Oct 11**
Location:	**Area E**	Total Depth:	**229 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,161,225 N, 1,397,745 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			100								
	17			100								
60	18											
	19			100								
65	20			100								
	21											
70	22			100								
75	23			100								
	24											
80	25			96								
85	26			93								
	27											
90	28			99								
95	29			99								
	30											

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Date Revised: 1 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-293**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**4 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1483 ft**	Date Completed:	**6 Oct 11**
Location:	**Area E**	Total Depth:	**229 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,161,225 N, 1,397,745 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100								
	33											
110	34			100								
115	35			93								
	36											
120	37			89								
125	38			96								
	39											
130	40			98								
	41			98								
135			BEDROCK, Cretaceous Fault Breccia Zone, light grey to light green, healed fault breccia from 143.3 to 149.6', polymictic, 50% angular clasts in hydrothermal altered fine grained matrix, trace disseminated pyrite, weak.	37								
	42											
140	43			56								
	44											
145				100								
	45											

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Date Revised: 1 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-293**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**4 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1483 ft**	Date Completed:	**6 Oct 11**
Location:	**Area E**	Total Depth:	**229 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,161,225 N, 1,397,745 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			100								
	47											
155				75								
	48											
			BEDROCK, Cretaceous Diorite, dark green to grey, medium strong to very strong, slightly to moderately weathered, some small breccia zones, fine grained, aphanitic, decreasing amount of disseminated pyrite and calcite veins with depth.	102								
160	49			100								
	50											
165				100								
	51											
170	52			100								
	53											
175				100								
	54											
180	55			100								
	56											
185				100								
	57											
190	58			100								
	59											
195				100								
	60											

Pebble Limited Partnership
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Date Revised: 1 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-293**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**4 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1483 ft**	Date Completed:	**6 Oct 11**
Location:	**Area E**	Total Depth:	**229 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,161,225 N, 1,397,745 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100								
	63			100								
210	64			100								
	65											
215	66			100								
220	67			100								
	68											
225	69			100								
230	70		END OF HOLE @ 229 FT									
	71											
235	72											
	73											
240	74											
	75											
245	76											

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Date Revised: 1 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-294**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**6 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1574 ft**	Date Completed:	**8 Oct 11**
Location:	**Area E**	Total Depth:	**224 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,160,964 N, 1,398,669 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, dark brown, fibrous, root inclusions, moist.								PQ Casing to 55.5'. Core Size: PQ3 to 55.5', HQ3 to 224'.	
			GRAVEL, some sand, some silt, trace clay, subangular to angular clasts, clasts up to 15cm, clasts are stained with iron oxide, well graded, low to no plasticity, brown, root inclusions to 1.5' depth, moist (Glacial Drift).	49			GH11-294-1	//			* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	1		BEDROCK, Cretaceous Andesitic Siltstone, hornfelsed, 5-9' and 9.5-14' composed of clay and jarosite, weathered fault and pyrite vein zones.	39								
10	2											
	3			68								
	4											
15	5		BEDROCK, NO RECOVERY from 19 to 49', assumed to be similar rock type to above, tube mislatch as core had fallen out of tube into core barrel.	0							***Depths are downhole***	
20	6			0								
	7											
25	8		▼	0								▼
	9											
30	10			0								
35	11			0								
40	12			0							***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	13											
45	14			0								
	15		BEDROCK, Cretaceous Andesitic Siltstone,									

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Date Revised: 10 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-294**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**6 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1574 ft**	Date Completed:	**8 Oct 11**
Location:	**Area E**	Total Depth:	**224 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,160,964 N, 1,398,669 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16		interbedded metasediments, bedding, bleached zones, pyrite veins, rubbly fractured intervals, minor calcite, pyrite, arsenopyrite, chalcopyrite veins,	33								
	17			85								
60	18			80								
	19											
65	20			100								
	21											
70	22			100								
75	23			100								
	24											
80	25			88								
				102								
85	26			101								
				66								
	27											
90	28			76								
95	29			89								
	30											

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Date Revised: 10 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-294**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**6 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1574 ft**	Date Completed:	**8 Oct 11**
Location:	**Area E**	Total Depth:	**224 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,160,964 N, 1,398,669 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100								
	33											
110	34			100								
	35											
115	36			100								
				98								
120	37			100								
	38											
125	39			100								
	40											
130				100								
	41											
135	42			98								
	43											
140				100								
	44											
145	45			100								

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Date Revised: 10 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-294**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**6 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1574 ft**	Date Completed:	**8 Oct 11**
Location:	**Area E**	Total Depth:	**224 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,160,964 N, 1,398,669 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			98								
	47											
155				100								
	48											
160				100								
	49											
	50											
165				98								
	51											
170				100								
	52											
	53											
175				99								
	54											
180				100								
	55											
	56											
185				93								
	57											
190				100								
	58											
	59											
195				92								
	60											

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Date Revised: 10 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-294**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**6 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1574 ft**	Date Completed:	**8 Oct 11**
Location:	**Area E**	Total Depth:	**224 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,160,964 N, 1,398,669 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100								
	63			100								
210	64			100								
	65											
215	66			100								
220	67			100								
	68		END OF HOLE @ 224 FT									
225	69											
	70											
230	71											
235	72											
	73											
240	74											
	75											
245	76											

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Date Revised: 10 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-296**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**9 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1647 ft**	Date Completed:	**10 Oct 11**
Location:	**Area E**	Total Depth:	**239 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,160,999 N, 1,399,428 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, dark brown, root inclusions, moist.								PQ Casing to 24'. Core Size: PQ3 to 24', HQ3 to 239'.	
			Sandy, silty GRAVEl, trace clay, angular to subrounded clasts up to 3cm diameter, well graded, low to no plasticity, light brown, moist (Glacial Drift).	25								
5	1				47		GH11-296 SPT #1	22/15/10	25			
	2			20								
10	3		BEDROCK, Cretaceous Granodiorite, fine to medium grained, dark grey green, sulphides in veins, mostly pyrite, rare chalcopyrite, competent, medium to very strong, epidote veins, calcite, pyrite veins, some iron oxides on joint surfaces.		78		GH11-296 SPT #2	15/38/45	83		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
15	4			39								
	5			93								
20	6			100								
25	7										***Depths are downhole***	
	8			100								
30	9			92								
	10											
35	11			100							***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
40	12			100								
	13											
45	14			100								
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-296

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

GH11-296

Rev. 0 - Issued for Report VA101-176/38-3

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 12 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-296**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**9 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1647 ft**	Date Completed:	**10 Oct 11**
Location:	**Area E**	Total Depth:	**239 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,160,999 N, 1,399,428 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			100								
	17			100								
60	18			100								
	19											
65	20			100								
	21											
70	22			100								
	23			100								
75	24											
80	25			100								
	26			100								
85	27											
90	28			100								
	29			100								
95	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-296

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Date Revised: 12 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-296**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**9 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1647 ft**	Date Completed:	**10 Oct 11**
Location:	**Area E**	Total Depth:	**239 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,160,999 N, 1,399,428 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100								
	33											
110	34			100								
115	35			100								
	36											
120	37			100								
	38											
125				100								
	39											
130	40			100								
	41											
135				100								
	42											
140	43			100								
	44											
145				100								
	45											

Pebble Limited Partnership
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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 12 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-296**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**9 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1647 ft**	Date Completed:	**10 Oct 11**
Location:	**Area E**	Total Depth:	**239 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,160,999 N, 1,399,428 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			100								
	47											
155				100								
	48											
160				100								
	49											
	50											
165				100								
	51											
170				100								
	52											
	53											
175				100								
	54											
180				100								
	55											
	56											
185				100								
	57											
190				100							No top bentonite seal installed in piezometer.	
	58											
	59											
195				100								
	60											

Pebble Limited Partnership
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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Date Revised: 12 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**GH11-296**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**9 Oct 11**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1647 ft**	Date Completed:	**10 Oct 11**
Location:	**Area E**	Total Depth:	**239 ft**	Logged by:	**LS/EEB**
Coordinates:	**2,160,999 N, 1,399,428 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100								
	63			100								
210	64			100								
	65											
215	66			98								
220	67			100								
	68											
225	69			100								
	70			100								
230	71											
235	72			100								
240	73		END OF HOLE @ 239 FT									
	74											
245	75											
	76											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH11-296

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 12 Oct 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**1** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		TOPSOIL, brown, root inclusions, moist.	0							Core Size: PQ to 40', HQ to 1292.5', NQ to 1917.5'.	
5	1		Silty SAND and GRAVEL, trace clay, clasts up to large gravel size, angular to subrounded, well graded, low to no plasticity, yellowish brown to orange brown, moist, possible weathered bedrock, difficult to tell, hematite on some clasts at the end of run.	73								
10	3		HIGHLY WEATHERED BEDROCK, Cretaceous Diorite/Granodiorite, angular clasts of bedrock in more weathered matrix, pervasive iron oxide staining, hematite and limonite, weak, will behave like gravelly, silty SAND, trace clay, angular clasts up to gravel size, well graded, low to no plasticity, yellowish brown with reddish orange iron staining, moist to dry.	38							***Depths are downhole***	
20	6			16								
25	8			11								
30	9											
35	10		BEDROCK, Cretaceous Diorite, greenish black, aphanitic matrix, disseminated magnetite, moderately fractured, some porphyritic dykes, fault zone at 172.2-180' with 30% gouge, fault zone from 223-228', quartz, carbonate, pyrite, hematite, rare molybdenite, weak chlorite, minor chalcopyrite.	108								
40	12										40 - 49 ft was triconed.	
45	13			0								
50	15			55								
55	16											
60	18			104								
65	19											
70	21											
75	22											
80	24										Recovery and RQD Measurements past 34 ft were recorded by PLP technicians.	
85	25			116								
90	27											
95	28											
	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For 11534

Knight Piésold CONSULTING

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**2** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	32			115								
110	34											
115	35											
120	36			110								
125	38											
130	39											
135	41			99								
140	42											
145	44											
150	45											
155	46			100								
160	48											
165	49											
170	51											
175	52			79								
180	53											
185	55											
190	56			105								
195	57											
	58											
	59											
	60			101								

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

Pebble Limited Partnership
Pebble Project
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Project No.	Ref. No.	Rev.
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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**3** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62											
	63			104						■		
210	64											
	65			103						■		
215	66											
	67			117						■		
220				85					●			
	68			67					●	■		
225	69											
230	70											
	71											
235	72			100						■		
	73											
240	74											
245	75											
	76											
250	77											
	78			101						■		
255	79											
260	80											
	81											
265	82											
270	83											
	84			99						■		
275	85											
280	86											
	87											
285	88											
290	89			94						■		
	90											
295	91											

Pebble Limited Partnership
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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**4** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
305	92			95								
	93											
	94											
310	95			100								
	96											
315	97											
320	98		BEDROCK, Cretaceous Granodiorite, grey, medium grained, porphyritic, disseminated specular hematite, less veining, weak chlorite, disseminated pyrite and minor veinlets, trace chalcopyrite.	102								
	99											
325	100											
330	101			107								
335	102											
	103											
340	104			116								
345	105											
	106											
350	107			124								
355	108											
	109											
360	110			113								
365	111											
	112											
370	113			120								
375	114											
	115			120								
380	116											
	117			107								
385	118											
390	119											
	120											
395	121											

Pebble Limited Partnership
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Date Revised: 16 Aug 11

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Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**5** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
405	123			114								
	124											
410	125			88								
	126											
415	127			106								
420	128											
	129			97								
425	130											
430	131			91								
	132											
435	133			100								
440	134											
	135			89								
445	136											
450	137			98								
	138											
455	139			100								
460	140											
	141			20								
465	142			99								
	143											
470	144			93								
475	145											
	146			52								
480	147											
485	148			91								
	149											
490	150			55								
495	151											
	152											

Pebble Limited Partnership
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Project No.	Ref. No.	Rev.
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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**6** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
505	153											
	154											
	155			71								
510	156											
	157											
515	158											
	159			59								
520	160											
	161			11								
525	162											
	163			108								
530	164			115								
	165											
535	166			106								
	167											
540	168			104								
	169											
545	170											
	171			86								
550	172											
	173			90								
555	174											
	175											
560	176			58								
	177											
565	178											
	179			92								
570	180											
	181											
575	182											

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**7** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
605	184			44								
	185											
610	186			48								
	187											
615	188		BEDROCK, Cretaceous Diorite, greenish black, weaker alteration than 27-320', massive texture, magnetic, aplite dykes, fault zone at 625.2 to 642', pyrite, chlorite and quartz veins, weak alteration, pervasive chlorite, weak disseminated pyrite, pyrite veins.	67								
620	189											
	190											
625	191			15								
	192											
630	193											
	194											
635	195											
	196											
640	197		BEDROCK, Cretaceous Granodiorite, similar to 320-616', medium grained, becomes darker from 705.9-720', interval of diorite from 753.1-756.7', moderate magnetic response, pyrite, minor chlorite and quartz veinlets, minor molybdenite, veins become slightly more abundant with depth, epidote, disseminated pyrite and veinlets, disseminated pyrite increases below 728 and is higher in the diorite unit, 1cm disseminated mass of chalcopyrite at 976'.	101								
645	198											
	199											
650	200											
	201											
655	202			102								
	203											
660	204											
	205											
665	206			101								
	207											
670	208											
	209											
675	210											
	211											
680	212			103								
	213											

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Pebble Project
Overburden Log For 11534

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

11534

Rev. 0 - Issued for Report VA101-176/38-3

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**8** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
705	214–215											
710	216–217			97						■		
715	218–219											
720	220–221			86						■		
725	222–223			77						●		
730	224			127						■		
735	225–226			104						■ >>		
740	227–228			105						■		
745	229–230			90						■		
750	231–232			93						●		
755	233–234			103						■		
760	235–236			97						■		
765	237–238			83						■		
770	239–240											
775	241–242											
780	243											
785												
790												
795												

Pebble Limited Partnership
Pebble Project
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Knight Piésold CONSULTING

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101-176/38	**3**	**0**

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SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**9** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
805	244–246			97 / 151								
810	247–248			39								
815	249											
820	250			88								
825	251–252			101								
830	253–254			85								
835	255											
840	256–257			100								
845	258											
850	259–260			101								
855	261			107								
860	262–263											
865	264			92								
870	265–266											
875	267			106								
880	268–269											
885	270			98								
890	271–272											
895	273											
	274											

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Project No.	Ref. No.	Rev.
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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**10** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
905	275			97								
	276											
	277											
910	278											
915	279			101								
	280											
920	281											
925	282											
	283											
930	284			94								
935	285											
	286											
940	287			93								
945	288											
	289											
950	290											
955	291			94								
	292											
960	293											
965	294			92								
	295											
970	296											
975	297											
	298			62								
980	299			93								
	300											
985	301											
990	302											
	303			72								
995	304											

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**11** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	305			84								
	306			77								
1005	307											
	308			105								
1010	309											
	310											
1015	311			95								
	312											
1020	313											
	314			67								
1025	315			100								
	316			120								
1030	317			79								
	318			69								
1035	319			60								
	320			62								
1040	321											
	322			84								
1045	323											
	324			83								
1050	325											
	326			75								
1055	327											
	328			80								
1060	329											
	330			68								
1065	331			95								
	332			77								
1070	333											
	334			93								
1075	335											

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**12** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
1100	335			73								
	336											
1105	337			100								
	338											
1110	339			70								
1115	340			79								
				44								
	341			37								
1120	342			85								
1125	343			90								
	344			80								
1130	345			73								
1135	346			62								
	347											
1140	348			60								
1145	349			73								
	350											
1150	351			50								
				83								
1155	352			76								
	353											
1160	354			70								
1165	355											
	356											
1170	357			70								
1175	358											
	359											
1180	360			85								
	361											
1185	362			110								
1190	363		BEDROCK, Cretaceous Diorite, green black, moderately magnetic, veinlets of massive pyrite, minor epidote, fine grained disseminated chlorite, cluster of native gold at 1193.2', minor disseminated chalcopyrite, rubble zones.	96								
1195	364											
	365		BEDROCK, Cretaceous Granodiorite, similar to									

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**13** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	366		interval from 647.5-1190.2', pinkish grey, medium grained, small interval of diorite at 1204.3-1205.6', quartz, magnetite, pyrite veinlets, chlorite, minor epidote, disseminated pyrite, trace disseminated chalcopyrite.	92								
1205	367			95								
	368											
1210	369			90								
	370											
1215	371			92								
	372											
1220	373			95								
1225	374		BEDROCK, Cretaceous Diorite, similar to 1190.2-1198.4', healed fault zones, fault zone from 1232-1244', calcite crystals, one clast of pyritic quartz with fine grained molybdenite, veinlets of massive pyrite, quartz and chlorite, disseminated magnetite, minor epidote, minor disseminated pyrite.	91								
1230	375											
	376											
1235	377			84								
1240	378											
	379											
1245	380			96								
1250	381											
	382											
1255	383			92								
1260	384											
	385			83								
1265	386			130								
	387			98								
1270	388											
1275	389			101								
1280	390											
	391			102								
1285	392											
1290	393			90								
	394			63								
1295	395		BEDROCK, Cretaceous Basalt, black, massive, aphanitic, weakly magnetic, no phenocrysts, aplite dykes (8 to 60mm wide) between 1274.4-1330.5 and 1396.3, pyrite/calcite veins	114								
	396											

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**14** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	397		and epidote throughout, rare magnetite veins, pyrite veins, trace chalcopyrite, overall estimate of 2% pyrite, rubble zones.									
1305	398			70								
	399			93								
1310	400			77								
1315	401			90								
	402											
1320	403			82								
1325	404			73								
	405											
1330	406			98								
1335	407											
	408											
1340	409			102								
1345	410			107								
	411											
1350	412											
	413			87								
1355	414											
1360	415			110								
	416											
1365	417											
1370	418			104								
1375	419			125						>>		
	420											
1380	421			95								
1385	422											
	423			73								
1390	424											
	425			90								
1395	426			94								

Pebble Limited Partnership
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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**15** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
1405	428			49								
1410	430			74								
1415	431			106								
1420	433			105								
1425	435			87								
1430	436			98								
	437			220								
1435	438			87								
1440	439											
1445	440			103								
	441			78								
1450	442											
1455	443			57								
1460	445			98								
1465	446											
1470	447											
1475	449			96								
1480	450											
	451			73								
1485	452			107								
1490	453			110								
	454			86								
1495	455											
	456			115								
	457											

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**16** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
1505	458			101								
	459			98								
1510	460			121								
	461			96								
1515	462											
1520	463			95								
	464			131								
1525	465			112								
				135								
1530	466			83								
	467			93								
1535	468			112								
	469			105								
1540	470											
				79								
1545	471			120								
	472			91								
1550	473											
1555	474			110								
	475			96								
1560	476											
1565	477			67								
	478			20								
1570	479			57								
1575	480			82								
	481											
1580	482		BEDROCK, Cretaceous Granodiorite, similar to 1198.4-1224.8', yet appears more porphyritic, rubble/fractured/shear zones, veins of calcite, clay, quartz, and pyrite, chlorite, 0.6% visual estimate of pyrite, disseminated and in veins, trace chalcopyrite.	110								
1585	483			100								
	484											
1590	485											
1595	486			64								
	487											

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Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**17** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
1605	488			82								
	489											
1610	490			108								
	491											
1615	492			101								
	493											
1620	494											
1625	495			102								
	496											
1630	497			78								
	498											
1635	499			12								
1640	500			39								
	501		BEDROCK, Cretaceous Basalt, similar to 1293-1579.8', black, fine grained, moderately to strongly magnetic, very fractured zones, becomes more porphyritic with depth, veinlets of pyrite, epidote, chlorite and calcite, moderate epidote, abundant carbonate, Visual estimate of ~2.5 to 3% pyrite, disseminated and in veins, reduces to ~1.5% after 1750', pyrrhotite starts at 1832.8', trace chalcopyrite.	49								
1645	502			67								
	503			36								
1650	504			66								
				81								
1655	505			100								
	506			98								
1660	507			65								
	508			96								
1665	509			47								
1670	510			65								
	511			30								
1675	512											
	513											
1680	514			56								
1685	515											
	516											
1690	517			73								
1695	518											

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**18** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
1705	519			54							
	520			20							
1710	521			24							
	522										
1715	523			26							
1720	524										
	525			70							
1725	526										
	527										
1730	528			33							
	529										
1735	530			59							
1740	531			75						>>	
	532			70							
1745	533										
1750	534			180							
	535			88							
1755	536			73							
	537			71							
1760	538			110							
1765	539			84							
	540			66							
1770	541			100							
1775	542			93							
	543			83							
1780	544			112							
1785	545			97							
	546			85							
1790	547			91							
1795	548			100							

SPT TEST DATA Uncorrected 'N' values vs. depth (●)

RQD DATA (%) (■) 20 40 60 80

Pebble Limited Partnership
Pebble Project
Overburden Log For 11534

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

11534

Rev. 0 - Issued for Report VA101-176/38-3

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**19** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
Location:	**Area E**	Total Depth:	**1917.5 ft**	Logged by:	**LS**
Coordinates:	**2,161,262 N, 1,398,047 E, Alaska State Plane Zone 5 ft**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	549											
1805	550			102								
	551											
1810	552			97								
	553											
1815	554			73								
				131								
1820	555			98								
				75								
	556			100								
1825	557			56								
1830	558			77								
	559											
1835	560			62								
1840	561			85								
	562			62								
1845	563			77								
1850	564											
	565			62								
1855	566			56								
1860	567		BEDROCK, Cretaceous Gabbro, dark and light grey, moderate to strongly magnetic, coarse grained, relatively fresh except around veins, veinlets of epidote, pyrite, and calcite, minor chlorite, visual estimate of ~1.5% pyrite, disseminated and in veins.	112								
	568											
1865	569			99								
1870	570											
	571											
1875	572			108								
1880	573			102								
	574											
1885	575			100								
				90								
1890	576			20								
	577											
1895				89								
	578			22								

Pebble Limited Partnership
Pebble Project
Overburden Log For 11534

Rev. 0 - Issued for Report VA101-176/38-3

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

11534

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

M:\1\01\00176\38\A\DATA\2011 GEOTECHNICAL SITE INVESTIGATION\PEBBLE 2011\GINT\2011 WMF SI.GPJ

Date Revised: 16 Aug 11

Project:	**Pebble Project**	Drill Hole No.	**11534**	Page	**20** of **20**
Drilling Co:	**Quest Drilling Ltd.**	In-Situ Sampler:	**NONE**	Date Started:	**23 Jun 11**
Drilling Method:	**LF-175**	Elevation:	**1509 ft**	Date Completed:	**24 Jul 11**
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DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
1905	580			88								
	581			112								
1910	582			66								
	583			28								
1915	584			60								
			END OF HOLE @ 1917.5 FT									
1920	585											
	586											
1925	587											
	588											
1930	589											
	590											
1935	591											
	592											
1940	593											
	594											
1945	595											
	596											
1950	597											
	598											
1955	599											
	600											
1960	601											
	602											
1965	603											
	604											
1970	605											
	606											
1975	607											
	608											
1980	609											
1985												
1990												
1995												

Pebble Limited Partnership
Pebble Project
Overburden Log For 11534

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

11534

Rev. 0 - Issued for Report VA101-176/38-3

SOILS LOG WITH WELL DETAILS 2011 WMF SI.GPJ DRILL TEMPLATE.GDT 6 Feb 12

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Date Revised: 16 Aug 11

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APPENDIX A2

BEDROCK GEOTECHNICAL DRILLHOLE LOGGING DATA SHEETS

- TABLE A2.1
- TABLE A2.2
- GH11-229 to GH11-243
- GH11-245 to GH11-247
- GH11-274
- GH11-277
- GH11-281
- GH11-287
- GH11-293
- GH11-294
- GH11-296

(Pages A2-1 to A2-113)

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TABLE A2.1

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 GEOTECHNICAL SITE INVESTIGATION
ROCK MASS RATING (RMR) CLASSIFICATION SYSTEM

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												VALUE	RATING
Intact Rock Strength	PLST	10	8	6.5	5.5	5	4.5	3	2	1	<1		
	UCS, MPa	250	200	160	140	125	110	75	50	25	< 25		
	Field Est.	chipped by hammer		many blows by hammer to break				single blow		pocket knife			
	RATING	15	14	13	12	11	10	8	6	4	< 3		
RQD	RQD %	100	90	80	70	60	50	40	30	20	0		
	RATING	20	18	16	14	12	10	9	5	4	3		
Joint Spacing	Js, cm	> 200	160	130	90	60	40	20	15	10	<6		
	RATING	20	18	16	14	12	10	9	8	7	5		

								Set 1	Set 2	Set 3		
							Orientation					
							J Spacing					
Joint Condition	**Persistence**	< 1 m	1 - 3m	3 - 10m	10 - 20 m	> 20m						
	RATING	6	4	2	1	0						
	Aperture	None	< 0.1 mm	0.1 - 1.0	1 - 5	5 - 10						
	RATING	6	5	4	1	0						
	Roughness	V Rough	Rough	SL Rough	Smooth	Slicks						
	RATING	6	5	3	1	0						
	Infilling	None	Hard Infilling		Soft Infilling							
			< 5 mm	> 5 mm	< 5mm	> 5 mm						
	RATING	6	4	3	2	0						
	Weathering	FRESH	SW	MW	HW	CW						
	RATING	6	5	3	1	0						
							Sub-Total					

Groundwater	**Inflow** l/min/10m	None	< 10	10 - 25	25 -125	> 125	
		Dry	Damp	Wet	Dripping	Flowing	
	RATING	15	10	7	4	0	

Adjustment for Joint Orientation	DIP OF ADVERSE JOINT SET				
	0 - 20	20 - 45	45 - 90		
Strike Perpendicular to Tunnel Axis drive with Dip	Unfavourable	Favourable	Very Favourable		
	-10	-2	0		
Strike Perpendicular to Tunnel Axis drive against Dip	Unfavourable	Unfavourable	Fair		
	-10	-10	-5		
Strike Parallel to Tunnel	Unfavourable	Fair	Very Unfavourable		
	-10	-5	-12		

RMR RATING	80 - 100	60 - 80	40 - 60	20 - 40	0 - 20	
DESCRIPTION	**VERY GOOD**	**GOOD**	**FAIR**	**POOR**	**VERY POOR**	
ROCK CLASS	1	2	3	4	5	

M:\1\01\00176\38\A\Report\3 - 2011 SI Report\Appendices\A\A2\[RMR Classification.xls]RMR-1989 Table

NOTE:

1. REFERENCE: BIENIAWSKI, 1989.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	30JAN'12	ISSUED WITH REPORT VA101-176/38-3	LS	DAY	KJB

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TABLE A2.2

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

2011 GEOTECHNICAL SITE INVESTIGATION
LITHOLOGY LEGEND

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Lithocode	Bedrock Type
B	Basalt
D	Diorite
G, GK	Granodiorite (Kaskanak)
OB	Overburden
R	Gabbro
TB	Tertiary Basalt
TC	Tertiary Conglomerate
TF	Tertiary Volcaniclastic Conglomerate
TXTM	Tertiary Volcaniclastic Breccia/Conglomerate / Tertiary Monzonite
TM	Tertiary Monzonite
TR	Tertiary Rhyolite
TX	Tertiary Volcaniclastic Breccia/Conglomerate
TY	Tertiary Siltstone/Mudstone
Y	Andesitic Siltstone/Mudstone
YZ	Fault - Andesitic Siltstone
Z	Fault Zone

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NOTES:

1. LITHOCODES WERE PROVIDED BY PLP.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	30JAN'12	ISSUED WITH REPORT 101-176/38-3	LS	DAY	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-229

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1413849 E, 2161612 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 245.1 m / 804 ft
Total Depth: 53.0 m / 174 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 58 ft PQ3 3.27 "
From to ft
From 58 to 174 ft HQ3 2.41 "
From to ft
From to ft

Logged By: LS/DLP/GD
Reviewed By: LS
Date Started: 05-Jun-11
Date Completed: 08-Jun-11

Drillhole Number: GH11-229

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	804.0	0.00	245.1	24.0	7.31	7.31	2.46	34	0.00	0	OB	OVERBURDEN																
24.0	780.0	7.31	237.7	26.5	8.08	0.76	0.30	39	0.00	0	TX	Tertiary Volcaniclastic Breccia, matrix supported, clasts up to 10cm diameter, mostly 2cm, varying lithology, subrounded to angular, fine grained matrix, inequigranular matrix reddish brown, clasts vary from green to brown, massive, highly weathered, fractured.	10	15	20	0	1	1	0	1	3	15	2.0	3.0	5.3	3.0	15	28
26.5	777.5	8.08	237.0	29.0	8.84	0.76	0.76	100	0.00	0	TX	As above, matrix supported, clasts up to 10cm diameter, mostly 2cm, varying lithology, subrounded to angular, fine grained matrix, inequigranular matrix reddish brown, clasts vary from green to brown, massive, highly weathered, fractured.	10	15	51	0	1	1	0	1	3	15	2.0	3.0	5.7	3.0	15	29

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
29.0	775.0	8.84	236.2	34.0	10.36	1.52	0.42	28	0.00	0	TX	As above, more soil like, poor recovery, matrix supported, clasts up to 10cm diameter, mostly 2cm, varying lithology, subrounded to angular, fine grained matrix, inequigranular matrix reddish brown, clasts vary from green to brown, massive, highly weathered.	10	15	28	0	1	1	0	1	3	15	2.0	3.0	5.4	3.0	15	**28**
34.0	770.0	10.36	234.7	39.0	11.89	1.52	0.00	0		0	TX	No Recovery.																
39.0	765.0	11.89	233.2	44.0	13.41	1.52	0.00	0		0	TX	No Recovery.																
44.0	760.0	13.41	231.6	49.0	14.93	1.52	0.70	46	0.00	0	TX	Tertiary Volcaniclastic Breccia, matrix supported, clasts up to 10cm diameter, mostly 2cm, varying lithology, subrounded to angular, fine grained matrix, inequigranular matrix reddish brown, clasts vary from green to brown, massive, moderate weathering.	10	15	47	0	1	1	0	1	3	15	2.0	3.0	5.6	3.0	15	**29**
49.0	755.0	14.93	230.1	54.0	16.46	1.52	1.52	100	0.15	10	TX	Tertiary Volcaniclastic Breccia, matrix supported, clasts up to 10cm diameter, mostly 2cm, varying lithology, subrounded to angular, fine grained matrix, inequigranular matrix reddish brown, clasts vary from green to brown, massive, moderate weathering.	50	12	127	0	1	3	2	3	9	15	5.7	4.1	6.7	9.0	15	**40**
54.0	750.0	16.46	228.6	58.0	17.68	1.22	1.19	98	0.88	72	TX	As above, clasts up to 4cm diameter, mostly 2cm, varying lithology, subrounded to angular, fine grained matrix, matrix supported, clasts light grey to dark brown, massive, slightly to moderate weathering.	110	4	298	0	0	3	2	3	8	15	10.0	14.1	8.7	8.0	15	**56**
58.0	746.0	17.68	227.4	59.0	17.98	0.30	0.31	100	0.00	0	TX	As above.	110	3	102	0	1	3	2	3	9	15	10.0	3.0	6.4	9.0	15	**43**
59.0	745.0	17.98	227.1	63.5	19.35	1.37	1.12	82	0.15	11	TX	Less recovery at top of run, clay in fractures, moderate weathering, as above.	50	11	102	0	1	3	2	3	9	15	5.7	4.3	6.4	9.0	15	**40**
63.5	740.5	19.35	225.7	68.5	20.88	1.52	1.52	100	0.85	56	TX	As above, more competent.	75	5	304	0	4	3	2	3	12	15	7.7	11.0	8.8	12.0	15	**54**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
68.5	735.5	20.88	224.2	73.5	22.40	1.52	1.52	100	1.17	77	TX	As above.	75	8	190	0	4	3	2	3	12	15	7.7	15.1	7.5	12.0	15	**57**
73.5	730.5	22.40	222.7	78.5	23.93	1.52	1.52	100	0.44	29	TX/TB/TC	Contact at 74ft with less weathered Tertiary Basalt unit with calcite veins, contact at 77.2ft back into conglomerate/breccia unit, shear zone clay gouge from 77.2-78.5ft.	75	7	217	0	4	3	2	1	10	15	7.7	6.7	7.8	10.0	15	**47**
78.5	725.5	23.93	221.1	79.0	24.08	0.15	0.12	79	0.00	0	TC	Tertiary Conglomerate, light grey matrix supported, rounded clasts.	50	1	120	0	4	3	2	1	10	15	5.7	3.0	6.6	10.0	15	**40**
79.0	725.0	24.08	221.0	84.0	25.60	1.52	1.52	100	0.00	0	TC	Out of broken zone and back into conglomerate, slight weathering, clasts up to 8cm diameter, most clasts 5-10mm, fine grained matrix, highly weathered brownish shear zone from 81.5-82ft.	50	4	380	0	4	3	2	1	10	15	5.7	3.0	9.6	10.0	15	**43**
84.0	720.0	25.60	219.5	89.0	27.13	1.52	1.52	100	1.05	69	TC	Tertiary Conglomerate, clasts up to 13cm diameter, clast supported, soft white matrix, fresh rock.	50	4	380	0	1	3	2	3	9	15	5.7	13.5	9.6	9.0	15	**53**
89.0	715.0	27.13	217.9	94.0	28.65	1.52	1.49	98	0.10	7	TC	As above, calcite, chlorite, iron oxide and clay in joints.	50	10	149	0	1	3	2	3	9	15	5.7	3.7	7.0	9.0	15	**40**
94.0	710.0	28.65	216.4	99.0	30.17	1.52	1.52	100	0.00	0	TC/TXf	As above, contact at 95.1ft with Tertiary Volcaniclastic Breccia, soft conglomerate shear zone, greenish clays, highly altered.	15	15	101	0	1	3	0	1	5	15	2.5	3.0	6.4	5.0	15	**32**
99.0	705.0	30.17	214.9	104.0	31.70	1.52	1.52	100	0.27	18	TXf	Soft clay matrix with grey fragments of TXf unit inside very soft clay, highly weathered, weak.	15	9	169	0	1	3	0	1	5	15	2.5	5.1	7.2	5.0	15	**35**
104.0	700.0	31.70	213.4	109.0	33.22	1.52	1.52	100	0.00	0	TXf	As above, weak unit continues with breccia clasts in soft grey clay, clasts up to 2cm diameter.	25	21	72	0	1	3	2	1	7	15	3.4	3.0	6.0	7.0	15	**34**
109.0	695.0	33.22	211.8	114.0	34.75	1.52	1.52	100	0.00	0	TXf/TB	As above, then contact at 112.3ft into darker grey Tertiary Basalt unit, stronger, calcite and clay joints, dark green angular clasts, most less than 1cm diameter.	25	11	138	0	1	1	0	1	3	15	3.4	3.0	6.8	3.0	15	**31**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
114.0	690.0	34.75	210.3	119.0	36.27	1.52	1.50	98	0.00	0	TB	Basalt, Fine grained grey matrix with dark green and white subrounded clasts 2-15mm in diameter, many joints filled with clay and calcite.	100	29	52	0	0	3	0	1	4	15	9.4	3.0	5.7	4.0	15	**37**
119.0	685.0	36.27	208.8	124.0	37.79	1.52	1.30	85	0.14	9	TX	Tertiary Volcaniclastic Breccia, greenish grey, matrix supported.	75	16	81	0	0	3	0	1	4	15	7.7	4.0	6.1	4.0	15	**37**
124.0	680.0	37.79	207.3	129.0	39.32	1.52	1.49	98	0.75	49	TX/TB	As above, greenish grey matrix supported volcaniclastic breccia, clasts up to 4 cm diameter, highly weathered and altered from 1.1 m to 1.4 m (clay), then basalt at 127.8 ft.	25		1524	0	4	3	0	1	8	15	3.4	9.9	17.6	8.0	15	**54**
129.0	675.0	39.32	205.7	134.0	40.84	1.52	1.52	100	1.00	66	TB/TXf	From 0 to 1.15 m purplish grey, fine-grained Tertiary basalt, below 1.15 m greenish Tertiary Volcaniclastic Breccia, light grey matrix supported breccia, bottom 0.20 m highly weathered and altered (clay).	50	8	190	0	4	1	0	1	6	15	5.7	12.8	7.5	6.0	15	**47**
134.0	670.0	40.84	204.2	139.0	42.37	1.52	1.52	100	1.03	68	TXf	Highly weathered, highly altered matrix supported volcaniclastic breccia, light grey with yellowish brown mid section, highly weathered sections.	25	9	169	0	4	1	0	1	6	15	3.4	13.2	7.2	6.0	15	**45**
139.0	665.0	42.37	202.7	144.0	43.89	1.52	1.52	100	1.52	100	TXf	As above, very light grey, matrix supported volcaniclastic breccia, clasts up to 2 cm diameter, moderately weathered, some chlorite and calcite infilling.	50	8	190	0	4	5	0	3	12	15	5.7	20.1	7.5	12.0	15	**60**
144.0	660.0	43.89	201.2	149.0	45.41	1.52	1.52	100	1.34	88	TXf	First 0.85 m as above, below 0.85 m purple grey matrix supported volcaniclastic breccia, some chlorite infilling, quite competent but soft rock.	50	5	304	0	4	5	2	3	14	15	5.7	17.5	8.8	14.0	15	**61**
149.0	655.0	45.41	199.6	154.0	46.94	1.52	1.52	100	1.49	98	TXf	First 0.5 m as above, then rusty purple-grey matrix supported volcaniclastic breccia, some hematite in joints, competent rock.	75	4	380	0	4	3	2	3	12	15	7.7	19.7	9.6	12.0	15	**64**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
154.0	650.0	46.94	198.1	159.0	48.46	1.52	1.52	100	1.26	83	TXf	Purplish brown, matrix supported volcaniclastic breccia, at 0.70 m joint is either sheared or highly weathered, fairly competent but soft rock.	75	4	380	0	1	3	0	1	5	15	7.7	16.3	9.6	5.0	15	**54**
159.0	645.0	48.46	196.6	164.0	49.98	1.52	1.52	100	1.48	97	TXf	Purplish grey matrix supported volcaniclastic breccia, some calcite veins throughout, clasts range from white to black, competent and hard.	125	3	507	0	4	3	2	5	14	15	10.9	19.5	10.8	14.0	15	**70**
164.0	640.0	49.98	195.1	169.0	51.51	1.52	1.52	100	1.52	100	TXf	As above.	125	1	1520	0	4	3	2	5	14	15	10.9	20.1	17.5	14.0	15	**78**
169.0	635.0	51.51	193.6	174.0	53.03	1.52	1.52	100	1.42	93	TXf	As above.	125	2	760	0	4	1	2	5	12	15	10.9	18.6	12.9	12.0	15	**70**
END OF HOLE																												

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-229\[GH11-229.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	27JUN'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

Knight Piésold CONSULTING

Drillhole Number: GH11-230

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1420460 E, 2164330 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 305.0 m / 1,001 ft
Total Depth: 52.7 m / 173 ft
Azimuth: N/A deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 13 ft PQ3 3.27 in
to ft
Core Diameter: From 13 to 173 ft HQ3 2.41 in
to ft
to ft

Logged By: GD/LS/DLP
Reviewed By: LS
Date Started: 08-Jun-11
Date Completed: 10-Jun-11

Drillhole Number: GH11-230

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
0.0	1000.8	0.00	305.0	3.0	0.91	0.91	0.65	71	0.00	0	OB	OVERBURDEN																
3.0	997.8	0.91	304.1	8.0	2.44	1.52	0.90	59	0.00	0	TR	Moderately weathered greyish white, coarse grained, porphyritic Tertiary Rhyolite, iron staining.	50	25	36	0	0	5	0	3	8	15	5.7	3.0	5.5	8.0	15	**37**
8.0	992.8	2.44	302.6	13.0	3.96	1.52	1.40	92	0.77	51	TR	Moderately weathered greyish white Tertiary Rhyolite, lots of iron oxide staining on joints.	75	25	56	0	0	1	0	3	4	15	7.7	10.1	5.8	4.0	15	**43**
13.0	987.8	3.96	301.1	18.0	5.49	1.52	1.52	100	0.97	64	TR	As above, moderately weathered.	50	11	138	0	1	3	0	3	7	15	5.7	12.5	6.8	7.0	15	**47**
18.0	982.8	5.49	299.6	23.0	7.01	1.52	1.52	100	0.87	57	TR	Greyish white, coarse grained, sparse black xenoliths, less iron oxide in core and on joints.	50	11	138	0	4	3	0	3	10	15	5.7	11.3	6.8	10.0	15	**49**
23.0	977.8	7.01	298.0	28.0	8.53	1.52	1.52	100	0.33	22	TR	First 1.6 ft as above, from 1.6 ft to 2.6 ft joints very broken and gouge filled, heavy iron oxide staining, below 2.6 ft tighter joints but still heavy iron oxide staining.	50	16	95	0	1	3	0	0	4	15	5.7	5.6	6.3	4.0	15	**37**
28.0	972.8	8.53	296.5	33.0	10.06	1.52	1.52	100	1.31	86	TR	More competent, greyish white, heavy iron oxide stains on joints.	75	6	253	0	1	3	2	3	9	15	7.7	17.0	8.2	9.0	15	**57**
33.0	967.8	10.06	295.0	38.0	11.58	1.52	1.52	100	1.26	83	TR	As above.	5	6	253	0	4	5	2	3	14	15	1.5	16.3	8.2	14.0	15	**55**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
38.0	962.8	11.58	293.5	43.0	13.11	1.52	1.52	100	1.20	79	TR	As above.	75	9	169	0	4	3	2	3	12	15	7.7	15.5	7.2	12.0	15	**57**
43.0	957.8	13.11	291.9	48.0	14.63	1.52	1.52	100	1.38	91	TR	As above, joint at 3.6 ft rubbly with some gouge.	75	5	304	0	4	3	0	3	10	15	7.7	18.0	8.8	10.0	15	**59**
48.0	952.8	14.63	290.4	53.0	16.15	1.52	1.42	93	0.54	35	TR	Rhyolite, coarse to medium grained, inequigranular, beige white with small black phenocrysts scattered throughout, slightly to moderately weathered, hematite and clay on fractures.	75	15	95	0	1	3	2	3	9	15	7.7	7.6	6.3	9.0	15	**46**
53.0	947.8	16.15	288.9	58.0	17.68	1.52	1.44	94	1.16	76	TR	As above to 2.17 ft, then there is a zone of pinkish red which seems less weathered for 1.73 ft, some hematite and clay on joints.	50	8	180	0	1	3	2	3	9	15	5.7	14.9	7.3	9.0	15	**52**
58.0	942.8	17.68	287.4	63.0	19.20	1.52	1.52	100	0.54	35	TR	As above with zones of pinkish rock, less weathered, hematite and clay on joints, some joints are near vertical.	50	16	95	0	4	3	2	3	12	15	5.7	7.6	6.3	12.0	15	**47**
63.0	937.8	19.20	285.8	68.0	20.73	1.52	1.52	100	0.72	47	TR	As above, less pink zones, dendritic manganese oxide, coarse grained, inequigranular, black phenocrysts, vugs with hematite and limonite.	50	5	304	0	4	3	2	3	12	15	5.7	9.5	8.8	12.0	15	**51**
68.0	932.8	20.73	284.3	73.0	22.25	1.52	1.52	100	0.47	31	TR	As above, rhyolite, moderately weathered, hematite on joints, minor clay, coarse grained, vugs on core surface.	50	13	117	0	4	3	2	3	12	15	5.7	6.9	6.6	12.0	15	**46**
73.0	927.8	22.25	282.8	78.0	23.77	1.52	1.52	100	1.20	79	TR	As above, banding, more competent, hematite, dendritic manganese oxide, yellowish white, coarse grained, slightly weathered.	80	7	217	0	4	3	2	5	14	15	8.0	15.5	7.8	14.0	15	**60**
78.0	922.8	23.77	281.3	83.0	25.30	1.52	1.52	100	1.09	72	TR	As above, coarse grained, vugs, dendritic manganese oxide, pyrite crystals, hematite on fractures, competent.	150	11	138	0	4	3	2	5	14	15	12.2	14.0	6.8	14.0	15	**62**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
83.0	917.8	25.30	279.8	88.0	26.82	1.52	1.52	100	1.18	77	TR	As above, coarse grained, competent, steep fractures, vugs, hematite, dendritic manganese oxide, yellow orange rock.	150	6	253	0	4	3	2	5	14	15	12.2	15.2	8.2	14.0	15	**65**
88.0	912.8	26.82	278.2	93.0	28.35	1.52	1.50	98	1.04	68	TR	As above, fractured at end, hematite zones, coarse grained, vugs, dendritic manganese.	50	10	150	0	4	3	2	5	14	15	5.7	13.4	7.0	14.0	15	**55**
93.0	907.8	28.35	276.7	98.0	29.87	1.52	1.44	94	0.50	33	TR	As above, fractured to friable for first 1.6 ft, friable zones, dendritic manganese oxide, coarse grained.	50	25	58	0	4	3	2	3	12	15	5.7	7.2	5.8	12.0	15	**46**
98.0	902.8	29.87	275.2	103.0	31.39	1.52	1.52	100	0.91	60	TR	As above, coarse grained, heavy iron oxide in joints, hematite in vugs.	50	7	217	0	1	3	2	3	9	15	5.7	11.7	7.8	9.0	15	**49**
103.0	897.8	31.39	273.7	108.0	32.92	1.52	1.52	100	0.60	39	TR	As above, much less iron oxide weathering, some vugs with hematite.	110	9	169	0	1	5	2	5	13	15	10.0	8.2	7.2	13.0	15	**54**
108.0	892.8	32.92	272.1	113.0	34.44	1.52	1.52	100	0.46	30	TR	As above, soft friable zone 1-3.3 ft, red staining at 112.5ft.	50	11	138	0	1	5	0	3	9	15	5.7	6.8	6.8	9.0	15	**43**
113.0	887.8	34.44	270.6	118.0	35.96	1.52	1.52	100	0.57	37	TR	As above, very little iron oxide, soft light grey material in joints.	50	13	117	0	1	3	2	5	11	15	5.7	7.9	6.6	11.0	15	**46**
118.0	882.8	35.96	269.1	123.0	37.49	1.52	1.50	98	0.00	0	TR	As above, many joints, soft infilling, some iron oxide shear zones.	25	25	60	0	0	3	0	3	6	15	3.4	3.0	5.8	6.0	15	**33**
123.0	877.8	37.49	267.6	128.0	39.01	1.52	1.52	100	0.63	41	TR	As above, shear zone ends at 1.77 ft, competent rock after that, iron oxide in joints.	125	14	109	0	1	3	0	3	7	15	10.9	8.6	6.5	7.0	15	**48**
128.0	872.8	39.01	266.0	133.0	40.54	1.52	1.52	100	0.38	25	TR	As above, very highly weathered possible shear zone at 130ft, lots of iron oxide reddish brown.	75	25	61	0	1	3	2	0	6	15	7.7	6.1	5.8	6.0	15	**41**
133.0	867.8	40.54	264.5	138.0	42.06	1.52	1.50	98	0.35	23	TR	Highly weathered iron oxide zone ends at 133ft, As above, coarse grained, moderately weathered, soft material in some joints.	75	10	150	0	1	3	0	3	7	15	7.7	5.8	7.0	7.0	15	**42**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
138.0	862.8	42.06	263.0	143.0	43.58	1.52	1.52	100	0.99	65	TR	Competent coarse grained Rhyolite?, iron oxide in joints and vugs, as above.	100	6	253	0	4	3	2	3	12	15	9.4	12.7	8.2	12.0	15	**57**
143.0	857.8	43.58	261.5	148.0	45.11	1.52	1.52	100	0.95	62	TR	As above, one joint with >5mm soft infill.	100	7	217	0	4	1	0	3	8	15	9.4	12.2	7.8	8.0	15	**52**
148.0	852.8	45.11	259.9	153.0	46.63	1.52	1.46	96	0.38	25	TR	As above, competent at beginning of run for 2.6 ft, then sheared, fragments of rock in clay matrix, hematite alteration.	50	8	183	0	1	3	0	3	7	15	5.7	6.1	7.4	7.0	15	**41**
153.0	847.8	46.63	258.4	158.0	48.16	1.52	1.40	92	0.10	7	TR	As above, clay washed out from fragments for 0.3 ft, then more competent fractured rock, yellowish white, hematite on fractures, coarse grained.	50	25	56	0	1	3	2	3	9	15	5.7	3.7	5.8	9.0	15	**39**
158.0	842.8	48.16	256.9	163.0	49.68	1.52	1.52	100	0.96	63	TR	As above, coarse grained, reddish pink banding, hematite on fractures, inequigranular, slightly to moderately weathered.	50	8	190	0	4	3	2	3	12	15	5.7	12.3	7.5	12.0	15	**52**
163.0	837.8	49.68	255.4	168.0	51.20	1.52	1.48	97	0.00	0	TR	As above, all reddish pink, brecciated/fractured, banded, slightly to moderately weathered, inequigranular, hematite and clay in fractures or as matrix.	30	25	59	0	1	3	2	3	9	15	3.9	3.0	5.8	9.0	15	**37**
168.0	832.8	51.20	253.8	173.0	52.73	1.52	1.52	100	0.00	0	TR	As above, slightly more competent, coarse grained, reddish pink, back to greyish white at end of run for 0.3 ft, minor clay on fractures.	40	25	61	0	1	3	2	3	9	15	4.8	3.0	5.8	9.0	15	**38**
END OF HOLE																												

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	20JUN'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-231

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1413027 E, 2160040 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 250.2 m / 821 ft
Total Depth: 34.8 m / 114 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 26 ft PQ3 3.27 "
From to ft
Core Diameter: From 26 to 114 ft HQ3 2.41 "
to ft
to ft

Logged By: LS/DLP
Reviewed By: LS
Date Started: 11-Jun-11
Date Completed: 12-Jun-11

Drillhole Number: GH11-231

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	821.0	0.00	250.2	24.0	7.31	7.31	4.24	58	0.00	0	OB	OVERBURDEN																
24.0	797.0	7.31	242.9	26.0	7.92	0.61	0.58	95	0.00	0	TXf	Tertiary Volcaniclastic Breccia, matrix supported, fine grained matrix, angular clasts up to 3cm diameter, inequigranular, light brown matrix, clasts of various colours and lithology, strong rock, slightly weathered to fresh.	100	3	193	0	4	5	6	5	20	15	9.4	3.0	7.5	20.0	15	55
26.0	795.0	7.92	242.3	29.0	8.84	0.91	0.74	81	0.13	14	TXf	As above, clay in sheared zones, matrix supported conglomerate.	100	10	74	0	1	5	2	5	13	15	9.4	4.7	6.0	13.0	15	48
29.0	792.0	8.84	241.4	34.0	10.36	1.52	1.52	100	1.01	66	TXf	As above, more competent, clasts up to 8 cm diameter, matrix supported.	150	3	507	0	4	5	2	5	16	15	12.2	13.0	10.8	16.0	15	67

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
34.0	787.0	10.36	239.9	39.0	11.89	1.52	1.45	95	0.81	53	TXf	As above, competent zones, some shear zones, hard rock, driller has to change bit, shear zones at 2.4 ft for 8cm, iron oxide on fractures, some clasts are angular.	175	8	181	0	4	3	2	5	14	15	13.3	10.6	7.4	14.0	15	**60**
39.0	782.0	11.89	238.4	44.0	13.41	1.52	1.52	100	1.52	100	TXf	Tertiary Volcaniclastic Breccia, matrix supported, several larger clasts up to 6cm diameter varying in colour, brownish grey matrix, slightly weathered to fresh rock.	140	0	1524	0	6	6	6	5	23	15	11.7	20.1	17.6	23.0	15	**87**
44.0	777.0	13.41	236.8	49.0	14.93	1.52	1.51	99	1.40	92	TXf	As above, one joint with brown clay infilling >5mm.	140	1	1510	0	4	3	0	3	10	15	11.7	18.3	17.5	10.0	15	**73**
49.0	772.0	14.93	235.3	54.0	16.46	1.52	1.45	95	0.85	56	TXf	As above, becoming more weathered, brownish colour and weaker at 53ft.	140	10	145	0	4	3	2	3	12	15	11.7	11.0	6.9	12.0	15	**57**
54.0	767.0	16.46	233.8	59.0	17.98	1.52	1.50	98	1.09	72	TXf	As above, clay in joints washed out.	140	6	250	0	4	3	2	3	12	15	11.7	14.0	8.2	12.0	15	**61**
59.0	762.0	17.98	232.3	64.0	19.51	1.52	1.50	98	0.54	35	TXf	As above, with more joints with greyish brown clay infilling.	140	15	100	0	4	3	0	3	10	15	11.7	7.6	6.3	10.0	15	**51**
64.0	757.0	19.51	230.7	69.0	21.03	1.52	1.48	97	1.19	78	TXf	As above, competent.	150	6	247	0	4	3	2	5	14	15	12.2	15.3	8.1	14.0	15	**65**
69.0	752.0	21.03	229.2	74.0	22.55	1.52	1.52	100	1.20	79	TXf	As above, light brown clay in joints.	125	6	253	0	4	3	2	3	12	15	10.9	15.5	8.2	12.0	15	**62**
74.0	747.0	22.55	227.7	79.0	24.08	1.52	1.42	93	1.18	77	TXf	As above, very competent after 1.3 ft, 15% of clasts are clay altered, soft and white in colour.	125	4	355	0	4	3	0	5	12	15	10.9	15.2	9.3	12.0	15	**62**
79.0	742.0	24.08	226.2	84.0	25.60	1.52	1.52	100	0.43	28	TXf	As above, less competent, more weathered, dark and light brown clay infilling joints, large vertical joint.	110	10	152	0	4	3	0	3	10	15	10.0	6.6	7.0	10.0	15	**49**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
84.0	737.0	25.60	224.6	89.0	27.13	1.52	1.52	100	0.92	60	TXf	As above, several larger clasts up to 5cm in diameter, competent, fresh.	140	5	304	0	4	3	2	5	14	15	11.7	11.9	8.8	14.0	15	**61**
89.0	732.0	27.13	223.1	94.0	28.65	1.52	1.51	99	1.17	77	TXf	As above, infilling of light brown clay in joint 5cm thick.	140	4	378	0	4	3	0	3	10	15	11.7	15.1	9.6	10.0	15	**61**
94.0	727.0	28.65	221.6	99.0	30.17	1.52	1.52	100	1.52	100	TXf	As above, no joints, slightly weathered to fresh, competent.	140	0	1524	0	6	6	6	5	23	15	11.7	20.1	17.6	23.0	15	**87**
99.0	722.0	30.17	220.1	104.0	31.70	1.52	1.52	100	1.32	87	TXf	As above.	140	4	380	0	4	5	2	5	16	15	11.7	17.2	9.6	16.0	15	**69**
104.0	717.0	31.70	218.5	109.0	33.22	1.52	1.49	98	1.49	98	TXf	As above, competent, no fractures, slightly weathered to fresh, massive, matrix supported conglomerate, fine-grained matrix, clasts up to 4cm diameter, some angular to rounded.	150	0	1524	0	6	6	6	5	23	15	12.2	19.7	17.6	23.0	15	**87**
109.0	712.0	33.22	217.0	114.0	34.75	1.52	1.51	99	1.44	94	TXf	As above, one fracture.	150	1	1510	0	4	3	6	5	18	15	12.2	18.9	17.5	18.0	15	**82**
END OF HOLE																												

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	21JUN'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-232

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1417674 E, 2161848 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 242.3 m / 795 ft
Total Depth: 47.5 m / 156 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter:

From	to			
0	84 ft	PQ3	3.27 "
	ft		
84	156 ft	HQ3	2.41 "
	ft		
	ft		

Logged By: LS/DLP
Reviewed By: LS
Date Started: Jun-12-2011
Date Completed: Jun-14-2011

Drillhole Number: GH11-232

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	795.0	0.00	242.3	79.0	24.08	24.08	10.95	45	0.00	0	OB	OVERBURDEN																
79.0	716.0	24.08	218.2	84.0	25.60	1.52	0.80	52	0.48	31	TXf	Tertiary volcaniclastic congolmerate, matrix supported, fine-grained matrix, polymictic, coarse grained clasts, up to 3cm diameter, reddish brown matrix, clasts of various lithology including basalt, fine-gained sedimentary and clay altered clasts, strong rock, slightly to moderately weathered, massive, sharp contact with overburden.	100	7	114	0	1	5	2	3	11	15	9.4	7.0	6.5	11.0	15	49
84.0	711.0	25.60	216.7	86.0	26.21	0.61	0.48	79	0.16	26	TXf	As above, only more fractured.	100	6	80	0	4	5	2	3	14	15	9.4	6.3	6.1	14.0	15	51

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
86.0	709.0	26.21	216.1	91.0	27.74	1.52	1.52	100	0.25	16	TXf	As above, some zones are bleached white, highly fractured and friable, clay on joints, clay altered clasts.	80	25	61	0	4	3	2	3	12	15	8.0	4.9	5.8	12.0	15	**46**
91.0	704.0	27.74	214.6	96.0	29.26	1.52	1.44	94	0.77	51	TXf	As above, wet brown cuttings at 91.5' for 5cm possibly from flushing the hole.	110	7	206	0	4	3	2	3	12	15	10.0	10.1	7.7	12.0	15	**55**
96.0	699.0	29.26	213.1	101.0	30.78	1.52	1.50	98	1.07	70	TXf	As above, some white infilling in joints (calcite) and brown clay.	110	8	188	0	4	3	2	3	12	15	10.0	13.7	7.4	12.0	15	**58**
101.0	694.0	30.78	211.5	106.0	32.31	1.52	1.51	99	1.10	72	TXf	As above, several larger subrounded to subangular clasts up to 5cm diameter, hard white infilling in joints, some soft white infilling.	140	10	151	0	4	3	0	3	10	15	11.7	14.1	7.0	10.0	15	**58**
106.0	689.0	32.31	210.0	111.0	33.83	1.52	1.50	98	1.10	72	TXf	As above, one vertical joint with soft greenish white infilling.	110	2	750	0	4	3	0	3	10	15	10.0	14.1	12.9	10.0	15	**62**
111.0	684.0	33.83	208.5	116.0	35.36	1.52	1.48	97	1.43	94	TXf	As above, no joints.	125	0	1524	0	6	6	6	5	23	15	10.9	18.8	17.6	23.0	15	**85**
116.0	679.0	35.36	207.0	121.0	36.88	1.52	1.52	100	1.52	100	TXf	As above, weaker greenish grey matrix in places <10cm thick.	140	1	1520	0	4	3	6	5	18	15	11.7	20.1	17.5	18.0	15	**82**
121.0	674.0	36.88	205.4	126.0	38.40	1.52	1.52	100	1.44	94	TXf	As above, competent.	140	1	1520	0	4	3	2	3	12	15	11.7	18.9	17.5	12.0	15	**75**
126.0	669.0	38.40	203.9	131.0	39.93	1.52	1.43	94	1.11	73	TXf	As above, vertical healed fractures with clay alteration, angular clasts, matrix supported.	140	3	477	0	4	5	6	3	18	15	11.7	14.3	10.5	18.0	15	**70**
131.0	664.0	39.93	202.4	136.0	41.45	1.52	1.52	100	1.36	89	TXf	As above, purplish reddish to last 2 ft, then greenish white, matrix supported conglomerate.	140	1	1520	0	1	3	2	5	11	15	11.7	17.7	17.5	11.0	15	**73**
136.0	659.0	41.45	200.9	141.0	42.97	1.52	1.50	98	1.50	98	TXf	As above, only mechanical breaks.	140	0	1524	0	6	6	6	5	23	15	11.7	19.8	17.6	23.0	15	**87**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
141.0	654.0	42.97	199.3	146.0	44.50	1.52	1.52	100	1.52	100	TXf	As above, only machine breaks, some soft clay altered clasts in rock.	140	0	1524	0	6	6	6	5	23	15	11.7	20.1	17.6	23.0	15	**87**
146.0	649.0	44.50	197.8	151.0	46.02	1.52	1.52	100	1.14	75	TXf	As above, chloritized clasts, vertical, healed fractures, angular to subrounded clasts.	140	3	507	0	4	5	2	5	16	15	11.7	14.7	10.8	16.0	15	**68**
151.0	644.0	46.02	196.3	156.0	47.55	1.52	1.50	98	1.50	98	TXf	As above, no fractures.	140	0	1524	0	6	6	6	5	23	15	11.7	19.8	17.6	23.0	15	**87**
END OF HOLE																												

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	27JUN'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

Knight Piésold CONSULTING

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-233

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1404163 E, 2160359 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 315.8 m / 1,036 ft
Total Depth: 44.5 m / 146 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 49 ft PQ3 3.27 "
Core Diameter: From 49 to 149 ft HQ3 2.41 "

Logged By: LS/DLP
Reviewed By: LS
Date Started: 15-Jun-11
Date Completed: 16-Jun-11

Drillhole Number: GH11-233

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1036.0	0.00	315.8	39.0	11.89	11.89	2.75	23	0.00	0	OB	OVERBURDEN																
39.0	997.0	11.89	303.9	44.0	13.41	1.52	1.52	100	0.11	7	Gs	Cretaceous Granodiorite, fine to medium grained, porphyritic, light to medium grey, fractured but otherwise competent, strong, slightly weathered, sulphides in veins.	140	25	61	0	4	1	2	5	12	15	11.7	3.8	5.8	12.0	15	48
44.0	992.0	13.41	302.4	49.0	14.93	1.52	1.50	98	0.00	0	Gs	As above, fractured granodiorite, veining, otherwise competent.	140	25	60	0	4	1	2	5	12	15	11.7	3.0	5.8	12.0	15	48
49.0	987.0	14.93	300.8	54.0	16.46	1.52	1.31	86	0.00	0	Gs	As above.	160	25	52	0	1	1	0	3	5	15	12.7	3.0	5.7	5.0	15	41
54.0	982.0	16.46	299.3	59.0	17.98	1.52	1.52	100	0.00	0	Gs	As above, slightly weaker.	110	25	61	0	4	1	2	3	10	15	10.0	3.0	5.8	10.0	15	44

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
59.0	977.0	17.98	297.8	64.0	19.51	1.52	1.52	100	0.00	0	Gs	As above, brown staining and sulphides on some joints, very broken, medium strong rock.	50	25	61	0	1	1	2	3	7	15	5.7	3.0	5.8	7.0	15	**36**
64.0	972.0	19.51	296.3	69.0	21.03	1.52	1.35	89	0.00	0	Gs	As above, very broken and weak along fractures, sulphide and gouge infilling, strong rock.	75	25	54	0	4	1	2	3	10	15	7.7	3.0	5.7	10.0	15	**41**
69.0	967.0	21.03	294.7	74.0	22.55	1.52	1.45	95	0.00	0	Gs	As above, medium strong.	50	25	58	0	1	1	0	3	5	15	5.7	3.0	5.8	5.0	15	**34**
74.0	962.0	22.55	293.2	79.0	24.08	1.52	1.40	92	0.00	0	Gs	As above, continued medium strong, fractured rock.	50	25	56	0	1	1	2	3	7	15	5.7	3.0	5.8	7.0	15	**36**
79.0	957.0	24.08	291.7	84.0	25.60	1.52	1.52	100	0.00	0	Gs	As above, slightly more weathered on joints, soft gouge material, sulphides, and brown staining on joints.	50	25	61	0	4	1	2	3	10	15	5.7	3.0	5.8	10.0	15	**39**
84.0	952.0	25.60	290.2	89.0	27.13	1.52	1.52	100	0.00	0	Gs	Granodiorite, slightly to moderately weathered, veining with sulphides, mostly pyrite, fine to medium grained, light and dark grey, porphyritic, fractured, strong, iron oxide and pyrite in joints.	100	28	54	0	4	1	2	5	12	15	9.4	3.0	5.7	12.0	15	**45**
89.0	947.0	27.13	288.6	93.7	28.55	1.42	1.42	100	0.53	37	Gs	As above, slightly more competent, pyrite veins, 2 UCS samples taken.	80	25	57	0	4	1	4	5	14	15	8.0	7.9	5.8	14.0	15	**51**
93.7	942.3	28.55	287.2	99.0	30.17	1.63	1.61	99	0.30	18	Gs	As above, pyrite veins, calcite/quartz veins, calcite on joints, strong rock.	100	7	230	0	4	1	2	5	12	15	9.4	5.2	7.9	12.0	15	**50**
99.0	937.0	30.17	285.6	104.0	31.70	1.52	1.52	100	0.44	29	Gs	As above, pyrite veins, fractured, smooth joints, some vertical joints.	100	25	61	0	4	1	2	5	12	15	9.4	6.7	5.8	12.0	15	**49**
104.0	932.0	31.70	284.1	109.0	33.22	1.52	1.52	100	0.10	7	Gs	As above, very fractured at top of run, pyrite, calcite veins throughout.	80	25	61	0	4	1	2	5	12	15	8.0	3.7	5.8	12.0	15	**45**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
109.0	927.0	33.22	282.6	114.0	34.75	1.52	1.50	98	0.11	7	Gs	As above, pyrite veins up to 3cm thick, slightly less fractured.	80	27	56	0	4	1	2	5	12	15	8.0	3.8	5.8	12.0	15	**45**
114.0	922.0	34.75	281.0	119.0	36.27	1.52	1.49	98	0.39	26	Gs	As above, slightly more competent, pyrite veins 45°tca to 30°tca.	80	27	55	0	4	1	2	5	12	15	8.0	6.2	5.8	12.0	15	**47**
119.0	917.0	36.27	279.5	124.0	37.79	1.52	1.52	100	0.10	7	Gs	As above, pyrite veins, fractured, strong.	80	30	51	0	4	1	2	5	12	15	8.0	3.7	5.7	12.0	15	**44**
124.0	912.0	37.79	278.0	129.0	39.32	1.52	1.52	100	0.33	22	Gs	As above, 1cm thick pyrite veins, highly fractured, stepped joint surfaces.	80	26	58	0	4	1	2	5	12	15	8.0	5.6	5.8	12.0	15	**46**
129.0	907.0	39.32	276.5	134.0	40.84	1.52	1.35	89	0.32	21	Gs	As above, slightly more competent, pyrite veins, fractured.	80	20	68	0	4	1	2	5	12	15	8.0	5.6	5.9	12.0	15	**46**
134.0	902.0	40.84	274.9	139.0	42.37	1.52	1.52	100	0.32	21	Gs	As above, pyrite veins, calcite on fractures.	80	21	72	0	4	1	2	5	12	15	8.0	5.6	6.0	12.0	15	**47**
139.0	897.0	42.37	273.4	141.0	42.97	0.61	0.61	100	0.15	25	Gs	As above, core tube blocked.	80	7	87	0	1	1	2	5	9	15	8.0	6.0	6.2	9.0	15	**44**
141.0	895.0	42.97	272.8	144.0	43.89	0.91	0.91	100	0.17	19	Gs	As above, pyrite veins, calcite in fractures, chloritized, molybdenite?	80	13	70	0	4	1	2	5	12	15	8.0	5.2	6.0	12.0	15	**46**
144.0	892.0	43.89	271.9	149.0	45.41	1.52	1.52	100	0.10	7	Gs	As above, pyrite veins.	80	25	61	0	4	1	2	5	12	15	8.0	3.7	5.8	12.0	15	**45**
END OF HOLE																													

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	16JUN'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

Knight Piésold CONSULTING

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-234

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1391922 E, 2165660 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 367.6 m / 1,206 ft
Total Depth: 30.5 m / 100 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 25 ft PQ3 3.27 "
From to ft
Core Diameter: From 25 to 100 ft HQ3 2.41 "
to ft
to ft

Logged By: LS/DLP
Reviewed By: LS
Date Started: 16-Jun-11
Date Completed: 18-Jun-11

Drillhole Number: GH11-234

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1206.0	0.00	367.6	28.0	8.53	8.53	2.28	27	0.00	0	OB	OVERBURDEN																
28.0	1178.0	8.53	359.1	30.0	9.14	0.61	0.60	98	0.00	0	Y?	Cretaceous Andesitic Siltstone?, fine grained, dark green, highly fractured, slight to moderate weathering, heavy iron oxide staining in joints, highly silicified, difficult to discern rock type.	100	25	24	0	1	1	2	3	7	15	9.4	3.0	5.3	7.0	15	40
30.0	1176.0	9.14	358.4	33.0	10.06	0.91	0.81	89	0.00	0	Y?	As above, highly fractured.	125	25	32	0	1	1	2	1	5	15	10.9	3.0	5.4	5.0	15	39
33.0	1173.0	10.06	357.5	35.0	10.67	0.61	0.61	100	0.00	0	Y?	As above, soft rusty brown infilling in joints.	125	15	41	0	1	1	2	3	7	15	10.9	3.0	5.6	7.0	15	41

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
35.0	1171.0	10.67	356.9	40.0	12.19	1.52	1.36	89	0.34	22	Bp	Cretaceous Basalt, plagioclase phenocrysts, greenish dark black, some phenocrysts are greenish white, calcite veins, pyrite, iron oxide, hematite on joints at top of run, fine grained, massive, slightly to moderately weathered, close joint spacing.	75	25	54	0	1	1	2	3	7	15	7.7	5.7	5.7	7.0	15	**41**
40.0	1166.0	12.19	355.4	45.0	13.72	1.52	1.52	100	0.27	18	Bp	As above, no visible iron oxide on joints, slightly weathered, vertical joints.	75	13	117	0	4	1	2	5	12	15	7.7	5.1	6.6	12.0	15	**46**
45.0	1161.0	13.72	353.9	50.0	15.24	1.52	1.52	100	0.20	13	Bp	As above.	75	22	69	0	1	1	2	5	9	15	7.7	4.5	5.9	9.0	15	**42**
50.0	1156.0	15.24	352.3	55.0	16.76	1.52	1.52	100	0.43	28	Bp	As above, highly fractured, shear zone 49.5-51 ft, calcite and pyrite veins.	50	25	61	0	1	1	2	5	9	15	5.7	6.6	5.8	9.0	15	**42**
55.0	1151.0	16.76	350.8	60.0	18.29	1.52	1.52	100	0.72	47	Bp	As above, more competent, calcite and pyrite in joints.	75	11	138	0	4	1	2	5	12	15	7.7	9.5	6.8	12.0	15	**51**
60.0	1146.0	18.29	349.3	65.0	19.81	1.52	1.52	100	0.70	46	Bp/TBd	Cretaceous Basalt, dark black, some phenocrysts are greenish white, some greyish white, fine grained to medium grained, massive, slightly weathered to fresh, competent, then Tertiary basalt dyke at 62.5', some near vertical joints near end of run.	75	14	109	0	4	3	2	5	14	15	7.7	9.3	6.5	14.0	15	**52**
65.0	1141.0	19.81	347.8	70.0	21.33	1.52	1.49	98	0.88	58	TBd/Bp	As above, Tertiary Basalt Dyke, continues to 65.3', then back to Cretaceous Basalt, possibly brecciated, greyish white angular fragments, greenish at the end of run, calcite veins, competent.	75	12	124	0	4	1	2	5	12	15	7.7	11.4	6.7	12.0	15	**53**
70.0	1136.0	21.33	346.3	75.0	22.86	1.52	1.52	100	0.34	22	Bp	As above, near vertical fractures, calcite veins up to 1cm wide.	75	16	95	0	4	1	0	5	10	15	7.7	5.7	6.3	10.0	15	**45**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
75.0	1131.0	22.86	344.7	80.0	24.38	1.52	1.45	95	1.16	76	Bp	As above, calcite veins, strong rock, slightly more competent, chlorite and/or epidote on some joint surfaces, very strong rock.	200	10	145	0	4	3	2	5	14	15	14.1	14.9	6.9	14.0	15	**65**
80.0	1126.0	24.38	343.2	85.0	25.91	1.52	1.52	100	0.95	62	Bp	As above, more fractured at end of run.	150	25	61	0	4	3	2	5	14	15	12.2	12.2	5.8	14.0	15	**59**
85.0	1121.0	25.91	341.7	90.0	27.43	1.52	1.51	99	0.85	56	Bp	As above, more competent.	100	18	84	0	4	1	2	5	12	15	9.4	11.0	6.1	12.0	15	**54**
90.0	1116.0	27.43	340.2	95.0	28.95	1.52	1.52	100	0.56	37	Bp/TBd	As above, more vertical fractures, calcite veins, black in colour for last 1.5 ft, pyrite and calcite on joints.	100	25	61	0	4	1	2	5	12	15	9.4	7.8	5.8	12.0	15	**50**
95.0	1111.0	28.95	338.6	100.0	30.48	1.52	1.52	100	0.95	62	TBd/Bp	As above, dark black as at end of last run for first 1.5 ft, then greenish black as before with greenish white phenocrysts, calcite veins, pyrite on fractures.	100	14	109	0	4	1	2	5	12	15	9.4	12.2	6.5	12.0	15	**55**
END OF HOLE																												

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-234\[GH11-234.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	18JUN'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-235

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1392861 E, 2165210 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 379.5 m / 1,245 ft
Total Depth: 42.5 m / 139 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter:

From	to			
0	60	ft	PQ3	3.27 "
		ft		
60	86.33	ft	HQ3	2.41 "
		ft		
86.33	139	ft	NQ3	1.78 "

Logged By: LS/DLP
Reviewed By: LS
Date Started: 19-Jun-11
Date Completed: 22-Jun-11

Drillhole Number: GH11-235

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1245.0	0.00	379.5	60.0	18.29	18.29	5.56	30	0.00	0	OB	OVERBURDEN																
60.0	1185.0	18.29	361.2	65.0	19.81	1.52	1.30	85	0.00	0	Bp	Cretaceous Basalt, fine grained volcanic, greenish grey, highly weathered, heavy iron oxide staining in joints, vertical joints.	50	25	52	0	1	1	0	1	3	15	5.7	3.0	5.7	3.0	15	32
65.0	1180.0	19.81	359.7	70.0	21.33	1.52	1.46	96	0.15	10	Bp	As above.	75	25	58	0	1	1	2	1	5	15	7.7	4.1	5.8	5.0	15	38
70.0	1175.0	21.33	358.1	75.0	22.86	1.52	1.52	100	0.47	31	Bp	As above, large plagioclase phenocrysts, moderately weathered, some white infilling in joints, continued iron oxide in joints.	75	24	63	0	4	1	2	1	8	15	7.7	6.9	5.9	8.0	15	43

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
75.0	1170.0	22.86	356.6	80.0	24.38	1.52	1.52	100	0.38	25	Bp	As above, some vertical joints, slightly more competent than above.	75	20	76	0	4	1	0	3	8	15	7.7	6.1	6.0	8.0	15	**43**
80.0	1165.0	24.38	355.1	85.0	25.91	1.52	1.52	100	0.30	20	Bp	As above, only slightly weathered, minimal iron oxide, highly fractured shear zone 81-84', sulphides (py) in joints.	75	25	61	0	1	1	0	5	7	15	7.7	5.4	5.8	7.0	15	**41**
85.0	1160.0	25.91	353.6	86.3	26.31	0.41	0.40	99	0.22	54	Bp	As above, fine grained, inequigranular, light greyish green, slightly weathered to fresh, massive, competent, chlorite, pyrite, and calcite on joints, calcite veins.	75	4	100	0	4	1	2	5	12	15	7.7	10.8	6.3	12.0	15	**52**
86.3	1158.7	26.31	353.2	90.0	27.43	1.12	0.77	69	0.63	56	Bp	As above, greenish rock, rectangular phenocrysts, pyrite, hematite, chlorite and calcite on joints, competent, slightly weathered.	75	5	154	0	4	1	2	5	12	15	7.7	11.1	7.0	12.0	15	**53**
90.0	1155.0	27.43	352.0	94.0	28.65	1.22	1.20	98	0.89	73	Bp	As above.	75	7	171	0	4	1	2	5	12	15	7.7	14.3	7.2	12.0	15	**56**
94.0	1151.0	28.65	350.8	95.0	28.95	0.30	0.31	102	0.00	0	Bp	As above, plugged bit.	75	4	78	0	4	1	2	5	12	15	7.7	3.0	6.0	12.0	15	**44**
95.0	1150.0	28.95	350.5	100.0	30.48	1.52	1.52	100	0.38	25	Bp	As above, greenish purple rock, some vertical joints.	110	16	95	0	4	3	2	5	14	15	10.0	6.1	6.3	14.0	15	**51**
100.0	1145.0	30.48	349.0	105.0	32.00	1.52	1.52	100	1.04	68	Bp	As above, calcite, chlorite, and pyrite in joints, competent, slightly weathered.	75	9	169	0	4	1	2	5	12	15	7.7	13.4	7.2	12.0	15	**55**
105.0	1140.0	32.00	347.5	109.0	33.22	1.22	1.27	104	0.63	52	Bp	As above, Bit wore down at end of run.	75	8	159	0	4	1	2	5	12	15	7.7	10.3	7.1	12.0	15	**52**
109.0	1136.0	33.22	346.3	114.0	34.75	1.52	1.52	100	1.16	76	Bp	As above, pyrite, calcite/quartz, and chlorite in joints.	75	8	190	0	4	1	2	5	12	15	7.7	14.9	7.5	12.0	15	**57**
114.0	1131.0	34.75	344.7	119.0	36.27	1.52	1.52	100	0.79	52	Bp	As above, shear zone 116-117'.	50	14	109	0	4	1	0	5	10	15	5.7	10.3	6.5	10.0	15	**47**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
119.0	1126.0	36.27	343.2	124.0	37.79	1.52	1.52	100	1.13	74	Bp	As above, calcite/quartz, chlorite, and pyrite in joints, slightly weathered to fresh, dark greyish green.	75	8	190	0	4	1	4	5	14	15	7.7	14.5	7.5	14.0	15	**59**
124.0	1121.0	37.79	341.7	129.0	39.32	1.52	1.44	94	1.32	87	Bp	As above, competent.	75	2	720	0	4	1	2	5	12	15	7.7	17.2	12.6	12.0	15	**64**
129.0	1116.0	39.32	340.2	134.0	40.84	1.52	1.52	100	1.36	89	Bp	As above, competent.	75	2	760	0	4	1	2	5	12	15	7.7	17.7	12.9	12.0	15	**65**
134.0	1111.0	40.84	338.6	139.0	42.37	1.52	1.50	98	0.76	50	Bp	As above, more joints, some vertical joints.	75	12	125	0	4	1	2	5	12	15	7.7	10.0	6.7	12.0	15	**51**
END OF HOLE																												

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-235\[GH11-235.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	22JUN'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

Knight Piésold CONSULTING

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-236

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1393657 E, 2163473 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 408.4 m / 1,340 ft
Total Depth: 51.5 m / 169 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter:

From	to			
0	51.5 ft	PQ3	3.27 "
	ft		
51.5	109 ft	HQ3	2.41 "
	ft		
109	169 ft	NQ3	1.78 "

Logged By: LS/DLP
Reviewed By: LS
Date Started: 22-Jun-11
Date Completed: 25-Jun-11

Drillhole Number: GH11-236

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1340.0	0.00	408.4	59.0	17.98	17.98	4.54	25	0.00	0	OB	OVERBURDEN																
59.0	1281.0	17.98	390.4	96.5	29.41	11.43	8.39	73	0.00	0	R	Completely Weathered Bedrock, Cretaceous Gabbro, fine grained, iron oxide staining, very weak, weathered to soil like material.	5	190	44	0	0	1	0	1	2	15	1.5	3.0	5.6	2.0	15	27
96.5	1243.5	29.41	379.0	99.0	30.17	0.76	0.76	100	0.00	0	R	Cretaceous Gabbro, fine grained, inequigranular, greenish grey, red iron oxide staining, highly to completely weathered.	5	25	30	0	1	3	0	0	4	15	1.5	3.0	5.4	4.0	15	29
99.0	1241.0	30.17	378.3	104.0	31.70	1.52	1.35	89	0.00	0	R	As above, very weak rock, Gabbro	5	25	54	0	1	3	0	0	4	15	1.5	3.0	5.7	4.0	15	29

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
104.0	1236.0	31.70	376.7	109.0	33.22	1.52	1.08	71	0.00	0	R	Gabbro, dark greenish grey, weak to moderate strength, highly weathered, soft iron oxide in joints.	15	25	43	0	1	3	0	0	4	15	2.5	3.0	5.6	4.0	15	**30**
109.0	1231.0	33.22	375.2	114.0	34.75	1.52	1.36	89	0.00	0	R	As above, aphanitic, dark greyish green, medium strength, slightly weathered, vertical joints, pyrite and iron oxide in joints.	75	25	54	0	1	3	2	3	9	15	7.7	3.0	5.7	9.0	15	**40**
114.0	1226.0	34.75	373.7	119.0	36.27	1.52	1.52	100	0.76	50	R/B	As above, pyrite, calcite, some iron oxide in joints, less fractured, some dark black, fine grained Basalt at 115'.	75	17	89	0	4	1	0	5	10	15	7.7	10.0	6.2	10.0	15	**49**
119.0	1221.0	36.27	372.2	124.0	37.79	1.52	1.46	96	0.66	43	B/R	Cretaceous Basalt to 121.1ft, then back to Gabbro, aphanitic, dark greenish grey-black, medium strong, slightly weathered to fresh, calcite veins, pyrite, hematite in joints.	75	25	58	0	4	1	2	5	12	15	7.7	8.9	5.8	12.0	15	**49**
124.0	1216.0	37.79	370.6	129.0	39.32	1.52	1.52	100	0.52	34	R	Gabbro, pyrite veins, 0.5 cm, iron or manganese oxide, chlorite on joints, small shear/fractured zones.	75	20	76	0	4	1	2	5	12	15	7.7	7.4	6.0	12.0	15	**48**
129.0	1211.0	39.32	369.1	134.0	40.84	1.52	1.52	100	0.79	52	R	As above, slightly more competent, pyrite vein 0.5m, pyrite, iron oxide, manganese oxide on joints, fractured at end of run.	75	20	76	0	4	1	2	5	12	15	7.7	10.3	6.0	12.0	15	**51**
134.0	1206.0	40.84	367.6	139.0	42.37	1.52	1.52	100	0.97	64	R	As above, pyrite veins throughout, calcite veins, iron oxide, chlorite, calcite on joints.	75	12	127	0	4	1	2	5	12	15	7.7	12.5	6.7	12.0	15	**54**
139.0	1201.0	42.37	366.1	144.0	43.89	1.52	1.43	94	0.67	44	R	As above, large zone of pyrite vein at top of run, pretty competent, iron oxide, chlorite, pyrite, manganese oxide on joint surfaces.	75	14	102	0	4	1	2	5	12	15	7.7	9.0	6.4	12.0	15	**50**
144.0	1196.0	43.89	364.5	149.0	45.41	1.52	1.40	92	1.20	79	R	Gabbro, strong rock, few joints, pyrite and quartz veins, iron oxide, chlorite, and pyrite on joints.	75	3	467	0	4	1	2	5	12	15	7.7	15.5	10.4	12.0	15	**61**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
149.0	1191.0	45.41	363.0	154.0	46.94	1.52	1.52	100	1.26	83	R	As above.	75	8	190	0	4	1	2	5	12	15	7.7	16.3	7.5	12.0	15	**58**
154.0	1186.0	46.94	361.5	159.0	48.46	1.52	1.49	98	0.76	50	R	As above, large vertical pyrite vein through run, small <3cm shear with light grey gouge.	75	13	115	0	1	1	2	5	9	15	7.7	10.0	6.5	9.0	15	**48**
159.0	1181.0	48.46	360.0	164.0	49.98	1.52	1.52	100	1.20	79	R	Gabbro, iron oxide, chlorite, and pyrite on joints, competent.	75	6	253	0	4	1	2	5	12	15	7.7	15.5	8.2	12.0	15	**58**
164.0	1176.0	49.98	358.4	169.0	51.51	1.52	1.44	94	0.76	50	R	As above, iron oxide, chlorite and pyrite on joints, pyrite veins throughout, medium to strong rock, slightly weathered.	75	13	111	0	4	1	2	5	12	15	7.7	10.0	6.5	12.0	15	**51**
END OF HOLE																												

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-236\[GH11-236.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	25JUN'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-237

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1391778 E, 2163427 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 398.1 m / 1,306 ft
Total Depth: 62.0 m / 203 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter:

From	to			
0	29 ft	PQ3	3.27 "
	ft		
29	139.5 ft	HQ3	2.41 "
	ft		
139.5	203 ft	NQ3	1.78 "

Logged By: LS/DLP
Reviewed By: LS
Date Started: 25-Jun-11
Date Completed: 28-Jun-11

Drillhole Number: GH11-237

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1306.0	0.00	398.1	104.0	31.70	31.70	12.32	39	0.00	0	OB	OVERBURDEN																
104.0	1202.0	31.70	366.4	109.0	33.22	1.52	0.75	49	0.00	0	B	Highly to completely weathered Cretaceous Basalt, soil like, gravel and sand, trace silt, subrounded to angular clasts up to 7cm diameter, iron oxide weathering.	5	25	30	0	0	1	0	1	2	15	1.5	3.0	5.4	2.0	15	27
109.0	1197.0	33.22	364.8	114.0	34.75	1.52	1.52	100	0.10	7	B	Dark green, fine grained, basalt, equigranular, moderately weathered, highly fractured, more competent than run above.	75	25	61	0	1	3	2	3	9	15	7.7	3.7	5.8	9.0	15	41

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
114.0	1192.0	34.75	363.3	119.0	36.27	1.52	1.33	87	0.00	0	B/GK	As above, basalt, then Granodiorite fault zone, soft, light greenish grey gouge, pyrite, iron oxide and manganese oxide in fractures.	25	25	53	0	1	3	0	1	5	15	3.4	3.0	5.7	5.0	15	**32**
119.0	1187.0	36.27	361.8	124.0	37.79	1.52	1.52	100	0.00	0	GK	As above Granodiorite, light greyish green fault gouge/clay throughout full run.	5	25	61	0	0	1	0	0	1	15	1.5	3.0	5.8	1.0	15	**26**
124.0	1182.0	37.79	360.3	129.0	39.32	1.52	0.86	56	0.00	0	GK	As above, fault zone, continuing from 114', weak, highly weathered, light greenish grey.	5	25	34	0	0	1	0	0	1	15	1.5	3.0	5.5	1.0	15	**26**
129.0	1177.0	39.32	358.8	134.0	40.84	1.52	0.20	13	0.00	0	GK	Fault zone continued, very poor recovery, weak, highly weathered, soft.	5	25	8	0	0	1	0	0	1	15	1.5	3.0	5.1	1.0	15	**26**
134.0	1172.0	40.84	357.2	139.0	42.37	1.52	1.52	100	0.60	39	GK	Granodiorite, brecciated, basalt clasts, moderately weathered, medium strong, less competent for first 2 ft of run, calcite/qtz veins, clay in joints at top of run, fine to medium grained, vug at end, chlorite and pyrite on joints.	40	15	101	0	1	1	2	3	7	15	4.8	8.2	6.4	7.0	15	**41**
139.0	1167.0	42.37	355.7	139.5	42.52	0.15	0.16	105	0.00	0	GK	As above at end of run, brecciated granodiorite, basalt clasts, silicified, moderately to slightly weathered, medium strong, Reduce to NQ.	50	2	80	0	4	3	2	3	12	15	5.7	3.0	6.1	12.0	15	**42**
139.5	1166.5	42.52	355.6	144.0	43.89	1.37	0.00	0		0	GK	NO RECOVERY, DUE TO CORE TUBE MISLATCH.			1372						0					0.0	0	**0**
144.0	1162.0	43.89	354.2	149.0	45.41	1.52	0.16	10	0.00	0	GK	Granodiorite, very poor recovery, core fell out of tube and was inside the core barrel, medium strong, all core pieces have been ground, calcite, molybdenum, some iron oxide on surfaces.	50	5	32	0	4	3	2	3	12	15	5.7	3.0	5.4	12.0	15	**41**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
149.0	1157.0	45.41	352.7	154.0	46.94	1.52	1.50	98	0.52	34	GK	As above, better recovey, Granodiorite, breccia, basalt clasts, chlorite, calcite on joints, vugs, strong rock, moderately weathered.	50	17	88	0	1	3	2	3	9	15	5.7	7.4	6.2	9.0	15	**43**
154.0	1152.0	46.94	351.1	159.0	48.46	1.52	1.49	98	0.65	43	GK	As above, granodiorite, angular basalt clasts in fine grained matrix, greyish green matrix, mainly matrix supported, medium strong, moderately weathered, calcite and light green clay on joints.	50	10	149	0	4	3	2	3	12	15	5.7	8.8	7.0	12.0	15	**48**
159.0	1147.0	48.46	349.6	163.0	49.68	1.22	1.02	84	0.00	0	GK	As above, granodiorite, highly fractured, shear zone, 4' run.	5	25	41	0	1	3	0	3	7	15	1.5	3.0	5.6	7.0	15	**32**
163.0	1143.0	49.68	348.4	168.0	51.20	1.52	1.48	97	0.20	13	GK	As above, granodiroite, slightly more competent at end of run.	25	17	87	0	1	3	0	3	7	15	3.4	4.5	6.2	7.0	15	**36**
168.0	1138.0	51.20	346.9	173.0	52.73	1.52	1.52	100	0.00	0	GK	As above, granodiorite, highly fractured and sheared, matrix soft and cumbles in parts.	25	17	89	0	1	3	0	3	7	15	3.4	3.0	6.2	7.0	15	**35**
173.0	1133.0	52.73	345.3	178.0	54.25	1.52	1.52	100	0.26	17	GK	As above, granodiorite, more competent, some vertical joints, pyrite and light green clay on joints.	50	22	69	0	4	1	2	3	10	15	5.7	5.0	5.9	10.0	15	**42**
178.0	1128.0	54.25	343.8	183.0	55.78	1.52	1.50	98	0.25	16	GK	As above, granodiorite, calcite veins, calcite, pyrite, and geen clay on joints, some large basalt clasts >12cm.	50	12	125	0	4	1	0	3	8	15	5.7	4.9	6.7	8.0	15	**40**
183.0	1123.0	55.78	342.3	188.0	57.30	1.52	1.44	94	0.29	19	GK	As above, granodiorite, matrix sheared and soft in places, continued shear zone, slickensides on some joints.	50	14	103	0	4	0	0	3	7	15	5.7	5.3	6.4	7.0	15	**39**
188.0	1118.0	57.30	340.8	193.0	58.82	1.52	0.51	33	0.15	10	GK	As above, granodiorite, core stayed in barrel, had to re drill.	50	3	170	0	4	1	0	3	8	15	5.7	4.1	7.2	8.0	15	**40**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
193.0	1113.0	58.82	339.2	198.0	60.35	1.52	1.45	95	0.44	29	GK/B	As above, granodiorite breccia, more clast supported, py/cc veins, cc/green clay on joints, basalt at end.	50	23	63	0	4	1	2	3	10	15	5.7	6.7	5.9	10.0	15	**43**
198.0	1108.0	60.35	337.7	203.0	61.87	1.52	0.90	59	0.17	11	B	Cretaceous basalt, 0.5m shear zone at top of run, poor recovery, dark black, calcite veins, pyrite veins, soft greyish green infill on joint surfaces at end of run, moderately strong, slightly weathered, clay in shear zone.	50	25	36	0	1	3	2	5	11	15	5.7	4.3	5.5	11.0	15	**41**
END OF HOLE																												

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	28JUN'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-238

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1403838 E, 2140885 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 297.2 m / 975 ft
Total Depth: 90.8 m / 298 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter:

From		to			
0	ft	127	ft	PQ3	3.27 "
	m		ft		
127	ft	167	ft	HQ3	2.41 "
	deg		ft		
167	ft	298	ft	NQ3	1.78 "

Logged By: LS/DLP
Reviewed By: LS
Date Started: 28-Jun-11
Date Completed: 05-Jul-11

Drillhole Number: GH11-238

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	975.0	0.00	297.2	159.0	48.46	48.46	12.53	26	0.00	0	OB	OVERBURDEN																
159.0	816.0	48.46	248.7	163.0	49.68	1.22	0.40	33	0.00	0	TX	Tertiary Volcaniclastic Conglomerate, light grey, altered to tan brown, fine grained, very fractured, rubble, pervasive iron oxide staining on joints, some clay on joints, moderately weathered.	40	25	16	0	1	1	2	3	7	15	4.8	3.0	5.2	7.0	15	35
163.0	812.0	49.68	247.5	167.0	50.90	1.22	1.16	95	0.00	0	TX	As above, light grey, altered to tan brown, fine grained, very fractured, rubble, pervasive iron oxide staining on joints, shear zones with clay, moderately weathered.	40	30	39	0	0	1	0	1	2	15	4.8	3.0	5.5	2.0	15	30
167.0	808.0	50.90	246.3	168.0	51.20	0.30	0.00	0		0	TX	No Recovery																

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
168.0	807.0	51.20	246.0	171.3	52.21	1.01	1.01	100	0.00	0	TX	Tertiary Volcaniclastic Conglomerate, very fractured friable pervasive iron oxide staining on joint surfaces and on veins, fine grained, tan brown, moderately weathered, slightly more competent than above.	40	25	40	0	4	3	0	3	10	15	4.8	3.0	5.6	10.0	15	**38**
171.3	803.7	52.21	245.0	173.0	52.73	0.52	0.51	98	0.00	0	TX	As above, more fractures, fine grained but looks like it could have 2cm phenocrysts, difficult to tell due to weathering, pervasive iron staining, moderately weathered, clay in shear zone at top.	30	25	20	0	1	3	2	3	9	15	3.9	3.0	5.3	9.0	15	**36**
173.0	802.0	52.73	244.5	178.0	54.25	1.52	1.48	97	0.22	14	TX	As above, fine grained with clasts up to and > 7cm diameter, inequigranular, tan brown clasts, dark grey matrix, weak to medium strong, moderately weathered, heavey iron oxide staining on joints, some clay in joints.	40	25	59	0	1	3	2	1	7	15	4.8	4.7	5.8	7.0	15	**37**
178.0	797.0	54.25	242.9	183.0	55.78	1.52	1.50	98	0.25	16	TX/TR	As above to 180', iron oxide staining on joints, fault at 180-182', white, soft fault gouge, Starting at 182', Tertiary Rhyolite, light to medium greenish grey porphyritic, manganese oxide and iron oxide on joints.	40	20	75	0	1	3	0	1	5	15	4.8	4.9	6.0	5.0	15	**36**
183.0	792.0	55.78	241.4	188.0	57.30	1.52	1.48	97	0.40	26	TR	Tertiary Rhyolite, fine grained, porphyritic, light grey/tan, medium strong, moderately weathered, iron oxide and manganese oxide on joints and manganese oxide in veins, soft white clay on several joints, highly fractured, vertical joints.	40	25	59	0	1	1	0	3	5	15	4.8	6.3	5.8	5.0	15	**37**
188.0	787.0	57.30	239.9	193.0	58.82	1.52	1.47	96	0.52	34	TR	As above, highly fractured, highly weathered, iron oxide and manganese oxide on joints.	40	25	59	0	1	3	0	3	7	15	4.8	7.4	5.8	7.0	15	**40**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
193.0	782.0	58.82	238.4	198.0	60.35	1.52	0.98	64	0.10	7	TR/TX	As above, shear zone, highly fractured areas of extremely weak rock, soft, continued iron oxide and manganese oxide staining, lithology change 197.8' to Tertiary Volcaniclastic Conglomerate.	25	25	39	0	0	3	0	3	6	15	3.4	3.7	5.5	6.0	15	**34**
198.0	777.0	60.35	236.8	203.0	61.87	1.52	1.52	100	0.53	35	TX	As above to 200', 200-203' is highly fractured shear zone but light greenish grey rock, weak, highly weathered, minor iron oxide staining and no visible manganese oxide.	25	25	61	0	1	3	0	1	5	15	3.4	7.5	5.8	5.0	15	**37**
203.0	772.0	61.87	235.3	208.0	63.40	1.52	1.41	93	0.23	15	TX	As above, Tertiary Volcaniclastic Conglomerate, greenish grey breccia, polylithic clasts, weak to medium strong, moderate to highly weathered, fragmented, iron oxide and manganese oxide staining on joints.	25	20	71	0	1	3	2	3	9	15	3.4	4.8	6.0	9.0	15	**38**
208.0	767.0	63.40	233.8	213.0	64.92	1.52	1.47	96	0.29	19	TX	As above, increased iron oxide and manganese oxide weathering at 211', soft brown clay in joints.	40	20	74	0	4	1	0	3	8	15	4.8	5.3	6.0	8.0	15	**39**
213.0	762.0	64.92	232.3	215.8	65.76	0.84	0.43	51	0.00	0	TX	As above, gouge zone washed away at top of run, fractured pervasive, iron oxide staining.	40	25	17	0	4	3	2	3	12	15	4.8	3.0	5.2	12.0	15	**40**
215.8	759.3	65.76	231.4	218.0	66.44	0.69	0.50	73	0.00	0	TR	As above, lighter coloured, Tertiary Rhyolite, iron oxide staining, small shear zones throughout.	30	25	20	0	4	3	2	3	12	15	3.9	3.0	5.3	12.0	15	**39**
218.0	757.0	66.44	230.7	223.0	67.97	1.52	1.30	85	0.00	0	TR	Tertiary Rhyolite, very fractured/sheared, moderately weathered, pervasive iron staining, shear zones.	40	25	52	0	4	1	2	3	10	15	4.8	3.0	5.7	10.0	15	**39**
223.0	752.0	67.97	229.2	225.0	68.58	0.61	0.25	41	0.00	0	TR	As above, highly fractured, friable, very poor recovery, MnO and FeO staining.	25	25	10	0	1	1	2	3	7	15	3.4	3.0	5.1	7.0	15	**34**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
225.0	750.0	68.58	228.6	228.0	69.49	0.91	0.77	84	0.00	0	TR	As above, better recovery, slightly more competent, iron oxide and manganese oxide staining, rubble.	40	25	31	0	4	1	2	3	10	15	4.8	3.0	5.4	10.0	15	**38**
228.0	747.0	69.49	227.7	233.0	71.01	1.52	1.44	94	0.20	13	TR	As above, much more competent for last 2', less weathered, shear zone/rubble zone at top of run, clay in joints.	40	25	58	0	1	1	2	3	7	15	4.8	4.5	5.8	7.0	15	**37**
233.0	742.0	71.01	226.2	238.0	72.54	1.52	1.45	95	0.00	0	TR	As above, top 6" less weathered then back to dark greyish brown, pervasive iron oxide staining, clay on fractures, manganese dendrites.	40	25	58	0	1	1	2	3	7	15	4.8	3.0	5.8	7.0	15	**36**
238.0	737.0	72.54	224.6	243.0	74.06	1.52	1.31	86	0.00	0	TR	As above, shear zone at top of run, breciated rhyolite, friable, iron oxide and manganese oxide alteration.	30	25	52	0	1	1	2	3	7	15	3.9	3.0	5.7	7.0	15	**35**
243.0	732.0	74.06	223.1	248.0	75.59	1.52	1.41	93	0.00	0	TR	As above, highly fractured with clay infilling, shear zone, iron oxide staining on fractures becoming grey blue at last 1.5'.	30	25	56	0	1	1	2	3	7	15	3.9	3.0	5.8	7.0	15	**35**
248.0	727.0	75.59	221.6	253.0	77.11	1.52	1.51	99	0.26	17	TR	As above, light greenish grey, some competent zones, some rubble zones, iron oxide and clay in fractures, moderately weathered, medium grained to coarse grained.	40	25	60	0	1	1	2	3	7	15	4.8	5.0	5.8	7.0	15	**38**
253.0	722.0	77.11	220.1	258.0	78.63	1.52	1.52	100	0.26	17	TR	As above, shear zones at top, iron oxide on joints, light grey rhyolite, greenish, manganese oxide and iron oxide.	40	20	76	0	1	1	2	3	7	15	4.8	5.0	6.0	7.0	15	**38**
258.0	717.0	78.63	218.5	263.0	80.16	1.52	1.52	100	0.20	13	TR	As above, less iron oxide weathering, brecciated after 2', clay in fractures, light grey to greenish grey.	30	11	138	0	1	1	2	3	7	15	3.9	4.5	6.8	7.0	15	**37**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
263.0	712.0	80.16	217.0	268.0	81.68	1.52	1.44	94	0.00	0	TR	As above, poor recovery, core is sheared, iron oxide and manganese oxide staining, moderately weathered.	30	25	58	0	1	1	2	3	7	15	3.9	3.0	5.8	7.0	15	**35**
268.0	707.0	81.68	215.5	273.0	83.21	1.52	1.40	92	0.16	10	TR/TF	Contact with Tertiary Volcaniclastic Conglomerate, matrix supported, at 270.5', iron oxide on fractures, TR is coarse grained, light grey shear zone, TF is light green matrix, fine grained, angular to rounded fragments, manganese oxide and iron oxide on fractures.	30	20	70	0	1	3	2	3	9	15	3.9	4.2	6.0	9.0	15	**38**
273.0	702.0	83.21	214.0	278.0	84.73	1.52	1.45	95	0.25	16	TF	Continued Tertiary Volcaniclastic, matrix supported, Conglomerate, weak to medium strong, moderately weathered, manganese oxide and iron oxide on joints, sheared.	30	25	58	0	1	1	2	3	7	15	3.9	4.9	5.8	7.0	15	**37**
278.0	697.0	84.73	212.4	283.0	86.25	1.52	1.49	98	0.20	13	TF	As above, sheared, some vertical joints, iron oxide and manganese oxide on joints.	40	25	60	0	1	3	0	3	7	15	4.8	4.5	5.8	7.0	15	**37**
283.0	692.0	86.25	210.9	288.0	87.78	1.52	1.52	100	0.34	22	TF	As above, sheared but more competent than above.	40	25	61	0	1	3	2	3	9	15	4.8	5.7	5.8	9.0	15	**40**
288.0	687.0	87.78	209.4	293.0	89.30	1.52	1.47	96	0.44	29	TF	As above, very broken, more competent at end of run, iron oxide and manganese oxide on joints.	50	25	59	0	1	3	2	3	9	15	5.7	6.7	5.8	9.0	15	**42**
293.0	682.0	89.30	207.9	298.0	90.83	1.52	1.20	79	0.12	8	TF	As above, highly fractured but hard, light greyish green matrix, medium to strong, moderately weathered, possible shera zone at end of run, iron oxide and manganese oxide on joints.	75	25	48	0	1	3	2	3	9	15	7.7	3.9	5.7	9.0	15	**41**
END OF HOLE																												

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	05JUL'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-239

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1402590 E, 2141008 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 318.5 m / 1,045 ft
Total Depth: 80.5 m / 264 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter:

From	to			
0 ft	179 ft	PQ3	3.27 "
	ft		
179 ft	264 ft	HQ3	2.41 "
	ft		
	ft		

Logged By: LS/DLP/SR/AA
Reviewed By: LS
Date Started: 05-Jul-11
Date Completed: 10-Jul-11

Drillhole Number: GH11-239

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
0.0	1045.0	0.00	318.5	173.0	52.73	52.73	11.11	21	0.00	0	OB	OVERBURDEN																
173.0	872.0	52.73	265.8	174.0	53.03	0.30	0.20	66	0.10	33	TM	Tertiary Monzonite, coarse grained, dark greenish grey, porphyritic, strong, massive, slightly weathered, iron oxide on fractures.	75	5	40	0	1	3	2	5	11	15	7.7	7.2	5.5	11.0	15	**46**
174.0	871.0	53.03	265.5	179.0	54.56	1.52	0.60	39	0.00	0	TM	As above, broken into fragments by drilling?, iron oxide on fracture surfaces, Reduce to HQ.	75	25	24	0	1	3	2	5	11	15	7.7	3.0	5.3	11.0	15	**42**
179.0	866.0	54.56	264.0	184.0	56.08	1.52	1.52	100	0.00	0	TM	As above, greenish, reddish, grey-brown, moderately to highly weathered, very weak to strong, very fractured.	25	25	61	0	1	3	2	1	7	15	3.4	3.0	5.8	7.0	15	**34**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
184.0	861.0	56.08	262.4	189.0	57.60	1.52	0.85	56	0.00	0	TM	As above, grey and greenish and reddish brown staining, highly weathered, very weak to weak, very fractured, clay rich.	15	25	34	0	1	3	2	1	7	15	2.5	3.0	5.5	7.0	15	**33**
189.0	856.0	57.60	260.9	194.0	59.13	1.52	1.52	100	0.00	0	TM	As above, grey, reddish iron oxide staining, moderately weathered, very weak to weak, very fractured to rubble.	15	25	61	0	1	3	2	3	9	15	2.5	3.0	5.8	9.0	15	**35**
194.0	851.0	59.13	259.4	199.0	60.65	1.52	1.52	100	0.16	10	TM	As above, grey, reddish brown and yellow staining, moderately weahtered, many fractures, very weak to medium strong, end of run is more competent.	25	25	61	0	1	3	2	3	9	15	3.4	4.2	5.8	9.0	15	**37**
199.0	846.0	60.65	257.9	204.0	62.18	1.52	0.00	0	0.00	0	TM	No recovery.																
204.0	841.0	62.18	256.3	209.0	63.70	1.52	1.40	92	0.67	44	TM	Tertiary Monzonite, dark grey pophyritic, coarse to medium grained, iron oxide staining on the fractures, slightly weathered, lots of drill grind, core fell out of tube and was retrieved from core barrel, mixed with drill cutting at end of run.	75	13	108	0	1	3	2	5	11	15	7.7	9.0	6.4	11.0	15	**49**
209.0	836.0	63.70	254.8	214.0	65.22	1.52	1.52	100	0.63	41	TM	As above, dark grey porphyritic, coarse to medium grained, iron oxide staining in fractures, slightly weathered.	50	11	138	0	1	3	2	5	11	15	5.7	8.6	6.8	11.0	15	**47**
214.0	831.0	65.22	253.3	219.0	66.75	1.52	1.52	100	1.17	77	TM	As above, dark grey prophytic, coarse to medium grained, large white crystals in some joints and in rock along possible joints, slightly weathered, iron oxide staining in some joints and one is filled with soft brown infill.	100	8	190	0	1	3	2	5	11	15	9.4	15.1	7.5	11.0	15	**58**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
219.0	826.0	66.75	251.8	224.0	68.27	1.52	1.40	92	1.07	70	TM	As above, dark grey porphyritic, coarse to medium grained, iron oxide staining in some fractures and purple red stain in others, some joints with hard calcite, slightly weathered.	125	8	175	0	1	3	2	5	11	15	10.9	13.7	7.3	11.0	15	**58**
224.0	821.0	68.27	250.2	229.0	69.80	1.52	1.52	100	1.31	86	TM	As above, dark grey porphyritic, coarse to medium grained with iron oxide stain in some joints and some hard calcite infilling, slightly weathered with some near vertical joints.	200	4	380	0	1	3	2	5	11	15	14.1	17.0	9.6	11.0	15	**67**
229.0	816.0	69.80	248.7	234.0	71.32	1.52	1.52	100	0.92	60	TM	As above, dark grey porphyritic, coarse to medium grained with slight iron oxide staining in some joints, some crushed rock infilling, slightly weathered.	250	11	138	0	4	3	2	5	14	15	15.1	11.9	6.8	14.0	15	**63**
234.0	811.0	71.32	247.2	239.0	72.84	1.52	1.50	98	1.12	73	TM	As above, dark grey prophyritic, coarse to medium grained, hard calcite infilling with light iron oxide staining in some joints and some purple stains in other joints, slightly weathered.	250	7	214	0	4	3	2	5	14	15	15.1	14.4	7.8	14.0	15	**66**
239.0	806.0	72.84	245.7	244.0	74.37	1.52	1.40	92	0.90	59	TM	As above, dark grey, porphyritic, coarse to medium grained, hard calcite infilling, iron oxide stains in some joints, slightly weathered, very strong.	250	10	140	0	4	3	2	5	14	15	15.1	11.6	6.9	14.0	15	**63**
244.0	801.0	74.37	244.1	249.0	75.89	1.52	1.50	98	0.95	62	TM	As above, dark grey, porphyritic, coarse to medium grained, hard calcite infilling, iron oxide stain in some joints, slightly weathered, very strong.	250	8	188	0	4	3	2	5	14	15	15.1	12.2	7.4	14.0	15	**64**
249.0	796.0	75.89	242.6	254.0	77.42	1.52	1.52	100	0.85	56	TM	As above, dark grey, porphyritic, coarse to medium grained, hard calcite infilling, some yellowish infilling, moderately weathered, strong to very strong.	75	9	169	0	4	3	2	3	12	15	7.7	11.0	7.2	12.0	15	**53**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
254.0	791.0	77.42	241.1	259.0	78.94	1.52	1.52	100	1.10	72	TM	As above, dark grey, porphyritic, coarse to medium grained, hard calcite infilling, iron oxide stains in some joints, slightly weathered, very strong.	250	7	217	0	4	3	2	5	14	15	15.1	14.1	7.8	14.0	15	**66**
259.0	786.0	78.94	239.6	264.0	80.46	1.52	1.52	100	1.05	69	TM	As above, dark grey, porphyritic, some calcite staining, very strong, slightly weathered, coarse to medium grained.	250	7	217	0	4	3	2	5	14	15	15.1	13.5	7.8	14.0	15	**65**
END OF HOLE																												

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	10JUL'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-240

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1404684 E, 2141559 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 318.8 m / 1,046 ft
Total Depth: 52.8 m / 173 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 104 ft PQ3 3.27 "
From to ft
Core Diameter: From 104 to 173 ft HQ3 2.41 "
From to ft
From to ft

Logged By: AA/SR
Reviewed By: LS
Date Started: 10-Jul-11
Date Completed: 13-Jul-11

Drillhole Number: GH11-240

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1046.0	0.00	318.8	94.0	28.65	28.65	10.50	37	0.00	0	OB	OVERBURDEN																
94.0	952.0	28.65	290.2	103.0	31.39	2.74	1.61	59	0.00	0	TX	Highly weathered bedrock, Tertiary Volcaniclastic Conglomerate/Breccia, highly fractured, fines, oxide staining.	15	25	64	0	0	1	0	1	2	15	2.5	3.0	5.9	2.0	15	28
103.0	943.0	31.39	287.4	104.0	31.70	0.30	0.30	98	0.00	0	TX	Tertiary Volcaniclastic Breccia, dark grey, blackened on joints, highly fractured, moderately weathered, medium strong, fine grained.	25	25	12	0	1	3	2	3	9	15	3.4	3.0	5.2	9.0	15	36
104.0	942.0	31.70	287.1	108.0	32.92	1.22	1.37	112	0.00	0	TX	As above, grey conglomerate, fine grained with medium to coarse clasts/fragments of purple rock, moderately weathered, hightly fractured with iron oxide staining and granular infilling.	75	25	55	0	1	3	2	3	9	15	7.7	3.0	5.7	9.0	15	40

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL							
108.0	938.0	32.92	285.9	113.0	34.44	1.52	1.52	100	0.00	0	TX	As above, grey conglomerate, fine grained with medium to coarse clasts of purple rock, moderately weathered, hightly fractured with iron oxide staining and granular infilling and some calcite in joints.	100	25	61	0	1	3	2	3	9	15	9.4	3.0	5.8	9.0	15	**42**
113.0	933.0	34.44	284.4	118.0	35.96	1.52	1.42	93	0.18	12	TX	As above, grey conglomerate, fine grained with medium to coarse clasts of purple rock, moderately weathered with lenses of highly weathered rock, highly fractured with iron oxide staining and granular infilling and some calcite in joints.	50	25	57	0	1	3	2	1	7	15	5.7	4.4	5.8	7.0	15	**38**
118.0	928.0	35.96	282.9	123.0	37.49	1.52	1.42	93	0.12	8	TX/TB	As above, dark purple grey, fine grained, moderately weathered, highly fractured with iron oxide staining in joints and calcite in some joints, Tertiary basalt at 118.5'.	75	25	57	0	1	3	2	3	9	15	7.7	3.9	5.8	9.0	15	**41**
123.0	923.0	37.49	281.3	128.0	39.01	1.52	1.52	100	0.21	14	TB	Tertiary Basalt, dark brown, some flow banding.	100	25	61	0	1	3	2	3	9	15	9.4	4.6	5.8	9.0	15	**44**
128.0	918.0	39.01	279.8	133.0	40.54	1.52	1.52	100	0.10	7	TB	As above.	100	25	61	0	1	3	2	3	9	15	9.4	3.7	5.8	9.0	15	**43**
133.0	913.0	40.54	278.3	138.0	42.06	1.52	1.52	100	0.21	14	TB	Tertiary Basalt, dark brown, fine grained, moderately weathered, very fractured with light iron oxide staining, some hard calcite in joints and greenish veins.	200	25	61	0	1	3	2	3	9	15	14.1	4.6	5.8	9.0	15	**49**
138.0	908.0	42.06	276.8	143.0	43.58	1.52	1.43	94	0.34	22	TB	As above, dark grey, fine grained, moderately weathered, very fractured with some hard calcite in joints and large red stained joints.	200	25	57	0	1	3	2	3	9	15	14.1	5.7	5.8	9.0	15	**50**
143.0	903.0	43.58	275.2	148.0	45.11	1.52	1.52	100	0.63	41	TB	As above, dark grey, fine grained, moderately weathered, very fractured with some hard calcite in joints and some dark iron oxide staining.	150	25	61	0	1	3	2	3	9	15	12.2	8.6	5.8	9.0	15	**51**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
148.0	898.0	45.11	273.7	153.0	46.63	1.52	0.95	62	0.00	0	TB	As above, dark grey, fine grained, moderately weathered, highly fractured, calcite in joints and veins, very strong.	200	25	38	0	1	3	2	3	9	15	14.1	3.0	5.5	9.0	15	**47**
153.0	893.0	46.63	272.2	158.0	48.16	1.52	1.30	85	0.00	0	TX	Tertiary Volcaniclastic Breccia, dark grey, reddish (iron oxide) joints, some white (calcite) inclusions, fine grained, moderately - highly weathered, highly fractured - decomposed, weak - medium strong.	25	25	52	0	0	1	0	1	2	15	3.4	3.0	5.7	2.0	15	**29**
158.0	888.0	48.16	270.7	163.0	49.68	1.52	1.52	100	0.30	20	TX	As above, dark grey, white (calcite) phenocrysts, red (iron oxide), green and black colouring on joints, fine grained, moderately weathered, very strong.	200	25	61	0	1	3	2	3	9	15	14.1	5.4	5.8	9.0	15	**49**
163.0	883.0	49.68	269.1	168.0	51.20	1.52	1.52	100	0.25	16	TX	As above, dark grey, white (calcite) phenocrysts, orange-red (iron oxide), blackened joints, fine grained, highly fractured, medium strong - strong.	50	25	61	0	1	3	2	3	9	15	5.7	4.9	5.8	9.0	15	**40**
168.0	878.0	51.20	267.6	173.0	52.73	1.52	1.52	100	0.00	0	TX	As above, dark grey with white (calcite) patches, black and some green on joints, some iron oxide staining, fine grained.	200	25	61	0	1	3	2	3	9	15	14.1	3.0	5.8	9.0	15	**47**
END OF HOLE																												

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	13JUL'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-241

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1401709 E, 2140947 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 320.0 m / 1,050 ft
Total Depth: 123.0 m / 404 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter	From	to			
	0	285 ft	PQ3	3.27 "
		ft		
	285	349 ft	HQ3	2.41 "
		ft		
	349	404 ft	NQ3	1.78 "

Logged By: AA/SR/LS
Reviewed By: LS
Date Started: 14-Jul-11
Date Completed: 22-Jul-11

Drillhole Number: GH11-241

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1050.0	0.00	320.0	329.0	100.27	100.27	21.51	21	0.00	0	OB	OVERBURDEN																
329.0	721.0	100.27	219.8	334.0	101.80	1.52	0.70	46	0.00	0	Y	Highly to Completely Weathered Cretaceous Andesitic Siltstone, clay altered, weak.	5	25	28	0	0	1	0	1	2	15	1.5	3.0	5.4	2.0	15	27
334.0	716.0	101.80	218.2	339.0	103.32	1.52	0.30	20	0.00	0	Y	Highly weathered bedrock, small fragments with clay, possibly washed out.	5	25	12	0	0	1	0	1	2	15	1.5	3.0	5.2	2.0	15	27
339.0	711.0	103.32	216.7	344.0	104.85	1.52	1.22	80	0.00	0	Y	Cretaceous Andesitic Siltstone, dark grey, iron oxide staining on joints, calcite veins, pyrite, fine grained, moderately weathered, medium strong, highly fractured, smooth joints, hard infill.	50	25	49	0	1	1	2	3	7	15	5.7	3.0	5.7	7.0	15	36

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
344.0	706.0	104.85	215.2	349.0	106.37	1.52	1.52	100	0.25	16	Y	As above, dark grey, iron oxide staining on joints, calcite veins, pyrite, fine grained, moderately weathered, medium strong, highly fractured, smooth joints, hard infill.	50	19	80	0	1	1	2	3	7	15	5.7	4.9	6.1	7.0	15	**39**
349.0	701.0	106.37	213.7	354.0	107.89	1.52	1.52	100	0.61	40	Y	As above, fine grained, dark greenish grey, medium strong, slightly weathered, smooth to slightly rough joints, calcite and pyrite veins, some iron oxide staining.	50	22	69	0	1	1	2	5	9	15	5.7	8.4	5.9	9.0	15	**44**
354.0	696.0	107.89	212.1	359.0	109.42	1.52	0.11	7	0.11	7	Y	As above, driller is not sure why very little recovery.	50	2	55	0	1	1	2	5	9	15	5.7	3.8	5.8	9.0	15	**39**
359.0	691.0	109.42	210.6	364.0	110.94	1.52	1.36	89	0.80	52	Y	As above, smooth fractures, calcite on joints, some pyrite veins, medium strong.	50	15	91	0	1	1	4	5	11	15	5.7	10.4	6.2	11.0	15	**48**
364.0	686.0	110.94	209.1	369.0	112.47	1.52	1.49	98	1.33	87	Y	As above, laminated, calcite and pyrite veins.	50	7	213	0	4	1	4	5	14	15	5.7	17.3	7.7	14.0	15	**60**
369.0	681.0	112.47	207.6	374.0	113.99	1.52	1.46	96	1.10	72	Y	As above, some lighter colour laminations, calcite and pyrite veins, smooth joints.	50	8	183	0	4	1	4	6	15	15	5.7	14.1	7.4	15.0	15	**57**
374.0	676.0	113.99	206.1	379.0	115.51	1.52	1.52	100	0.96	63	Y	As above, highly fractured near end of run.	50	20	76	0	1	3	2	6	12	15	5.7	12.3	6.0	12.0	15	**51**
379.0	671.0	115.51	204.5	384.0	117.04	1.52	1.52	100	1.40	92	Y	As above, fine grained, grey to dark grey, greenish and blueish coloring, medium strong, fresh, smooth to slightly rough joints, calcite veins and pyrite throughout.	50	8	190	0	4	1	4	6	15	15	5.7	18.3	7.5	15.0	15	**61**
384.0	666.0	117.04	203.0	389.0	118.56	1.52	1.52	100	1.40	92	Y	As above.	50	7	217	0	4	1	4	6	15	15	5.7	18.3	7.8	15.0	15	**62**
389.0	661.0	118.56	201.5	394.0	120.09	1.52	1.52	100	1.20	79	Y	As above.	50	7	217	0	4	1	4	6	15	15	5.7	15.5	7.8	15.0	15	**59**
394.0	656.0	120.09	200.0	399.0	121.61	1.52	1.52	100	1.25	82	Y	As above, one long, steepy dipping joint .	50	6	253	0	4	1	4	6	15	15	5.7	16.2	8.2	15.0	15	**60**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
399.0	651.0	121.61	198.4	404.0	123.13	1.52	1.52	100	1.20	79	Y	As above.	50	6	253	0	4	1	4	6	15	15	5.7	15.5	8.2	15.0	15	**59**
END OF HOLE																												

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	25JUL'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-242

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1400539 E, 2141281 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 350.5 m / 1,150 ft
Total Depth: 60.9 m / 200 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter	From	to			
	0	85	ft	PQ3	3.27 "
			ft		
	85	200	ft	HQ3	2.41 "
			ft		
			ft		

Logged By: LS/DLP
Reviewed By: LS
Date Started: 23-Jul-11
Date Completed: 27-Jul-11

Drillhole Number: GH11-242

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1150.0	0.00	350.5	79.0	24.08	24.08	3.52	15	0.00	0	OB	OVERBURDEN																
79.0	1071.0	24.08	326.4	80.0	24.38	0.30	0.30	98	0.00	0	Y	Cretaceous Andesitic Siltstone, fine grained, dark grey and bleached white, highly weathered, fractured and broken, Iron oxide staining.	50	25	12	0	0	3	0	1	4	15	5.7	3.0	5.2	4.0	15	33
80.0	1070.0	24.38	326.1	85.0	25.91	1.52	0.74	49	0.00	0	Y	As above.	50	25	30	0	0	3	o	1	4	15	5.7	3.0	5.4	4.0	15	33
85.0	1065.0	25.91	324.6	90.0	27.43	1.52	1.00	66	0.00	0	Y	As above, fine grained andesitic siltstone, grey, heavily veined, highly fractured, pervasive iron staining, hematite on all fracture surfaces.	30	25	40	0	1	1	2	3	7	15	3.9	3.0	5.5	7.0	15	34

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
90.0	1060.0	27.43	323.1	95.0	28.95	1.52	1.38	91	0.00	0	Y	As above, slightly more competent for last two feet, heavily veined, iron staining, very fractured and friable at beginning of run to moderately fractured for last 2 ft, dark grey, fine grained.	25	25	55	0	0	1	2	3	6	15	3.4	3.0	5.8	6.0	15	**33**
95.0	1055.0	28.95	321.6	100.0	30.48	1.52	1.26	83	0.00	0	Y	As above, competent at beginning of run, brecciated for last 1.5 ft, limonite and hematite alteration, very soft and friable in brecciated zone.	25	25	50	0	0	1	0	3	4	15	3.4	3.0	5.7	4.0	15	**31**
100.0	1050.0	30.48	320.0	105.0	32.00	1.52	1.39	91	0.40	26	Y	As above, brecciated zones, some more competent zones that have been subjected to less weathering, clay in fractures	30	25	56	0	0	1	0	3	4	15	3.9	6.3	5.8	4.0	15	**35**
105.0	1045.0	32.00	318.5	110.0	33.53	1.52	1.25	82	0.14	9	Y	As above, limonite and hematite alteration, soft friable and broken rock near end of run.	25	25	50	0	1	1	0	1	3	15	3.4	4.0	5.7	3.0	15	**31**
110.0	1040.0	33.53	317.0	115.0	35.05	1.52	1.40	92	0.00	0	Y	As above, fractured and broken, hematite on joints, second half of run is partially weathered, end of run is more competent.	25	25	56	0	0	1	0	3	4	15	3.4	3.0	5.8	4.0	15	**31**
115.0	1035.0	35.05	315.5	120.0	36.57	1.52	1.52	100	0.22	14	Y	As above, highly fractured but more competent, iron oxide on joints, pyrite throughout, partially weathered.	50	25	61	0	1	1	2	5	9	15	5.7	4.7	5.8	9.0	15	**40**
120.0	1030.0	36.57	313.9	125.0	38.10	1.52	1.50	98	0.30	20	Y	As above, highly fractured, harder than above (silicified?), vertical fractures, clay and iron oxide on joints.	125	25	60	0	1	1	2	5	9	15	10.9	5.4	5.8	9.0	15	**46**
125.0	1025.0	38.10	312.4	130.0	39.62	1.52	1.52	100	0.89	58	Y	As above, vertical joints, sulphide veins.	125	24	63	0	1	1	2	5	9	15	10.9	11.5	5.9	9.0	15	**52**
130.0	1020.0	39.62	310.9	135.0	41.15	1.52	1.50	98	1.32	87	Y	As above, competent, iron oxide and sulphides on joints and in veins.	75	8	188	0	4	1	2	5	12	15	7.7	17.2	7.4	12.0	15	**59**
135.0	1015.0	41.15	309.4	140.0	42.67	1.52	1.47	96	0.36	24	Y	As above, highly fractured, vertical joints.	125	25	59	0	4	1	2	5	12	15	10.9	5.9	5.8	12.0	15	**50**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
140.0	1010.0	42.67	307.9	145.0	44.19	1.52	1.50	98	0.80	52	Y	As above, brecciated, quartz and pyrite veins, iron oxide and light grey clay on joints, vertical joints, only chipped by a rock hammer.	200	13	115	0	1	1	2	5	9	15	14.1	10.4	6.5	9.0	15	**55**
145.0	1005.0	44.19	306.3	150.0	45.72	1.52	1.50	98	0.90	59	Y	As above, not as hard.	110	14	107	0	4	1	2	5	12	15	10.0	11.6	6.4	12.0	15	**55**
150.0	1000.0	45.72	304.8	155.0	47.24	1.52	1.50	98	0.67	44	Y	As above, vertical joints.	110	14	107	0	4	1	2	5	12	15	10.0	9.0	6.4	12.0	15	**52**
155.0	995.0	47.24	303.3	160.0	48.77	1.52	1.52	100	0.10	7	Y	As above, vertical joints, highly fractured, light grey clay and minor iron oxide on joints.	110	25	61	0	4	1	2	5	12	15	10.0	3.7	5.8	12.0	15	**47**
160.0	990.0	48.77	301.8	165.0	50.29	1.52	1.52	100	0.63	41	Y	As above, slightly more cmpetent than above run.	110	22	69	0	4	1	2	5	12	15	10.0	8.6	5.9	12.0	15	**52**
165.0	985.0	50.29	300.2	170.0	51.81	1.52	1.45	95	1.07	70	Y	As above.	110	15	97	0	4	1	2	5	12	15	10.0	13.7	6.3	12.0	15	**57**
170.0	980.0	51.81	298.7	175.0	53.34	1.52	1.52	100	0.80	52	Y/R	As above to 174.2, then Cretaceous Gabbro, pyrite throughout, iron oxide and light grey clay on joints.	110	14	109	0	4	1	2	5	12	15	10.0	10.4	6.5	12.0	15	**54**
175.0	975.0	53.34	297.2	180.0	54.86	1.52	1.50	98	0.72	47	R	As above, broken shear zone at 179-180' with soft gouge material.	110	25	60	0	1	1	0	6	8	15	10.0	9.5	5.8	8.0	15	**48**
180.0	970.0	54.86	295.7	185.0	56.39	1.52	1.40	92	1.15	75	R	As above, competent, unweathered.	110	7	200	0	4	1	2	6	13	15	10.0	14.8	7.6	13.0	15	**60**
185.0	965.0	56.39	294.1	190.0	57.91	1.52	1.51	99	1.44	94	R	As above, competent, unweathered	110	4	378	0	4	1	2	6	13	15	10.0	18.9	9.6	13.0	15	**67**
190.0	960.0	57.91	292.6	195.0	59.43	1.52	1.50	98	1.50	98	R	As above.	110	1	1500	0	4	1	2	6	13	15	10.0	19.8	17.4	13.0	15	**75**
195.0	955.0	59.43	291.1	200.0	60.96	1.52	1.52	100	1.34	88	R	As above, competent.	110	10	152	0	4	1	2	6	13	15	10.0	17.5	7.0	13.0	15	**62**
END OF HOLE																												

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-242\[GH11-242.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	30JUL'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

Knight Piésold CONSULTING

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-243

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1415449 E, 2161635 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 252.4 m / 828 ft
Total Depth: 31.8 m / 104 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 19 ft PQ3 3.27 "
From to ft
Core Diameter: From 19 to 104 ft HQ3 2.41 "
to ft
to ft

Logged By: LS/DLP
Reviewed By: LS
Date Started: 27-Jul-11
Date Completed: 29-Jul-11

Drillhole Number: GH11-243

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	828.0	0.00	252.4	16.0	4.88	4.88	1.90	39	0.00	0	OB	OVERBURDEN																
16.0	812.0	4.88	247.5	19.0	5.79	0.91	0.85	93	0.00	0	TF	Tertiary matrix-supported, volcaniclastic conglomerate, angular to subrounded clasts up to 2cm diameter with varying lithology, fine grained orange brown matrix, moderately weathered, broken, iron oxide staining.	50	25	34	0	1	3	2	3	9	15	5.7	3.0	5.5	9.0	15	38
19.0	809.0	5.79	246.6	24.0	7.31	1.52	1.48	97	0.53	35	TF	As above, iron oxide staining on joints, some brown clay and gouge in joints.	50	19	78	0	1	3	0	3	7	15	5.7	7.5	6.1	7.0	15	41
24.0	804.0	7.31	245.1	29.0	8.84	1.52	1.52	100	0.00	0	TF	As above, highly fractured, brown clay and soft gouge in joints.	30	25	61	0	1	1	0	3	5	15	3.9	3.0	5.8	5.0	15	33

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
29.0	799.0	8.84	243.5	34.0	10.36	1.52	1.47	96	0.35	23	TF	As above, moderately weathered, vertical fractures, brown clay and soft gouge in joints.	50	25	59	0	1	3	0	3	7	15	5.7	5.8	5.8	7.0	15	**39**
34.0	794.0	10.36	242.0	39.0	11.89	1.52	1.49	98	0.50	33	TF	As above.	75	25	60	0	4	3	0	3	10	15	7.7	7.2	5.8	10.0	15	**46**
39.0	789.0	11.89	240.5	44.0	13.41	1.52	1.45	95	0.92	60	TF	As above.	75	20	73	0	1	3	2	3	9	15	7.7	11.9	6.0	9.0	15	**49**
44.0	784.0	13.41	239.0	49.0	14.93	1.52	1.42	93	1.42	93	TF	As above, iron oxide staining for first 5",then dark grey, fine grained matrix of Tertiary volcaniclastic unit, calcite veins, some clay altered clasts, competent, very strong.	200	2	710	0	4	3	2	5	14	15	14.1	18.6	12.6	14.0	15	**74**
49.0	779.0	14.93	237.4	54.0	16.46	1.52	1.52	100	0.79	52	TF	As above to 41", then back to brownish orange, slightly more fractured.	100	11	138	0	4	3	2	3	12	15	9.4	10.3	6.8	12.0	15	**54**
54.0	774.0	16.46	235.9	59.0	17.98	1.52	1.52	100	0.00	0	TF	As above, more fractured, shear zone 1ft from end for 6cm, iron staining.	80	16	95	0	1	1	2	3	7	15	8.0	3.0	6.3	7.0	15	**39**
59.0	769.0	17.98	234.4	64.0	19.51	1.52	1.52	100	1.09	72	TF	As above, back to dark grey for 2.33', more competent, top of run is as above, small shear zones, 5cm.	150	8	190	0	1	1	2	3	7	15	12.2	14.0	7.5	7.0	15	**56**
64.0	764.0	19.51	232.9	69.0	21.03	1.52	1.52	100	1.52	100	TF	Dark grey, fine grained, competent, strong, no fractures, calcite veins.	150	0	1524	0	6	6	6	5	23	15	12.2	20.1	17.6	23.0	15	**88**
69.0	759.0	21.03	231.3	74.0	22.55	1.52	1.52	100	1.32	87	TF	As above, dark grey to last foot, then iron oxide, calcite veins, competent.	100	5	304	0	4	3	2	5	14	15	9.4	17.2	8.8	14.0	15	**64**
74.0	754.0	22.55	229.8	79.0	24.08	1.52	1.52	100	0.96	63	TF	As above, core tube blocked after 6", logged together, iron oxide staining, altered clasts, becomes darker grey at end of run.	100	5	304	0	4	3	2	3	12	15	9.4	12.3	8.8	12.0	15	**58**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
79.0	749.0	24.08	228.3	84.0	25.60	1.52	1.46	96	0.82	54	TF	As above, dark grey for first foot, then back to brown, small shear zone, 5cm, clay altered clasts.	100	12	122	0	1	3	2	3	9	15	9.4	10.7	6.6	9.0	15	**51**
84.0	744.0	25.60	226.8	89.0	27.13	1.52	1.32	87	1.06	70	TF	As above, weathered and fractured at top of run, cuttings on core due to lost circulation, run turns dark grey, calcite veins in last 2.3 ft.	100	6	220	0	1	3	2	3	9	15	9.4	13.6	7.8	9.0	15	**55**
89.0	739.0	27.13	225.2	94.0	28.65	1.52	1.50	98	1.34	88	TF	As above, with some small zones of iron oxide staining, competent.	150	3	500	0	4	3	2	5	14	15	12.2	17.5	10.8	14.0	15	**69**
94.0	734.0	28.65	223.7	99.0	30.17	1.52	1.50	98	1.03	68	TF	As above, iron oxide staining for top 2ft with fractures, small shear zone grades into dark grey rock.	100	5	300	0	1	3	2	5	11	15	9.4	13.2	8.7	11.0	15	**57**
99.0	729.0	30.17	222.2	104.0	31.70	1.52	1.52	100	1.24	81	TF	As above for 18", then back to brown, back to grey for last 2', small shear zones, calcite veins.	100	4	380	0	1	3	2	5	11	15	9.4	16.0	9.6	11.0	15	**61**
END OF HOLE																												

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	10JAN'12	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

Knight Piésold CONSULTING

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-245

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1417380 E, 2163479 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 276.8 m / 908 ft
Total Depth: 33.5 m / 110 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 20 ft PQ3 3.27 "
From to ft
From 20 to 110 ft HQ3 2.41 "
From to ft
From to ft

Logged By: LS/DLP
Reviewed By: LS
Date Started: 30-Jul-11
Date Completed: 31-Jul-11

Drillhole Number: GH11-245

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	908.0	0.00	276.8	17.5	5.33	5.33	1.00	19	0.00	0	OB	OVERBURDEN																
17.5	890.5	5.33	271.4	20.0	6.10	0.76	0.72	94	0.30	39	TBv	Tertiary Basalt, dark greenish brown, hematite and manganese oxide on fractures, medium grained, strong, moderately weathered, competent.	100	9	80	0	4	3	2	3	12	15	9.4	8.2	6.1	12.0	15	51
20.0	888.0	6.10	270.7	25.0	7.62	1.52	1.27	83	0.36	24	TBv	As above, vertical joints, hematite and manganese oxide on fractures.	75	12	106	0	4	3	2	3	12	15	7.7	5.9	6.4	12.0	15	47
25.0	883.0	7.62	269.1	30.0	9.14	1.52	1.49	98	1.03	68	TBv	As above,light brown clay on some joints, highly weathered and weak near end of run.	75	12	124	0	1	3	0	2	6	15	7.7	13.2	6.7	6.0	15	49

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
30.0	878.0	9.14	267.6	35.0	10.67	1.52	1.52	100	1.30	85	TBv	As above, dark green, fine grained, strong, slightly weathered, competent, becomes fresh at 32.3'	110	4	380	0	4	3	2	3	12	15	10.0	16.9	9.6	12.0	15	**64**
35.0	873.0	10.67	266.1	40.0	12.19	1.52	1.51	99	1.32	87	TBv	As above, competent, brown weathering and alteration along fractures, slightly weathered to fresh.	110	2	755	0	4	3	2	5	14	15	10.0	17.2	12.9	14.0	15	**69**
40.0	868.0	12.19	264.6	45.0	13.72	1.52	1.52	100	1.02	67	TBv	As above, first half of run is moderately to slightly weathered and brown with vertical fractures, second half of run is fresh, dark green.	100	15	101	0	4	3	2	3	12	15	9.4	13.1	6.4	12.0	15	**56**
45.0	863.0	13.72	263.0	50.0	15.24	1.52	1.43	94	0.98	64	TBv	As above, fresh to 48', brown and moderately weathered for last 2' of run, light brown clay and gouge on one joints.	125	9	159	0	4	3	0	3	10	15	10.9	12.6	7.1	10.0	15	**56**
50.0	858.0	15.24	261.5	55.0	16.76	1.52	1.52	100	1.28	84	TBv	As above, more competent, same moderately weathered brown areas at beginning of run.	125	5	304	0	4	3	2	5	14	15	10.9	16.6	8.8	14.0	15	**65**
55.0	853.0	16.76	260.0	60.0	18.29	1.52	1.52	100	1.21	79	TBv	As above, light brown clay is several fractures.	110	12	127	0	4	3	2	3	12	15	10.0	15.6	6.7	12.0	15	**59**
60.0	848.0	18.29	258.5	65.0	19.81	1.52	1.49	98	1.21	79	TBv	As above, dark green, medium to coarse grained fragments, white phenocrysts, iron oxide, calcite veins, competent.	150	6	248	0	4	3	2	5	14	15	12.2	15.6	8.1	14.0	15	**65**
65.0	843.0	19.81	256.9	70.0	21.33	1.52	1.50	98	1.44	94	TBv	Dark green to black, basalt, some quartz veins, very competent, white phenocrysts, some healed breccia zones.	200	2	750	0	4	3	2	5	14	15	14.1	18.9	12.9	14.0	15	**75**
70.0	838.0	21.33	255.4	75.0	22.86	1.52	1.52	100	1.45	95	TBv	As above, calcite veins associated with brown alteration haloes, competent very strong rock, dark green, medium grained, slightly weathered.	200	5	304	0	4	3	2	5	14	15	14.1	19.1	8.8	14.0	15	**71**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
75.0	833.0	22.86	253.9	80.0	24.38	1.52	1.52	100	1.39	91	TBv	As above, competent, slightly weathered, medium grained, calcite veins, white phenocrysts, hematite on fractures.	150	4	380	0	4	3	2	5	14	15	12.2	18.2	9.6	14.0	15	**69**
80.0	828.0	24.38	252.4	85.0	25.91	1.52	1.52	100	1.35	89	TBv	As above, dark green with an 8" brownish zone, angular fragments, white phenocrysts, competent.	150	3	507	0	4	3	2	5	14	15	12.2	17.6	10.8	14.0	15	**70**
85.0	823.0	25.91	250.9	90.0	27.43	1.52	1.52	100	1.31	86	TBv	As above, fractured zones in brown zone (8"), cc/quartz veins, dark greenish rock, slightly weathered, competent.	100	4	380	0	1	3	2	5	11	15	9.4	17.0	9.6	11.0	15	**62**
90.0	818.0	27.43	249.3	95.0	28.95	1.52	1.49	98	1.44	94	TBv	As above, very competent, small brown zone, 6" wide 6" from end of run.	150	4	373	0	4	3	2	5	14	15	12.2	18.9	9.5	14.0	15	**70**
95.0	813.0	28.95	247.8	100.0	30.48	1.52	1.47	96	0.98	64	TBv	As above, vertical fracture at top of run, 6" brown zone at 97'	150	7	210	0	4	3	2	5	14	15	12.2	12.6	7.7	14.0	15	**62**
100.0	808.0	30.48	246.3	105.0	32.00	1.52	1.52	100	1.05	69	TBv	As above competent, fresh, vertical fracture at end of run, brown alteration around fracture.	150	3	507	0	4	3	2	5	14	15	12.2	13.5	10.8	14.0	15	**66**
105.0	803.0	32.00	244.8	110.0	33.53	1.52	1.43	94	1.10	72	TBv	As above, possible 3" thick brown and grey clay zone at top of run, hard to tell might just be drill cutting filling void, competent run.	125	4	358	0	4	3	2	5	14	15	10.9	14.1	9.3	14.0	15	**63**
END OF HOLE																												

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	01AUG'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

Knight Piésold CONSULTING

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-246

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1419391 E, 2165240 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 309.7 m / 1,016 ft
Total Depth: 44.0 m / 144 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 9 ft PQ3 3.27 "
From to ft
Core Diameter: From 9 to 144 ft HQ3 2.41 "
to ft
to ft

Logged By: LS/DLP
Reviewed By: LS
Date Started: 01-Aug-11
Date Completed: 04-Aug-11

Drillhole Number: GH11-246

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)											RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1016.0	0.00	309.7	4.0	1.22	1.22	0.15	12	0.00	0	OB	OVERBURDEN																
4.0	1012.0	1.22	308.5	9.0	2.74	1.52	0.80	52	0.31	20	TRb	Tertiary Rhyolite, moderately weathered, massive, creamy white to cream brown, medium to coarse grained, strong, fractured, iron oxides on fractures.	75	15	53	0	1	3	2	3	9	15	7.7	5.5	5.7	9.0	15	43
9.0	1007.0	2.74	306.9	14.0	4.27	1.52	1.52	100	0.00	0	TRb	Reduce to HQ3, Tertiary Rhyolite, as above, iron oxide on fracture surfaces, clay in some sheared/fractured zones, highly, fractured, medium strong, moderately weathered, creamy white.	50	25	61	0	0	3	0	3	6	15	5.7	3.0	5.8	6.0	15	35

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
14.0	1002.0	4.27	305.4	19.0	5.79	1.52	1.36	89	0.17	11	TRb	As above, very highly fractured with some clay in fractures, iron oxide staining, medium to coarse grained, moderately weathered, manganese oxide, creamy white, medium strong.	30	25	54	0	0	3	0	3	6	15	3.9	4.3	5.7	6.0	15	**35**
19.0	997.0	5.79	303.9	24.0	7.31	1.52	1.52	100	0.19	12	TRb	As above, slightly more competent, iron oxide on fractures, banded rhyolite, medium to coarse grained, weak rock.	25	20	76	0	4	3	2	3	12	15	3.4	4.4	6.0	12.0	15	**41**
24.0	992.0	7.31	302.4	29.0	8.84	1.52	1.49	98	0.10	7	TRb	As above, moderately weathered to highly weathered , iron oxide and manganese oxide on joints, soft clay and gouge zones.	50	25	60	0	1	3	0	1	5	15	5.7	3.7	5.8	5.0	15	**35**
29.0	987.0	8.84	300.8	34.0	10.36	1.52	1.52	100	0.63	41	TRb	As above.	50	25	61	0	1	3	0	3	7	15	5.7	8.6	5.8	7.0	15	**42**
34.0	982.0	10.36	299.3	39.0	11.89	1.52	1.52	100	0.86	56	TRb	As above, more competent, moderately weathered, some soft clay blocks off drill.	75	16	95	0	1	3	0	3	7	15	7.7	11.1	6.3	7.0	15	**47**
39.0	977.0	11.89	297.8	44.0	13.41	1.52	1.50	98	0.68	45	TRb	As above, bottom half of run is very competent, 6 cm thick orange brown clay at end of run, moderately weathered.	75	20	75	0	1	3	0	3	7	15	7.7	9.1	6.0	7.0	15	**45**
44.0	972.0	13.41	296.3	49.0	14.93	1.52	1.48	97	0.47	31	TRb	As above, first half of run is heavily weathered with orange brown clay, end of run is more competent and moderately weathered, continued iron oxide and manganese oxide on joints.	75	20	74	0	1	3	0	1	5	15	7.7	6.9	6.0	5.0	15	**41**
49.0	967.0	14.93	294.7	54.0	16.46	1.52	1.49	98	1.02	67	TRb	As above, moderately weathered to slightly weathered, more competent, very strong, pinkish alteration, iron oxide and manganese oxide on joints.	125	10	149	0	4	3	2	3	12	15	10.9	13.1	7.0	12.0	15	**58**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
54.0	962.0	16.46	293.2	59.0	17.98	1.52	1.46	96	0.55	36	TRb	As above, large vertical fractures with iron oxide and manganese oxide, some brown clay in joints, very strong, moderately to slightly weathered.	125	16	91	0	1	3	0	3	7	15	10.9	7.7	6.2	7.0	15	**47**
59.0	957.0	17.98	291.7	64.0	19.51	1.52	1.38	91	0.83	54	TRb	As above, purplish, creamy white, iron oxide on fracture surfaces and in veins, moderately weathered, medium to coarse grained, manganese oxide dendrites, medium strong, much more competent at end of run.	80	10	138	0	1	3	0	3	7	15	8.0	10.8	6.8	7.0	15	**48**
64.0	952.0	19.51	290.2	69.0	21.03	1.52	1.52	100	0.24	16	TRb	As above, hematite, manganese oxide on fractures, small shear zones less than 10 cm, creamy white, medium strong, less competent than end of run above.	80	22	69	0	1	3	2	3	9	15	8.0	4.9	5.9	9.0	15	**43**
69.0	947.0	21.03	288.6	74.0	22.55	1.52	1.50	98	0.31	20	TRb	As above, turning to greyish rhyolite at end of run, small shear zones, iron oxide stained zones, medium to coarse grained, medium strong.	50	16	94	0	1	3	2	3	9	15	5.7	5.5	6.3	9.0	15	**41**
74.0	942.0	22.55	287.1	79.0	24.08	1.52	1.52	100	0.21	14	TRb	As above, only much poorer quality, vugs, grey to dark grey, greenish clay in highly fractured zone.	25	25	61	0	0	3	0	3	6	15	3.4	4.6	5.8	6.0	15	**35**
79.0	937.0	24.08	285.6	84.0	25.60	1.52	1.52	100	0.41	27	TRb	As above, dark brown grey, some brecciated zones, very soft greenish clay at end of run, friable, large dark clasts in conglomerate, 15cm wide.	25	25	61	0	0	3	0	5	8	15	3.4	6.4	5.8	8.0	15	**39**
84.0	932.0	25.60	284.1	89.0	27.13	1.52	1.52	100	0.00	0	TRb	As above, rock is altered to clay, friable to last 6", where it becomes competent.	25	25	61	0	0	3	0	3	6	15	3.4	3.0	5.8	6.0	15	**33**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
89.0	927.0	27.13	282.6	94.0	28.65	1.52	1.52	100	1.09	72	TRb	Banded Rhyolite, dark grey to grey, medium to coarse grained, slightly weathered, medium strong, calcite on fractures.	80	13	117	0	4	3	2	5	14	15	8.0	14.0	6.6	14.0	15	**58**
94.0	922.0	28.65	281.0	99.0	30.17	1.52	1.50	98	0.80	52	TRb	As above, with 9cm wide shear zone, or vein breccia, some smaller shear zones, rock is greenish cream colour, slightly weathered, medium strong.	80	11	136	0	0	3	0	3	6	15	8.0	10.4	6.8	6.0	15	**46**
99.0	917.0	30.17	279.5	104.0	31.70	1.52	1.52	100	1.17	77	TRb	As above, slightly more competent zone with iron oxide and greenish colouration, vugs on core surface, hematite on fracture surfaces, slightly weathered, medium strong.	80	8	190	0	4	3	2	5	14	15	8.0	15.1	7.5	14.0	15	**60**
104.0	912.0	31.70	278.0	109.0	33.22	1.52	1.40	92	0.43	28	TRb	As above, much more iron oxide staining, some grey/white zones, more fractured than run above, hematite on fractures, dendritic manganese oxide, vugs, medium to coarse grained, medium strong.	80	15	93	0	1	3	2	5	11	15	8.0	6.6	6.3	11.0	15	**47**
109.0	907.0	33.22	276.5	114.0	34.75	1.52	1.50	98	0.94	62	TRb	As above, competent though iron oxide weathering at top two feet of run, manganese oxide dendrites, hematite on fractures, medium strong.	80	16	94	0	1	3	2	5	11	15	8.0	12.1	6.3	11.0	15	**52**
114.0	902.0	34.75	274.9	119.0	36.27	1.52	1.47	96	0.73	48	TRb	As above, grey greenish chlorite, iron oxide, vugs on core surface, competent.	80	13	113	0	4	3	2	5	14	15	8.0	9.6	6.5	14.0	15	**53**
119.0	897.0	36.27	273.4	124.0	37.79	1.52	1.43	94	1.09	72	TRb	As above, vugs, greenish grey, slightly weathered.	100	9	159	0	4	3	2	5	14	15	9.4	14.0	7.1	14.0	15	**59**
124.0	892.0	37.79	271.9	129.0	39.32	1.52	1.35	89	0.11	7	TRb	As above, highly fractured, soft greenish grey clay and gouge zones, dark green soft infilling on fractures, slightly weathered, sheared.	25	25	54	0	1	3	0	5	9	15	3.4	3.8	5.7	9.0	15	**37**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
129.0	887.0	39.32	270.4	134.0	40.84	1.52	1.07	70	0.37	24	TRb	As above, continued shear zone, soft green and grey gouge, several pieces of solid rock, areas of washed out material account for low recovery.	25	25	43	0	0	3	0	5	8	15	3.4	6.0	5.6	8.0	15	**38**
134.0	882.0	40.84	268.8	139.0	42.37	1.52	1.50	98	0.36	24	TRb/TXTM	As above, continued shear zone into greyish green volcaniclastic conglomerate unit, weak to very weak, slightly weathered, mainly soft gouge.	25	25	60	0	1	3	0	5	9	15	3.4	5.9	5.8	9.0	15	**39**
139.0	877.0	42.37	267.3	144.0	43.89	1.52	1.52	100	1.26	83	TXTM	End of shear zone, conglomerate unit, competent grey matrix with angular clasts up to cobble size, mixed lithologies.	100	7	217	0	1	3	0	5	9	15	9.4	16.3	7.8	9.0	15	**58**
END OF HOLE																												

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	04AUG'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

Knight Piésold CONSULTING

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-247

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1392555 E, 2163507 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 394.1 m / 1,293 ft
Total Depth: 20.5 m / 67 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter	From	to			
	0	67	ft	PQ3	3.27 "
			ft		
			ft	HQ3	2.41 "
			ft		
			ft		

Logged By: LS/DLP
Reviewed By: LS
Date Started: 04-Aug-11
Date Completed: 07-Aug-11

Drillhole Number: GH11-247

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1293.0	0.00	394.1	67.0	20.42	20.42	3.55	17	0.00	0	OB	OVERBURDEN															
END OF HOLE																											

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	10AUG'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

Knight Piésold CONSULTING

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-274

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1403783 E, 2162423 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 328.6 m / 1,078 ft
Total Depth: 54.7 m / 179 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter	From	to			
	0	31.5 ft	PQ3	3.27 "
		ft		
	31.5	179 ft	HQ3	2.41 "
		ft		
		ft		

Logged By: LS/EEB
Reviewed By: LS
Date Started: 16-Sep-11
Date Completed: 18-Sep-11

Drillhole Number: GH11-274

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1078.0	0.00	328.6	21.0	6.40	6.40	2.20	34	0.00	0	OB	OVERBURDEN																
21.0	1057.0	6.40	322.2	24.0	7.31	0.91	0.65	71	0.00	0	Gs	Highly weathered bedrock, some competent pieces in completely weathered matrix, basically soil like, gravelly, silty SAND, some clay, angular clasts up to 5cm diameter, poorly graded, most weathered material is of a similar size, low to no plasticity, grey, moist.	100	11	59	0	4	3	2	1	10	15	9.4	3.0	5.8	10.0	15	43
24.0	1054.0	7.31	321.3	26.0	7.92	0.61	0.40	66	0.00	0	Gs	Granodiorite, medium grained, porphyritic, grey with zones of yellowish grey limonite/hematite, pyrite crystals throughout, extremely weak, any structure difficult to discern, highly weathered.	1	25	16	0	0	1	0	1	2	15	1.1	3.0	5.2	2.0	15	26

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
26.0	1052.0	7.92	320.6	29.0	8.84	0.91	0.69	75	0.10	11	Gs	As above, only much more competent, visible pyrite veins, some limonite/clay on fractures and veins, dark and light grey, porphyritic, highly weathered, medium strong rock.	25	18	38	0	1	3	2	1	7	15	3.4	4.3	5.5	7.0	15	**35**
29.0	1049.0	8.84	319.7	31.5	9.60	0.76	0.15	20	0.00	0	Gs	As above, pyrite on joint surfaces, medium strong, less limonite, dark grey, some iron oxide on joint surfaces.	25	10	15	0	1	3	2	1	7	15	3.4	3.0	5.2	7.0	15	**34**
31.5	1046.5	9.60	319.0	34.0	10.36	0.76	0.76	100	0.00	0	Gs	Granodiorite, porphyritic, medium to fine grained, grey with lighter grey zones, weak rock, some zones more weathered to clay but stronger than previous run in some areas, moderately to highly weathered, large pyrite veins with large crystals up to 1cm, lots of pyrite throughout, clay and calcite on joint surfaces as well.	25	18	42	0	0	1	0	1	2	15	3.4	3.0	5.6	2.0	15	**29**
34.0	1044.0	10.36	318.2	39.0	11.89	1.52	1.17	77	0.00	0	Gs	As above, highly weathered to clay at end, pyrite throughout, stronger rock at beginning of run, more competent than at end, extremely weak at end of run.	1	18	65	0	0	1	0	1	2	15	1.1	3.0	5.9	2.0	15	**27**
39.0	1039.0	11.89	316.7	44.0	13.41	1.52	1.52	100	0.00	0	Gs	As above, more competent for first half of run, medium grained, porphyritic, dark grey with some lighter zones, moderately weathered, clay, pyrite, calcite, chlorite, iron oxide on joint surfaces, pyrite veins up to 1cm thick.	30	37	41	0	1	1	2	3	7	15	3.9	3.0	5.6	7.0	15	**34**
44.0	1034.0	13.41	315.2	49.0	14.93	1.52	1.52	100	0.29	19	Gs	Granodiorite, as above, medium to fine grained, porphyritic, dark grey, medium strong, moderately weathered, clay, calcite, pyrite, chlorite, iron oxide on joint surfaces, some rubble zones.	30	25	61	0	1	1	2	3	7	15	3.9	5.3	5.8	7.0	15	**37**
49.0	1029.0	14.93	313.6	54.0	16.46	1.52	1.50	98	0.00	0	Gs	As above, rubble zones at top of run, calcite veins, pyrite veins, extremely weak rock at end of run but more competent at beginning of run, medium to fine grained, porphyritic, dark grey.	1	30	50	0	1	1	2	3	7	15	1.1	3.0	5.7	7.0	15	**32**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
54.0	1024.0	16.46	312.1	59.0	17.98	1.52	1.44	94	0.00	0	Gs/TBd/Gs	As above, only highly weathered, possible contact with fault zone at 0.66' into run, rock in fault is possibly a different type, coarse grained, inequigranular, pale green with some lighter green zones, extremely weak, no visible structure, pyrite, calcite, clay in joints.	1	15	96	0	0	1	0	1	2	15	1.1	3.0	6.3	2.0	15	**27**
59.0	1019.0	17.98	310.6	64.0	19.51	1.52	1.52	100	0.33	22	Gs	As above, brecciated, fault zone continues to 1.75', then much more competent granodiorite as before, pyrite veins, rubble zones, calcite veins, some vugs in veins.	1	15	101	0	0	1	0	1	2	15	1.1	5.6	6.4	2.0	15	**30**
64.0	1014.0	19.51	309.1	69.0	21.03	1.52	1.32	87	0.20	13	Gs	As above, rubble zones for top 10cm, then weathered breccia/rubble zone for 1.5', large pyrite veins up to 1cm width, clay filled zones, molybdenite? near top of run, medium to coarse grained, porphyritic, very weak rock.	1	12	110	0	0	3	0	1	4	15	1.1	4.5	6.5	4.0	15	**31**
69.0	1009.0	21.03	307.5	74.0	22.55	1.52	1.47	96	0.14	9	Gs	As above, granodiorite, pyrite veins with crystals up to 1cm, calcite veins, clay, calcite, pyrite, molybdenum on joints, medium grained, moderately weathered, medium strong.	25	25	59	0	0	3	0	3	6	15	3.4	4.0	5.8	6.0	15	**34**
74.0	1004.0	22.55	306.0	79.0	24.08	1.52	1.47	96	0.14	9	Gs	As above, granodiorite, medium to fine grained, dark grey, medium strong, porphyritic, pyrite and calcite veins, moderately weathered.	25	25	59	0	1	1	2	3	7	15	3.4	4.0	5.8	7.0	15	**35**
79.0	999.0	24.08	304.5	84.0	25.60	1.52	1.52	100	0.12	8	Gs	As above, fractured granodiorite, medium grained, moderately weathered, medium strong, grey, porphyritic, chlorite, calcite, clay, pyrite on joints, large pyrite and clay veins ~5cm, calcite on joints.	25	25	61	0	0	3	0	3	6	15	3.4	3.9	5.8	6.0	15	**34**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
84.0	994.0	25.60	303.0	89.0	27.13	1.52	1.52	100	1.02	67	Gs	As above, granodiorite, medium to fine grained, porphyritic, grey to dark grey, medium strong, moderately weathered, pyrite veins with pyrite crystals, more competent.	50	13	117	0	1	1	2	3	7	15	5.7	13.1	6.6	7.0	15	**47**
89.0	989.0	27.13	301.4	94.0	28.65	1.52	1.52	100	0.77	51	Gs/D	As above, granodiorite, grades to darker grey rock, coarse grained to fine grained, moderately weathered, porphyritic, medium strong, pyrite veins and disseminated pyrite.	50	21	72	0	1	1	2	3	7	15	5.7	10.1	6.0	7.0	15	**44**
94.0	984.0	28.65	299.9	99.0	30.17	1.52	1.52	100	1.01	66	D/Gs	As above, granodiorite, dark grey, coarse to fine grained, moderately weathered, porphyritic, medium strong, pyrite veins and disseminated pyrite, calcite on joint surfaces.	50	13	117	0	4	1	2	3	10	15	5.7	13.0	6.6	10.0	15	**50**
99.0	979.0	30.17	298.4	104.0	31.70	1.52	1.52	100	0.53	35	Gs	As above, granodiorite, dark grey, coarse to fine grained, moderately weathered, porphyritic, medium strong, calcite and chlorite veins as well as pyrite veins and disseminated pyrite.	50	27	56	0	4	1	2	3	10	15	5.7	7.5	5.8	10.0	15	**44**
104.0	974.0	31.70	296.9	109.0	33.22	1.52	1.52	100	1.48	97	Gs	As above, granodiorite, dark grey, thinly laminated, coarse to fine grained, moderately weathered, porphyritic, medium strong, pyrite veins and disseminated pyrite, calcite on joint surfaces.	50	15	101	0	4	1	2	3	10	15	5.7	19.5	6.4	10.0	15	**57**
109.0	969.0	33.22	295.4	114.0	34.75	1.52	1.52	100	1.42	93	Gs	As above, granodiorite, light to dark grey, thinly laminated, coarse to fine grained, moderately weathered, porphyritic, medium strong, pyrite veins and disseminated pyrite, calcite on joint surfaces.	50	12	127	0	4	1	2	3	10	15	5.7	18.6	6.7	10.0	15	**56**
114.0	964.0	34.75	293.8	119.0	36.27	1.52	1.50	98	1.12	73	Gs	As above, very strong, competent, disseminated pyrite and pyrite veins, fine grained, aphanitic, dark greenish grey, moderately weathered, calcite, pyrite on joints.	100	9	167	0	4	1	2	3	10	15	9.4	14.4	7.2	10.0	15	**56**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
119.0	959.0	36.27	292.3	124.0	37.79	1.52	1.50	98	0.83	54	Gs	As above, large pyrite veins up to 1cm thick, calcite veins, chlorite, porphyritic, medium to coarse grained, very strong, slightly weathered, greyish green, disseminated pyrite.	100	11	136	0	1	1	2	5	9	15	9.4	10.8	6.8	9.0	15	**51**
124.0	954.0	37.79	290.8	129.0	39.32	1.52	1.52	100	0.83	54	Gs	As above, greyish green, porphyritic, fine to medium grained, disseminated pyrite and pyrite veins, calcite veins, slightly weathered, very strong, pyrite and calcite on joints.	100	14	109	0	4	3	2	5	14	15	9.4	10.8	6.5	14.0	15	**56**
129.0	949.0	39.32	289.3	134.0	40.84	1.52	1.52	100	0.74	49	Gs	Granodiorite, light grey, porphyritic, fine to coarse grained, pyrite veins and disseminated pyrite, slightly weathered, pyrite and calcite on joints, medium strong.	50	13	117	0	1	3	2	5	11	15	5.7	9.8	6.6	11.0	15	**48**
134.0	944.0	40.84	287.7	139.0	42.37	1.52	1.52	100	0.11	7	Gs	Granodiorite, fine to medium grained, porphyritic, grey with lighter grey zones, weak rock, moderately weathered, disseminated pyrite and pyrite veins, brecciated zone near top of run, more competent at end, calcite on fractures.	25	21	72	0	0	1	0	3	4	15	3.4	3.8	6.0	4.0	15	**32**
139.0	939.0	42.37	286.2	144.0	43.89	1.52	1.52	100	0.85	56	Gs/D	Diorite, fine grained, green grey, strong, slightly weathered, pyrite veins, rubble zones, disseminated pyrite, pyrite and calcite on joint surfaces, manganese oxide or molybdenite on one joint.	50	17	89	0	1	1	2	5	9	15	5.7	11.0	6.2	9.0	15	**47**
144.0	934.0	43.89	284.7	149.0	45.41	1.52	1.52	100	1.01	66	D/Gs	As above, diorite, fine to coarse grained, porphyritic, grey to dark grey, medium strong, slightly weathered, pyrite and calcite and epidote in veins and on fracture surfaces, granodiorite at end of run.	50	11	138	0	4	1	2	5	12	15	5.7	13.0	6.8	12.0	15	**52**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
149.0	929.0	45.41	283.2	154.0	46.94	1.52	1.51	99	0.80	52	Gs	Granodiorite, fine to medium grained, porphyritic, grey, medium strong, moderately weathered, pyrite and calcite veins up to 2cm thick, pyrite crystals, calcite and pyrite on joints.	50	13	116	0	1	1	2	3	7	15	5.7	10.4	6.5	7.0	15	**45**
154.0	924.0	46.94	281.6	159.0	48.46	1.52	1.52	100	1.00	66	Gs	As above, competent at beginning of run, disseminated pyrite and in veins and masses, calcite veins, pyrite crystals, strong rock, slightly weathered.	100	12	127	0	1	3	2	5	11	15	9.4	12.8	6.7	11.0	15	**55**
159.0	919.0	48.46	280.1	164.0	49.98	1.52	1.52	100	0.58	38	Gs	As above, granodiorite, fine to medium grained, porphyritic, grey, medium strong, slighly weathered, pyrite disseminated and in veins up to 3cm thick with pyrite crystals, calcite veins, pyrite and calcite on joints.	50	18	84	0	1	1	2	5	9	15	5.7	8.0	6.1	9.0	15	**44**
164.0	914.0	49.98	278.6	169.0	51.51	1.52	1.52	100	0.92	60	Gs	As above, calcite and pyrite veins, clay, calcite, pyrite in fractures.	50	16	95	0	1	1	0	5	7	15	5.7	11.9	6.3	7.0	15	**46**
169.0	909.0	51.51	277.1	174.0	53.03	1.52	1.52	100	1.26	83	Gs/D	As above, very strong, competent, pyrite and calcite veins, dark grey, fine grained, greenish phenocrysts, diorite at end of run.	100	8	190	0	1	1	2	5	9	15	9.4	16.3	7.5	9.0	15	**57**
174.0	904.0	53.03	275.5	179.0	54.56	1.52	1.52	100	0.57	37	D	Diorite, fine to medium grained, porphyritic, dark grey (greenish tinge), slightly weathered, pyrite disseminated and in veins up to 1cm thick, calcite veins, some subvertical fractures, very strong, calcite and pyrite on fracture surfaces.	200	20	76	0	4	3	2	5	14	15	14.1	7.9	6.0	14.0	15	**57**
END OF HOLE																												

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-274\[GH11-274.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	18SEP'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-277

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1398102 E, 2163203 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 515.7 m / 1,692 ft
Total Depth: 90.5 m / 297 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 18 ft PQ3 3.27 "
Core Diameter: From 18 to 297 ft HQ3 2.41 "

Logged By: LS/EEB
Reviewed By: LS
Date Started: 19-Sep-11
Date Completed: 22-Sep-11

Drillhole Number: GH11-277

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
0.0	1692.0	0.00	515.7	13.0	3.96	3.96	1.80	45	0.00	0	OB	OVERBURDEN AND FELSENMEER, fine grained, equigranular, dark grey, medium strong, moderately weathered, iron oxide pervasive on joint surfaces, thinly laminated, some interstitial overburden, rock is highly fractured due to frost heave, angular fragments.																
13.0	1679.0	3.96	511.8	14.5	4.42	0.46	0.46	100	0.12	26	Y	Andesitic Siltstone, fine grained, equigranular, dark grey, thinly laminated, medium strong, moderately weathered, iron oxide pervasive on joint surfaces, pyrite on joint surfaces.	50	7	65	0	4	1	2	3	10	15	5.7	6.3	5.9	10.0	15	**43**
14.5	1677.5	4.42	511.3	18.0	5.49	1.07	0.91	85	0.28	26	Y	Cretaceous Andesitic siltstone, fine grained, equigranular, dark grey, medium strong, moderately weathered, laminated, pervasive hematite (iron oxide) and minor pyrite on joint surfaces, most of core is rubbled.	50	25	36	0	4	1	2	3	10	15	5.7	6.3	5.5	10.0	15	**42**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
18.0	1674.0	5.49	510.2	19.5	5.94	0.46	0.30	66	0.12	26	Y	Andesitic Siltstone, fine grained, equigranular, light to dark grey, medium strong, moderately weathered, laminated, pervasive hematite (iron oxide) and minor pyrite on joint surfaces, oxidation present at joints.	50	12	25	0	1	3	2	3	9	15	5.7	6.3	5.3	9.0	15	**41**
19.0	1673.0	5.79	509.9	24.0	7.31	1.52	1.30	85	0.37	24	Y	Andesitic Siltstone, fine grained, equigranular, light to dark grey, medium strong, moderately weathered, laminated, pervasive hematite (iron oxide) and minor pyrite on joint surfaces, oxidation present at joints.	50	24	54	0	1	1	0	3	5	15	5.7	6.0	5.7	5.0	15	**37**
24.0	1668.0	7.31	508.4	29.0	8.84	1.52	1.52	100	0.38	25	Y	Andesitic Siltstone, fine grained, equigranular, light to dark grey, medium strong, moderately weathered, laminated, pervasive hematite (iron oxide) and minor pyrite on joint surfaces, oxidation present at joints.	50	22	69	0	1	1	2	3	7	15	5.7	6.1	5.9	7.0	15	**40**
29.0	1663.0	8.84	506.9	34.0	10.36	1.52	1.49	98	0.13	9	Y	Cretaceous andesitic siltstone, fine grained, dark grey, black, equigranular, laminated, medium strong, moderately to slightly weathered, iron oxide on joints, pyrite veins.	50	22	68	0	1	1	2	3	7	15	5.7	4.0	5.9	7.0	15	**38**
34.0	1658.0	10.36	505.4	39.0	11.89	1.52	1.52	100	0.13	9	Y	Andesitic Siltstone, fine grained, equigranular, dark grey, medium strong, moderately weathered, thinly laminated, iron oxide on joints, calcite on joints.	50	22	69	0	4	1	2	3	10	15	5.7	4.0	5.9	10.0	15	**41**
39.0	1653.0	11.89	503.8	44.0	13.41	1.52	1.52	100	0.27	18	Y	As above, zone that is slightly more weathered 1' from end of run, iron oxides on joints, limonite, pyrite on joints.	50	22	69	0	1	1	2	3	7	15	5.7	5.1	5.9	7.0	15	**39**
44.0	1648.0	13.41	502.3	48.0	14.63	1.22	1.22	100	0.12	10	Y	As above, calcite, iron oxide on joints, minor pyrite, run blocked.	50	18	68	0	1	1	2	3	7	15	5.7	4.1	5.9	7.0	15	**38**
48.0	1644.0	14.63	501.1	49.4	15.06	0.43	0.42	98	0.00	0	Y	As above, small pyrite veins, iron oxide on joints.	50	8	53	0	4	1	2	3	10	15	5.7	3.0	5.7	10.0	15	**39**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
49.4	1642.6	15.06	500.7	54.5	16.61	1.55	1.55	100	0.26	17	Y	As above, fine grained, equigranular, dark grey, medium strong, slightly to moderately weathered, laminated, iron oxide, calcite, pyrite on joints.	50	27	57	0	1	1	2	3	7	15	5.7	5.0	5.8	7.0	15	**38**
54.5	1637.5	16.61	499.1	59.0	17.98	1.37	1.37	100	0.20	15	Y	As above, some rubble zones, pyrite veins.	50	27	51	0	1	1	2	3	7	15	5.7	4.7	5.7	7.0	15	**38**
59.0	1633.0	17.98	497.7	64.0	19.51	1.52	1.52	100	0.00	0	Y	As above, only much more rubbled/sheared, rods actually get stuck during drilling this run, iron oxide, pyrite, chlorite, hematite on joints.	25	39	39	0	1	1	2	3	7	15	3.4	3.0	5.5	7.0	15	**34**
64.0	1628.0	19.51	496.2	69.0	21.03	1.52	1.46	96	0.45	30	Y	As above, slightly weathered, chlorite, epidote?, iron oxide, pyrite on joint surfaces, rubble zones, pyrite blebs, sheared at end of run, weak.	25	25	58	0	1	1	2	5	9	15	3.4	6.7	5.8	9.0	15	**40**
69.0	1623.0	21.03	494.7	74.0	22.55	1.52	1.42	93	0.14	9	Y	As above, shear zones, core lost in this zone, hematite/limonite on fractures, pyrite, very fractured, weak.	25	30	47	0	1	1	2	5	9	15	3.4	4.0	5.6	9.0	15	**37**
74.0	1618.0	22.55	493.2	79.0	24.08	1.52	1.41	93	0.23	15	Y	As above, fine grained, equigranular, dark grey, weak, slightly weathered, laminated, pyrite veins, iron oxide, pyrite, calcite, limonite on joints, shear/rubble zones.	25	22	64	0	1	1	2	5	9	15	3.4	4.8	5.9	9.0	15	**38**
79.0	1613.0	24.08	491.6	84.0	25.60	1.52	1.40	92	0.27	18	Y	As above, small shear zones.	25	28	50	0	1	1	2	5	9	15	3.4	5.1	5.7	9.0	15	**38**
84.0	1608.0	25.60	490.1	89.0	27.13	1.52	1.19	78	0.00	0	Y	As above, very highly fractured, core is rubble, iron oxide, hematite, pyrite on joint surfaces.	25	25	48	0	1	1	2	5	9	15	3.4	3.0	5.7	9.0	15	**36**
89.0	1603.0	27.13	488.6	94.0	28.65	1.52	1.52	100	0.36	24	Y	As above, fine grained, equigranular, dark grey, weak, slightly weathered, thinly laminated, pyrite, hematite/limonite on joints, rubble/shear zones, some clay.	25	29	52	0	1	1	2	5	9	15	3.4	5.9	5.7	9.0	15	**39**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
94.0	1598.0	28.65	487.1	99.0	30.17	1.52	1.52	100	0.75	49	Y	As above, fine grained, equigranular, dark grey, medium strong, slightly weathered, thinly laminated, pyrite veins, pyrite/iron oxide on fractures.	25	20	76	0	4	1	2	5	12	15	3.4	9.9	6.0	12.0	15	**46**
99.0	1593.0	30.17	485.5	104.0	31.70	1.52	1.52	100	0.51	33	Y	As above, fine grained, equigranular, dark grey, very weak, moderately weathered, thinly laminated, pyrite, calcite, iron oxide on joints, one zone highly weathered to clay, 102 to 103'.	5	25	61	0	0	1	0	3	4	15	1.5	7.3	5.8	4.0	15	**34**
104.0	1588.0	31.70	484.0	109.0	33.22	1.52	1.52	100	0.88	58	Y	Andesitic Siltstone, fine grained, dark grey, medium strong, thinly laminated, moderately weathered, pyrite and iron oxide on joints, pyrite veins.	50	24	63	0	1	1	2	3	7	15	5.7	11.4	5.9	7.0	15	**45**
109.0	1583.0	33.22	482.5	114.0	34.75	1.52	1.52	100	0.77	51	Y	As above, dark grey, medium strong, thinly laminated, moderately weathered, pyrite, iron oxide and calcite on joints, pyrite veins, one jointed section has many thin fractures.	50	25	61	0	4	3	2	5	14	15	5.7	10.1	5.8	14.0	15	**51**
114.0	1578.0	34.75	481.0	119.0	36.27	1.52	1.52	100	1.45	95	Y	As above, dark grey, medium strong, thinly laminated, moderately weathered, soft infill, pyrite, iron oxide and calcite on joints, veins of pyrite.	50	8	190	0	1	1	2	3	7	15	5.7	19.1	7.5	7.0	15	**54**
119.0	1573.0	36.27	479.5	124.0	37.79	1.52	1.52	100	0.54	35	Y	As above, light to dark grey, medium strong, thinly laminated, moderately weathered, soft infill, pyrite, iron oxide and calcite on joints, pyrite veins.	50	15	101	0	1	1	2	3	7	15	5.7	7.6	6.4	7.0	15	**42**
124.0	1568.0	37.79	477.9	129.0	39.32	1.52	1.52	100	0.82	54	Y	As above, dark grey, medium strong, thinly laminated, moderately weathered, soft infill, calcite and greenish blue infill, pyrite veins.	50	18	84	0	1	1	2	5	9	15	5.7	10.7	6.1	9.0	15	**46**
129.0	1563.0	39.32	476.4	134.0	40.84	1.52	1.52	100	1.28	84	Y	As above, dark grey, medium strong, thinly laminated, moderately weathered, soft infill, calcite and greenish blue infill, veins of pyrite.	50	15	101	0	4	1	2	5	12	15	5.7	16.6	6.4	12.0	15	**56**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
134.0	1558.0	40.84	474.9	139.0	42.37	1.52	1.52	100	1.52	100	Y	As above, dark grey with light bands, medium strong, thinly laminated, slightly weathered, soft infill, calcite and greenish blue infill, pyrite veins.	50	7	217	0	4	1	2	5	12	15	5.7	20.1	7.8	12.0	15	**61**
139.0	1553.0	42.37	473.4	144.0	43.89	1.52	1.52	100	1.46	96	Y	As above, dark and light grey, a little blueish, medium strong, thinly laminated, slightly weathered, soft infill, pyrite and greenish blue infill, pyrite in veins.	50	7	217	0	4	1	2	5	12	15	5.7	19.2	7.8	12.0	15	**60**
144.0	1548.0	43.89	471.8	149.0	45.41	1.52	1.52	100	1.52	100	Y	As above, dark and light grey,a little blueish, medium strong, thinly laminated, slightly weathered, soft infill, pyrite and greenish blue infill, pyrite veins.	50	8	190	0	4	1	2	5	12	15	5.7	20.1	7.5	12.0	15	**60**
149.0	1543.0	45.41	470.3	154.0	46.94	1.52	1.52	100	1.41	93	Y	As above, dark and light grey, a little blueish, medium strong, thinly laminated, slightly weathered, soft infill, pyrite, calcite and greenish blue infill, veins of pyrite.	50	9	169	0	4	1	2	5	12	15	5.7	18.5	7.2	12.0	15	**58**
154.0	1538.0	46.94	468.8	159.0	48.46	1.52	1.52	100	1.44	94	Y	As above, dark grey, a little blueish with lighter bands, medium strong, thinly laminated, moderately weathered, soft infill, pyrite and greenish blue infill, pyrite veins.	50	27	56	0	4	1	2	5	12	15	5.7	18.9	5.8	12.0	15	**57**
159.0	1533.0	48.46	467.3	164.0	49.98	1.52	1.52	100	1.23	81	Y	As above, dark grey, a little blueish with lighter bands, medium strong, thinly laminated, moderately weathered, soft infill, pyrite and greenish blue infill, pyrite veins.	50	16	95	0	4	1	2	5	0	15	5.7	15.9	6.3	0.0	15	**43**
164.0	1528.0	49.98	465.7	169.0	51.51	1.52	1.52	100	1.29	85	Y	As above, dark grey, a little blueish with lighter bands, medium strong, thinly laminated, moderately weathered, soft infill, pyrite and calcite infill, pyrite veins.	50	18	84	0	4	1	2	5	0	15	5.7	16.7	6.1	0.0	15	**44**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
169.0	1523.0	51.51	464.2	174.0	53.03	1.52	1.52	100	0.60	39	Y	As above, dark grey to black with light grey bands, medium strong, thinly laminated, moderately weathered, soft infill, pyrite and blue clayish infill, veins of pyrite, highly fractured at top of run.	50	25	61	0	1	1	2	5	0	15	5.7	8.2	5.8	0.0	15	**35**
174.0	1518.0	53.03	462.7	179.0	54.56	1.52	1.52	100	1.32	87	Y	As above, dark and light grey, medium strong, thinly laminated, moderately weathered, soft infill, pyrite, blue and brown infill, pyrite veins, rubble zone.	50	13	117	0	1	1	2	5	9	15	5.7	17.2	6.6	9.0	15	**53**
179.0	1513.0	54.56	461.2	184.0	56.08	1.52	1.52	100	1.52	100	Y	As above, dark grey, medium strong, thinly laminated, moderately weathered, soft infill, greenish blue infill, calcite and pyrite, veins of pyrite.	50	6	253	0	4	1	2	5	12	15	5.7	20.1	8.2	12.0	15	**61**
184.0	1508.0	56.08	459.6	189.0	57.60	1.52	1.52	100	1.44	94	Y	As above, dark to light grey, medium strong, thinly laminated, moderately weathered, soft infill, white & greenish blue infill, calcite and pyrite, pyrite veins.	50	15	101	0	4	1	2	5	12	15	5.7	18.9	6.4	12.0	15	**58**
189.0	1503.0	57.60	458.1	194.0	59.13	1.52	1.52	100	1.32	87	Y	As above, dark to light grey, medium strong, thinly laminated, moderately weathered, soft infill, white & greenish blue infill, calcite and pyrite, pyrite veins.	50	19	80	0	4	1	2	5	12	15	5.7	17.2	6.1	12.0	15	**56**
194.0	1498.0	59.13	456.6	199.0	60.65	1.52	1.52	100	1.37	90	Y	As above, dark grey, medium strong, thinly laminated, moderately weathered, soft infill, blueish infill, pyrite in joints and veins.	50	14	109	0	4	1	2	5	12	15	5.7	17.9	6.5	12.0	15	**57**
199.0	1493.0	60.65	455.1	204.0	62.18	1.52	1.52	100	0.98	64	Y	As above, fine grained, dark grey, equigranular, medium strong, slightly weathered, laminated, pyrite, chlorite, calcite on joints.	50	15	101	0	4	1	2	5	12	15	5.7	12.6	6.4	12.0	15	**52**
204.0	1488.0	62.18	453.5	209.0	63.70	1.52	1.49	98	0.70	46	Y	As above, calcite veins, fine grained, equigranular, dark grey, medium strong, slighlty weathered, laminated, pyrite, calcite, chlorite on joints.	50	18	83	0	4	1	2	5	12	15	5.7	9.3	6.1	12.0	15	**48**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
209.0	1483.0	63.70	452.0	214.0	65.22	1.52	0.08	5	0.00	0	Y	As above, only 3" of core recovered, the rest is missing.	50	3	27	0	4	1	2	5	12	15	5.7	3.0	5.4	12.0	15	**41**
214.0	1478.0	65.22	450.5	219.0	66.75	1.52	0.00	0			Y	NO RECOVERY DUE TO TUBE MISLATCH, IT WAS LATER DISCOVERED THAT CORE HAD FALLEN OUT OF THE TUBE AND WAS STUCK IN THE CORE BARREL.																
219.0	1473.0	66.75	449.0	224.0	68.27	1.52	0.00	0			Y?	NO RECOVERY, AS ABOVE.																
224.0	1468.0	68.27	447.4	229.0	69.80	1.52	0.00	0			Y?	NO RECOVERY, AS ABOVE.																
229.0	1463.0	69.80	445.9	234.0	71.32	1.52	0.00	0			Y?	NO RECOVERY, AS ABOVE.																
234.0	1458.0	71.32	444.4	239.0	72.84	1.52	0.00	0			Y?	NO RECOVERY, AS ABOVE.																
239.0	1453.0	72.84	442.9	241.4	73.58	0.73	0.00	0			Y?	NO RECOVERY, AS ABOVE.																
241.4	1450.6	73.58	442.1	244.0	74.37	0.79	0.00	0			Y?	NO RECOVERY, AS ABOVE.																
244.0	1448.0	74.37	441.4	249.0	75.89	1.52	0.00	0			Y?	NO RECOVERY, AS ABOVE.																
249.0	1443.0	75.89	439.8	254.0	77.42	1.52	0.00	0			Y?	NO RECOVERY, AS ABOVE.																
254.0	1438.0	77.42	438.3	259.0	78.94	1.52	0.00	0			Y?	NO RECOVERY, AS ABOVE.																
259.0	1433.0	78.94	436.8	264.0	80.46	1.52	0.00	0			Y?	NO RECOVERY, AS ABOVE.																
264.0	1428.0	80.46	435.3	269.0	81.99	1.52	0.00	0			Y?	NO RECOVERY, AS ABOVE.																
269.0	1423.0	81.99	433.7	274.0	83.51	1.52	1.39	91	0.40	26	Y	First 0.76m of run is redrilled material, Siltstone, fine grained, equigranular, dark grey, medium strong, slightly weathered, laminated, pyrite, chlorite, calcite on fractures.	50	9	154	0	4	1	2	5	12	15	5.7	6.3	7.0	12.0	15	**46**
274.0	1418.0	83.51	432.2	279.0	85.04	1.52	1.52	100	0.00	0	Y	As above, only rock is purplish grey, calcite veins, vugs in core with calcite crystals, vertical fractures, pyrite, calcite, chlorite in joints.	50	21	72	0	4	1	2	5	12	15	5.7	3.0	6.0	12.0	15	**42**
279.0	1413.0	85.04	430.7	284.0	86.56	1.52	1.52	100	0.24	16	Y	As above, brownish purplish grey, fine grained, equigranular, medium strong, slightly weathered, shear zones, pyrite, chlorite, calcite on joints and in veins, pyrite crystals in shear zone, slickenslides on some joints.	50	26	58	0	1	0	0	5	6	15	5.7	4.9	5.8	6.0	15	**37**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
284.0	1408.0	86.56	429.2	289.0	88.08	1.52	1.52	100	0.40	26	Y	As above, run blocked about 1' into it, dark grey siltstone, fine grained, fractured, laminated, chlorite, pyrite, calcite on fractures.	50	29	52	0	4	1	2	5	12	15	5.7	6.3	5.7	12.0	15	**45**
289.0	1403.0	88.08	427.6	294.0	89.61	1.52	1.52	100	0.46	30	Y	As above, fine grained, equigranular, dark grey with lighter grey zones, slightly weathered, laminated, medium strong, pyrite,calcite, chlorite on joints and in veins.	50	18	84	0	1	1	2	5	9	15	5.7	6.8	6.1	9.0	15	**43**
294.0	1398.0	89.61	426.1	297.0	90.52	0.91	0.90	98	0.50	55	Y	As above, slightly more competent, fine grained, equigranular, dark grey with lighter grey zones, slightly weathered, laminated, medium strong, pyrite,calcite, chlorite on joints and in veins.	50	9	100	0	4	1	2	5	12	15	5.7	10.8	6.3	12.0	15	**50**
END OF HOLE																												

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-277\[GH11-277.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	23SEP'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-281

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1397396 E, 2162779 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 484.9 m / 1,591 ft
Total Depth: 51.5 m / 169 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 19 ft PQ3 3.27 "
Core Diameter: From 19 to 169 ft HQ3 2.41 "

Logged By: LS/EEB
Reviewed By: LS
Date Started: 23-Sep-11
Date Completed: 26-Sep-11

Drillhole Number: GH11-281

Print Jan/26/12 14:17:20

DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1591.0	0.00	484.9	9.0	2.74	2.74	1.12	41	0.00	0	OB	OVERBURDEN																
9.0	1582.0	2.74	482.2	14.0	4.27	1.52	1.30	85	0.00	0	D	Diorite, fine to medium grained, equigranular, greenish grey, medium strong, moderately weathered, highly fractured, hematite on joints, pyrite, clay on joints.	50	25	52	0	1	1	2	3	7	15	5.7	3.0	5.7	7.0	15	36
14.0	1577.0	4.27	480.7	19.0	5.79	1.52	1.40	92	0.00	0	Y	Siltstone/sandstone, fine to medium grained, equigranular, dark grey with some black and light grey zones, strong, moderately weathered, laminated, hematite, pyrite, calcite on fractures.	50	25	56	0	1	1	2	3	7	15	5.7	3.0	5.8	7.0	15	36

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
19.0	1572.0	5.79	479.1	24.0	7.31	1.52	1.44	94	0.55	36	Y	Siltstone/sandstone, fine to medium grained, equigranular, dark grey with some black and light grey zones, strong, moderately weathered, laminated, hematite, pyrite, calcite on fractures.	50	13	111	0	4	1	2	3	10	15	5.7	7.7	6.5	10.0	15	**45**
24.0	1567.0	7.31	477.6	29.0	8.84	1.52	1.43	94	0.30	20	Y	As above, pyrite veins, fine grained, equigranular, dark grey with light grey zones, strong, moderately weathered, laminated, hematite, pyrite, calcite on fractures.	50	13	110	0	4	1	2	3	10	15	5.7	5.4	6.5	10.0	15	**43**
29.0	1562.0	8.84	476.1	34.0	10.36	1.52	1.52	100	0.45	30	Y	As above, subvertical fractures.	50	20	76	0	1	1	0	3	5	15	5.7	6.7	6.0	5.0	15	**38**
34.0	1557.0	10.36	474.6	39.0	11.89	1.52	1.52	100	1.05	69	Y	As above, less hematite on fractures, pyrite veins, strong.	100	16	95	0	4	1	2	5	12	15	9.4	13.5	6.3	12.0	15	**56**
39.0	1552.0	11.89	473.1	44.0	13.41	1.52	1.52	100	1.04	68	Y	As above, fine to medium grained, equigranular, dark grey with grey zones, strong, slightly weathered, laminated, hematite, calcite.	100	14	109	0	4	1	2	5	12	15	9.4	13.4	6.5	12.0	15	**56**
44.0	1547.0	13.41	471.5	49.0	14.93	1.52	1.52	100	0.31	20	Y	As above, fine to medium grained, equigranular, dark grey with brown grey zones, medium strong, slightly weathered, laminated, calcite, pyrite, hematite in joints, subvertical joints.	50	17	89	0	1	1	2	5	9	15	5.7	5.5	6.2	9.0	15	**41**
49.0	1542.0	14.93	470.0	54.0	16.46	1.52	1.50	98	0.49	32	Y	As above, rubble zone 1' from end, more competent at beginning of run, pyrite, hematite, calcite on joints.	50	17	88	0	1	1	2	5	9	15	5.7	7.1	6.2	9.0	15	**43**
54.0	1537.0	16.46	468.5	59.0	17.98	1.52	1.52	100	0.80	52	Y	As above, fine grained, equigranular, dark grey with lighter grey zones, strong, slightly weathered, laminated, hematite, pyrite, calcite, chlorite on fractures, pyrite veins with crystals.	75	13	117	0	1	1	2	5	9	15	7.7	10.4	6.6	9.0	15	**49**
59.0	1532.0	17.98	467.0	64.0	19.51	1.52	1.51	99	0.78	51	Y	As above, rubble zone near top of run, pyrite veins, chlorite, calcite on joints.	50	14	108	0	1	1	2	5	9	15	5.7	10.2	6.4	9.0	15	**46**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
64.0	1527.0	19.51	465.4	69.0	21.03	1.52	1.52	100	1.13	74	Y	Siltstone/sandstone, fine to medium grained, equigranular, dark grey with some lighter grey zones, very strong, slightly weathered, laminated, pyrite veins, pyrite, calcite on joints, competent.	200	8	190	0	4	1	2	5	12	15	14.1	14.5	7.5	12.0	15	**63**
										S																		
69.0	1522.0	21.03	463.9	74.0	22.55	1.52	1.51	99	1.43	94	Y	As above, more competent, calcite, pyrite veins, laminated, UCS sample 72 - 73'.	200	6	252	0	4	1	2	5	12	15	14.1	18.8	8.2	12.0	15	**68**
74.0	1517.0	22.55	462.4	79.0	24.08	1.52	1.52	100	1.03	68	Y	Siltstone, silicified?, fine grained, equigranular, dark grey, very strong, slightly weathered, laminated, calcite, pyrite veins.	200	11	138	0	4	1	2	5	12	15	14.1	13.2	6.8	12.0	15	**61**
79.0	1512.0	24.08	460.9	84.0	25.60	1.52	1.52	100	1.42	93	Y	Siltstone, equigranular, dark greenish grey, very strong, laminated, slightly weathered, soft infill, calcite, vein and disseminated pyrite.	200	11	138	0	4	1	2	5	12	15	14.1	18.6	6.8	12.0	15	**67**
84.0	1507.0	25.60	459.3	89.0	27.13	1.52	1.52	100	1.52	100	Y	Siltstone, equigranular, dark greenish grey, very strong, laminated, slightly weathered, soft infill, calcite, light and dark green, vein and disseminated pyrite.	200	10	152	0	4	1	2	5	12	15	14.1	20.1	7.0	12.0	15	**68**
89.0	1502.0	27.13	457.8	94.0	28.65	1.52	1.52	100	1.50	98	Y	Siltstone, equigranular, light and dark greenish grey, very strong, laminated, slightly weathered, soft infill, calcite, light green infill, vein and disseminated pyrite.	100	3	507	0	4	1	2	5	12	15	9.4	19.8	10.8	12.0	15	**67**
94.0	1497.0	28.65	456.3	99.0	30.17	1.52	1.52	100	1.52	100	Y	Siltstone, equigranular, light and dark greenish grey, very strong, laminated, slightly weathered, soft infill, calcite, light and dark green infill, vein and disseminated pyrite.	200	8	190	0	4	1	2	5	12	15	14.1	20.1	7.5	12.0	15	**69**
99.0	1492.0	30.17	454.8	104.0	31.70	1.52	1.52	100	1.52	100	Y	Siltstone, equigranular, light and dark greenish grey, very strong, laminated, slightly weathered, soft infill, calcite, green infill, vein and disseminated pyrite.	200	6	253	0	4	1	2	5	12	15	14.1	20.1	8.2	12.0	15	**69**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
104.0	1487.0	31.70	453.2	109.0	33.22	1.52	1.52	100	1.52	100	Y	Siltstone, equigranular, light and dark greenish grey, very strong, slightly weathered, soft infill, calcite, green infill, vein and disseminated pyrite.	200	5	304	0	4	1	2	5	12	15	14.1	20.1	8.8	12.0	15	**70**
109.0	1482.0	33.22	451.7	114.0	34.75	1.52	1.52	100	1.52	100	Y	Siltstone, equigranular, light and dark greenish grey, very strong, slightly weathered, soft infill, calcite, green infill, vein and disseminated pyrite.	200	5	304	0	4	1	2	5	12	15	14.1	20.1	8.8	12.0	15	**70**
114.0	1477.0	34.75	450.2	118.0	35.96	1.22	1.00	82	0.85	70	Y	Siltstone, equigranular, light and dark greenish grey, strong, moderately weathered, soft infill, calcite, light and dark green infill, vein and disseminated pyrite, fractured.	75	12	83	0	1	1	2	5	9	15	7.7	13.6	6.1	9.0	15	**51**
118.0	1473.0	35.96	449.0	119.0	36.27	0.30	0.25	82	0.00	0	Y	Siltstone, equigranular, dark grey, moderately weathered, soft infill, calcite, pyrite, green infill, very fractured.	50	25	10	0	1	1	2	5	9	15	5.7	3.0	5.1	9.0	15	**38**
119.0	1472.0	36.27	448.7	121.3	36.97	0.70	0.70	100	0.00	0	Y	Siltstone, equigranular, dark grey, moderately weathered, soft infill, calcite, pyrite, green infill, very fractured.	50	25	28	0	1	1	2	5	9	15	5.7	3.0	5.4	9.0	15	**38**
121.3	1469.7	36.97	448.0	124.0	37.79	0.82	0.82	100	0.00	0	Y	Siltstone, equigranular, light and dark greenish grey, strong, moderately weathered, soft infill, light and dark green and black infill, pyrite, fractured.	100	23	36	0	4	1	2	5	12	15	9.4	3.0	5.5	12.0	15	**45**
124.0	1467.0	37.79	447.1	129.0	39.32	1.52	1.52	100	1.37	90	Y	Siltstone, equigranular, light and dark grey, medium strong, slightly weathered, soft infill, light and dark green infill, pyrite, 2 mm pyrite vein.	50	18	84	0	1	1	2	5	9	15	5.7	17.9	6.1	9.0	15	**54**
129.0	1462.0	39.32	445.6	134.0	40.84	1.52	1.52	100	1.27	83	Y	Siltstone, equigranular, light and dark grey, very strong, slightly weathered, soft infill, calcite & light green infill, pyrite infill, vein and disseminated pyrite.	200	17	89	0	4	1	2	5	12	15	14.1	16.5	6.2	12.0	15	**64**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
134.0	1457.0	40.84	444.1	138.0	42.06	1.22	1.07	88	0.76	62	Y	Siltstone, equigranular, light and dark grey, very strong, moderately weathered, soft infill, calcite & light green infill, pyrite infill, vein and disseminated pyrite, fractured.	50	11	97	0	4	1	2	5	12	15	5.7	12.2	6.3	12.0	15	**51**
138.0	1453.0	42.06	442.9	139.0	42.37	0.30	0.30	98	0.00	0	Y	Siltstone, equigranular, light and dark grey, medium strong, moderately weathered, soft infill, calcite & light green infill, pyrite infill, fractured.	50	6	50	0	4	1	2	5	12	15	5.7	3.0	5.7	12.0	15	**41**
139.0	1452.0	42.37	442.6	143.0	43.58	1.22	1.18	97	0.00	0	Y	Siltstone, equigranular, light and dark grey, medium strong, moderately weathered, soft infill, calcite & light green infill, pyrite infill, highly fractured, 139-139.2' is a rubble zone.	100	25	47	0	4	1	2	5	12	15	9.4	3.0	5.6	12.0	15	**45**
143.0	1448.0	43.58	441.4	144.0	43.89	0.30	0.30	98	0.30	98	Y	Siltstone, equigranular, light and dark grey, very strong, moderately weathered, soft infill, calcite & light green infill, pyrite infill, fractured.	200	6	50	0	4	1	2	5	12	15	14.1	19.8	5.7	12.0	15	**67**
144.0	1447.0	43.89	441.0	146.0	44.50	0.61	0.30	49	0.00	0	Y	Siltstone, equigranular, light and dark grey, medium strong, moderately weathered, soft infill, calcite & light green infill, pyrite infill, highly fractured.	50	25	12	0	4	1	2	5	12	15	5.7	3.0	5.2	12.0	15	**41**
146.0	1445.0	44.50	440.4	149.0	45.41	0.91	0.91	100	0.80	87	YZ	Siltstone, Light and dark grey, medium strong, moderately weathered, soft infill, calcite, clay & light green infill, pyrite infill, highly fractured, 147.9-149.0' is fault gouge.	50	10	91	0	0	1	0	3	4	15	5.7	17.4	6.2	4.0	15	**48**
149.0	1442.0	45.41	439.5	154.0	46.94	1.52	1.34	88	1.24	81	YZ	Fault, light and dark grey, white, brown, weak, highly weathered, soft infill, calcite, clay, and green infill.	25	4	335	0	4	1	0	5	10	15	3.4	16.0	9.1	10.0	15	**54**
154.0	1437.0	46.94	438.0	159.0	48.46	1.52	1.25	82	0.00	0	YZ/Y	As above, less clay at beginning of run, broken fine grained siltstone/sandstone, equigranular, light and dark grey, medium strong, rubble zones, pyrite, calcite on joints.	10	25	50	0	1	3	2	5	11	15	2.0	3.0	5.7	11.0	15	**37**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
159.0	1432.0	48.46	436.5	164.0	49.98	1.52	1.52	100	0.37	24	Y	Fine grained siltstone/sandstone, more competent, equigranular, light and dark grey, medium strong, rubble zones/shear, pyrite, calcite on joints.	25	25	61	0	1	1	2	5	9	15	3.4	6.0	5.8	9.0	15	**39**
164.0	1427.0	49.98	435.0	169.0	51.51	1.52	0.61	40	0.00	0	Y	As above, light and dark grey, medium strong, rubble/shear zones, pyrite, calcite on joints, lost a lot of recovery, finer material was likely washed out.	25	25	24	0	1	1	2	5	9	15	3.4	3.0	5.3	9.0	15	**36**
END OF HOLE																												

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-281\[GH11-281.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	29SEP'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-287

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1398646 E, 2161591 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 478.2 m / 1,569 ft
Total Depth: 74.5 m / 244 ft
Azimuth: 0 deg
Inclination: 90 deg

Drill Type: HT-700

Core Diameter: From 0 to 33 ft PQ3 3.27 "
Core Diameter: From 33 to 102 ft HQ3 2.41 "
Core Diameter: From 102 to 244 ft NQ3 1.78 "

Logged By: LS/EEB
Reviewed By: LS
Date Started: 27-Sep-11
Date Completed: 30-Sep-11

(down is positive)

Drillhole Number: GH11-287

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1569.0	0.00	478.2	4.0	1.22	1.22	0.20	16	0.00	0	OB	OVERBURDEN																
4.0	1565.0	1.22	477.0	24.0	7.31	6.10	2.91	48	0.00	0	WB	HIGHLY WEATHERED BEDROCK, SILT and SAND, trace to some gravel, trace to some clay, poorly graded, yellowish brown, weak.	5	50	58	0	1	1	0	1	3	15	1.5	3.0	5.8	3.0	15	28
24.0	1545.0	7.31	470.9	29.0	8.84	1.52	0.35	23	0.00	0	D	Diorite, light greenish grey, some pyrite and calcite, angular to subangular rubble, highly fractured, moderately weathered.	20	50	7	0	1	1	0	3	5	15	3.0	3.0	5.1	5.0	15	31
29.0	1540.0	8.84	469.4	31.0	9.45	0.61	0.85	100	0.00	0	D	Diorite, light greenish grey, some pyrite and calcite, angular rubble, highly fractured, moderately weathered.	20	50	17	0	1	1	0	3	5	15	3.0	3.0	5.2	5.0	15	31

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
31.0	1538.0	9.45	468.8	33.0	10.06	0.61	0.61	100	0.20	33	D	Diorite, dark greenish grey, medium strong, moderately weathered, soft infill, calcite, pyrite, light and dark green infill, veins of pyrite, highly fractured.	50	25	24	0	4	3	2	3	12	15	5.7	7.2	5.3	12.0	15	**45**
33.0	1536.0	10.06	468.2	34.0	10.36	0.30	0.30	98	0.00	0	D	Diorite, dark greenish grey, medium grained, medium strong, slightly weathered, soft infill, calcite, pyrite, light and dark green infill, highly fractured.	50	25	12	0	4	3	2	5	14	15	5.7	3.0	5.2	14.0	15	**43**
34.0	1535.0	10.36	467.9	36.0	10.97	0.61	0.61	100	0.15	25	D	Diorite, dark greenish grey, strong, slightly weathered, soft infill, calcite, pyrite, light and dark green infill, highly fractured.	100	25	24	0	4	1	2	5	12	15	9.4	6.0	5.3	12.0	15	**48**
36.0	1533.0	10.97	467.3	39.0	11.89	0.91	0.75	82	0.20	22	D	Diorite, dark greenish grey, strong, slightly weathered, soft infill, calcite, pyrite, light and dark green infill, highly fractured.	100	25	30	0	4	1	2	5	12	15	9.4	5.7	5.4	12.0	15	**47**
39.0	1530.0	11.89	466.3	40.0	12.19	0.30	0.30	98	0.10	33	D	Diorite, dark greenish grey, very strong, slightly weathered, soft infill, calcite, pyrite, light and dark green infill, pyrite veins, highly fractured.	150	25	12	0	1	1	2	5	9	15	12.2	7.2	5.2	9.0	15	**49**
40.0	1529.0	12.19	466.0	44.0	13.41	1.22	1.05	86	0.50	41	D	Diorite, dark greenish grey, extremely weak, highly weathered, soft infill, calcite, pyrite, light and dark green infill, pyrite veins, clay in rock.	1	14	75	0	4	1	2	1	8	15	1.1	8.5	6.0	8.0	15	**39**
44.0	1525.0	13.41	464.8	47.0	14.32	0.91	0.75	82	0.30	33	D	Diorite, dark greenish grey, strong, slightly weathered, soft infill, calcite, pyrite, light and dark green infill, pyrite veins.	100	16	47	0	4	1	2	5	12	15	9.4	7.2	5.6	12.0	15	**49**
47.0	1522.0	14.32	463.9	49.0	14.93	0.61	0.54	89	0.00	0	D	Diorite, dark greenish grey, very strong, slightly weathered, soft infill, calcite, pyrite, light and dark green infill, pyrite veins.	200	25	22	0	4	1	2	5	12	15	14.1	3.0	5.3	12.0	15	**49**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
49.0	1520.0	14.93	463.3	54.0	16.46	1.52	1.52	100	0.90	59	D	Diorite, dark greenish grey, very strong, slightly weathered, soft infill, calcite, pyrite, light and dark green infill, pyrite veins.	200	25	61	0	4	1	2	5	12	15	14.1	11.6	5.8	12.0	15	**59**
54.0	1515.0	16.46	461.8	59.0	17.98	1.52	1.52	100	0.85	56	D	Diorite, dark greenish grey, strong, slightly weathered, soft infill, calcite, pyrite, light and dark green infill, pyrite veins.	100	25	61	0	1	1	2	5	9	15	9.4	11.0	5.8	9.0	15	**50**
59.0	1510.0	17.98	460.2	61.5	18.74	0.76	0.76	100	0.23	30	D	Diorite, dark greenish grey, strong, slightly weathered, soft infill, calcite, pyrite, light and dark green infill, pyrite veins, fractured at end or run, approx 20 cm.	75	25	30	0	1	3	2	5	11	15	7.7	6.8	5.4	11.0	15	**46**
61.5	1507.5	18.74	459.5	64.0	19.51	0.76	0.65	85	0.16	21	D	Diorite, dark greenish grey, medium strong, slightly weathered, soft infill, calcite, pyrite, light green infill, pyrite veins, fractured.	50	25	26	0	1	3	2	5	11	15	5.7	5.6	5.4	11.0	15	**43**
64.0	1505.0	19.51	458.7	69.0	21.03	1.52	1.20	79	0.40	26	D	Diorite, dark grey, very strong, slightly weathered, soft infill, calcite, pyrite, light green infill, pyrite veins, fractured.	200	25	48	0	1	3	2	5	11	15	14.1	6.3	5.7	11.0	15	**52**
69.0	1500.0	21.03	457.2	74.0	22.55	1.52	1.52	100	1.24	81	D	Diorite, fine grained, dark greenish black, slightly weathered, pyrite veins with crystals, verty strong, competent.	200	8	190	0	4	1	2	5	12	15	14.1	16.0	7.5	12.0	15	**65**
74.0	1495.0	22.55	455.7	79.0	24.08	1.52	1.52	100	0.66	43	D	As above, fine grained, black to grey at bottom, strong, slightly weathered, pyrite and calcite veins, disseminated pyrite, calcite, chlorite and pyrite on joint surfaces.	100	20	76	0	4	1	2	5	12	15	9.4	8.9	6.0	12.0	15	**51**
79.0	1490.0	24.08	454.2	84.0	25.60	1.52	0.90	59	0.00	0	D	As above for first 1.5', then fault zone, clay and sheared rock, lost recovery, pyrite veins, calcite, pyrite, clay on joints, weak rock.	5	25	36	0	0	1	0	3	4	15	1.5	3.0	5.5	4.0	15	**29**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
84.0	1485.0	25.60	452.6	89.0	27.13	1.52	0.54	35	0.00	0	D	As above, black, fine grained, medium strong, moderately weathered, rubble zone, highly fractured, clay, pyrite, calcite on joints, lost recovery in continuation of fault zone?	50	25	22	0	1	1	2	5	9	15	5.7	3.0	5.3	9.0	15	**38**
89.0	1480.0	27.13	451.1	94.0	28.65	1.52	1.48	97	0.00	0	D	Diorite, highly fractured, shear/rubble zone for first 1', pyrite, clay, chlorite, calcite in veins and on fractures, subvertical fractures, fine grained, medium strong, moderately weathered.	25	25	59	0	1	1	2	3	7	15	3.4	3.0	5.8	7.0	15	**34**
94.0	1475.0	28.65	449.6	99.0	30.17	1.52	1.52	100	0.00	0	D	As above, highly fractured, clay breccia zones, very weak rock, calcite, pyrite, chlorite, clay on joints, fine grained, moderately weathered, subvertical fractures, very friable at end, fault zone at 98'.	5	25	61	0	0	1	0	3	4	15	1.5	3.0	5.8	4.0	15	**29**
99.0	1470.0	30.17	448.1	102.0	31.09	0.91	0.94	100	0.00	0	D	As above, fault zone continues to 100', fault breccia, highly fractured, fine grained, equigranular, dark to light grey, moderately weathered, weak rock, pyrite veins, calcite veins, calcite, pyrite, chlorite, clay on fractures.	25	25	38	0	0	1	0	3	4	15	3.4	3.0	5.5	4.0	15	**31**
102.0	1467.0	31.09	447.1	104.0	31.70	0.61	0.40	66	0.00	0	D	Diorite, dark grey, very strong, slightly weathered, soft infill, calcite, pyrite, light green infill, pyrite veins, fractured.	200	15	27	0	4	1	2	5	12	15	14.1	3.0	5.4	12.0	15	**49**
104.0	1465.0	31.70	446.5	109.0	33.22	1.52	1.52	100	1.05	69	D	Diorite, dark grey, very strong, slightly weathered, soft infill, much calcite, pyrite, small amount of light green infill, pyrite veins.	200	18	84	0	1	1	2	5	9	15	14.1	13.5	6.1	9.0	15	**58**
109.0	1460.0	33.22	445.0	112.0	34.14	0.91	0.55	60	0.22	24	D	Diorite, dark grey, very strong, slightly weathered, soft infill, calcite, pyrite, light green infill, pyrite veins.	200	12	46	0	4	1	2	5	12	15	14.1	6.0	5.6	12.0	15	**53**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
112.0	1457.0	34.14	444.1	114.0	34.75	0.61	0.61	100	0.37	61	D	Diorite, dark grey, very strong, slightly weathered, soft infill, calcite, pyrite, light green and white infill, pyrite veins, partly fractured.	200	14	44	0	4	1	2	5	12	15	14.1	11.9	5.6	12.0	15	**59**
114.0	1455.0	34.75	443.5	116.0	35.36	0.61	0.65	100	0.20	33	D	Diorite, dark grey, very strong, slightly weathered, soft infill, calcite, pyrite, light green and white infill, pyrite veins, highly fractured.	200	16	41	0	1	1	2	5	9	15	14.1	7.2	5.6	9.0	15	**51**
116.0	1453.0	35.36	442.9	119.0	36.27	0.91	0.74	81	0.10	11	D	Diorite, dark grey, very strong, slightly weathered, soft infill, calcite, pyrite, light green and white infill, pyrite veins.	200	20	37	0	1	3	2	5	11	15	14.1	4.3	5.5	11.0	15	**50**
119.0	1450.0	36.27	442.0	124.0	37.79	1.52	1.52	100	1.37	90	D	Diorite, dark grey, very strong, slightly weathered, soft infill, calcite, pyrite, light green and white infill, pyrite veins.	200	10	152	0	4	1	2	5	12	15	14.1	17.9	7.0	12.0	15	**66**
124.0	1445.0	37.79	440.4	129.0	39.32	1.52	1.50	98	89.00	100	D	As above, dark grey black, fine grained, equigranular, slightly weathered, pyrite veins, calcite veins, disseminated pyrite, strong, pyrite, calcite, chlorite on joints.	100	13	115	4	4	1	2	5	16	15	9.4	20.2	6.5	16.0	15	**67**
129.0	1440.0	39.32	438.9	134.0	40.84	1.52	1.52	100	0.89	58	D	As above, competent, fine grained, equigranular, dark grey black, strong, slightly weathered, pyrite veins, calcite veins, pyrite and calcite on joints.	100	18	84	0	4	1	2	5	12	15	9.4	11.5	6.1	12.0	15	**54**
134.0	1435.0	40.84	437.4	139.0	42.37	1.52	1.52	100	0.82	54	D	As above, fine grained, dark grey black with some light grey zones, equigranular, strong, slightly weathered, calcite, pyrite on fractures, moderately fractured, disseminated pyrite.	100	16	95	0	4	1	2	5	12	15	9.4	10.7	6.3	12.0	15	**53**
139.0	1430.0	42.37	435.9	144.0	43.89	1.52	1.52	100	0.89	58	D	As above, fine grained, light and dark grey, strong, slightly weathered, calcite and pyrite veins, equigranular, disseminated pyrite, moderately fractured.	100	14	109	0	1	1	2	5	9	15	9.4	11.5	6.5	9.0	15	**51**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
144.0	1425.0	43.89	434.3	149.0	45.41	1.52	1.52	100	1.02	67	D	As above, fine grained, light and dark grey, equigranular, medium strong, slightly weathered, calcite and pyrite veins up to 1cm thick, disseminated pyrite, calcite and pyrite on joints.	50	16	95	0	4	1	2	5	12	15	5.7	13.1	6.3	12.0	15	**52**
149.0	1420.0	45.41	432.8	154.0	46.94	1.52	1.52	100	18.00	100	D	As above, highly fractured slightly weathered, medium strong, fine grained, dark grey to black, calcite pyrite veins, blebs and disseminations.	100	25	61	0	1	1	2	5	9	15	9.4	20.2	5.8	9.0	15	**59**
154.0	1415.0	46.94	431.3	159.0	48.46	1.52	1.45	95	1.21	79	D	As above, soft clay at end of run, pyrite disseminated and in veins, calcite veins.	100	9	161	0	0	1	0	3	4	15	9.4	15.6	7.1	4.0	15	**51**
159.0	1410.0	48.46	429.8	164.0	49.98	1.52	0.99	65	0.11	7	D	As above, clay rubble zone for first foot, core loss in this zone, fine grained, equigranular, grey, medium strong, moderately weathered, pyrite and calcite veins, disseminated pyrite.	50	16	62	0	1	1	2	3	7	15	5.7	3.8	5.8	7.0	15	**37**
164.0	1405.0	49.98	428.2	169.0	51.51	1.52	1.52	100	0.65	43	D	As above, fine grained, equigranular, dark grey, medium strong, slightly weathered, pyrite veins, calcite veins, pyrite and calcite on joints, disseminated pyrite.	50	23	66	0	4	1	2	5	12	15	5.7	8.8	5.9	12.0	15	**47**
169.0	1400.0	51.51	426.7	174.0	53.03	1.52	1.49	98	0.00	0	D	As above, highly fractured, fine grained, dark grey, moderately weathered, medium strong, equigranular, disseminated pyrite, pyrite blebs, veins, pyrite and calcite on fractures, some small shear zones, subvertical fractures.	50	25	60	0	1	1	2	5	9	15	5.7	3.0	5.8	9.0	15	**38**
174.0	1395.0	53.03	425.2	179.0	54.56	1.52	0.55	36	0.00	0	D	As above, highly fractured, fine grained, dark grey, moderately weathered, medium strong, equigranular, veins, pyrite and calcite on fractures, some small shear zones, subvertical fractures.	25	25	22	0	1	1	2	5	9	15	3.4	3.0	5.3	9.0	15	**36**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
179.0	1390.0	54.56	423.7	182.5	55.62	1.07	0.37	35	0.00	0	D	As above, highly fractured, rubble, fine grained, equigranular, dark grey, strong, moderately weathered, veins, pyrite and calcite on fractures.	100	25	15	0	1	1	2	5	9	15	9.4	3.0	5.2	9.0	15	**42**
182.5	1386.5	55.62	422.6	184.0	56.08	0.46	0.35	77	0.00	0	D	As above, highly fractured, rubble, fine grained, equigranular, dark grey, strong, moderately weathered, veins, pyrite and calcite on fractures.	100	25	14	0	1	1	2	5	9	15	9.4	3.0	5.2	9.0	15	**42**
184.0	1385.0	56.08	422.2	189.0	57.60	1.52	1.52	100	0.68	45	D	As above, fractured, fine grained, equigranular, dark grey, medium strong, moderately weathered, veins, pyrite and calcite on fractures.	50	25	61	0	1	1	2	5	9	15	5.7	9.1	5.8	9.0	15	**45**
189.0	1380.0	57.60	420.6	194.0	59.13	1.52	0.85	56	0.29	19	D	As above, fractured, fine grained, dark grey, weak, moderately weathered, veins, pyrite and calcite on fractures, 0.2 m of clay at end of run.	25	23	37	0	1	1	2	5	9	15	3.4	5.3	5.5	9.0	15	**38**
194.0	1375.0	59.13	419.1	197.0	60.04	0.91	0.85	93	0.00	0	D	As above, fractured, fine grained, equigranular, dark grey, medium strong, moderately weathered, veins, pyrite and calcite on fractures.	50	25	34	0	1	1	2	5	9	15	5.7	3.0	5.5	9.0	15	**38**
197.0	1372.0	60.04	418.2	199.0	60.65	0.61	0.40	66	0.00	0	D	As above, fractured, fine grained, equigranular, dark grey, strong, moderately weathered, veins, pyrite and calcite on fractures.	100	25	16	0	1	1	2	5	9	15	9.4	3.0	5.2	9.0	15	**42**
199.0	1370.0	60.65	417.6	201.0	61.26	0.61	0.50	82	0.00	0	D	As above, highly fractured, fine grained, equigranular, dark grey, medium strong, moderately weathered, veins, pyrite, calcite & green infill on fractures.	50	25	20	0	1	1	2	5	9	15	5.7	3.0	5.3	9.0	15	**38**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
201.0	1368.0	61.26	417.0	204.0	62.18	0.91	0.75	82	0.00	0	D	As above, highly fractured, fine grained, equigranular, dark grey, medium strong, moderately weathered, veins, pyrite, calcite & green infill on fractures.	25	25	30	0	1	1	2	5	9	15	3.4	3.0	5.4	9.0	15	**36**
204.0	1365.0	62.18	416.1	207.0	63.09	0.91	0.91	100	0.00	0	D	As above, fractured, fine grained, equigranular, dark grey, medium strong, moderately weathered, veins, pyrite, calcite & green infill on fractures.	25	25	36	0	1	1	2	5	9	15	3.4	3.0	5.5	9.0	15	**36**
207.0	1362.0	63.09	415.1	209.0	63.70	0.61	0.38	62	0.00	0	D	As above, highly fractured, fine grained, equigranular, dark grey, medium strong, moderately weathered, veins, pyrite, calcite & green infill on fractures.	25	25	15	0	1	1	0	5	7	15	3.4	3.0	5.2	7.0	15	**34**
209.0	1360.0	63.70	414.5	214.0	65.22	1.52	1.52	100	0.41	27	D	As above, fractured, fine grained, equigranular, dark grey, medium strong, moderately weathered, veins, pyrite, calcite & blueish infill on fractures.	50	25	61	0	1	3	2	5	11	15	5.7	6.4	5.8	11.0	15	**44**
214.0	1355.0	65.22	413.0	219.0	66.75	1.52	1.52	100	0.90	59	D	As above, fine grained, equigranular, dark grey, slightly weathered, pyrite and calcite veins, some white phenocrysts, calcite and pyrite on joints, softer material at end of run, medium strong, chlorite, soft black infill on some joints.	50	16	95	0	4	1	2	5	12	15	5.7	11.6	6.3	12.0	15	**51**
219.0	1350.0	66.75	411.5	224.0	68.27	1.52	1.41	93	12.00	100	D	As above, highly fractured, sheared, calcite, chlorite, pyrite on joints, fine grained, dark grey, equigranular, medium strong, slightly weathered, more competent at end of run.	50	25	56	0	1	1	2	5	9	15	5.7	20.2	5.8	9.0	15	**56**
224.0	1345.0	68.27	410.0	229.0	69.80	1.52	1.37	90	0.21	14	D	As above, fine grained, equigranular, dark grey, medium strong, slightly weathered, calcite and pyrite veins, chlorite, calcite and pyrite on joints.	50	27	51	0	4	1	2	5	12	15	5.7	4.6	5.7	12.0	15	**43**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
229.0	1340.0	69.80	408.4	234.0	71.32	1.52	1.52	100	1.21	79	D	As above, but much more competent until end of run where core is weathered to clay, friable.	25	11	138	0	1	1	2	5	9	15	3.4	15.6	6.8	9.0	15	**50**
234.0	1335.0	71.32	406.9	239.0	72.84	1.52	1.35	89	0.12	8	D	As above, core lost at top of run in shear zone, smaller shear zones throughout, pyrite and calcite veins, fine grained, medium strong, slightly weathered.	25	25	54	0	1	1	2	5	9	15	3.4	3.9	5.7	9.0	15	**37**
239.0	1330.0	72.84	405.4	244.0	74.37	1.52	1.23	81	0.66	43	D	As above, much more competent but fractured zone in middle of run, calcite and pyrite veins, medium strong, slightly weathered, chlorite, calcite, pyrite on joints.	25	25	49	0	1	1	2	5	9	15	3.4	8.9	5.7	9.0	15	**42**
												END OF HOLE																

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-287\[GH11-287.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	1OCT'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-293

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1397745 E, 2161225 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 452 m / 1,483 ft
Total Depth: 69.8 m / 229 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 19 ft PQ3 3.27 "
Core Diameter: From 19 to 229 ft HQ3 2.41 "

Logged By: LS/EEB
Reviewed By: LS
Date Started: 04-Oct-11
Date Completed: 06-Oct-11

Drillhole Number: GH11-293

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1483.0	0.00	452.0	14.0	4.27	4.27	1.25	29	0.00	0	OB	OVERBURDEN																
14.0	1469.0	4.27	447.8	19.0	5.79	1.52	1.45	95	1.05	69	D	Diorite, dark grey, medium strong, moderately weathered, soft infill, oxidized orange infill, veins of pyrite, finer material/highly weathered bedrock at start of run likely washed away.	50	8	181	0	1	1	2	3	7	15	5.7	13.5	7.4	7.0	15	49
19.0	1464.0	5.79	446.2	24.0	7.31	1.52	1.45	95	1.00	66	D	As above, dark grey, very strong, moderately weathered, soft infill, oxidized orange & light green (chlorite) infill, veins of pyrite.	150	25	58	0	1	1	2	3	7	15	12.2	12.8	5.8	7.0	15	53

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
24.0	1459.0	7.31	444.7	29.0	8.84	1.52	1.52	100	0.25	16	D	As above, dark grey, very strong, moderately weathered, soft infill, oxidized orange & light green (chlorite) & calcite infill, veins of pyrite, fractured.	200	25	61	0	1	1	2	3	7	15	14.1	4.9	5.8	7.0	15	**47**
29.0	1454.0	8.84	443.2	34.0	10.36	1.52	1.10	72	0.38	25	D	As above, dark grey, very strong, slightly weathered, soft infill, light green (chlorite) & calcite infill, veins of pyrite, fractured.	200	25	44	0	1	1	2	5	9	15	14.1	6.1	5.6	9.0	15	**50**
34.0	1449.0	10.36	441.7	38.0	11.58	1.22	1.22	100	0.45	37	D	As above, dark grey, very strong, slightly weathered, soft infill, light green (chlorite) & calcite infill, veins of pyrite, fractured.	200	25	49	0	1	1	2	5	9	15	14.1	7.9	5.7	9.0	15	**52**
38.0	1445.0	11.58	440.4	39.0	11.89	0.30	0.31	100	0.28	92	D	As above, dark grey, very strong, slightly weathered, soft infill, light green (chlorite) & calcite infill, veins of pyrite.	200	6	51	0	1	1	2	5	9	15	14.1	18.3	5.7	9.0	15	**62**
39.0	1444.0	11.89	440.1	44.0	13.41	1.52	1.52	100	1.44	94	D	As above, dark grey, very strong, slightly weathered, soft infill, light green (chlorite) & calcite infill, veins of pyrite.	200	11	138	0	4	1	2	5	12	15	14.1	18.9	6.8	12.0	15	**67**
44.0	1439.0	13.41	438.6	49.0	14.93	1.52	1.52	100	1.05	69	D	As above, dark grey, very strong, slightly weathered, soft infill, light green (chlorite) & calcite infill, veins of pyrite and calcite.	150	24	63	0	4	1	2	5	12	15	12.2	13.5	5.9	12.0	15	**59**
49.0	1434.0	14.93	437.1	54.0	16.46	1.52	1.52	100	1.20	79	D	As above, light and dark grey with some greenish areas, very strong, slightly weathered, soft infill, light green (chlorite) & calcite infill, veins of pyrite and calcite.	150	15	101	0	4	1	2	5	12	15	12.2	15.5	6.4	12.0	15	**61**
54.0	1429.0	16.46	435.6	59.0	17.98	1.52	1.52	100	1.02	67	D	As above, light and dark grey with some greenish areas, very strong, slightly weathered, soft infill, light green (chlorite) & calcite infill, veins of pyrite and calcite.	200	23	66	0	4	1	0	5	10	15	14.1	13.1	5.9	10.0	15	**58**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
59.0	1424.0	17.98	434.0	64.0	19.51	1.52	1.52	100	1.22	80	D	As above, light and dark grey with some greenish areas, very strong, slightly weathered, soft infill, light green (chlorite) & calcite infill, veins of pyrite and calcite.	200	12	127	0	4	1	0	5	10	15	14.1	15.8	6.7	10.0	15	**62**
64.0	1419.0	19.51	432.5	69.0	21.03	1.52	1.52	100	1.52	100	D	As above, light and dark grey, very strong, slightly weathered, soft infill, light green (chlorite) & calcite infill, veins of pyrite and calcite.	250	5	304	0	4	1	2	5	12	15	15.1	20.1	8.8	12.0	15	**71**
69.0	1414.0	21.03	431.0	74.0	22.55	1.52	1.52	100	1.52	100	D	As above, light and dark grey, extremely strong, slightly weathered, soft infill, light green (chlorite) & calcite infill, veins of pyrite and calcite.	250	4	380	0	4	1	2	5	12	15	15.1	20.1	9.6	12.0	15	**72**
74.0	1409.0	22.55	429.5	79.0	24.08	1.52	1.52	100	1.21	79	D	Diorite, fine grained, aphanitic, dark grey to black, medium strong, slightly weathered, pyrite, calcite veins, chlorite, calcite and pyrite in joints.	80	10	152	0	4	1	2	5	12	15	8.0	15.6	7.0	12.0	15	**58**
79.0	1404.0	24.08	427.9	84.0	25.60	1.52	1.47	96	0.28	18	D	As above, only more fractures, pyrite, calcite, and chlorite on fractures, pyrite veins and blebs.	80	26	57	0	4	1	2	5	12	15	8.0	5.2	5.8	12.0	15	**46**
84.0	1399.0	25.60	426.4	89.0	27.13	1.52	1.41	93	0.71	47	D	As above, clay breccia/rubble zone at top of run, rest is competent, pyrite veins, pyrite, clay, chlorite, and calcite on fractures.	80	16	88	0	0	1	0	5	6	15	8.0	9.4	6.2	6.0	15	**45**
89.0	1394.0	27.13	424.9	94.0	28.65	1.52	1.51	99	1.27	83	D	As above, much more competent, pyrite veins, calcite veins, calcite, chlorite, pyrite on fractures, fine grained, slightly weathered, strong.	150	8	189	0	4	1	2	5	12	15	12.2	16.5	7.4	12.0	15	**63**
94.0	1389.0	28.65	423.4	99.0	30.17	1.52	1.51	99	1.20	79	D	As above, pyrite veins, calcite veins, pyrite, chlorite, calcite on fractures, one small shear zone.	150	11	137	0	1	1	2	5	9	15	12.2	15.5	6.8	9.0	15	**59**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
99.0	1384.0	30.17	421.8	104.0	31.70	1.52	1.52	100	1.29	85	D	As above, fine grained, equigranular, grey to dark grey, strong, slightly weathered, pyrite and calcite veins, pyrite, calcite, and chlorite on joints.	250	8	190	0	4	3	2	5	14	15	15.1	16.7	7.5	14.0	15	**68**
104.0	1379.0	31.70	420.3	109.0	33.22	1.52	1.52	100	1.29	85	D	As above to 108', then brecciated/sheared zone with calcite matrix at end, very soft, slightly weathered, strong, pyrite veins.	150	15	101	0	0	1	0	5	6	15	12.2	16.7	6.4	6.0	15	**56**
109.0	1374.0	33.22	418.8	114.0	34.75	1.52	1.52	100	0.28	18	D	As above, highly fractured, calcite veins, some small shear zones (2cm), chlorite, pyrite and calcite on joints, very soft at end, weak rock.	25	25	61	0	1	1	2	5	9	15	3.4	5.2	5.8	9.0	15	**38**
114.0	1369.0	34.75	417.3	119.0	36.27	1.52	1.42	93	0.54	35	D	As above, small shear zone 6" into run, large calcite vein 3" wide with clay and chlorite, very broken at end, weak, moderately weathered.	25	14	101	0	1	1	2	3	7	15	3.4	7.6	6.4	7.0	15	**39**
119.0	1364.0	36.27	415.7	124.0	37.79	1.52	1.35	89	0.16	10	D	As above, some breccia and shear zones, very fractured at end of run, pyrite, calcite and chlorite on fractures, calcite veins, fine grained, dark grey to grey, weak, moderately weathered.	25	25	54	0	1	1	2	3	7	15	3.4	4.2	5.7	7.0	15	**35**
124.0	1359.0	37.79	414.2	129.0	39.32	1.52	1.46	96	0.37	24	D	As above, fine grained, dark grey to grey, medium strong, slightly weathered, calcite and pyrite veins, chlorite, calcite and pyrite on joints, rubble zone, rock becomes more competent with depth.	25	25	58	0	1	1	2	5	9	15	3.4	6.0	5.8	9.0	15	**39**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
129.0	1354.0	39.32	412.7	134.0	40.84	1.52	1.50	98	0.20	13	D	As above, fine grained, dark grey, medium strong, slightly weathered, subvertical fractures, pyrite and calcite veins, pyrite, calcite and chlorite on joints, shear zones, few large pyrite crystals, highly fractured to rubble in some places.	25	25	60	0	1	1	2	5	9	15	3.4	4.5	5.8	9.0	15	**38**
134.0	1349.0	40.84	411.2	135.5	41.30	0.46	0.45	98	0.10	22	D	Diorite, fine grained, dark grey, medium strong, slightly weathered, moderately fractured, pyrite and calcite veins, chlorite, calcite and pyrite on joints.	50	12	38	0	4	1	2	5	12	15	5.7	5.7	5.5	12.0	15	**44**
135.5	1347.5	41.30	410.7	139.0	42.37	1.07	0.40	37	0.00	0	D/Z	Diorite, dark grey, medium strong, moderately weathered, soft infill, calcite and chlorite with pyrite infill, rubble, subangular to subrounded material indicates material has been washed away.	50	25	16	0	1	1	2	5	9	15	5.7	3.0	5.2	9.0	15	**38**
139.0	1344.0	42.37	409.7	144.0	43.89	1.52	0.85	56	0.45	30	Z	Fault Breccia, inequigranular, grey, white & light faint green, weak, highly weathered, soft infill, calcite and chlorite infill, clayish fault zone.	15	25	34	0	1	1	2	5	9	15	2.5	6.7	5.5	9.0	15	**39**
144.0	1339.0	43.89	408.1	149.0	45.41	1.52	1.52	100	1.10	72	Z	Fault Breccia, inequigranular, grey, white, medium strong, moderately weathered, soft infill, calcite and chlorite infill.	50	11	138	0	1	1	2	5	9	15	5.7	14.1	6.8	9.0	15	**51**
149.0	1334.0	45.41	406.6	154.0	46.94	1.52	1.52	100	0.80	52	Z	Fault Breccia, inequigranular, grey, white & light faint green, weak, moderately weathered, soft infill, calcite and chlorite infill, fractured.	25	25	61	0	1	1	2	5	9	15	3.4	10.4	5.8	9.0	15	**44**
154.0	1329.0	46.94	405.1	158.0	48.16	1.22	0.91	75	0.00	0	Z	Fault zone, equigranular, dark grey, rubble, medium strong, moderately weathered, soft infill, calcite and chlorite infill, veins of pyrite, highly fractured.	50	25	36	0	1	1	2	5	9	15	5.7	3.0	5.5	9.0	15	**38**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
158.0	1325.0	48.16	403.9	159.0	48.46	0.30	0.31	100	0.15	49	D	Diorite, aphanitic, dark grey, medium strong, moderately weathered, soft infill, calcite and chlorite infill, veins of pyrite, fractured.	50	4	76	0	4	1	2	5	12	15	5.7	9.9	6.0	12.0	15	**49**
159.0	1324.0	48.46	403.6	164.0	49.98	1.52	1.52	100	0.31	20	D	Diorite, aphanitic, dark grey, medium strong, slightly weathered, soft infill, calcite and chlorite infill, veins of pyrite, fractured.	50	25	61	0	4	1	2	5	12	15	5.7	5.5	5.8	12.0	15	**44**
164.0	1319.0	49.98	402.0	169.0	51.51	1.52	1.52	100	1.12	73	D	Diorite, aphanitic, dark grey, strong, slightly weathered, soft infill, calcite and chlorite infill, veins of pyrite, rubble at first 0.1 m of run.	100	9	169	0	4	1	2	5	12	15	9.4	14.4	7.2	12.0	15	**58**
169.0	1314.0	51.51	400.5	174.0	53.03	1.52	1.52	100	1.45	95	D	Diorite, aphanitic, dark grey, very strong, slightly weathered, soft infill, calcite and chlorite infill, veins of pyrite and calcite.	200	3	507	0	4	1	2	5	12	15	14.1	19.1	10.8	12.0	15	**71**
174.0	1309.0	53.03	399.0	179.0	54.56	1.52	1.52	100	0.70	46	D	As above, aphanitic, dark grey, very strong, slightly weathered, soft infill, calcite and chlorite infill, veins of pyrite and calcite.	200	20	76	0	4	1	2	5	12	15	14.1	9.3	6.0	12.0	15	**56**
179.0	1304.0	54.56	397.5	184.0	56.08	1.52	1.52	100	1.31	86	D	As above, aphanitic, dark grey, very strong, slightly weathered, soft infill, calcite and chlorite infill, veins of pyrite and calcite.	200	10	152	0	1	1	2	5	9	15	14.1	17.0	7.0	9.0	15	**62**
184.0	1299.0	56.08	395.9	189.0	57.60	1.52	1.52	100	0.95	62	D	As above, aphanitic, dark grey, very strong, slightly weathered, soft infill, calcite and chlorite infill, veins of pyrite and calcite.	200	25	61	0	4	1	2	5	12	15	14.1	12.2	5.8	12.0	15	**59**
189.0	1294.0	57.60	394.4	194.0	59.13	1.52	1.52	100	1.24	81	D	As above, aphanitic, dark grey, very strong, slightly weathered, soft infill, calcite and chlorite infill, red veins on fractures, veins of pyrite and calcite.	200	11	138	0	4	1	2	5	12	15	14.1	16.0	6.8	12.0	15	**64**
194.0	1289.0	59.13	392.9	199.0	60.65	1.52	1.52	100	1.32	87	D	As above, aphanitic, dark grey, very strong, slightly weathered, soft infill, calcite and chlorite infill, veins of pyrite and calcite.	200	10	152	0	4	1	2	5	12	15	14.1	17.2	7.0	12.0	15	**65**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
199.0	1284.0	60.65	391.4	204.0	62.18	1.52	1.52	100	1.15	75	D	As above, aphanitic, dark grey, very strong, slightly weathered, soft infill, calcite and chlorite infill, veins of pyrite and calcite.	200	12	127	0	1	1	2	5	9	15	14.1	14.8	6.7	9.0	15	60
204.0	1279.0	62.18	389.8	209.0	63.70	1.52	1.52	100	0.75	49	D	As above, aphanitic, dark grey, very strong, slightly weathered, soft infill, calcite and chlorite infill, veins of pyrite and calcite, fractured.	200	25	61	0	4	1	2	5	12	15	14.1	9.9	5.8	12.0	15	57
209.0	1274.0	63.70	388.3	214.0	65.22	1.52	1.52	100	1.44	94	D	As above, aphanitic, dark grey, very strong, slightly weathered, soft infill, calcite and chlorite infill, veins of pyrite and calcite.	150	4	380	0	4	1	2	5	12	15	12.2	18.9	9.6	12.0	15	68
214.0	1269.0	65.22	386.8	219.0	66.75	1.52	1.52	100	1.45	95	D	As above, aphanitic, light & dark grey, very strong, slightly weathered, soft infill, calcite and chlorite infill, veins of pyrite.	200	7	217	0	4	1	2	5	12	15	14.1	19.1	7.8	12.0	15	68
219.0	1264.0	66.75	385.3	224.0	68.27	1.52	1.52	100	1.31	86	D	Diorite, fine grained, aphanitic, dark and light grey, laminated, slightly weathered, narrow pyrite and calcite veins, pyrite, calcite, chlorite on joints, strong.	150	7	217	0	4	1	2	5	12	15	12.2	17.0	7.8	12.0	15	64
224.0	1259.0	68.27	383.7	229.0	69.80	1.52	1.52	100	0.54	35	D	As above, competent for first 2 feet, then fractured zone, sheared, pyrite veins, strong, chlorite, calcite, clay and pyrite on joints.	150	25	61	0	1	1	2	5	9	15	12.2	7.6	5.8	9.0	15	50
END OF HOLE																												

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-293\[GH11-293.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	06OCT'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-294

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1398669 E, 2160964 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 479.8 m / 1,574 ft
Total Depth: 68.3 m / 224 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 55.5 ft PQ3 3.27 "
to ft
Core Diameter: From 55.5 to 224 ft HQ3 2.41 "
to ft
to ft

Logged By: LS/DLP
Reviewed By: LS
Date Started: 06-Oct-11
Date Completed: 08-Oct-11

Drillhole Number: GH11-294

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1574.0	0.00	479.8	4.0	1.22	1.22	0.60	49	0.00	0	OB	OVERBURDEN																
4.0	1570.0	1.22	478.5	9.0	2.74	1.52	0.60	39	0.00	0	Y	Highly weathered Andesitic Siltstone, angular to subangular rubble, iron staining on clast surfaces, yellowish brown, weak.	10	50	12	0	1	1	2	1	5	15	2.0	3.0	5.2	5.0	15	30
9.0	1565.0	2.74	477.0	14.0	4.27	1.52	1.04	68	0.00	0	Y	Highly weathered Andesitic Siltstone, some more competent pieces, angular to subangular rubble, iron staining on clast surfaces, yellowish brown, weak.	10	50	21	0	1	1	2	1	5	15	2.0	3.0	5.3	5.0	15	30

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
14.0	1560.0	4.27	475.5	19.0	5.79	1.52	0.00	0		0	Y	NO RECOVERY DUE TO TUBE MISLATCH, IT WAS LATER DISCOVERED THAT CORE HAD FALLEN OUT OF THE TUBE AND WAS STUCK IN THE CORE BARREL.									0		1.0	3.0	5.0	0.0	0	**9**
19.0	1555.0	5.79	474.0	24.0	7.31	1.52	0.00	0		0	Y?	NO RECOVERY, AS ABOVE.									0		1.0	3.0	5.0	0.0	0	**9**
24.0	1550.0	7.31	472.4	29.0	8.84	1.52	0.00	0		0	Y?	NO RECOVERY, AS ABOVE.									0		1.0	3.0	5.0	0.0	0	**9**
29.0	1545.0	8.84	470.9	34.0	10.36	1.52	0.00	0		0	Y?	NO RECOVERY, AS ABOVE.									0		1.0	3.0	5.0	0.0	0	**9**
34.0	1540.0	10.36	469.4	39.0	11.89	1.52	0.00	0		0	Y?	NO RECOVERY, AS ABOVE.									0		1.0	3.0	5.0	0.0	0	**9**
39.0	1535.0	11.89	467.9	44.0	13.41	1.52	0.00	0		0	Y?	NO RECOVERY, AS ABOVE.									0		1.0	3.0	5.0	0.0	0	**9**
44.0	1530.0	13.41	466.3	49.0	14.93	1.52	0.00	0		0	Y?	NO RECOVERY, AS ABOVE.									0		1.0	3.0	5.0	0.0	0	**9**
49.0	1525.0	14.93	464.8	54.0	16.46	1.52	0.50	33	0.10	7	Y	Andesitic Siltstone, equigranular, light & dark grey, strong, moderately weathered, soft infill, chlorite infill, veins of pyrite, highly fractured.	50	15	33	0	1	1	2	3	7	15	5.7	3.7	5.5	7.0	15	**37**
54.0	1520.0	16.46	463.3	59.0	17.98	1.52	1.30	85	0.00	0	Y	Andesitic Siltstone, equigranular, light & dark grey, strong, moderately weathered, soft infill, chlorite infill, veins of pyrite, highly fractured.	50	50	26	0	1	1	2	3	7	15	5.7	3.0	5.4	7.0	15	**36**
59.0	1515.0	17.98	461.8	64.0	19.51	1.52	1.22	80	0.27	18	Y	Andesitic Siltstone, equigranular, light & dark grey, strong, moderately weathered, soft infill, chlorite infill, veins of pyrite, highly fractured.	100	25	49	0	4	1	2	3	10	15	9.4	5.1	5.7	10.0	15	**45**
64.0	1510.0	19.51	460.2	69.0	21.03	1.52	1.52	100	0.80	52	Y	As above, equigranular, light & dark grey, medium strong, moderately weathered, soft infill, chlorite infill, veins of pyrite, highly fractured.	50	25	61	0	4	1	2	5	12	15	5.7	10.4	5.8	12.0	15	**49**
69.0	1505.0	21.03	458.7	74.0	22.55	1.52	1.52	100	0.60	39	Y	As above, equigranular, light & dark grey, strong, moderately weathered, soft infill, chlorite and pyrite infill, vein of pyrite ~5 mm wide, fractured.	100	25	61	0	1	3	2	3	9	15	9.4	8.2	5.8	9.0	15	**47**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
74.0	1500.0	22.55	457.2	79.0	24.08	1.52	1.52	100	0.37	24	Y	As above, equigranular, light & dark grey, very strong, moderately weathered, soft infill, chlorite and calcite with pyrite infill, veins of pyrite, fractured.	150	25	61	0	1	1	2	3	7	15	12.2	6.0	5.8	7.0	15	**46**
79.0	1495.0	24.08	455.7	83.0	25.30	1.22	1.07	88	0.00	0	Y	As above, equigranular, light & dark grey, medium strong, moderately weathered, soft infill, chlorite and calcite infill, vein of calcite, rubble.	25	25	43	0	1	1	0	3	5	15	3.4	3.0	5.6	5.0	15	**32**
83.0	1491.0	25.30	454.5	84.0	25.60	0.30	0.31	100	0.00	0	Y	As above, equigranular, light & dark grey, medium strong, moderately weathered, soft infill, chlorite and calcite infill, vein of calcite, rubble.	50	25	12	0	1	3	2	3	9	15	5.7	3.0	5.2	9.0	15	**38**
84.0	1490.0	25.60	454.2	85.5	26.06	0.46	0.46	100	0.00	0	Y	As above, equigranular, light & dark grey, medium strong, moderately weathered, soft infill, chlorite and calcite with pyrite infill, highly fractured.	50	25	18	0	4	1	2	5	12	15	5.7	3.0	5.3	12.0	15	**41**
85.5	1488.5	26.06	453.7	89.0	27.13	1.07	0.70	66	0.00	0	Y	As above, equigranular, light & dark grey, medium strong, moderately weathered, soft infill, chlorite and oxidized infill, highly fractured.	50	25	28	0	4	1	2	3	10	15	5.7	3.0	5.4	10.0	15	**39**
89.0	1485.0	27.13	452.6	94.0	28.65	1.52	1.16	76	0.10	7	Y	Andesitic siltstone, white (quartz??) for first 25 cm of run with visible clay on first 10 cm, light & dark grey, medium strong, moderately weathered, soft infill, chlorite, calcite and oxidized infill, highly fractured.	50	25	46	0	1	1	2	3	7	15	5.7	3.7	5.6	7.0	15	**37**
94.0	1480.0	28.65	451.1	99.0	30.17	1.52	1.35	89	0.70	46	Y	Andesitic Siltstone, equigranular, light & dark grey, strong, slightly weathered, soft infill, chlorite and calcite with pyrite infill, fractured.	100	25	54	0	4	1	2	5	12	15	9.4	9.3	5.7	12.0	15	**51**
99.0	1475.0	30.17	449.6	104.0	31.70	1.52	1.52	100	1.27	83	Y	As above, equigranular, light & dark grey, very strong, slightly weathered, soft infill, chlorite and calcite with pyrite infill, veins of pyrite.	100	11	138	0	4	1	2	5	12	15	9.4	16.5	6.8	12.0	15	**60**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
104.0	1470.0	31.70	448.1	109.0	33.22	1.52	1.52	100	1.35	89	Y	As above, equigranular, light & dark grey, very strong, slightly weathered, soft infill, chlorite and calcite with pyrite infill, veins of pyrite and calcite.	100	6	253	0	4	1	0	5	10	15	9.4	17.6	8.2	10.0	15	**60**
109.0	1465.0	33.22	446.5	114.0	34.75	1.52	1.52	100	1.45	95	Y	As above, equigranular, light & dark grey, very strong, slightly weathered, soft infill, chlorite and calcite with pyrite infill, veins of pyrite and calcite.	150	12	127	0	4	1	2	5	12	15	12.2	19.1	6.7	12.0	15	**65**
114.0	1460.0	34.75	445.0	118.0	35.96	1.22	1.22	100	1.02	84	Y	As above, equigranular, light & dark grey, very strong, slightly weathered, soft infill, chlorite and calcite with pyrite infill, veins of pyrite and calcite.	150	8	153	0	4	1	2	5	12	15	12.2	16.5	7.0	12.0	15	**63**
118.0	1456.0	35.96	443.8	119.0	36.27	0.30	0.30	98	0.30	98	Y	As above, equigranular, light & dark grey, very strong, slightly weathered, soft infill, chlorite and calcite with pyrite infill, veins of pyrite and calcite.	150	2	150	0	4	1	2	5	12	15	12.2	19.8	7.0	12.0	15	**66**
119.0	1455.0	36.27	443.5	124.0	37.79	1.52	1.52	100	1.12	73	Y	As above, equigranular, light & dark grey, white (quartz??), strong, slightly weathered, soft infill, chlorite and calcite infill, veins of pyrite and calcite.	100	14	109	0	4	3	2	5	14	15	9.4	14.4	6.5	14.0	15	**59**
124.0	1450.0	37.79	442.0	129.0	39.32	1.52	1.52	100	0.70	46	Y	Siltstone, fine grained, equigranular, dark to light grey, some black, medium strong, slightly weathered, laminated, calcite and pyrite veins, calcite, chlorite and pyrite on joints.	50	14	109	0	4	1	2	5	12	15	5.7	9.3	6.5	12.0	15	**48**
129.0	1445.0	39.32	440.4	134.0	40.84	1.52	1.52	100	0.41	27	Y	As above, chlorite, calcite and pyrite on joint surfaces, calcite and pyrite veins, laminated.	50	22	69	0	4	1	2	5	12	15	5.7	6.4	5.9	12.0	15	**45**
134.0	1440.0	40.84	438.9	139.0	42.37	1.52	1.50	98	1.00	66	Y	As above, pyrite and calcite veins, calcite, chlorite and pyrite on joints.	50	13	115	0	4	1	2	5	12	15	5.7	12.8	6.5	12.0	15	**52**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
139.0	1435.0	42.37	437.4	144.0	43.89	1.52	1.52	100	0.52	34	Y	As above, small shear zones, subvertical fractures, chlorite, calcite and pyrite on fractures, light and dark grey laminations.	50	20	76	0	1	1	2	5	9	15	5.7	7.4	6.0	9.0	15	**43**
144.0	1430.0	43.89	435.9	149.0	45.41	1.52	1.52	100	0.29	19	Y	As above, more fractured, shear zone from 2 to 2.5', chlorite, calcite and pyrite on fractures, subvertical fractures.	50	30	51	0	1	1	2	5	9	15	5.7	5.3	5.7	9.0	15	**41**
149.0	1425.0	45.41	434.3	154.0	46.94	1.52	1.49	98	0.56	37	Y	As above, calcite, pyrite and chlorite on joints, moderately fractured.	50	23	65	0	4	1	2	5	12	15	5.7	7.8	5.9	12.0	15	**46**
154.0	1420.0	46.94	432.8	159.0	48.46	1.52	1.52	100	0.69	45	Y	As above, pyrite and calcite veins, small shear zone, 3cm, moderately fractured.	50	22	69	0	1	1	2	5	9	15	5.7	9.2	5.9	9.0	15	**45**
159.0	1415.0	48.46	431.3	164.0	49.98	1.52	1.52	100	1.08	71	Y	As above, pyrite and calcite veins, some small shear zones, slightly more competent, strong.	100	25	61	0	1	1	2	5	9	15	9.4	13.9	5.8	9.0	15	**53**
164.0	1410.0	49.98	429.8	169.0	51.51	1.52	1.49	98	0.42	28	Y	As above, siltstone, fine grained, equigranular, light and dark grey laminations, strong, slightly weathered, calcite and pyrite veins, calcite, chlorite and pyrite on joints, moderately fractured.	100	12	124	0	4	1	2	5	12	15	9.4	6.5	6.7	12.0	15	**50**
169.0	1405.0	51.51	428.2	174.0	53.03	1.52	1.52	100	0.86	56	Y	As above.	50	12	127	0	4	1	2	5	12	15	5.7	11.1	6.7	12.0	15	**50**
174.0	1400.0	53.03	426.7	179.0	54.56	1.52	1.51	99	0.47	31	Y	As above, some pyrite and calcite veins, small shear zone, 1cm, moderately to highly fractured.	50	25	60	0	1	1	2	5	9	15	5.7	6.9	5.8	9.0	15	**42**
179.0	1395.0	54.56	425.2	184.0	56.08	1.52	1.52	100	0.48	31	Y	As above, siltstone, fine grained, equigranular, light and dark grey laminations, medium strong, slightly weathered, calcite and pyrite veins, sheared zone at 183; for 10cm, pyrite, calcite and chlorite on fractures.	50	23	66	0	1	1	2	5	9	15	5.7	7.0	5.9	9.0	15	**43**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
184.0	1390.0	56.08	423.7	189.0	57.60	1.52	1.41	93	0.32	21	Y	As above, very fractured, shear zones, calcite veins, pyrite veins, calcite, pyrite, chlorite on fractures.	50	25	56	0	1	1	2	5	9	15	5.7	5.6	5.8	9.0	15	**41**
189.0	1385.0	57.60	422.2	194.0	59.13	1.52	1.52	100	0.00	0	Y	As above, highly fractured, shear zone at 190 to 190.5', pyrite, calcite and chlorite on joints.	50	25	61	0	1	1	2	5	9	15	5.7	3.0	5.8	9.0	15	**38**
194.0	1380.0	59.13	420.6	199.0	60.65	1.52	1.40	92	0.28	18	Y	As above, shear zone at 195', pyrite, calcite and chlorite on joints.	50	25	56	0	1	1	2	5	9	15	5.7	5.2	5.8	9.0	15	**41**
199.0	1375.0	60.65	419.1	204.0	62.18	1.52	1.52	100	0.44	29	Y	As above, siltstone, fine grained, equigranular, light and dark grey laminations, medium strong, slightly weathered, highly fractured, shear/rubble zones, chlorite, calcite and pyrite on fractures.	50	25	61	0	1	1	2	5	9	15	5.7	6.7	5.8	9.0	15	**42**
204.0	1370.0	62.18	417.6	209.0	63.70	1.52	1.52	100	0.82	54	Y	As above, siltstone, fine grained, equigranular, light and dark grey laminations, medium strong, slightly weathered, more competent, pyrite and calcite veins, chlorite, calcite and pyrite on fractures.	50	14	109	0	4	1	2	5	12	15	5.7	10.7	6.5	12.0	15	**50**
209.0	1365.0	63.70	416.1	214.0	65.22	1.52	1.52	100	0.27	18	Y	As above, siltstone, fine grained, equigranular, light and dark grey laminations, medium strong, slightly weathered, rubble zones, pyrite and calcite veins, chlorite, calcite and pyrite on fractures.	50	25	61	0	1	1	2	5	9	15	5.7	5.1	5.8	9.0	15	**41**
214.0	1360.0	65.22	414.5	219.0	66.75	1.52	1.52	100	1.25	82	Y	As above, siltstone, fine grained, equigranular, light and dark grey laminations, medium strong, slightly weathered, fractured, pyrite and calcite veins, chlorite, calcite and pyrite on fractures.	50	20	76	0	1	1	2	5	9	15	5.7	16.2	6.0	9.0	15	**52**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
219.0	1355.0	66.75	413.0	224.0	68.27	1.52	1.52	100	1.09	72	Y	As above, siltstone, fine grained, equigranular, light and dark grey laminations, medium strong, slightly weathered, pyrite and calcite veins, chlorite, calcite and pyrite on fractures.	50	12	127	0	4	1	2	5	12	15	5.7	14.0	6.7	12.0	15	**53**
END OF HOLE																												

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-294\[GH11-294.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	08OCT'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

GEOTECHNICAL DRILLHOLE LOGGING DATA SHEET
ROCK MASS CLASSIFICATION - RMR 1989

Drillhole Number: GH11-296

PROJECT: PEBBLE PROJECT
Client: PEBBLE LIMITED PARTNERSHIP
Drilling Company: FOUNDEX PACIFIC INC.
Location: ILIAMNA, ALASKA
Coordinates : 1399428 E, 2160999 N
Coordinate System : UTM NAD 83 ALASKA STATE PLANE

Surface Elevation: 502 m / 1,647 ft
Total Depth: 72.8 m / 239 ft
Azimuth: 0 deg
Inclination: 90 deg (down is positive)

Drill Type: HT-700

Core Diameter: From 0 to 24 ft PQ3 3.27 "
Core Diameter: From 24 to 239 ft HQ3 2.41 "

Logged By: LS/EEB
Reviewed By: LS
Date Started: 09-Oct-11
Date Completed: 11-Oct-11

Drillhole Number: GH11-296

Print Jan/26/12 14:06:30

DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition: Persis- P	Apert- A	Rough R	Infill I	Weath W	TOTAL	Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
0.0	1647.0	0.00	502.0	9.0	2.74	2.74	0.60	22	0.00	0	OB	OVERBURDEN																
9.0	1638.0	2.74	499.3	14.0	4.27	1.52	0.60	39	0.00	0	Gs	Granodiorite, fine grained, grey, highly fractured, medium strong, moderately weathered, hematite on joints is pervasive.	50	25	24	0	1	1	2	3	7	15	5.7	3.0	5.3	7.0	15	36
14.0	1633.0	4.27	497.7	19.0	5.79	1.52	1.41	93	0.10	7	Gs	As above, fine grained, grey laminated, medium strong, moderately weathered, hematite on joints is pervasive, more competent.	50	33	43	0	4	1	2	3	10	15	5.7	3.7	5.6	10.0	15	40
19.0	1628.0	5.79	496.2	24.0	7.31	1.52	1.52	100	1.15	75	Gs	As above, fine grained, grey laminations, medium strong, moderately weathered, oxidation (hematite?) on joints is pervasive, more competent.	50	16	95	0	1	1	2	3	7	15	5.7	14.8	6.3	7.0	15	49

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
24.0	1623.0	7.31	494.7	29.0	8.84	1.52	1.52	100	1.45	95	Gs	As above, fine grained, grey laminations, strong, moderately weathered, soft infill, oxidation (hematite?) & pyrite on joints, veins of pyrite & white (quartz?), veins and blotches of dull green.	100	8	190	0	1	1	2	3	7	15	9.4	19.1	7.5	7.0	15	**58**
29.0	1618.0	8.84	493.2	34.0	10.36	1.52	1.40	92	0.52	34	Gs	As above, fine grained, grey laminations, strong, moderately weathered, soft infill, oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite, veins and blotches of dull green, rubble zone on first 15 cm of run.	100	25	56	0	1	1	2	3	7	15	9.4	7.4	5.8	7.0	15	**45**
34.0	1613.0	10.36	491.6	39.0	11.89	1.52	1.52	100	1.52	100	Gs	As above, fine grained, grey laminations, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite and white (calcite?), veins and blotches of dull green.	50	5	304	0	4	1	2	3	10	15	5.7	20.1	8.8	10.0	15	**60**
39.0	1608.0	11.89	490.1	44.0	13.41	1.52	1.52	100	0.81	53	Gs	As above, fine grained, grey laminations, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite and white (calcite?), veins and blotches of dull green.	50	20	76	0	1	1	2	3	7	15	5.7	10.6	6.0	7.0	15	**44**
44.0	1603.0	13.41	488.6	49.0	14.93	1.52	1.52	100	1.28	84	Gs	As above, fine grained, grey laminations, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite, veins and blotches of dull green.	50	14	109	0	1	1	2	3	7	15	5.7	16.6	6.5	7.0	15	**51**
49.0	1598.0	14.93	487.1	54.0	16.46	1.52	1.52	100	1.06	70	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite, veins and blotches of dull green.	50	15	101	0	1	1	2	3	7	15	5.7	13.6	6.4	7.0	15	**48**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
54.0	1593.0	16.46	485.5	59.0	17.98	1.52	1.52	100	1.31	86	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), veins and blotches of dull green.	50	10	152	0	4	1	2	3	10	15	5.7	17.0	7.0	10.0	15	**55**
59.0	1588.0	17.98	484.0	64.0	19.51	1.52	1.52	100	1.02	67	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), veins and blotches of dull green.	50	16	95	0	1	1	2	3	7	15	5.7	13.1	6.3	7.0	15	**47**
64.0	1583.0	19.51	482.5	69.0	21.03	1.52	1.52	100	1.41	93	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), veins and blotches of dull green.	50	6	253	0	4	1	2	3	10	15	5.7	18.5	8.2	10.0	15	**57**
69.0	1578.0	21.03	481.0	74.0	22.55	1.52	1.52	100	1.37	90	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), blotches of dull green.	50	9	169	0	4	1	2	3	10	15	5.7	17.9	7.2	10.0	15	**56**
74.0	1573.0	22.55	479.5	79.0	24.08	1.52	1.52	100	1.40	92	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, small amount of oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), blotches of dull green.	50	8	190	0	4	3	2	5	14	15	5.7	18.3	7.5	14.0	15	**60**
79.0	1568.0	24.08	477.9	84.0	25.60	1.52	1.52	100	1.30	85	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, small amount of oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), veins & blotches of dull green.	50	13	117	0	1	1	2	5	9	15	5.7	16.9	6.6	9.0	15	**53**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
84.0	1563.0	25.60	476.4	89.0	27.13	1.52	1.52	100	1.27	83	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, small amount of oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), veins & blotches of dull green.	50	14	109	0	1	1	2	5	9	15	5.7	16.5	6.5	9.0	15	**53**
89.0	1558.0	27.13	474.9	94.0	28.65	1.52	1.52	100	1.17	77	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite, chlorite, light and dark blue & light orange on joints, veins of pyrite & white (calcite?), veins & blotches of dull green.	50	6	253	0	4	1	2	3	10	15	5.7	15.1	8.2	10.0	15	**54**
94.0	1553.0	28.65	473.4	99.0	30.17	1.52	1.52	100	1.17	77	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), veins & blotches of dull green.	50	9	169	0	4	1	2	3	10	15	5.7	15.1	7.2	10.0	15	**53**
99.0	1548.0	30.17	471.8	104.0	31.70	1.52	1.52	100	1.52	100	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), blotches of dull green.	50	3	507	0	4	1	2	5	12	15	5.7	20.1	10.8	12.0	15	**64**
104.0	1543.0	31.70	470.3	109.0	33.22	1.52	1.52	100	1.52	100	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite, chlorite on joints, veins of pyrite, blotches of dull green.	50	5	304	0	4	1	2	5	12	15	5.7	20.1	8.8	12.0	15	**62**
109.0	1538.0	33.22	468.8	114.0	34.75	1.52	1.52	100	1.25	82	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite, chlorite on joints, veins of pyrite & white (calcite?), blotches of dull green.	50	9	169	0	4	1	2	3	10	15	5.7	16.2	7.2	10.0	15	**54**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
114.0	1533.0	34.75	467.3	119.0	36.27	1.52	1.52	100	1.42	93	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), blotches of dull green.	50	6	253	0	4	1	2	5	12	15	5.7	18.6	8.2	12.0	15	**59**
119.0	1528.0	36.27	465.7	124.0	37.79	1.52	1.52	100	1.47	96	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), veins & blotches of dull green.	50	2	760	0	4	1	2	5	12	15	5.7	19.4	12.9	12.0	15	**65**
124.0	1523.0	37.79	464.2	129.0	39.32	1.52	1.52	100	1.52	100	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, oxidation (hematite?), pyrite, calcite & chlorite on joints, veins of pyrite & dull green.	50	2	760	0	4	1	2	5	12	15	5.7	20.1	12.9	12.0	15	**66**
129.0	1518.0	39.32	462.7	134.0	40.84	1.52	1.52	100	1.52	100	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, pyrite, calcite & chlorite on joints, veins of pyrite & dull green, near vertical streaks of dull green.	50	2	760	0	4	1	2	5	12	15	5.7	20.1	12.9	12.0	15	**66**
134.0	1513.0	40.84	461.2	139.0	42.37	1.52	1.52	100	1.40	92	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, pyrite, calcite & chlorite on joints, veins of pyrite & white (calcite?), veins and blotches of dull green.	50	7	217	0	4	1	2	5	12	15	5.7	18.3	7.8	12.0	15	**59**
139.0	1508.0	42.37	459.6	144.0	43.89	1.52	1.52	100	1.52	100	Gs	As above, fine grained, grey, medium strong, slightly weathered, soft infill, pyrite, calcite & chlorite on joints, veins of pyrite, veins and blotches of dull green.	50	3	507	0	4	1	2	5	12	15	5.7	20.1	10.8	12.0	15	**64**
144.0	1503.0	43.89	458.1	149.0	45.41	1.52	1.52	100	1.52	100	Gs	Granodiorite, porphyritic, medium grained, dark grey, very strong, slightly weathered, pyrite and calcite veins, epidote, pyrite and calcite on joints.	150	2	760	0	4	3	2	5	14	15	12.2	20.1	12.9	14.0	15	**74**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
149.0	1498.0	45.41	456.6	154.0	46.94	1.52	1.52	100	1.39	91	Gs	As above, competent, medium grained, dark grey, very strong, slightly weathered, pyrite and calcite veins, epidote? Pyrite, calcite and chlorite on joints.	150	3	507	0	4	3	2	5	14	15	12.2	18.2	10.8	14.0	15	**70**
154.0	1493.0	46.94	455.1	159.0	48.46	1.52	1.52	100	1.52	100	Gs	Granodiorite, competent, medium grained, dark grey, very strong, slightly weathered, pyrite and calcite veins, pyrite, chlorite and calcite on joints.	200	3	507	0	4	3	2	5	14	15	14.1	20.1	10.8	14.0	15	**74**
159.0	1488.0	48.46	453.5	164.0	49.98	1.52	1.52	100	1.52	100	Gs	Granodiorite, medium grained, dark grey, very strong, slightly weathered, pyrite and calcite veins, pyrite, calcite and chlorite on joints, porphyritic.	200	3	507	0	4	3	2	5	14	15	14.1	20.1	10.8	14.0	15	**74**
164.0	1483.0	49.98	452.0	169.0	51.51	1.52	1.52	100	1.50	98	Gs	As above, very competent, pyrite, calcite, epidote veins, calcite, chlorite and pyrite on joints.	200	2	760	0	4	3	2	5	14	15	14.1	19.8	12.9	14.0	15	**76**
169.0	1478.0	51.51	450.5	174.0	53.03	1.52	1.52	100	1.44	94	Gs	As above, pyrite and calcite veins, epidote, very competent.	200	2	760	0	1	3	2	5	11	15	14.1	18.9	12.9	11.0	15	**72**
174.0	1473.0	53.03	449.0	179.0	54.56	1.52	1.52	100	1.45	95	Gs	As above, competent, medium grained, porphyritic, dark grey, very strong, pyrite and calcite veins, calcite, chlorite and pyrite on fractures.	200	5	304	0	4	1	2	5	12	15	14.1	19.1	8.8	12.0	15	**69**
179.0	1468.0	54.56	447.4	184.0	56.08	1.52	1.52	100	1.52	100	Gs	As above, very competent.	200	1	1520	0	4	3	2	5	14	15	14.1	20.1	17.5	14.0	15	**81**
184.0	1463.0	56.08	445.9	189.0	57.60	1.52	1.52	100	1.40	92	Gs	As above, calcite and pyrite veins, calcite up to 2mm thickness, epidote.	200	3	507	0	4	3	2	5	14	15	14.1	18.3	10.8	14.0	15	**72**
189.0	1458.0	57.60	444.4	194.0	59.13	1.52	1.52	100	1.46	96	Gs	As above, pyrite and calcite veins, epidote.	200	4	380	0	1	1	2	5	9	15	14.1	19.2	9.6	9.0	15	**67**
194.0	1453.0	59.13	442.9	199.0	60.65	1.52	1.52	100	1.04	68	Gs	As above, moderately fractured, pyrite and calcite veins, calcite, chlorite, and pyrite on fractures.	200	15	101	0	4	1	2	5	12	15	14.1	13.4	6.4	12.0	15	**61**
199.0	1448.0	60.65	441.4	204.0	62.18	1.52	1.52	100	1.35	89	Gs	As above, pyrite and calcite veins, epidote.	200	4	380	0	4	3	2	5	14	15	14.1	17.6	9.6	14.0	15	**70**

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DRILL RUN DATA											GEOLOGY - COMMENTS		RMR - DATA (BY RUN)									RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Weathered State, Structure, Color, Grain Size, Rock Material Strength, Rock Type,	UCS (Est.) (MPa)	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	**RMR-89 Total**
																Persis-P	Apert-A	Rough R	Infill I	Weath W	TOTAL							
204.0	1443.0	62.18	439.8	209.0	63.70	1.52	1.52	100	1.52	100	Gs	As above, pyrite and calcite veins.	200	3	507	0	4	1	2	5	12	15	14.1	20.1	10.8	12.0	15	**72**
209.0	1438.0	63.70	438.3	214.0	65.22	1.52	1.52	100	1.40	92	Gs	As above, very competent, pyrite and calcite veins.	200	2	760	0	4	3	2	5	14	15	14.1	18.3	12.9	14.0	15	**74**
214.0	1433.0	65.22	436.8	219.0	66.75	1.52	1.50	98	1.38	91	Gs	As above, pyrite and calcite veins, epidote, pyrite, calcite and chlorite on fractures.	200	4	375	0	4	3	2	5	14	15	14.1	18.0	9.5	14.0	15	**71**
219.0	1428.0	66.75	435.3	224.0	68.27	1.52	1.52	100	0.16	10	Gs	As above, granodiorite, medium grained, porphyritic, dark grey, strong, calcite veins, pyrite veins, shear zones beginning of run and some rubble zones, calcite, pyrite and chlorite on joints.	100	25	61	0	1	1	2	5	9	15	9.4	4.2	5.8	9.0	15	**43**
224.0	1423.0	68.27	433.7	229.0	69.80	1.52	1.52	100	1.38	91	Gs	As above, much more competent, pyrite and calcite veins, epidote, pyrite, calcite, and chlorite on joints.	200	7	217	0	4	1	2	5	12	15	14.1	18.0	7.8	12.0	15	**67**
229.0	1418.0	69.80	432.2	234.0	71.32	1.52	1.52	100	1.52	100	Gs	As above, granodiorite, medium grained, porphyritic, dark grey, very strong, slightly weathered, pyrite, calcite and epidote veins, calcite, pyrite and chlorite on joints.	200	3	507	0	4	1	2	5	12	15	14.1	20.1	10.8	12.0	15	**72**
234.0	1413.0	71.32	430.7	239.0	72.84	1.52	1.52	100	1.30	85	Gs	As above, calcite and pyrite veins, chlorite, calcite and pyrite on joints, very strong.	200	9	169	0	4	1	2	5	12	15	14.1	16.9	7.2	12.0	15	**65**
END OF HOLE																												

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-296\[GH11-296.xls]Data - Calc Sheet

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	10OCT'11	ISSUED WITH REPORT 101-176/38-3	LS	LJG	KJB

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APPENDIX A3

GEOTECHNICAL DRILLHOLE LABORATORY TEST RESULTS

- GH11-229
- GH11-231 to GH11-243
- GH11-245
- GH11-247
- GH11-266S
- GH11-267S
- GH11-278S
- GH11-279S
- GH11-289S
- GH11-290S
- GH11-274
- GH11-287
- GH11-293
- GH11-294
- GH11-296

(Pages A3-1 to A3-341)

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Moisture-Density Worksheet

Identification				*Test Results (Summary)*				*Density Determination*					*Moisture Determination*				
Hole (GH11-)	Depth (ft)	Sample No.	Sample Type	% Moisture	Dry Density (pcf)	USCS	Component, Color, Consistency, Structure ...	Sample Length (in)	Sample Diameter (in)	Wet Wt. + Tare, g	Tare, g	Wet Soil Wt., g	Tare I.D.	Wet Wt. + Tare	Dry Wt. + Tare	Tare	Run By
229	4-6'	2	ST	27.4	86.2		Density based on recovery length	12.470	2.875			2332.5		391.7	349.8	196.7	rsh
232	4-6'	2	ST	25.1	90.7		Density based on recovery length	21.360	2.875			4133.5		1054.7	921.4	391.2	rsh
239	14-15.5'	2	ST	22.0	97.3		Density based on recovery length	17.180	2.875			3475.0		592.8	521.6	197.9	rsh
241	19-20.5'	1	ST	14.3	103.8		Tube damaged - Used original tube diameter	18.000	2.875	5200.0	1560.0	3640.0		4063.6	3584.5	242.9	jdb
243	4.0-5.5'	1	ST	25.7	80.4		Density based on recovery length	17.000	2.875	2928.0	0.0	2928.0		392.2	335.7	115.8	jdb

Project	**Pebble Project**	**Sheet Prep. By**	**jdb/rsh**	**Lab No.**	**L2011-102**
Project No.	**DV101-00077/12**	**Checked By**	**spb**	**Date**	**11/16/2011**

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Moisture-Density Worksheet

Identification				*Test Results (Summary)*				*Density Determination*					*Moisture Determination*				
Hole (GH11-)	Depth (ft)	Sample No.	Sample Type		Bulk Density (pcf)	USCS	Component, Color, Consistency, Structure ...	Sample Length (in)	Sample Diameter (in)	Wet Wt. + Tare, g	Tare, g	Wet Soil Wt., g	Tare I.D.	Wet Wt. + Tare	Dry Wt. + Tare	Tare	Run By
232	32.6-33.4'	3			154.0			8.000	3.270	2765.5	49.0	2716.5					rsh
239	6-7'	1			123.7			12.000	3.270	3337.0	64.0	3273.0					rsh
236	51.5-52.5'	1			73.9			12.000	3.270	1972.0	16.5	1955.5					rsh
229	3-3.75'	1			119.1			9.000	3.270	2377.0	13.5	2363.5					rsh
241	213.5-214'	3			152.5			6.000	3.270	2029.0	11.5	2017.5					rsh
232	3-4'	1			104.9			12.000	3.270	2775.0	0.0	2775.0					rsh
231	21.5-22.5'	3			125.7			12.000	3.270	3354.5	28.0	3326.5					rsh
231	6.75-8.0'	2			130.8			15.000	3.270	4355.5	30.5	4325.0					rsh
231	4.75-5.75'	1			122.0			12.000	3.270	3246.0	19.0	3227.0					rsh
241	82.5-83'	2			172.4			6.000	3.270	2285.0	5.0	2280.0					rsh
232	67.75-68.5'	5			130.5		clayey silt with GRAVELS, moist, dense	8.500	3.270	2455.5	9.5	2446.0					rsh
232	52-53'	4		28.8	93.3			12.000	3.270			3177.1		1741.6	1438.2	383.1	rsh

Project	**Pebble Project**	**Sheet Prep. By**	**jdb/rsh**	**Lab No.**	**L2011-102**
Project No.	**DV101-00077/12**	**Checked By**	**spb**	**Date**	**11/10/2011**

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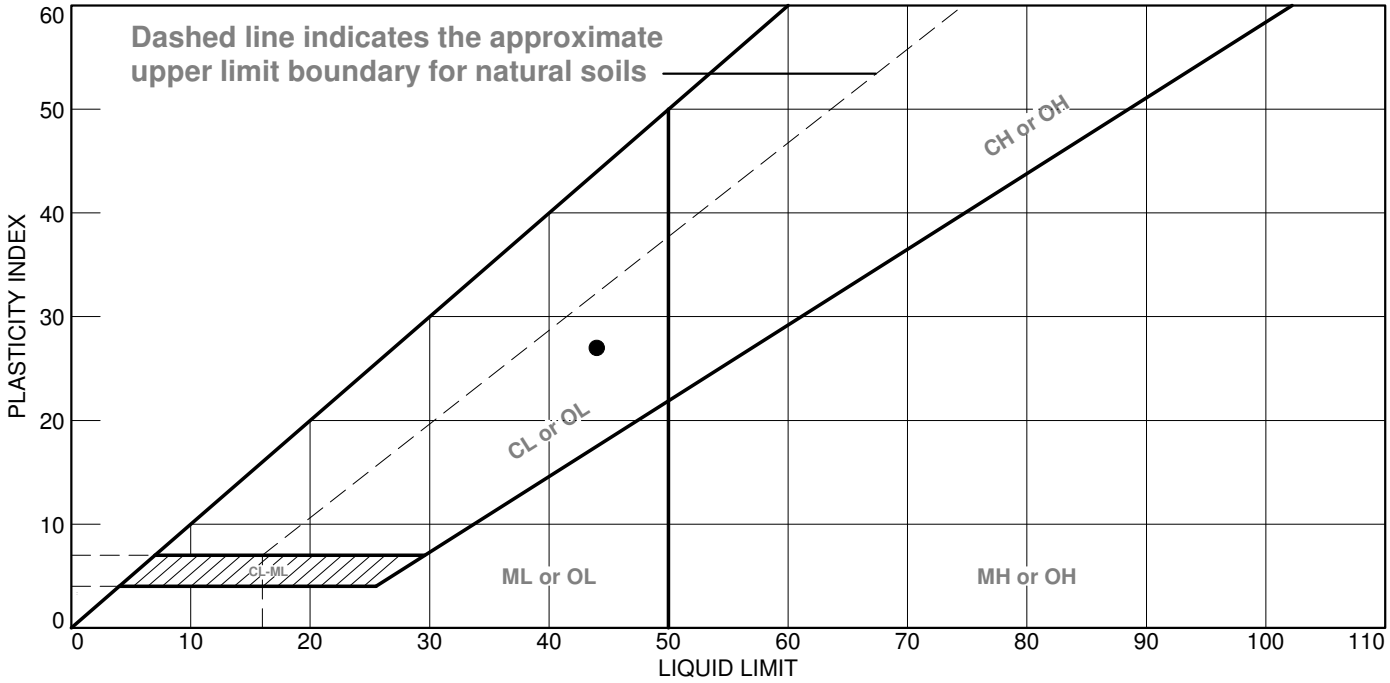
Specific Gravity - Soil
ASTM D 854

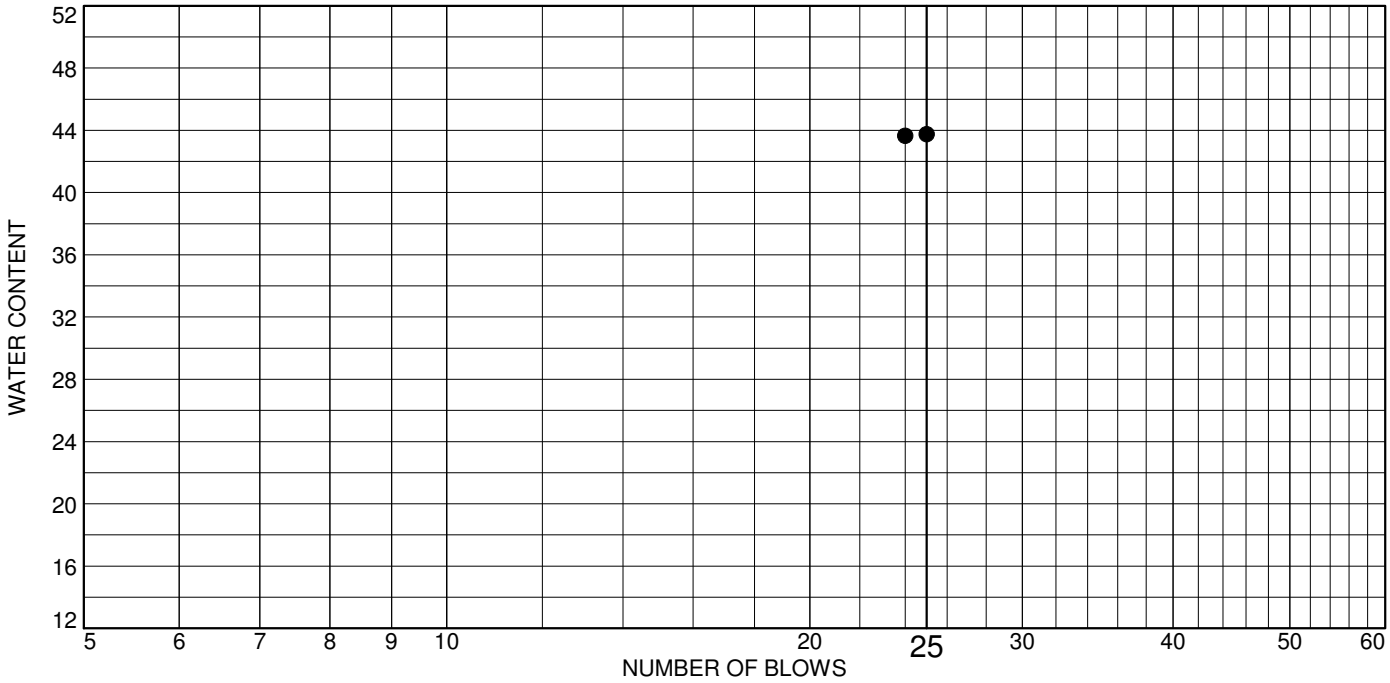
Project	Pebble Project	Project No.	DV101-00077/12
Date Staged	9/23/2011	Act. Code	700
Date Completed	9/27/2011	Lab No.	L2011-102
Tested By	jk	Checked By	spb

Sample No.	GH11-229-2 @ 4-6'		GH11-232-2 @ 4-6'		GH11-239-2 @ 14-15.5'		GH11-243-1 @ 4-5.5'		GH11-241-1 @ 19-20.5'	
Sample Prep. (Wet or Dry)	wet		wet		wet		dry		dry	
Flask No.	113	2	44		115	113	13	113	13	11
1) Wt. of Flask + Soil										
2) Wt. of Flask										
3) Wt. of Soil (1-2)	34.93	34.78	31.82		35.44	35.41	32.84	32.59	35.45	35.39
4) Calibrated Wt. of Flask + Water	344.34	352.59	354.55		352.41	344.44	364.78	344.76	364.64	359.31
5) #3 + #4	379.27	387.37	386.37		387.85	379.85	397.62	377.35	400.09	394.70
6) Wt. of Flask + Water + Soil	365.87	374.12	374.67		374.57	366.60	385.48	365.39	387.13	381.76
7) Volume of Soil (5 - 6)	13.40	13.25	11.70		13.28	13.25	12.14	11.96	12.96	12.94
8) Test Temperature, deg. C	25.1	25.2	25.2		23.9	23.9	19.7	19.8	21.5	21.7
9) Temperature Correction, k	0.998812	0.998786	0.998786		0.999114	0.999114	1.000060	1.000040	0.999679	0.999635
10) Specific Gravity ((3 / 7) * k)	2.604	2.622	2.716		2.666	2.670	2.705	2.725	2.734	2.734
Reported Average, G_s @ 20 deg.C	2.61		2.72		2.67		2.72		2.73	
Tare	2	15	1		17	20	C2	6	15	2
Dry Soil + tare, g	428	428.33	426.3		430.56	430.74	423.28	417.36	428.96	428.46
Tare, g	393.07	393.55	394.48		395.12	395.33	390.44	384.77	393.51	393.07

General Notes: Line 9, k, is determined by dividing the density of water at test temperature recorded, by the density of water at 20 deg. C.

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay with sand	44	17	27	88.9	83.5	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-229, Upper Talarik Creek Area
Sample Number: GH11-229-1 **Depth:** 3-3.75'

Remarks:

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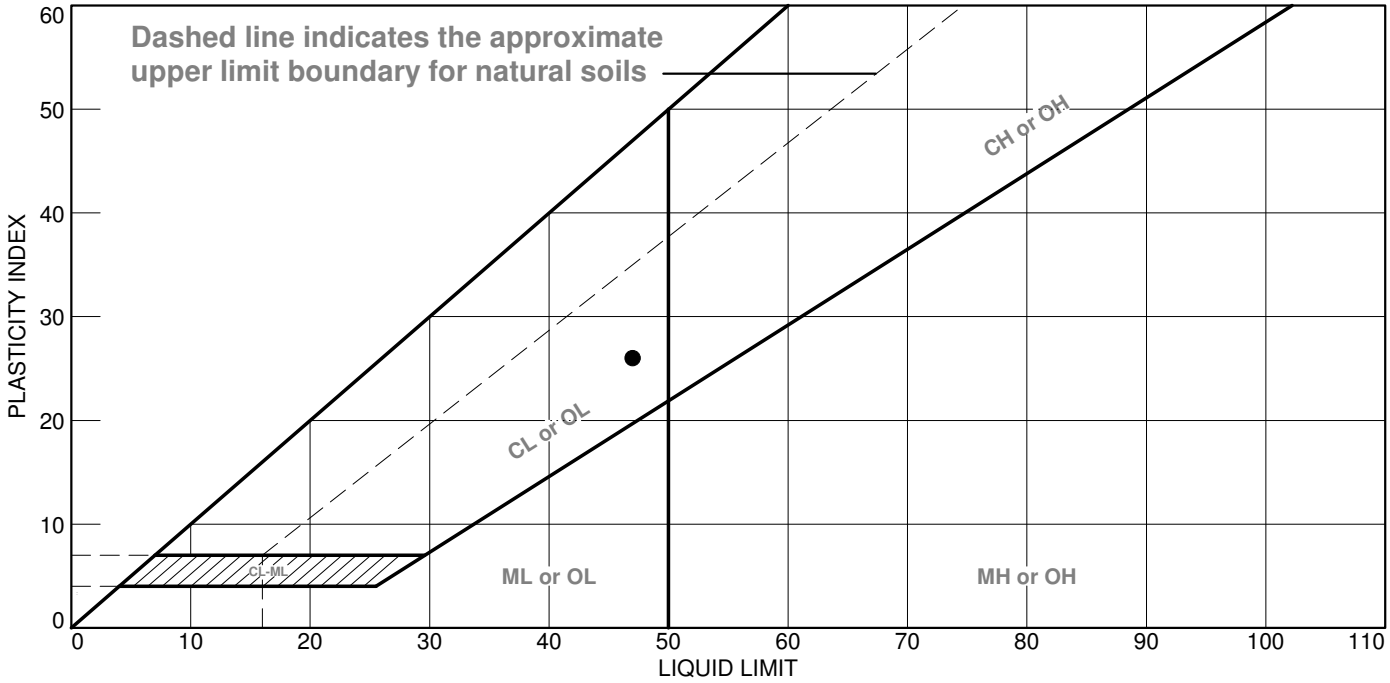
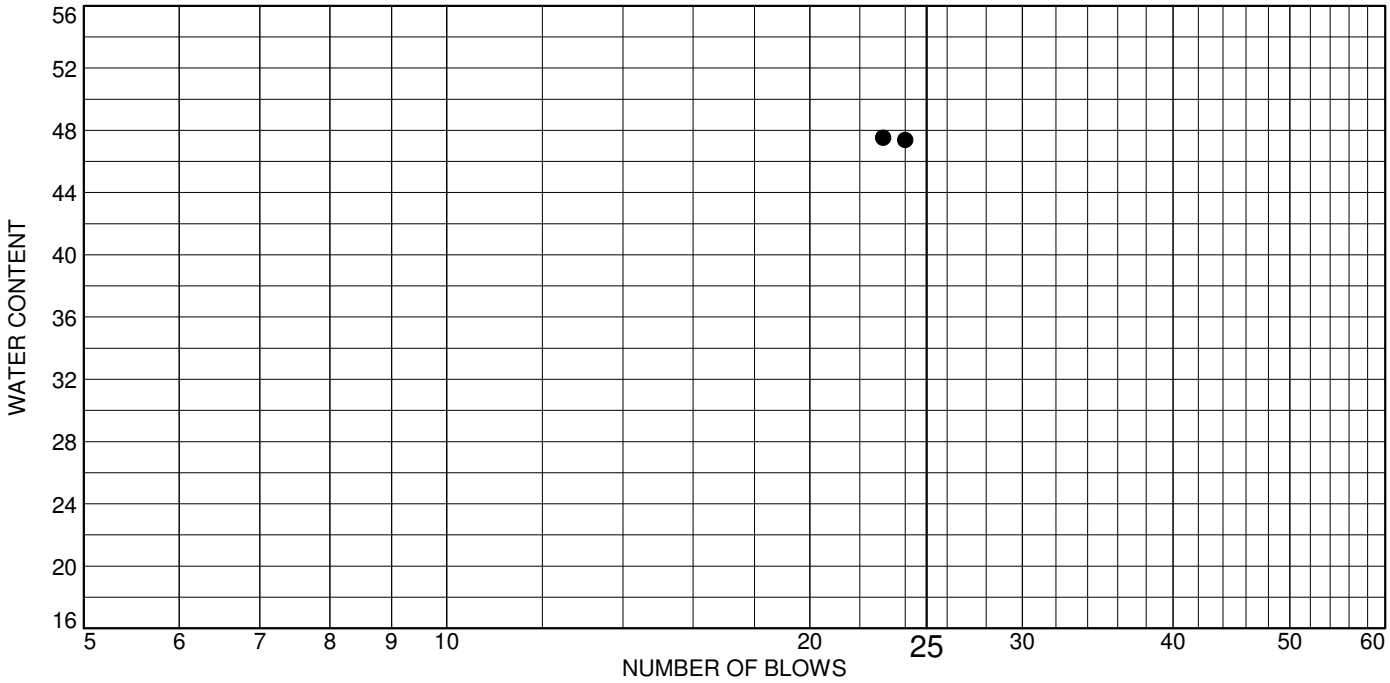
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay	47	21	26	95.9	90.1	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-229, Upper Talarik Creek Area
Sample Number: GH11-229-2 **Depth:** 4-6'

Remarks:

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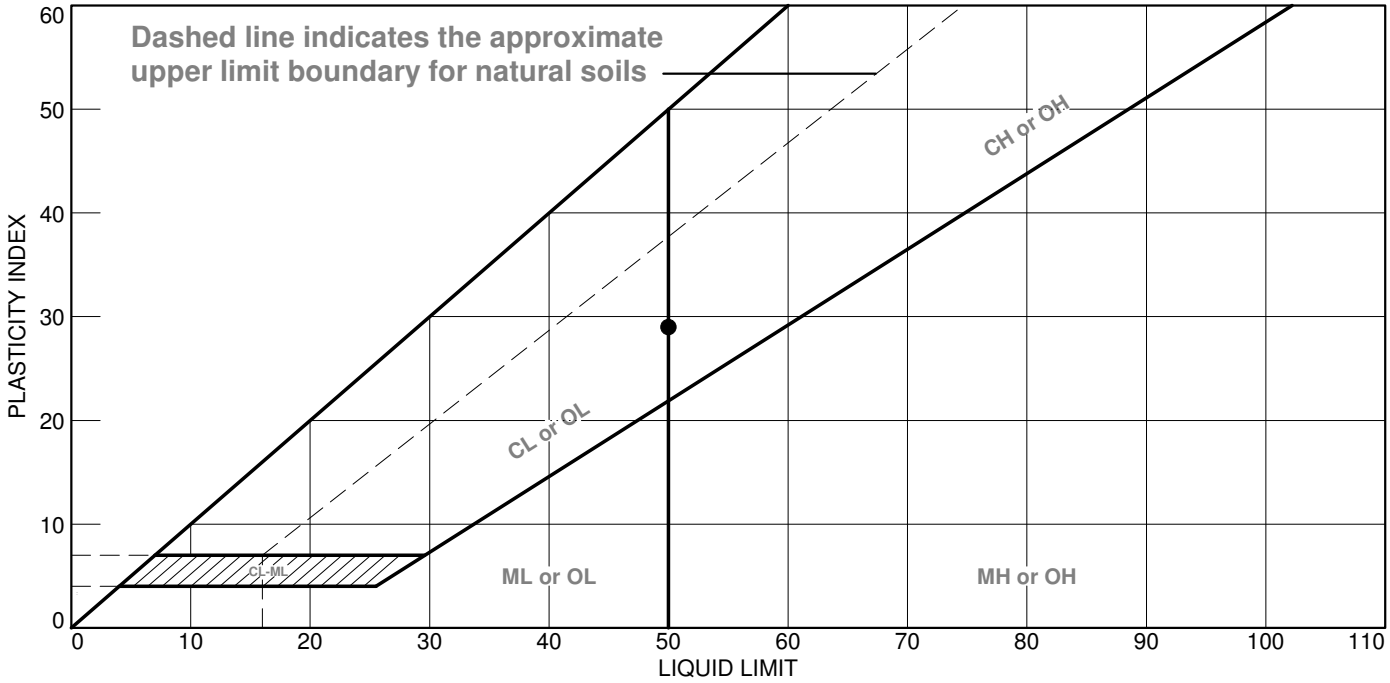
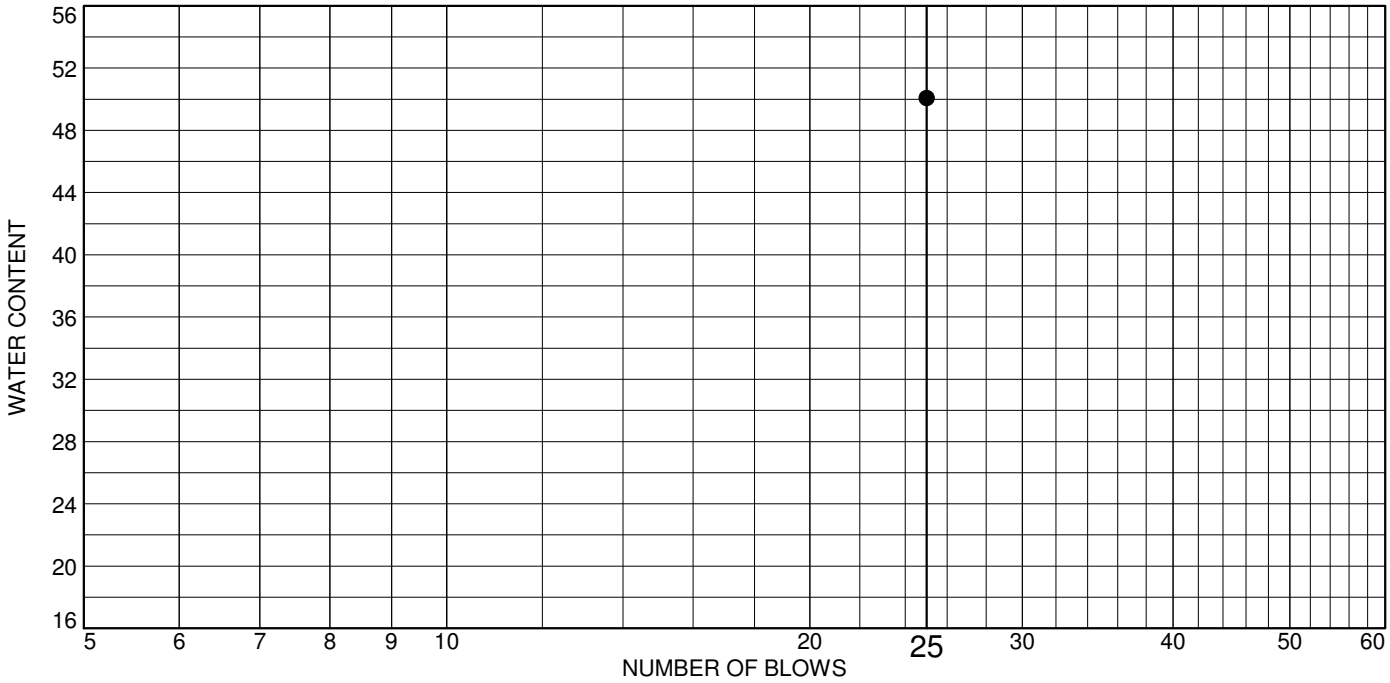
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	fat clay	50	21	29	93.0	88.0	CH

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-229, Upper Talarik Creek Area
Sample Number: SPT 1 **Depth:** 6-7.5'

Remarks:

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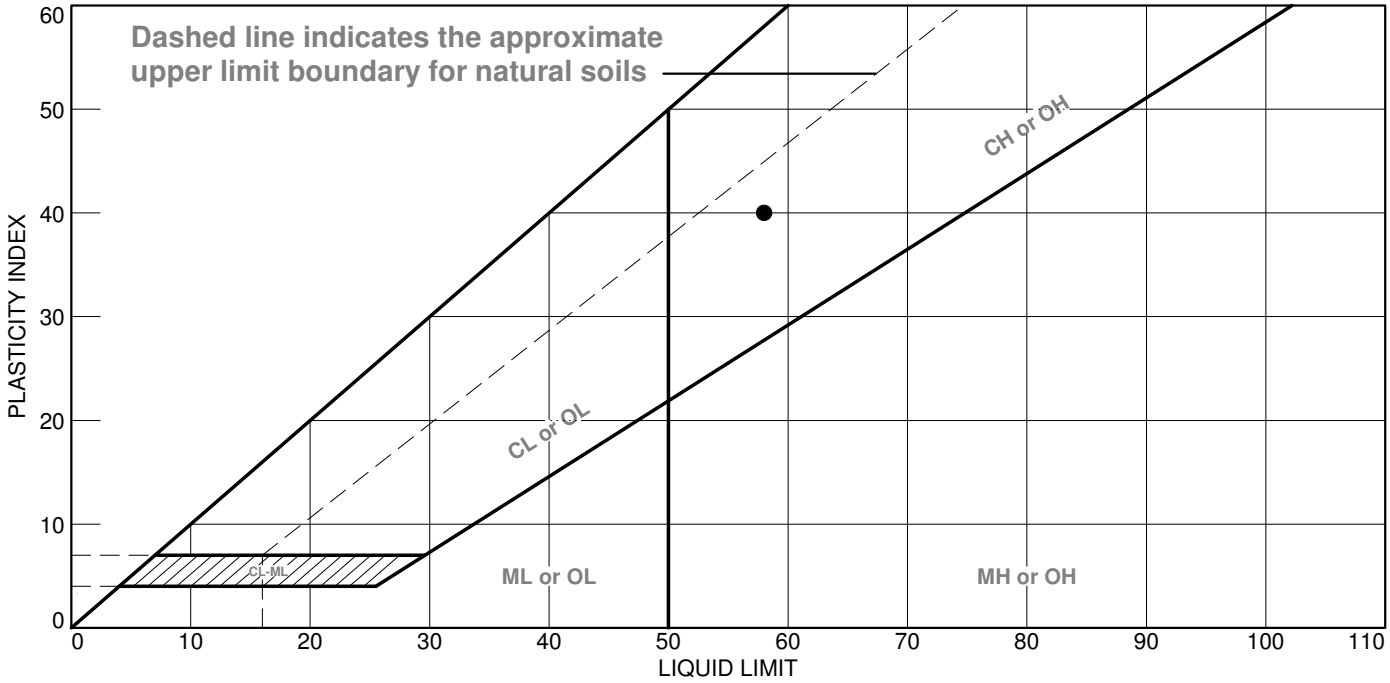
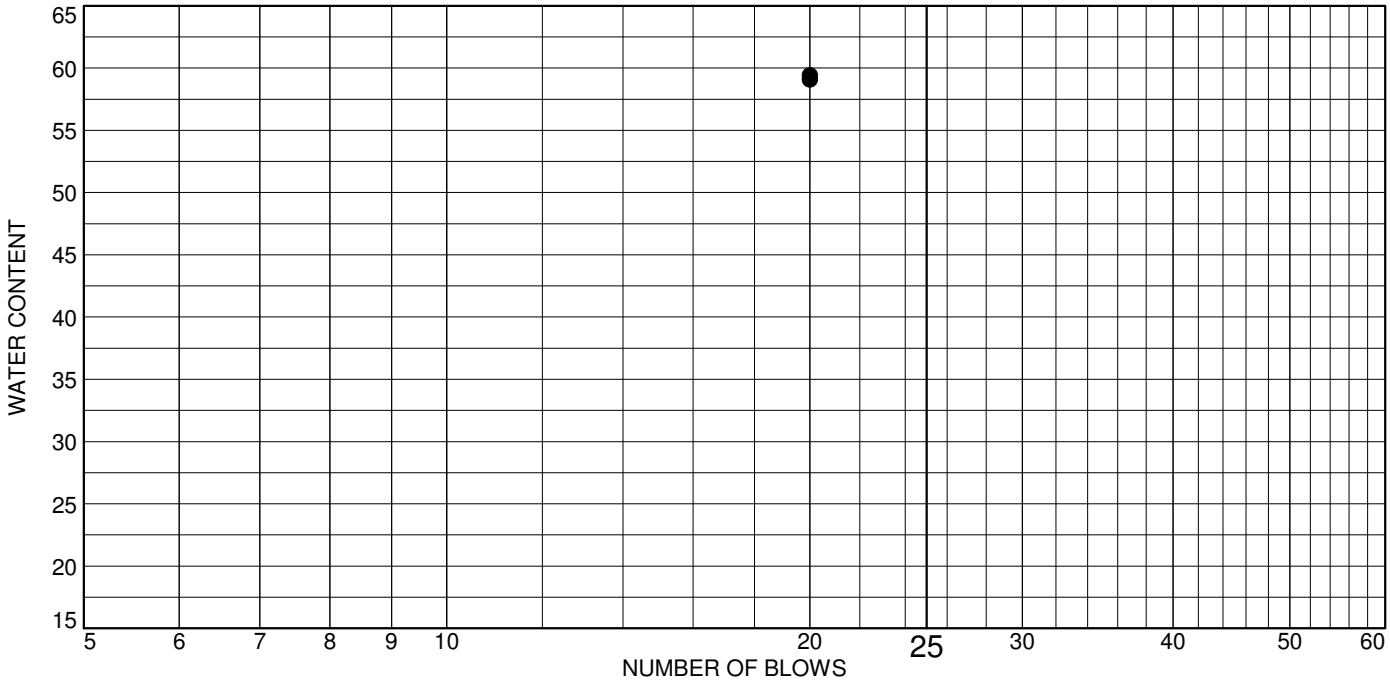
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	fat clay	58	18	40	98.4	96.9	CH

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-229, Upper Talarik Creek Area
Sample Number: SPT 2 **Depth:** 9-10.5'

Remarks:

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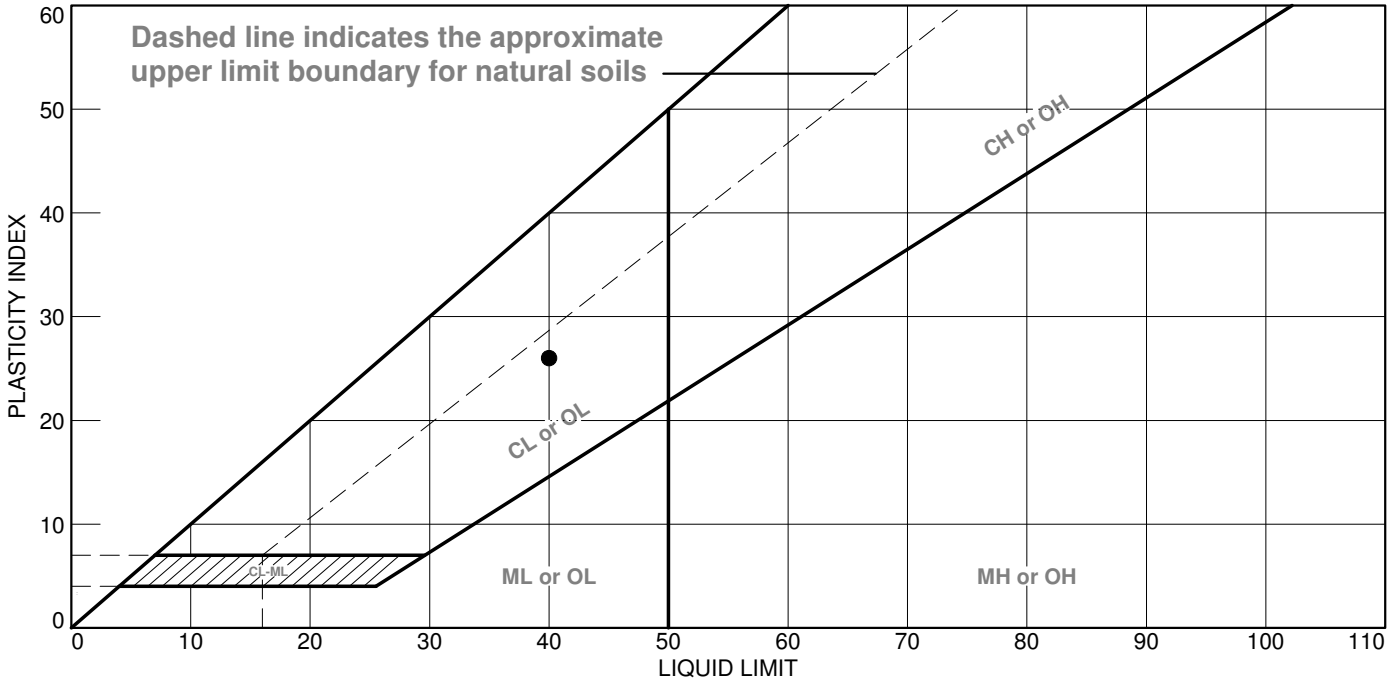
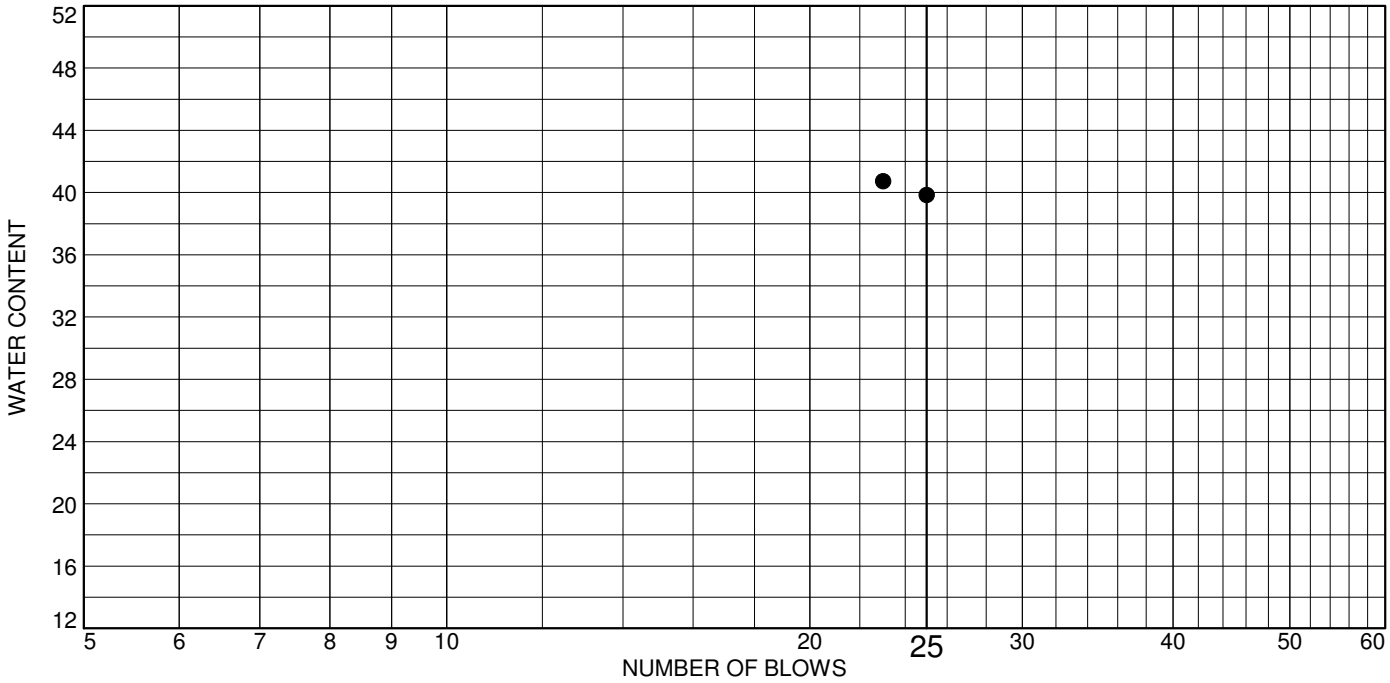
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	40	14	26	45.5	35.7	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-229, Upper Talarik Creek Area
Sample Number: SPT 3 **Depth:** 14-15.5'

Remarks:

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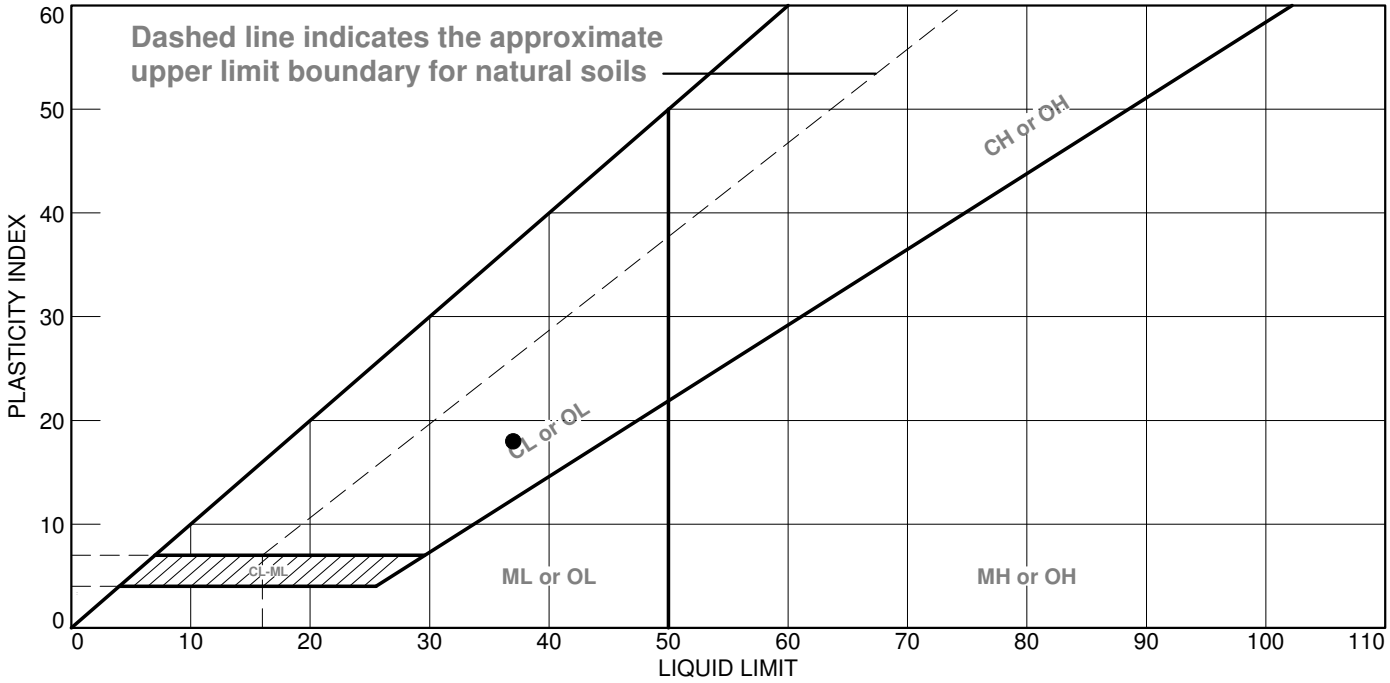
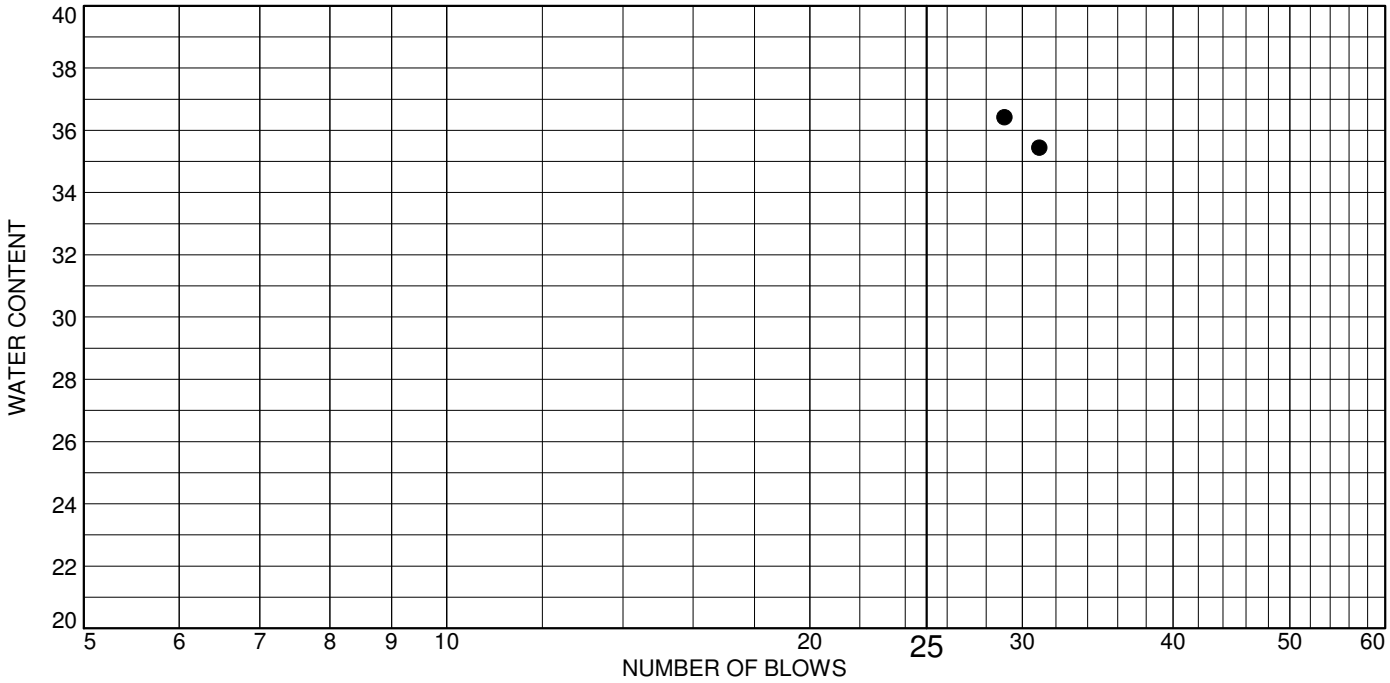
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay with sand	37	19	18	90.1	78.6	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-231, Upper Talarik Creek Area
Sample Number: GH11-231-1 **Depth:** 4.75-5.75'

Remarks:

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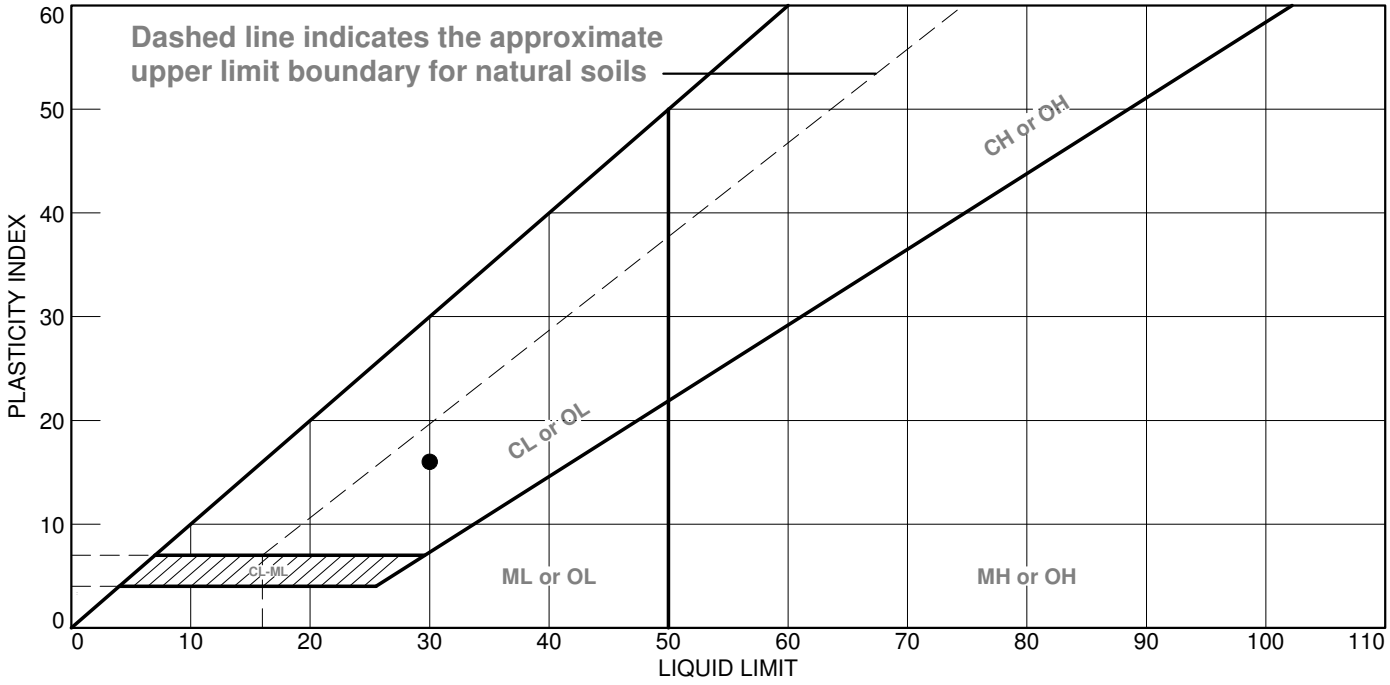
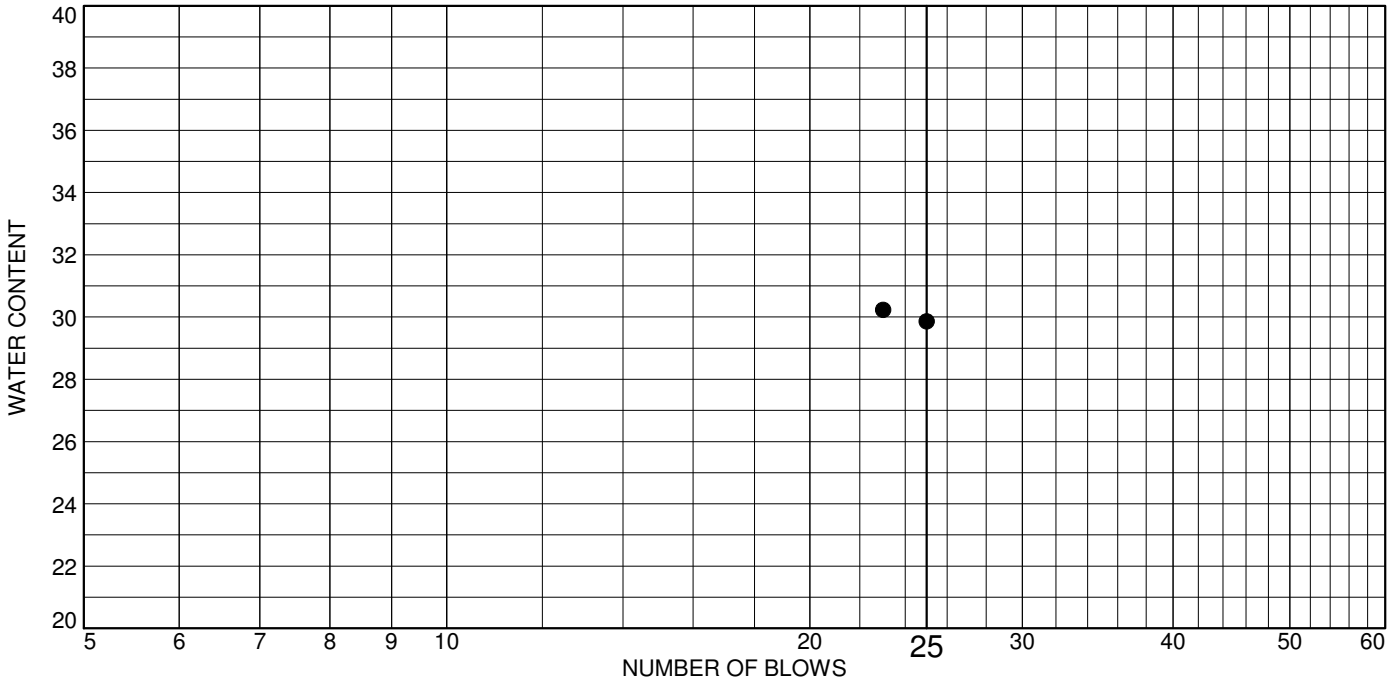
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	30	14	16	47.7	34.7	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-231, Upper Talarik Creek Area
Sample Number: GH11-231-2 **Depth:** 6.75'-8.0'

Remarks:

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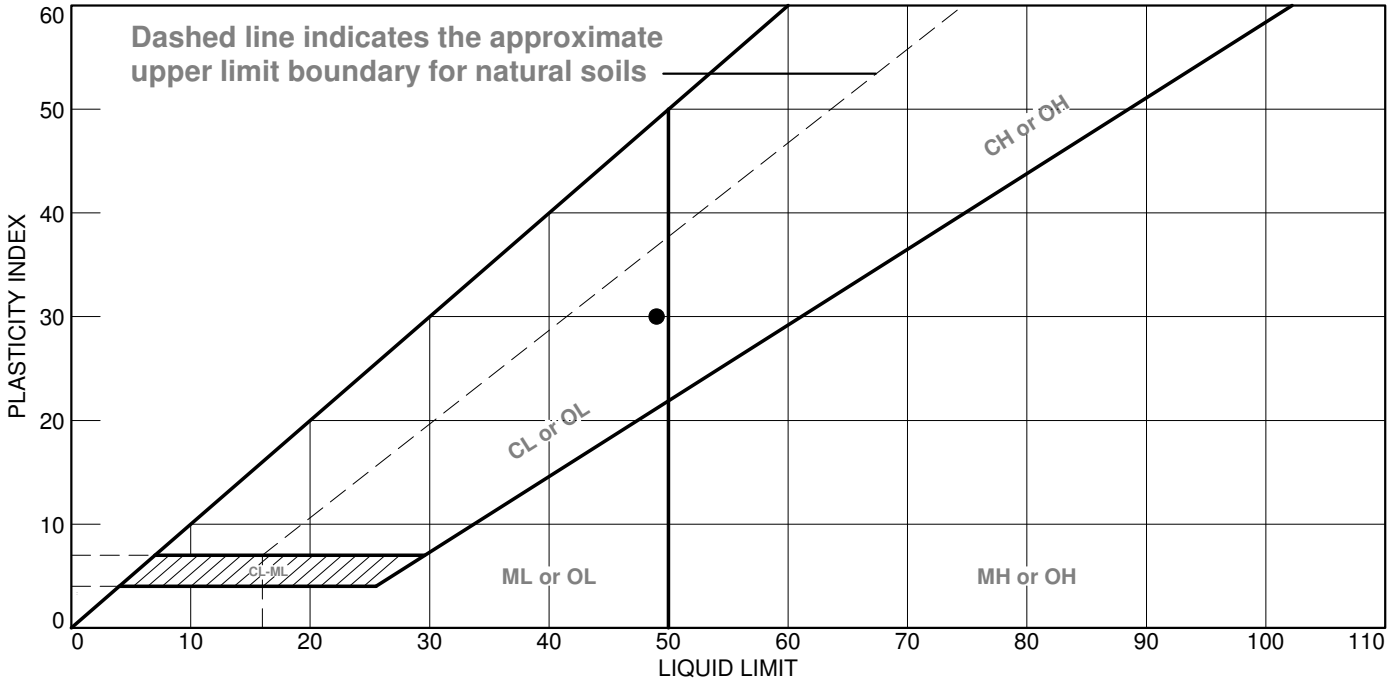
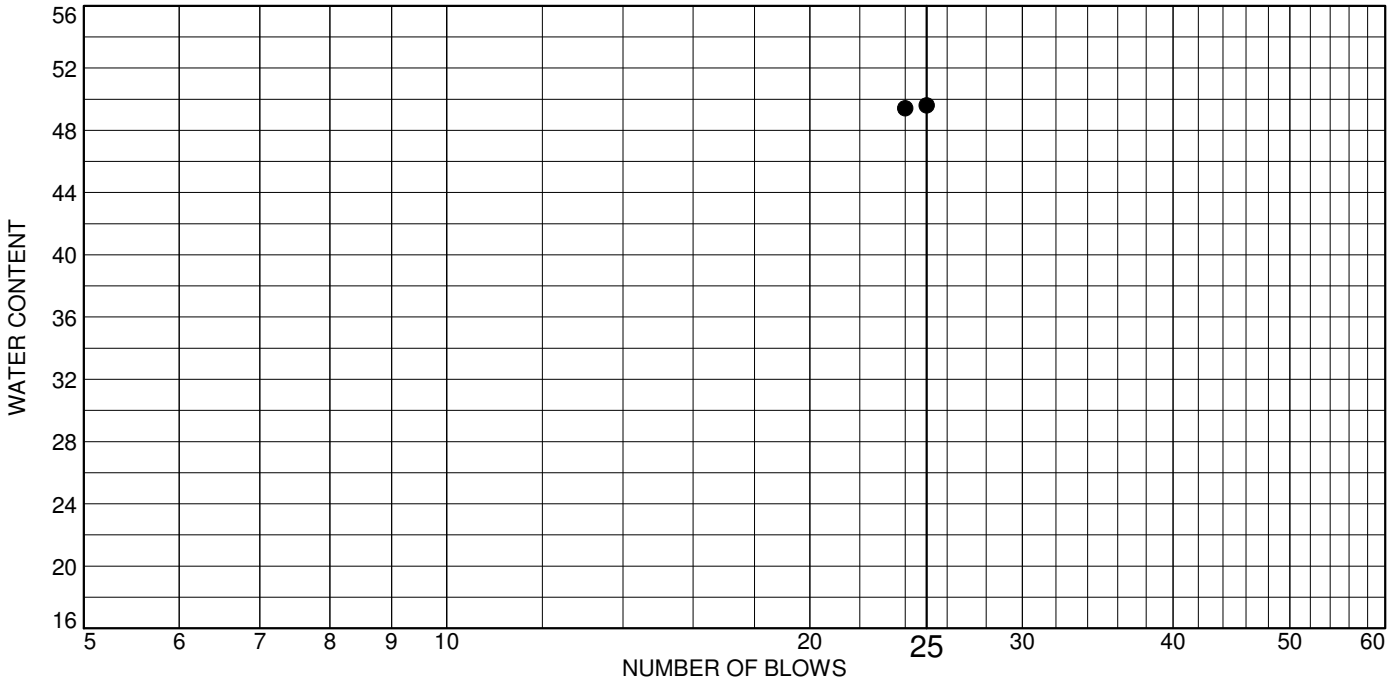
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay	49	19	30	98.3	97.4	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-231, Upper Talarik Creek Area
Sample Number: GH11-231-3 **Depth:** 21.5-22.5'

Remarks:

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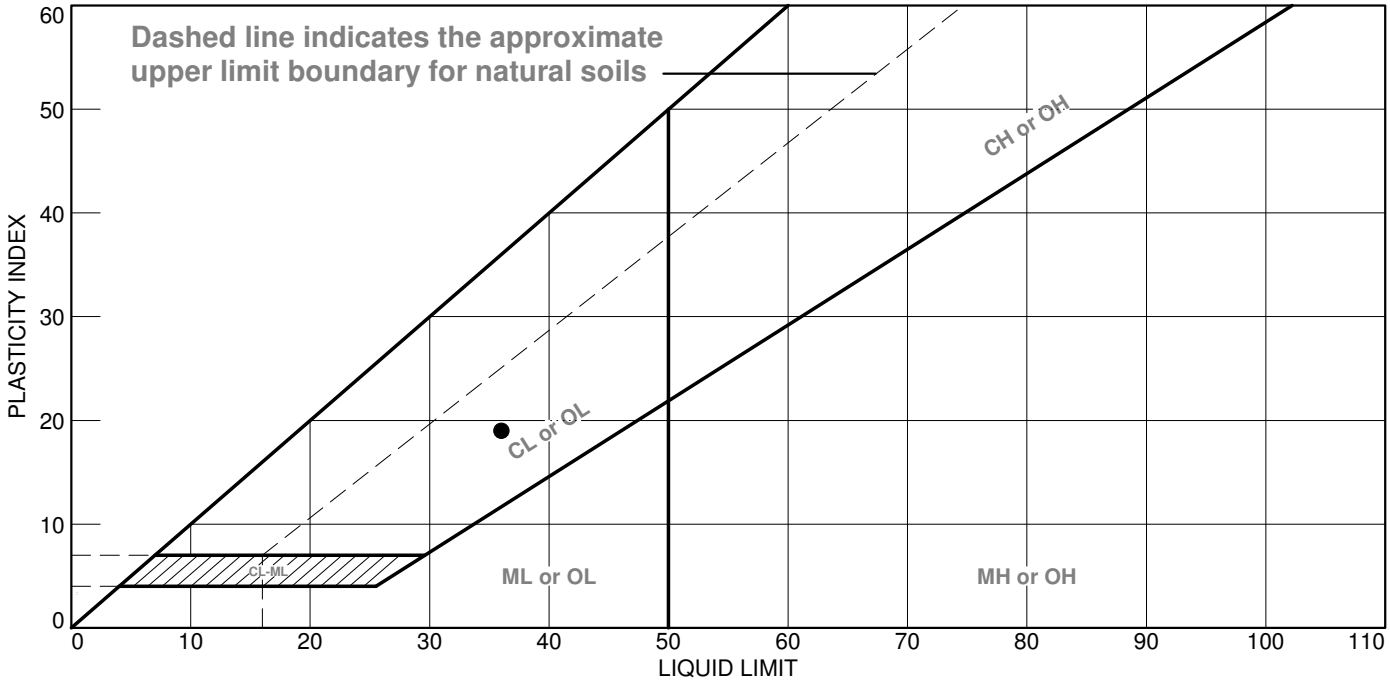
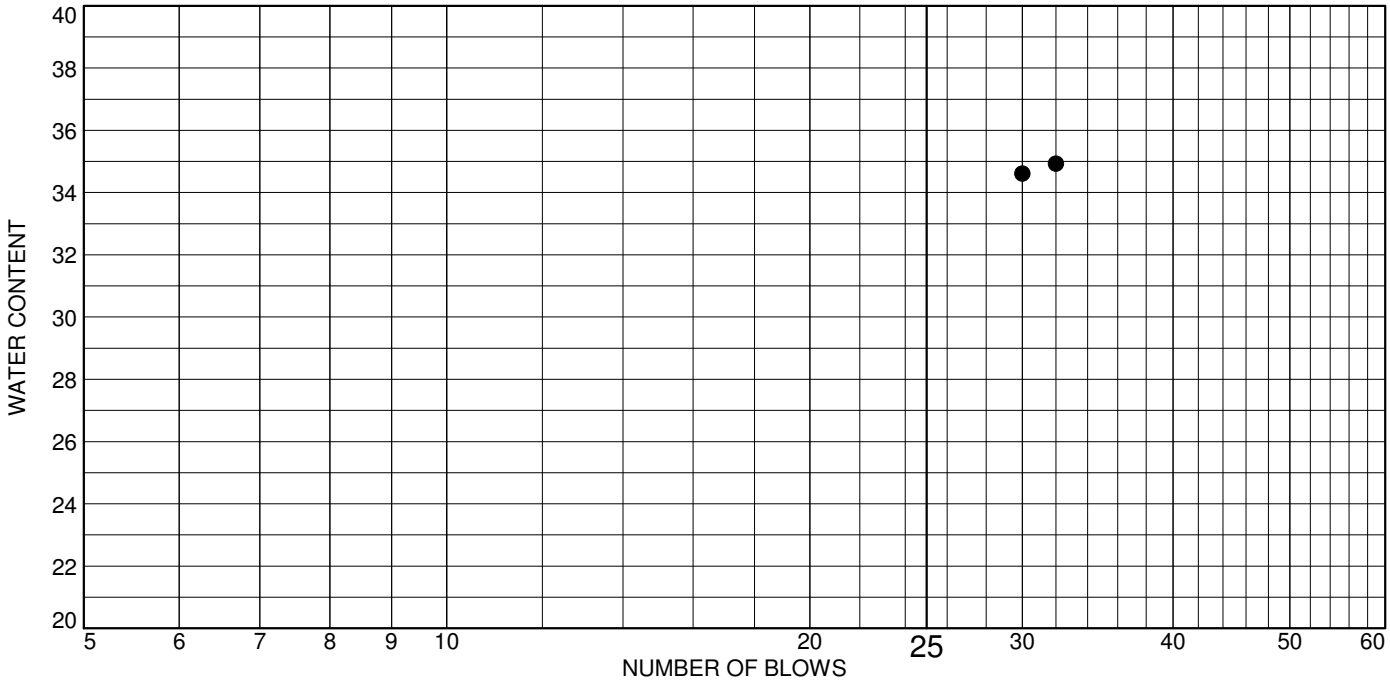
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay with gravel	36	17	19	64.2	50.7	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-231, Upper Talarik Creek Area
Sample Number: SPT 1 **Depth:** 9-10.5'

Remarks:

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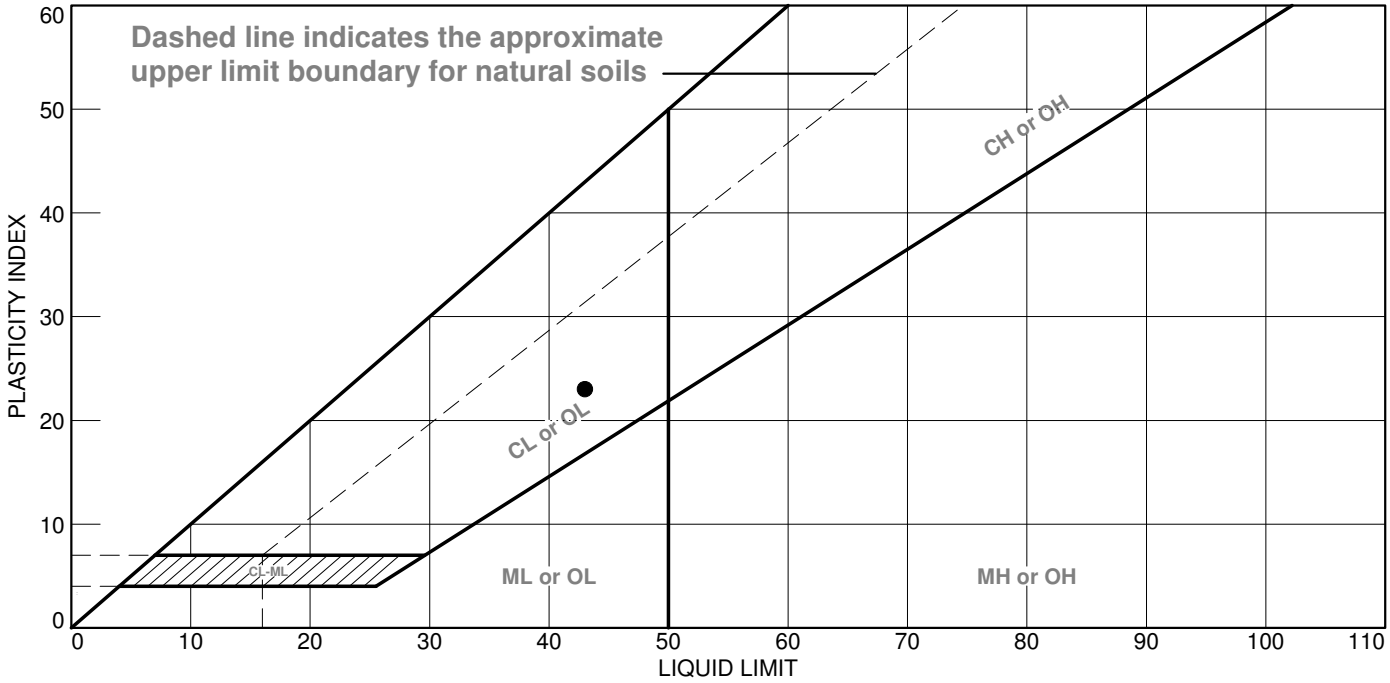
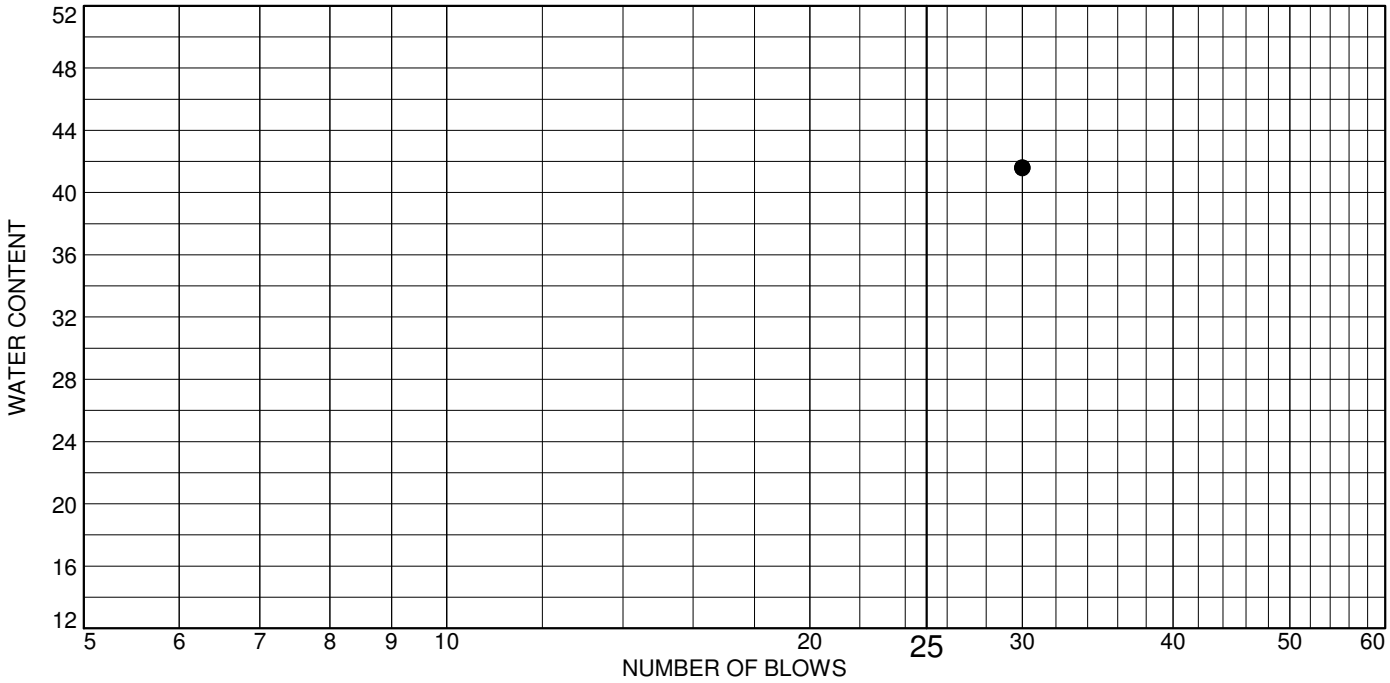
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay with gravel	43	20	23	84.3	80.3	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-231, Upper Talarik Creek Area
Sample Number: SPT 3 **Depth:** 19-20.5'

Remarks:

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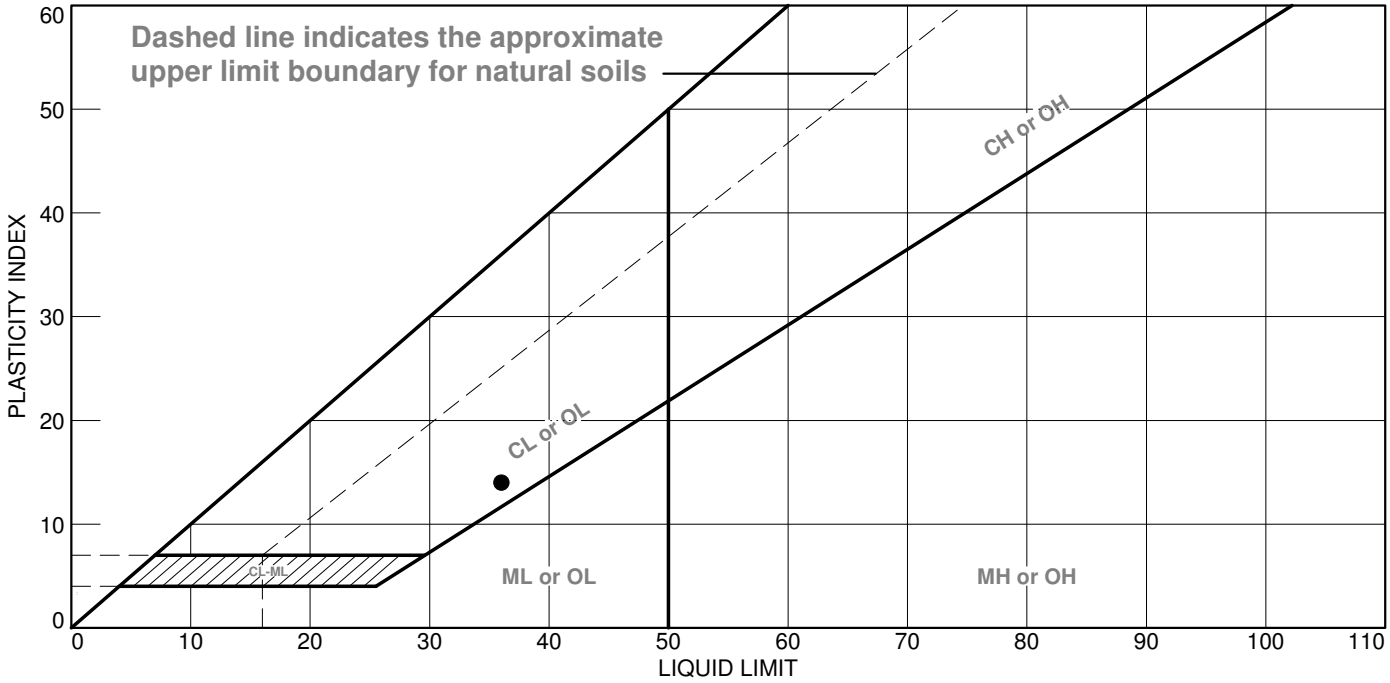
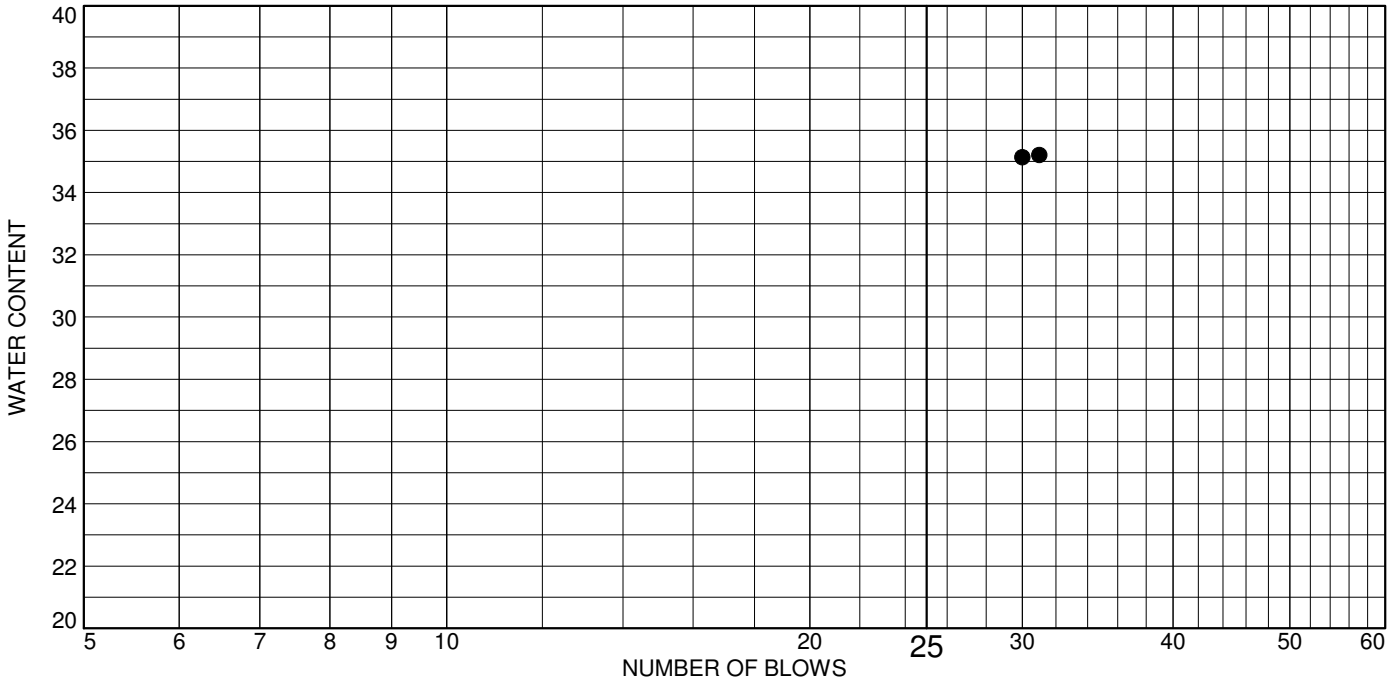
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay	36	22	14	95.2	90.2	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-232, Upper Talarik Creek Area
Sample Number: GH11-232-1 **Depth:** 3-4'

Remarks:

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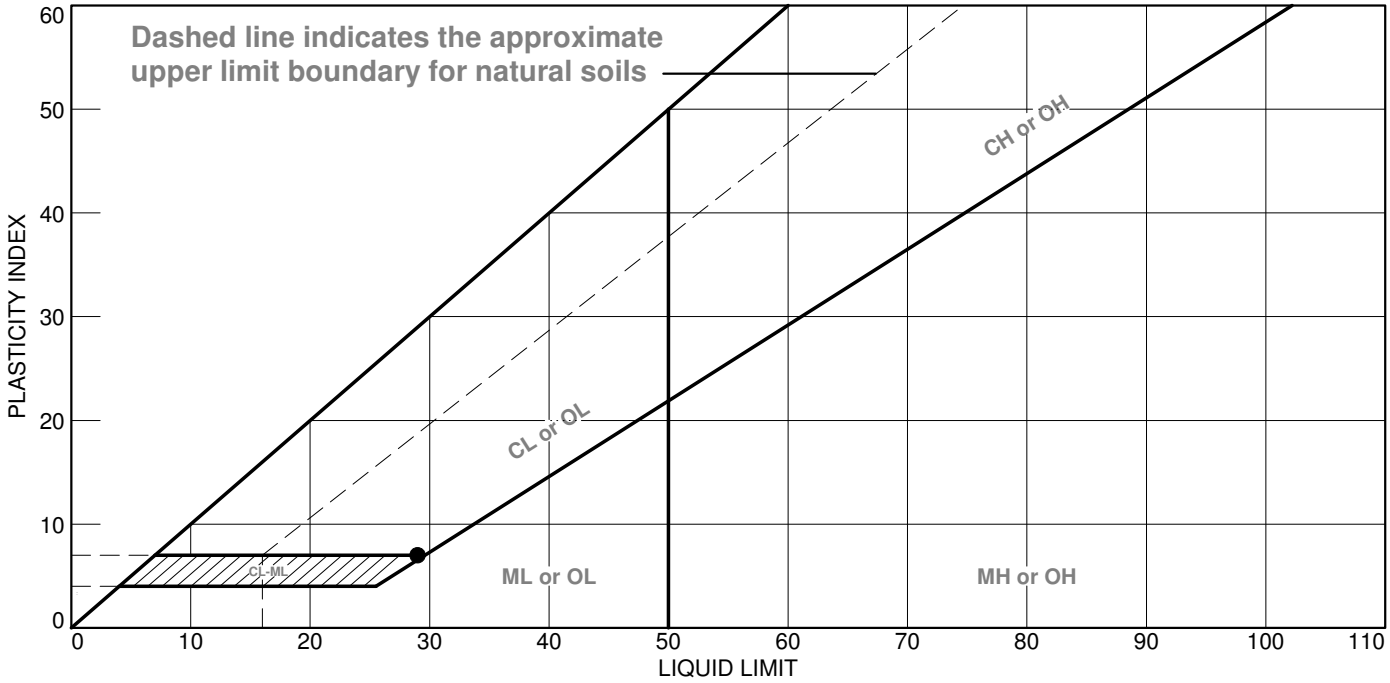
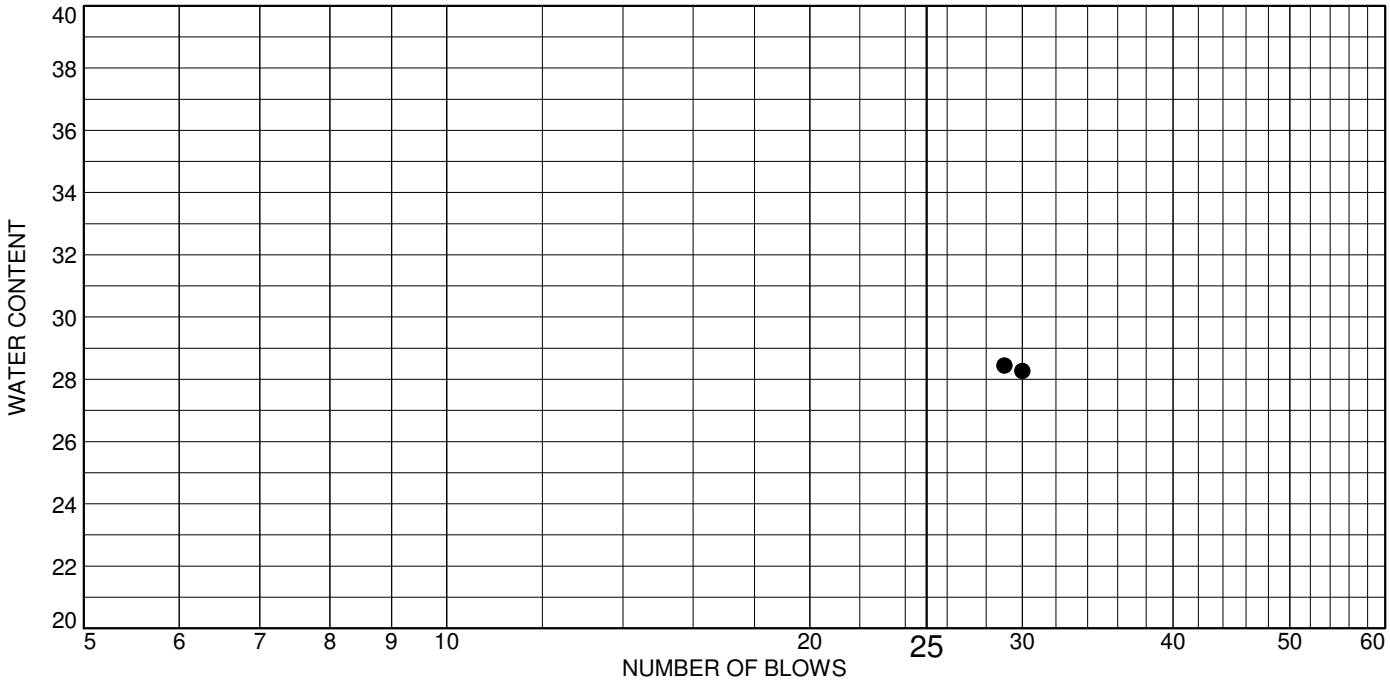
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty clay	29	22	7	91.9	86.3	CL-ML

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-232, Upper Talarik Creek Area
Sample Number: GH11-232-2 **Depth:** 4-6'

Remarks:

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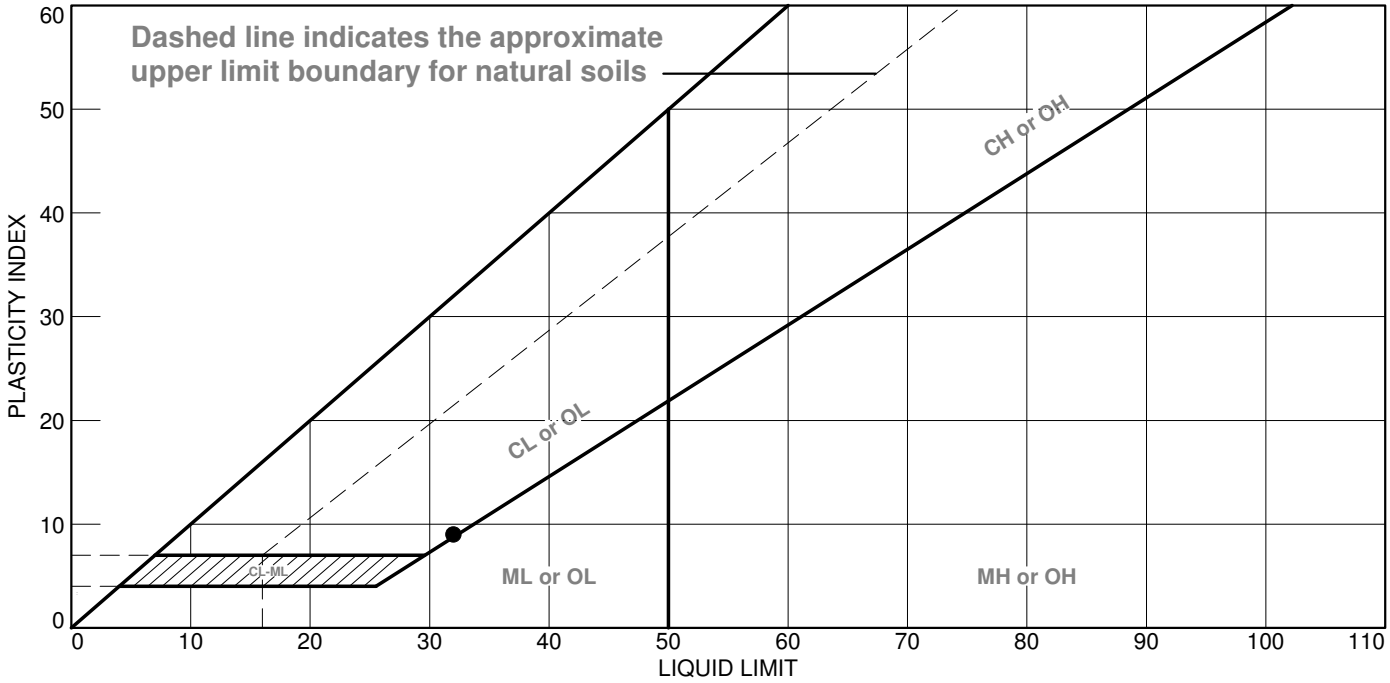
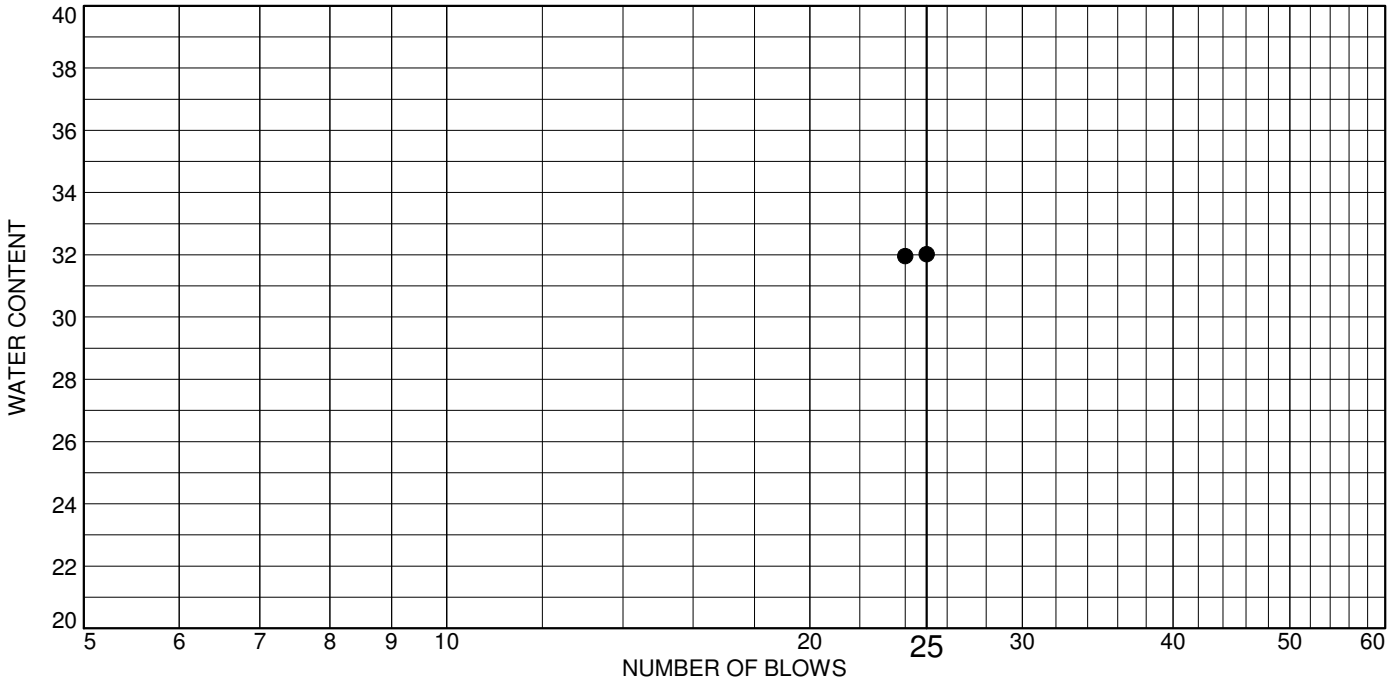
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay	32	23	9	99.9	99.6	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

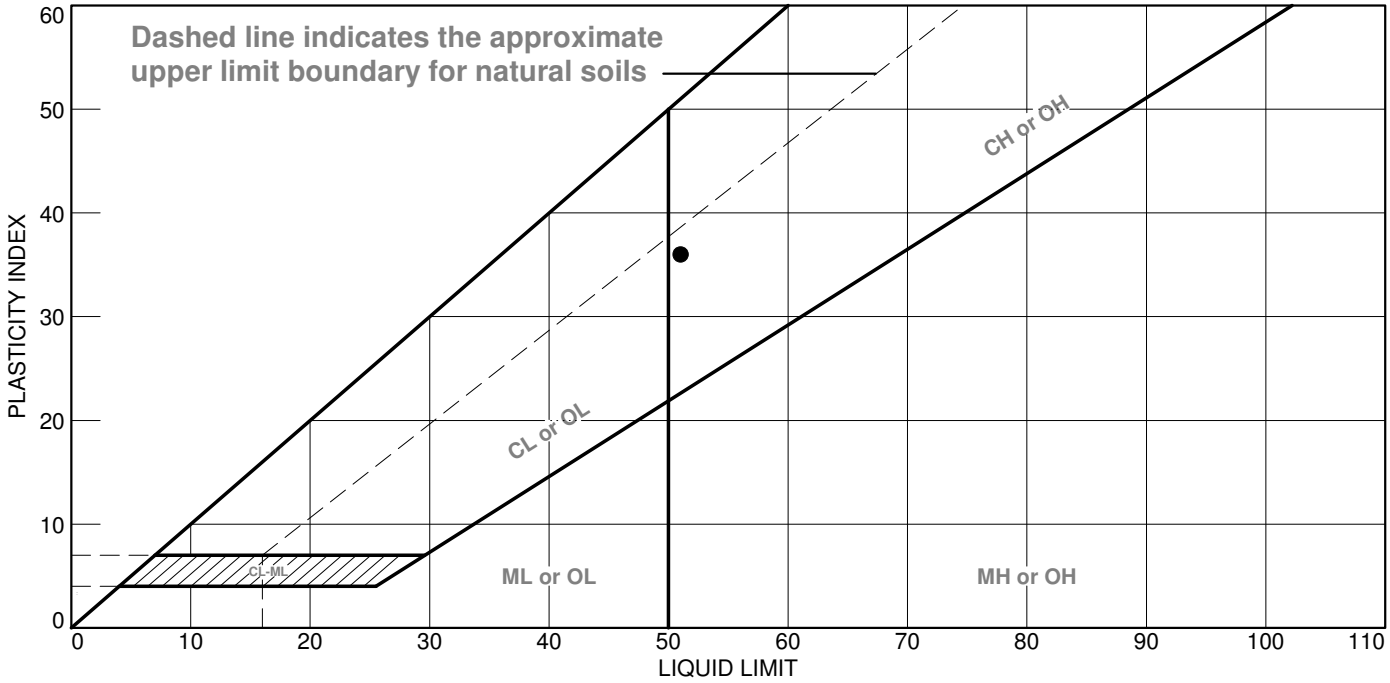
Location: GH11-232, Upper Talarik Creek Area
Sample Number: GH11-232-3 **Depth:** 32.6-33.4'

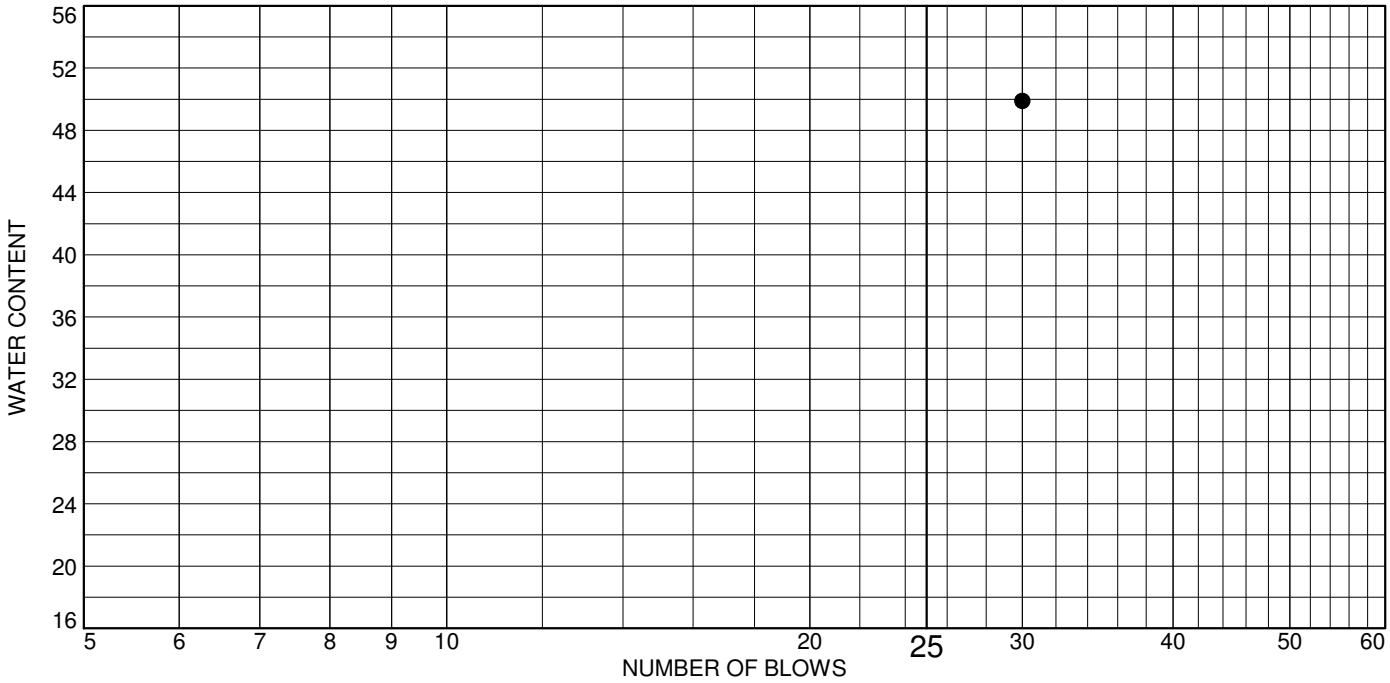
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	fat clay	51	15	36	92.9	88.8	CH

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-232, Upper Talarik Creek Area
Sample Number: GH11-232-4 **Depth:** 52-53'

Remarks:

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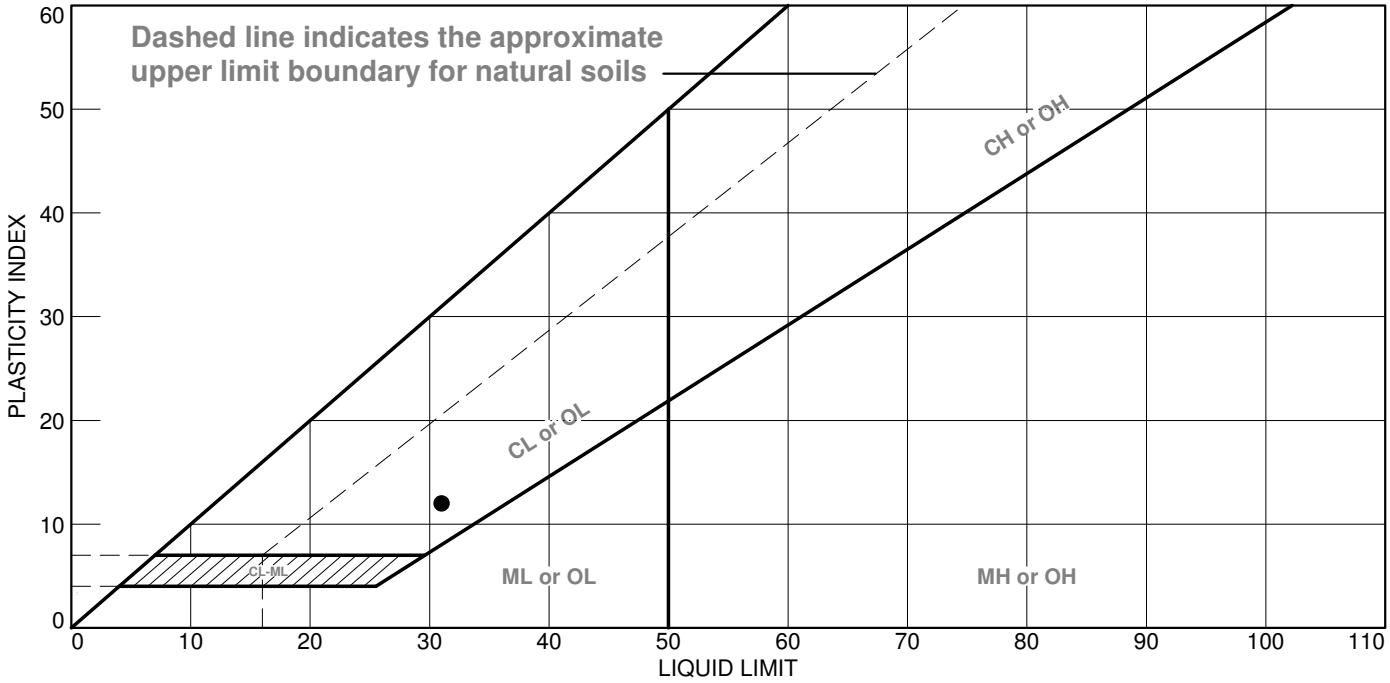
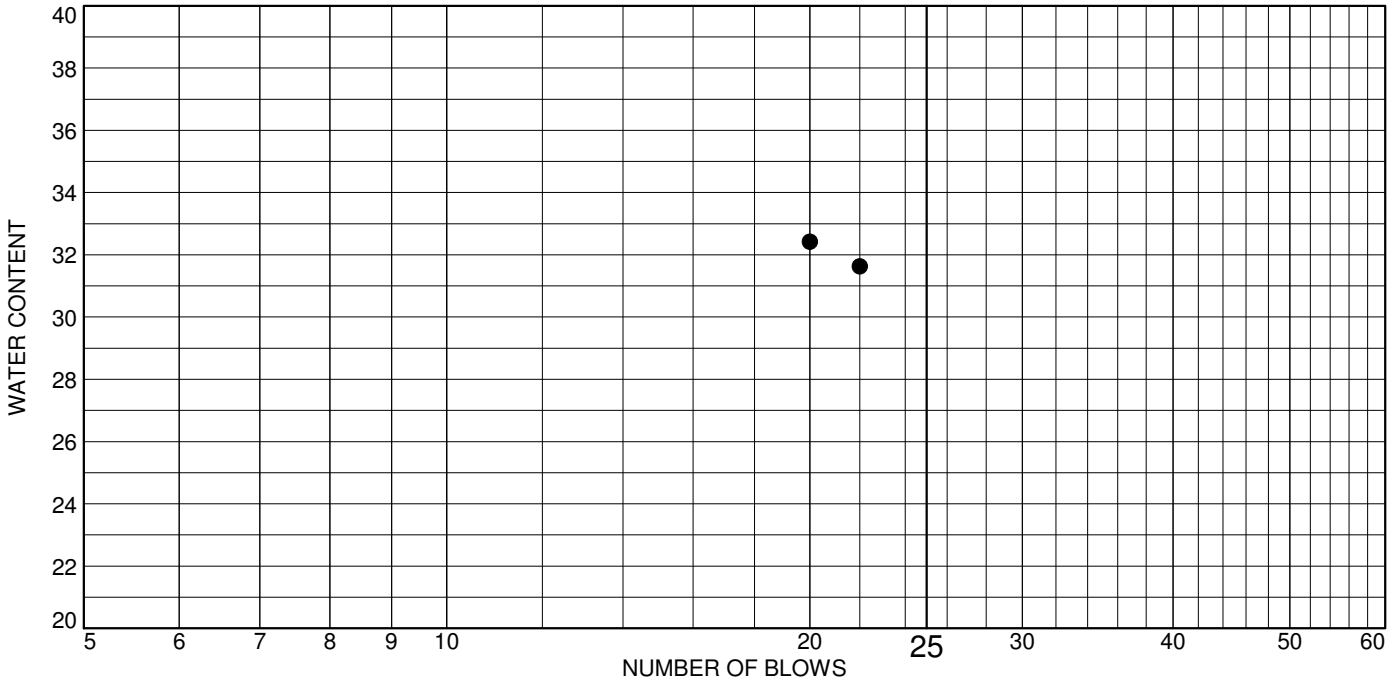
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	31	19	12	42.1	28.0	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-232, Upper Talarik Creek Area
Sample Number: GH11-232-5 **Depth:** 67.75-68.5'

Remarks:

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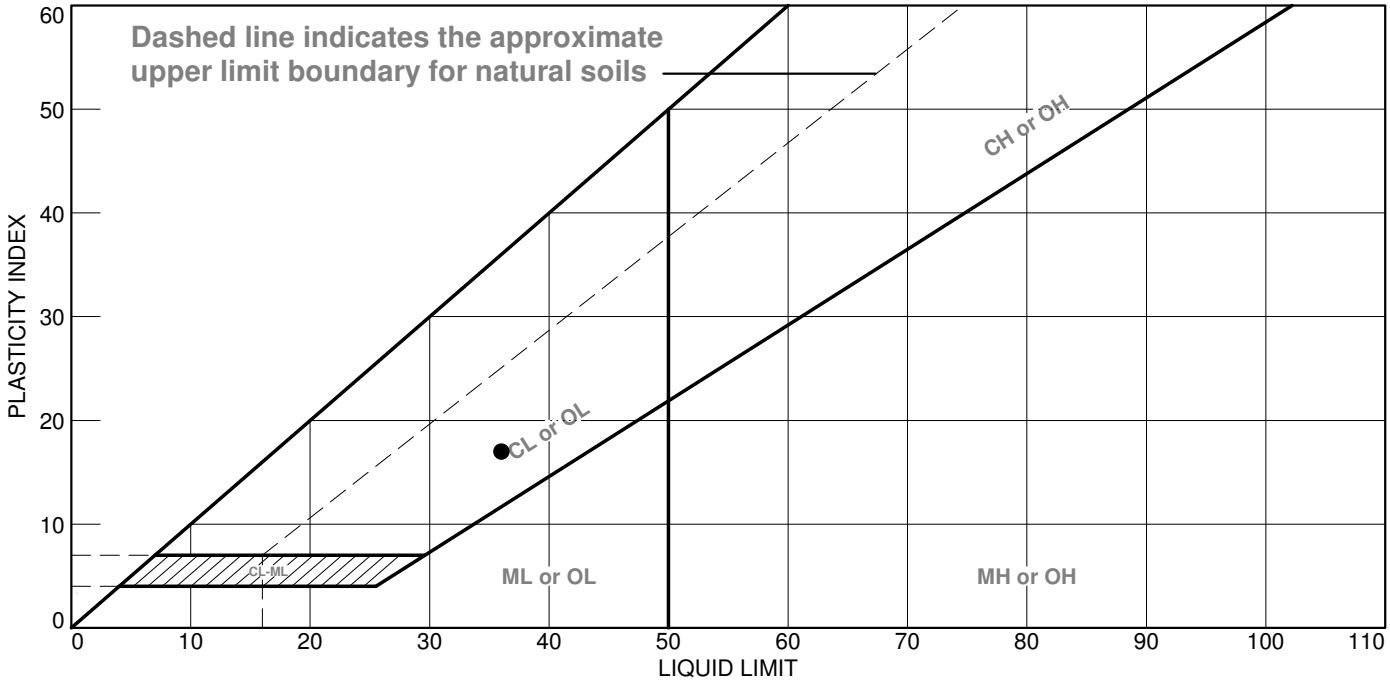
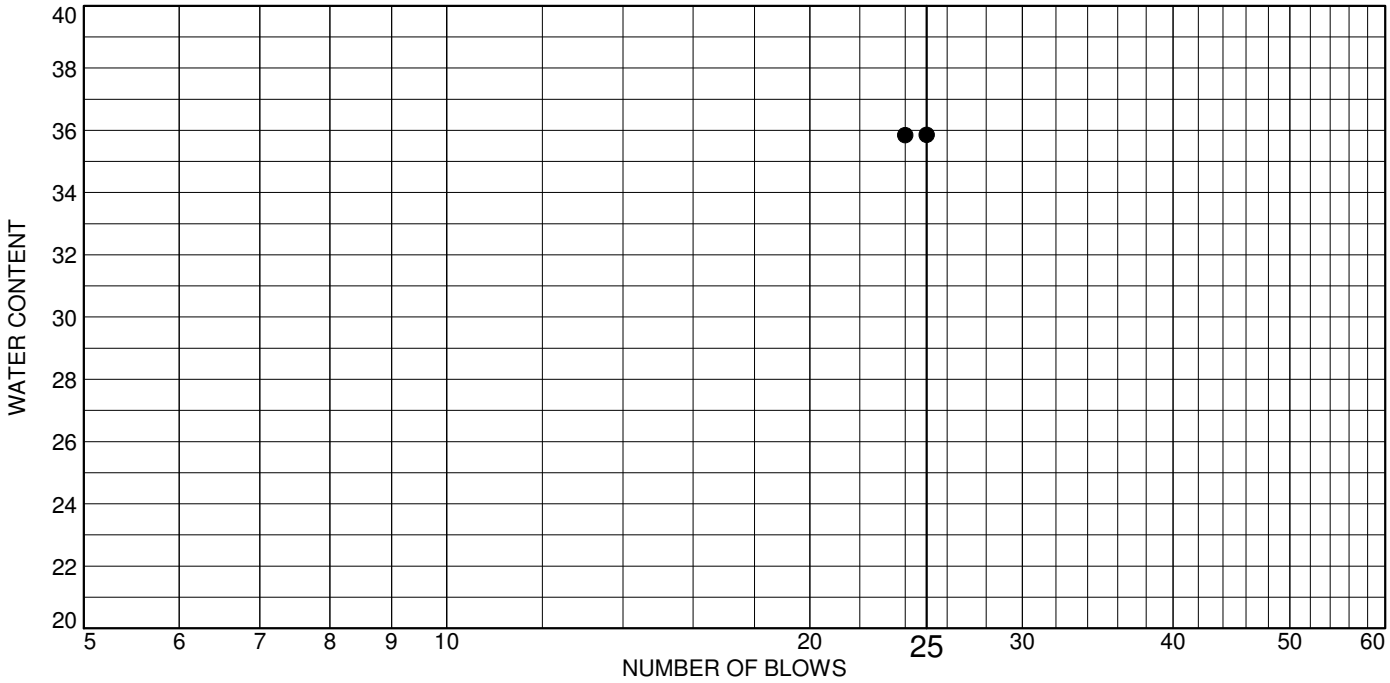
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay with gravel	36	19	17	69.4	60.8	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

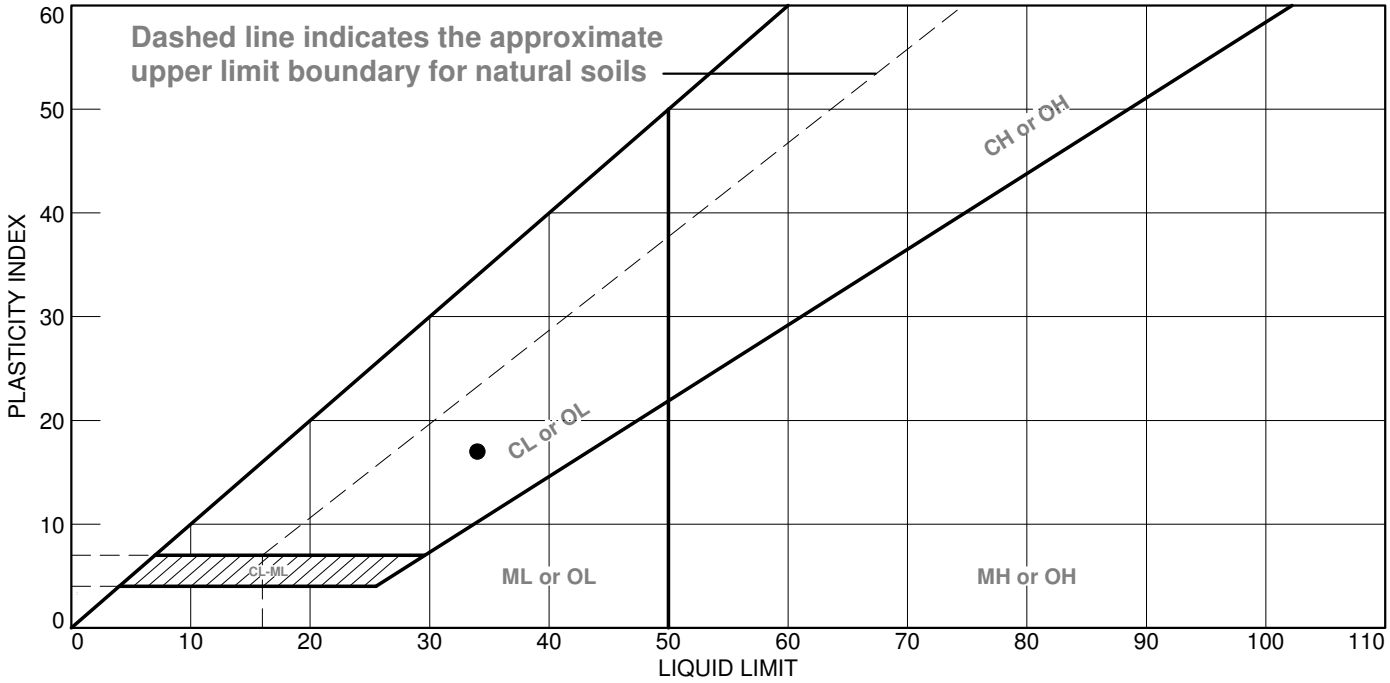
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 2 **Depth:** 9-10.5'

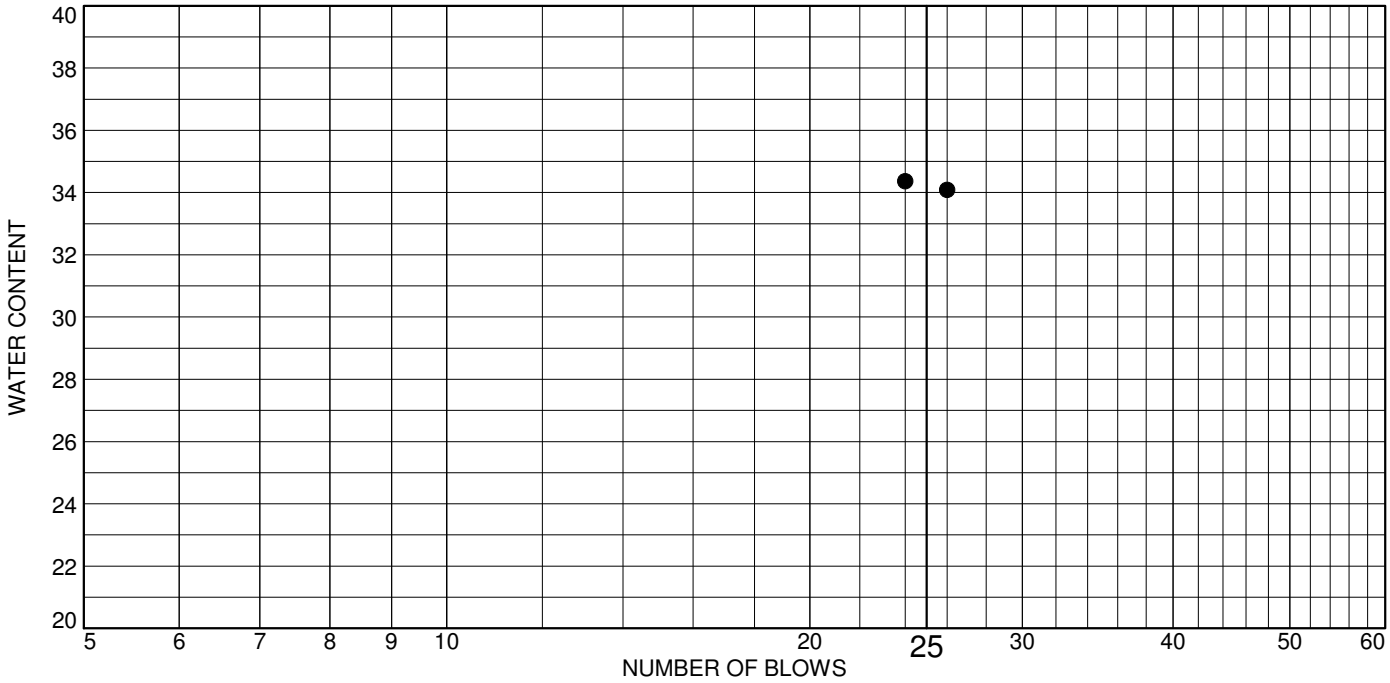
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay with gravel	34	17	17	71.1	60.7	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

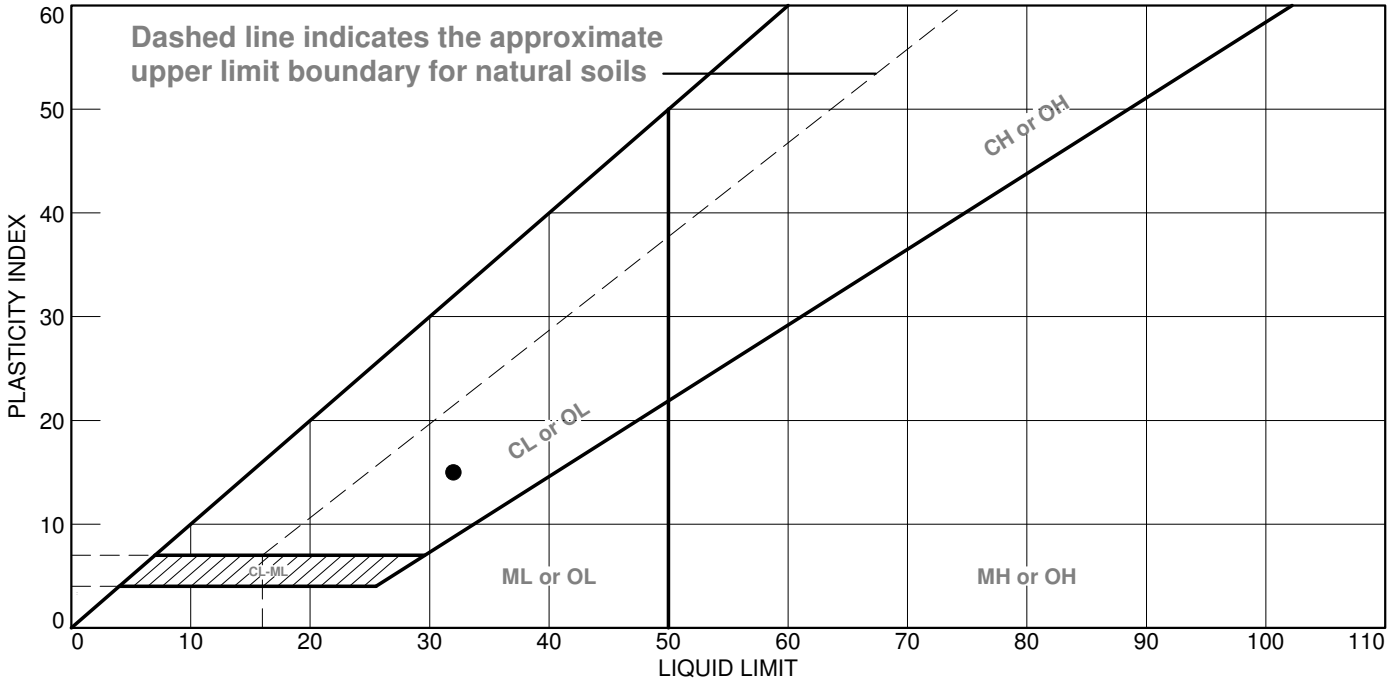
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 3 **Depth:** 14-15.5'

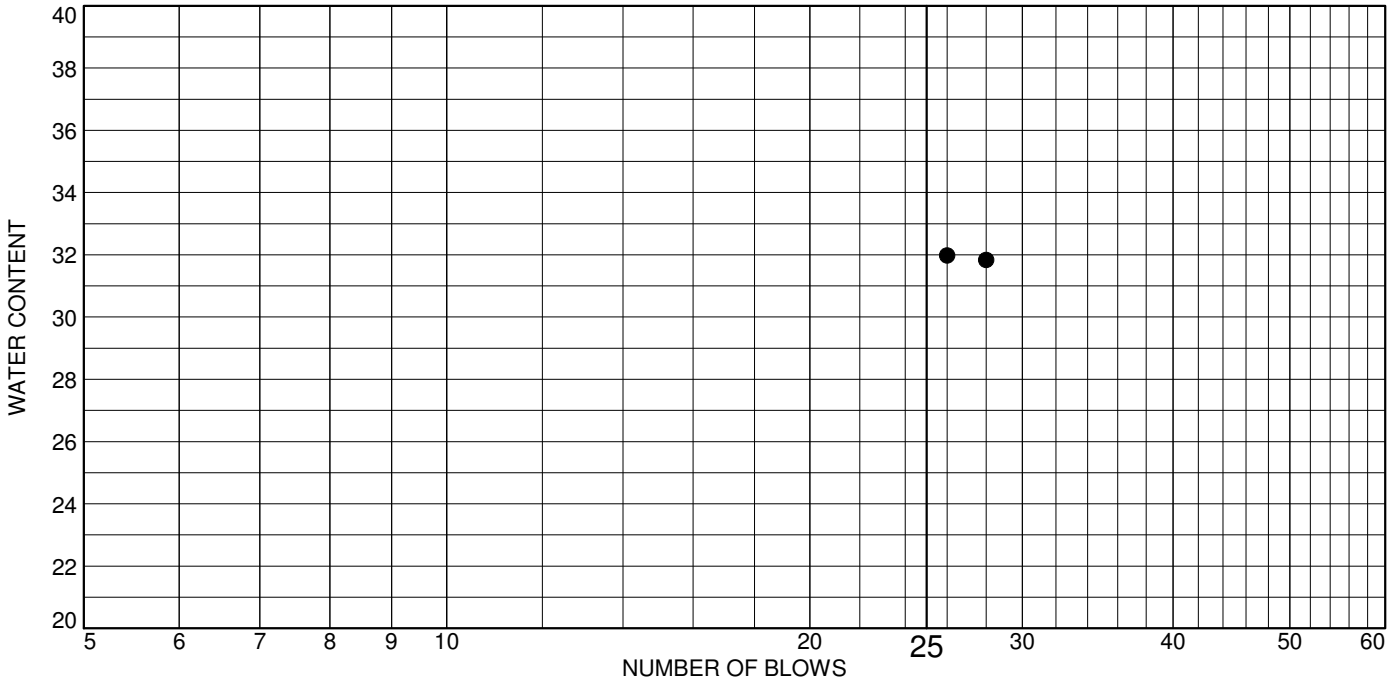
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay with gravel	32	17	15	61.9	53.7	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

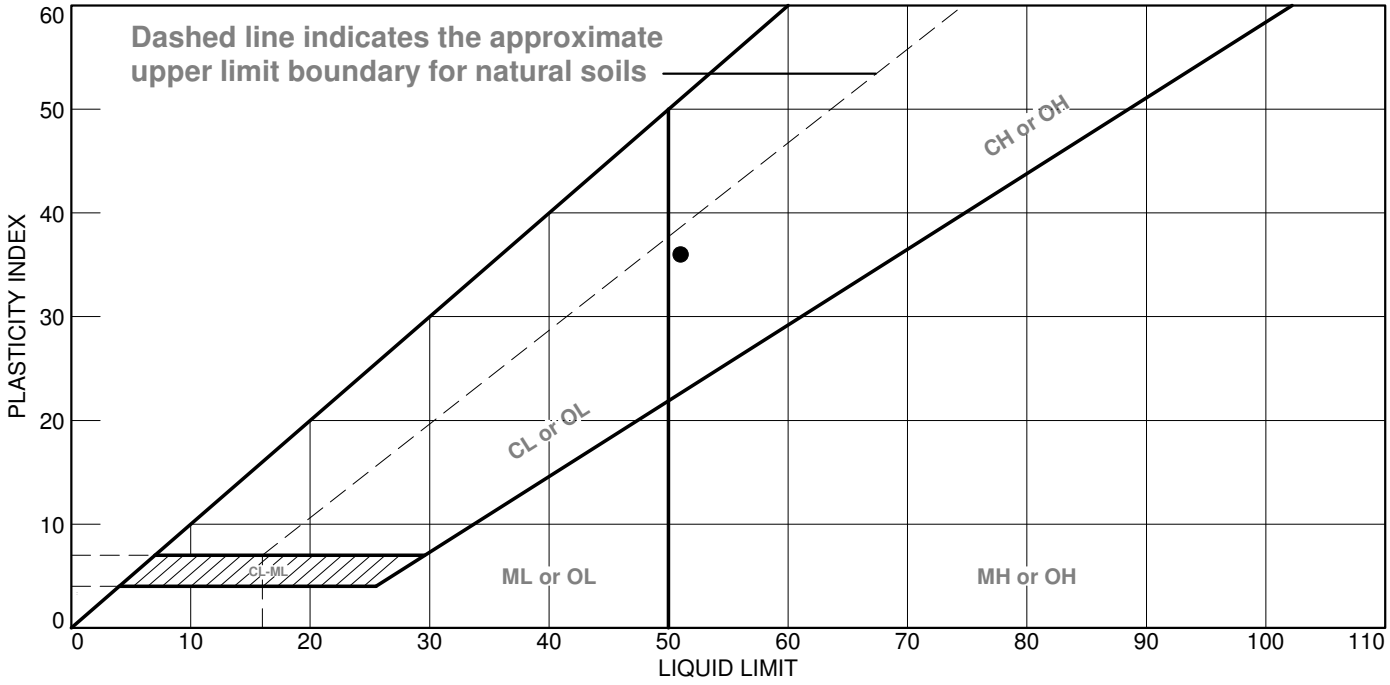
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 5 **Depth:** 24-25.5'

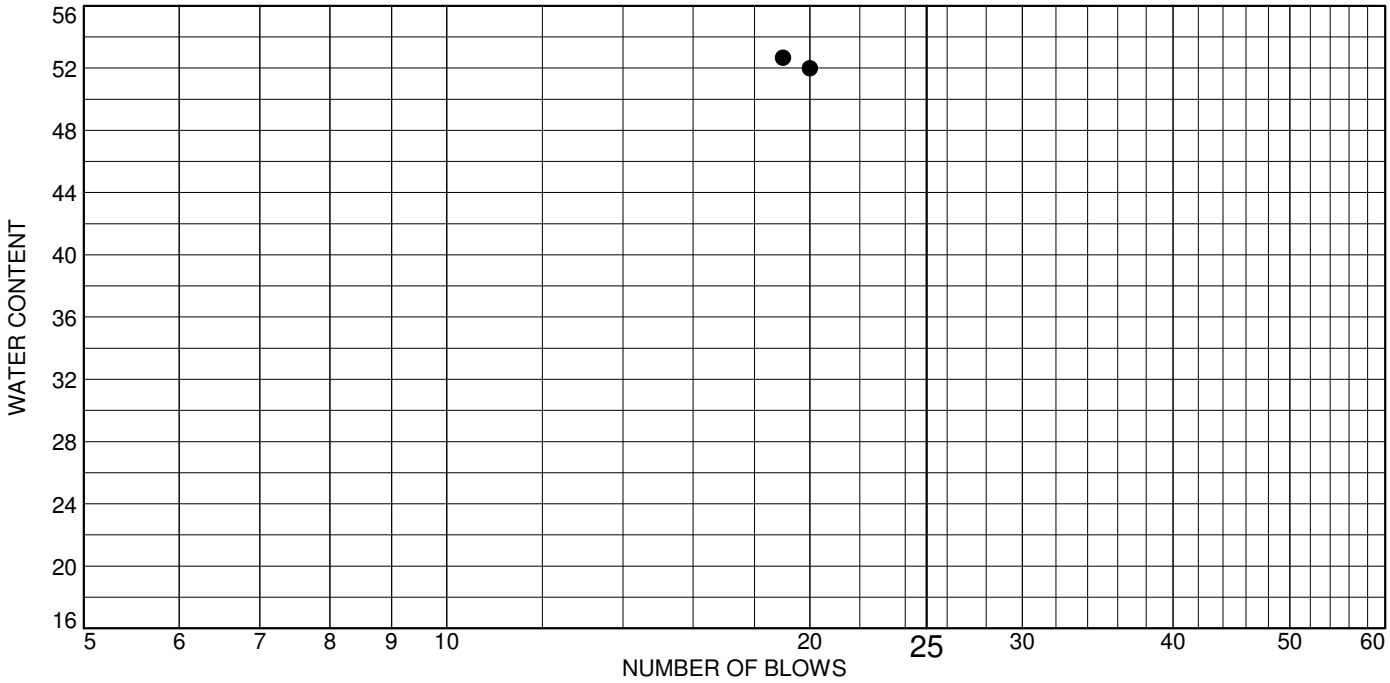
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	fat clay with sand	51	15	36	87.9	81.3	CH

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

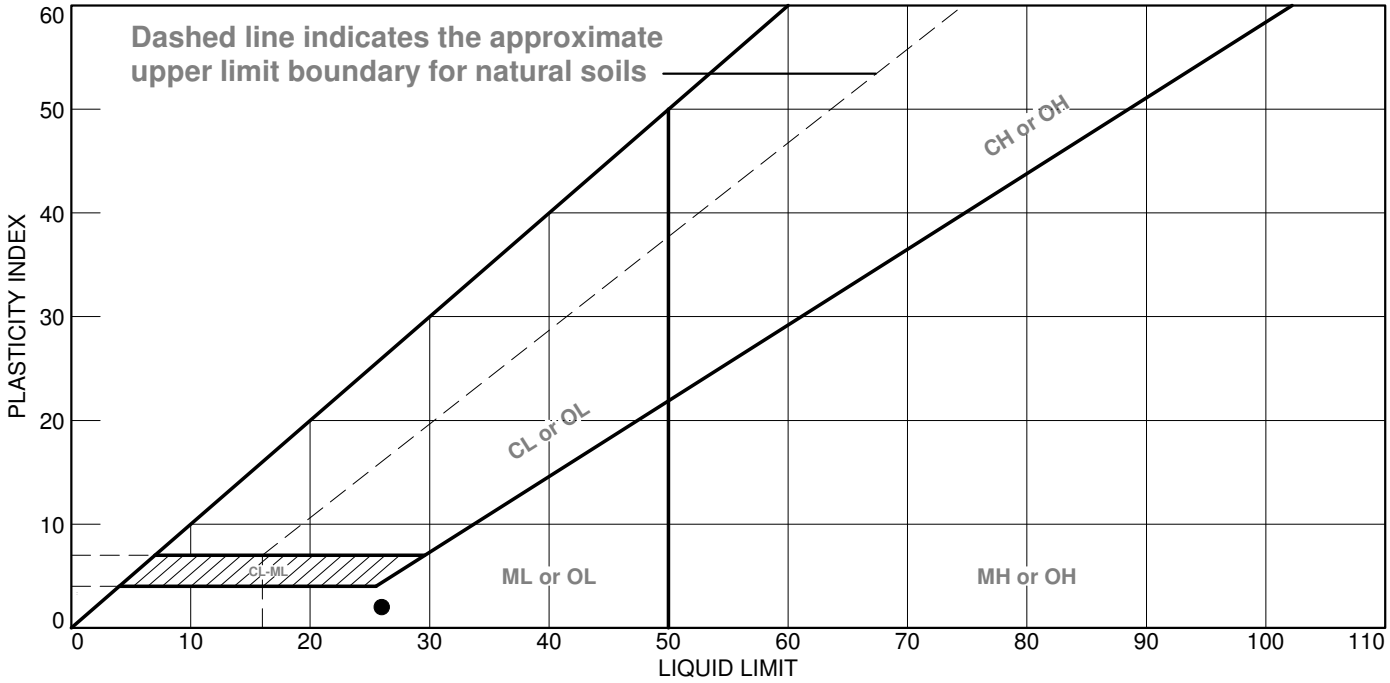
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 8 **Depth:** 39-40.5'

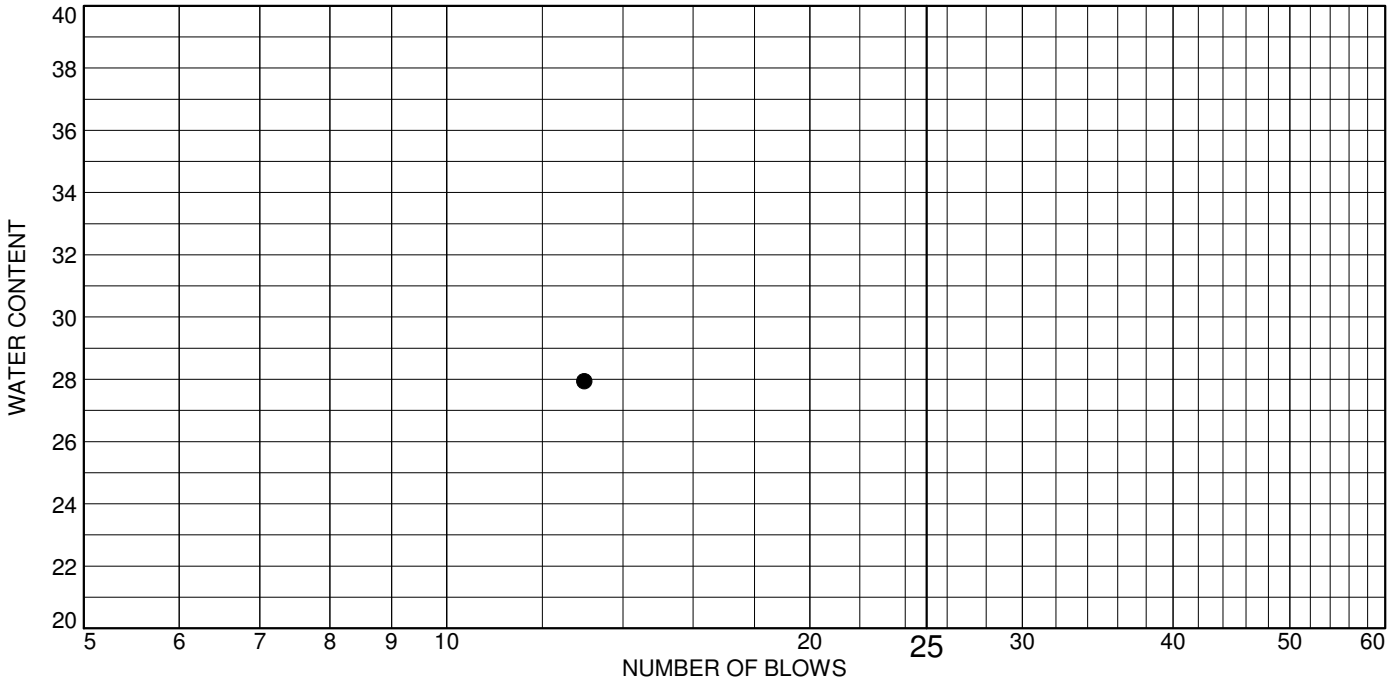
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy silt	26	24	2	80.5	66.4	ML

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

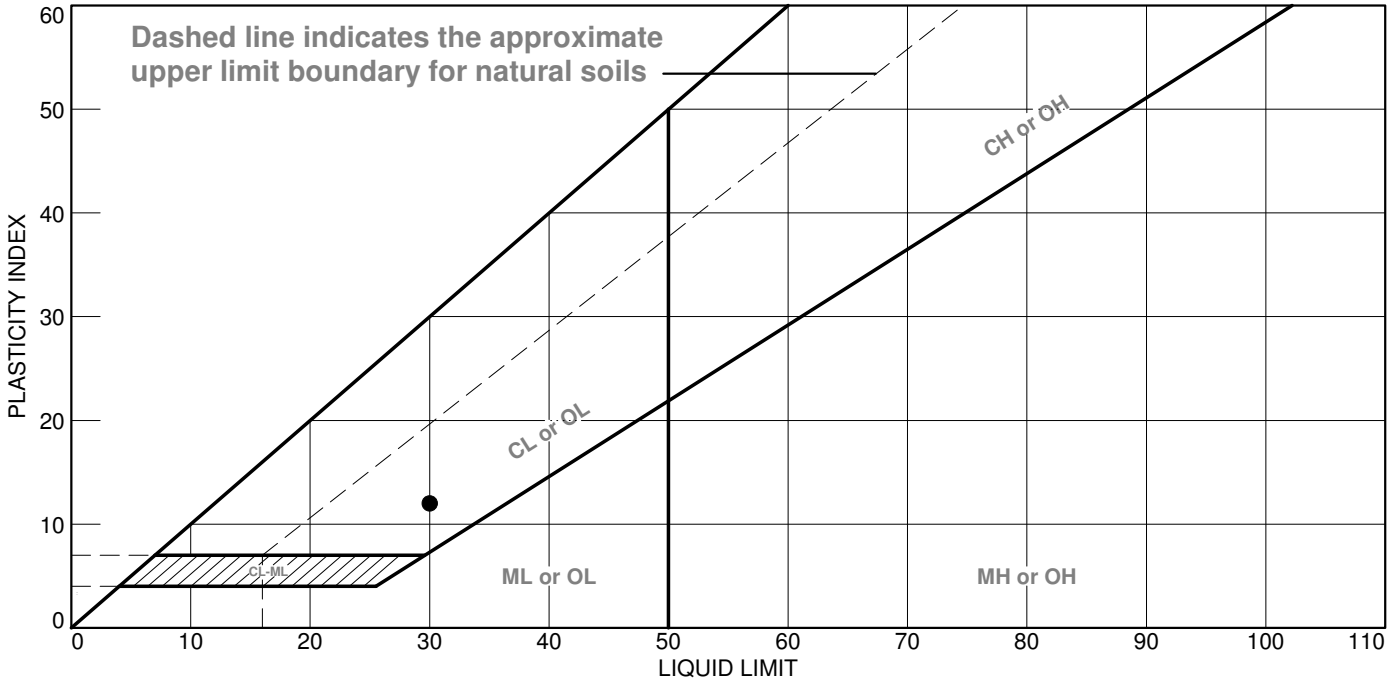
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 12 **Depth:** 59-60.5'

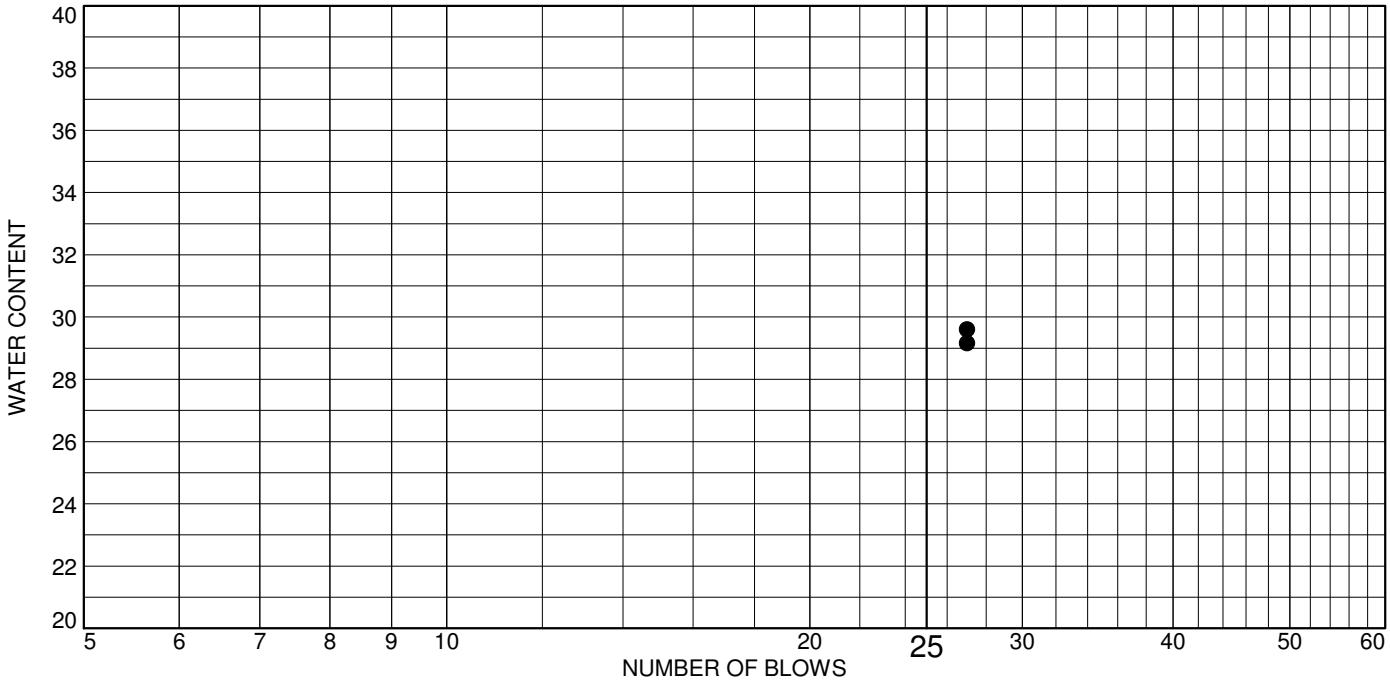
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand	30	18	12	52.0	34.9	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

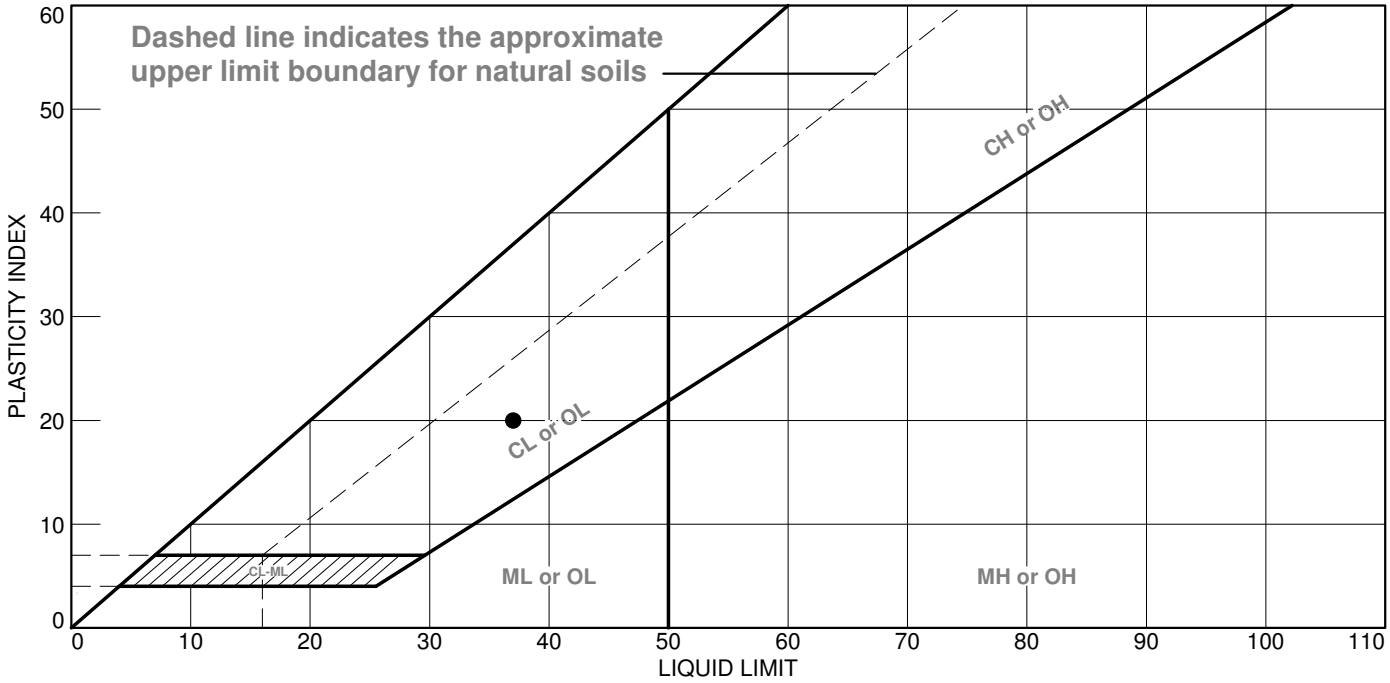
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 14 **Depth:** 69-70.5'

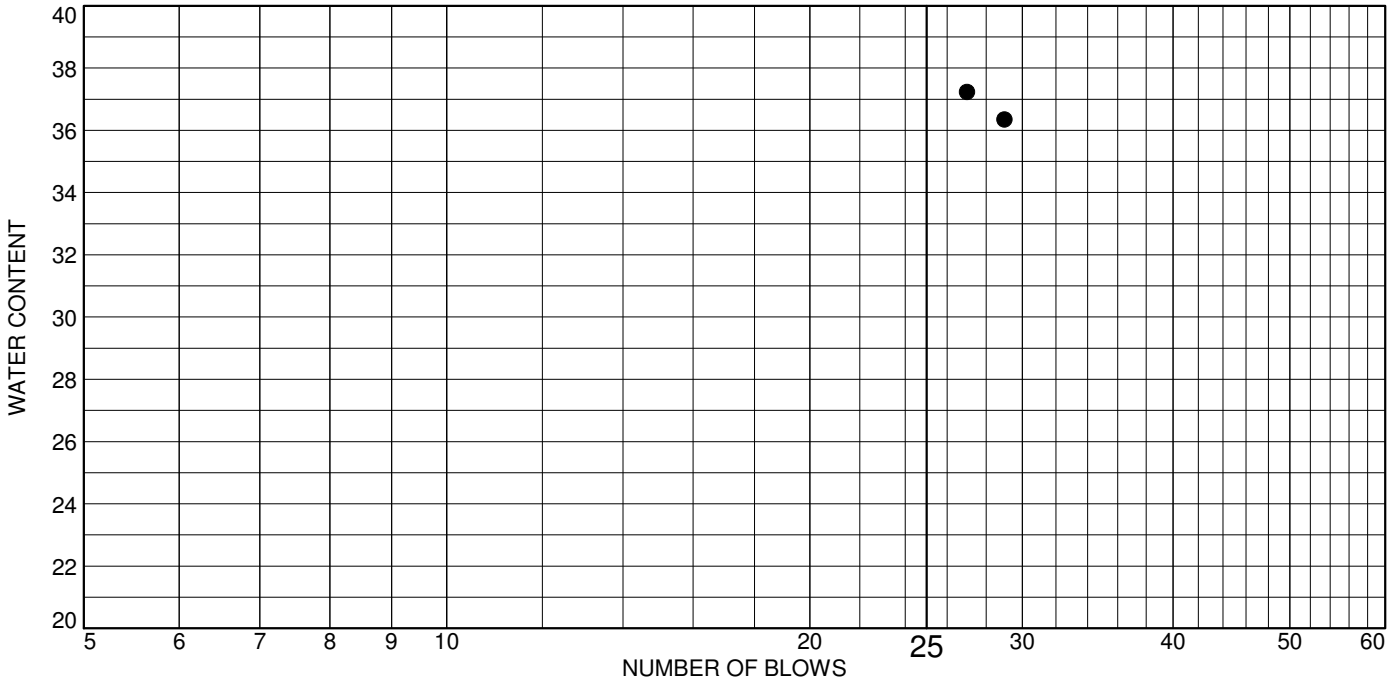
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	37	17	20	53.3	38.9	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

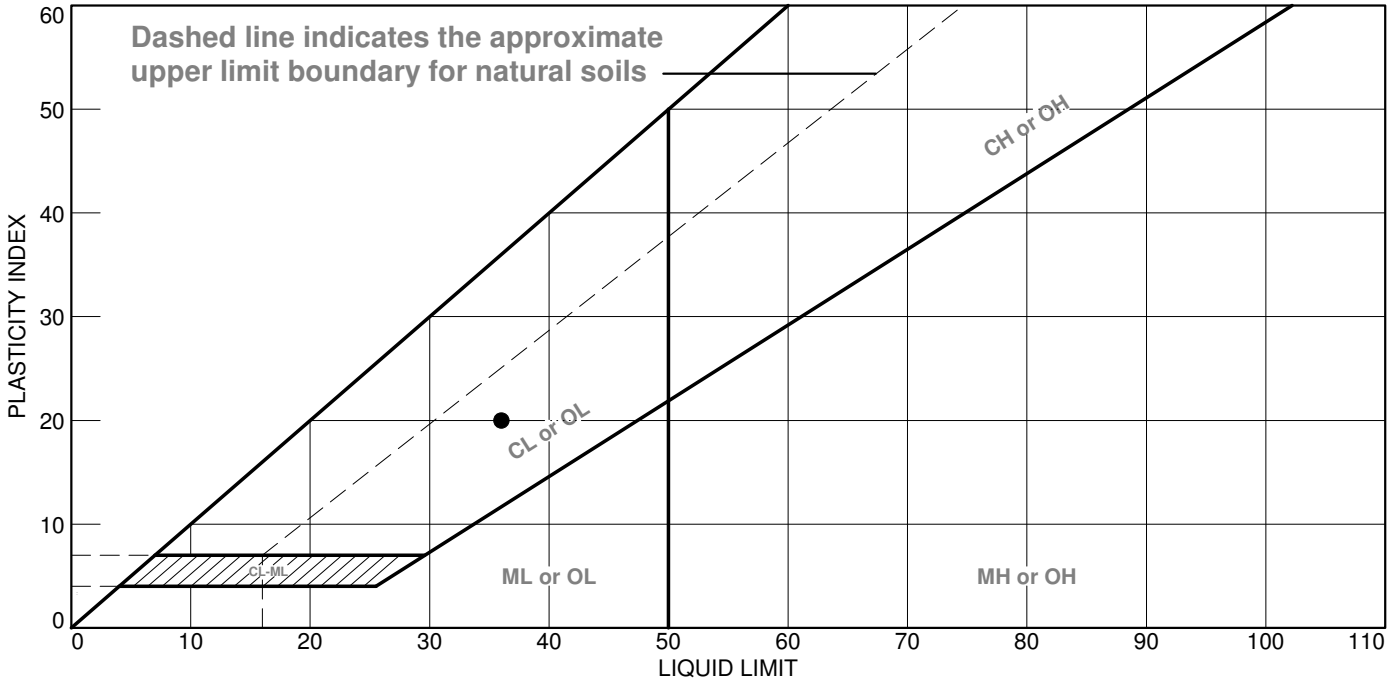
Location: GH11-233, Pebble West Area
Sample Number: SPT 1 **Depth:** 4-5.5'

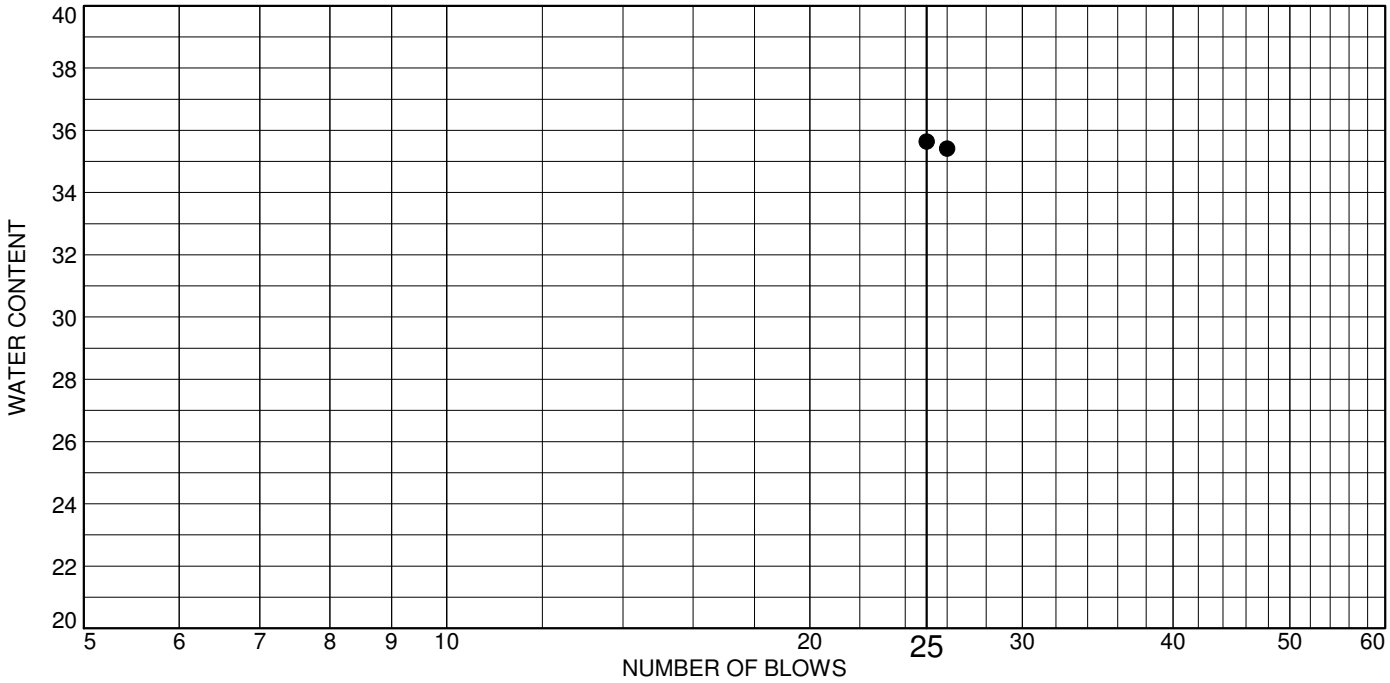
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	36	16	20	56.7	43.9	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

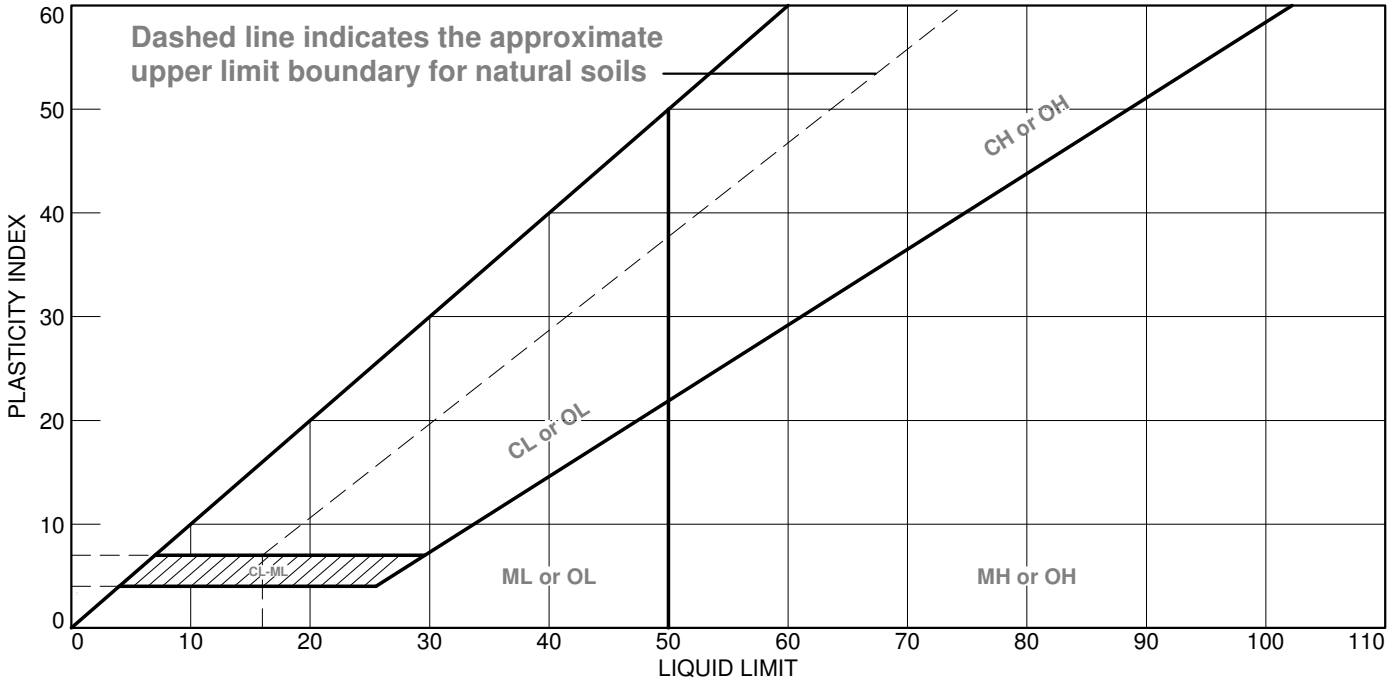
Location: GH11-233, Pebble West Area
Sample Number: SPT 3 **Depth:** 14-15.5'

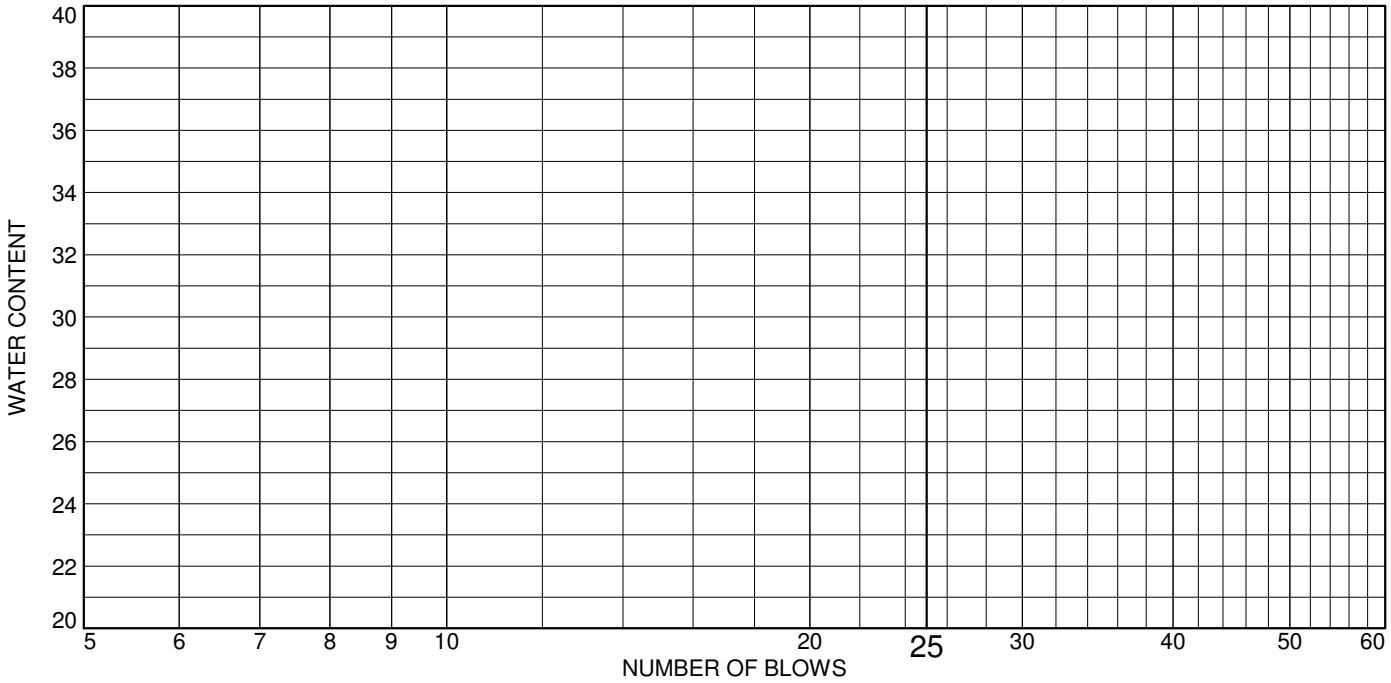
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded gravel with silt and sand	NP	NP	NP	18.9	10.1	GW-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

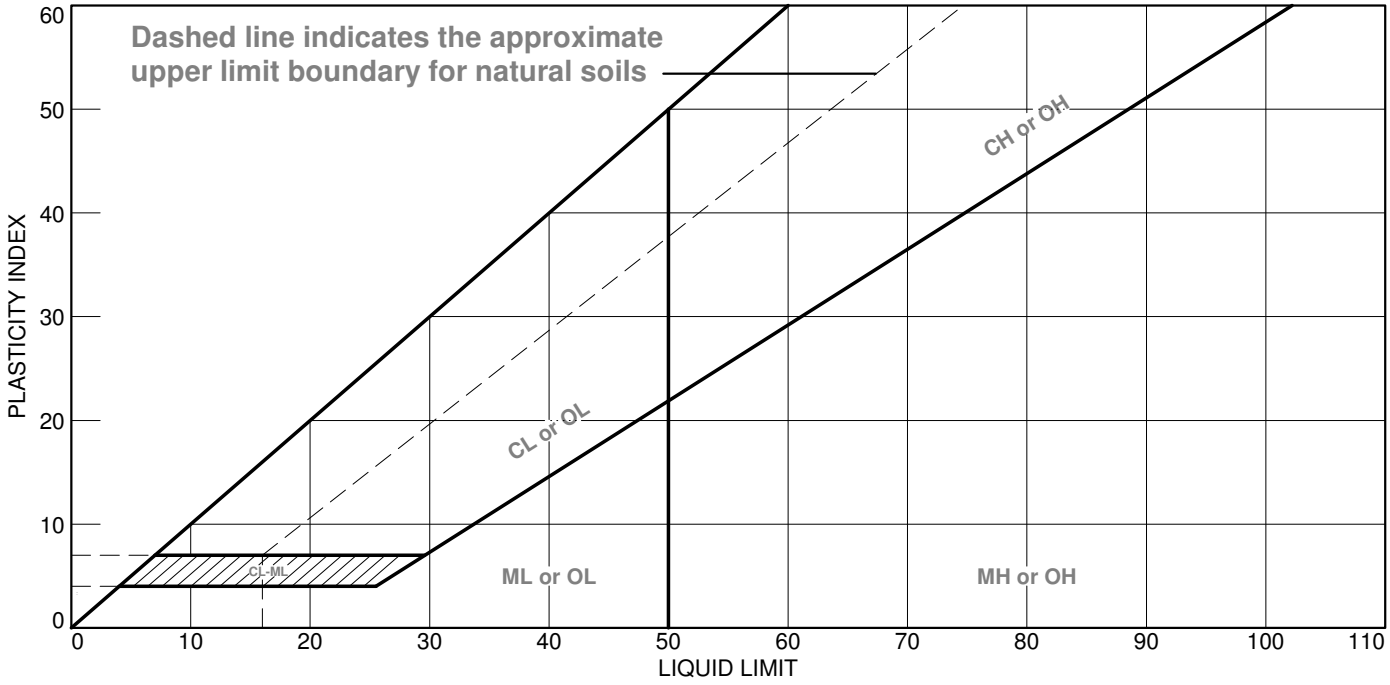
Location: GH11-233, Pebble West Area
Sample Number: SPT 5 **Depth:** 24-25.5'

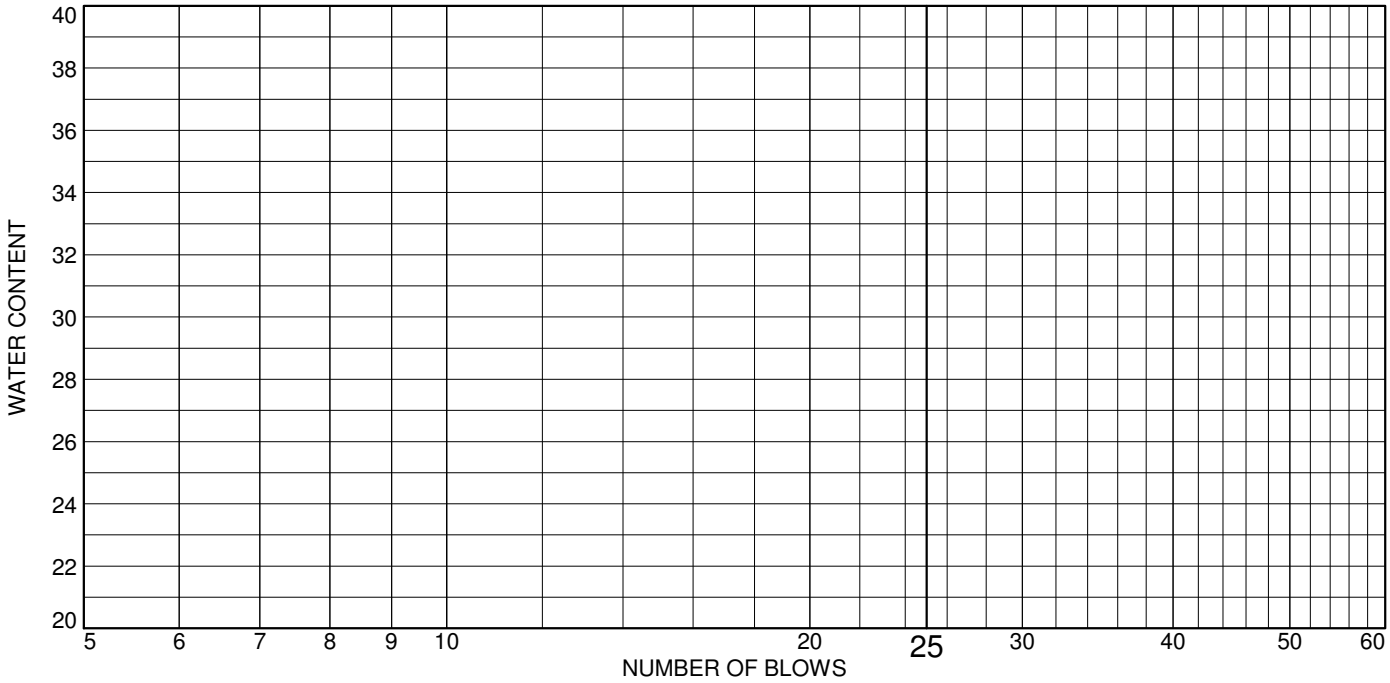
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand with gravel	NP	NP	NP	28.2	16.7	SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

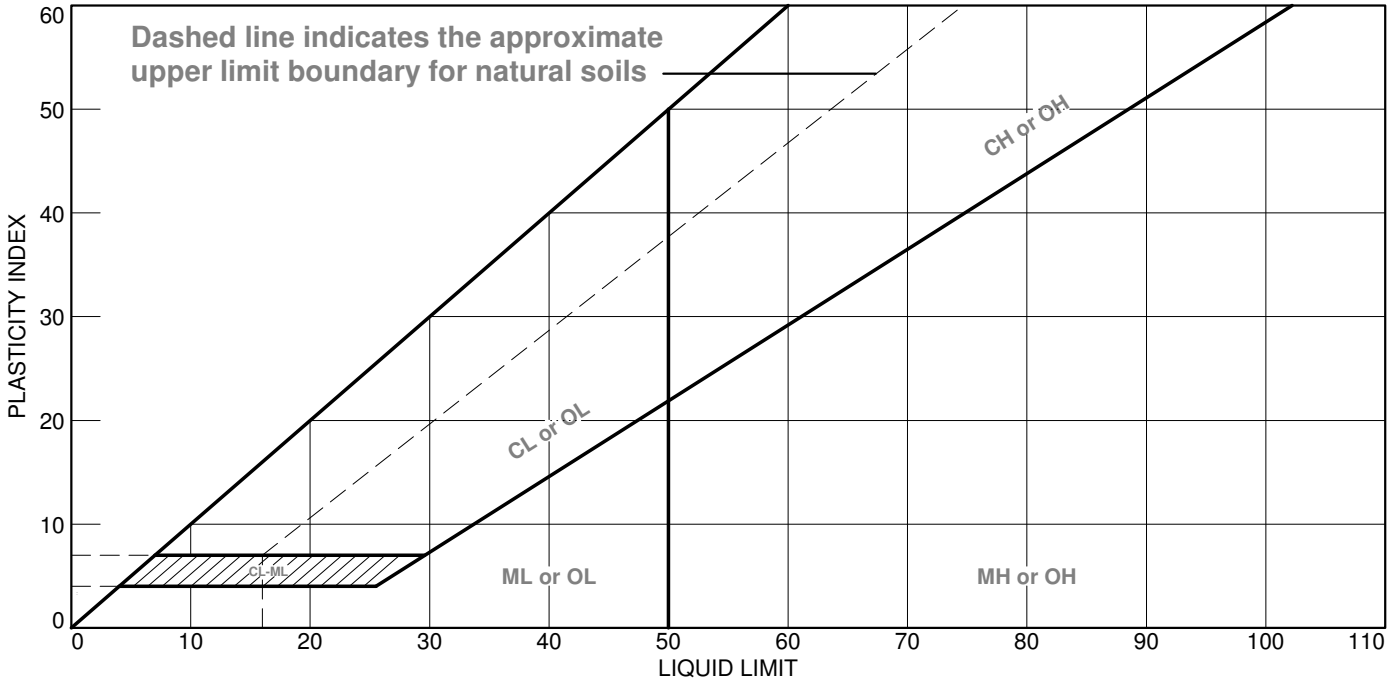
Location: GH11-233, Pebble West Area
Sample Number: SPT 6 **Depth:** 29-30.5'

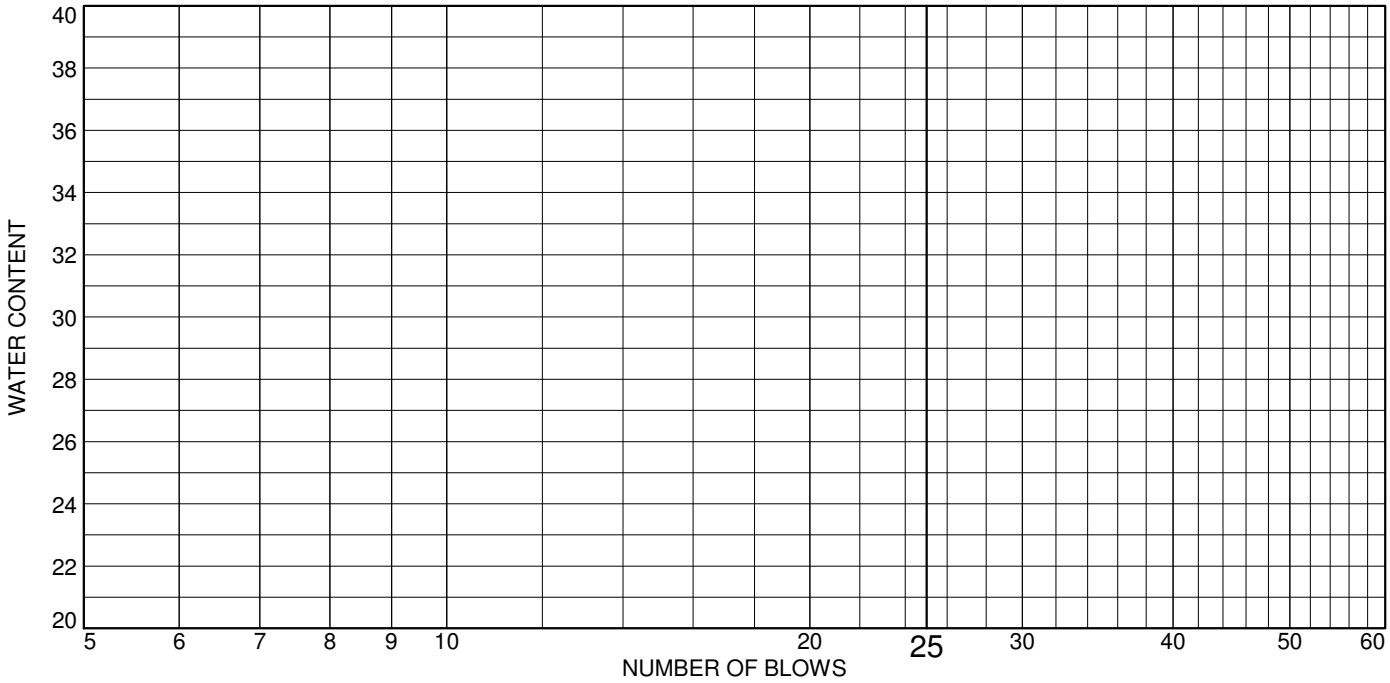
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand with gravel	NP	NP	NP	22.8	12.3	SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

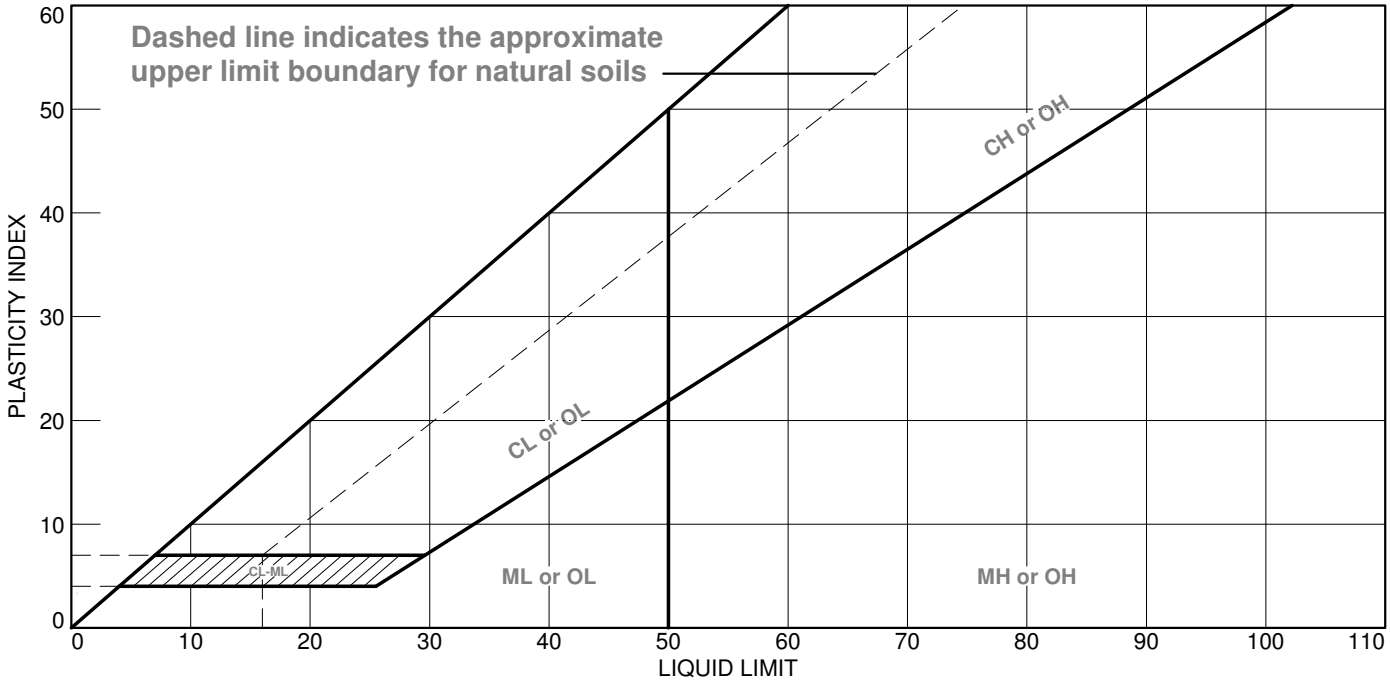
Location: GH11-234, Area E
Sample Number: SPT 2 **Depth:** 10-11.5'

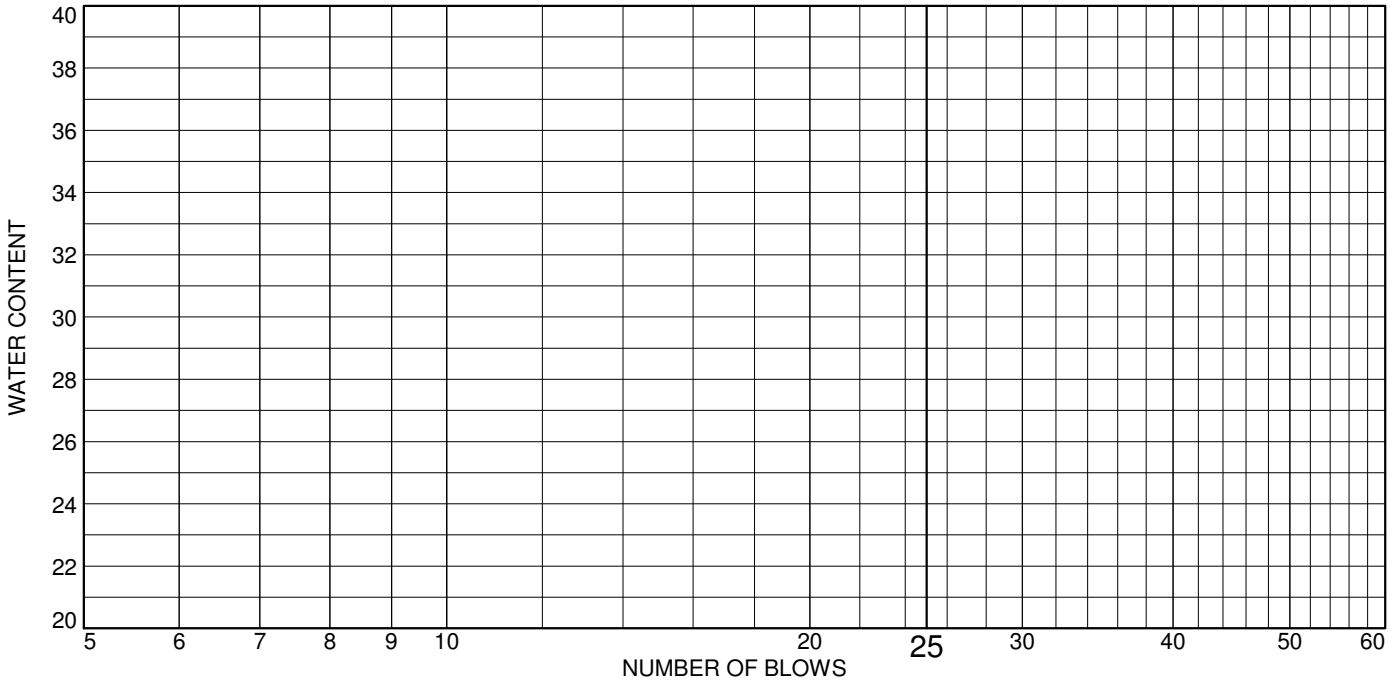
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded sand with silt and gravel	NP	NP	NP	14.2	9.7	SP-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

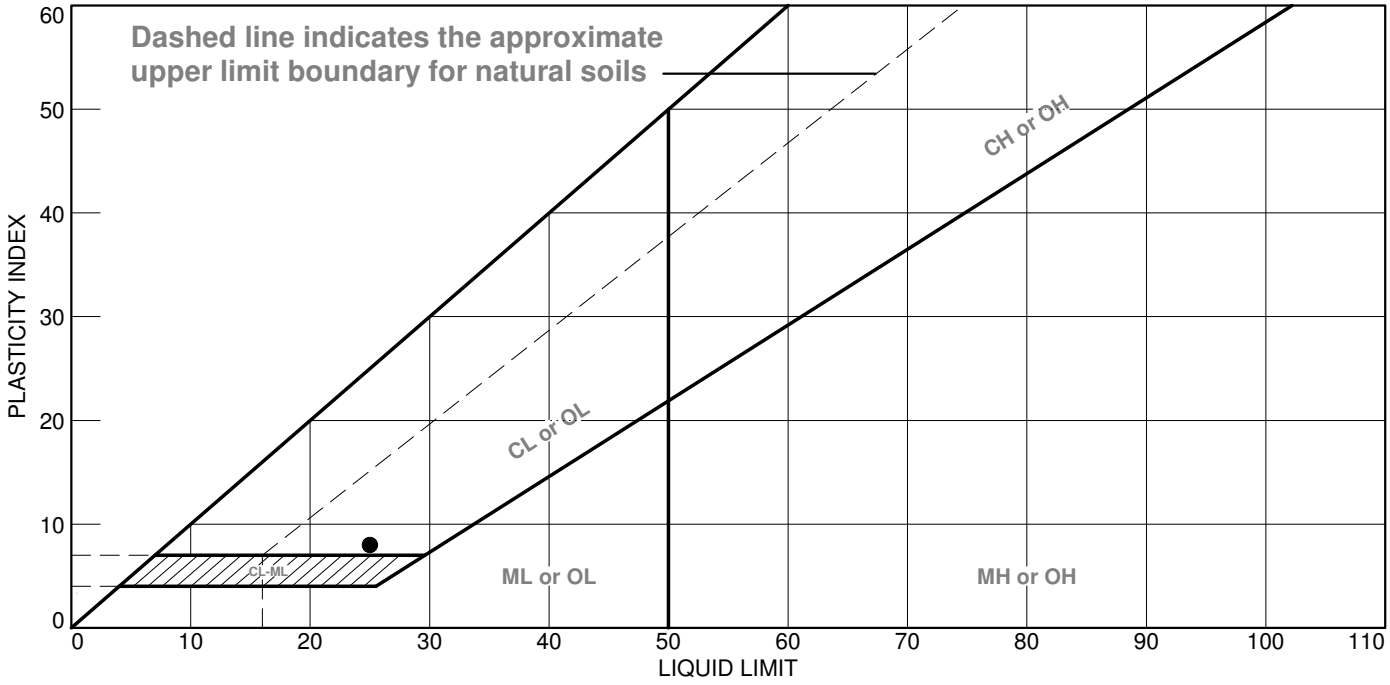
Location: GH11-234, Area E
Sample Number: SPT 5 **Depth:** 25-26.5'

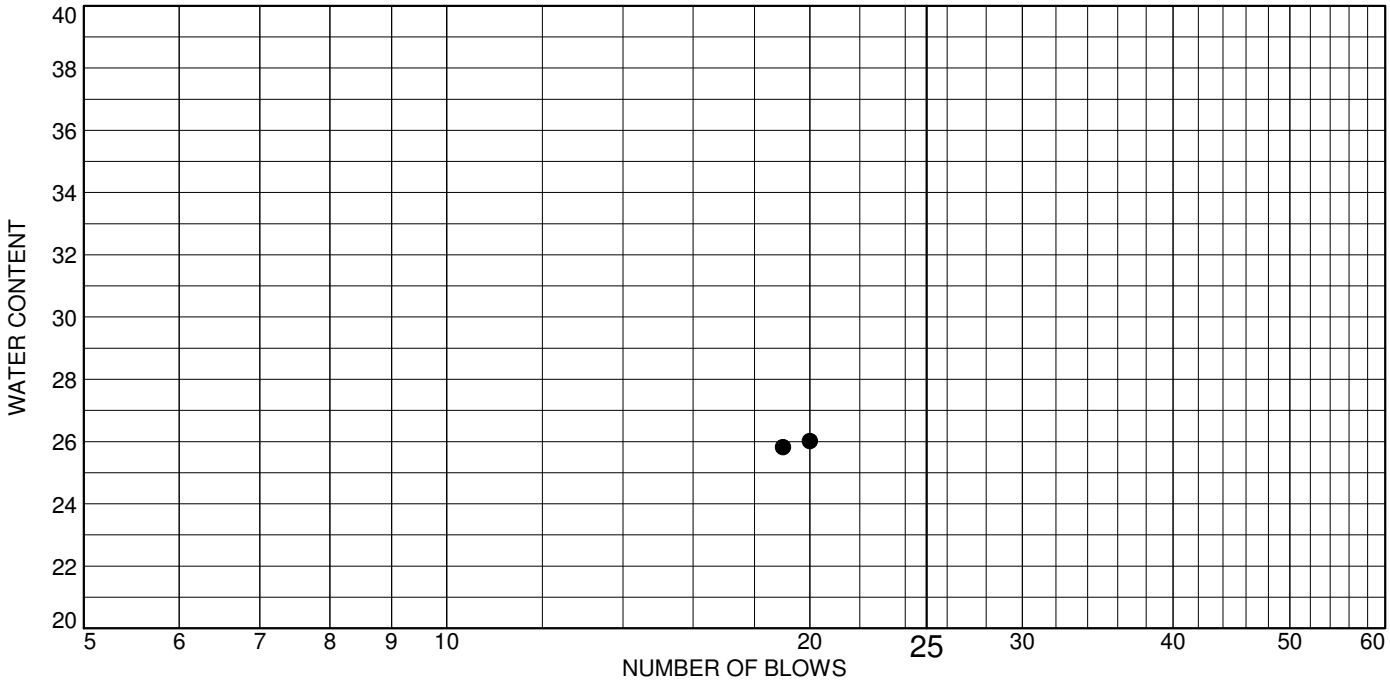
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	25	17	8	39.1	26.6	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

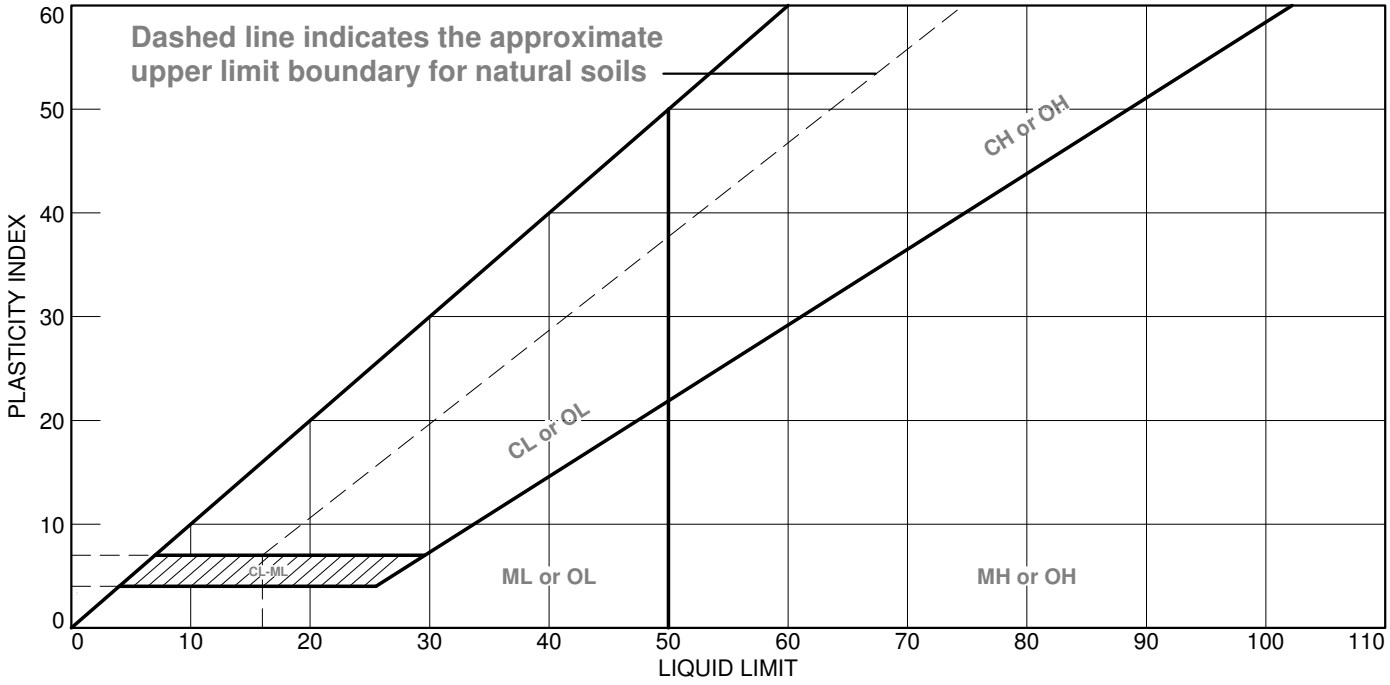
Location: GH11-235, Area E
Sample Number: SPT 1 **Depth:** 4.5-6'

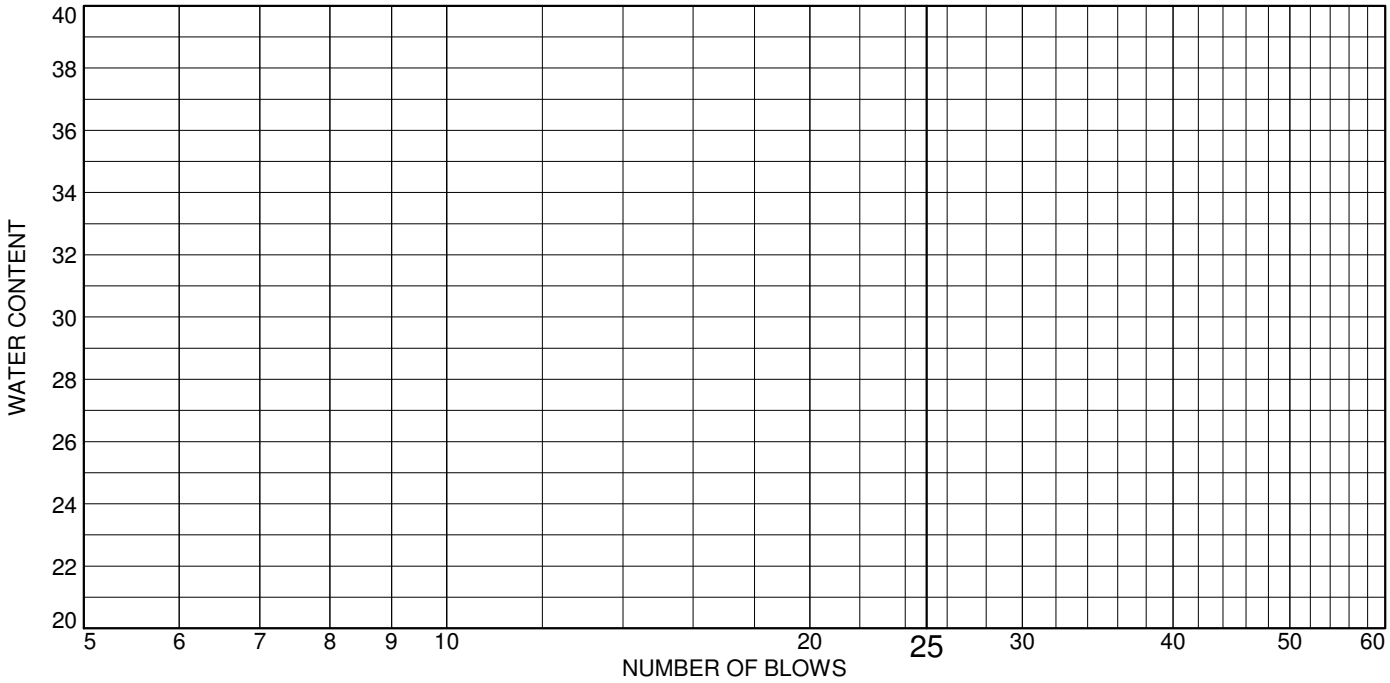
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded gravel with silt and sand	NP	NP	NP	17.3	9.5	GP-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

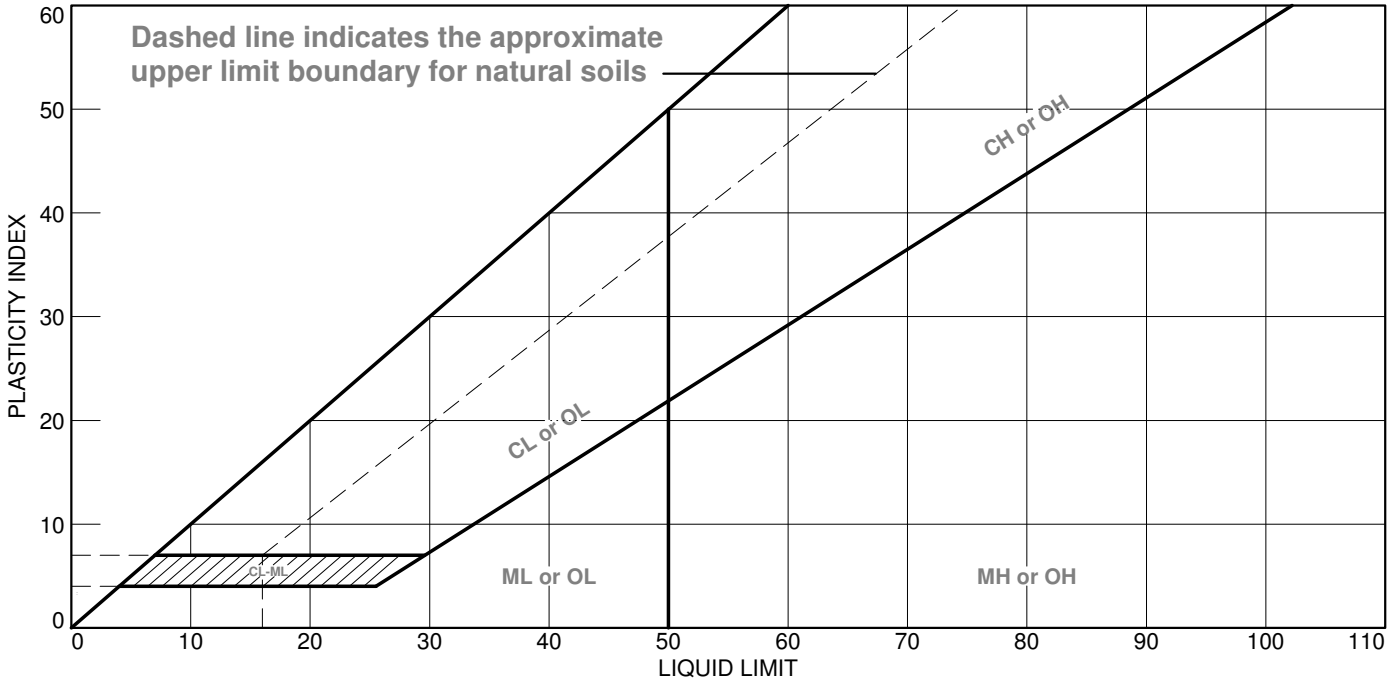
Location: GH11-235, Area E
Sample Number: SPT 2 **Depth:** 9-10.5'

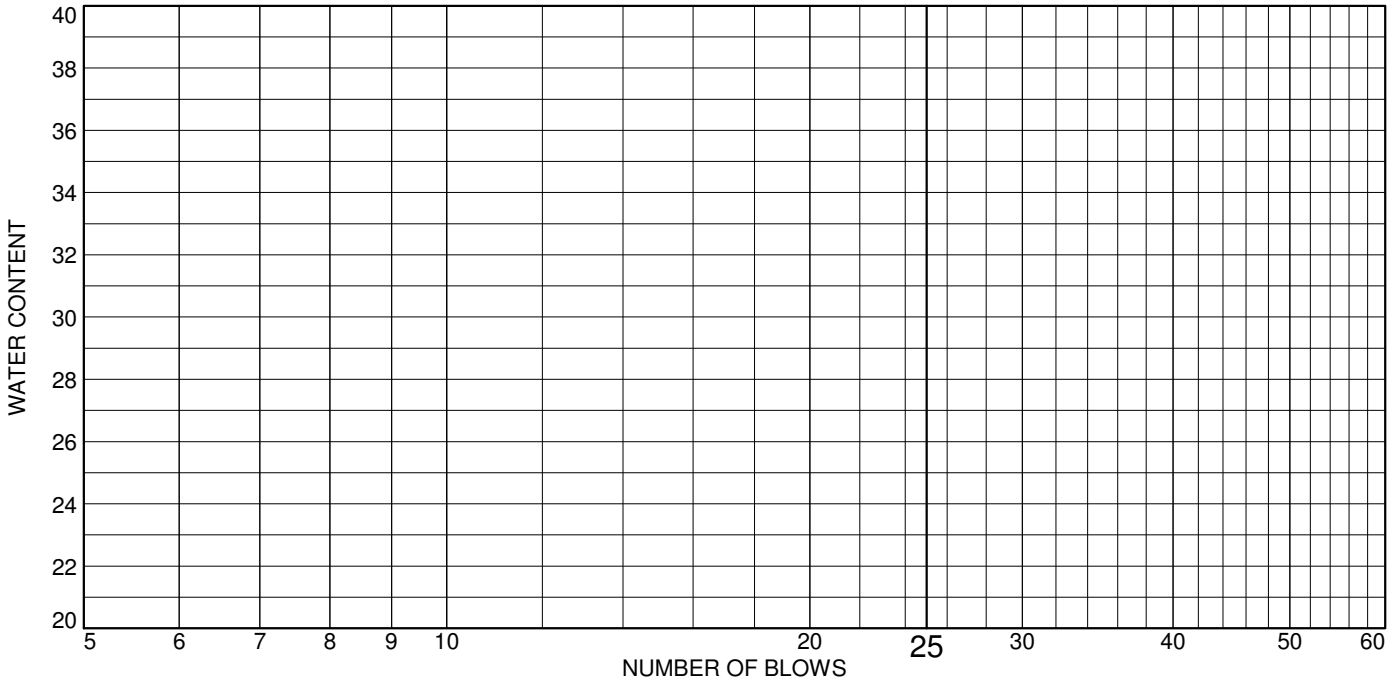
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty gravel with sand	NP	NP	NP	36.4	23.1	GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

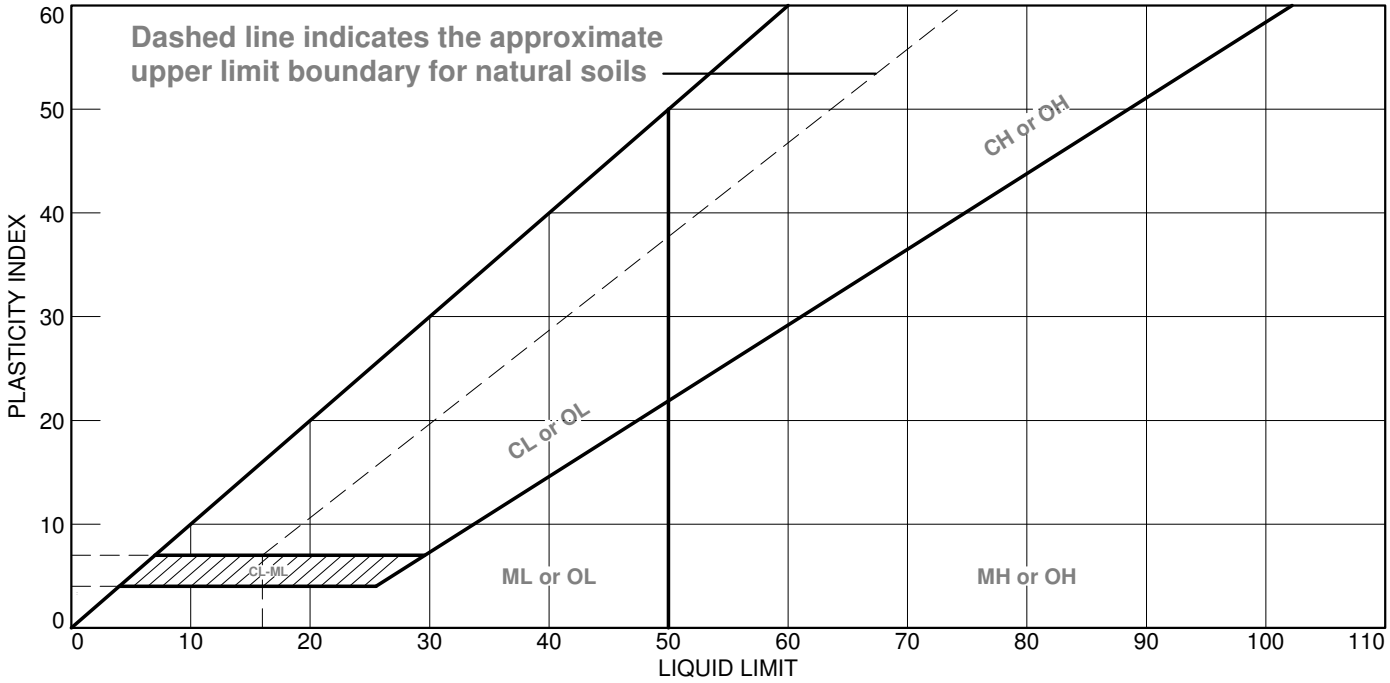
Location: GH11-235, Area E
Sample Number: SPT 4 **Depth:** 19-20.5'

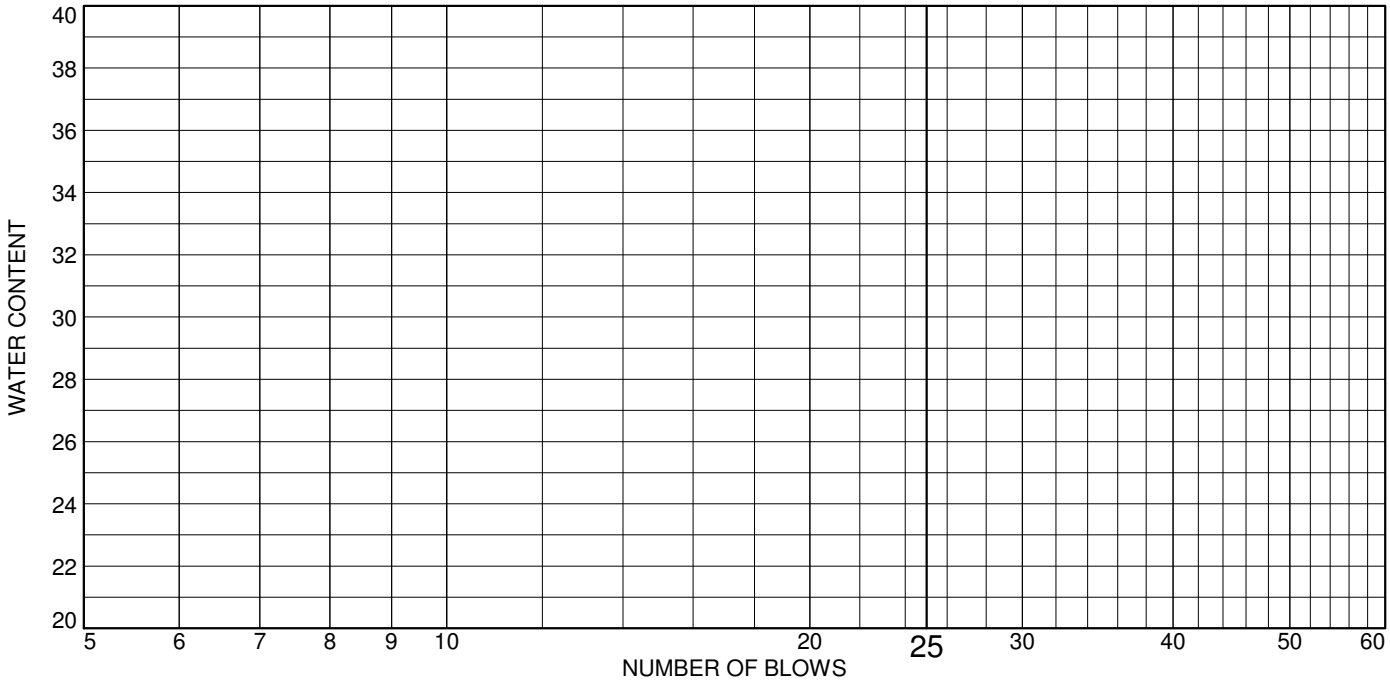
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand with gravel	NP	NP	NP	32.0	12.6	SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

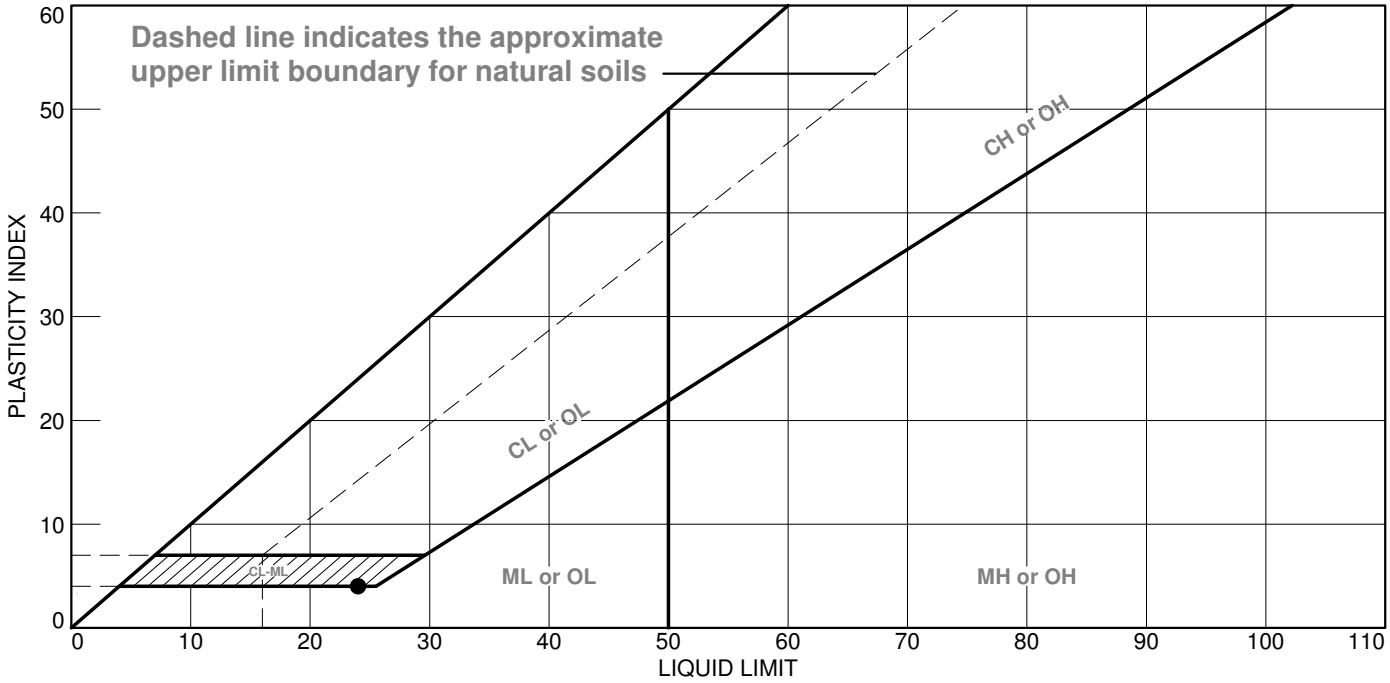
Location: GH11-235, Area E
Sample Number: SPT 7 **Depth:** 34.5-36'

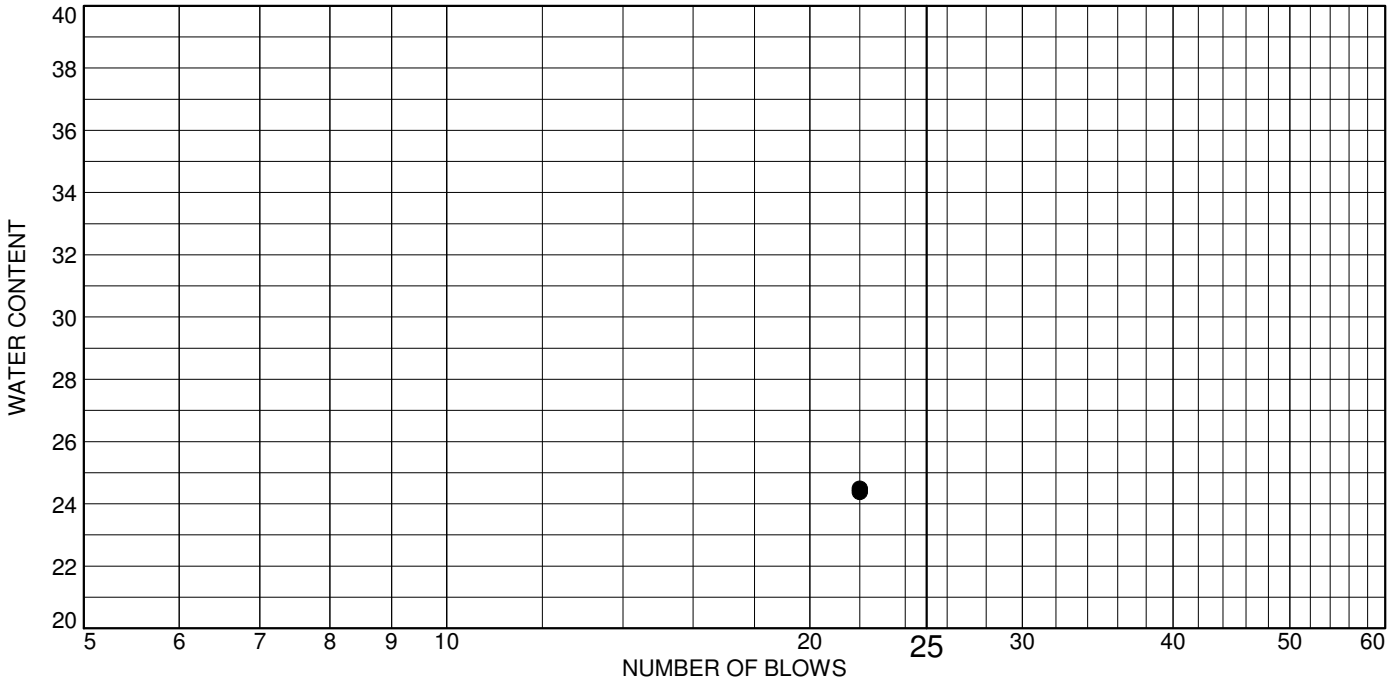
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty, clayey sand	24	20	4	50.4	25.5	SC-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

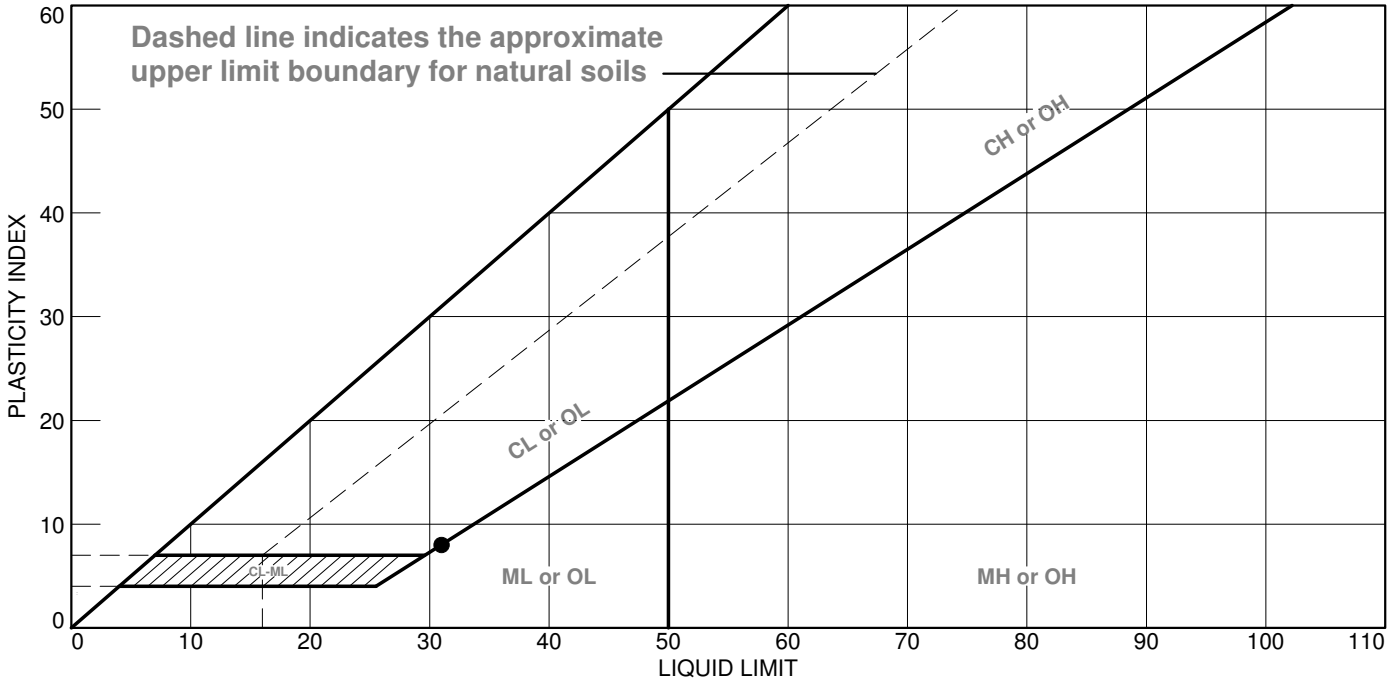
Location: GH11-235, Area E
Sample Number: SPT 9 **Depth:** 44.5-46'

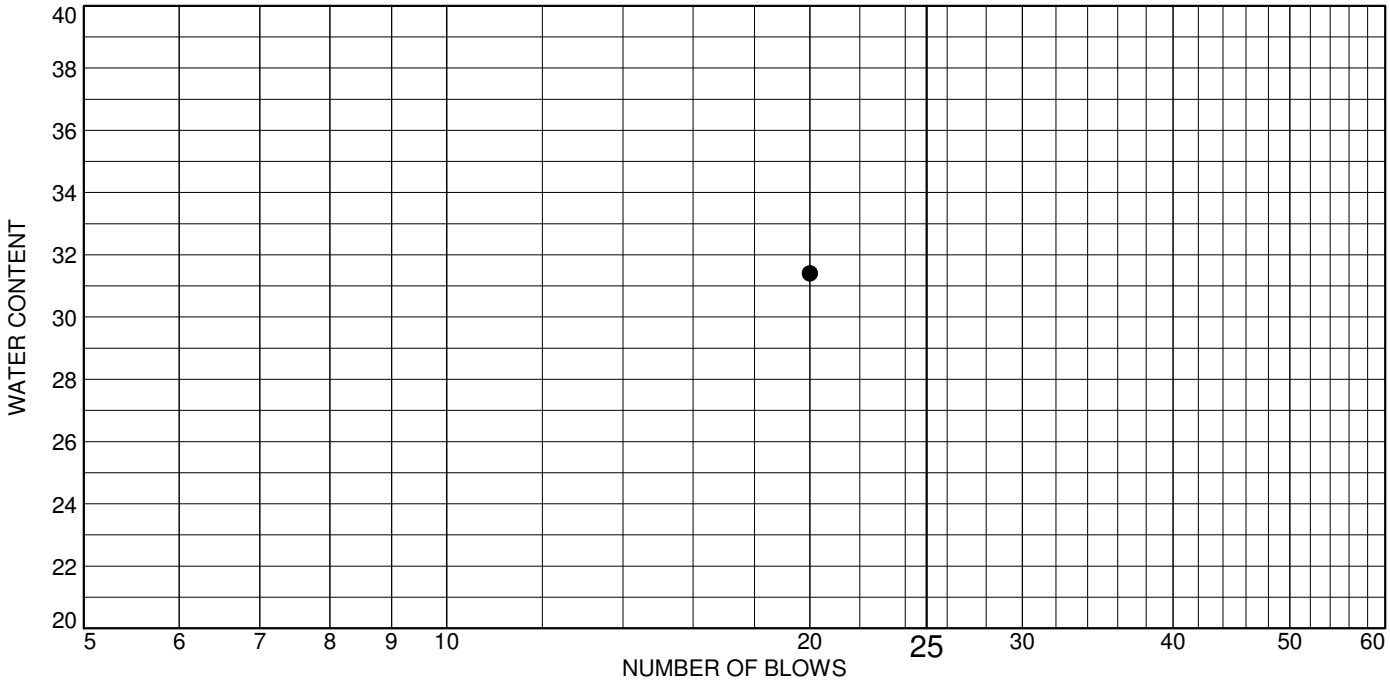
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	31	23	8	54.0	38.9	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

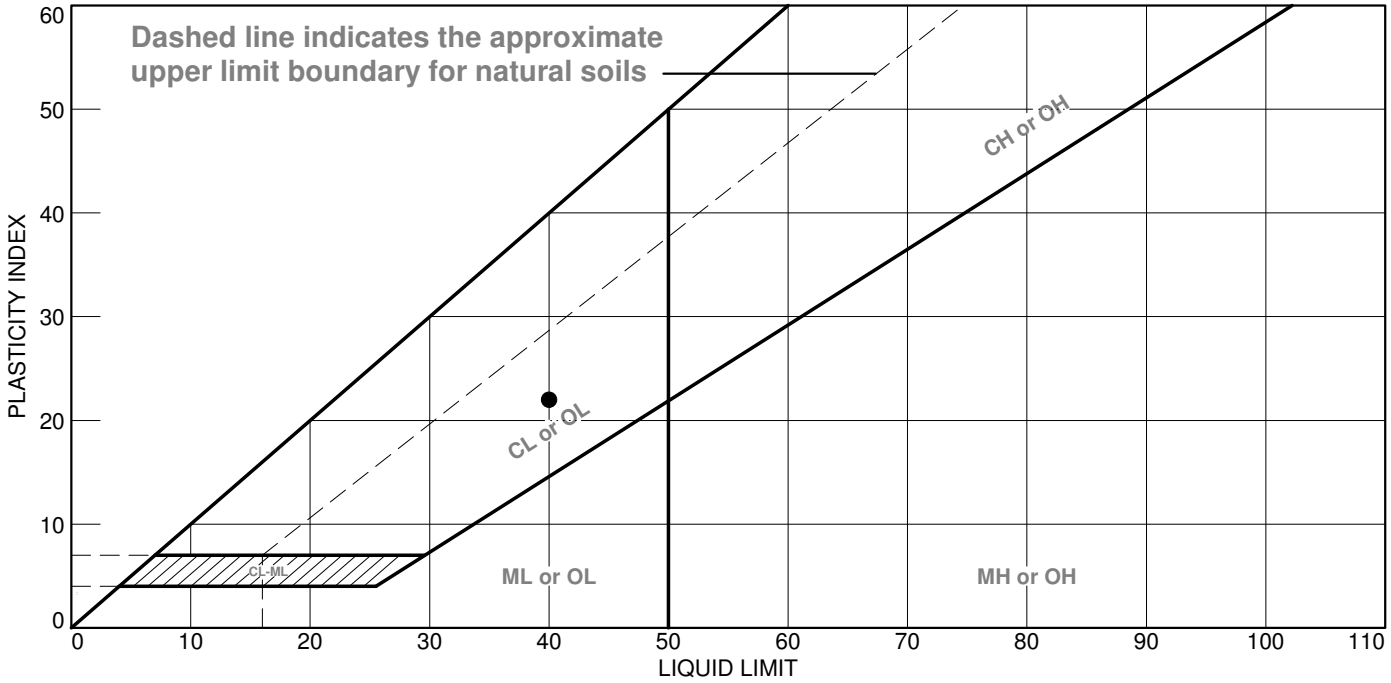
Location: GH11-235, Area E
Sample Number: SPT 10 **Depth:** 50-51.5'

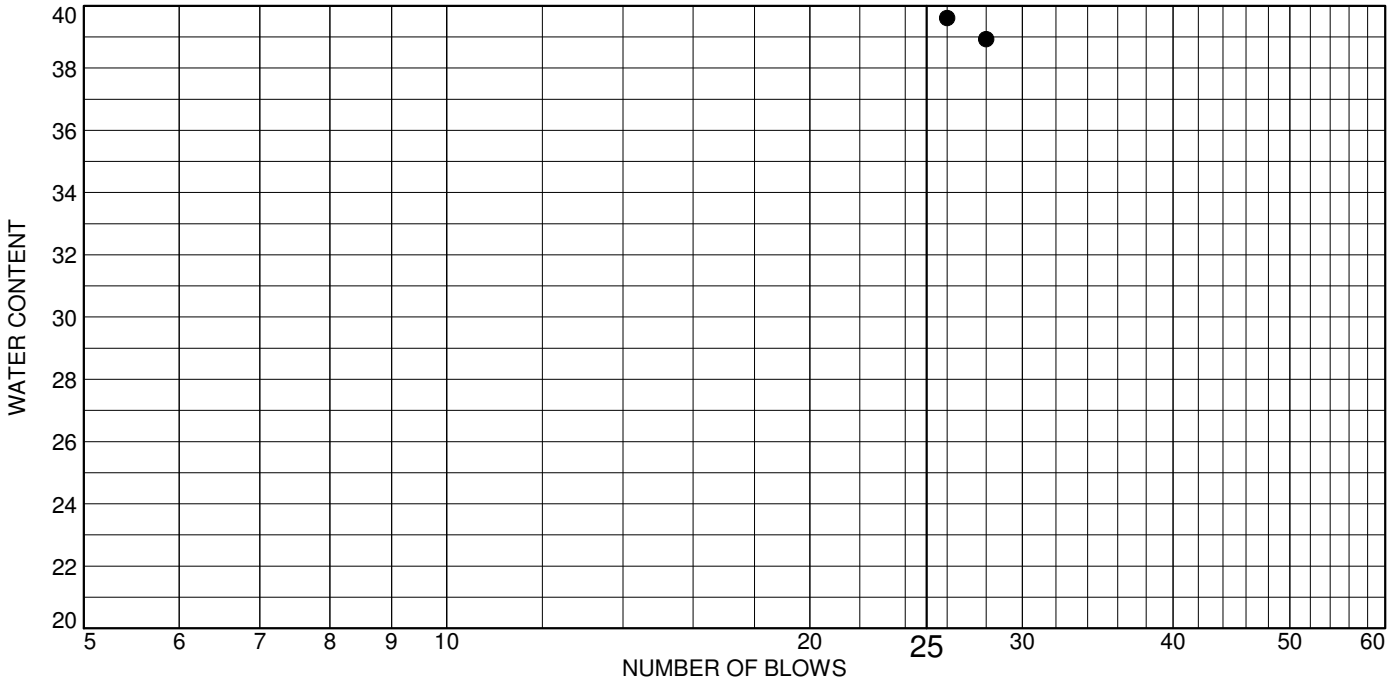
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	40	18	22	49.5	39.5	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

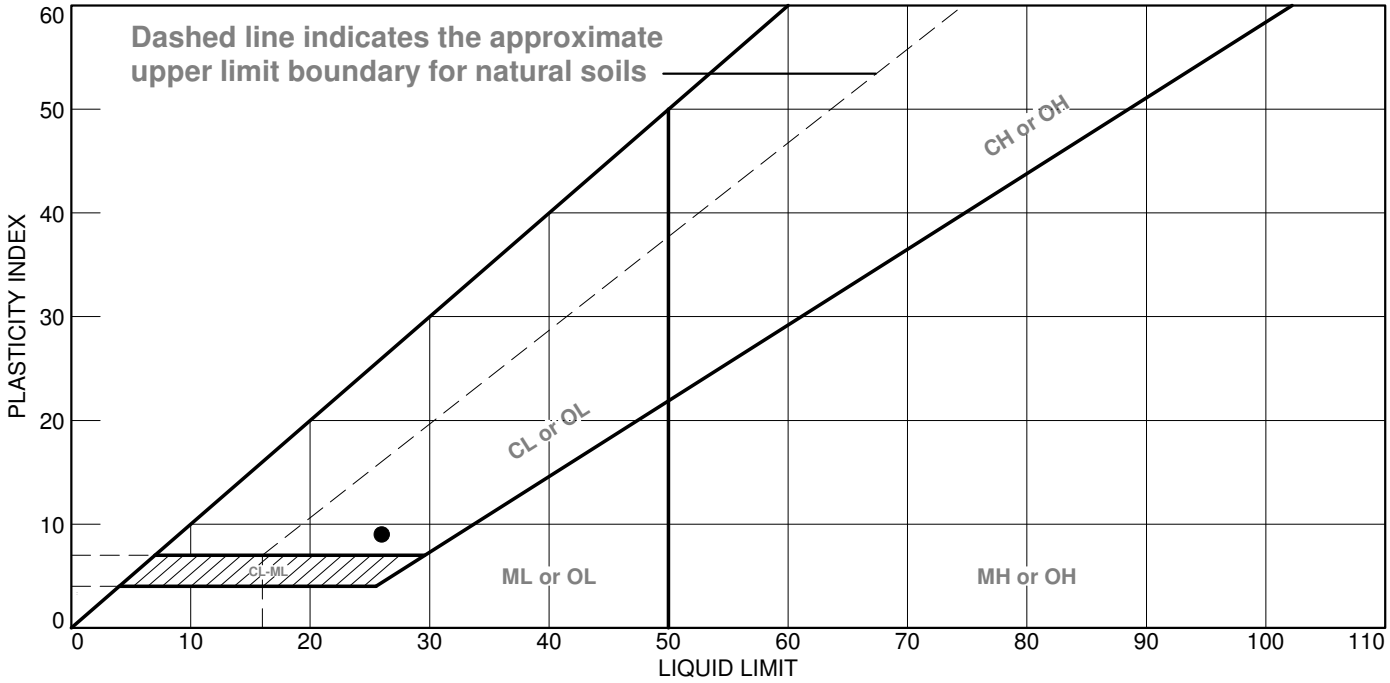
Location: GH11-236, Area E
Sample Number: GH11-236-1 **Depth:** 51-52.5'

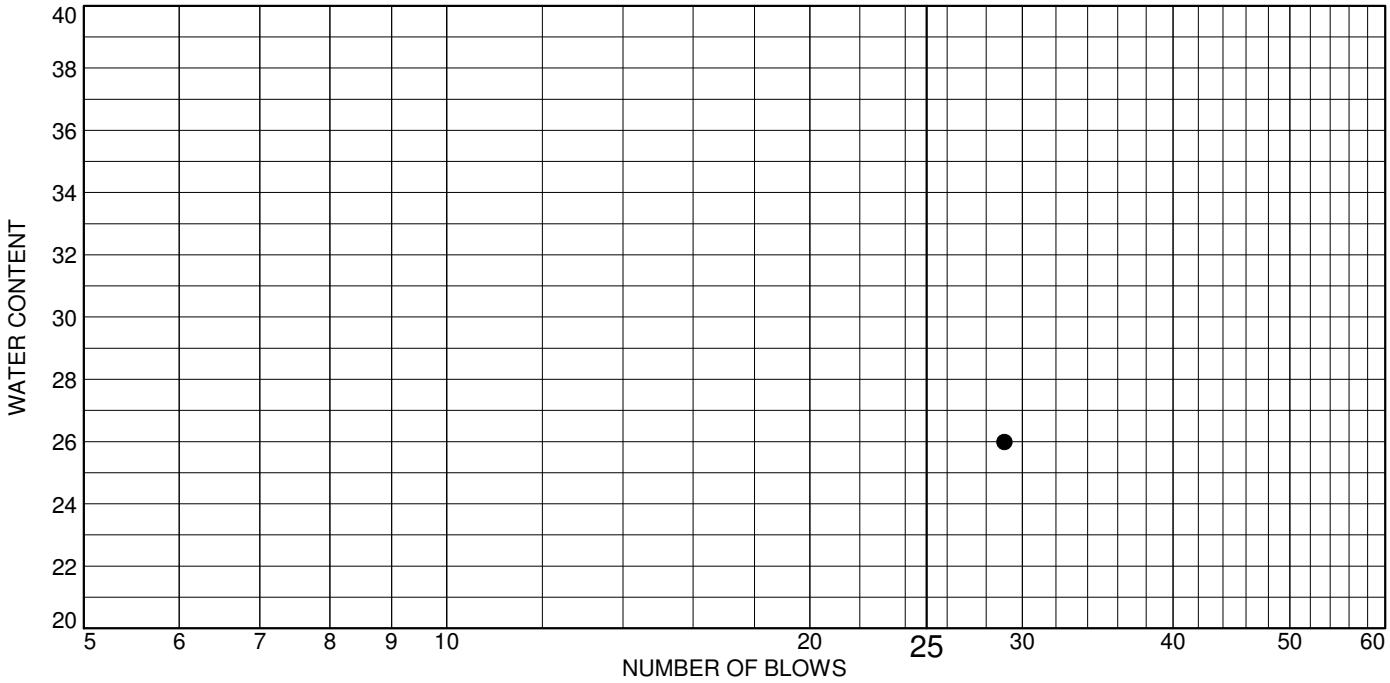
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	26	17	9	44.2	29.6	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

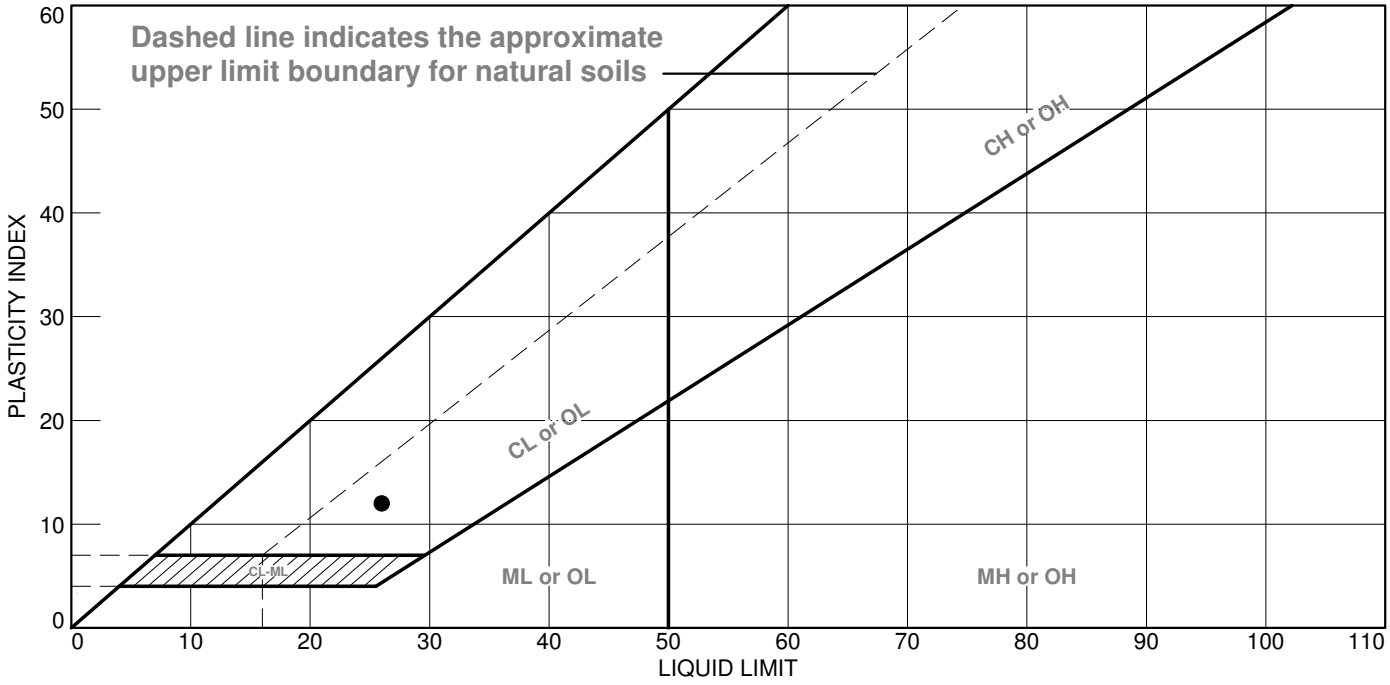
Location: GH11-236, Area E
Sample Number: SPT 1 **Depth:** 4-5.5'

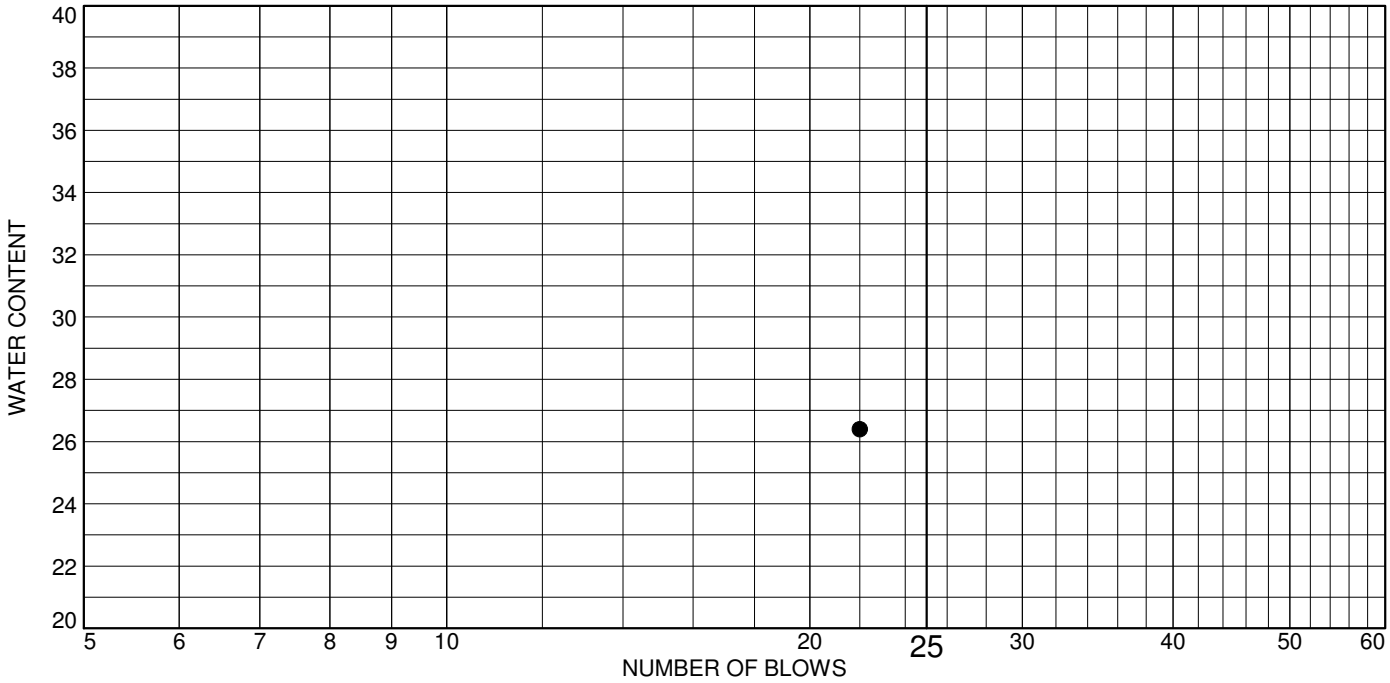
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	26	14	12	38.9	26.4	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

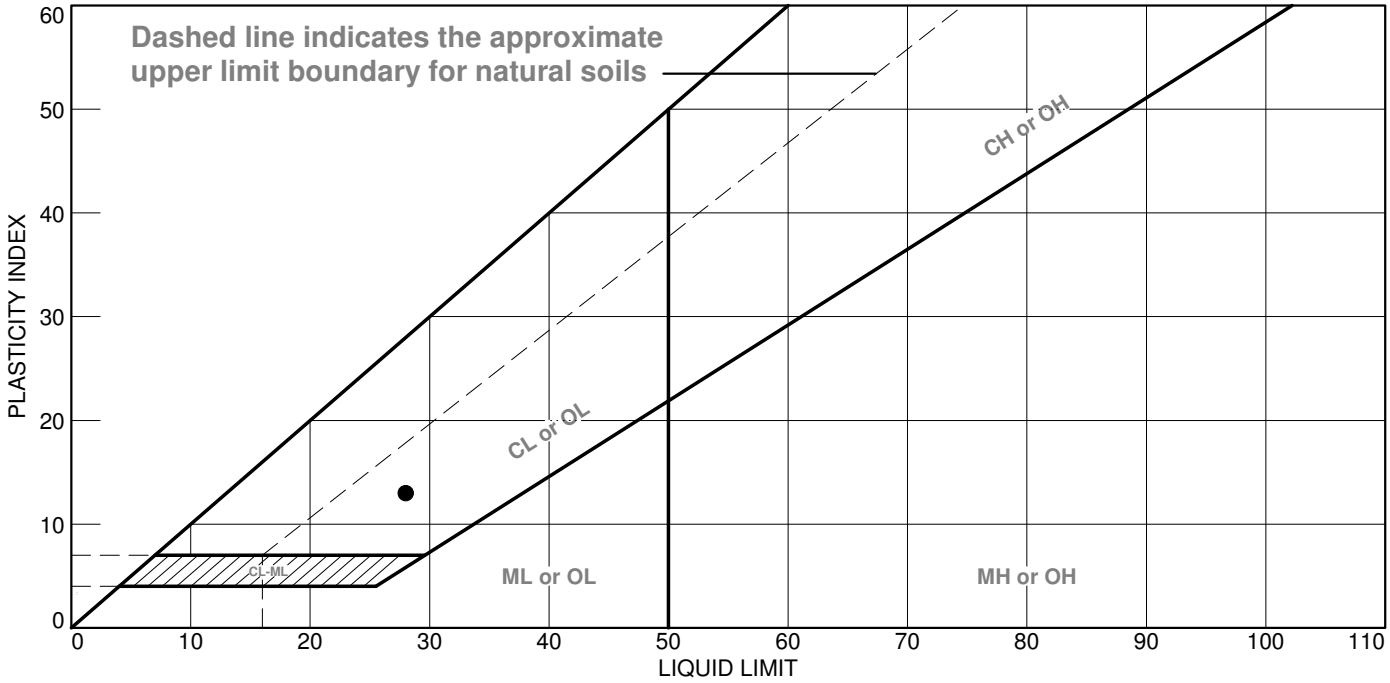
Location: GH11-236, Area E
Sample Number: SPT 3 **Depth:** 14-15.5'

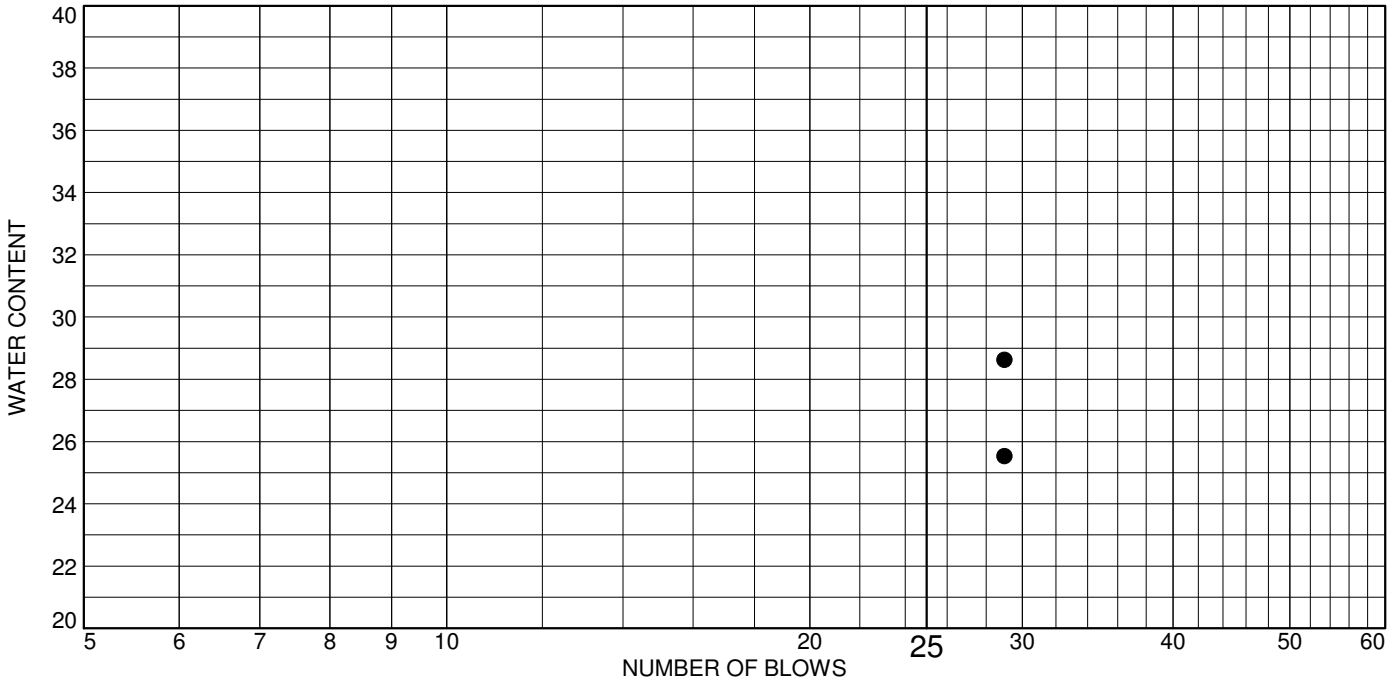
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	28	15	13	37.0	24.4	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

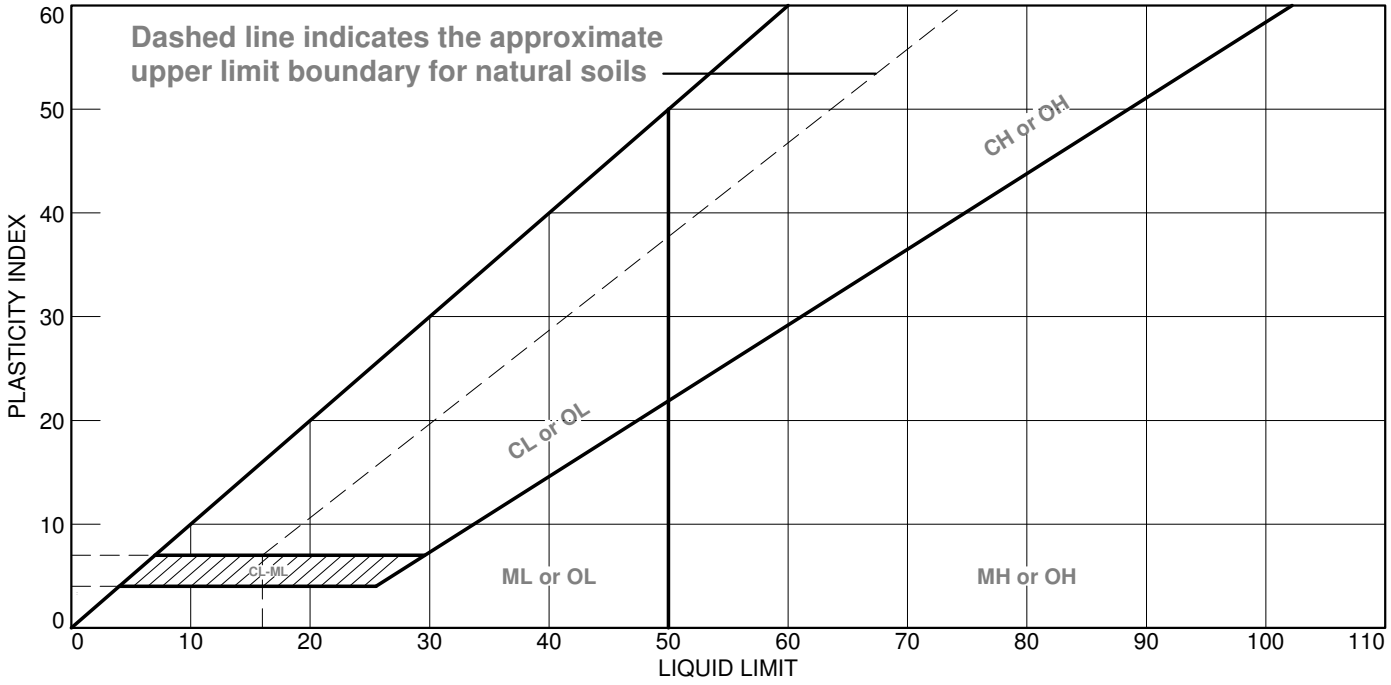
Location: GH11-236, Area E
Sample Number: SPT 5 **Depth:** 24-25.5'

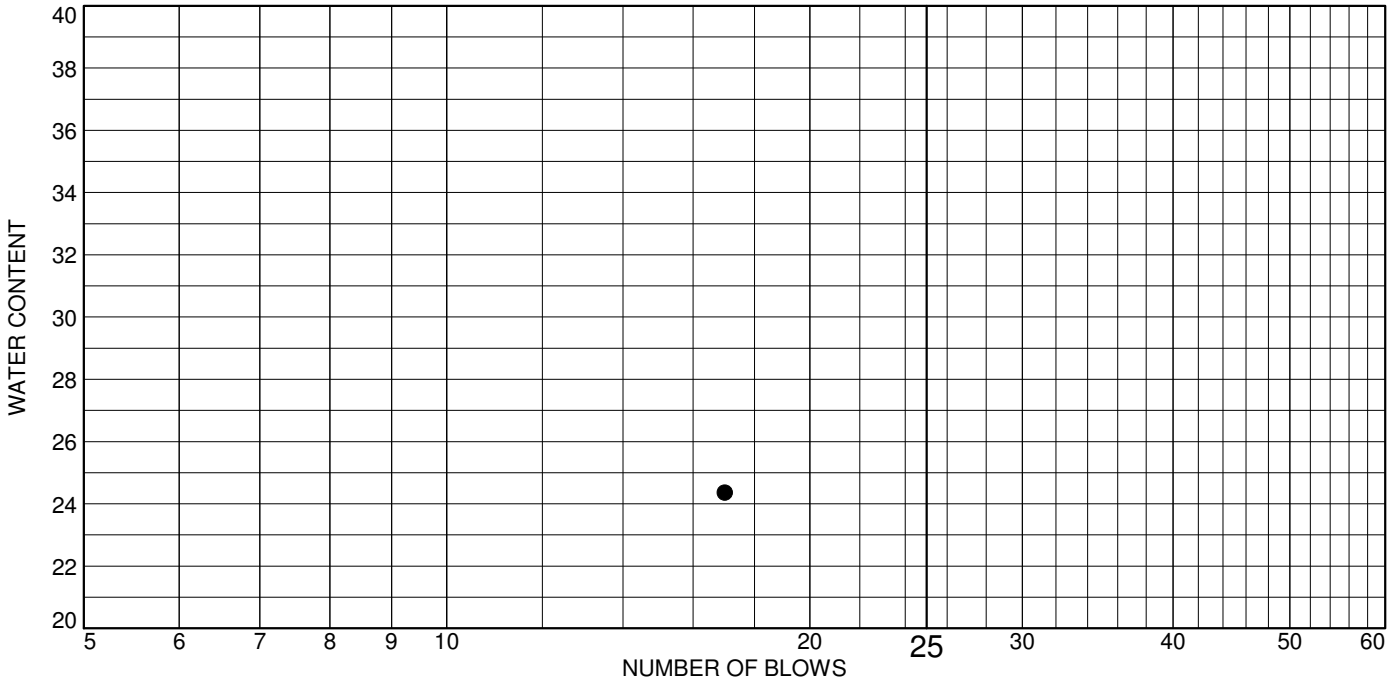
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded gravel with silt and sand	23	NP	NP	16.8	8.2	GP-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

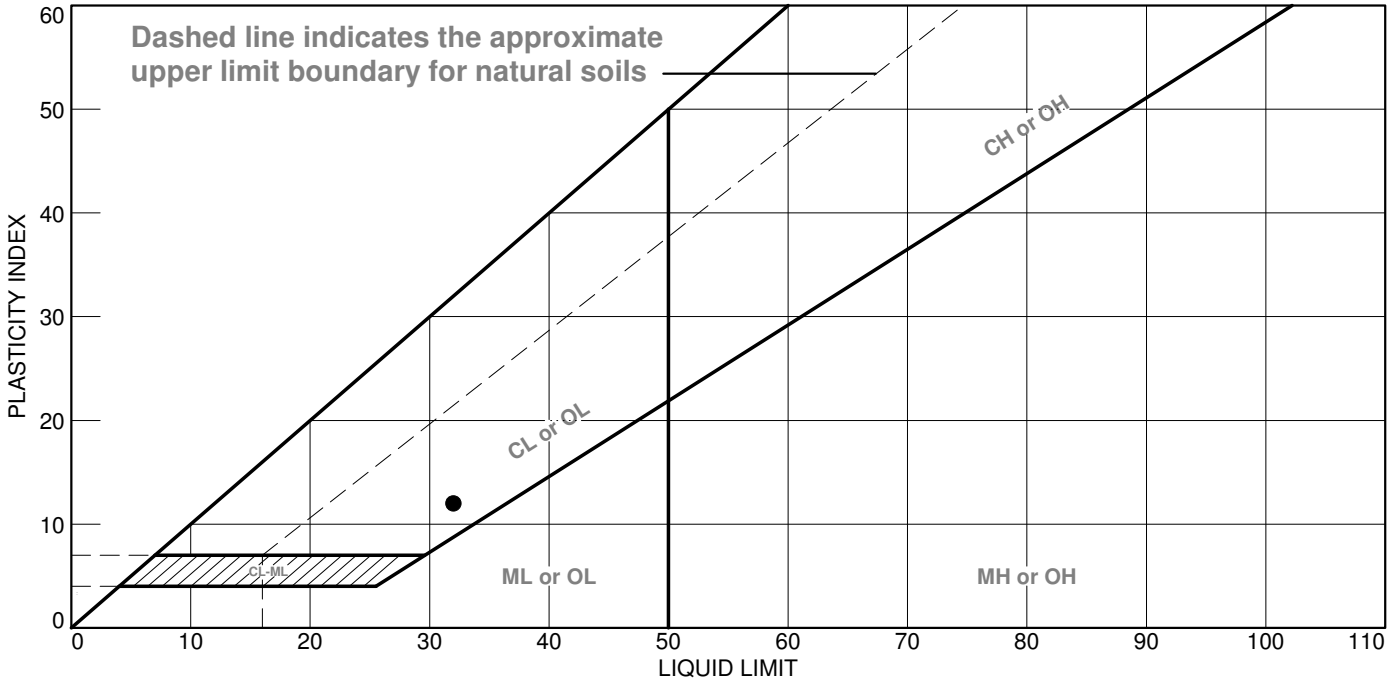
Location: GH11-236, Area E
Sample Number: SPT 7 **Depth:** 34-35.5'

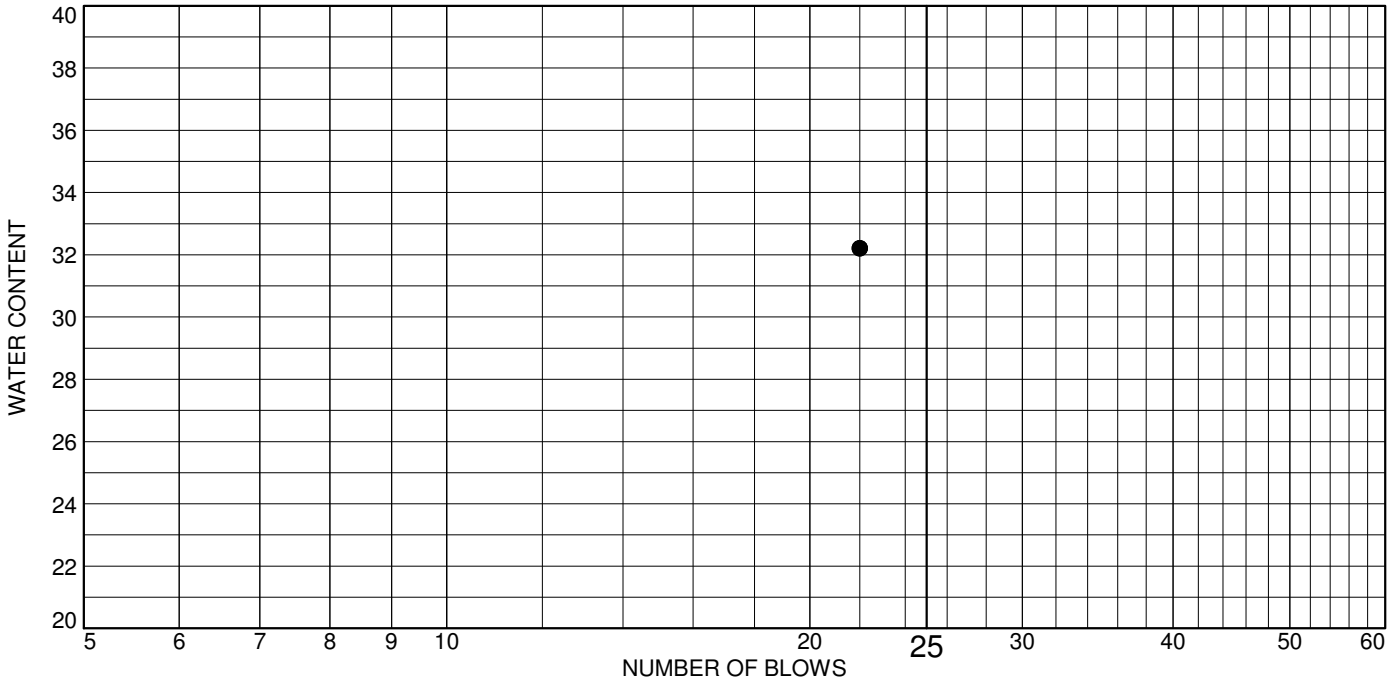
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	32	20	12	68.2	49.5	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

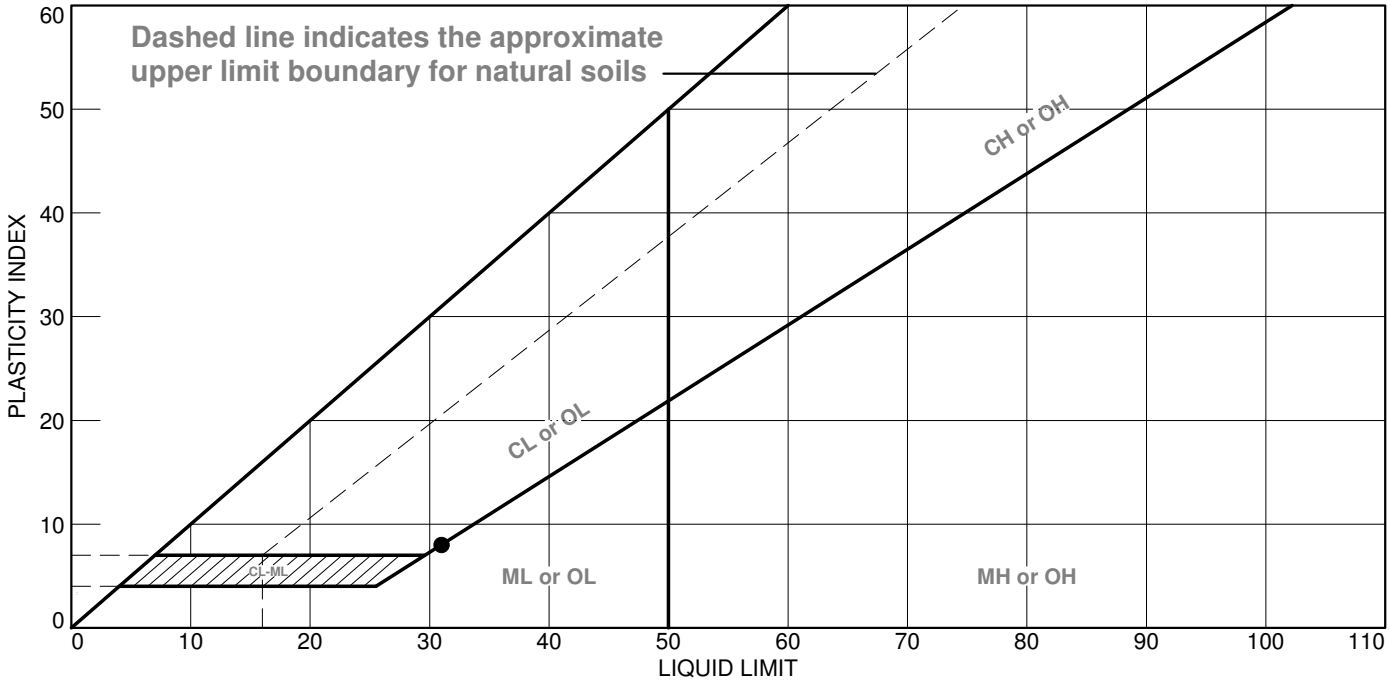
Location: GH11-236, Area E
Sample Number: SPT 10 **Depth:** 49-50.5'

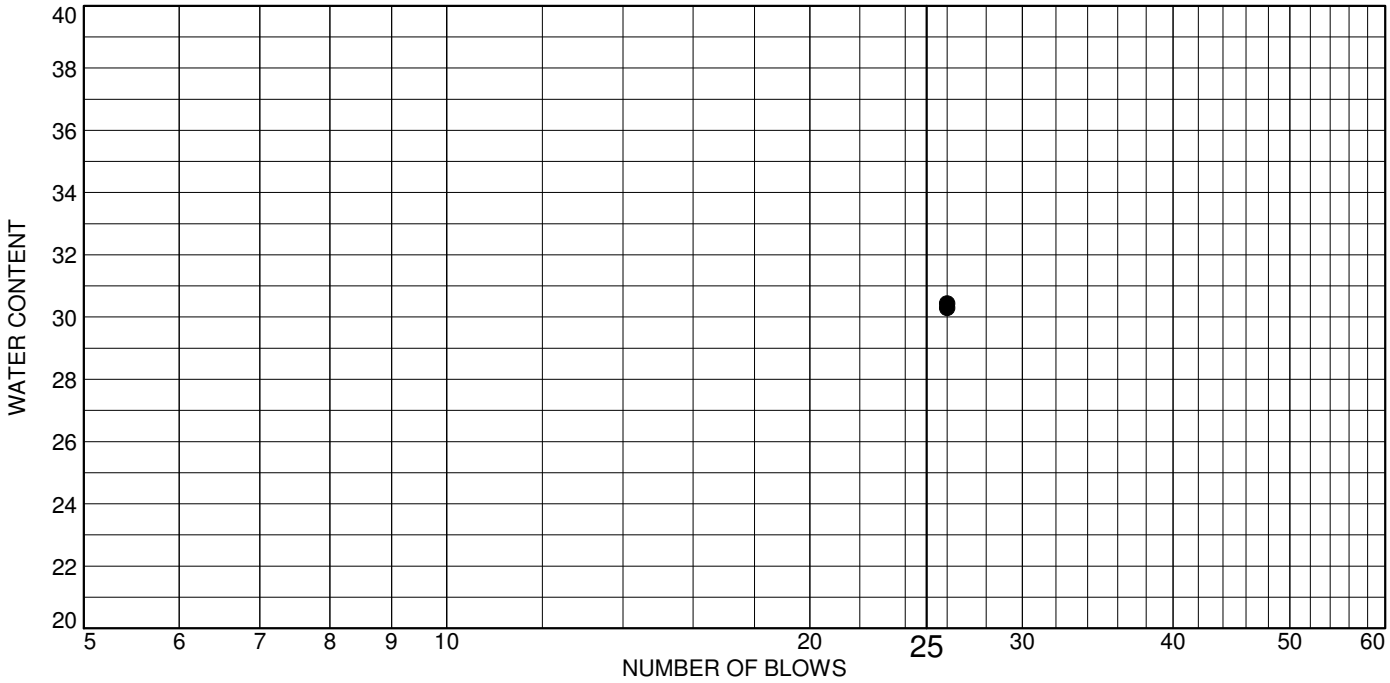
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay with gravel	31	23	8	69.0	54.8	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

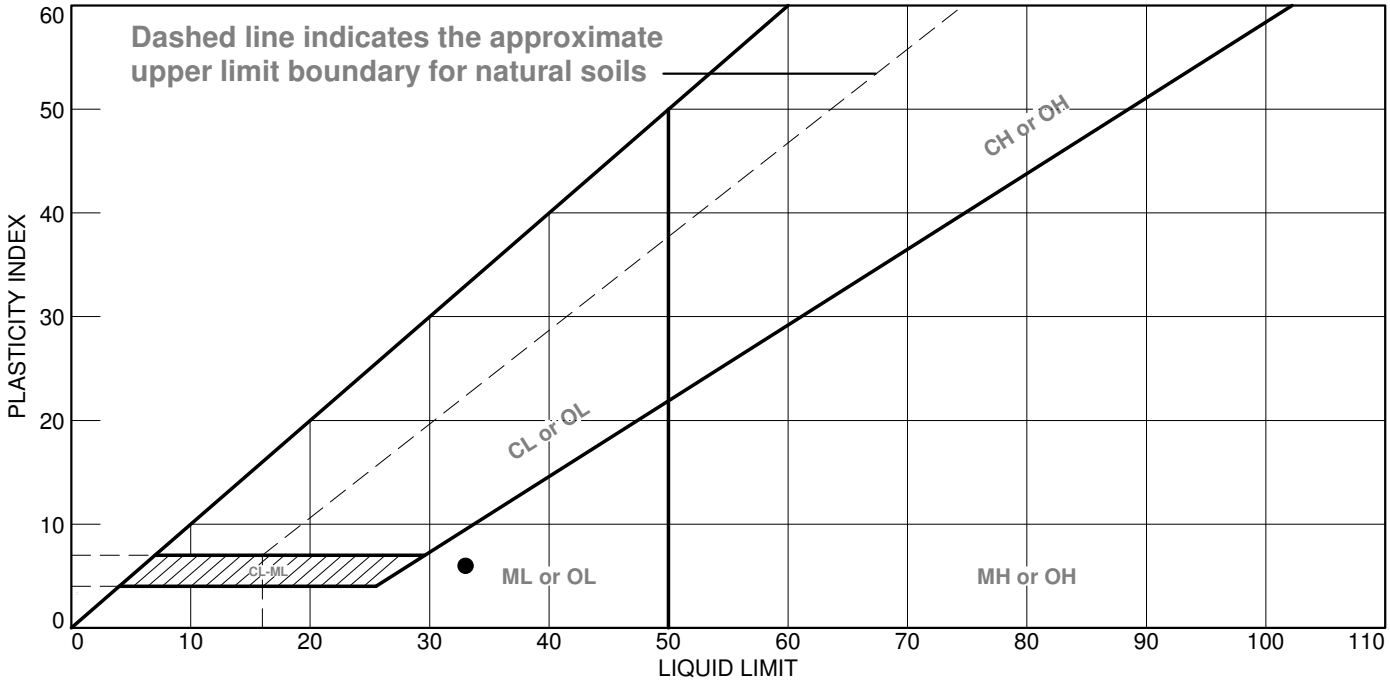
Location: GH11-236, Area E
Sample Number: SPT 12 **Depth:** 59.5-61'

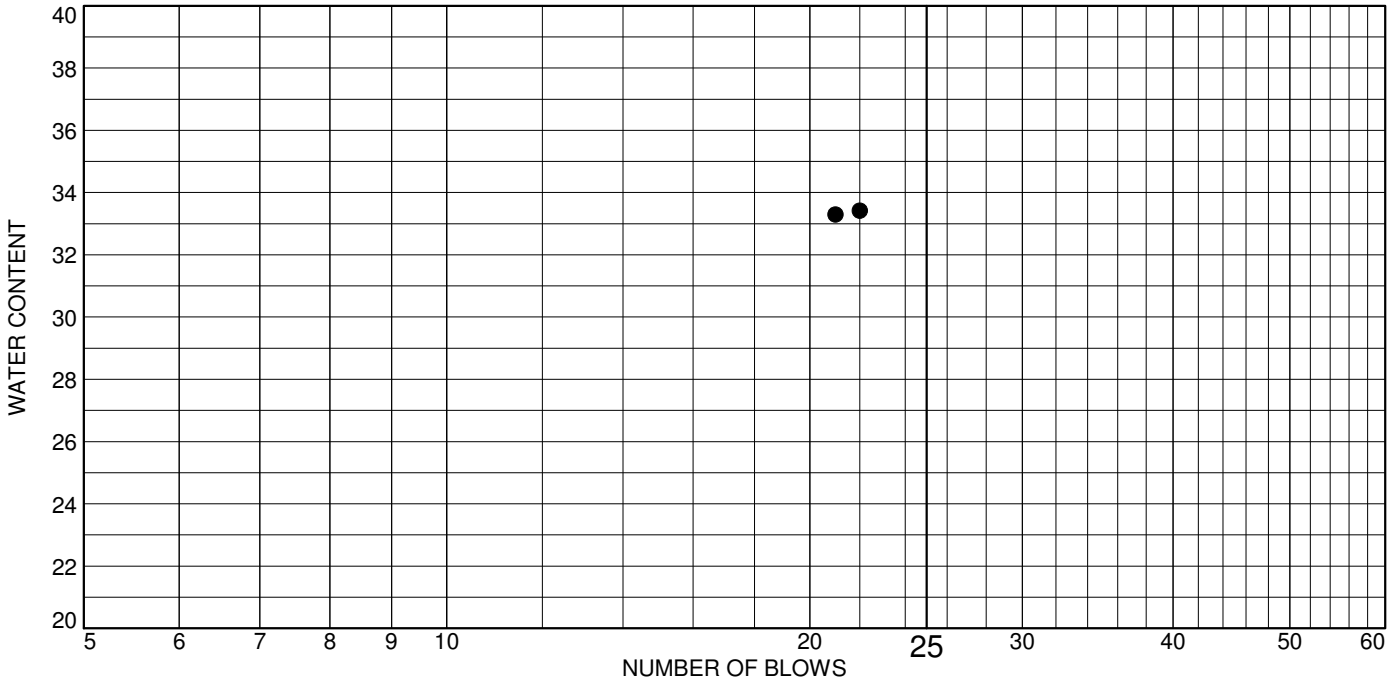
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy silt with gravel	33	27	6	68.9	56.6	ML

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

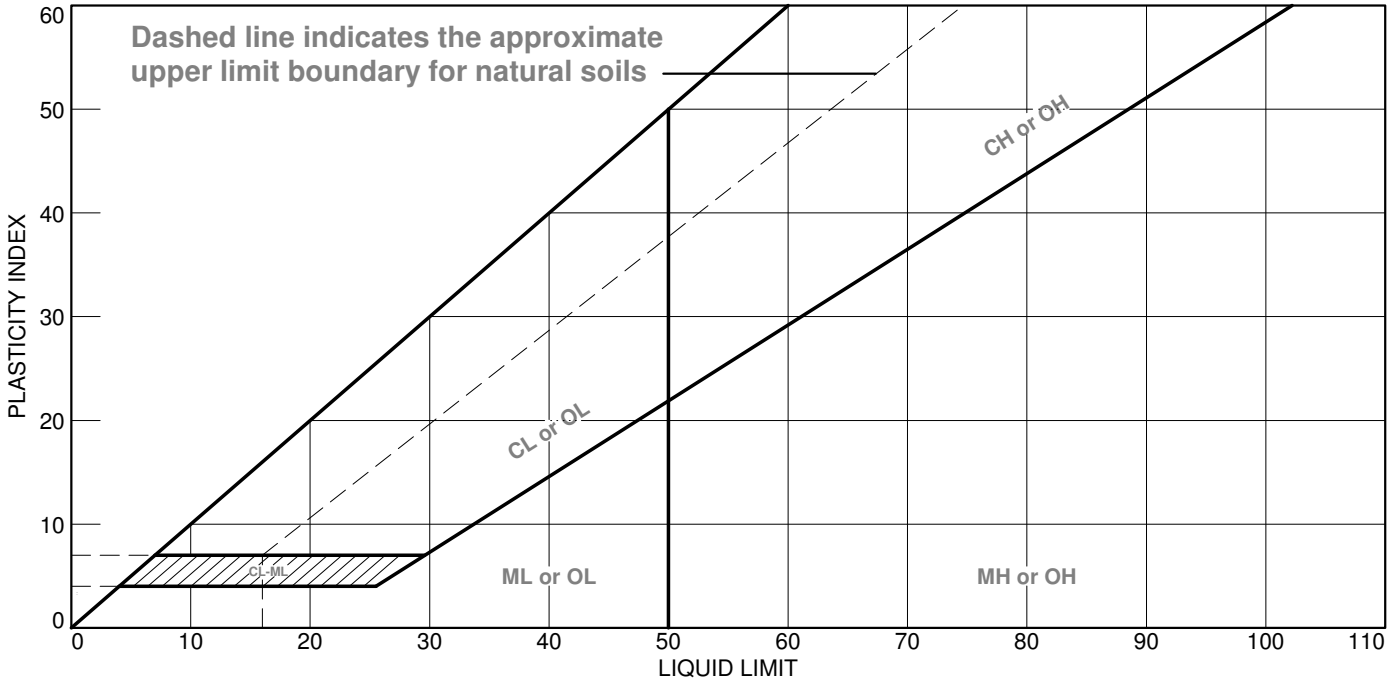
Location: GH11-236, Area E
Sample Number: SPT 15 **Depth:** 74-75.5'

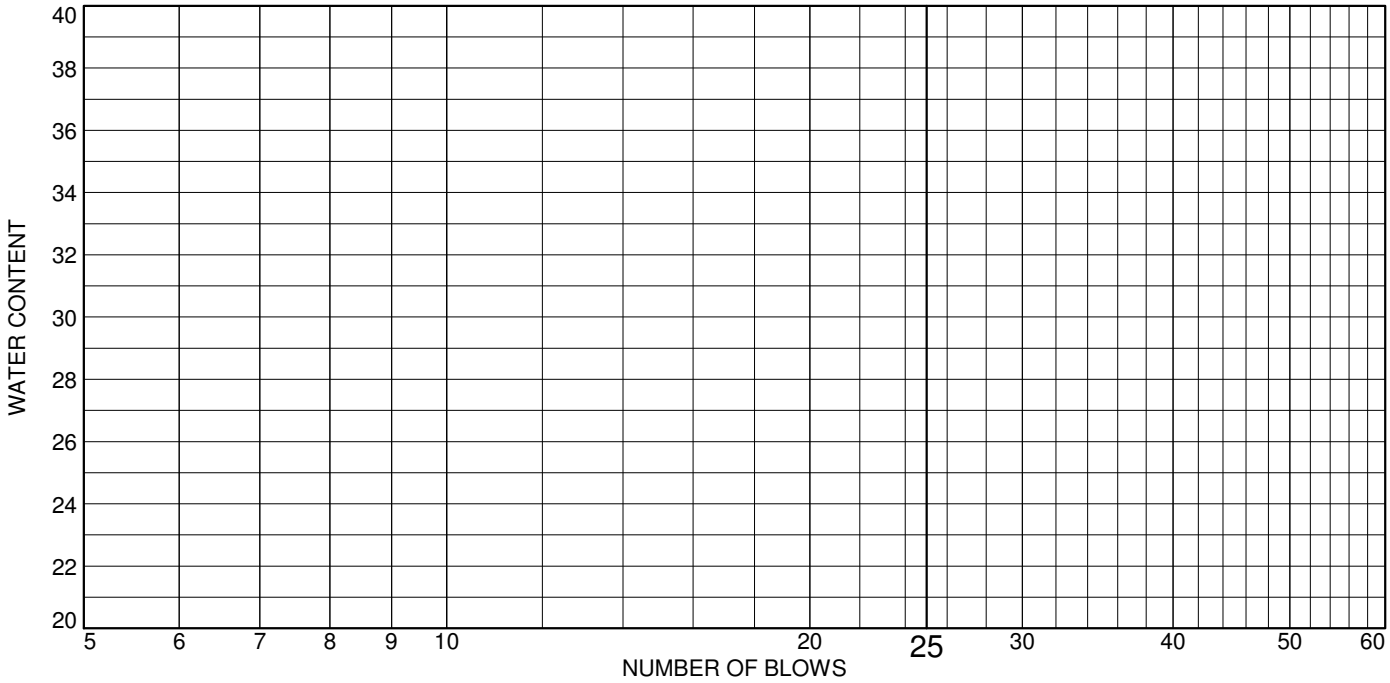
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded gravel with silt and sand	NP	NP	NP	10.4	5.0	GW-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

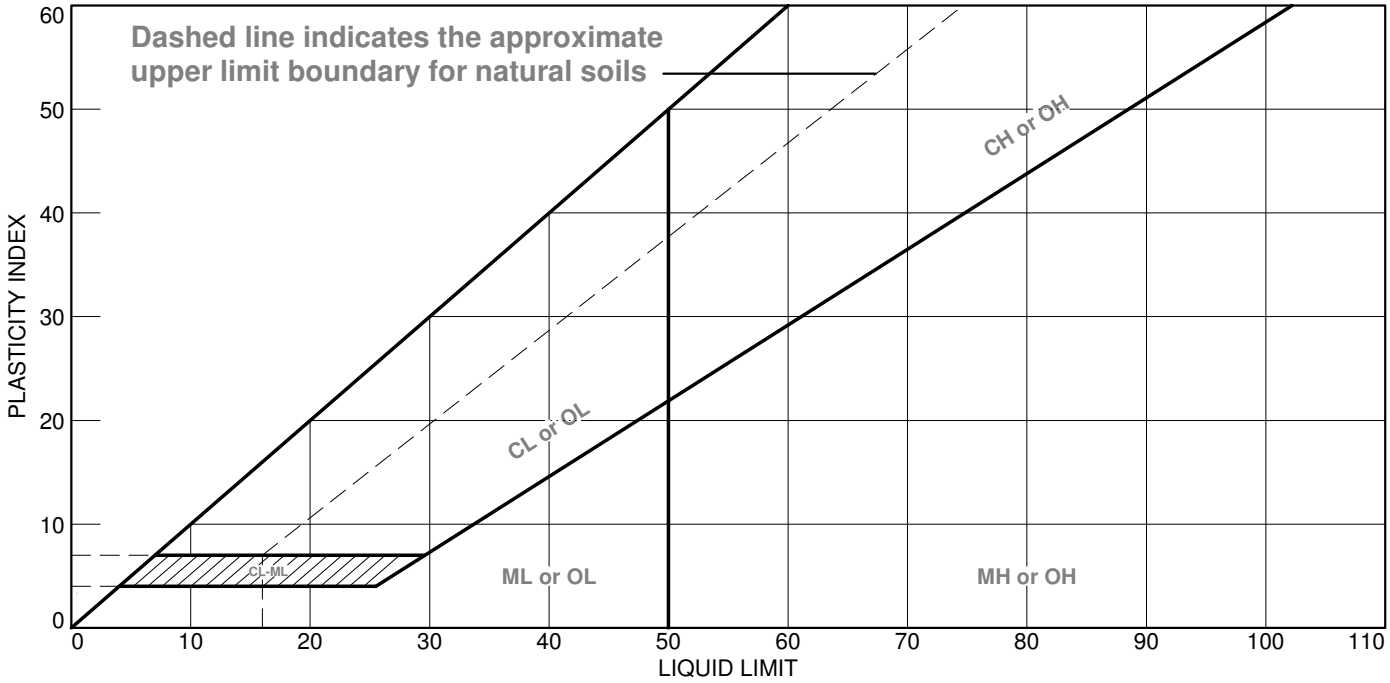
Location: GH11-237, Area E
Sample Number: SPT 2 **Depth:** 9-10.5'

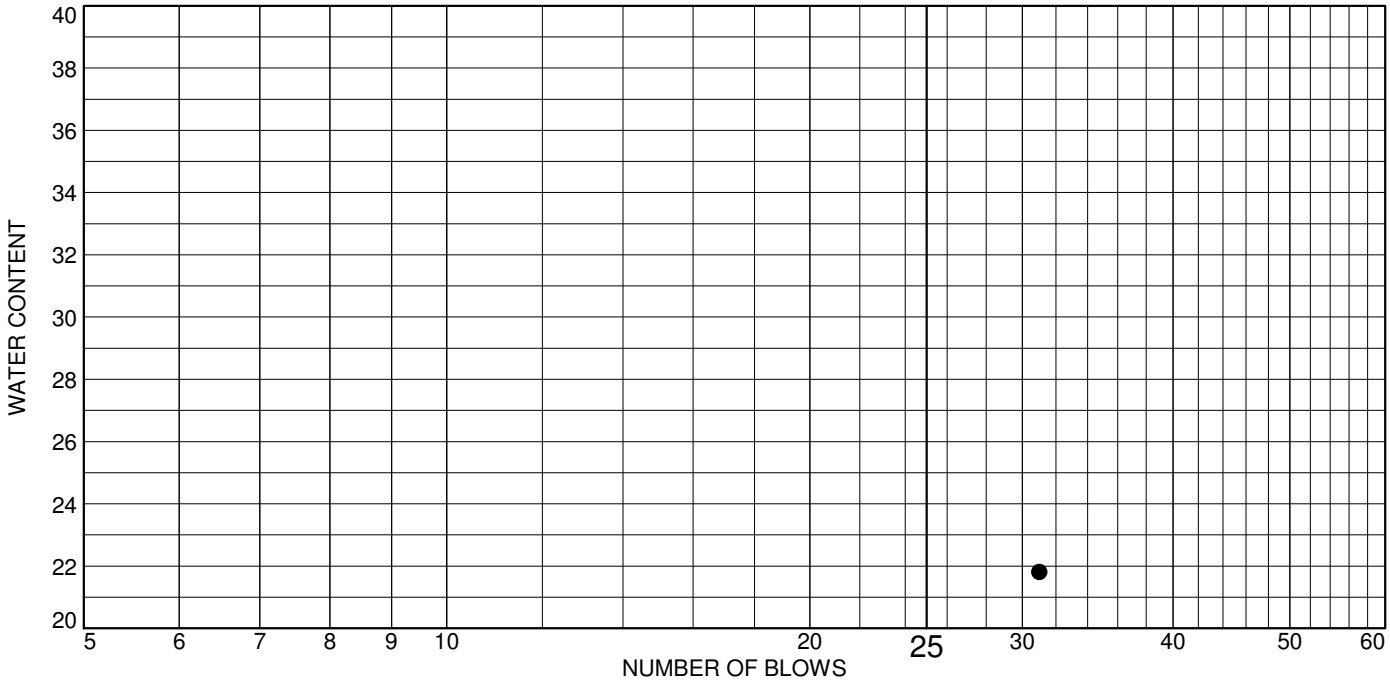
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded gravel with silt and sand	22	NP	NP	11.0	5.4	GW-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

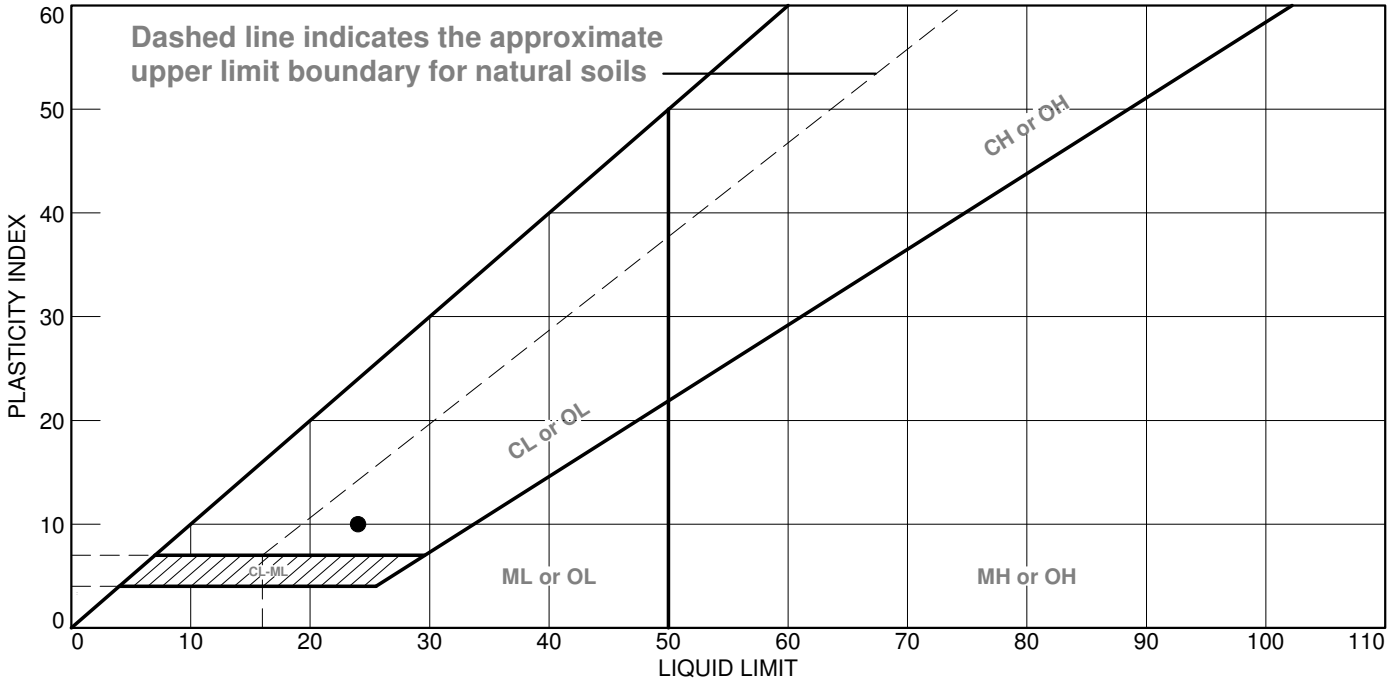
Location: GH11-237, Area E
Sample Number: SPT 6 **Depth:** 29-30.5'

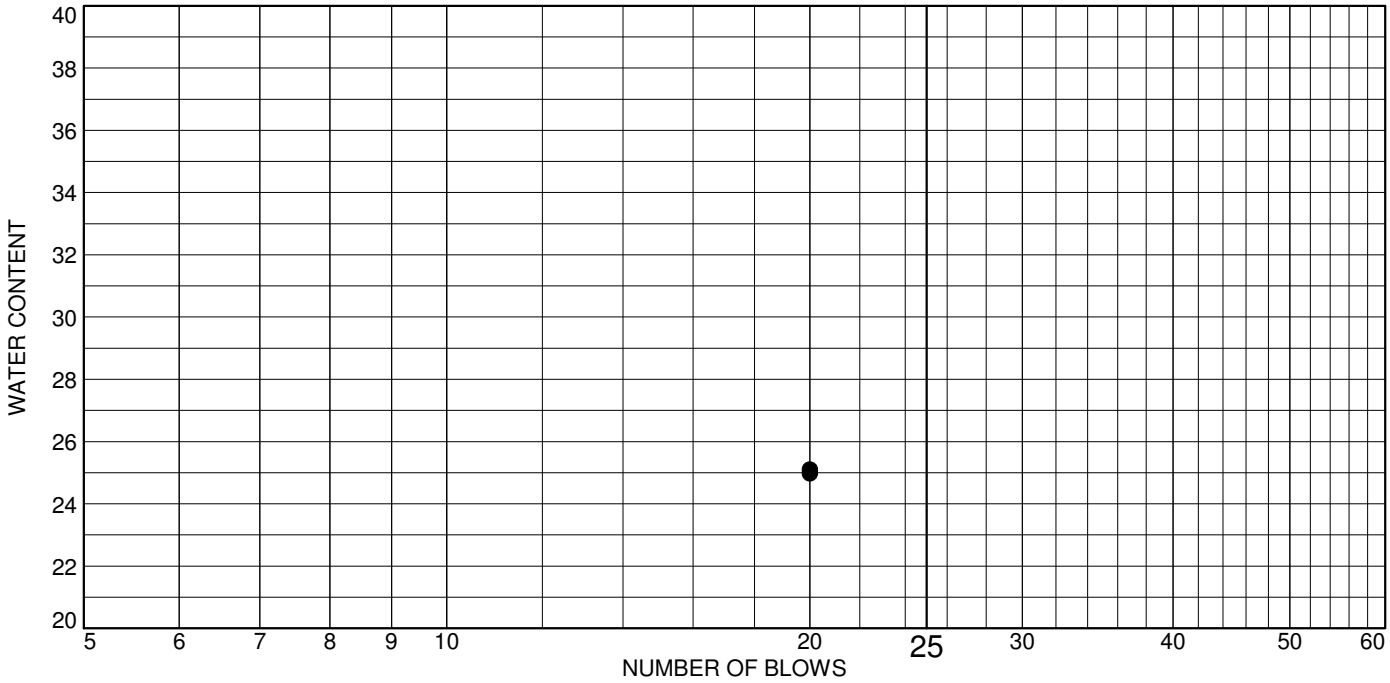
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	24	14	10	38.4	26.3	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

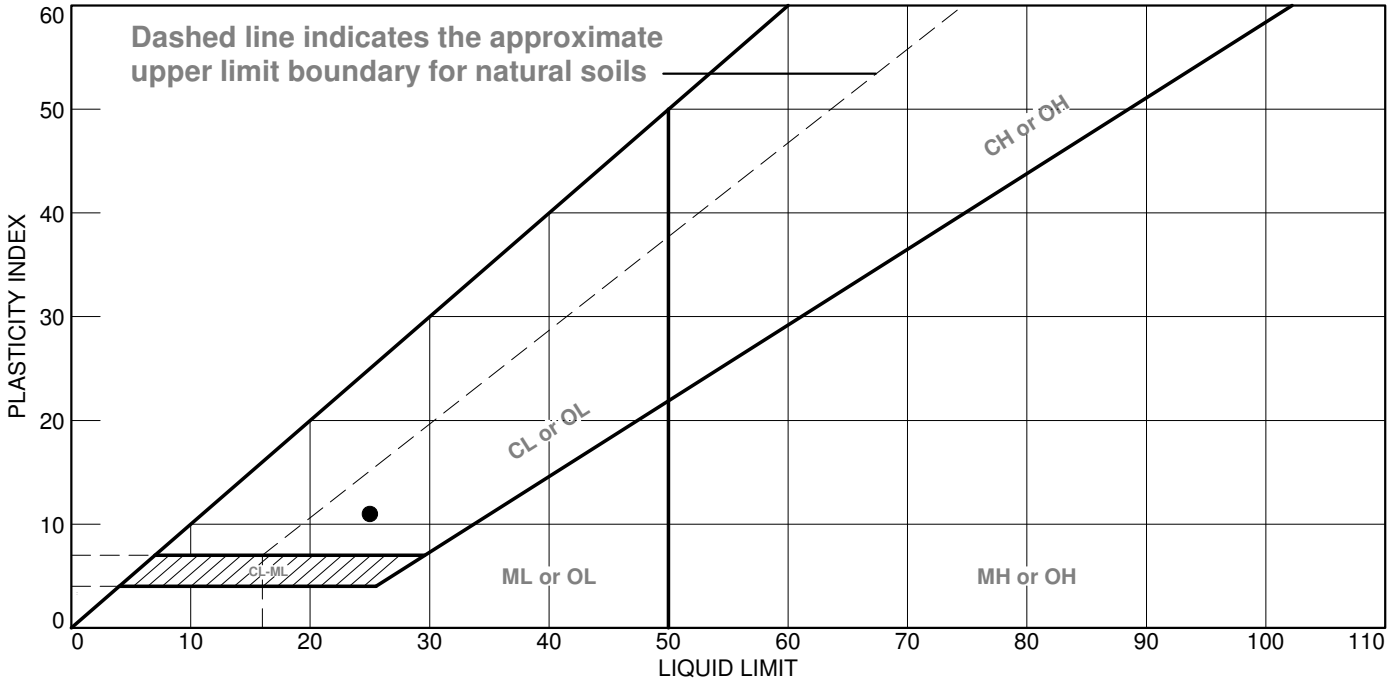
Location: GH11-237, Area E
Sample Number: SPT 10 **Depth:** 49-50.5'

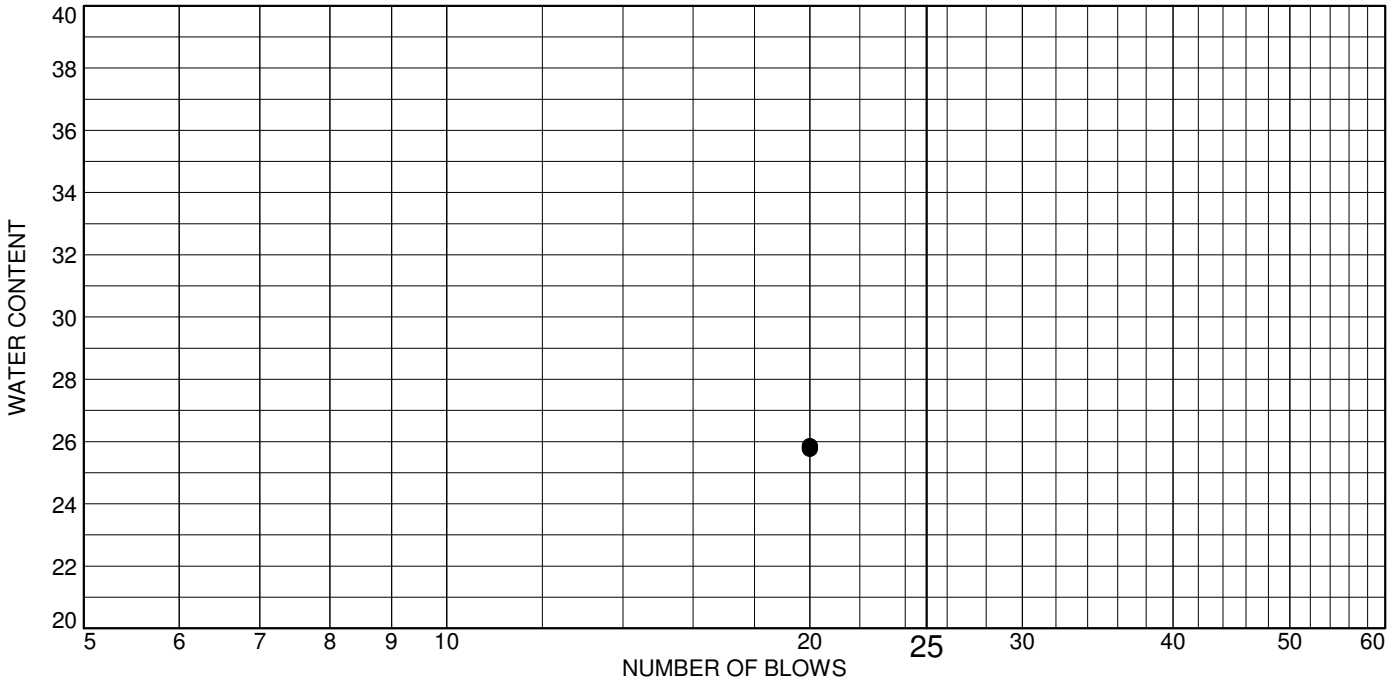
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	25	14	11	44.7	30.5	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

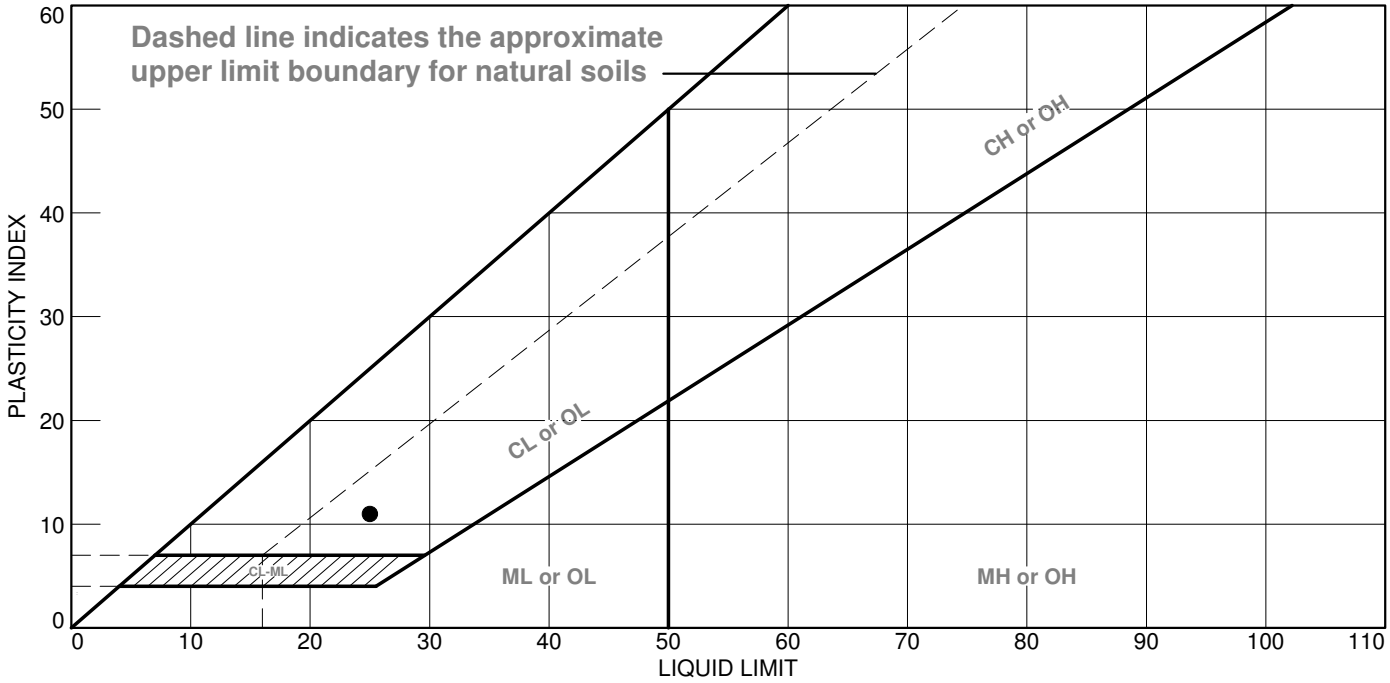
Location: GH11-237, Area E
Sample Number: SPT 11 **Depth:** 54-55.5'

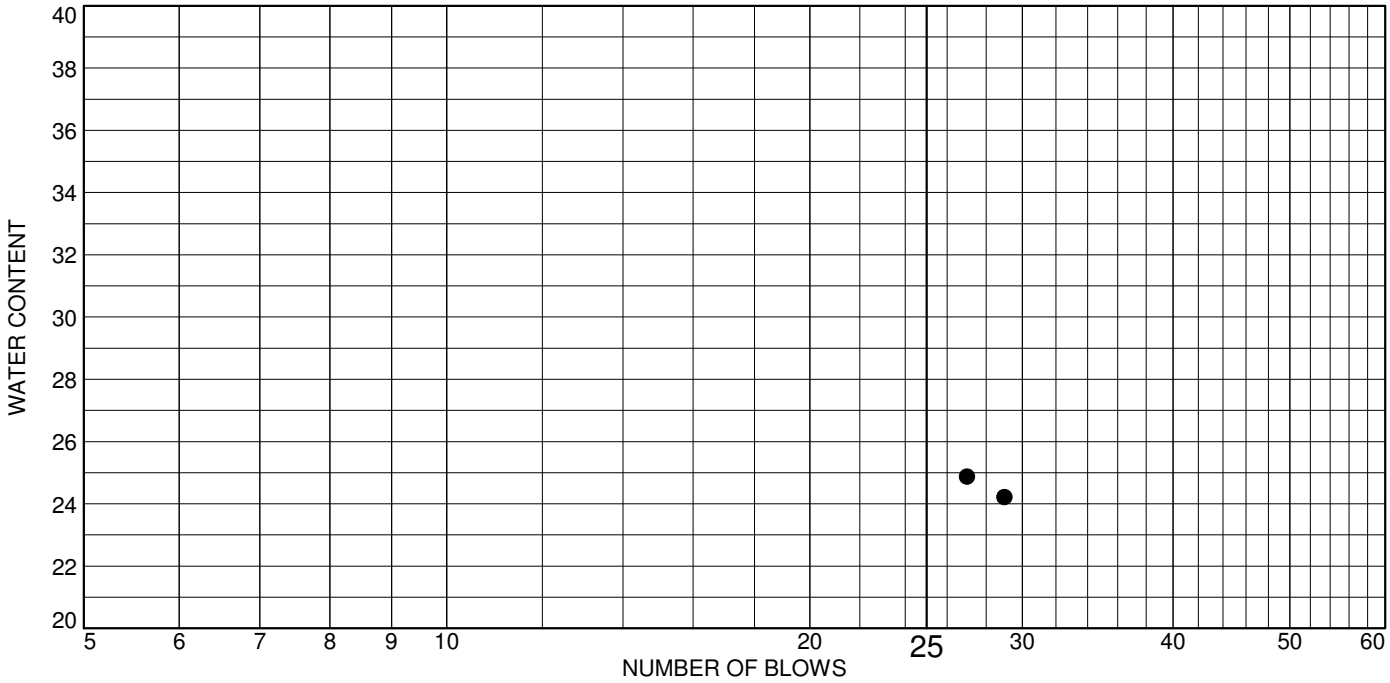
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	25	14	11	40.0	26.9	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

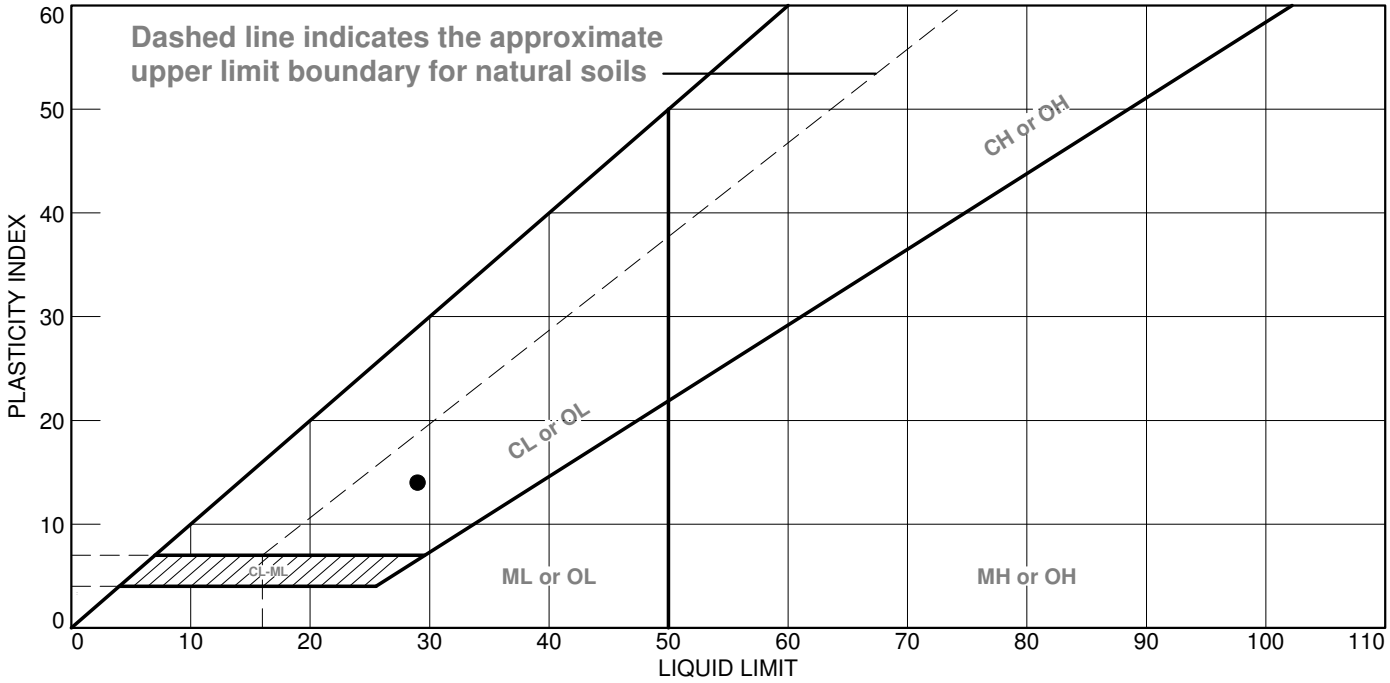
Location: GH11-237, Area E
Sample Number: SPT 12 **Depth:** 59-60.5'

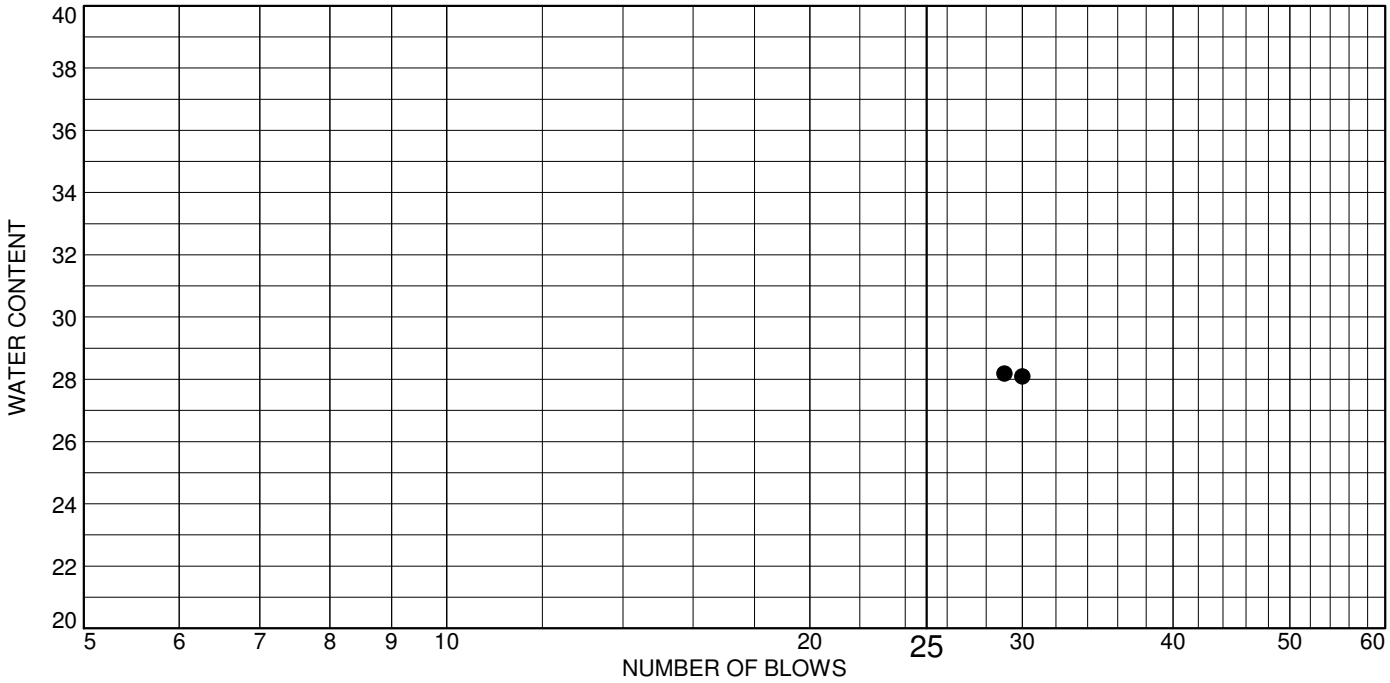
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	29	15	14	50.4	34.3	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

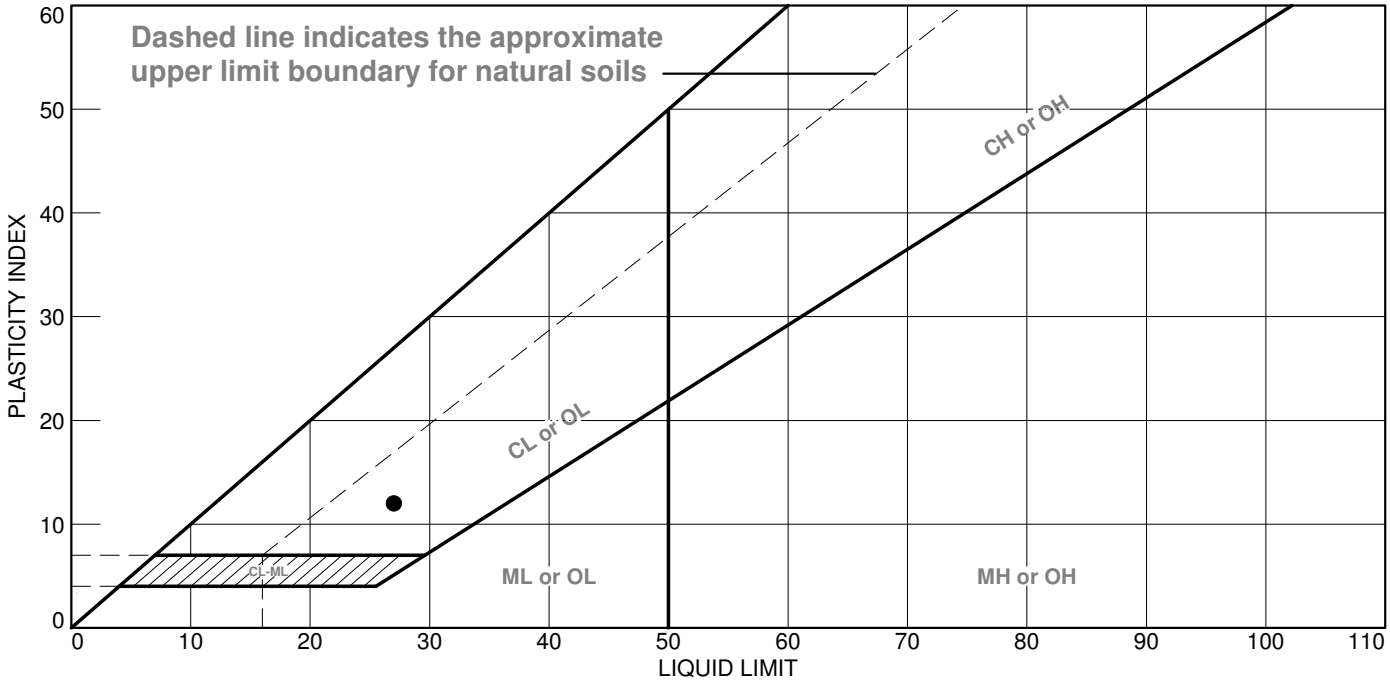
Location: GH11-237, Area E
Sample Number: SPT 16 **Depth:** 79-80.5'

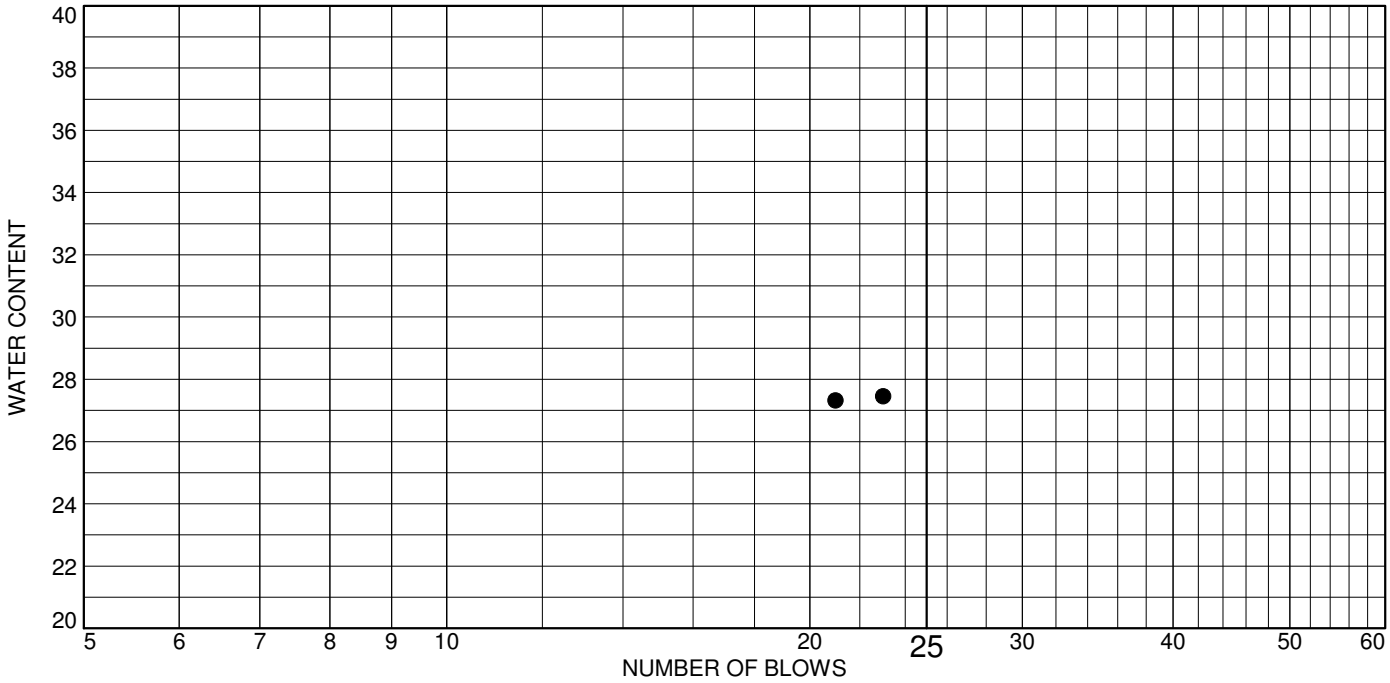
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	27	15	12	41.4	28.6	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

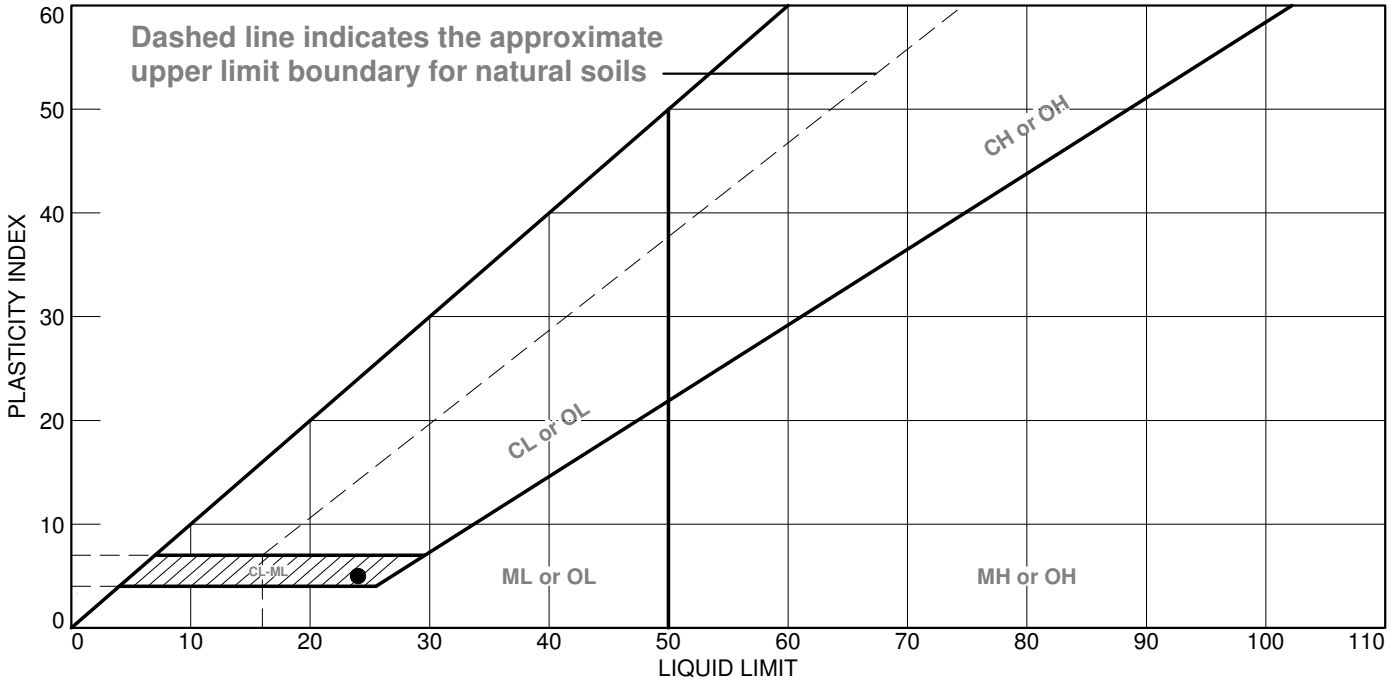
Location: GH11-237, Area E
Sample Number: SPT 17 **Depth:** 84-85.5'

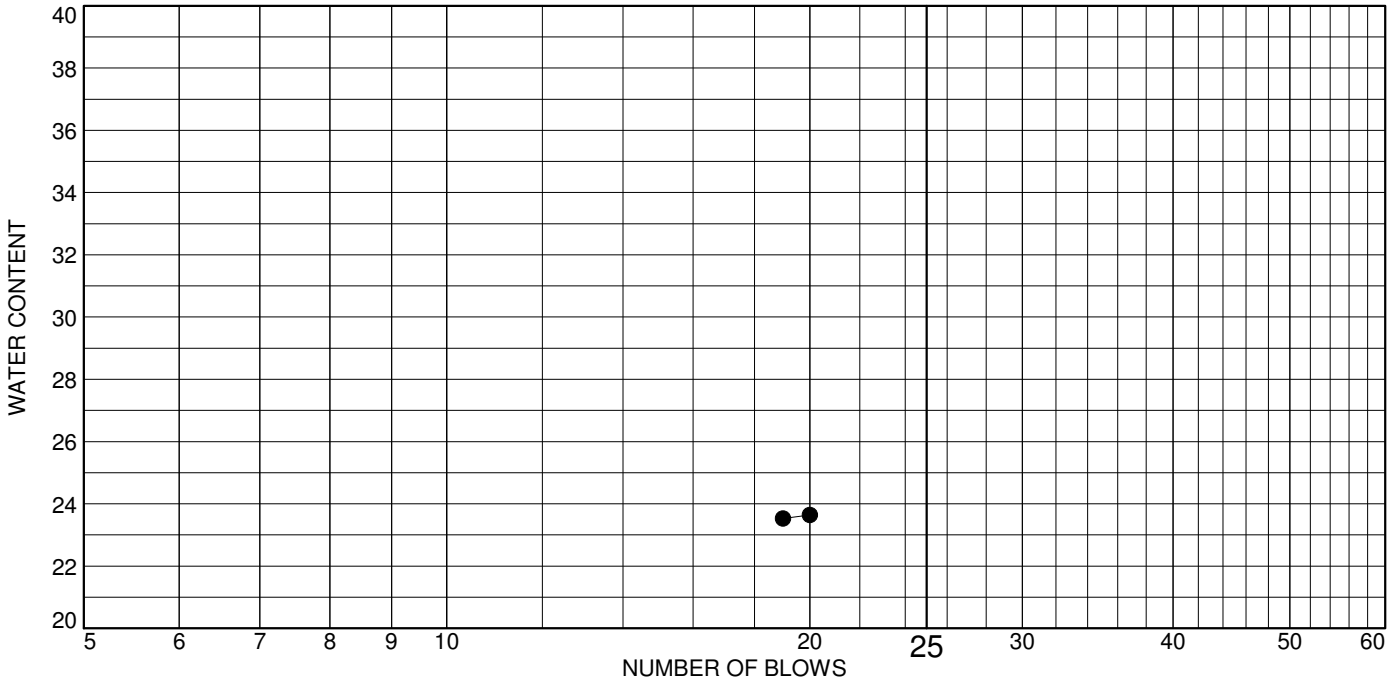
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty clayey gravel with sand	24	19	5	35.1	23.2	GC-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

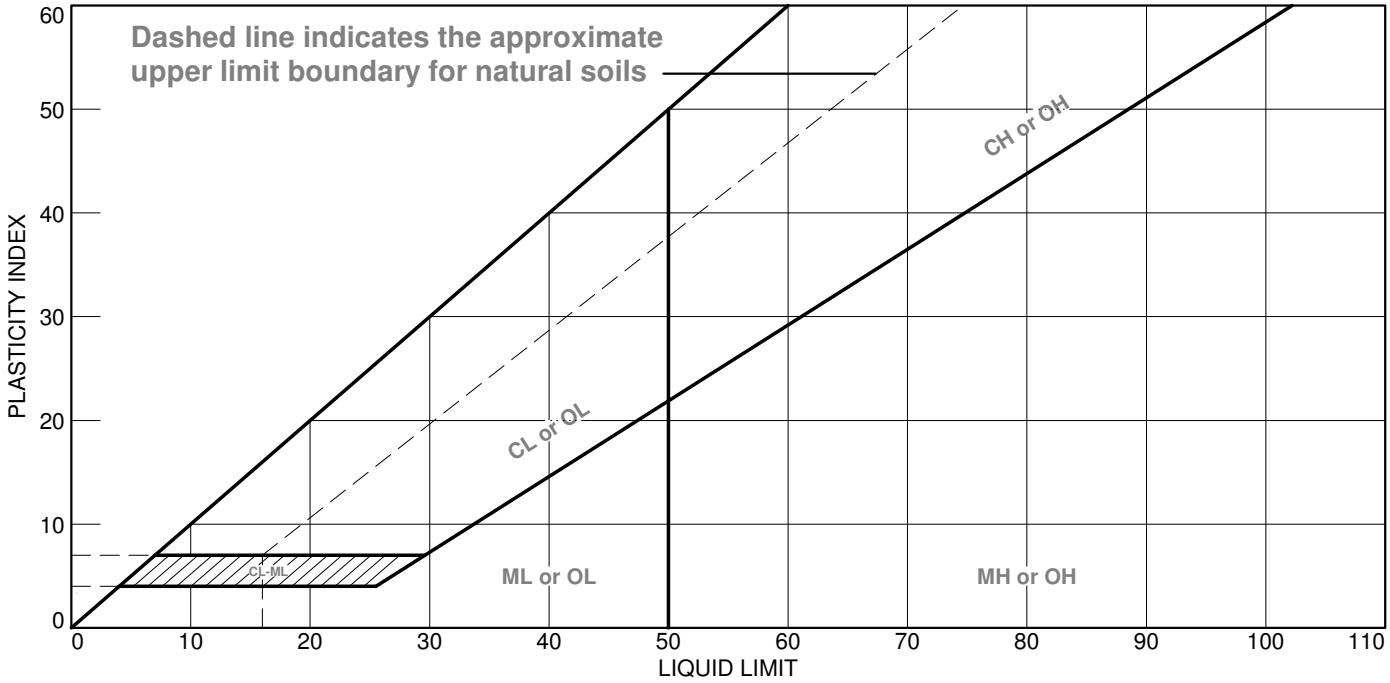
Location: GH11-237, Area E
Sample Number: SPT 19 **Depth:** 94-95.5'

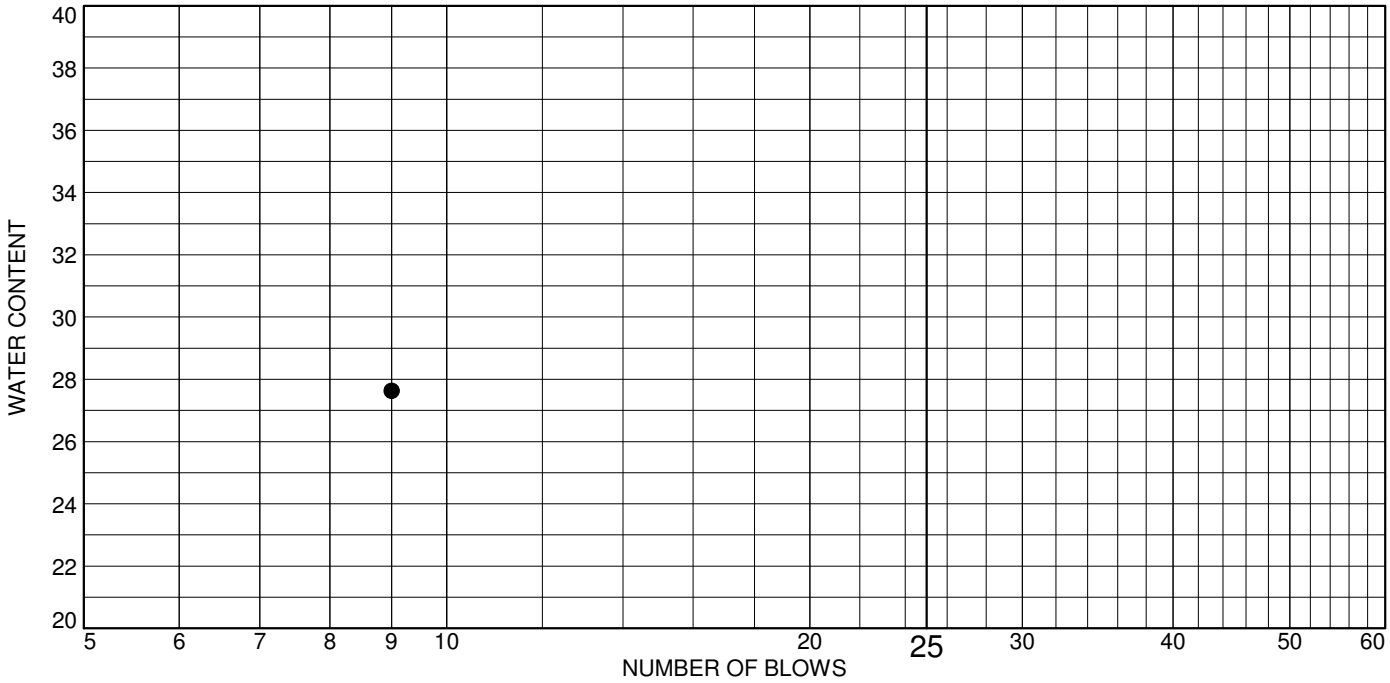
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand with gravel	24	NP	NP	41.0	27.0	SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

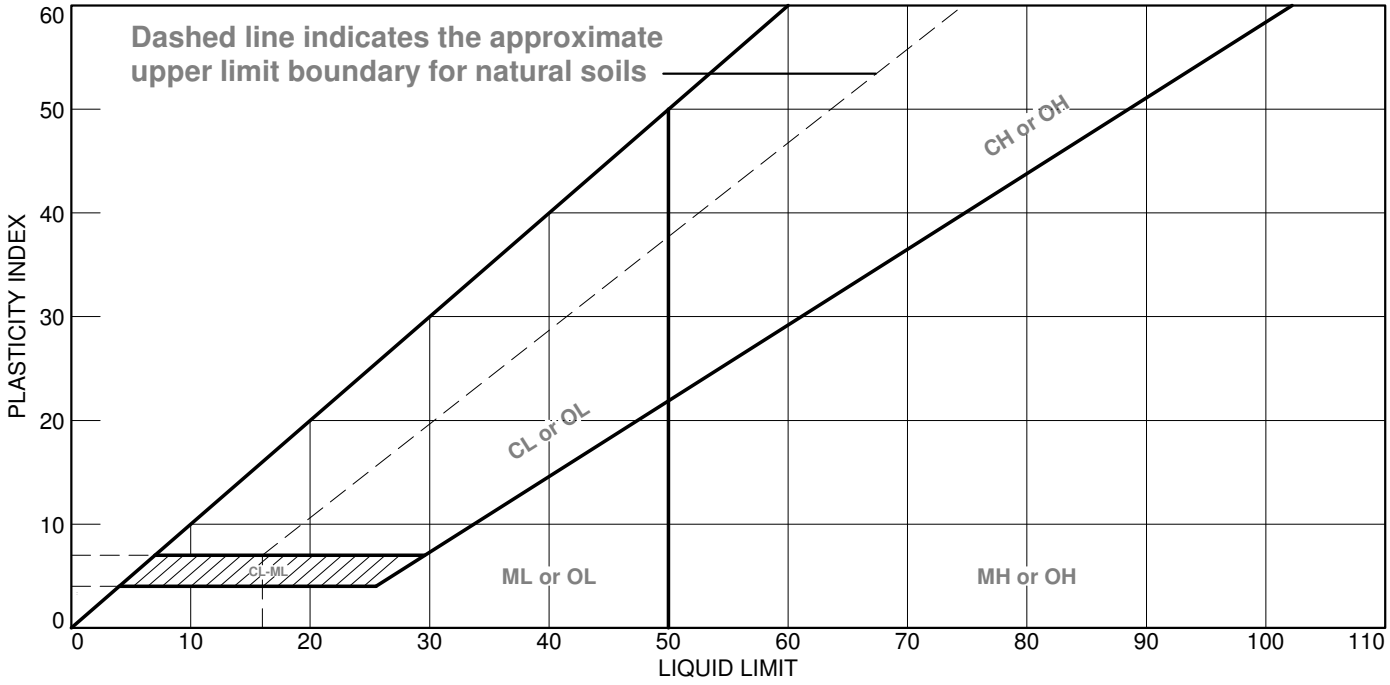
Location: GH11-237, Area E
Sample Number: SPT 21 **Depth:** 104-105.5'

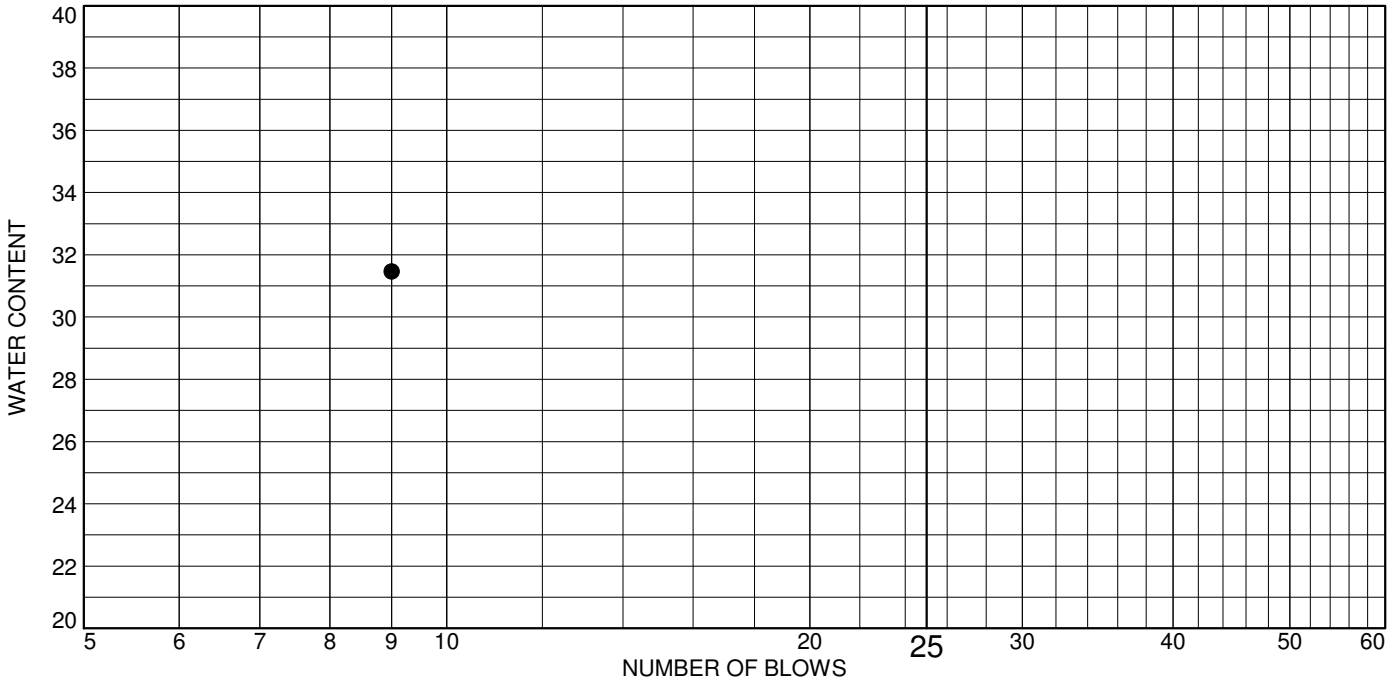
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand with gravel	28	NP	NP	62.3	42.1	SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

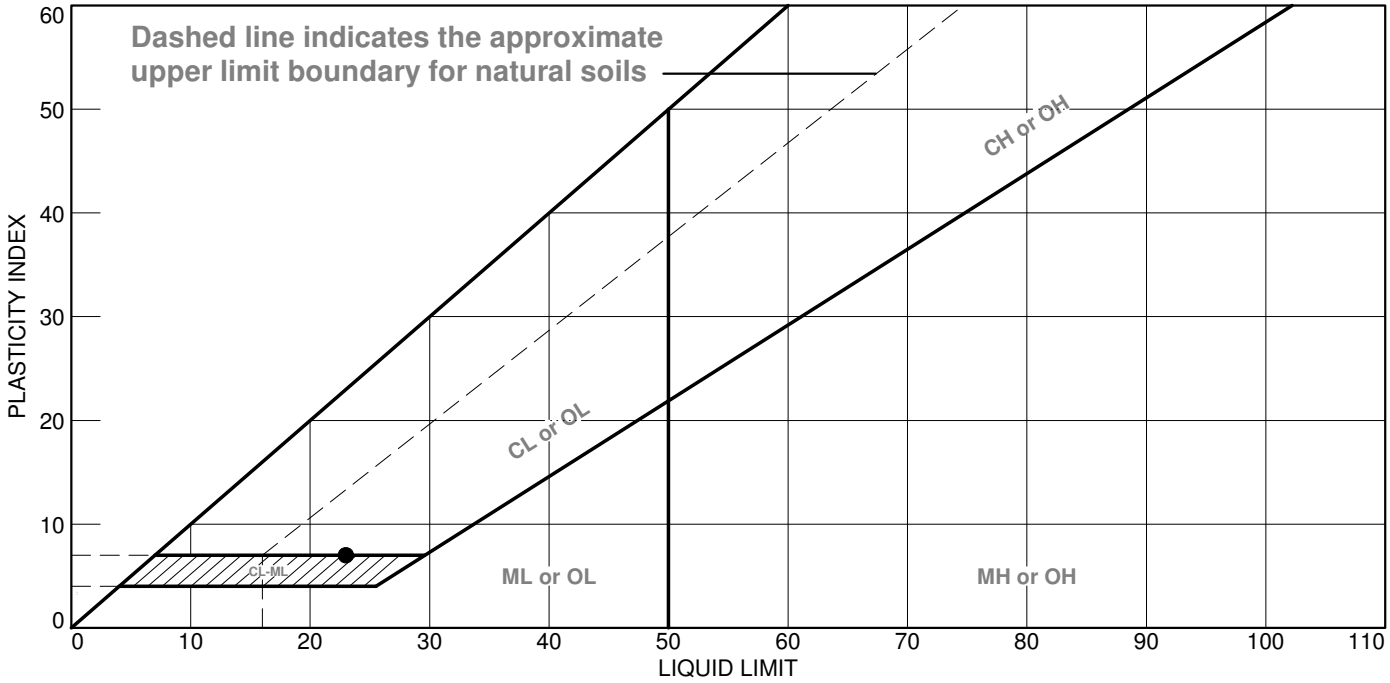
Location: GH11-238, Area A
Sample Number: SPT 1 **Depth:** 3.0-4.5'

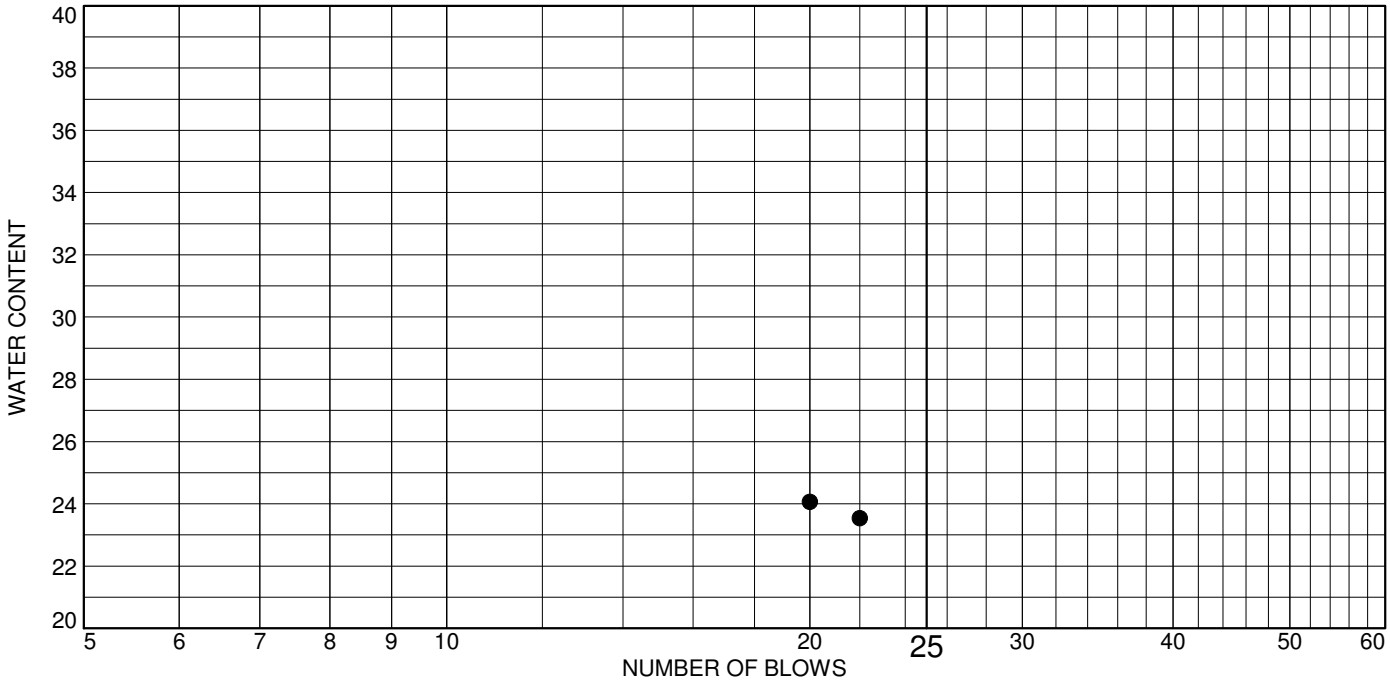
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty, clayey sand with gravel	23	16	7	48.4	31.6	SC-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

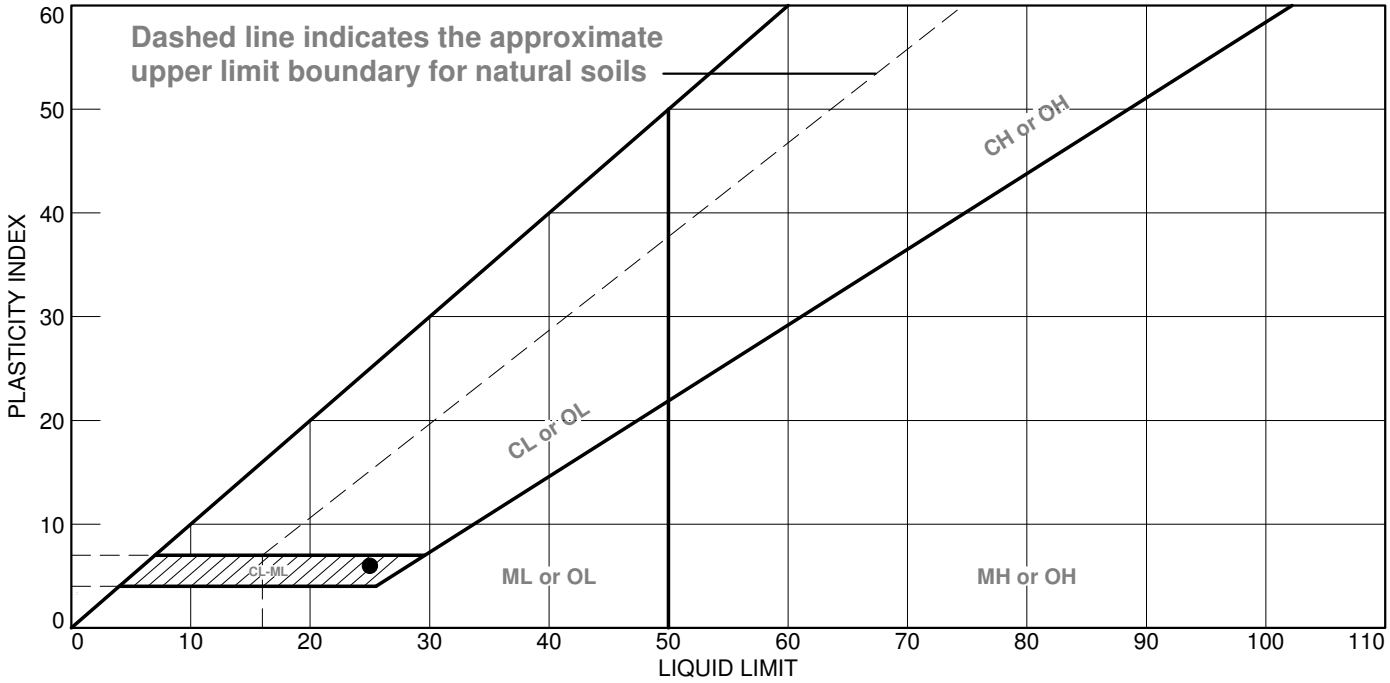
Location: GH11-238, Area A
Sample Number: SPT 5 **Depth:** 23-24.5'

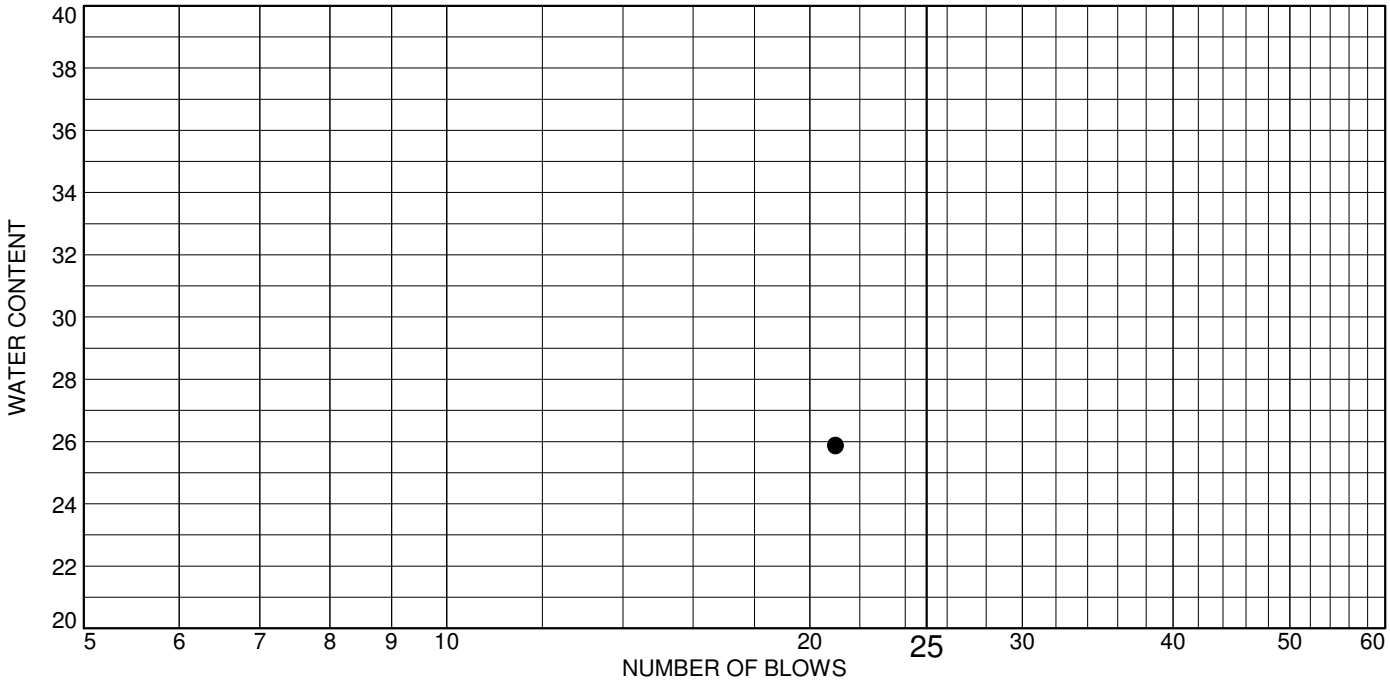
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy silty clay	25	19	6	74.6	62.9	CL-ML

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

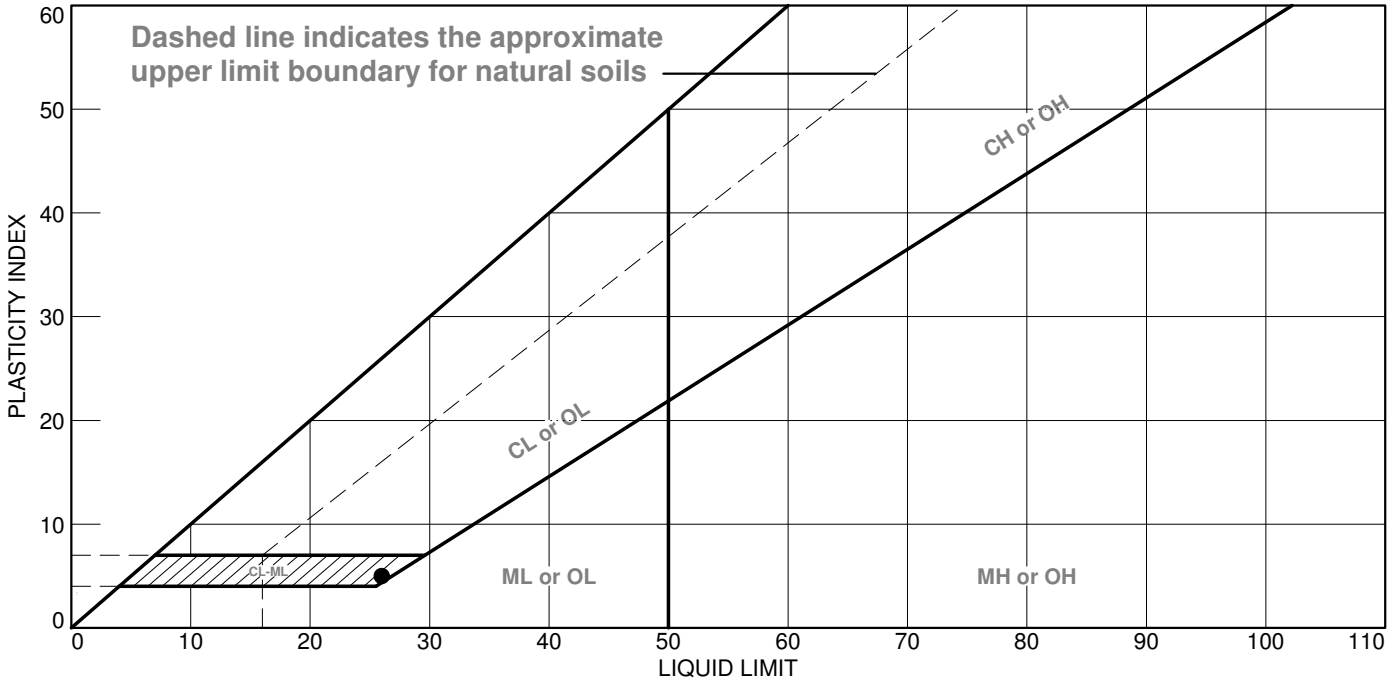
Location: GH11-238, Area A
Sample Number: SPT 7 **Depth:** 33-34.5'

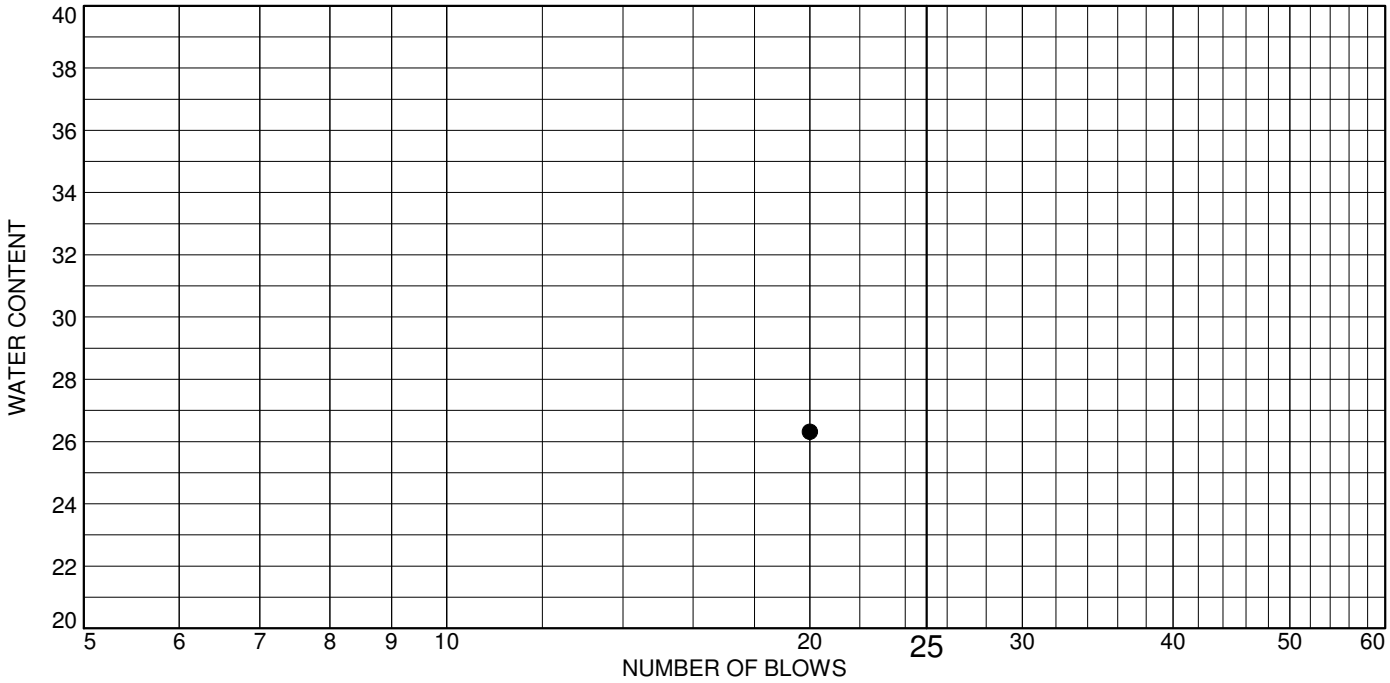
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded gravel with siltyclay and sand	26	21	5	20.3	11.4	GW-GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

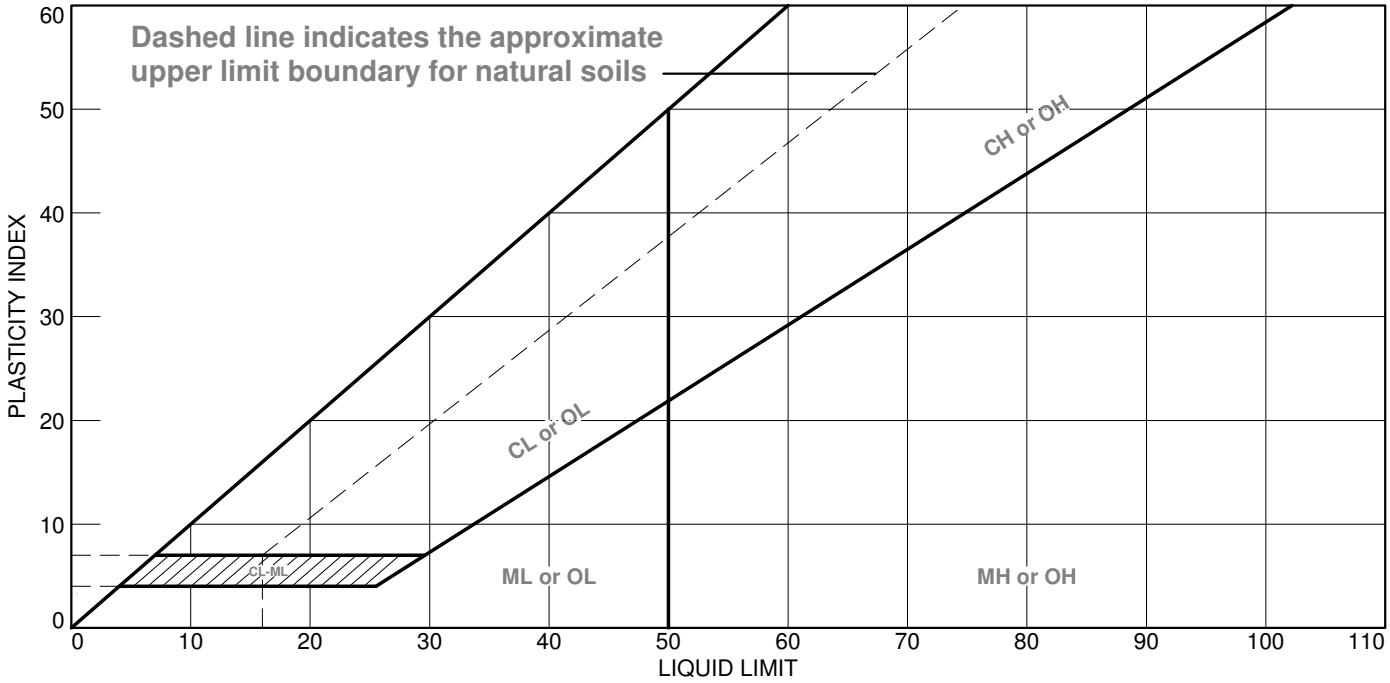
Location: GH11-238, Area A
Sample Number: SPT 8 **Depth:** 38-39.5'

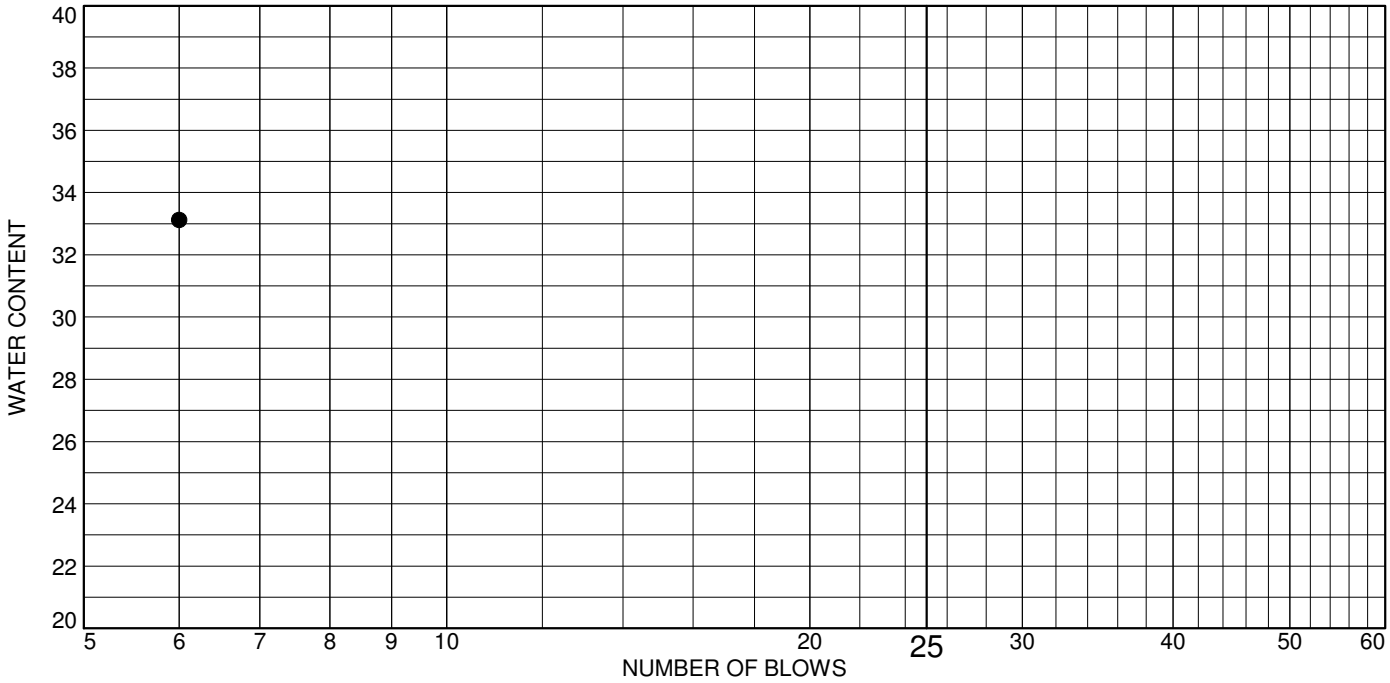
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded gravel with silt and sand	28	NP	NP	18.5	8.7	GW-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

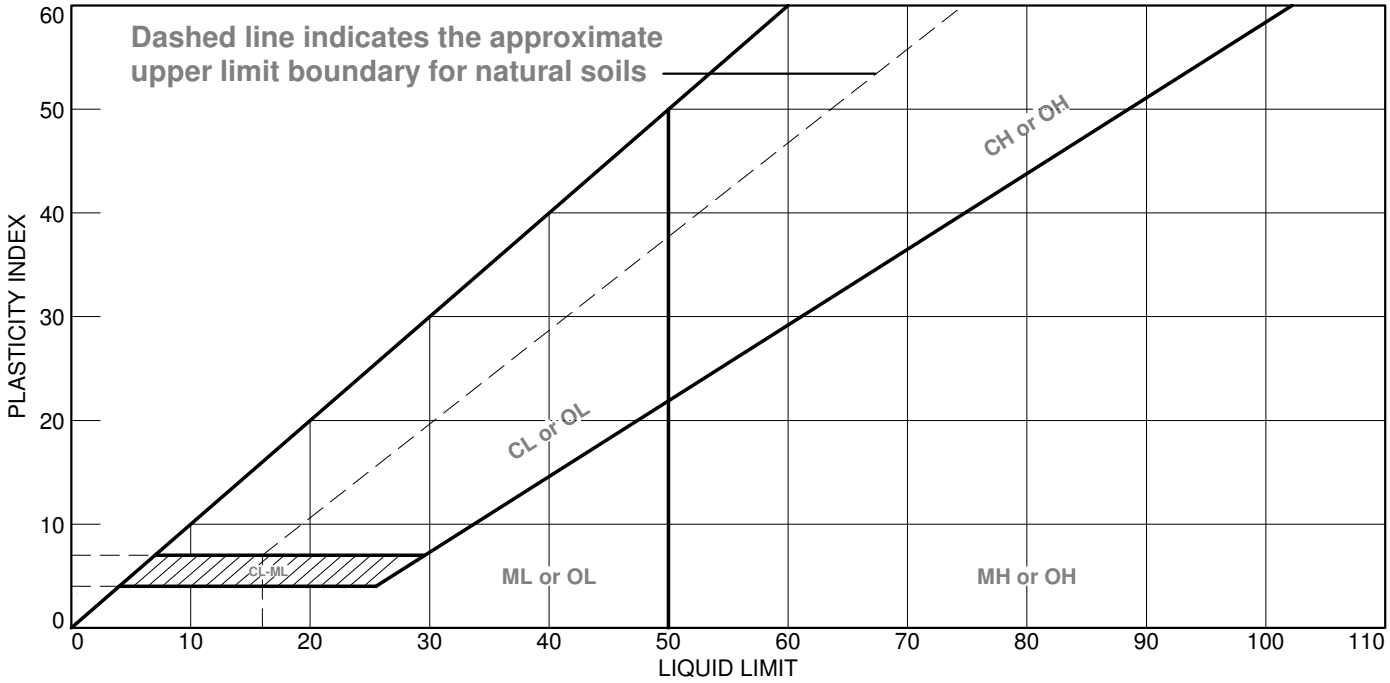
Location: GH11-238, Area A
Sample Number: SPT 10 **Depth:** 48-49.5'

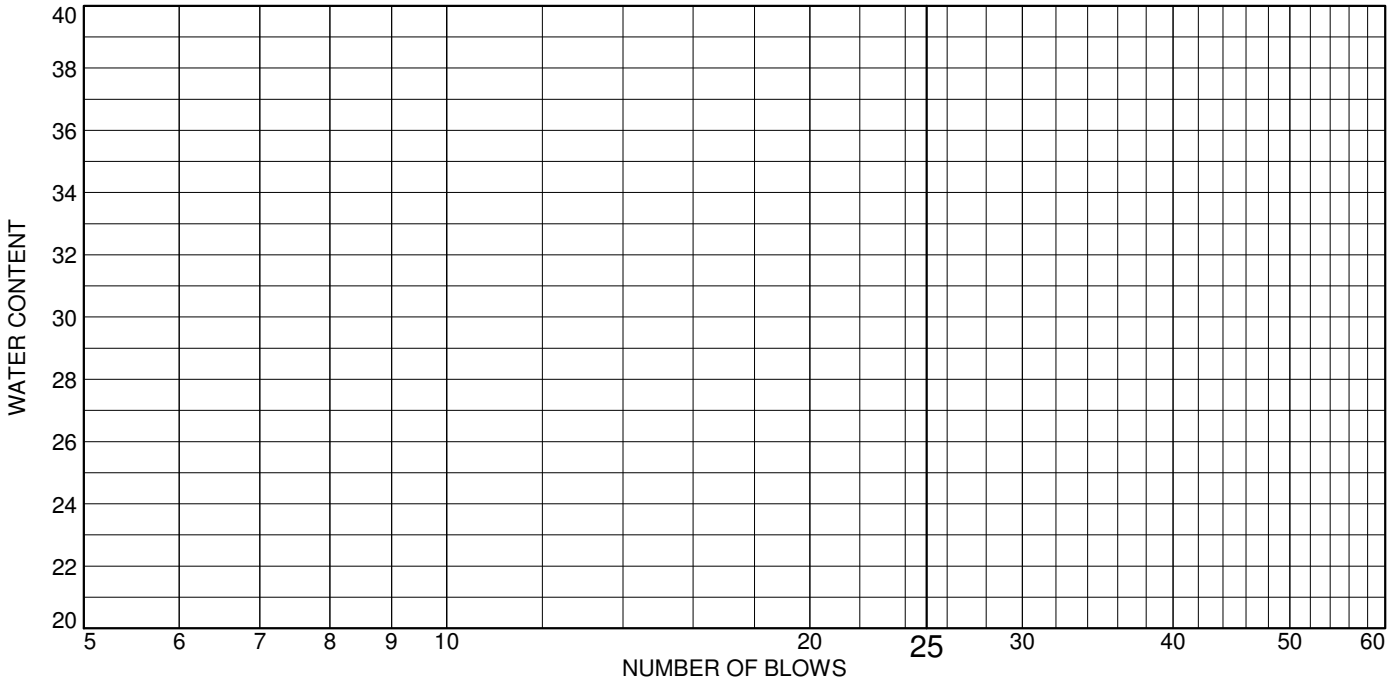
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded gravel with silt and sand	NP	NP	NP	16.6	7.9	GP-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

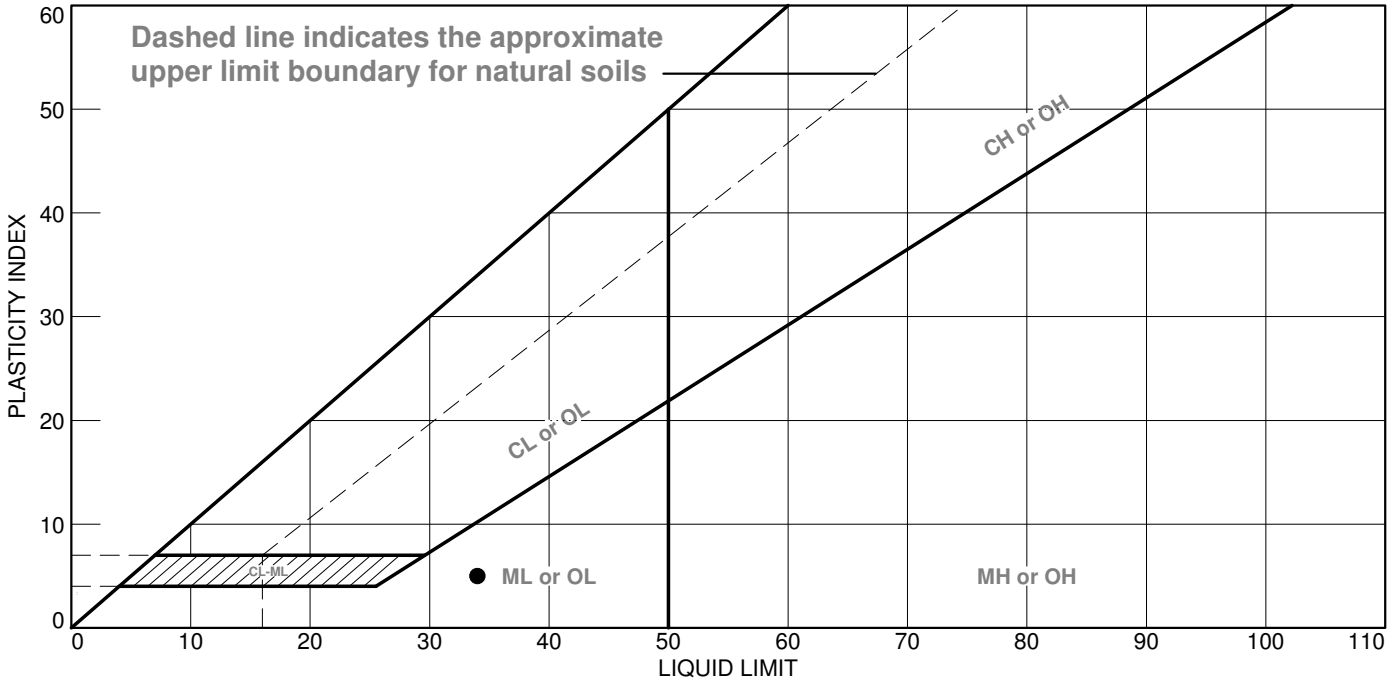
Location: GH11-238, Area A
Sample Number: SPT 14 **Depth:** 68-69.5'

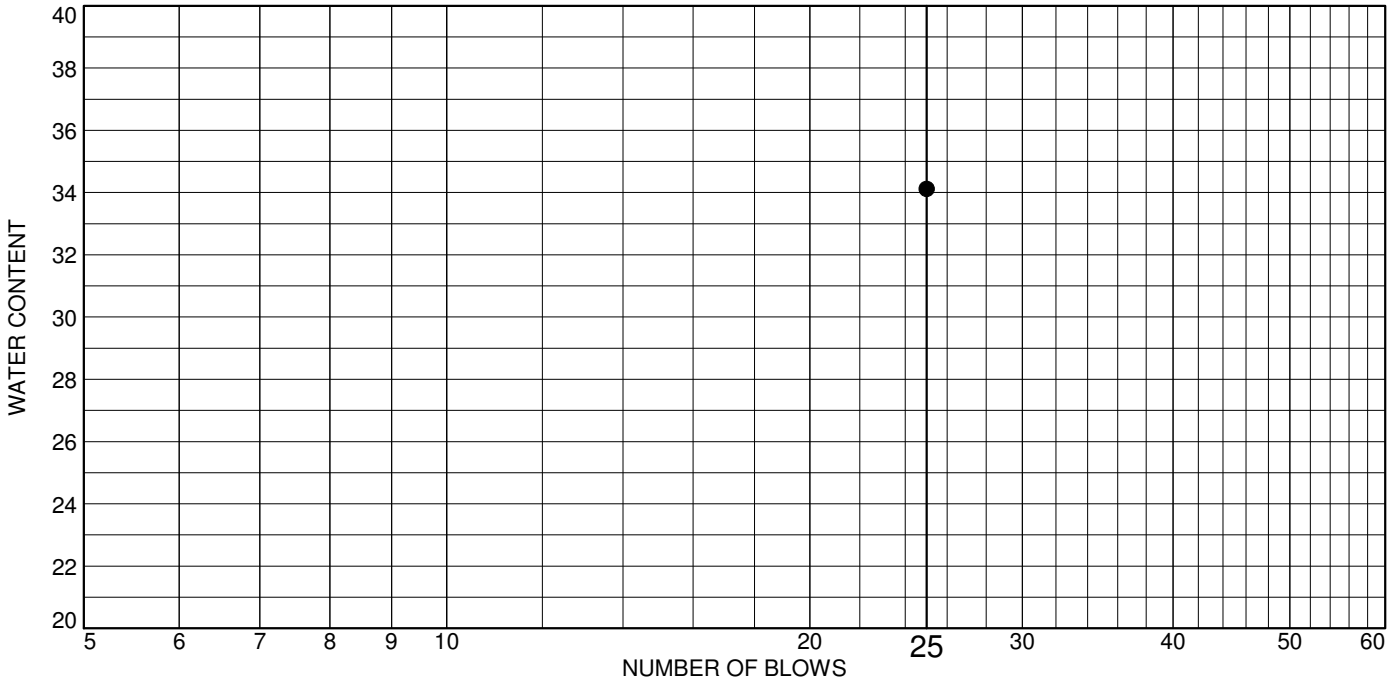
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded gravel with silt and sand	34	29	5	18.2	10.8	GP-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

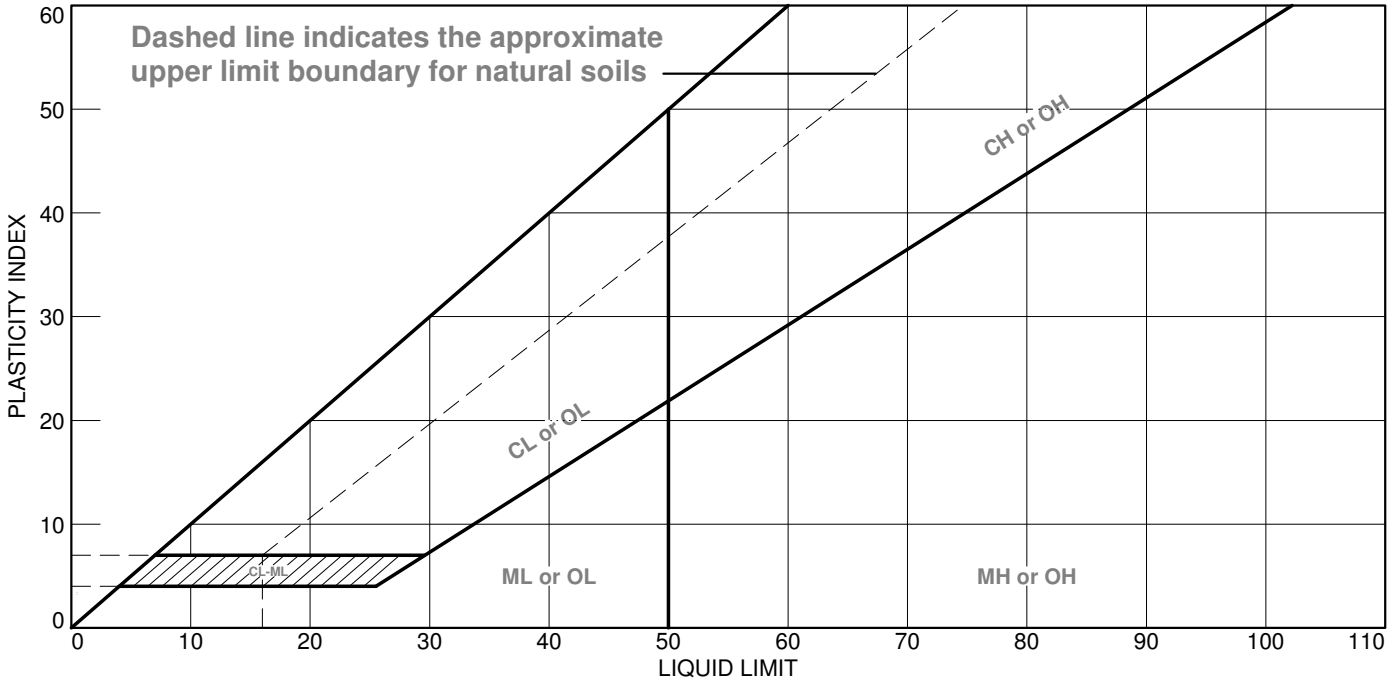
Location: GH11-238, Area A
Sample Number: SPT 16 **Depth:** 78-79.5'

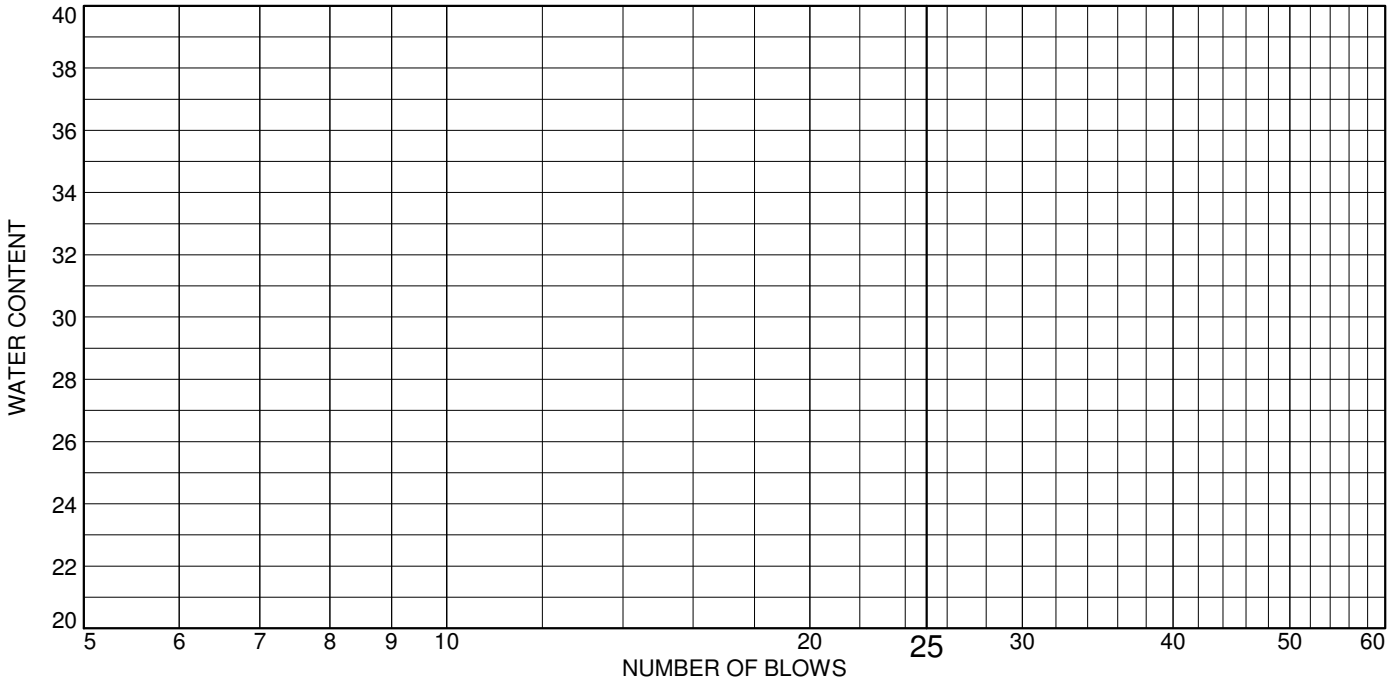
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty gravel with sand	NP	NP	NP	20.9	13.3	GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

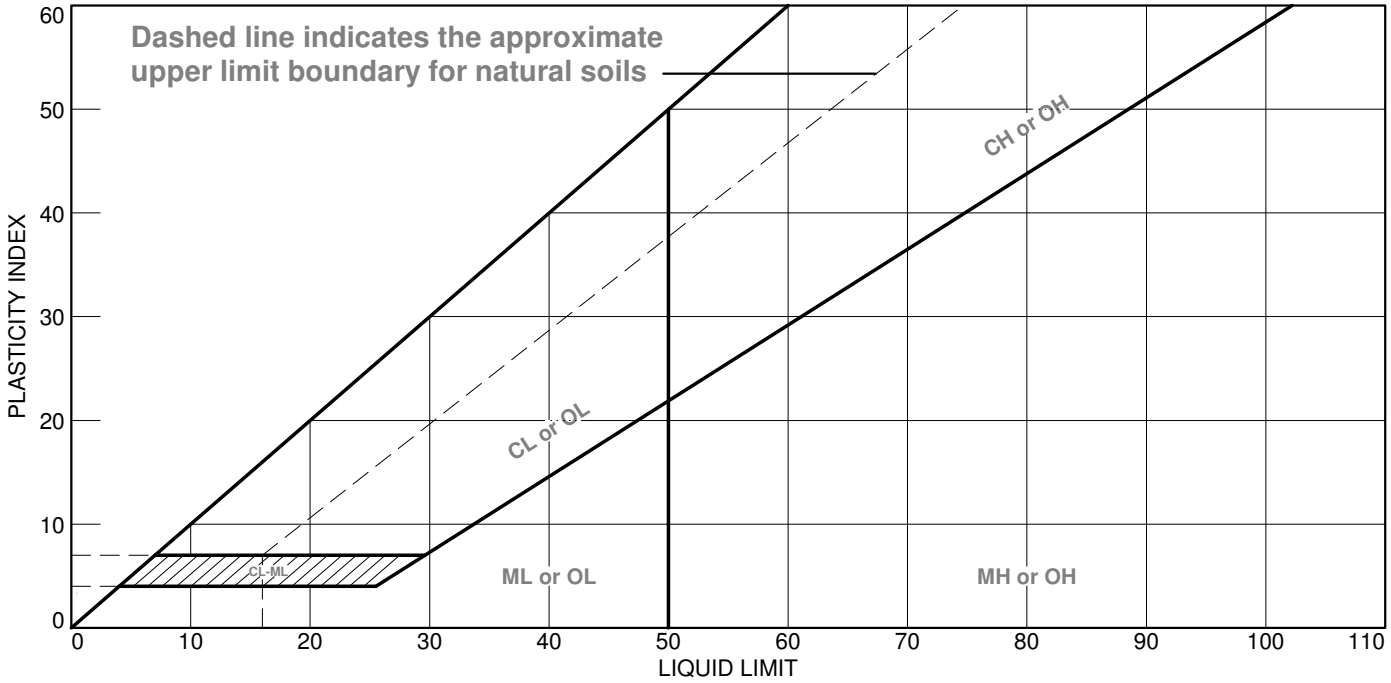
Location: GH11-238, Area A
Sample Number: SPT 17 **Depth:** 83-84.5'

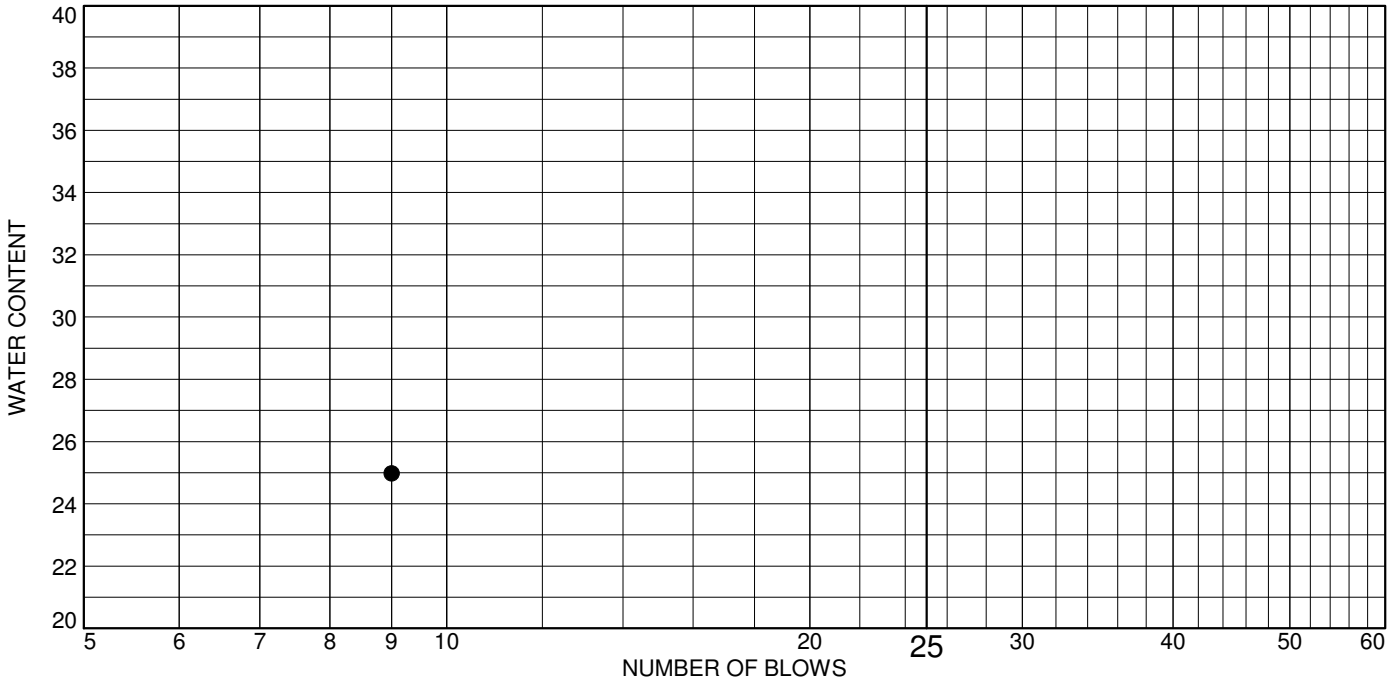
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded sand with silt and gravel	22	NP	NP	23.5	9.5	SW-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

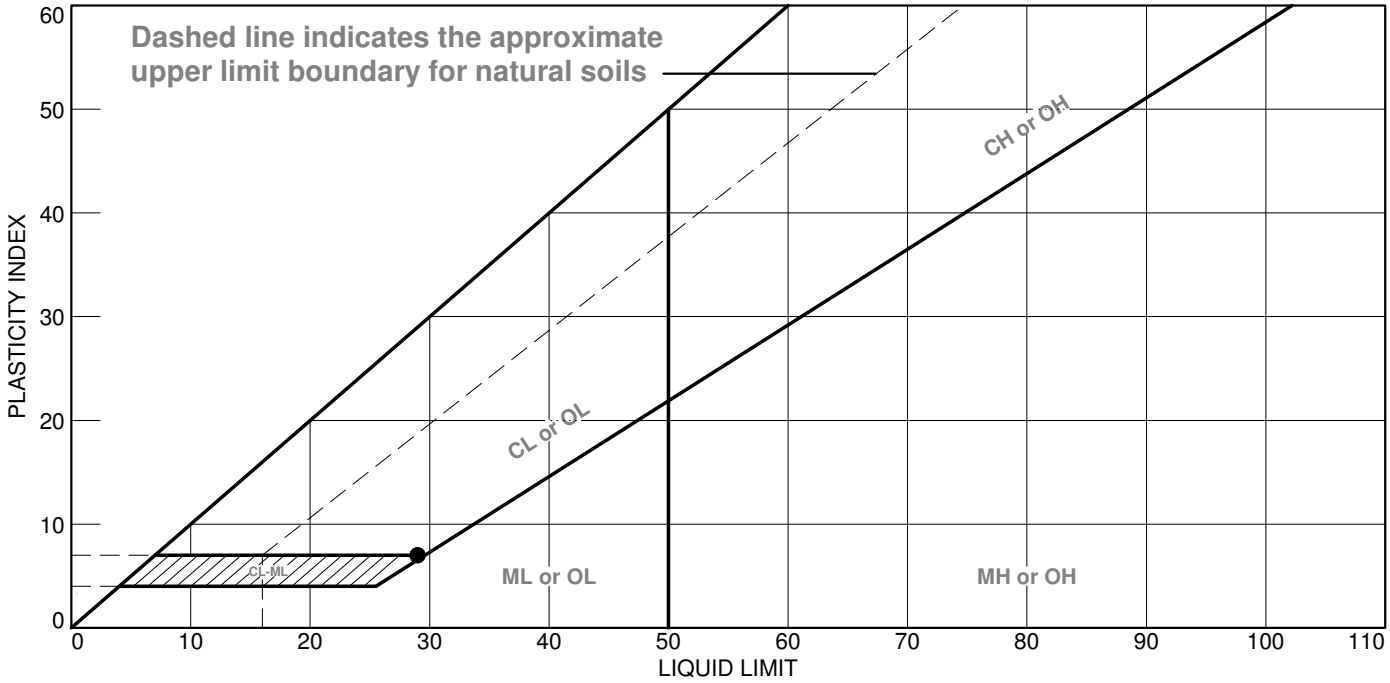
Location: GH11-238, Area A
Sample Number: SPT 20 **Depth:** 98-99.5'

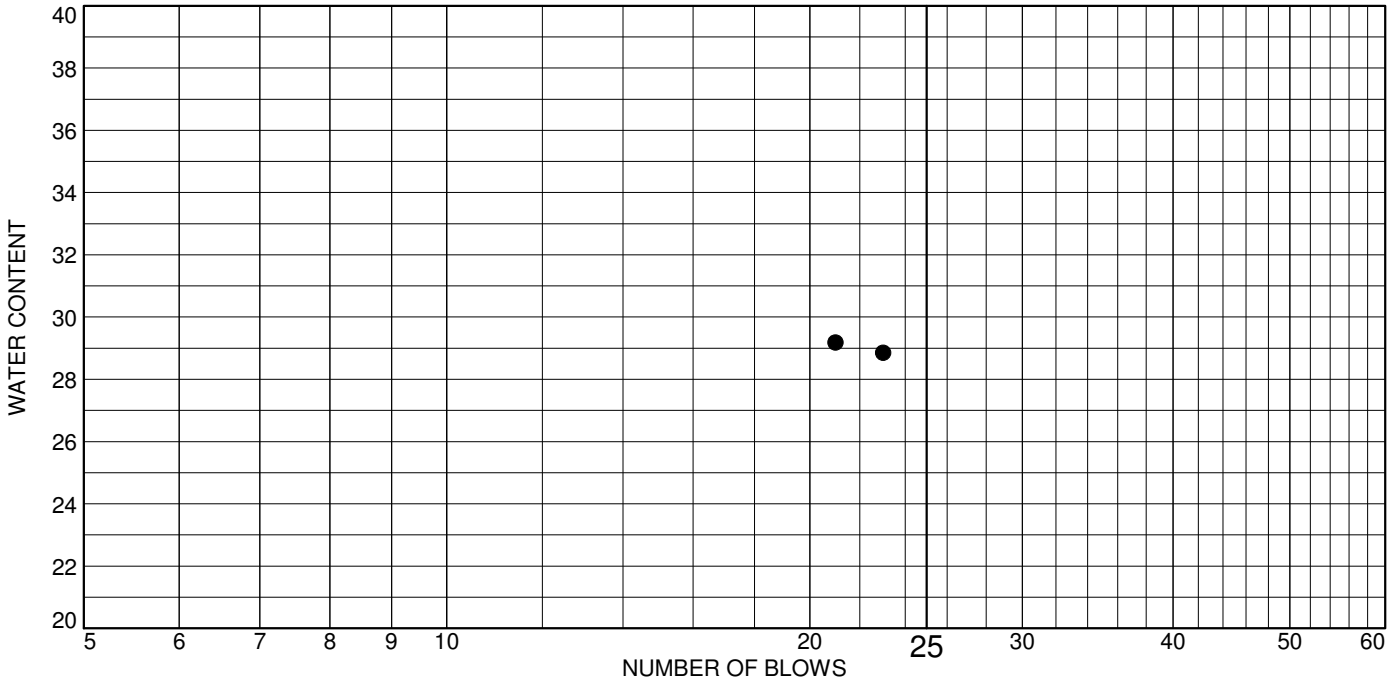
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty clayey gravel with sand	29	22	7	46.8	32.9	GC-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

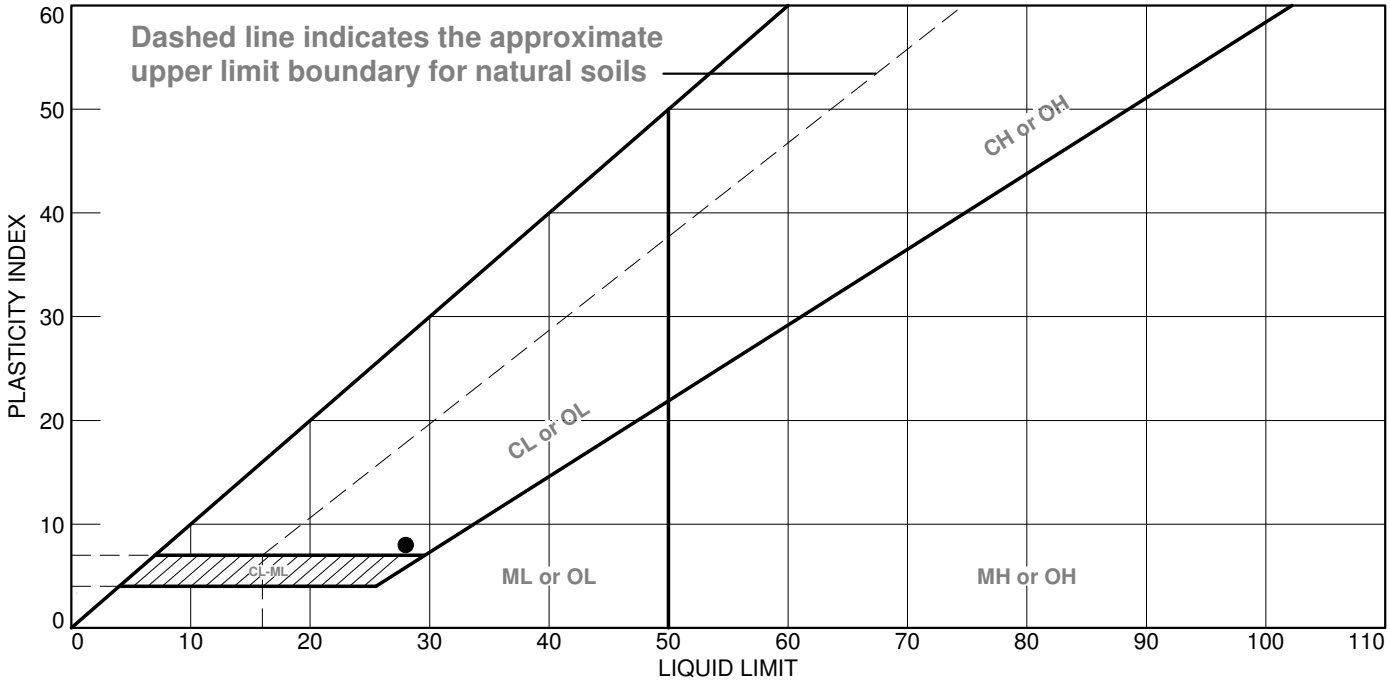
Location: GH11-238, Area A
Sample Number: SPT 21 **Depth:** 103-104.5'

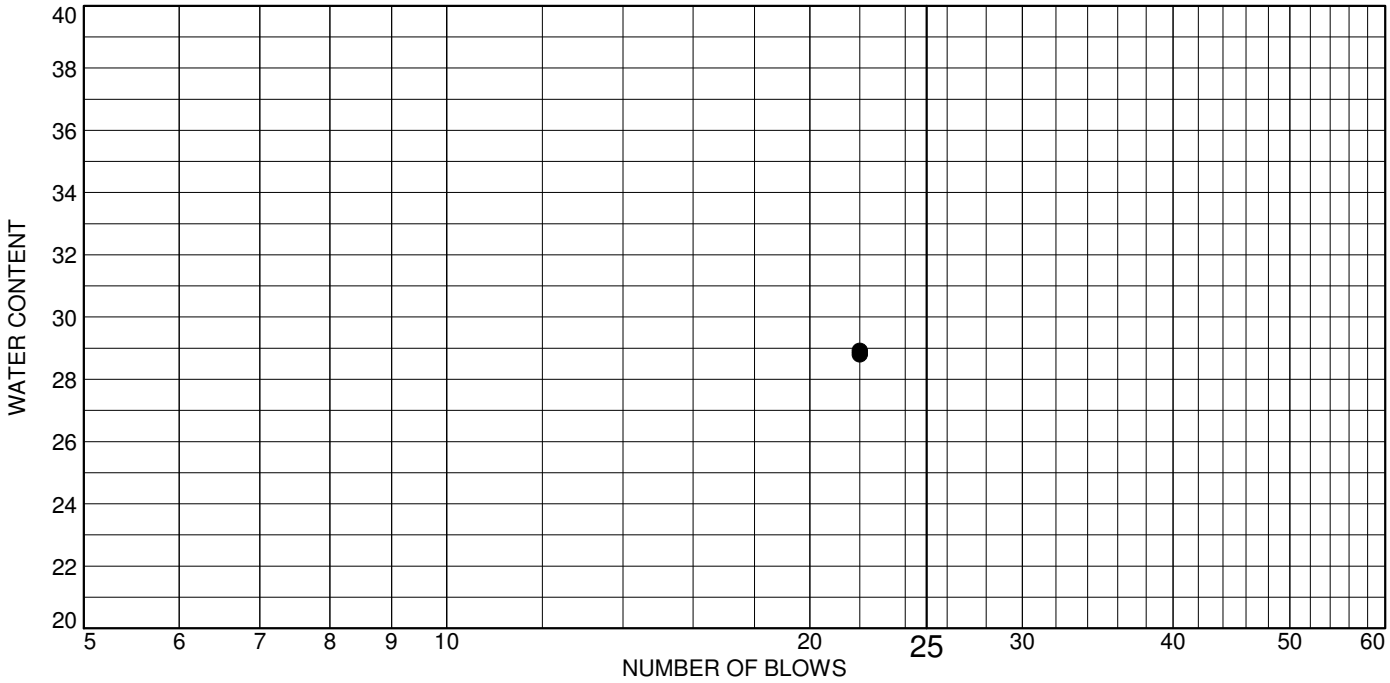
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	28	20	8	23.9	16.7	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

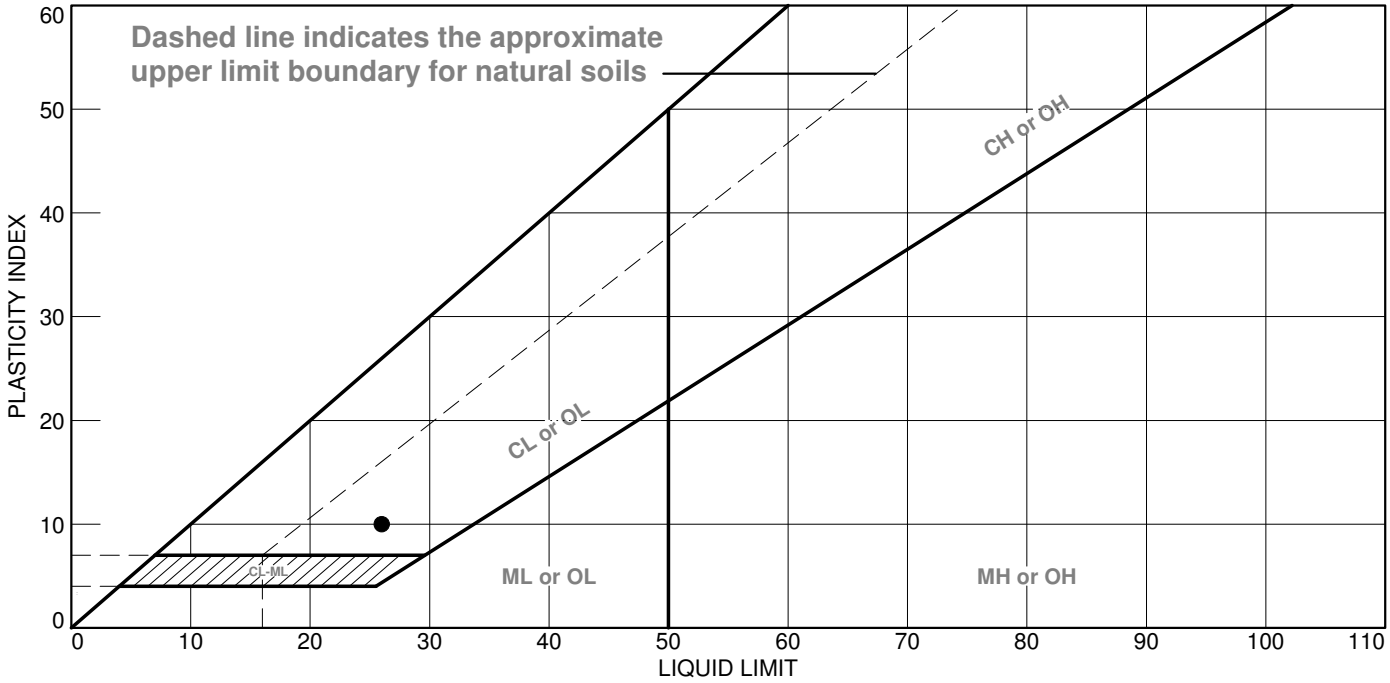
Location: GH11-238, Area A
Sample Number: SPT 22 **Depth:** 108-109.5'

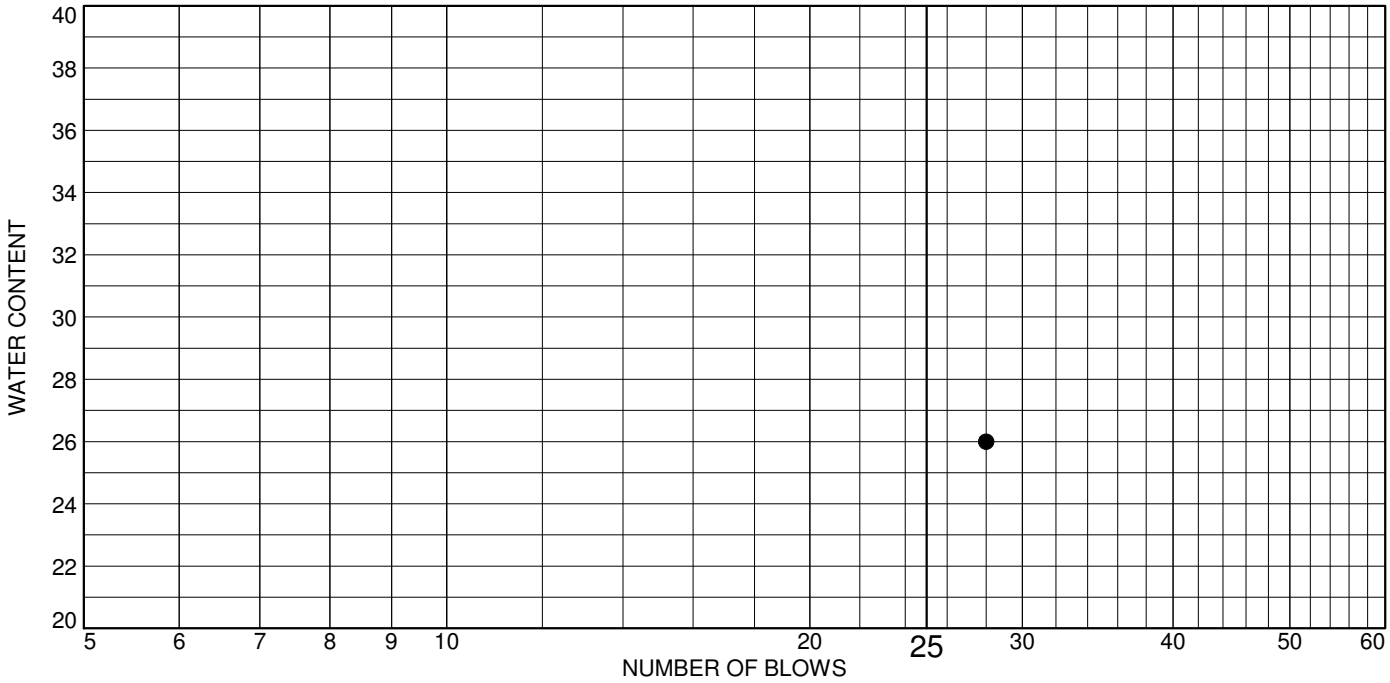
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	26	16	10	40.2	27.6	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

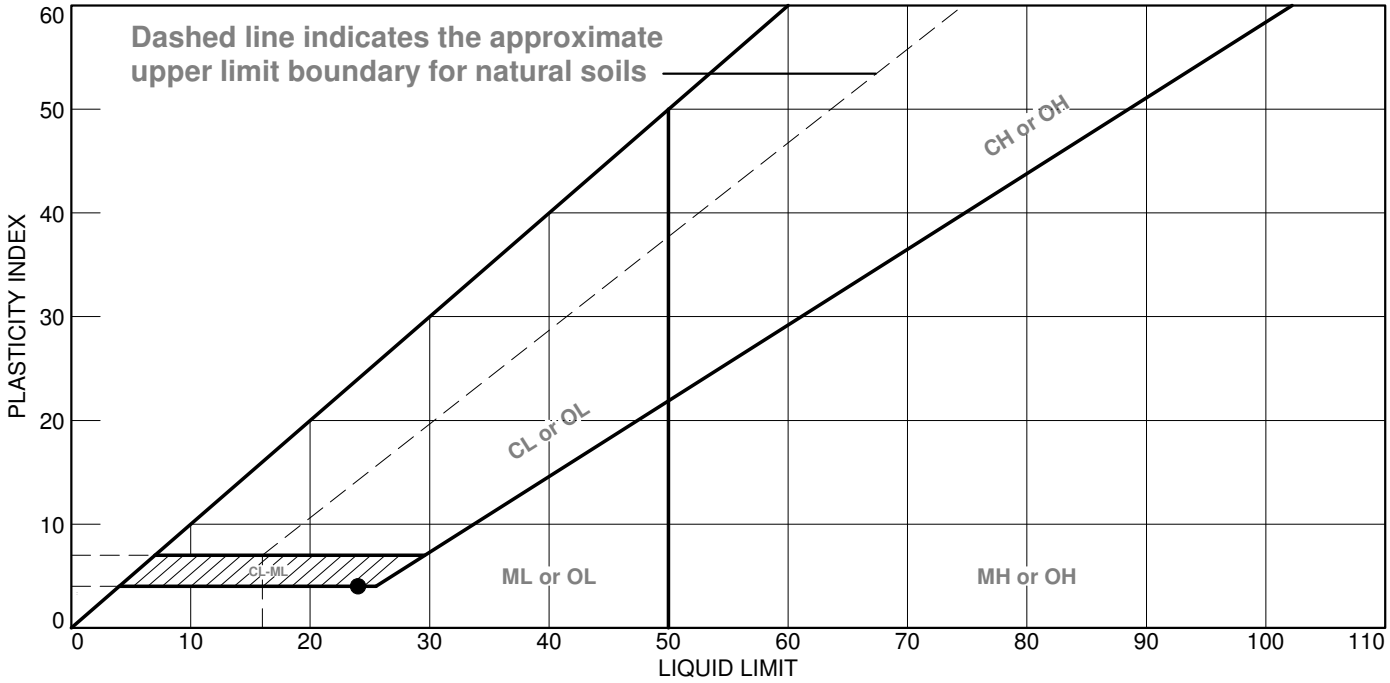
Location: GH11-238, Area A
Sample Number: SPT 26 **Depth:** 128-129.5'

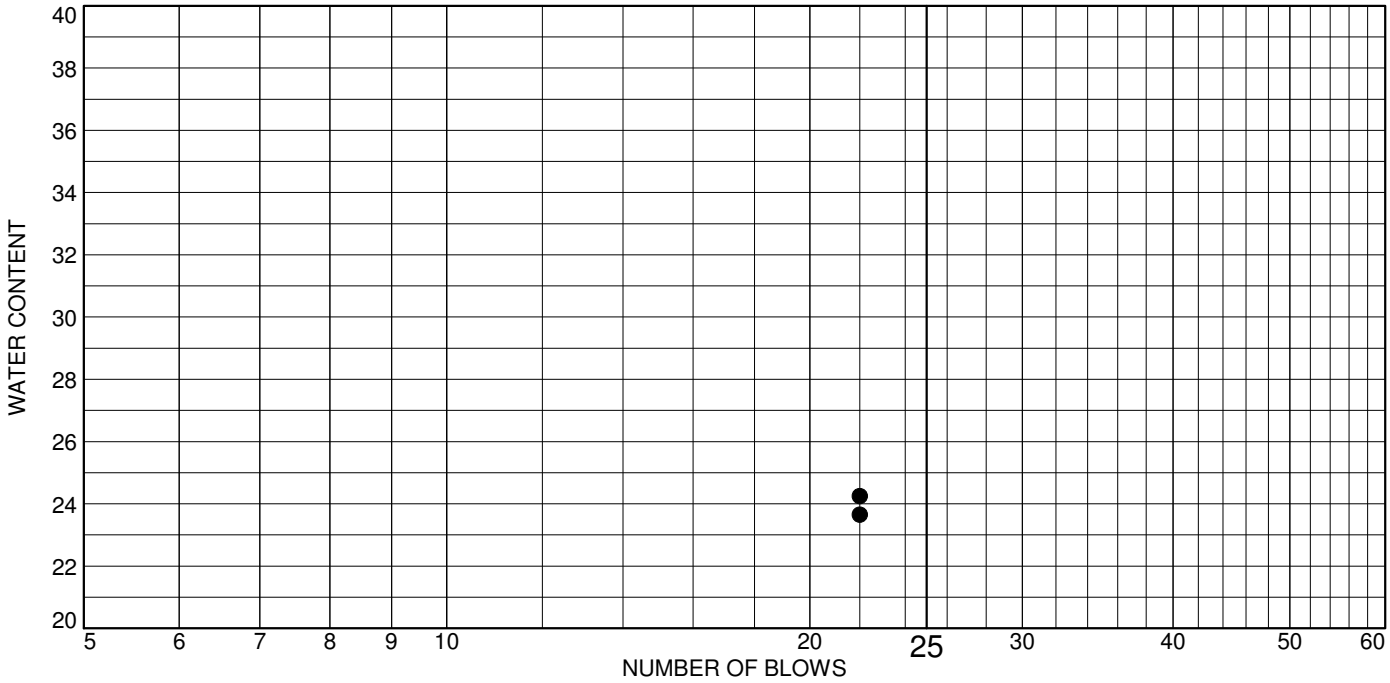
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded gravel with siltyclay and sand	24	20	4	18.6	9.9	GP-GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

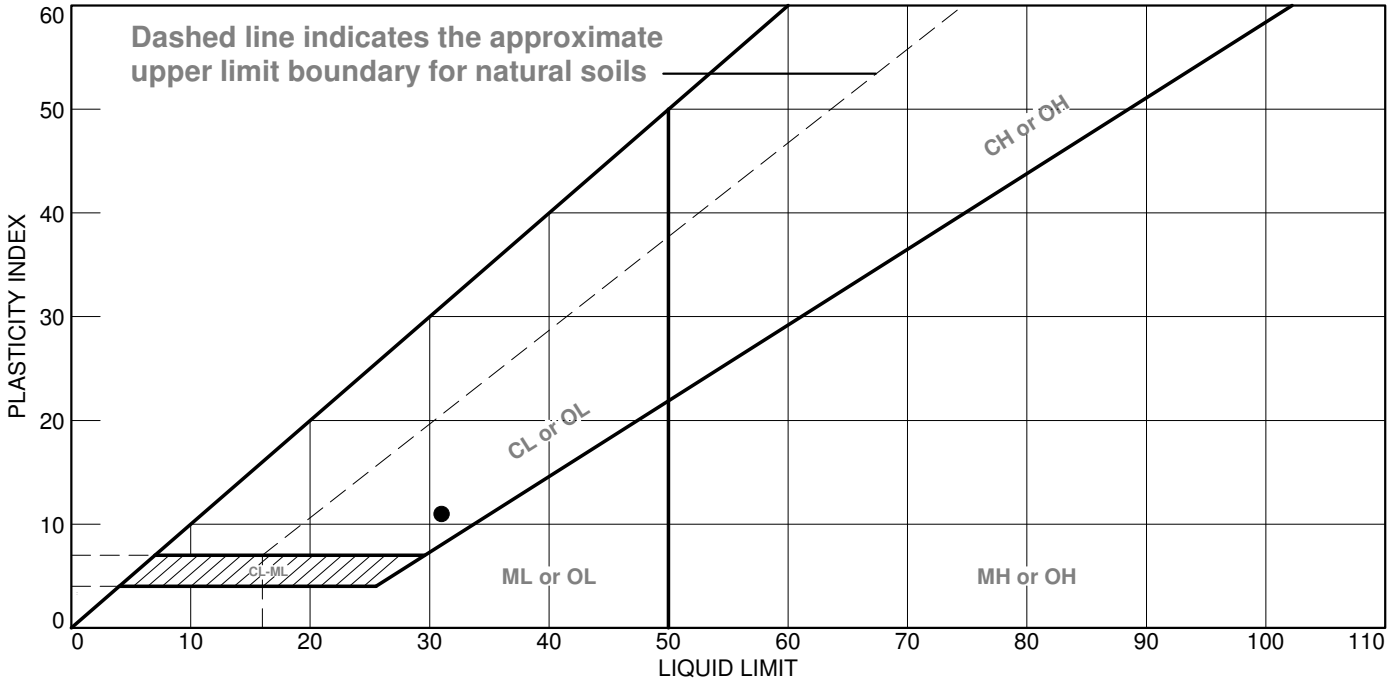
Location: GH11-238, Area A
Sample Number: SPT 29 **Depth:** 143-144.5'

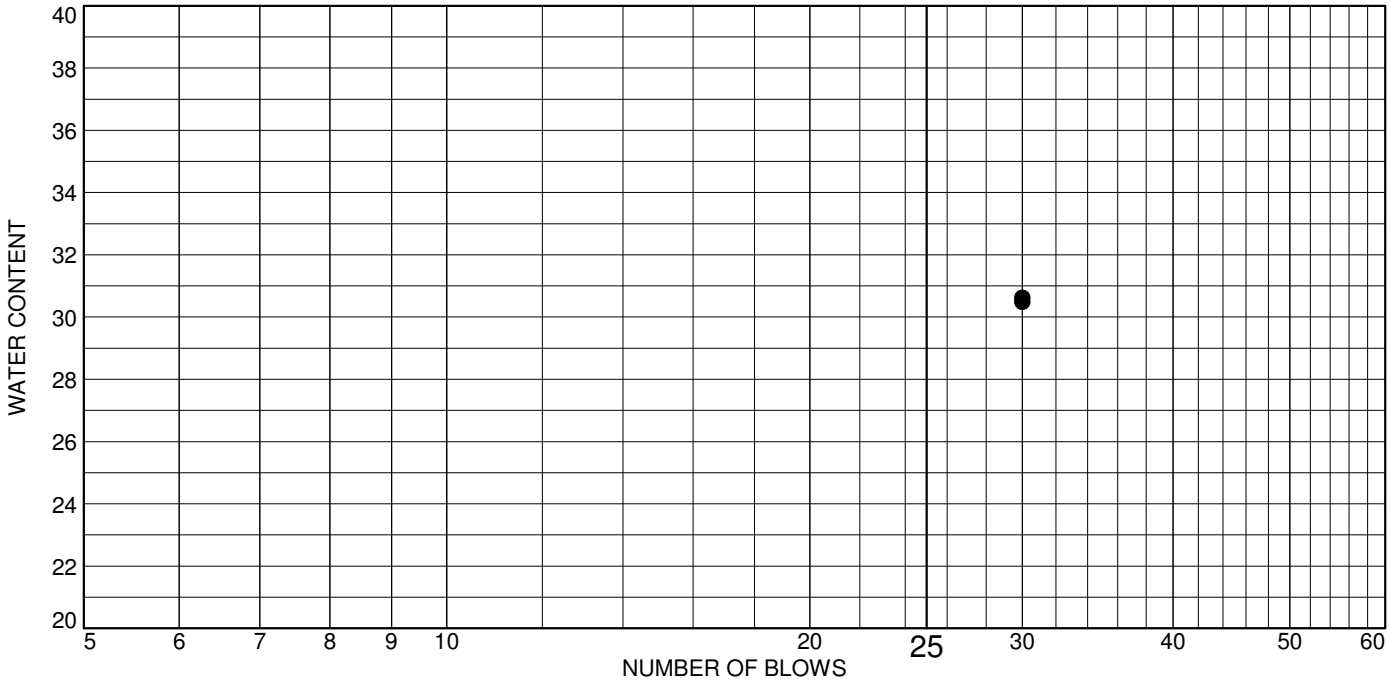
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay with gravel	31	20	11	80.5	76.8	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

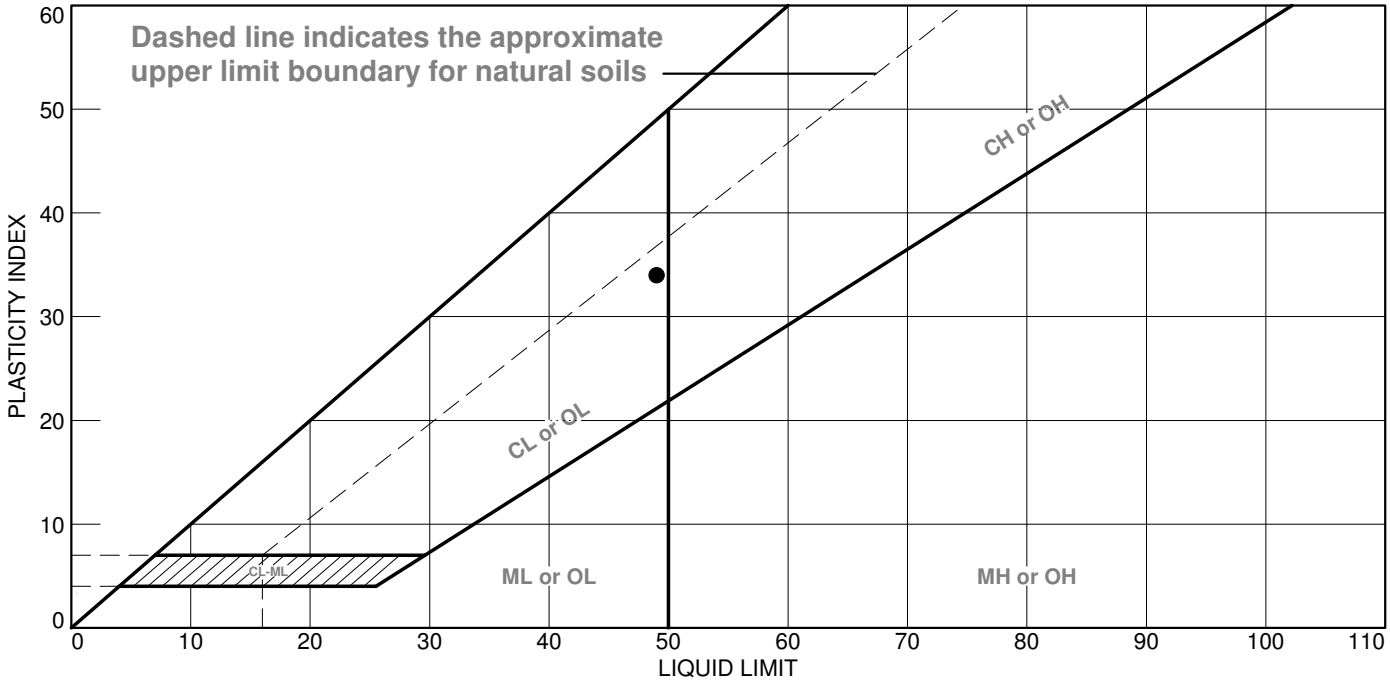
Location: GH11-239, Area A
Sample Number: GH11-239-1 **Depth:** 6-7'

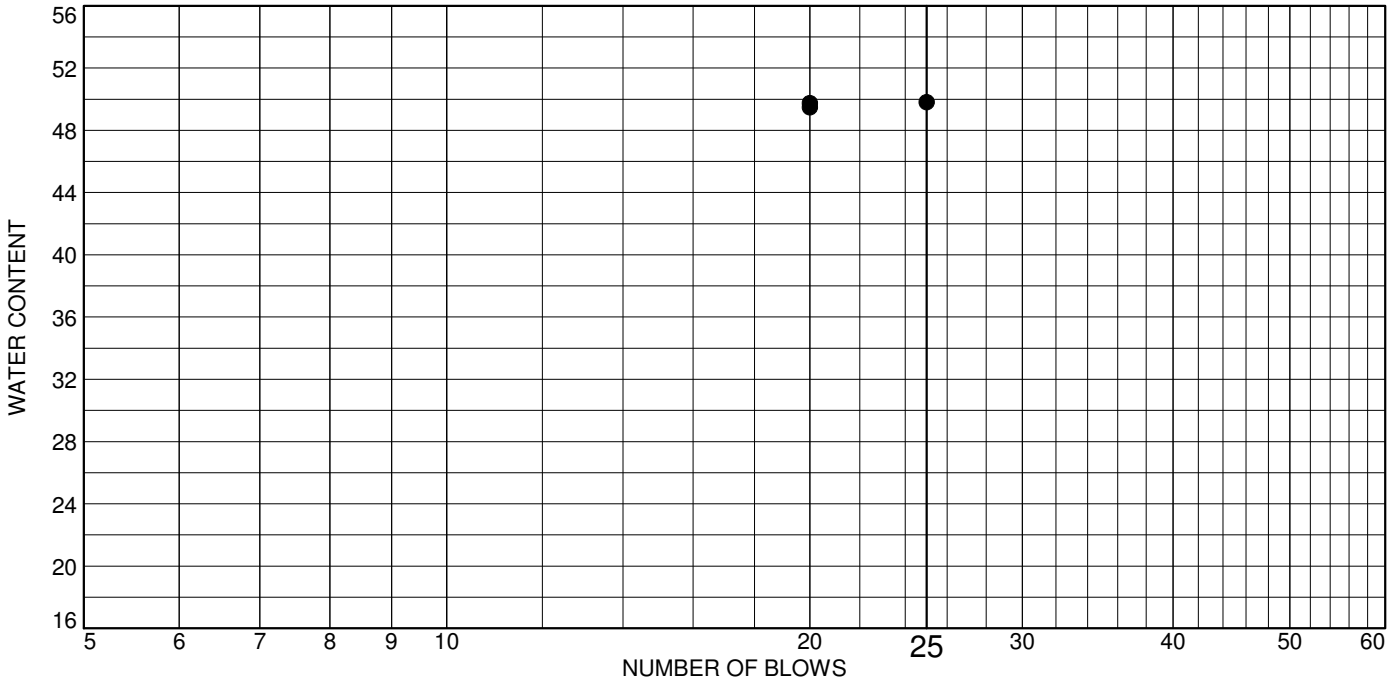
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay	49	15	34	72.4	61.1	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

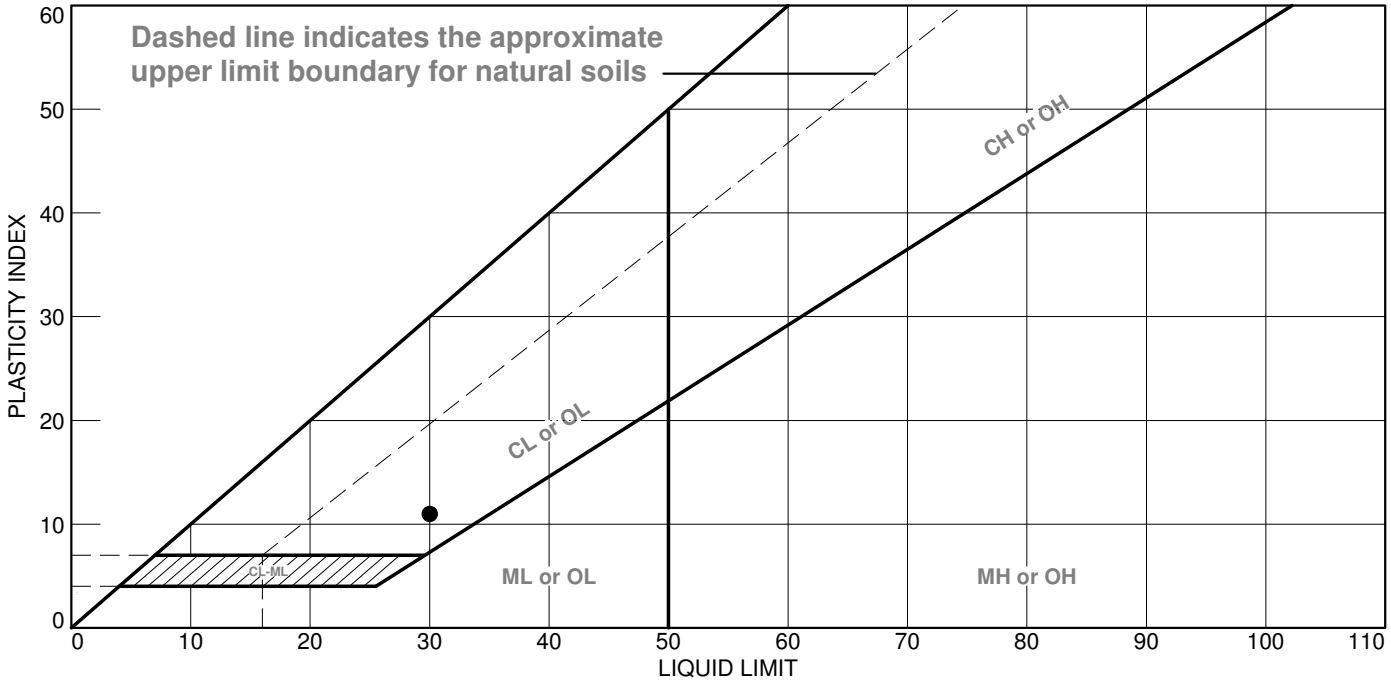
Location: GH11-239, Area A
Sample Number: GH11-239-2 **Depth:** 14-15.5'

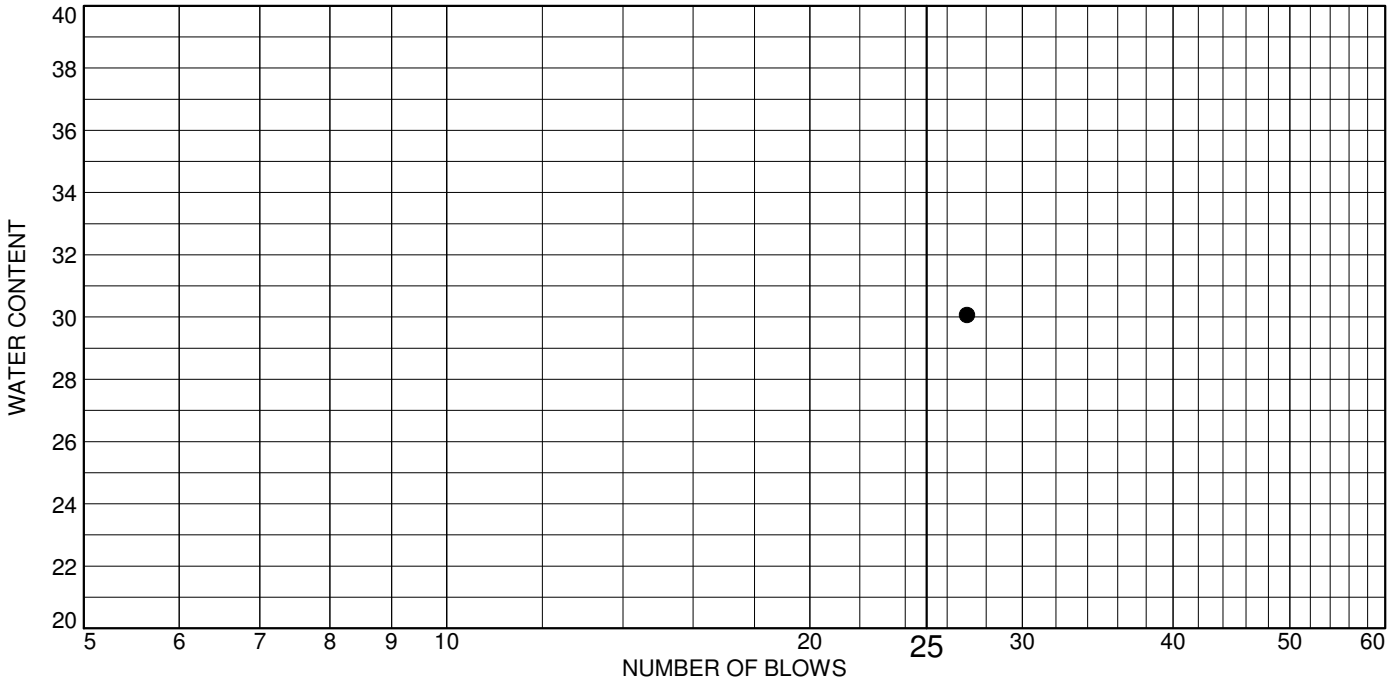
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay	30	19	11	74.3	63.1	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

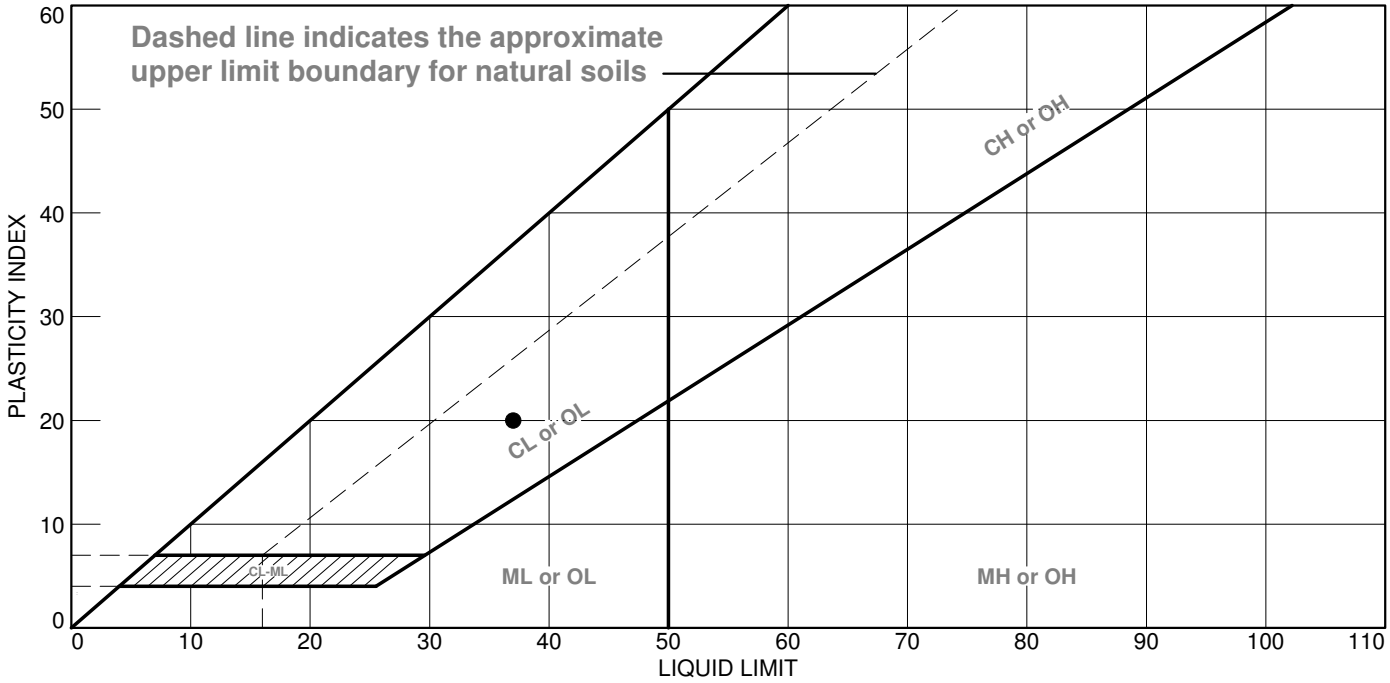
Location: GH11-239, Area A
Sample Number: SPT 1 **Depth:** 4-5.5'

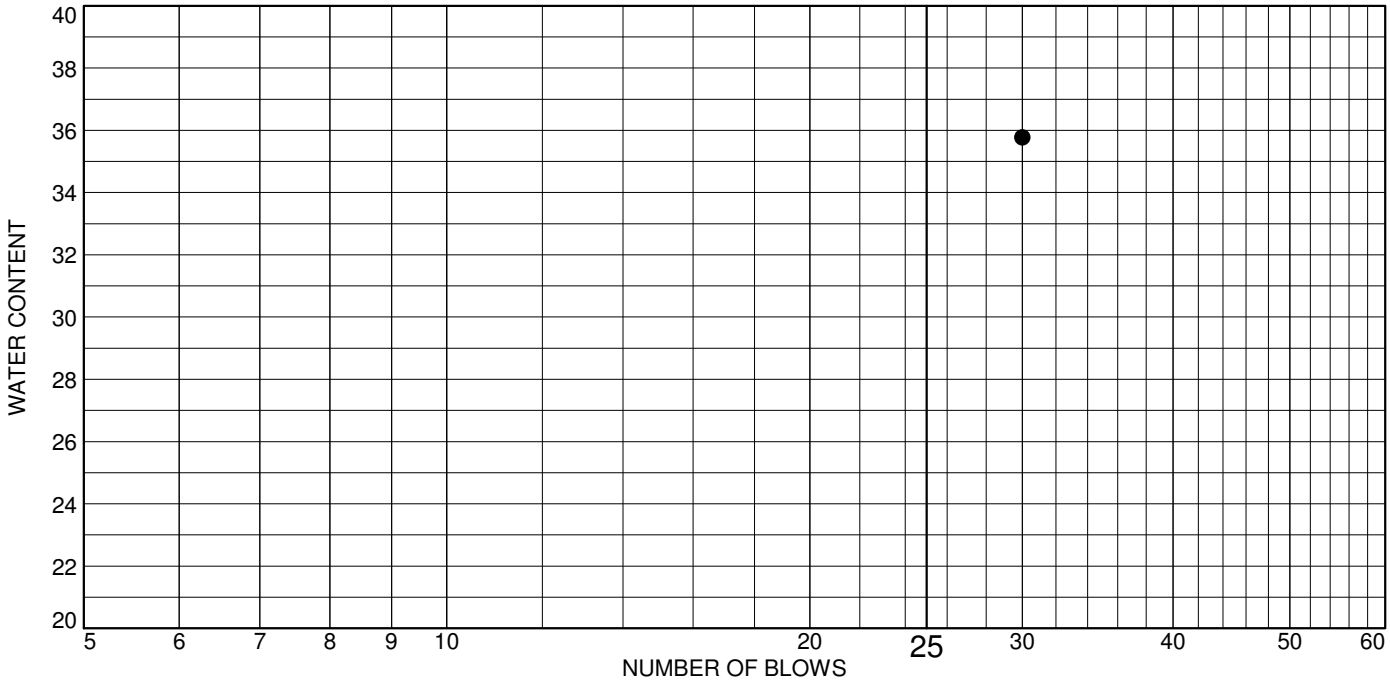
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay with gravel	37	17	20	66.4	57.1	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

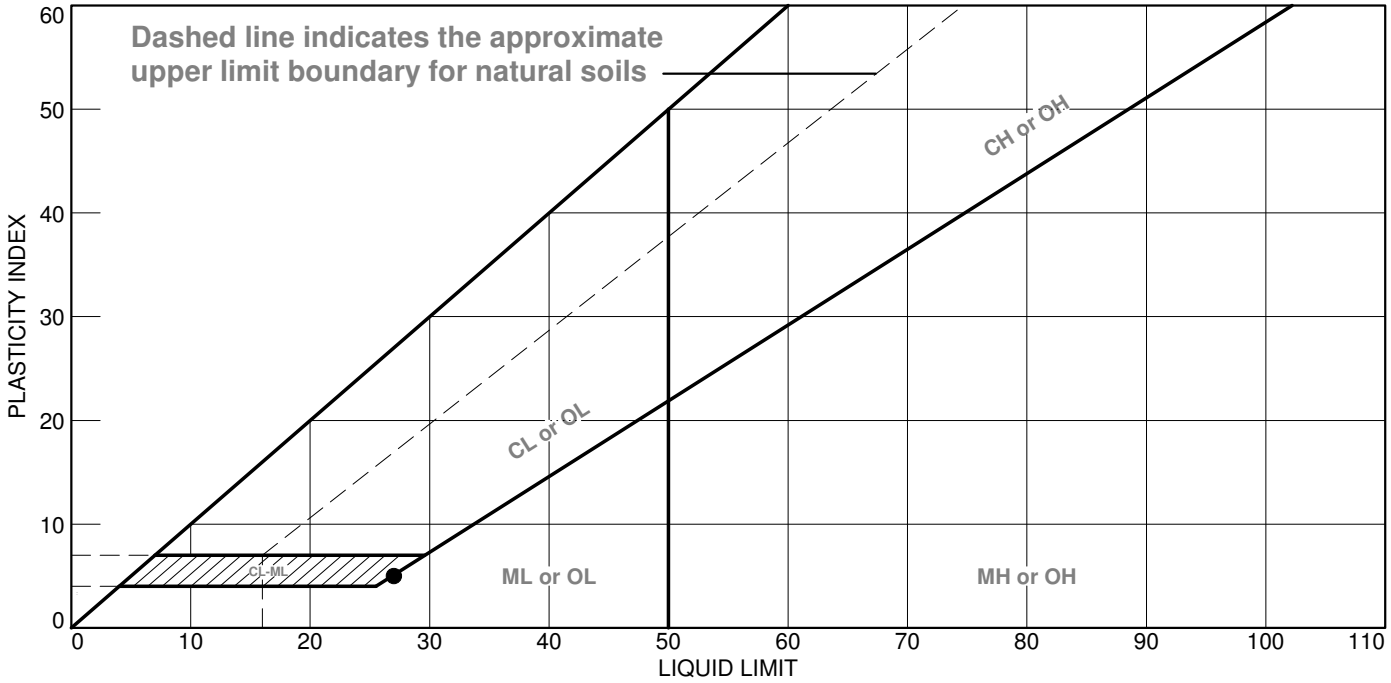
Location: GH11-239, Area A
Sample Number: SPT 5 **Depth:** 24-25.5'

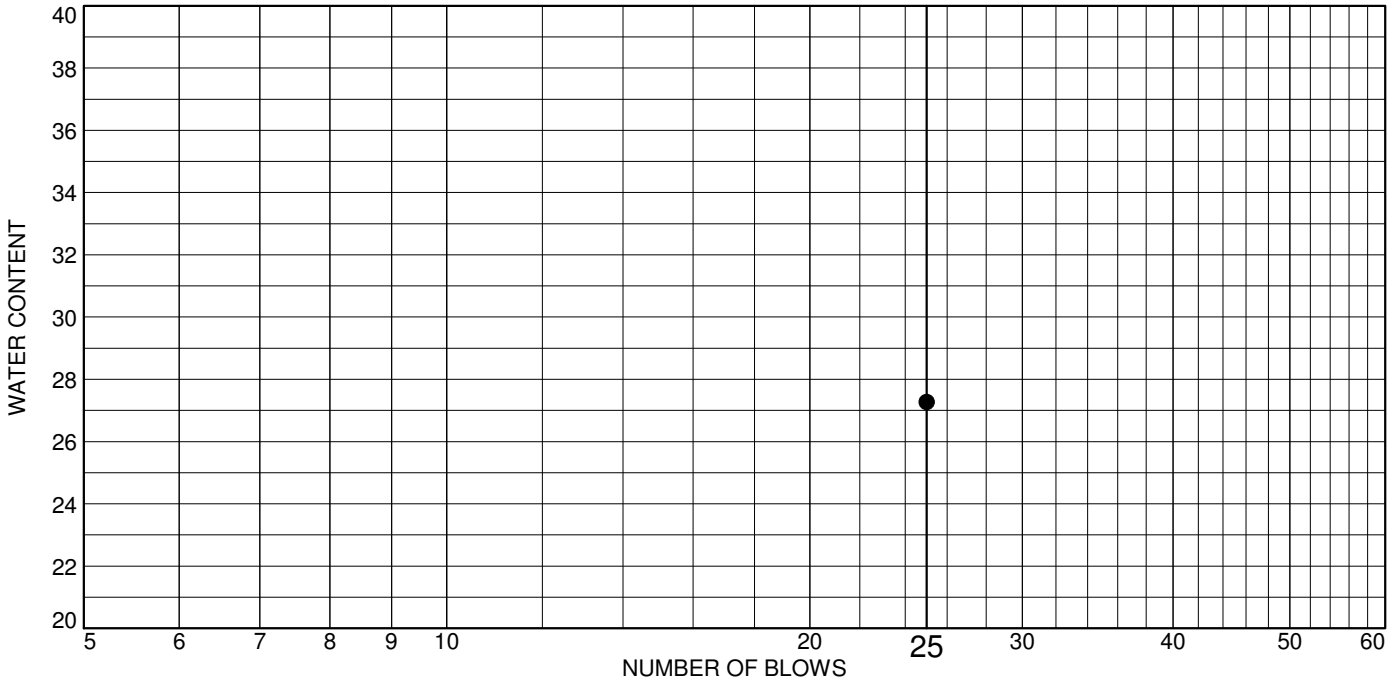
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded gravel with siltyclay and sand	27	22	5	17.5	10.1	GW-GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

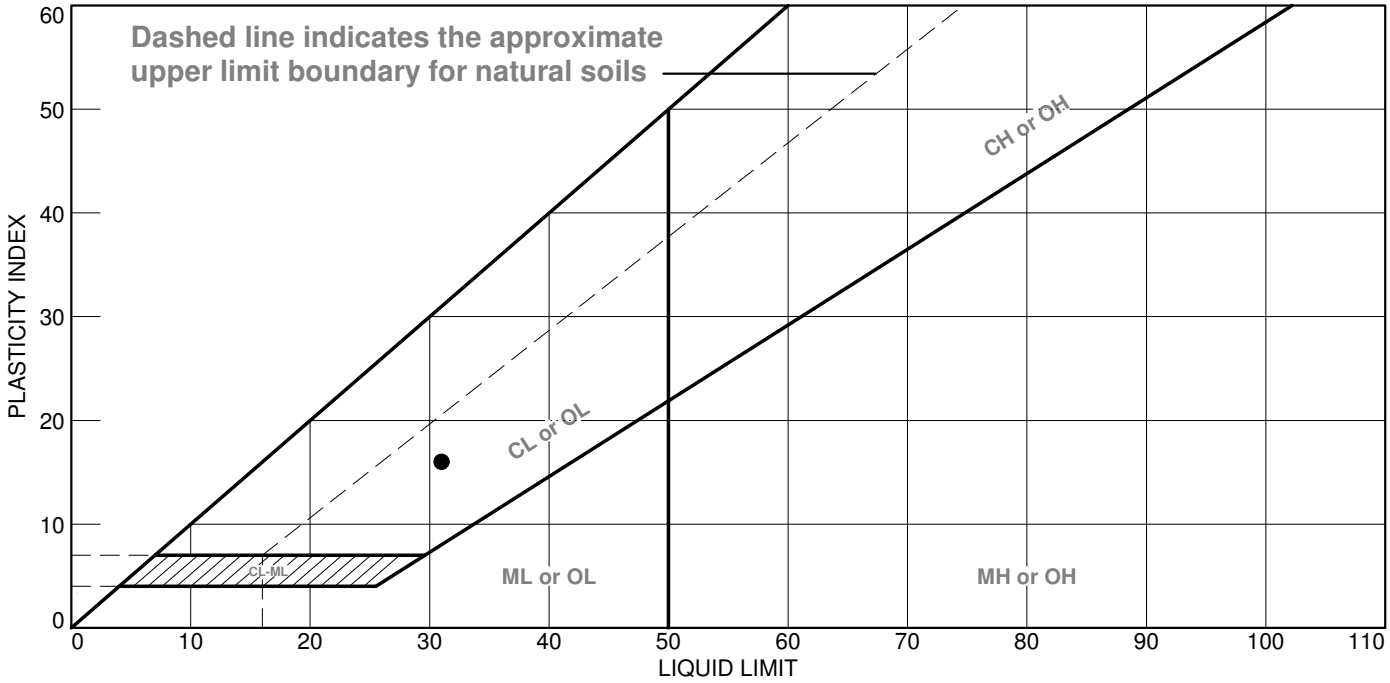
Location: GH11-239, Area A
Sample Number: SPT 6 **Depth:** 29-30.5'

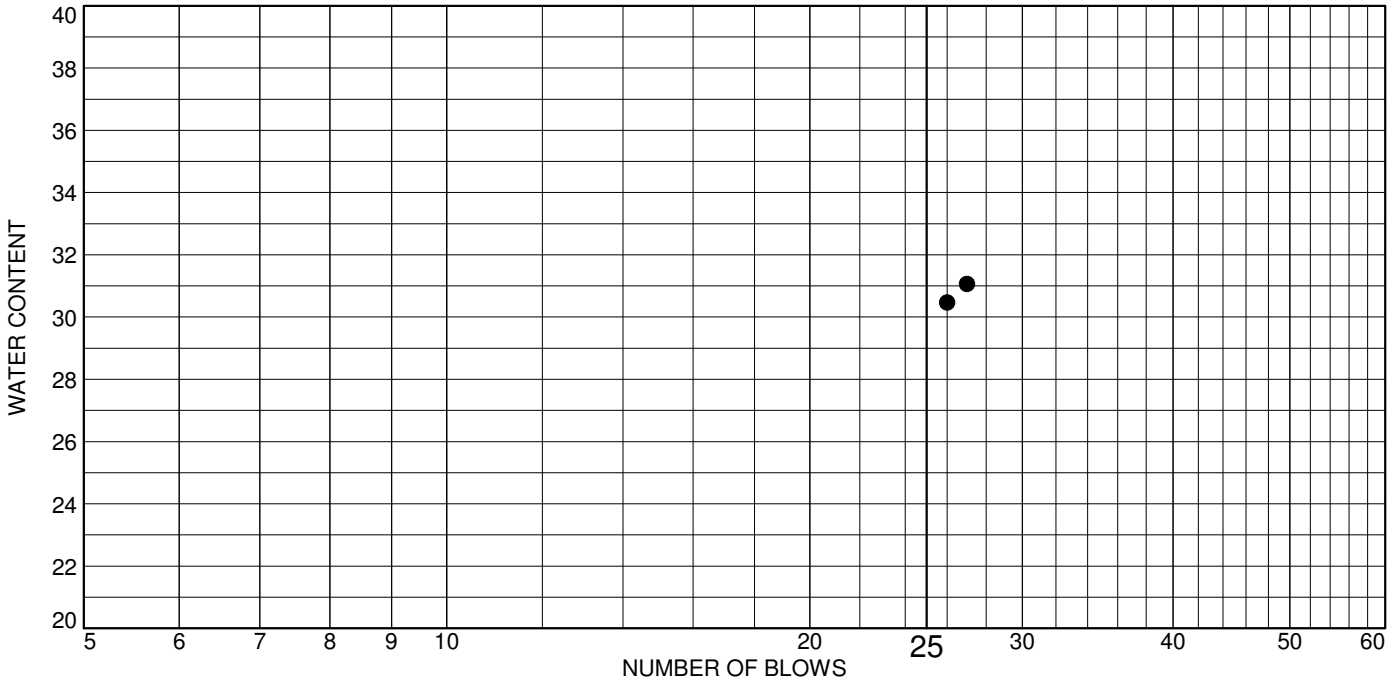
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	31	15	16	41.0	29.2	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

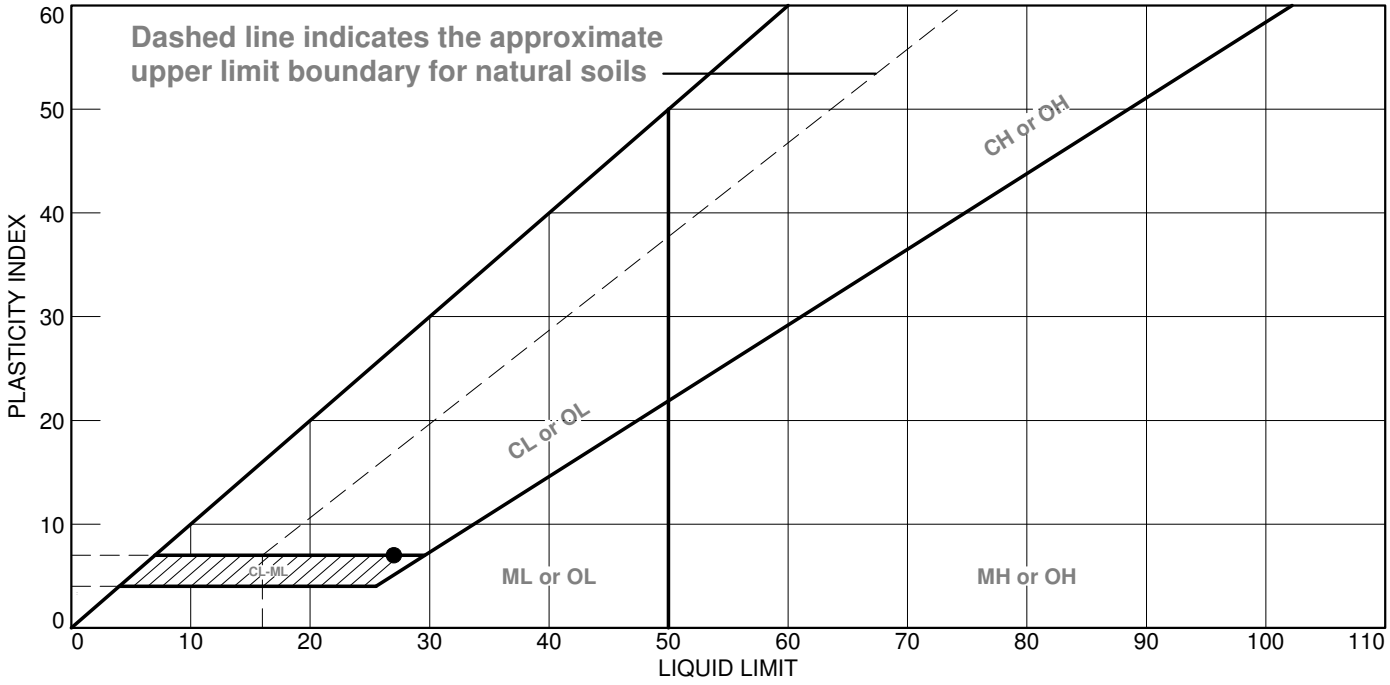
Location: GH11-239, Area A
Sample Number: SPT 11 **Depth:** 54-55.5'

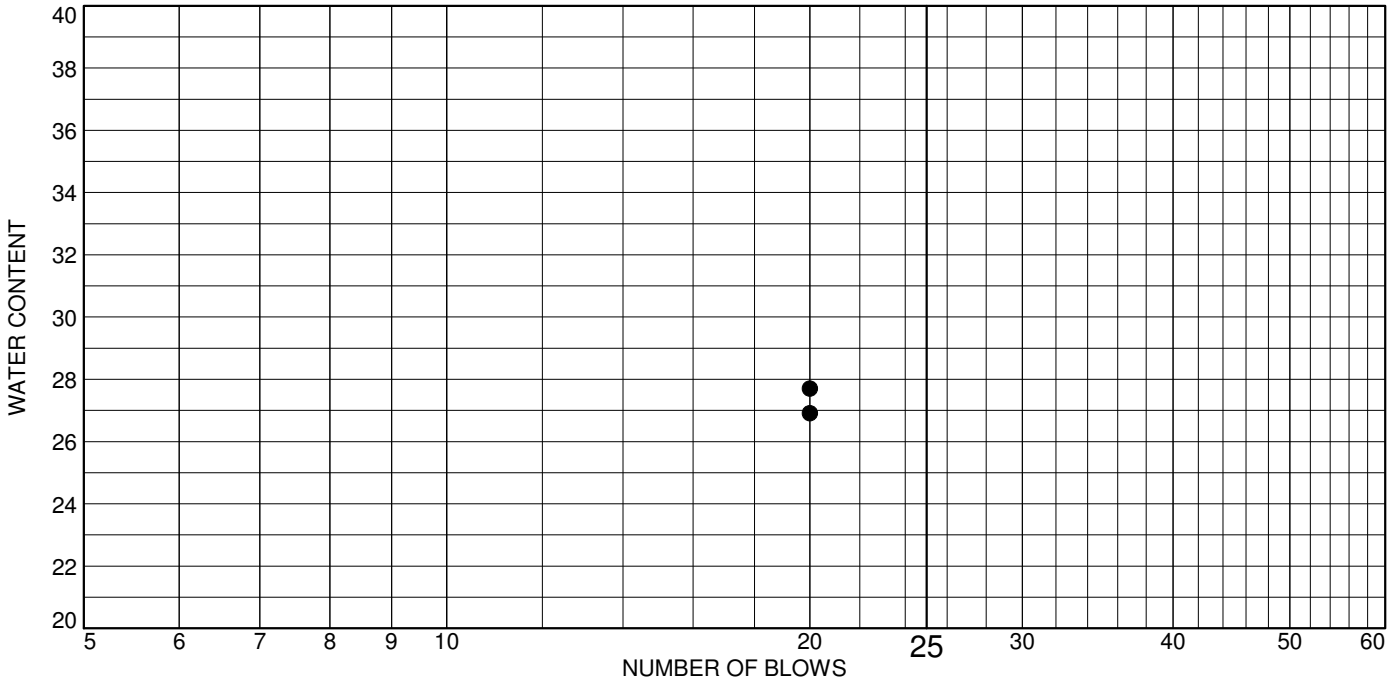
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty, clayey sand with gravel	27	20	7	23.4	14.1	SC-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

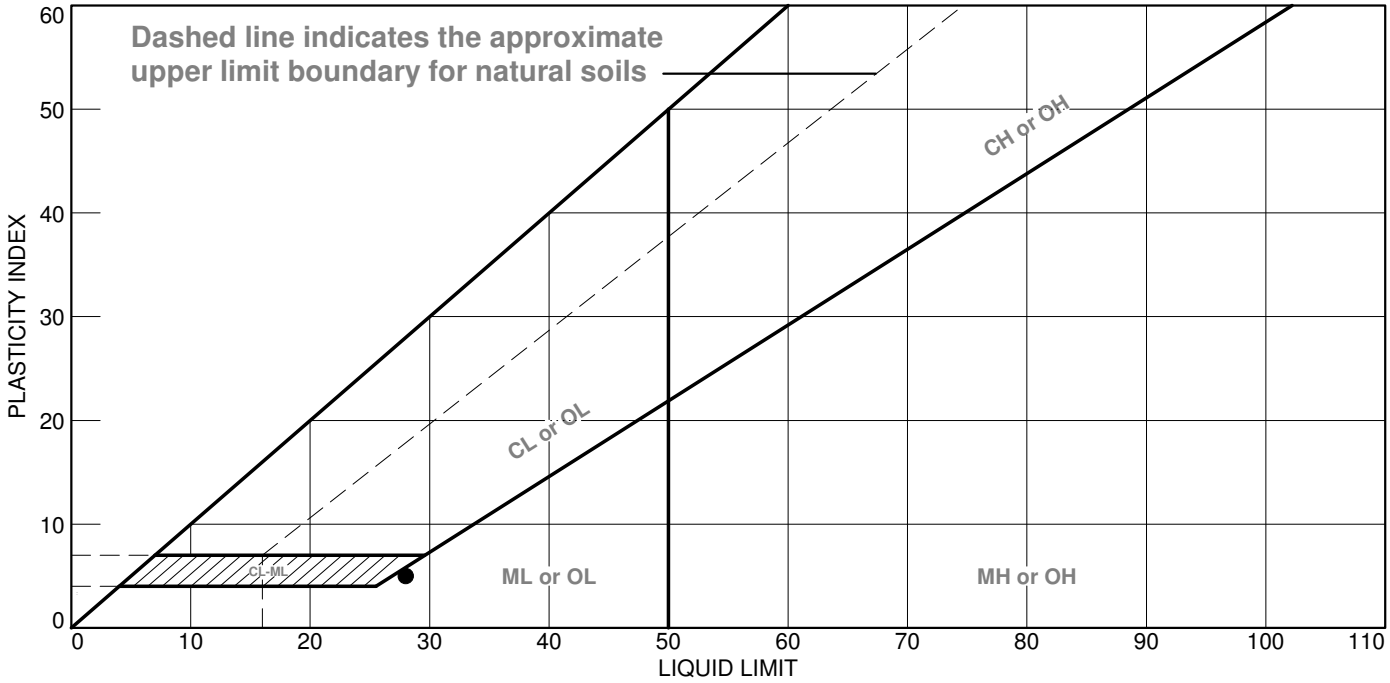
Location: GH11-239, Area A
Sample Number: SPT 12 **Depth:** 59-60.5'

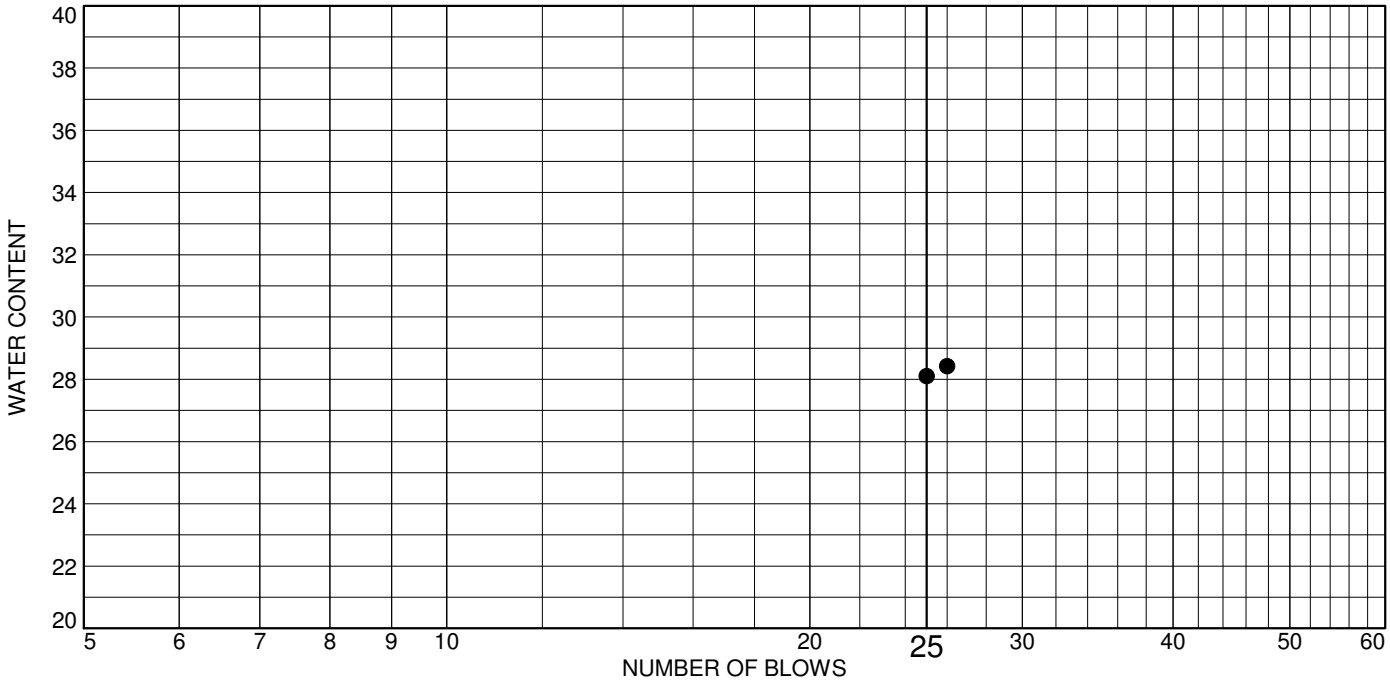
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty gravel with sand	28	23	5	23.3	14.0	GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

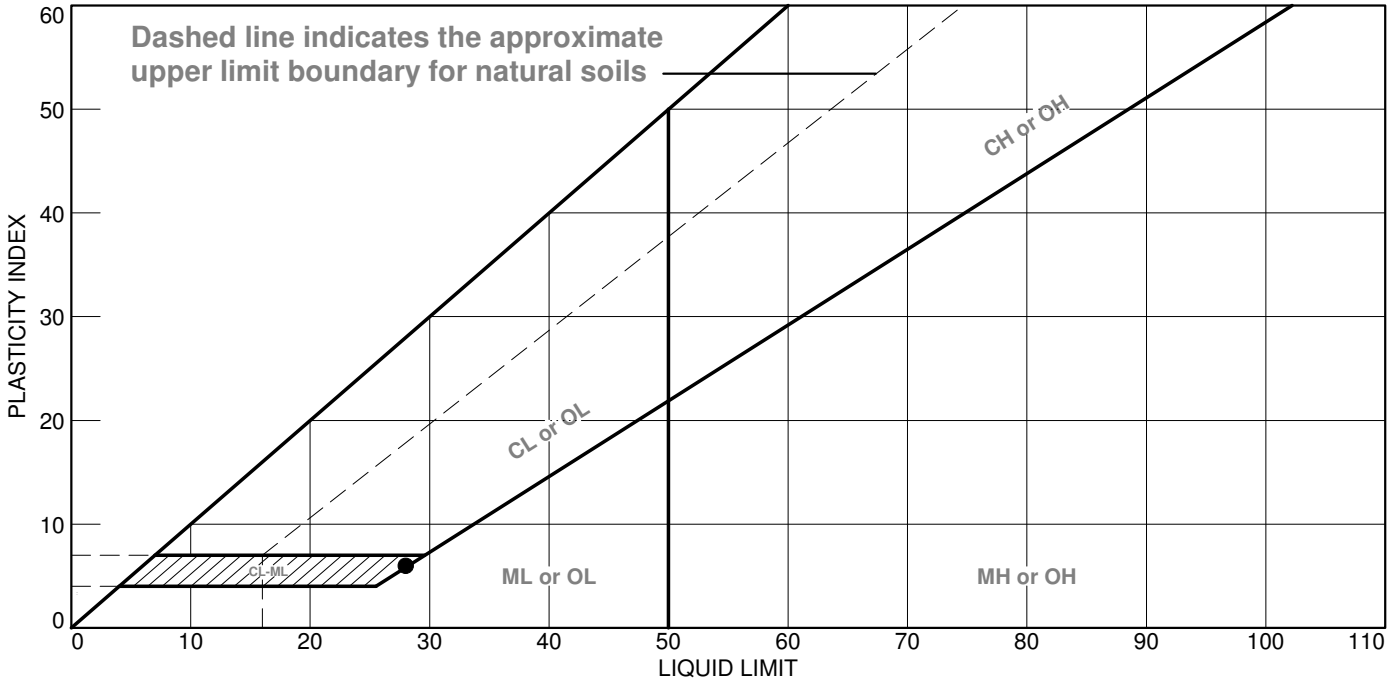
Location: GH11-239, Area A
Sample Number: SPT 14 **Depth:** 69-70.5'

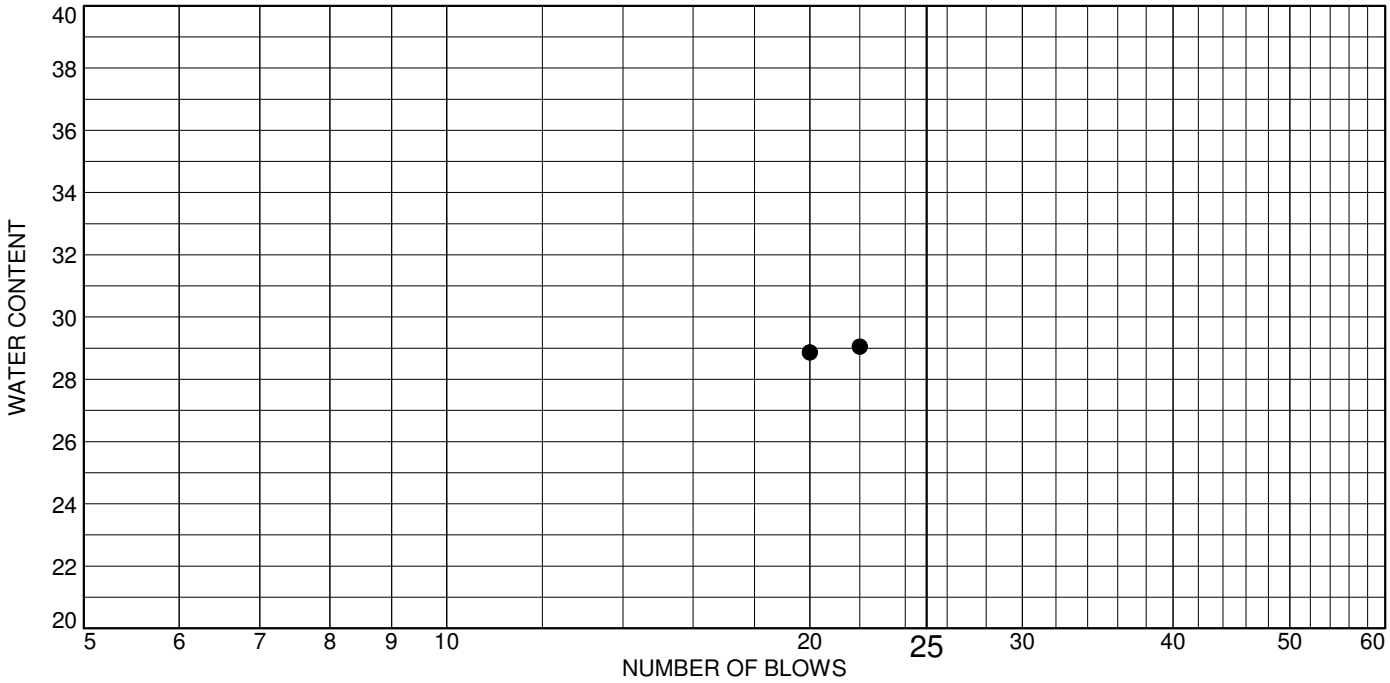
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty, clayey sand with gravel	28	22	6	27.5	15.8	SC-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

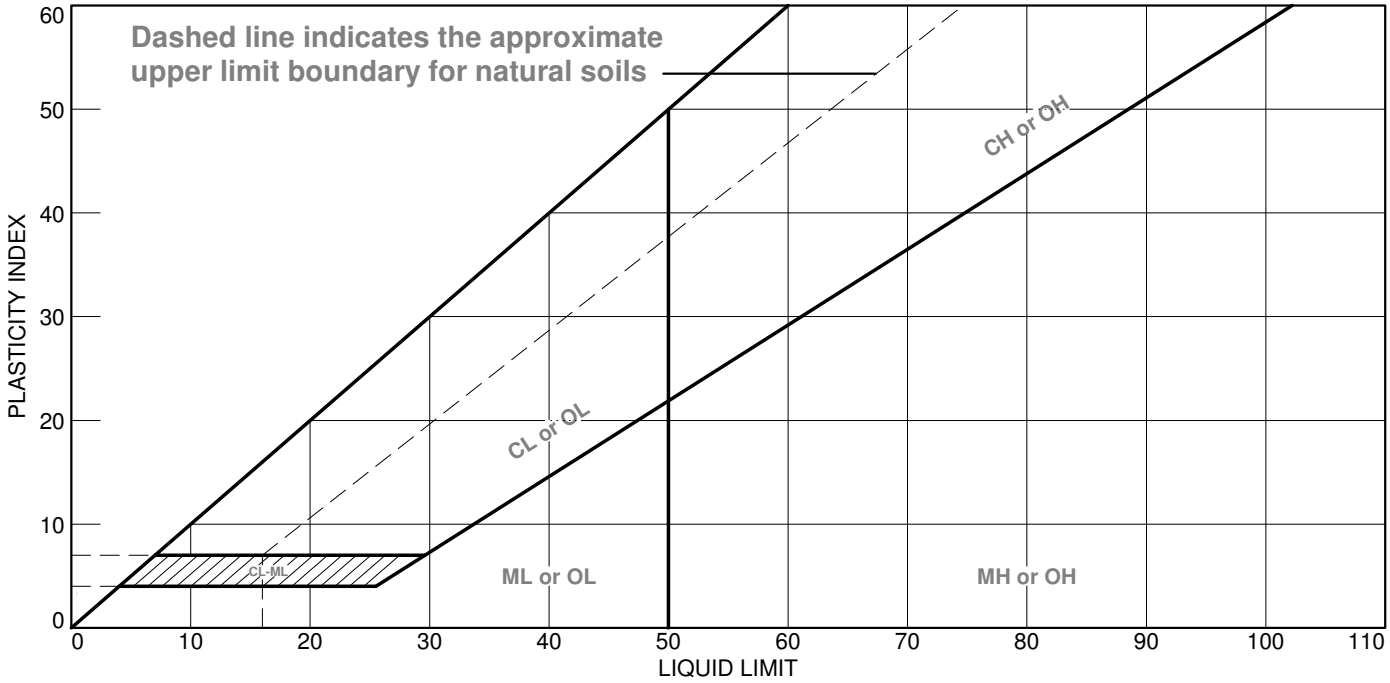
Location: GH11-239, Area A
Sample Number: SPT 16 **Depth:** 79-80.5'

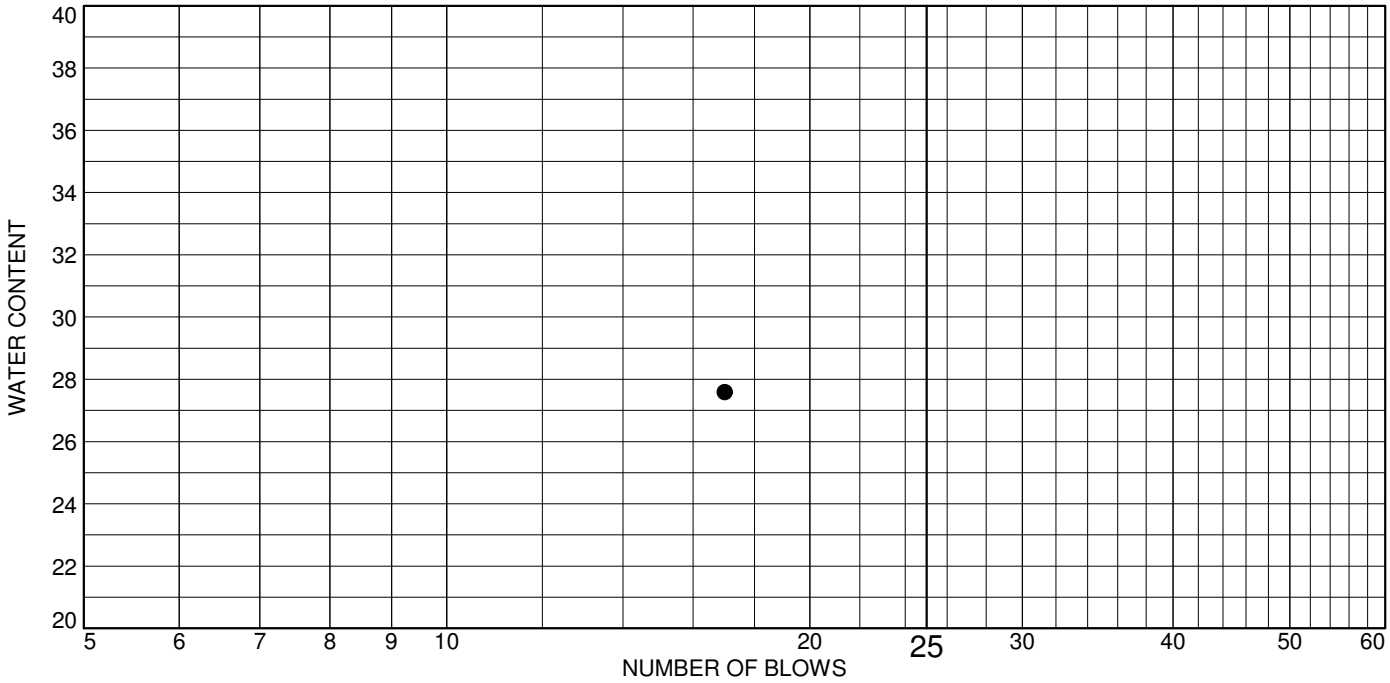
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded sand with silt and gravel	26	NP	NP	20.7	10.8	SP-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

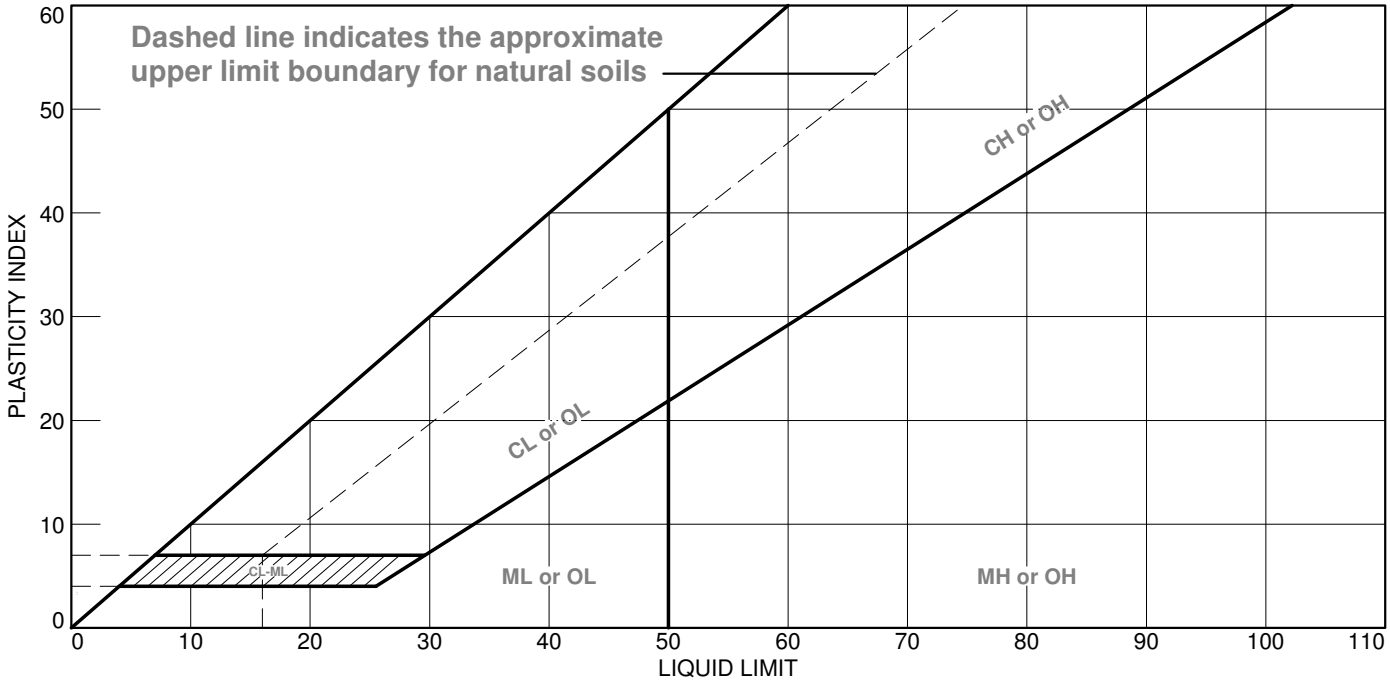
Location: GH11-239, Area A
Sample Number: SPT 18 **Depth:** 89-90.5'

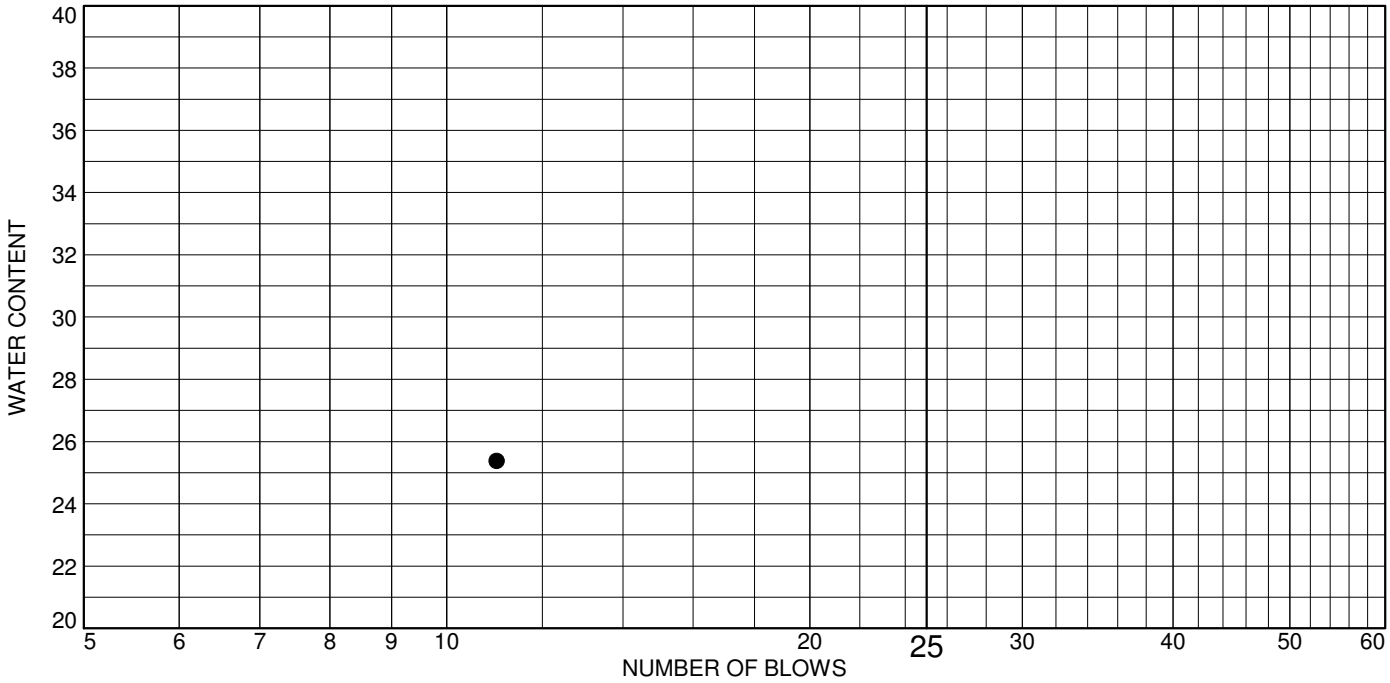
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded gravel with silt and sand	23	NP	NP	24.3	11.1	GW-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

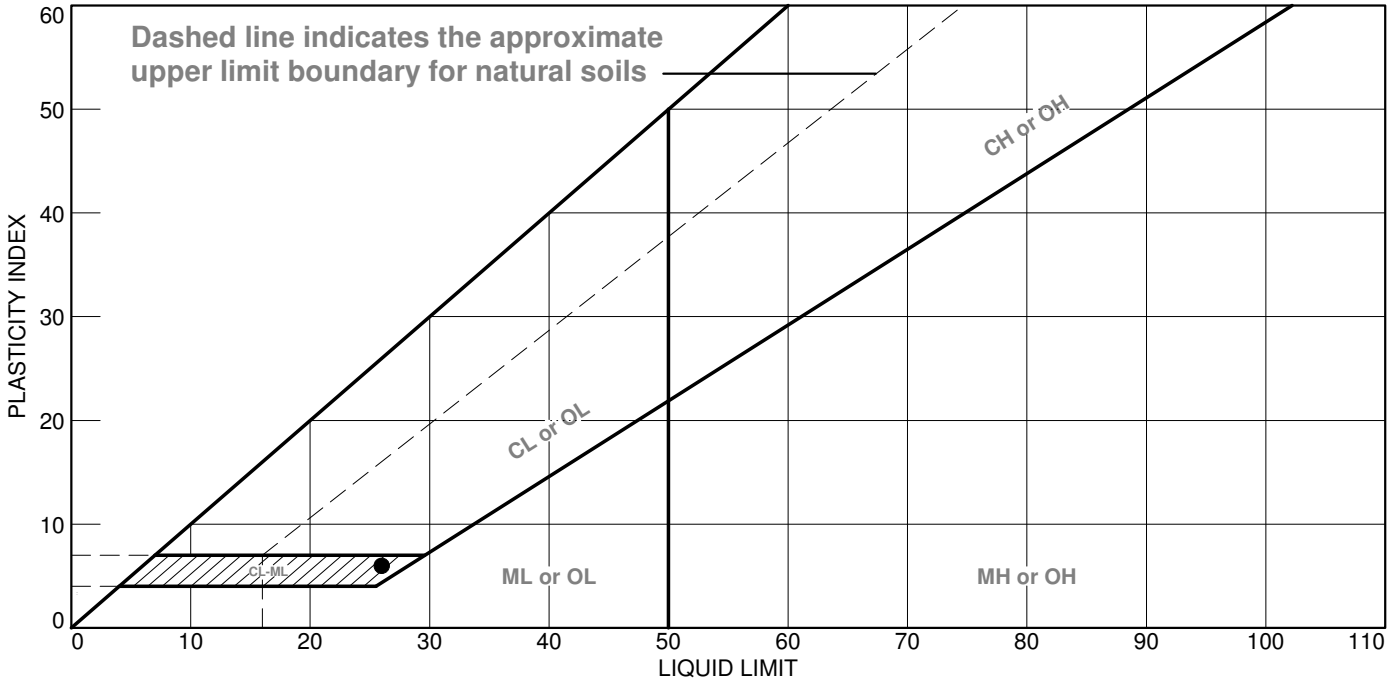
Location: GH11-239, Area A
Sample Number: SPT 21 **Depth:** 104-105.5'

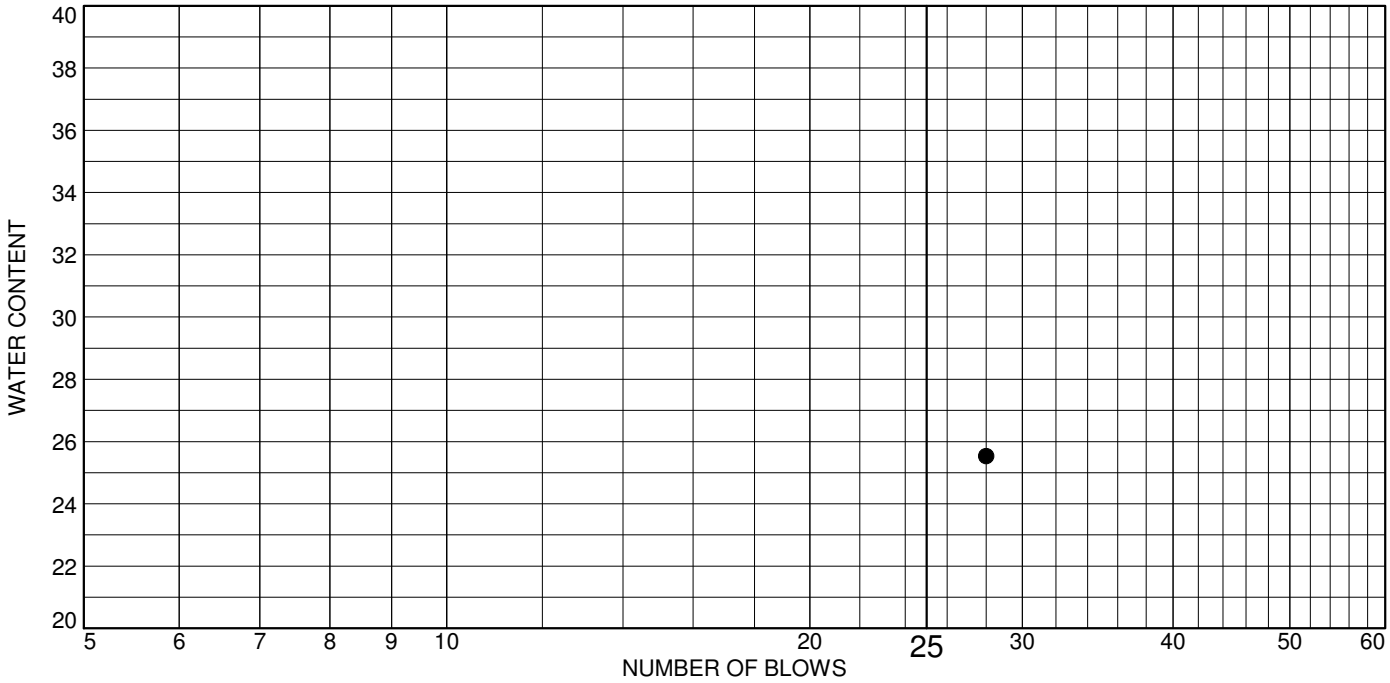
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty clayey gravel with sand	26	20	6	23.5	13.2	GC-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

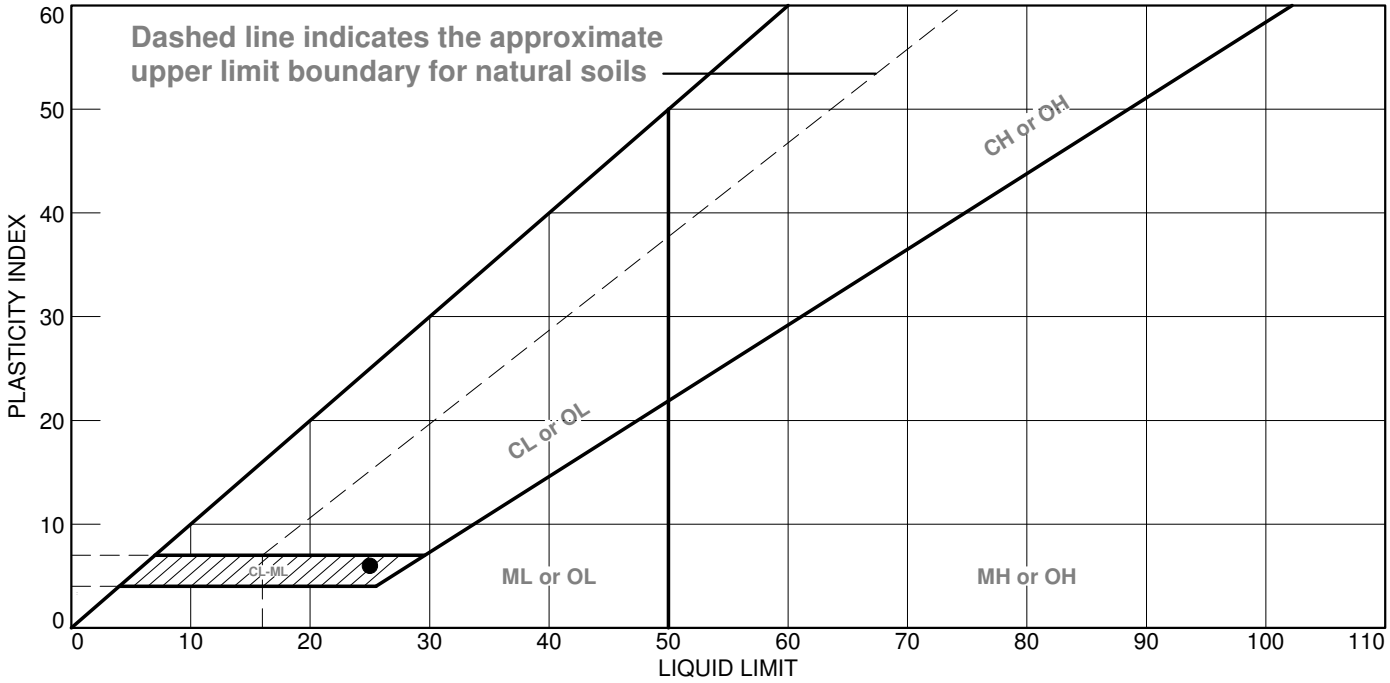
Location: GH11-239, Area A
Sample Number: SPT 23 **Depth:** 114-115.5'

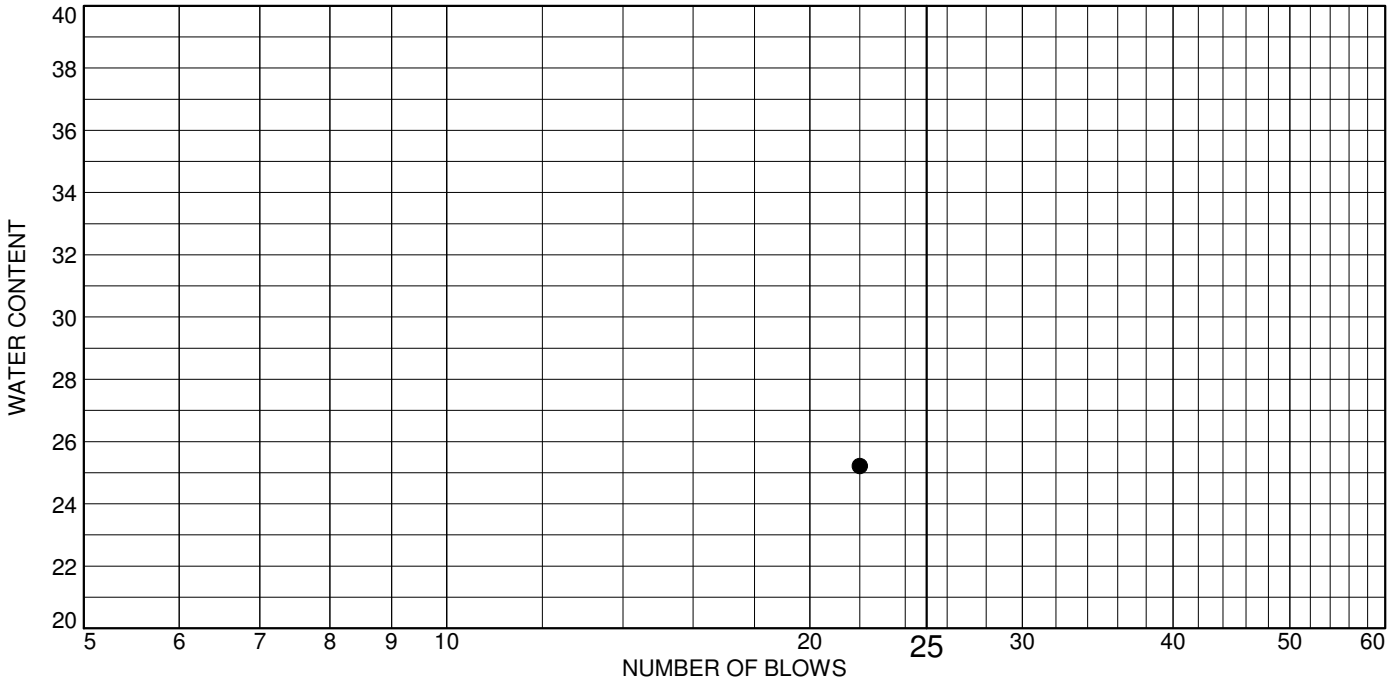
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty, clayey sand with gravel	25	19	6	25.1	14.0	SC-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

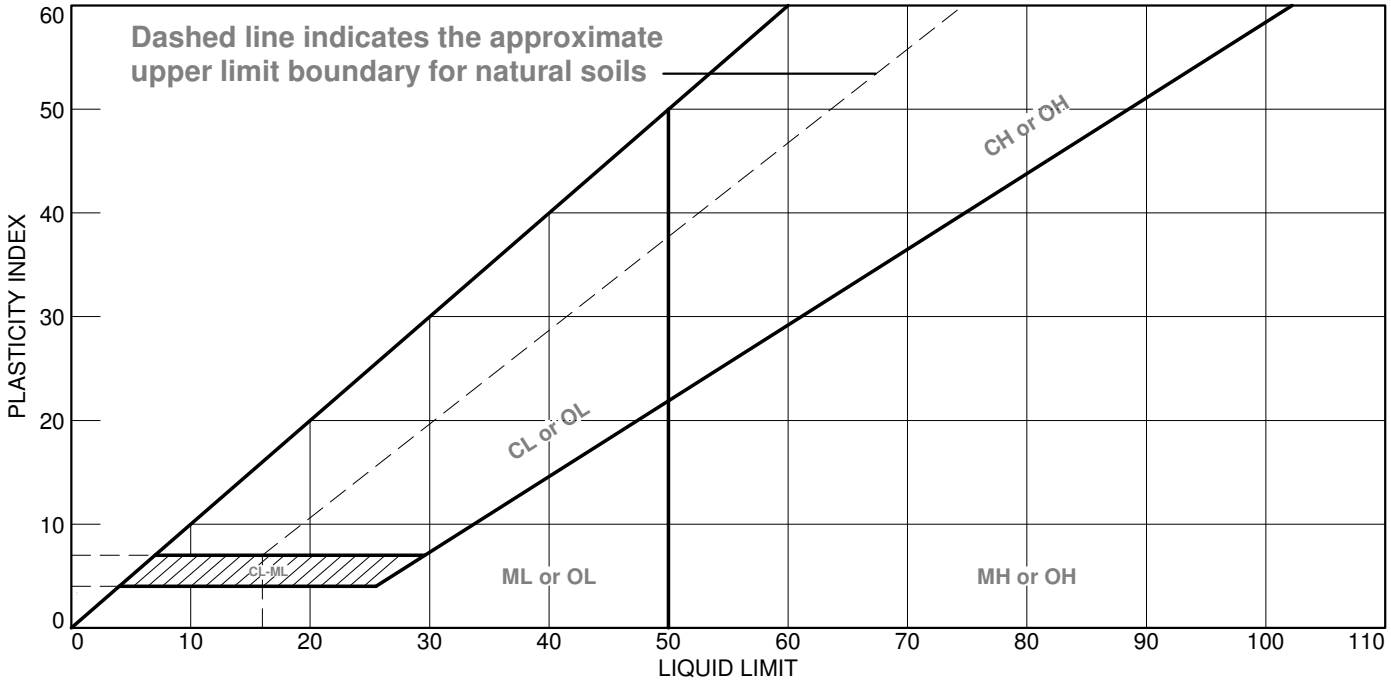
Location: GH11-239, Area A
Sample Number: SPT 25 **Depth:** 124-125.5'

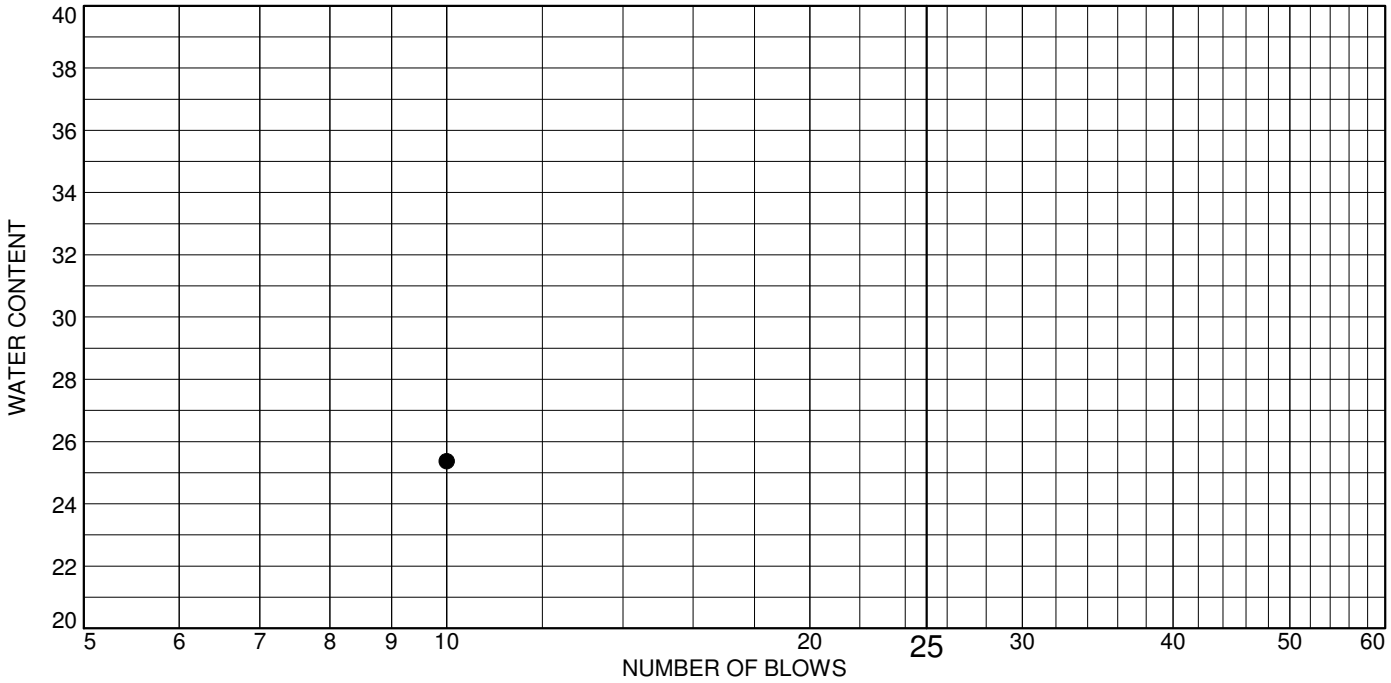
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded sand with silt and gravel	23	NP	NP	23.8	10.7	SW-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

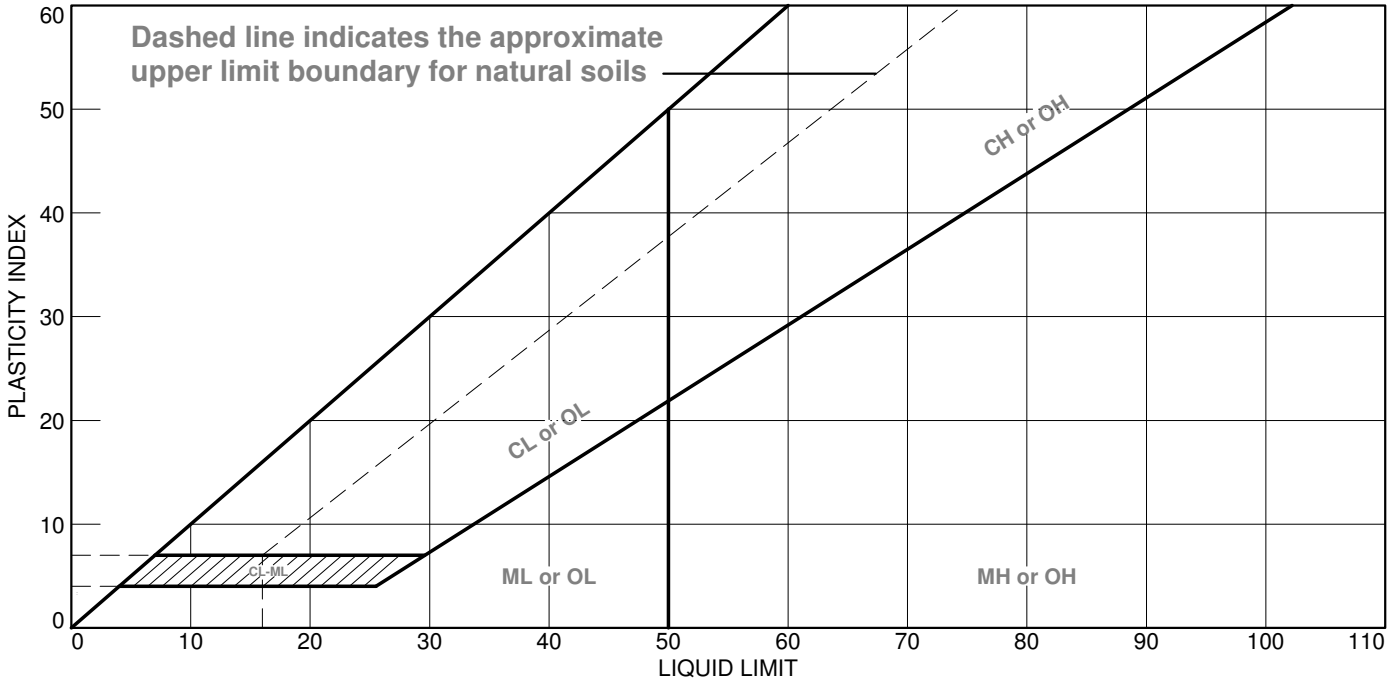
Location: GH11-239, Area A
Sample Number: SPT 29 **Depth:** 149-150.5'

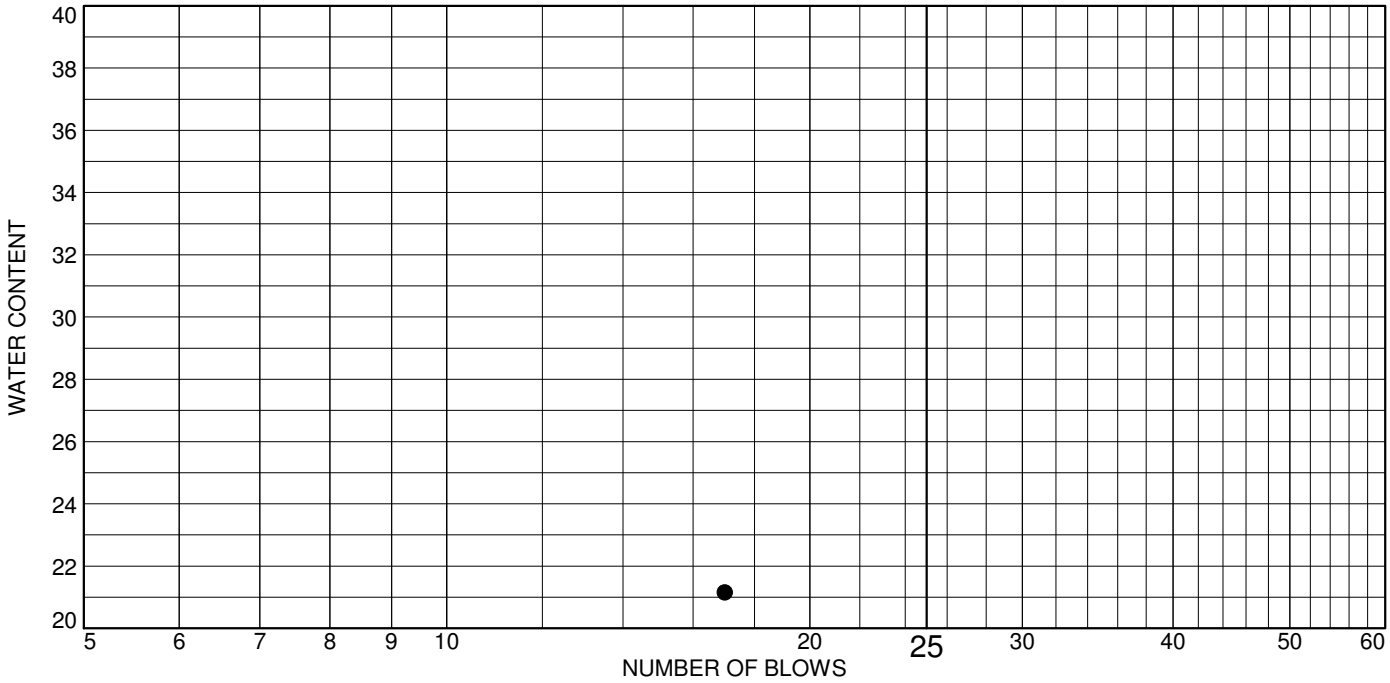
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded sand with silt and gravel	20	NP	NP	34.9	12.0	SP-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

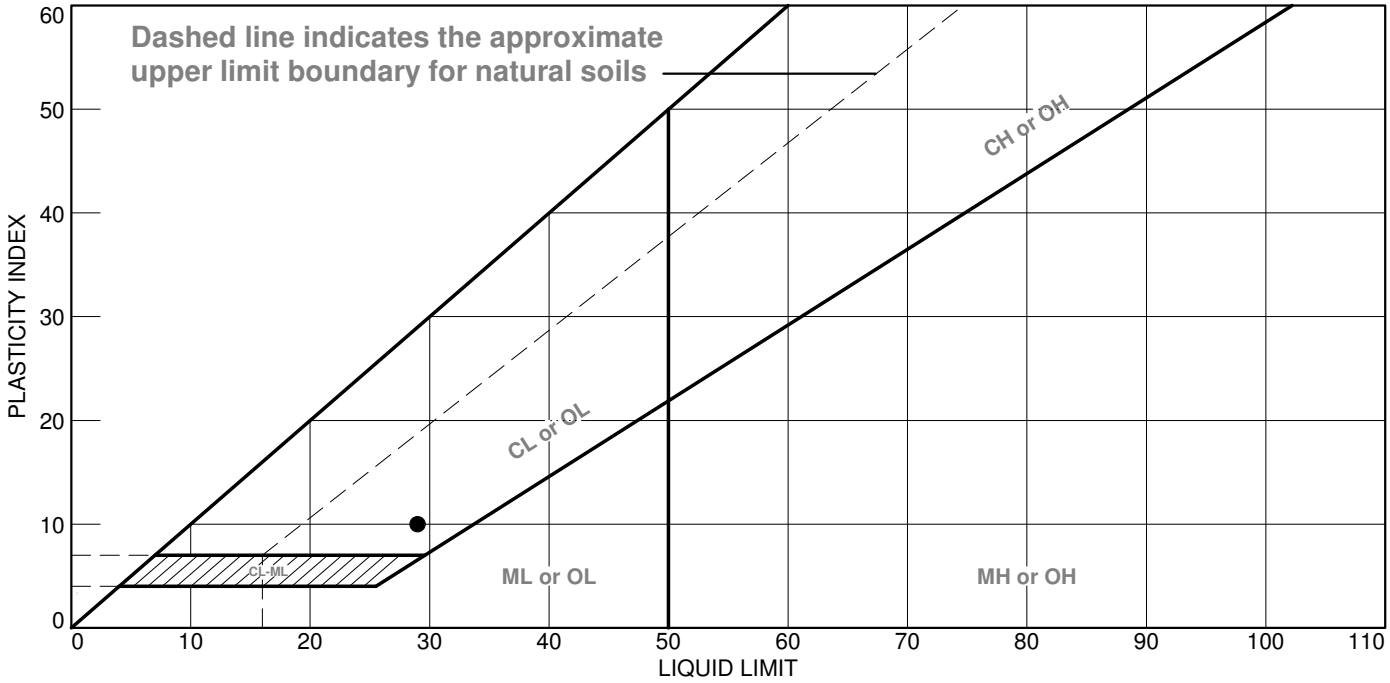
Location: GH11-239, Area A
Sample Number: SPT 31 **Depth:** 159-160.5'

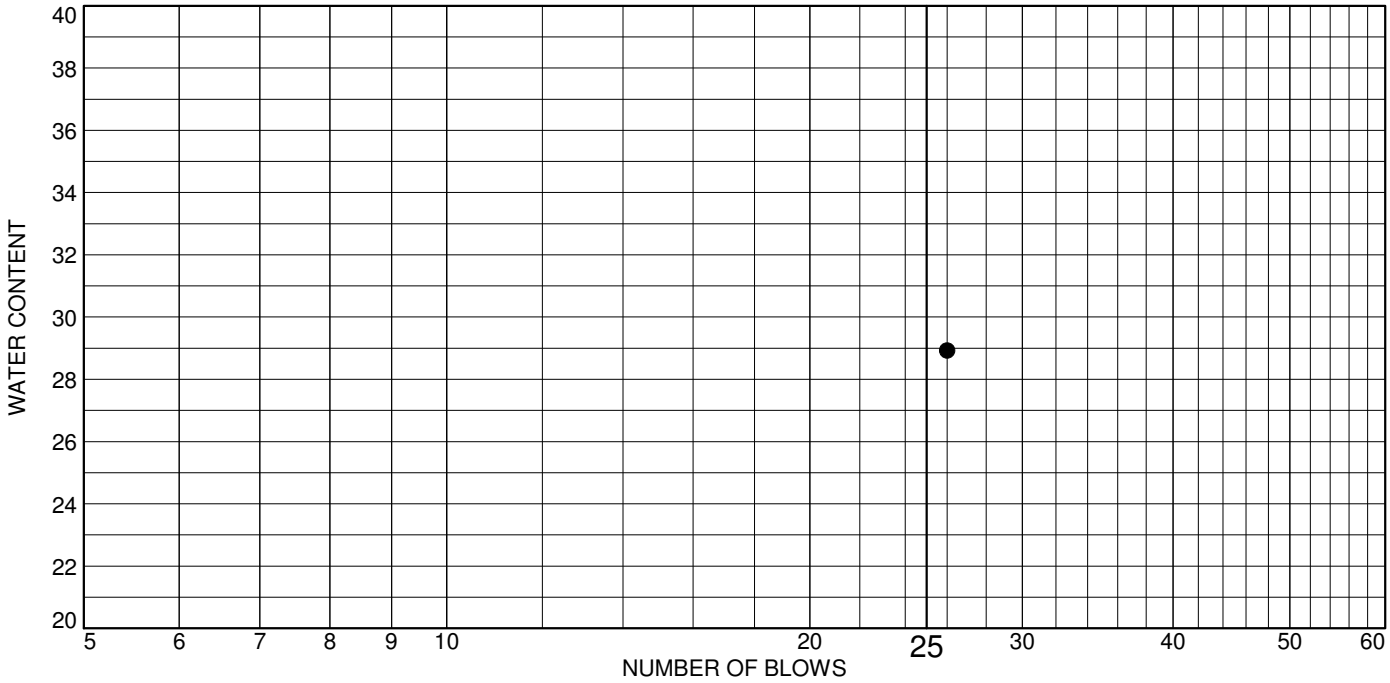
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	29	19	10	44.6	26.1	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

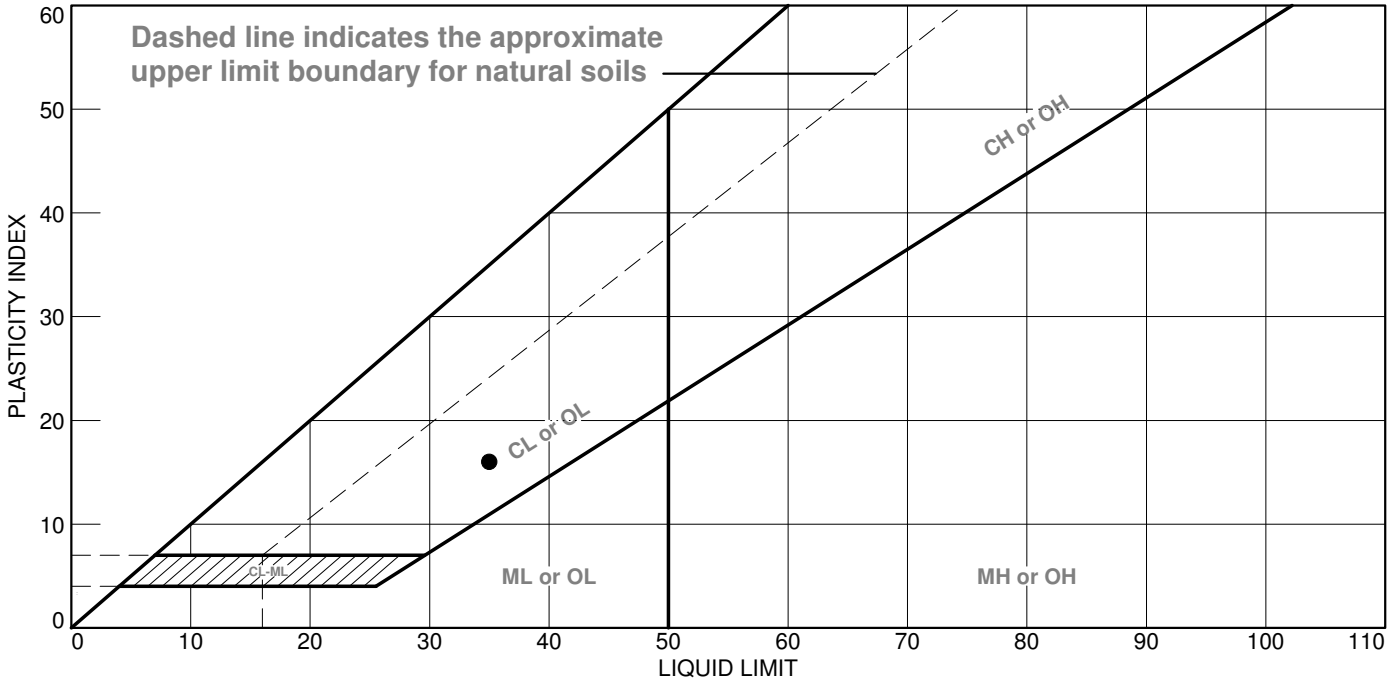
Location: GH11-239, Area A
Sample Number: SPT 33 **Depth:** 169-170.5'

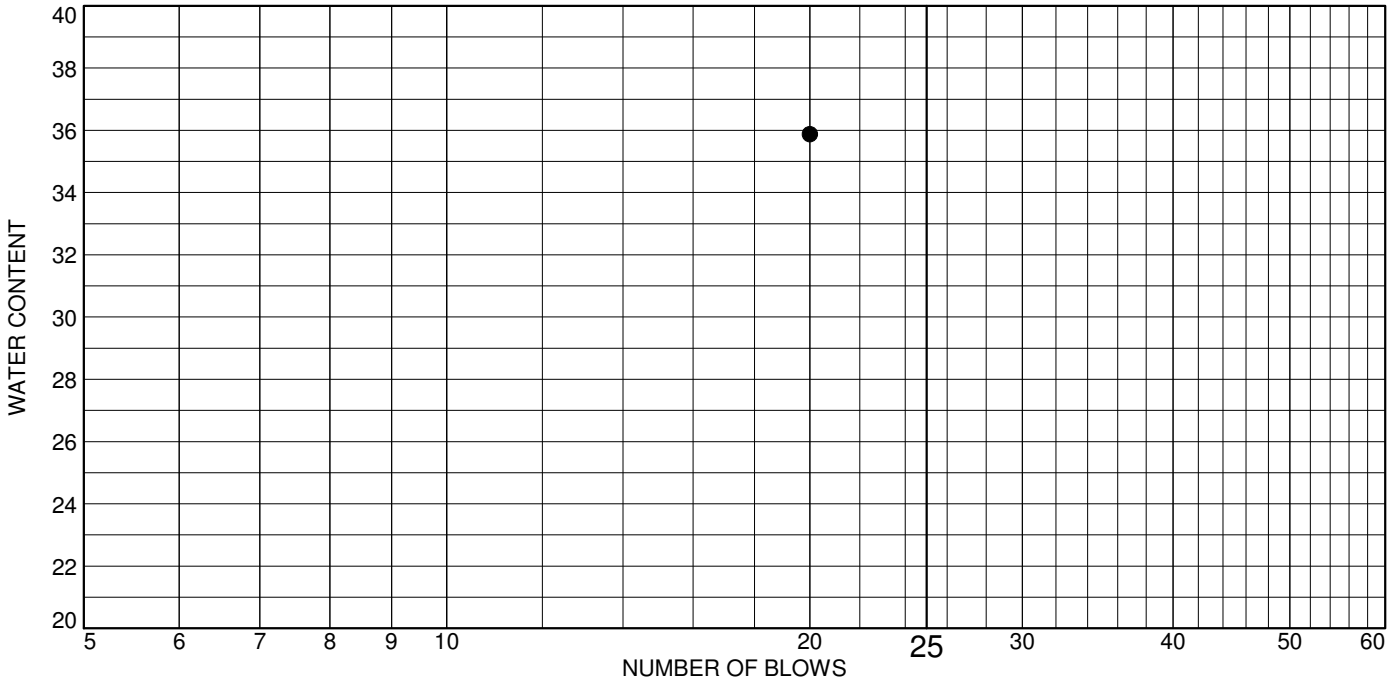
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	35	19	16	50.0	37.8	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

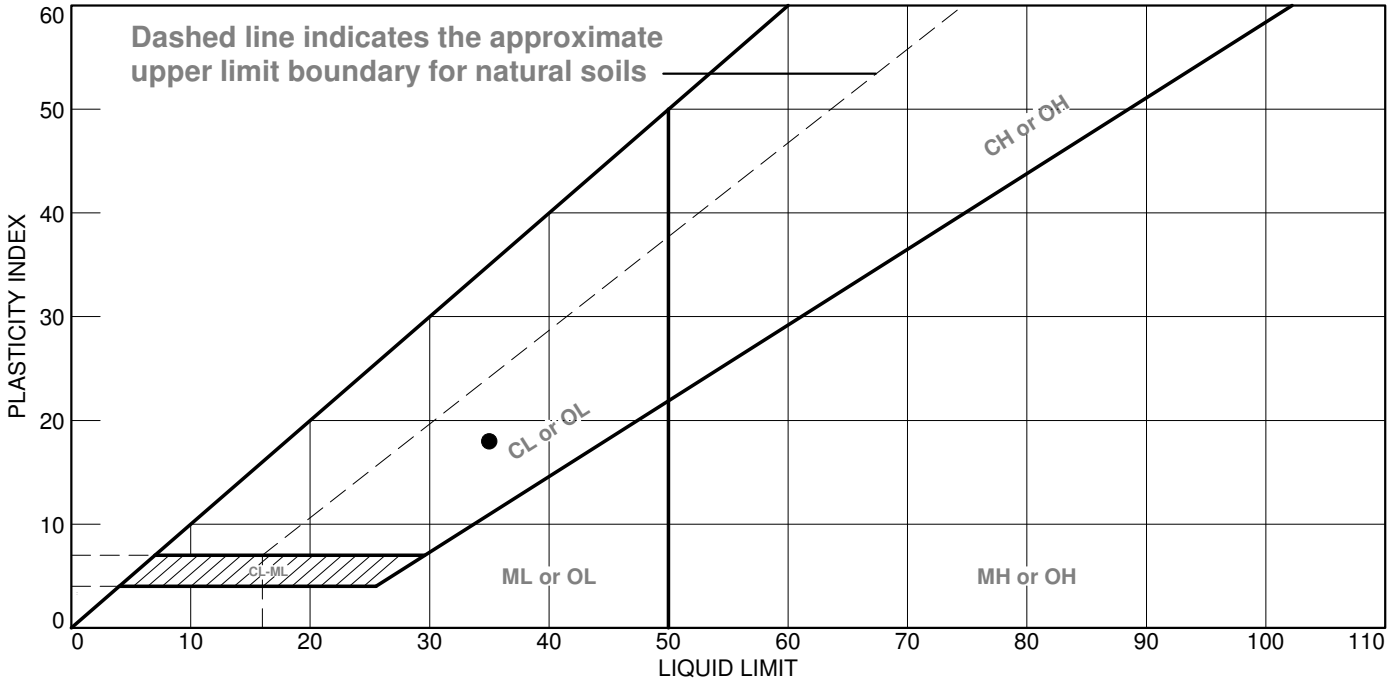
Location: GH11-240, Area A
Sample Number: SPT 2 **Depth:** 8-9.5'

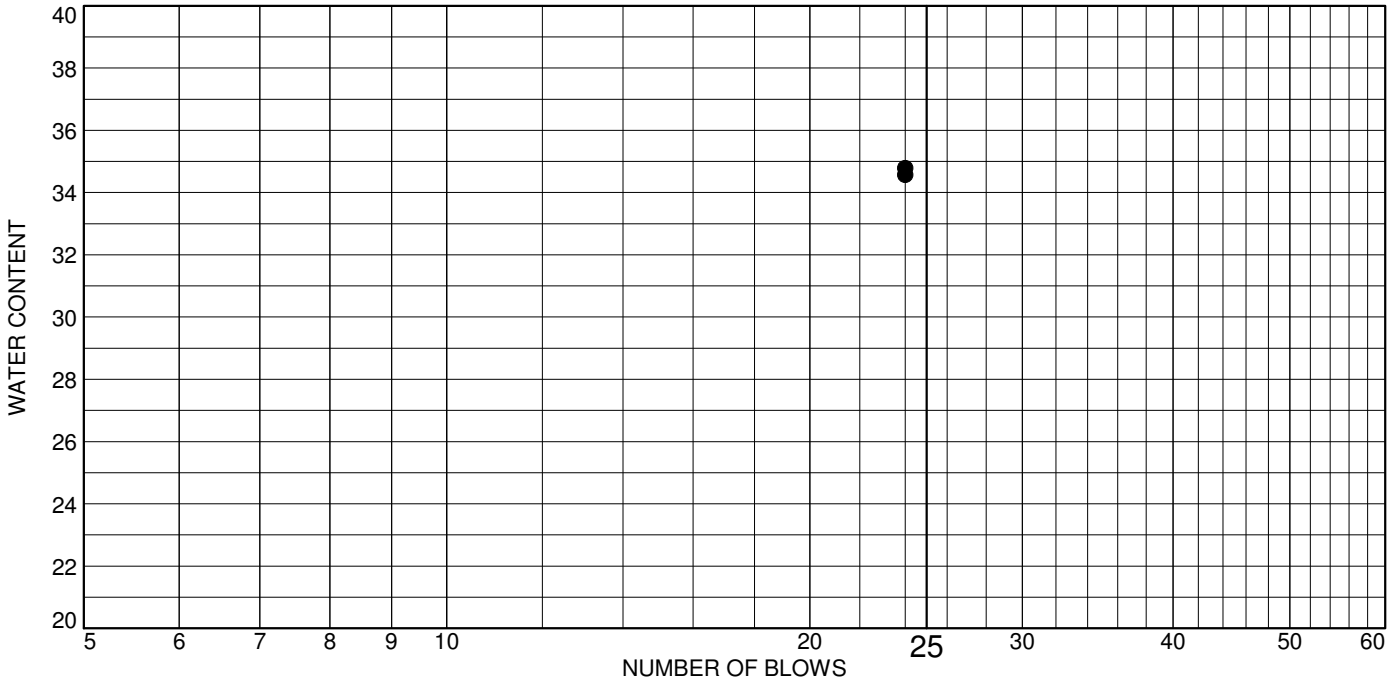
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	35	17	18	52.3	39.8	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

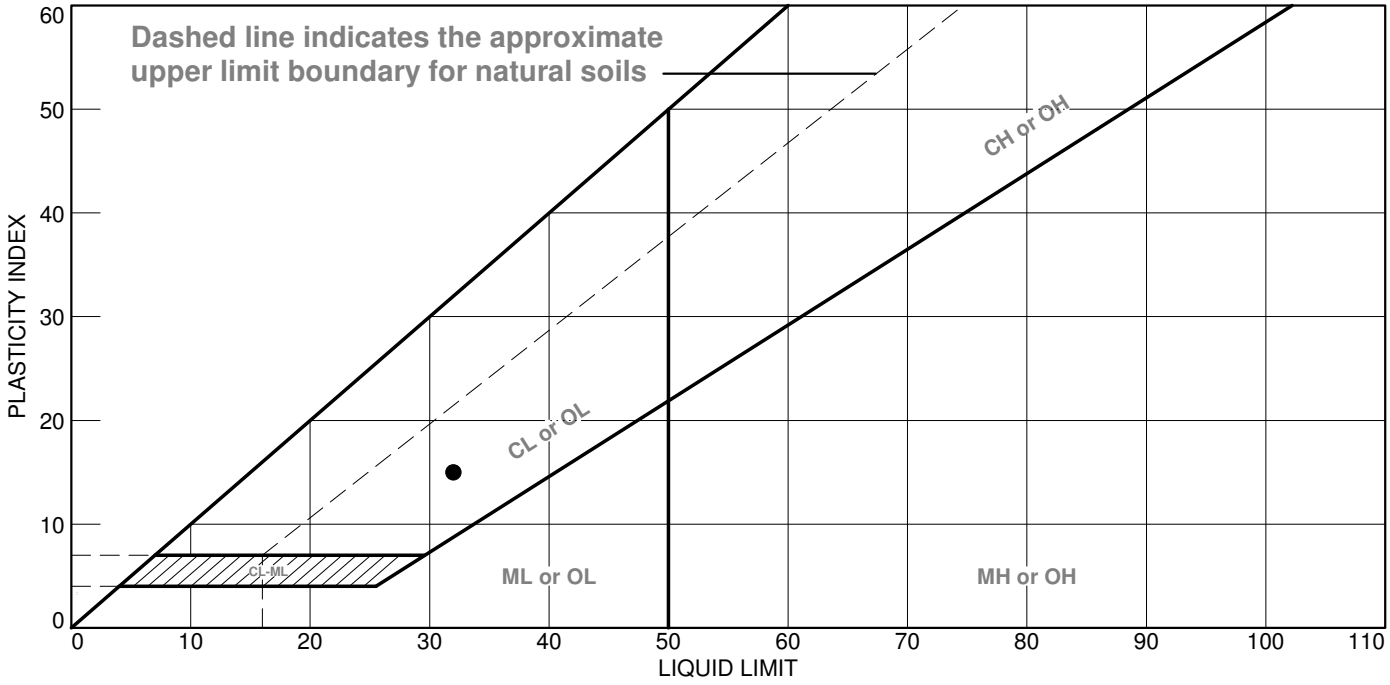
Location: GH11-240, Area A
Sample Number: SPT 4 **Depth:** 18-19.5'

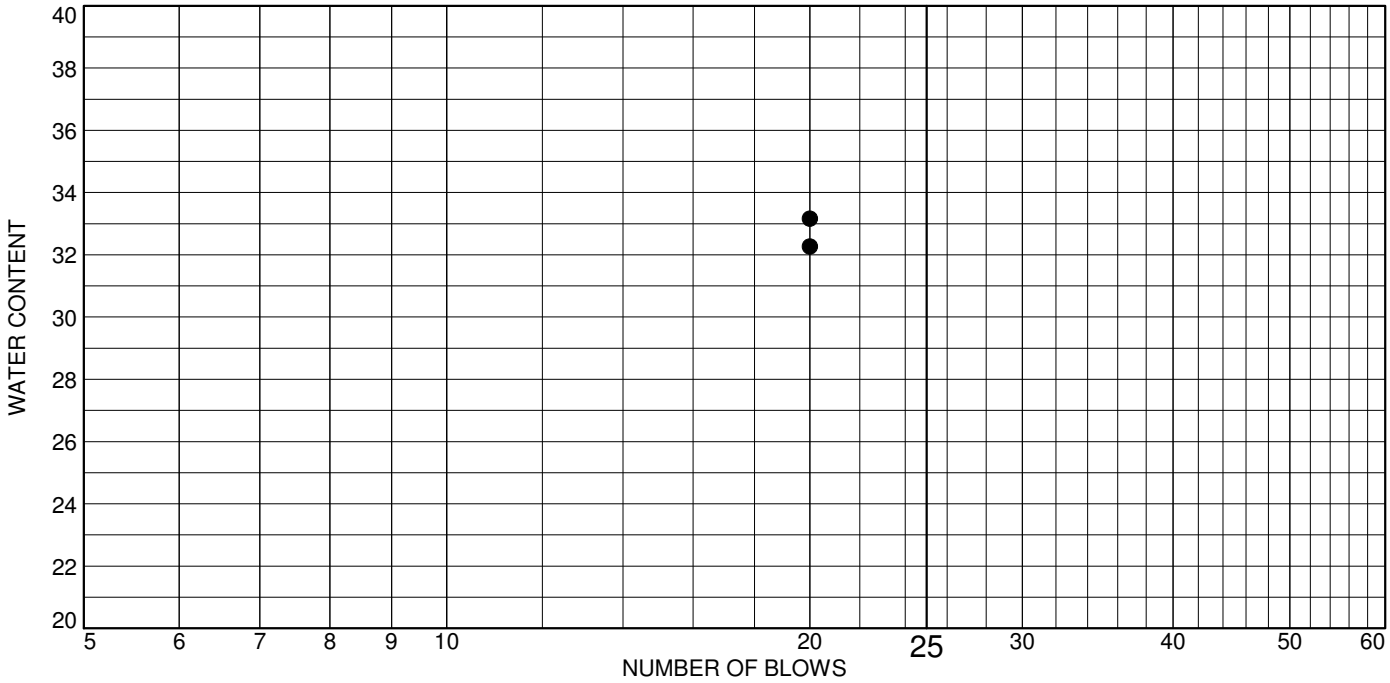
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	32	17	15	58.5	47.1	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

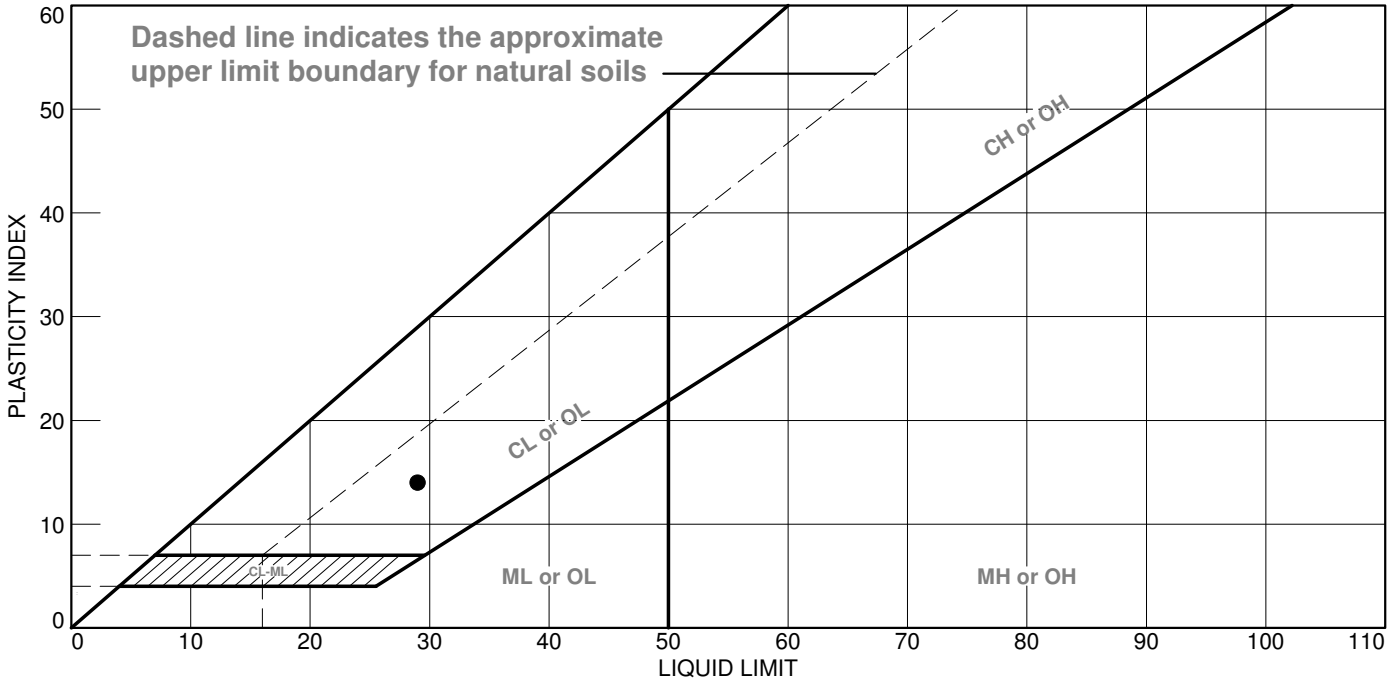
Location: GH11-240, Area A
Sample Number: SPT 5 **Depth:** 23-24.5'

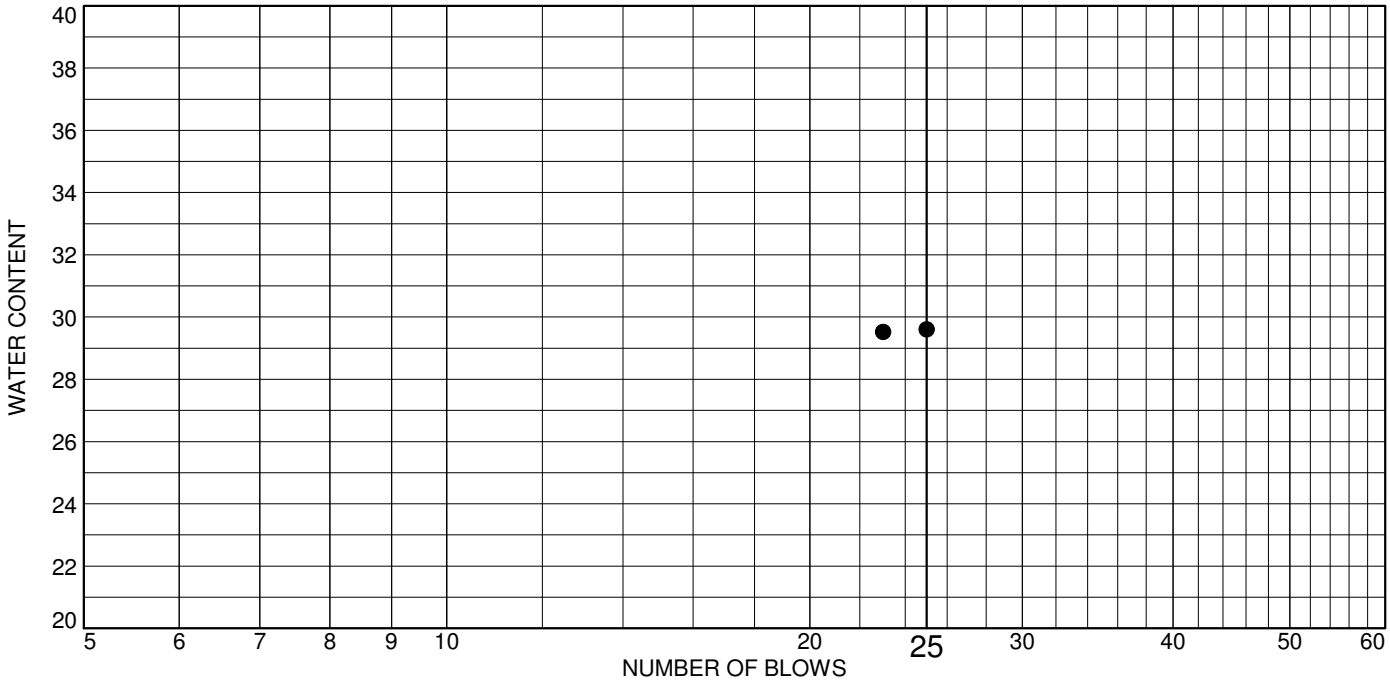
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	29	15	14	42.0	30.4	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

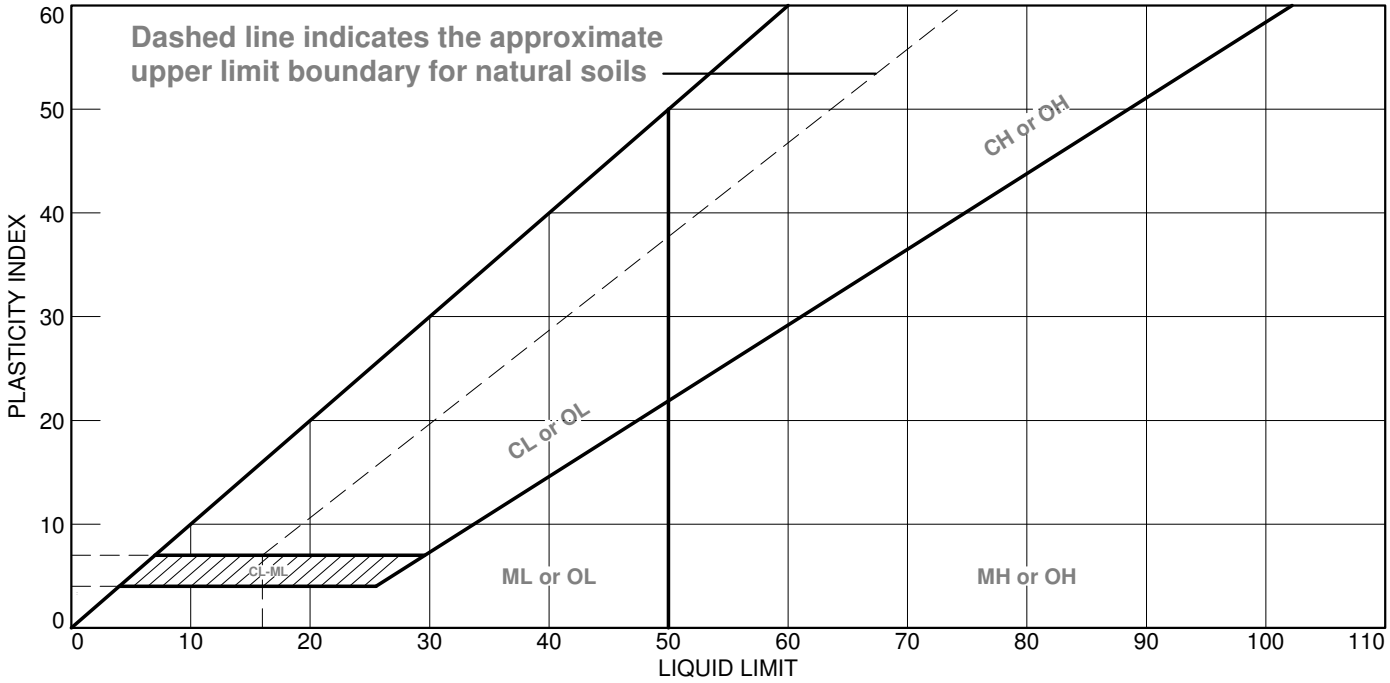
Location: GH11-240, Area A
Sample Number: SPT 8 **Depth:** 38-39.5'

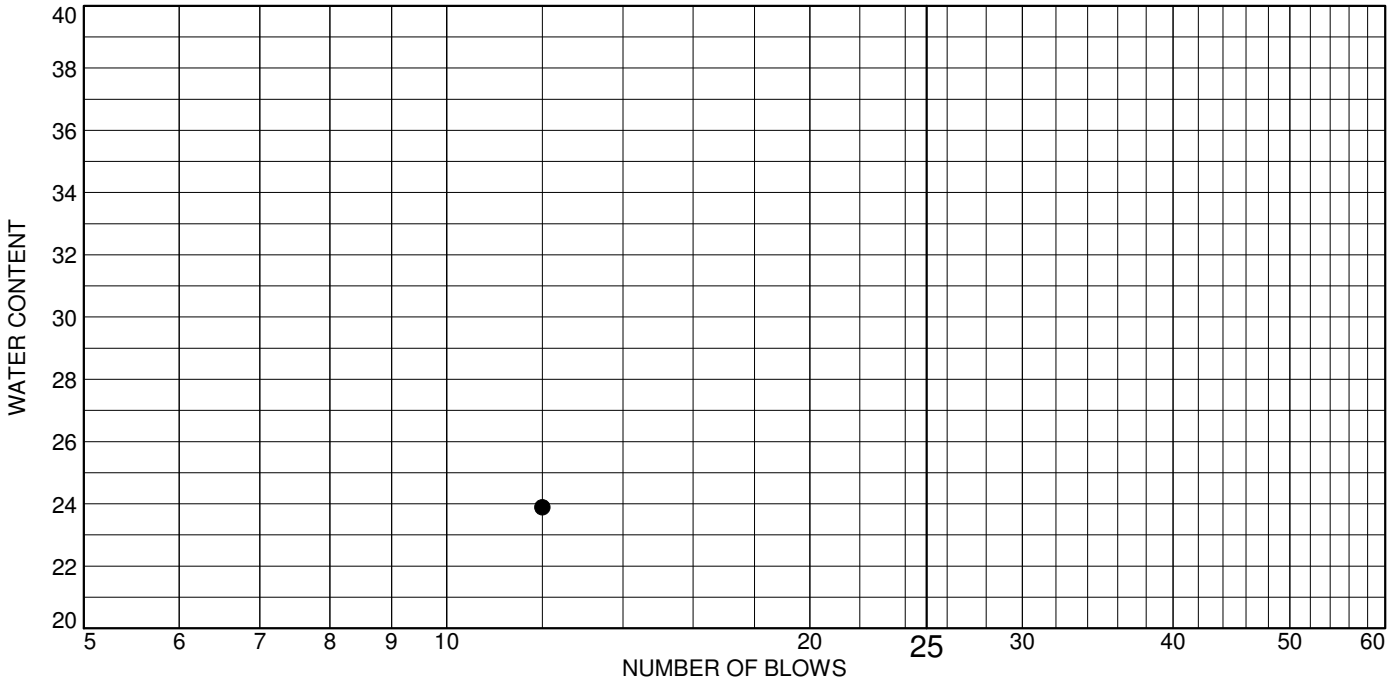
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded gravel with silt and sand	22	NP	NP	19.4	10.9	GP-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

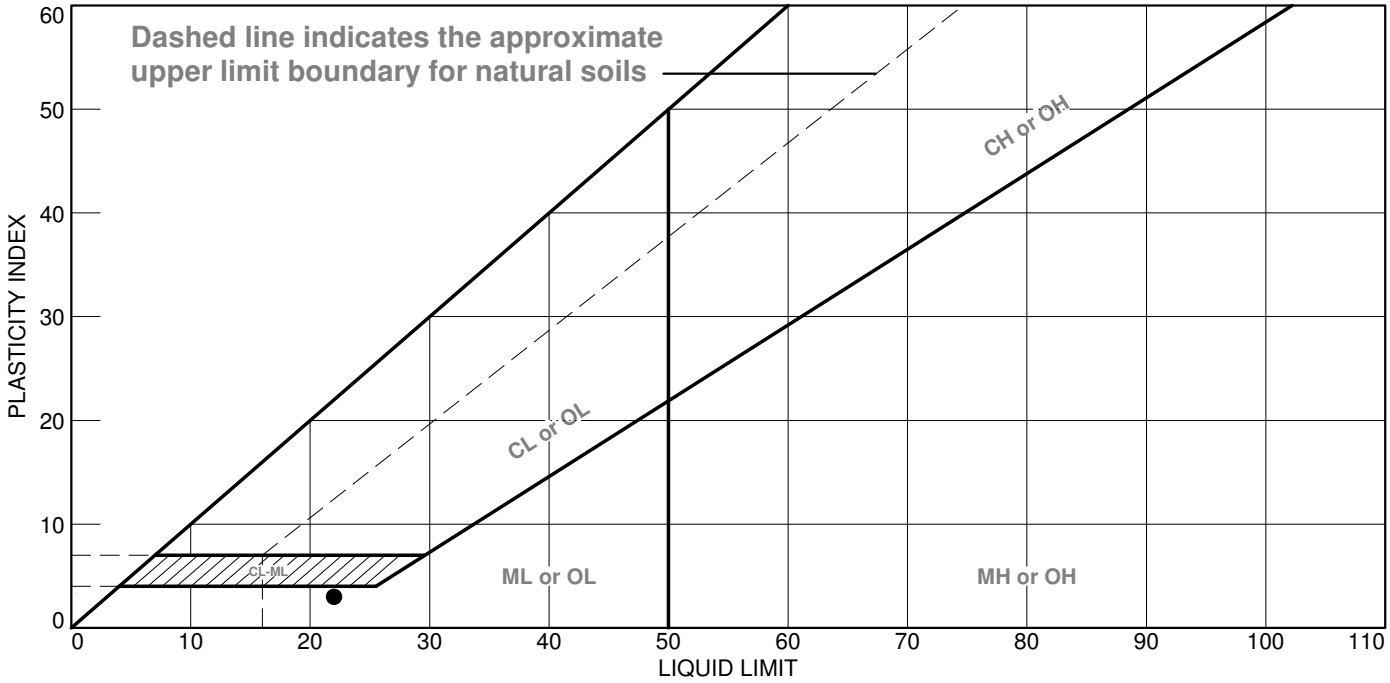
Location: GH11-240, Area A
Sample Number: SPT 11 **Depth:** 53-54.5'

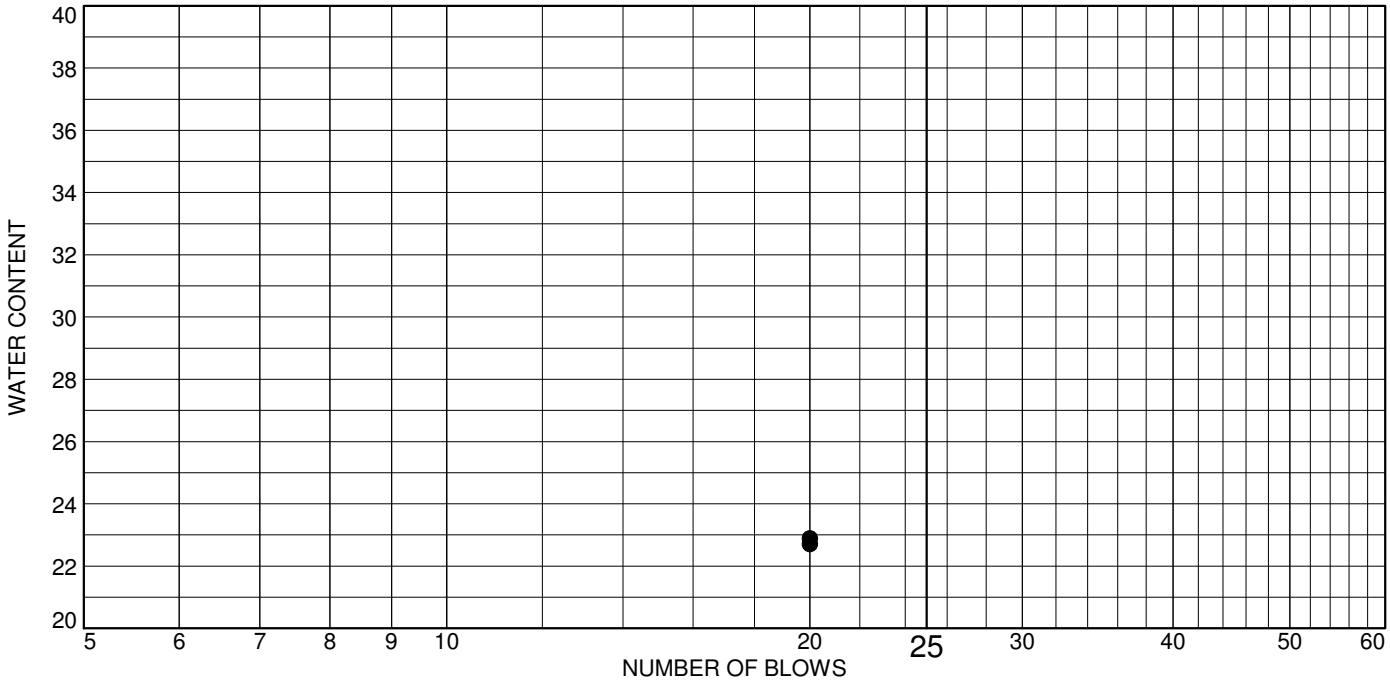
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded gravel with silt and sand	22	19	3	15.8	9.2	GP-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

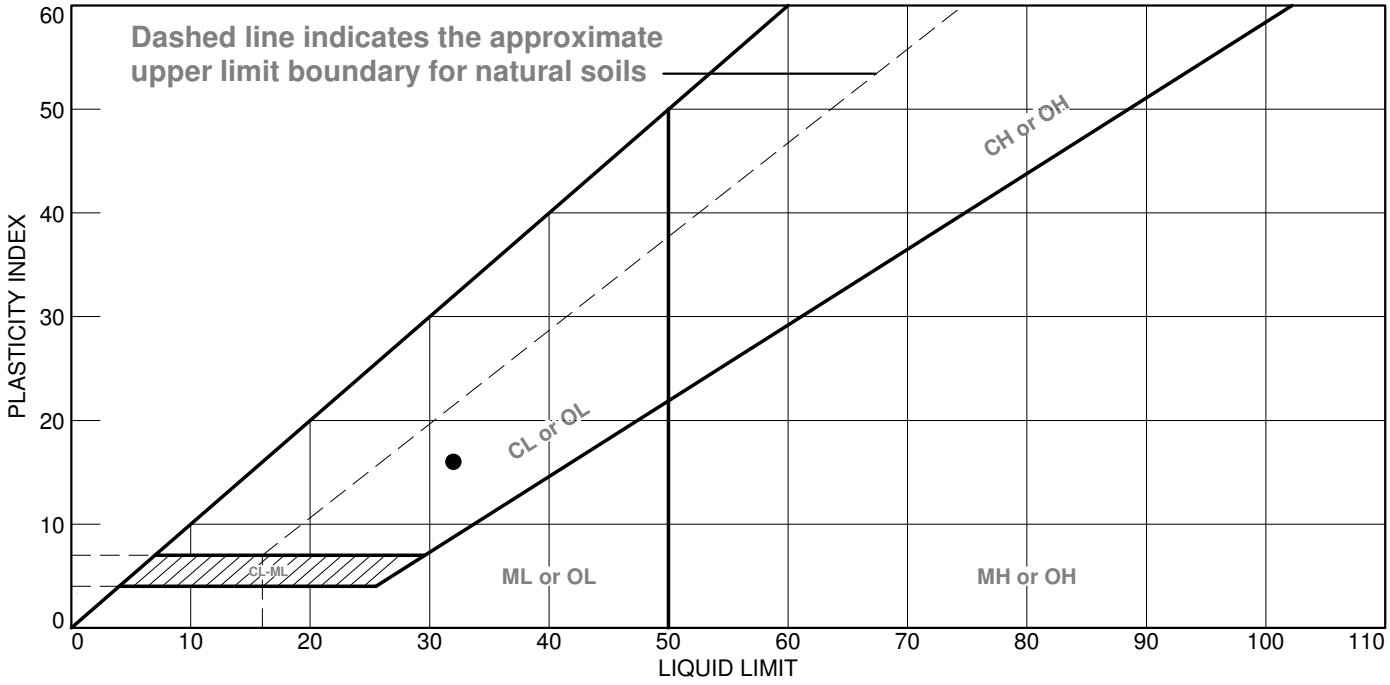
Location: GH11-240, Area A
Sample Number: SPT 12 **Depth:** 58-59.5'

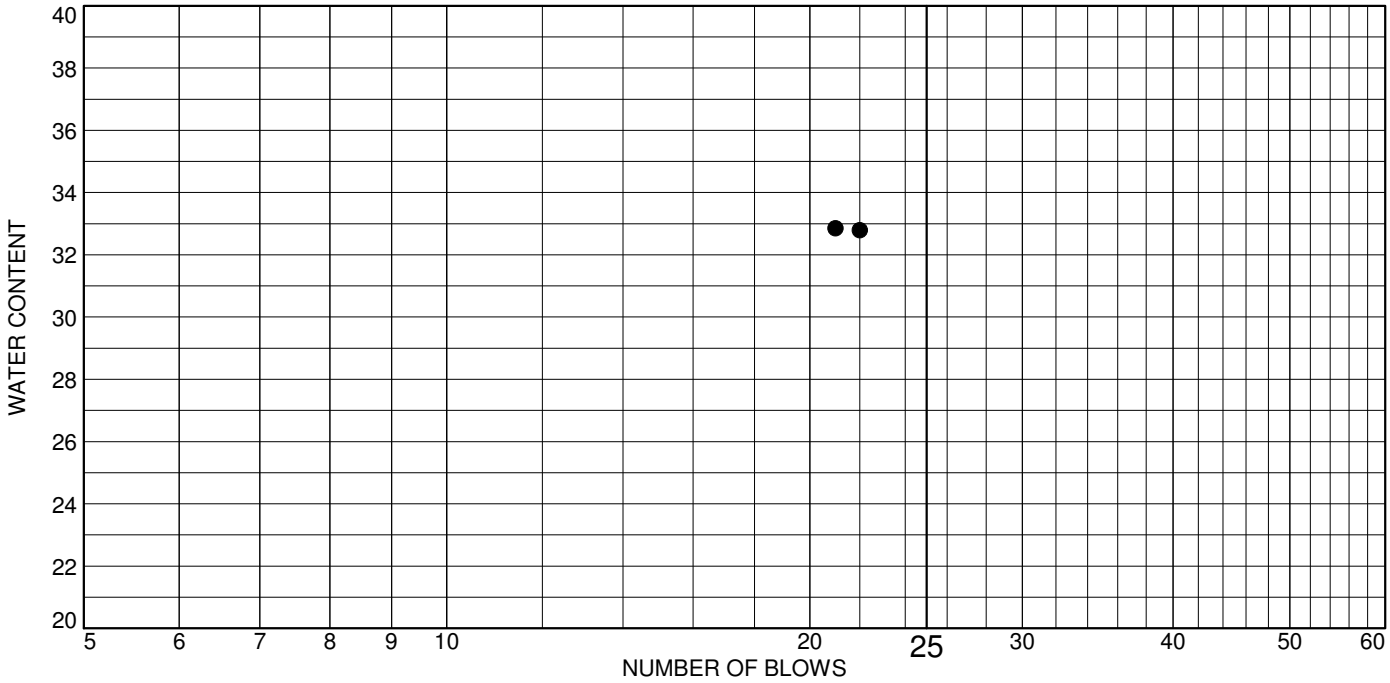
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	32	16	16	34.4	26.1	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

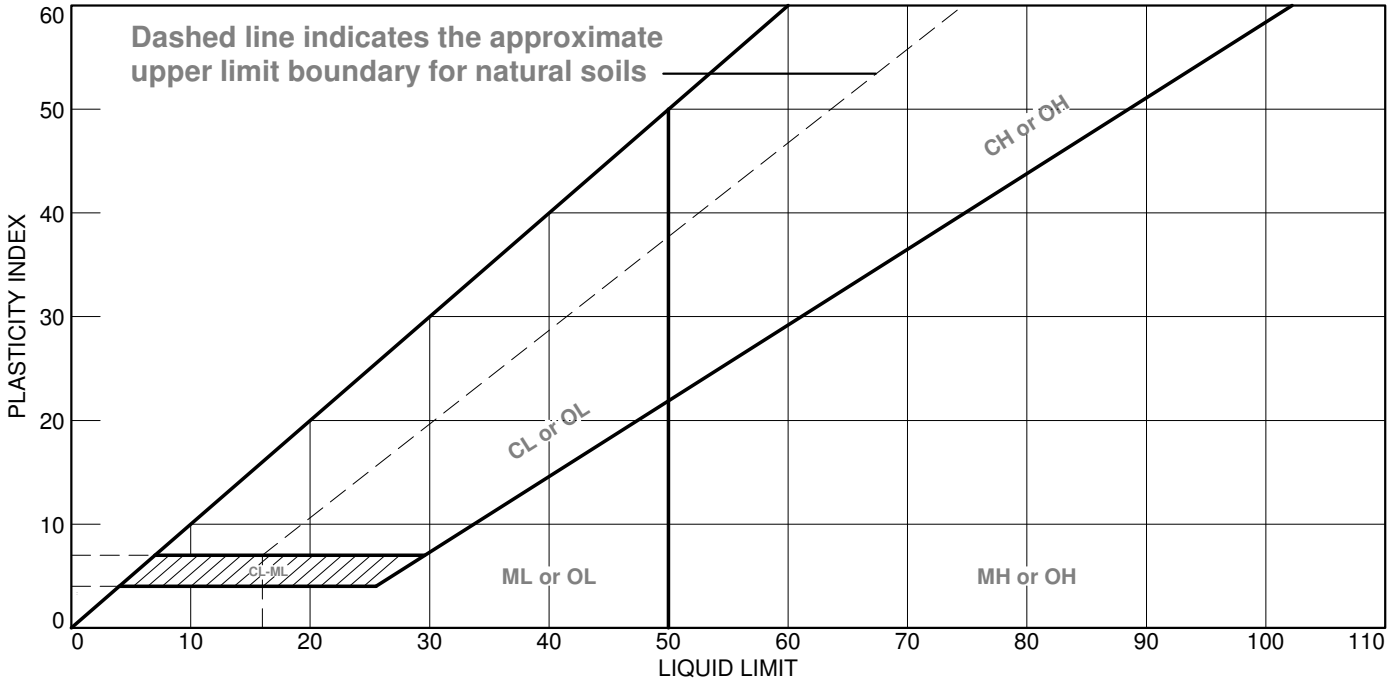
Location: GH11-240, Area A
Sample Number: SPT 14 **Depth:** 68-69.5'

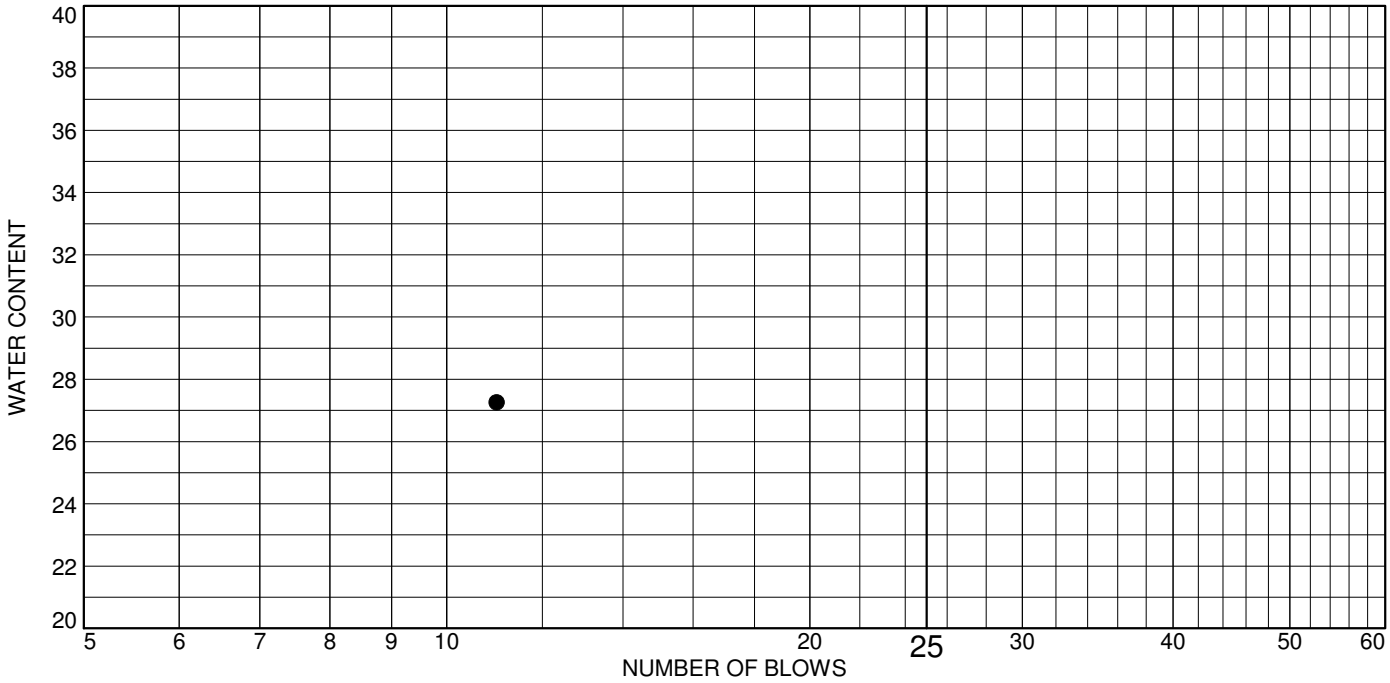
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded sand with silt and gravel	25	NP	NP	15.4	8.5	SW-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

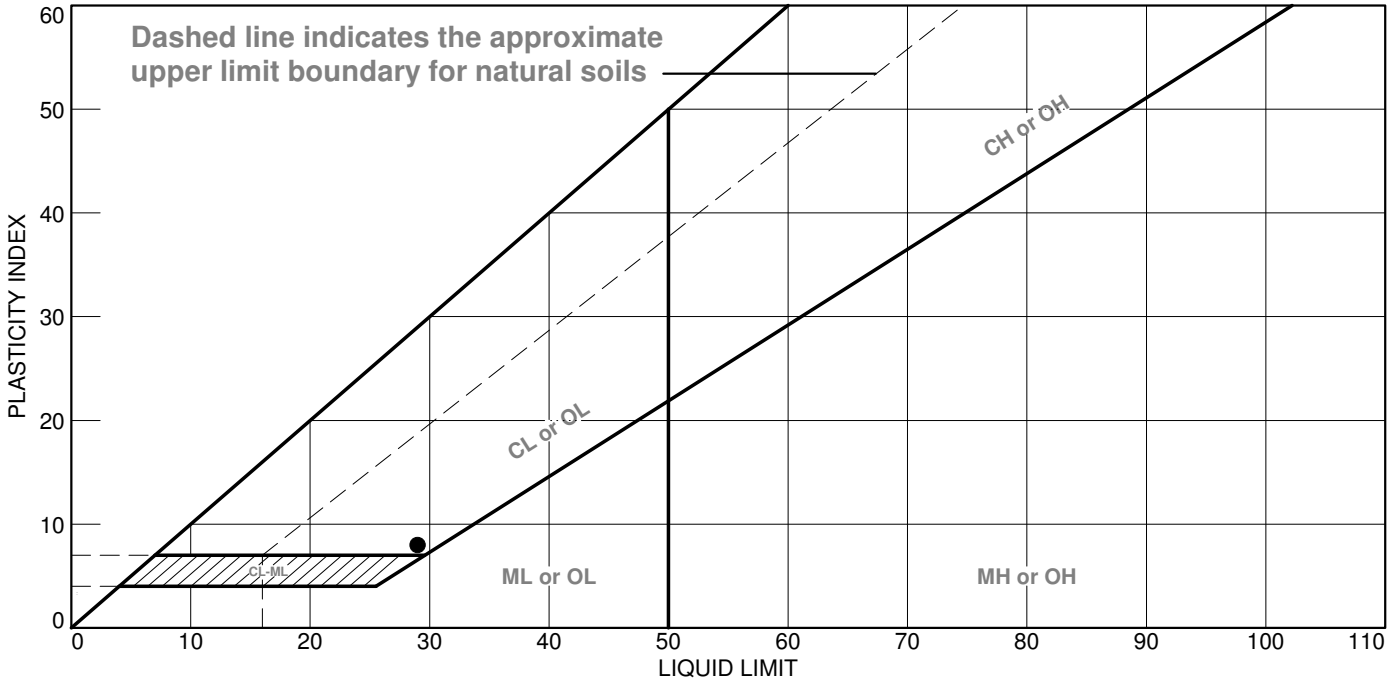
Location: GH11-240, Area A
Sample Number: SPT 17 **Depth:** 83-84.5'

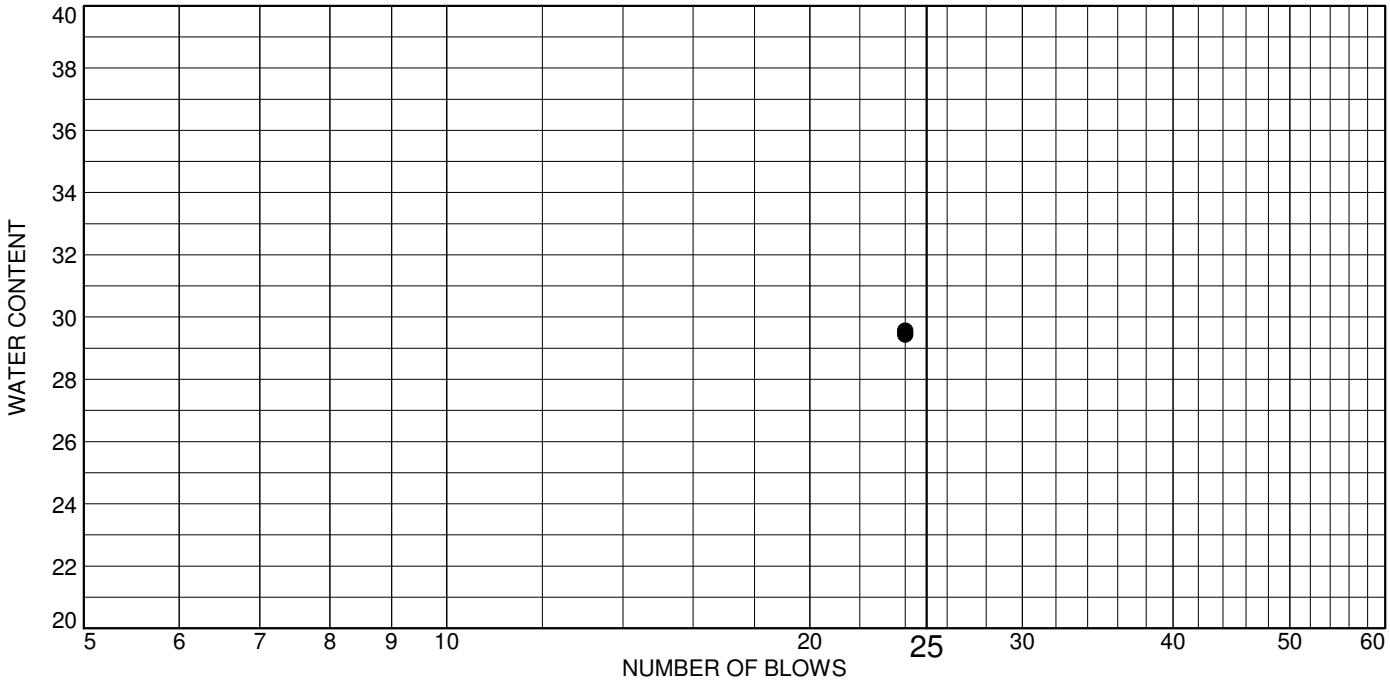
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	29	21	8	32.0	20.5	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

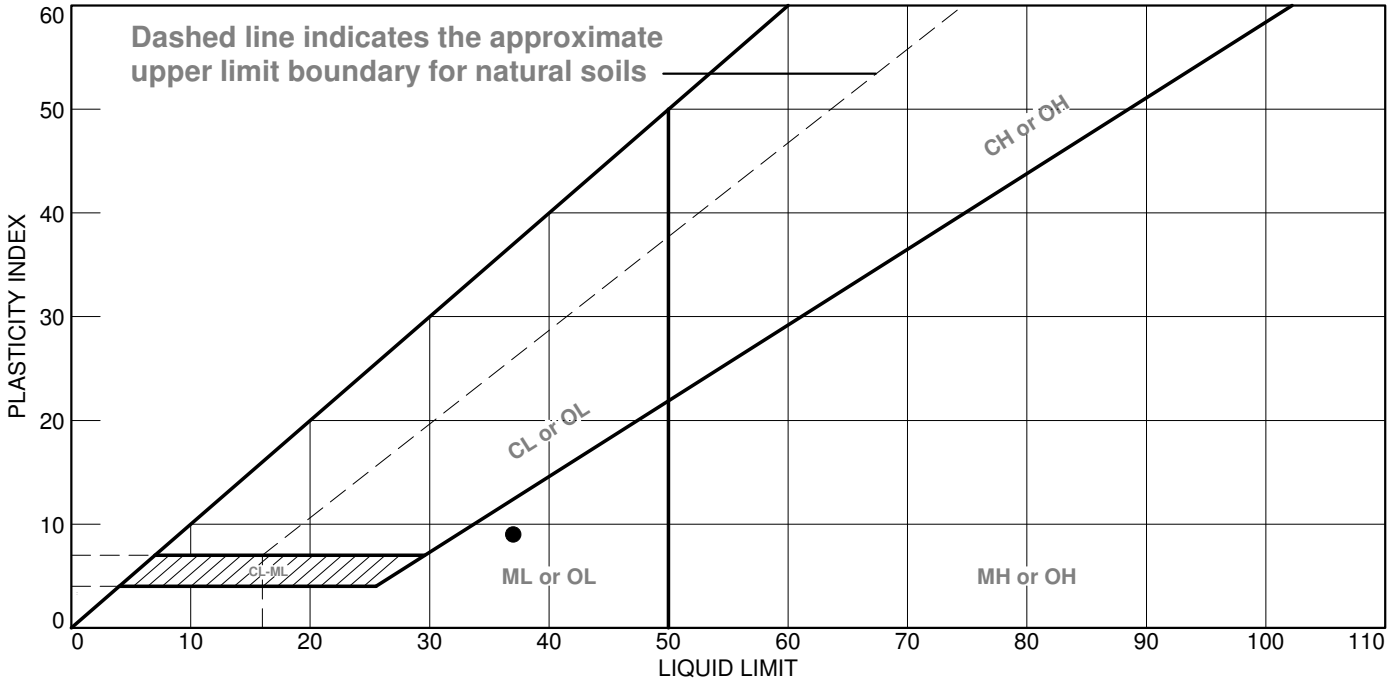
Location: GH11-240, Area A
Sample Number: SPT 18 **Depth:** 88-89.5'

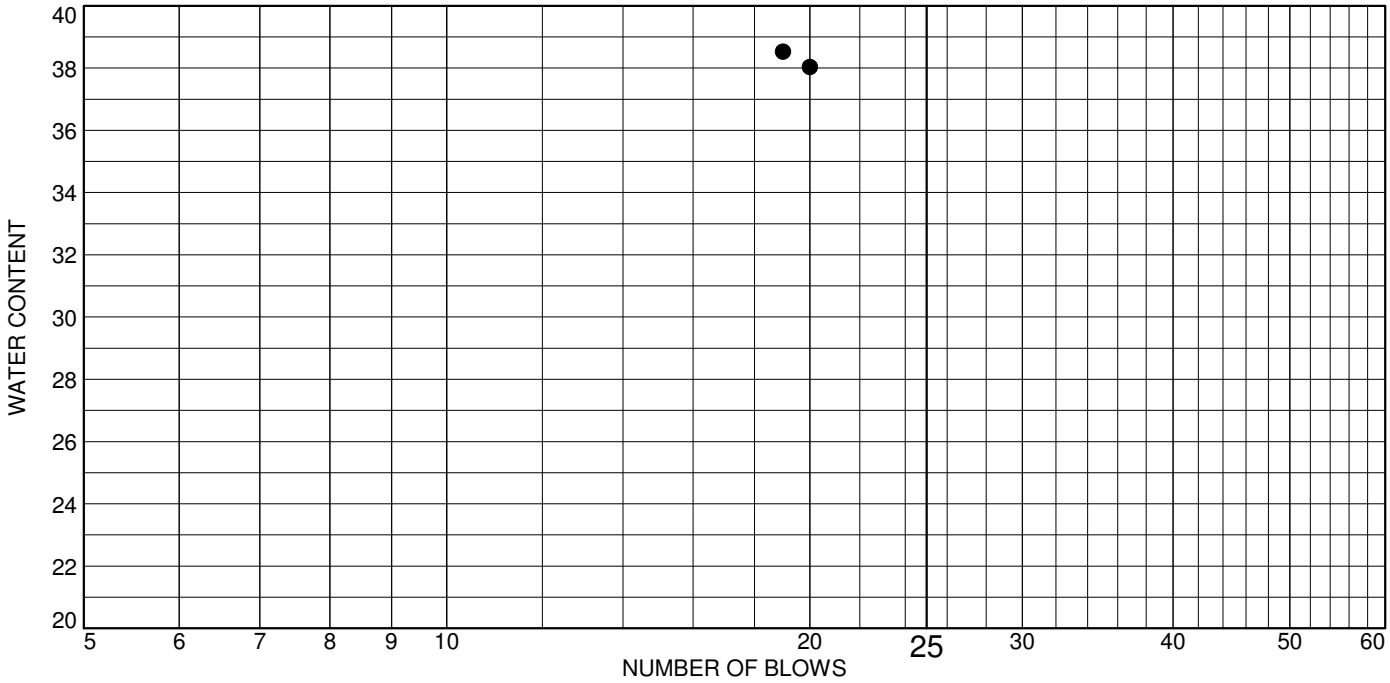
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand	37	28	9	63.5	49.5	SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

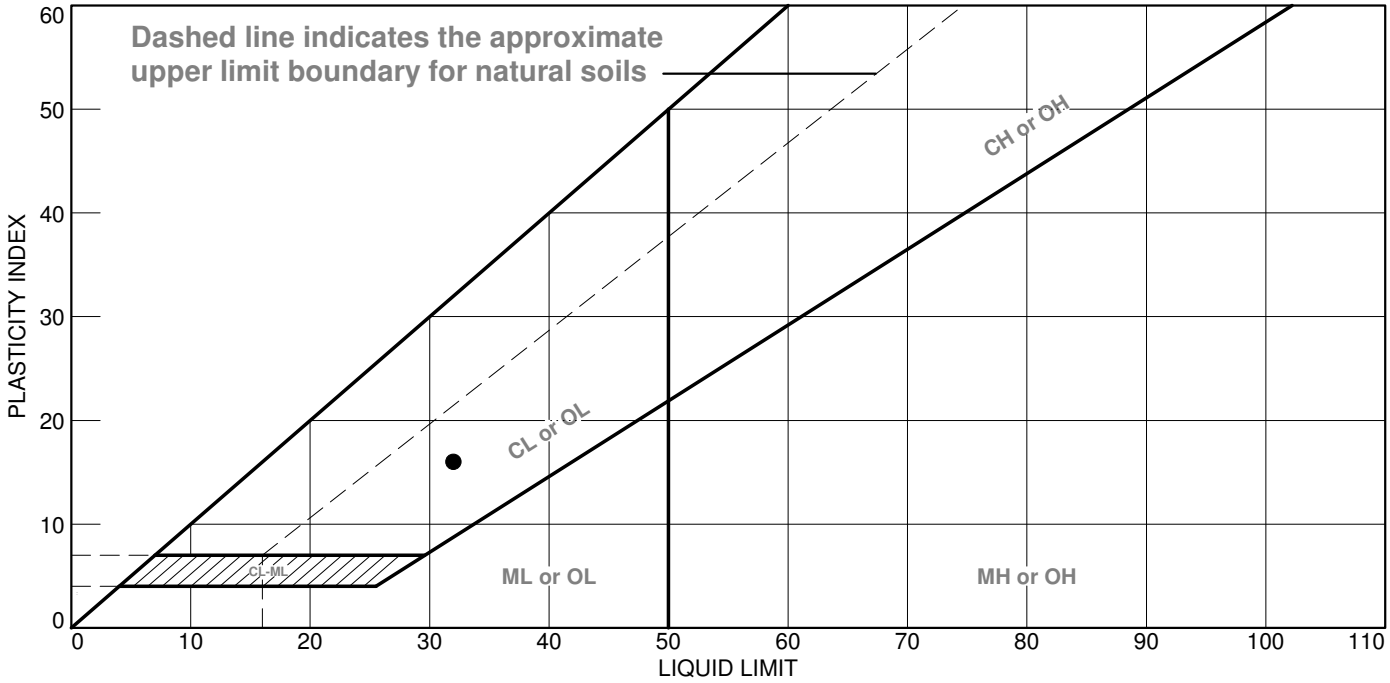
Location: GH11-240, Area A
Sample Number: SPT 19 **Depth:** 93-94.5'

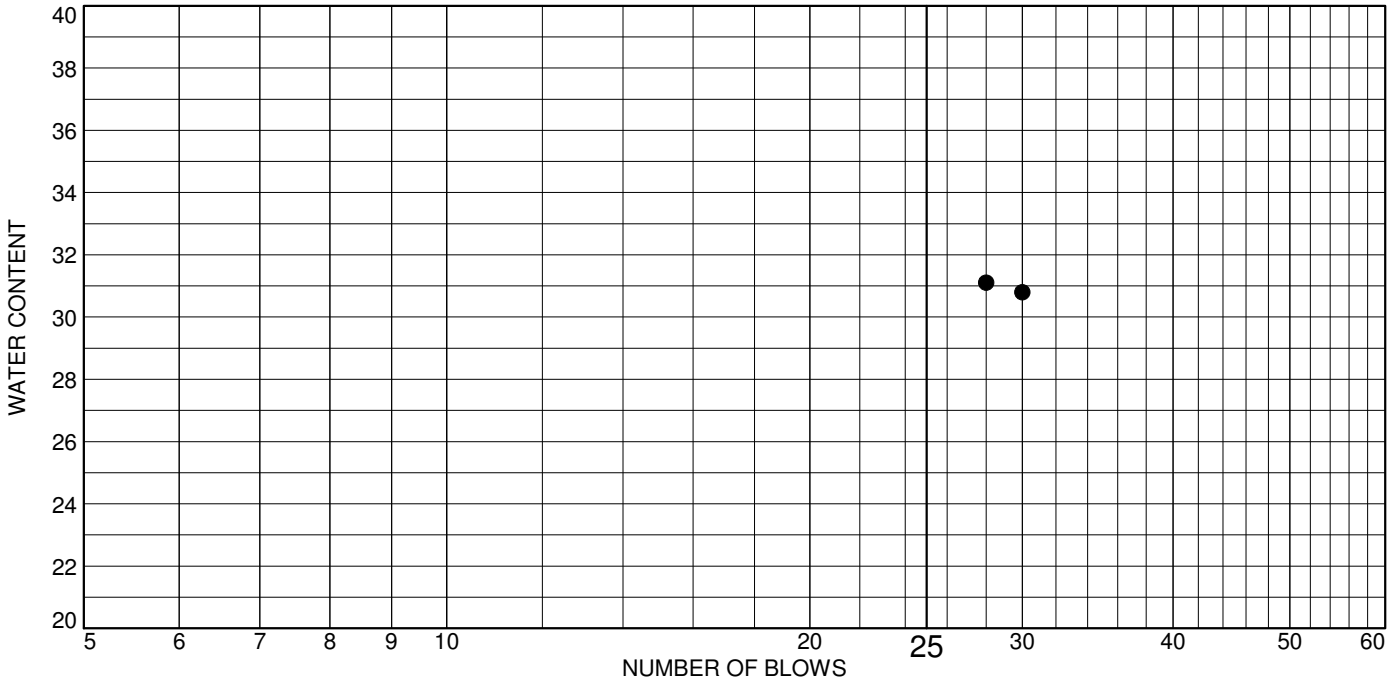
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	32	16	16	49.3	34.1	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

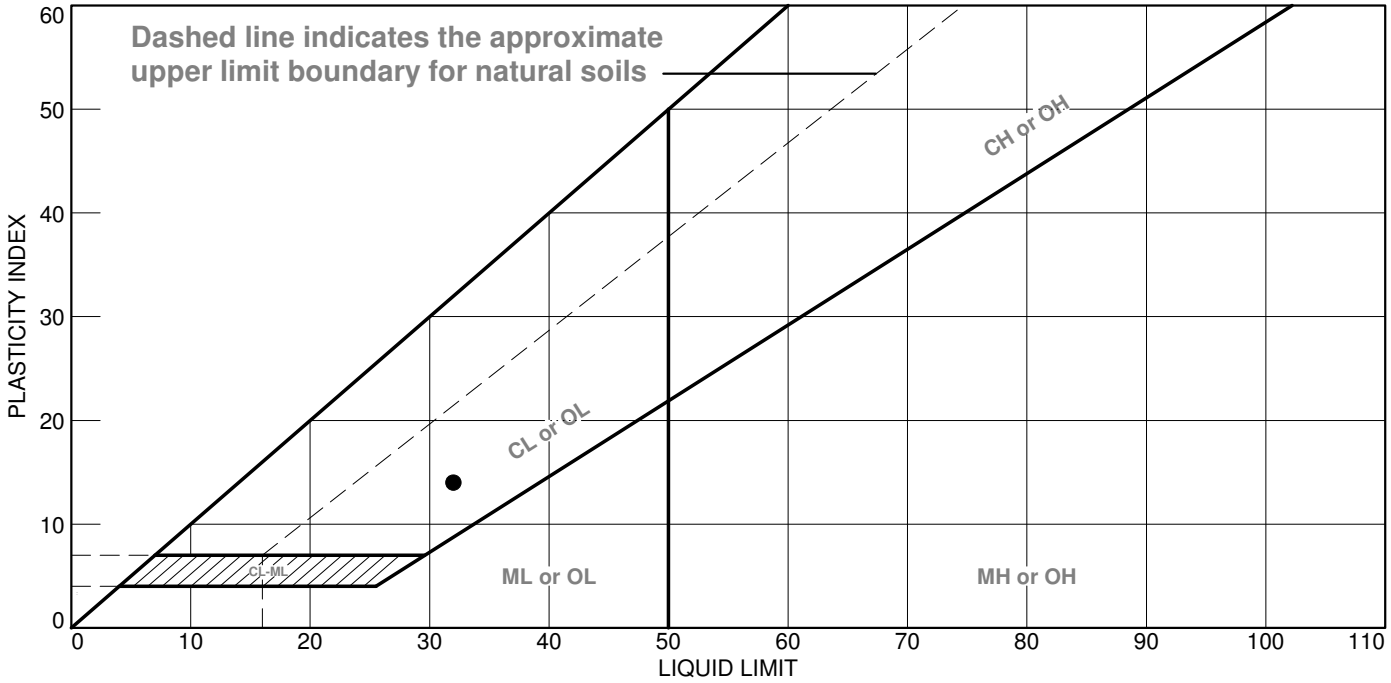
Location: GH11-241, Area A
Sample Number: GH11-241-1 **Depth:** 19-20.5'

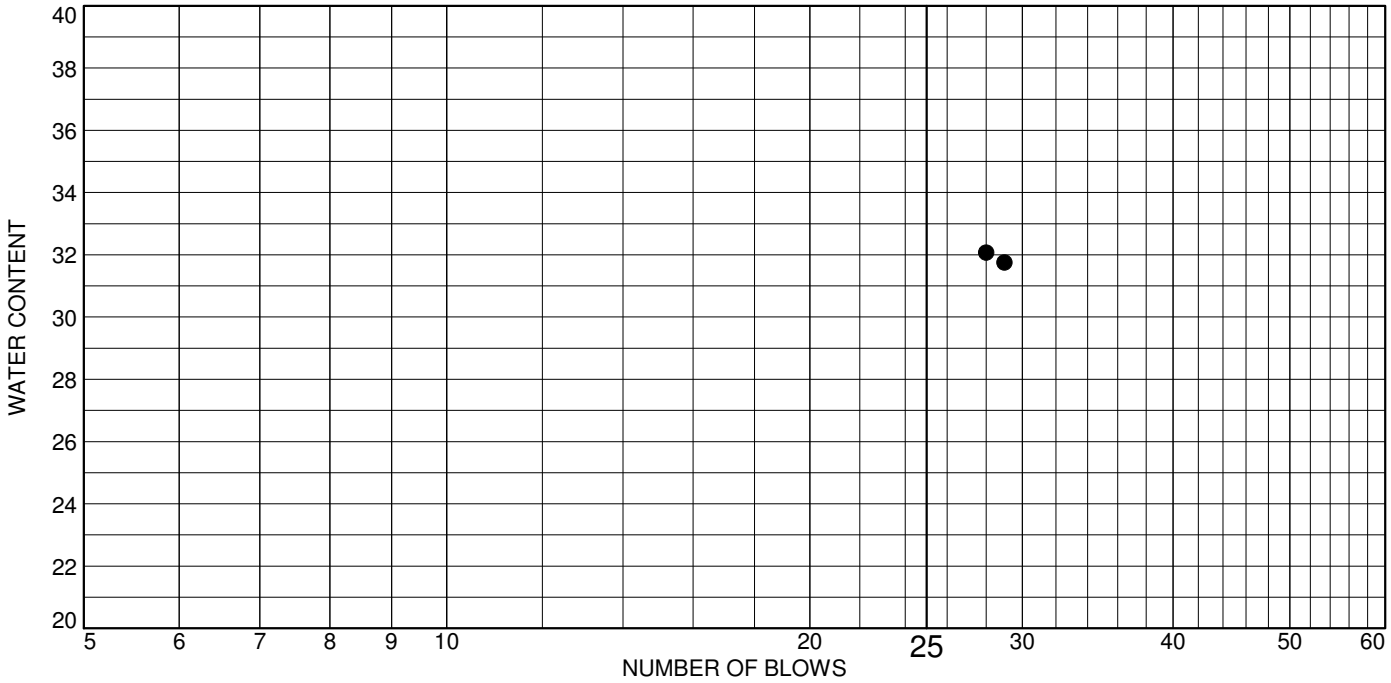
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay	32	18	14	80.1	60.3	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

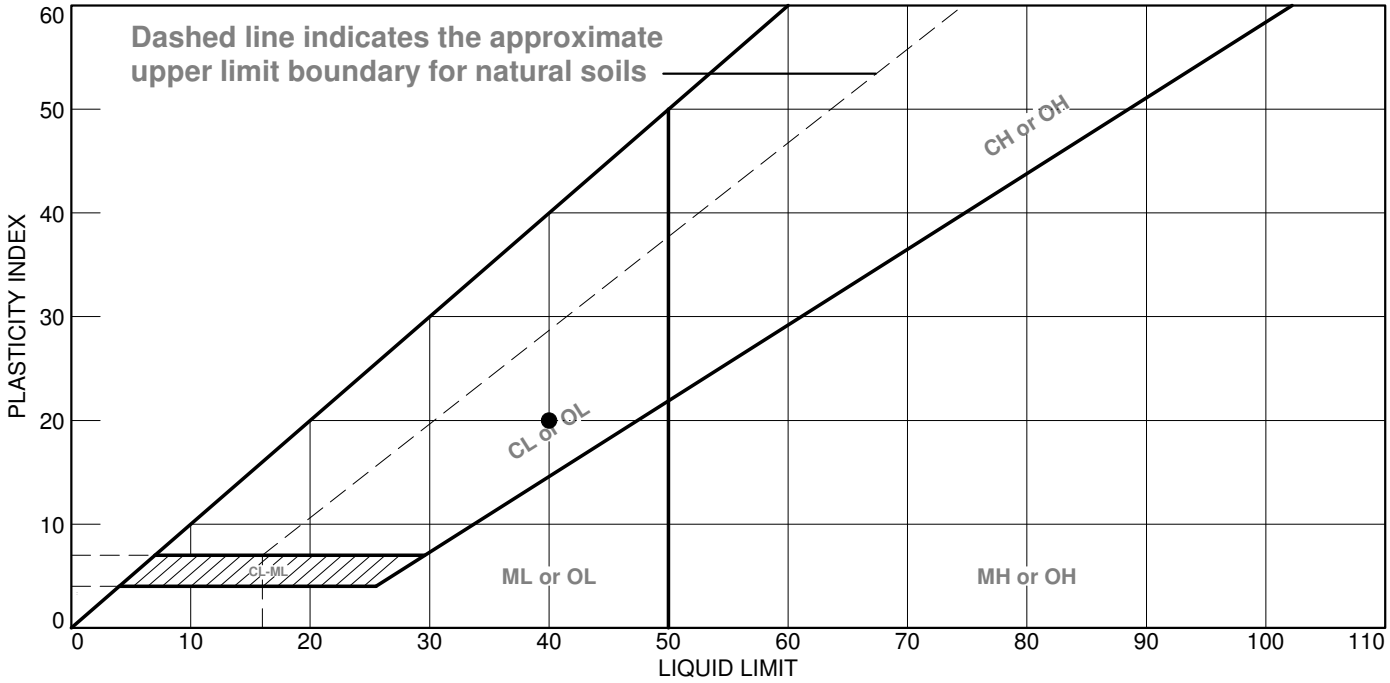
Location: GH11-241, Area A
Sample Number: GH11-241-2 **Depth:** 82.5-83'

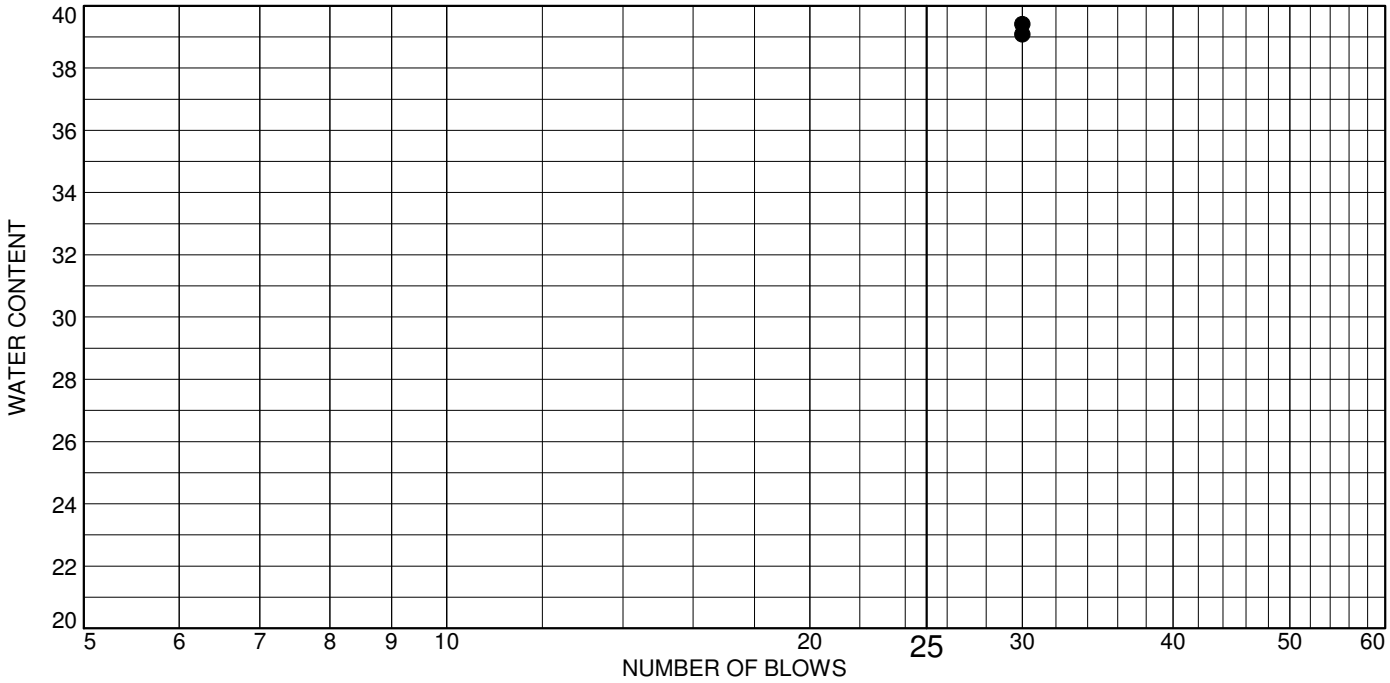
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay	40	20	20	99.7	97.2	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

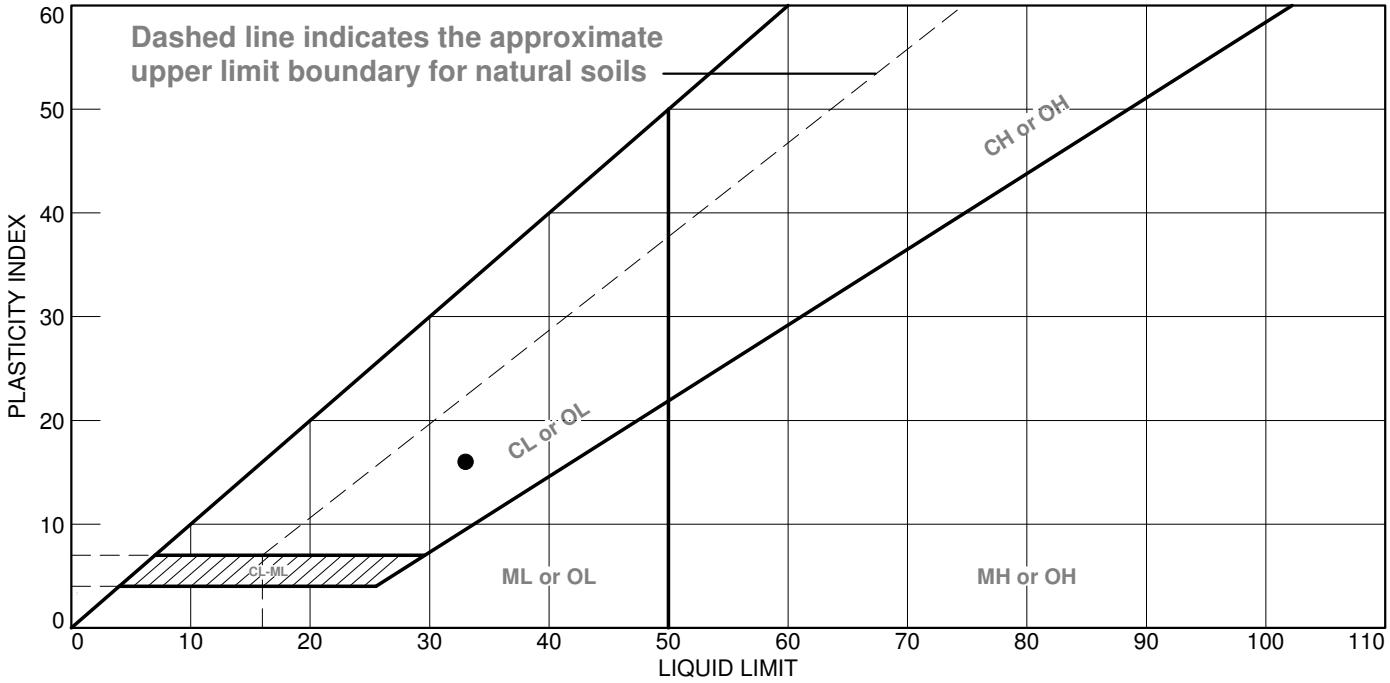
Location: GH11-241, Area A
Sample Number: GH11-241-3 **Depth:** 213.5-214'

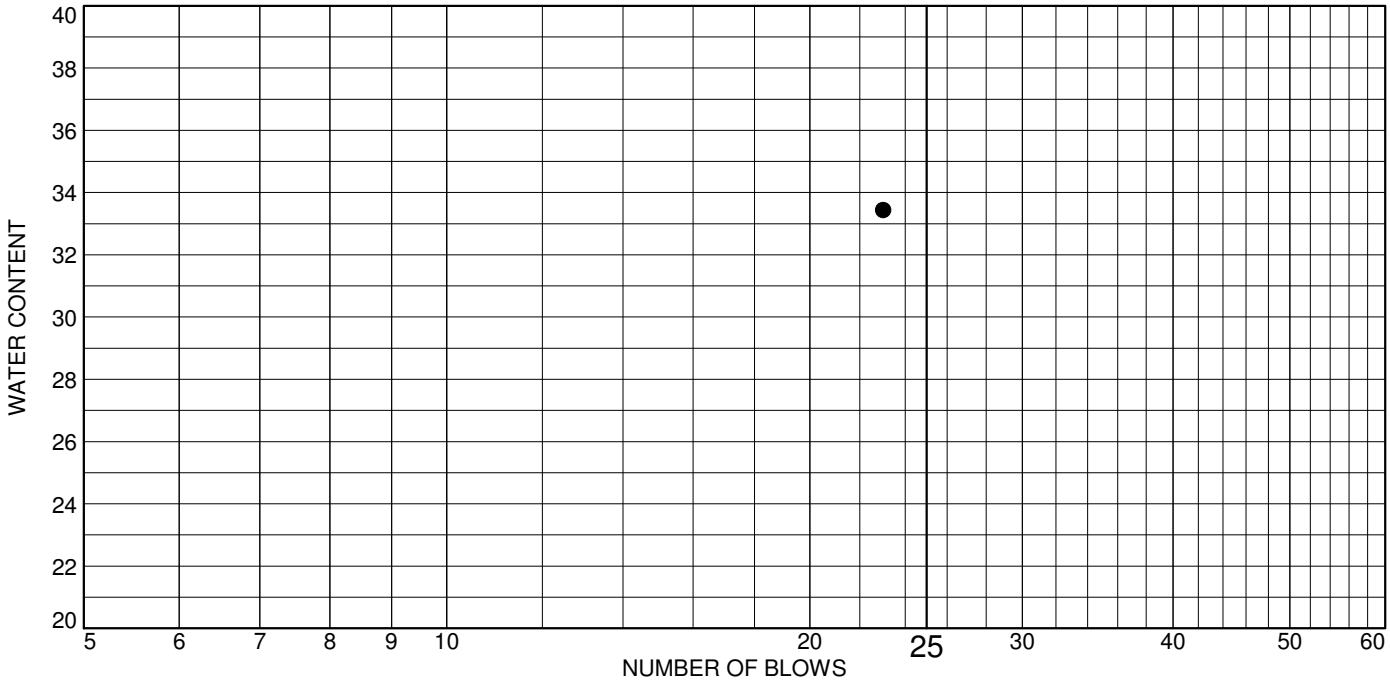
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	33	17	16	54.4	40.2	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

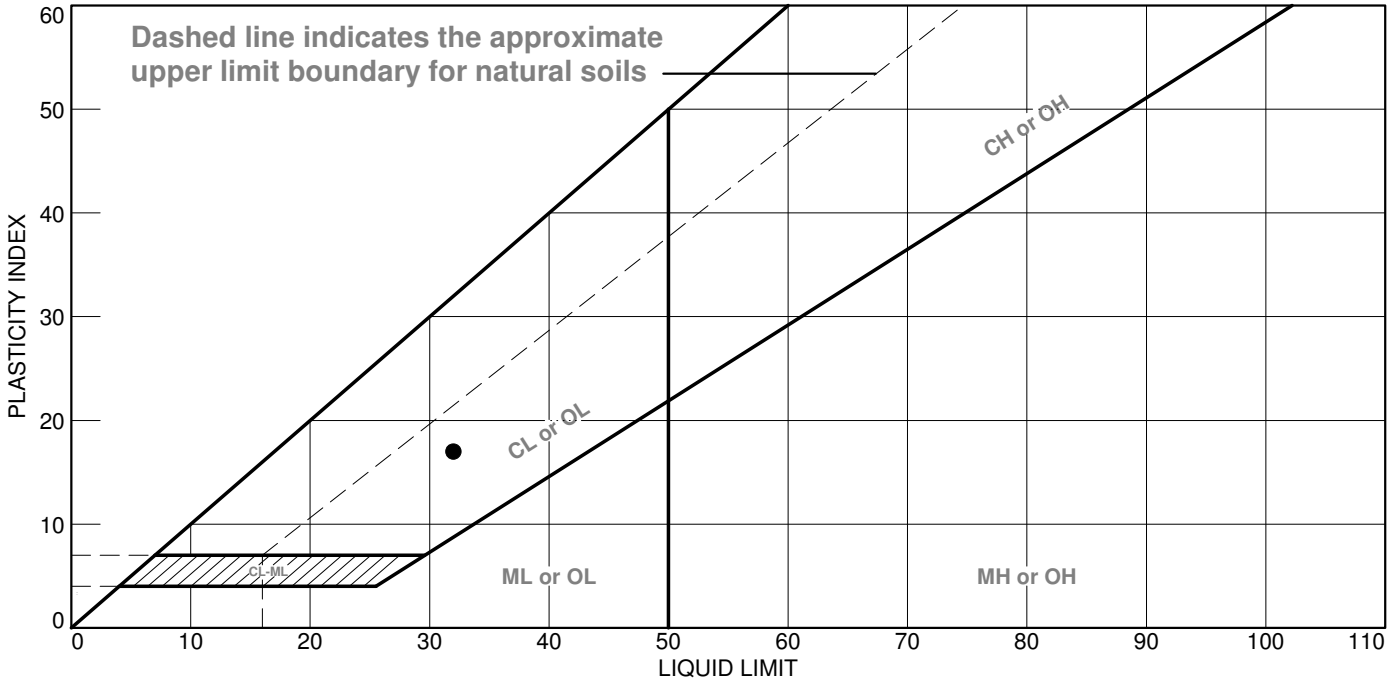
Location: GH11-241, Area A
Sample Number: SPT 1 **Depth:** 4-5.5'

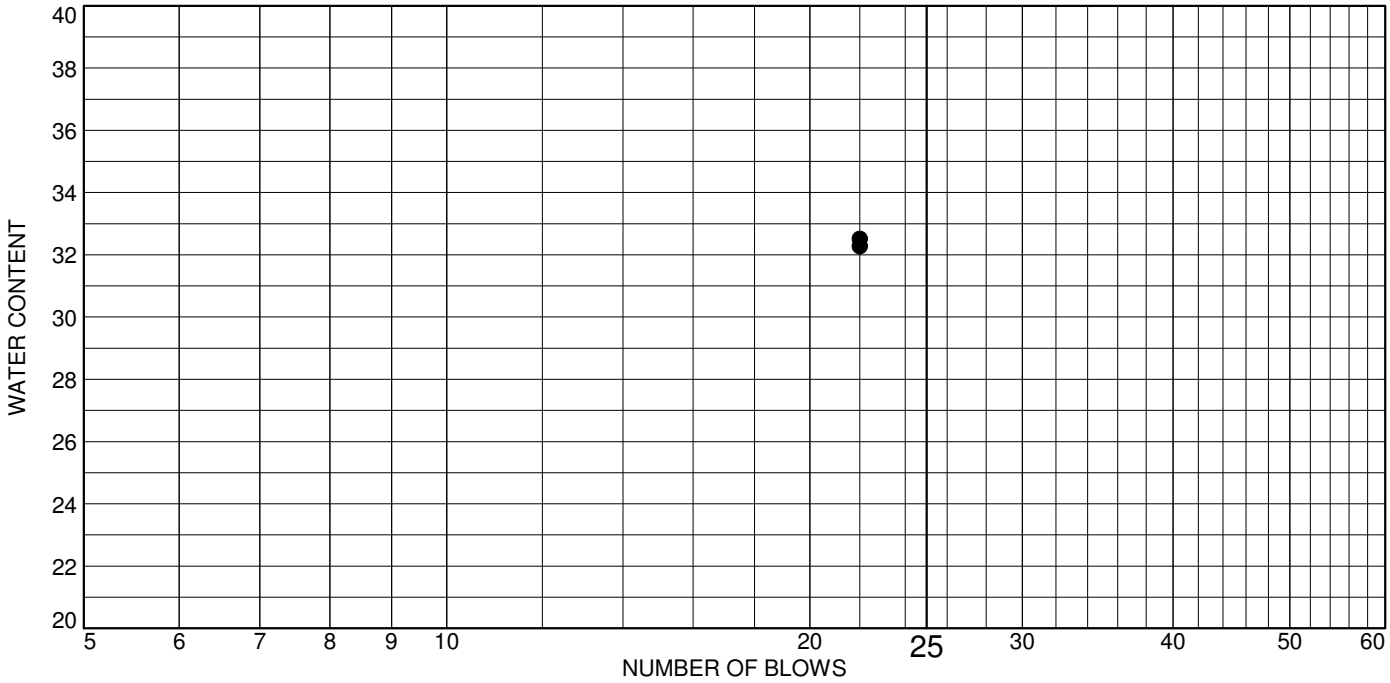
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	32	15	17	60.7	42.9	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

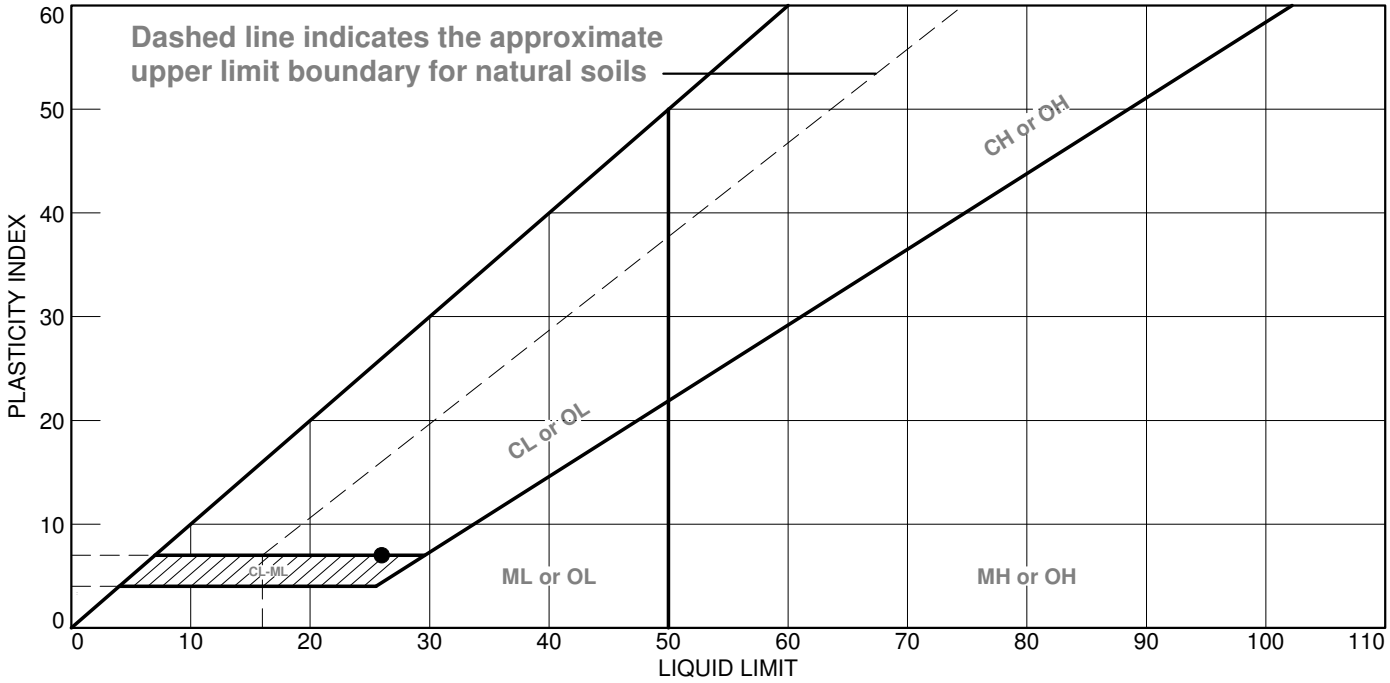
Location: GH11-241, Area A
Sample Number: SPT 3 **Depth:** 14-15.5'

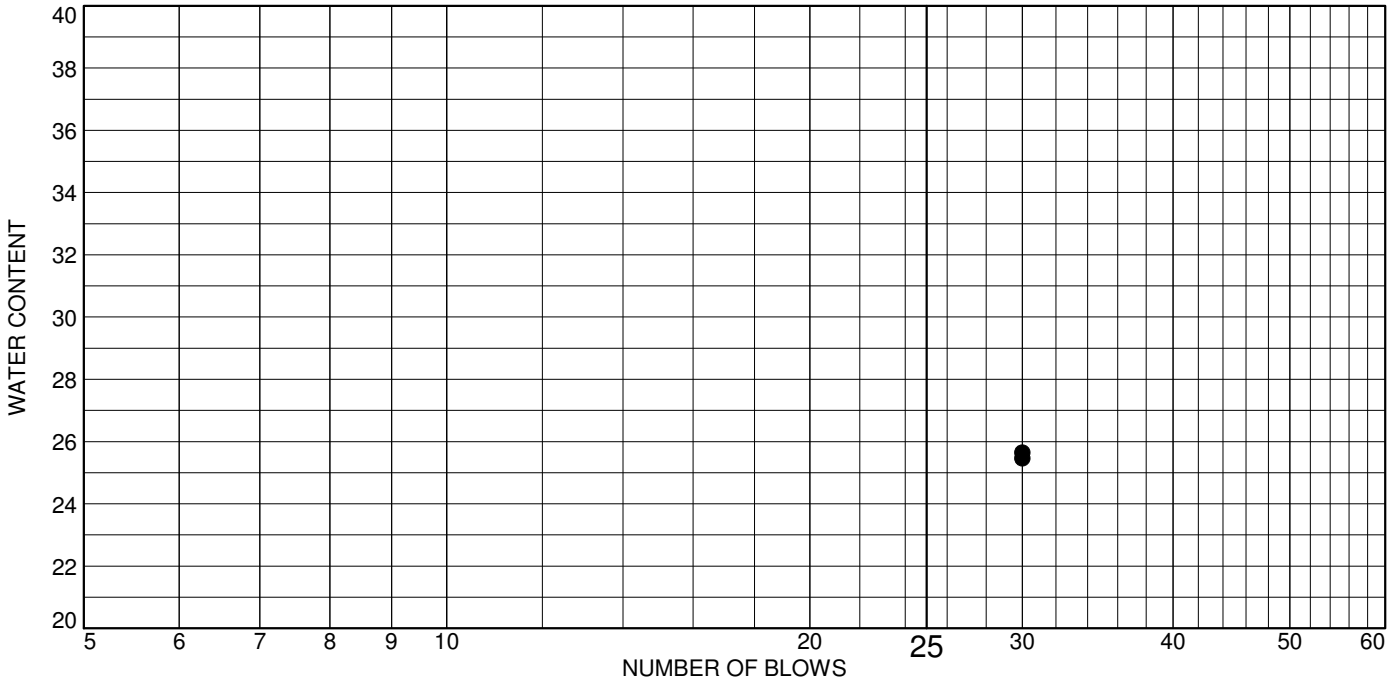
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty, clayey sand with gravel	26	19	7	59.3	40.3	SC-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

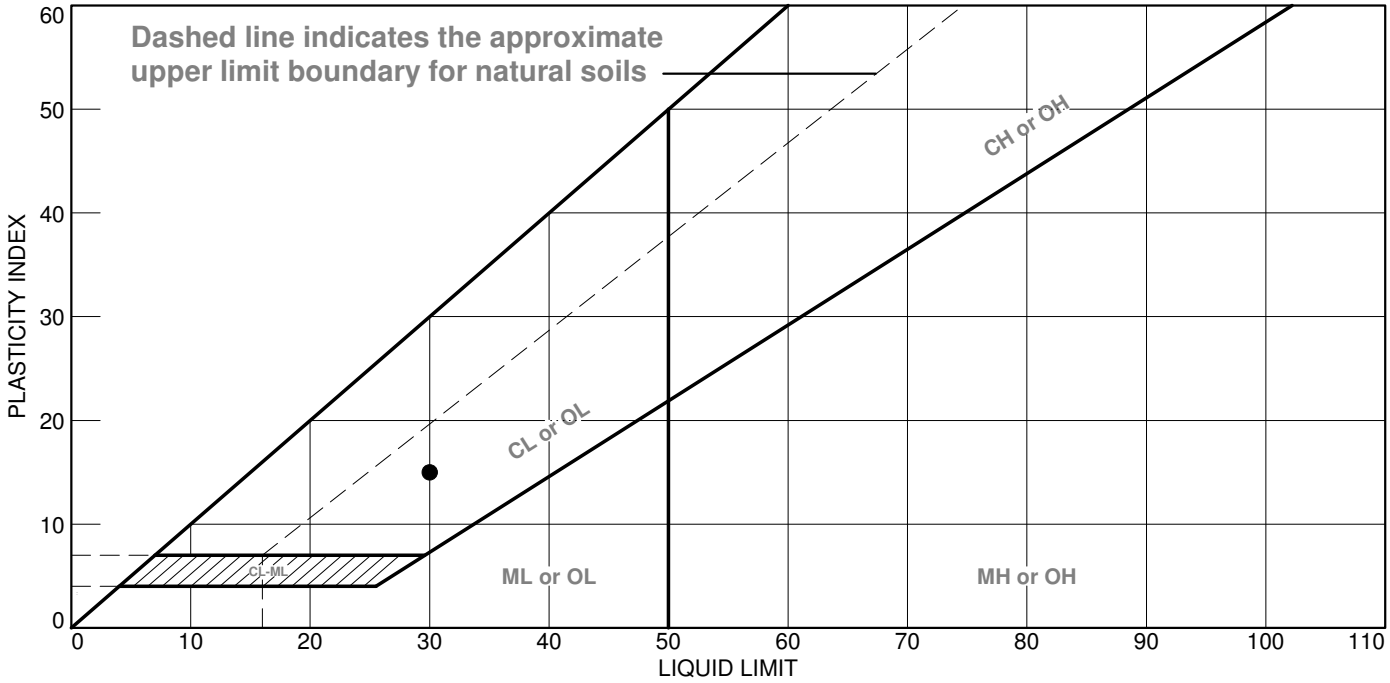
Location: GH11-241, Area A
Sample Number: SPT 5 **Depth:** 29-30.5'

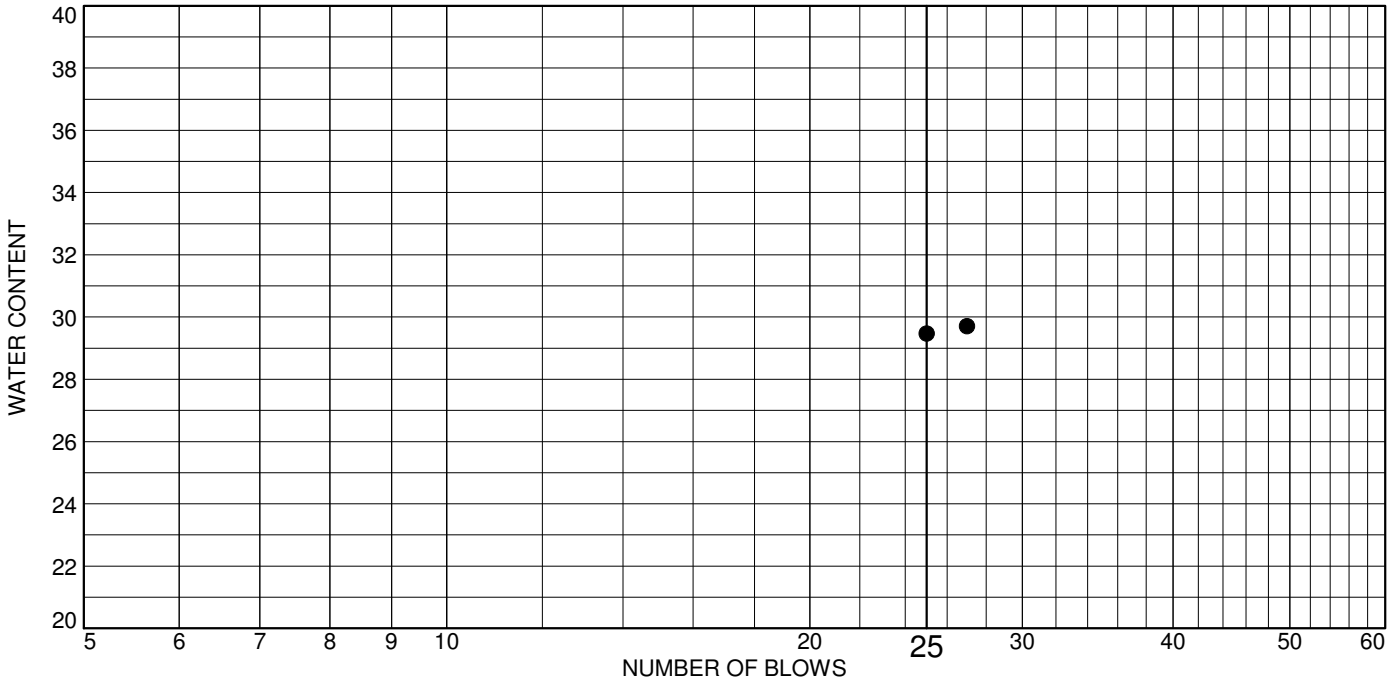
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	30	15	15	58.8	42.0	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

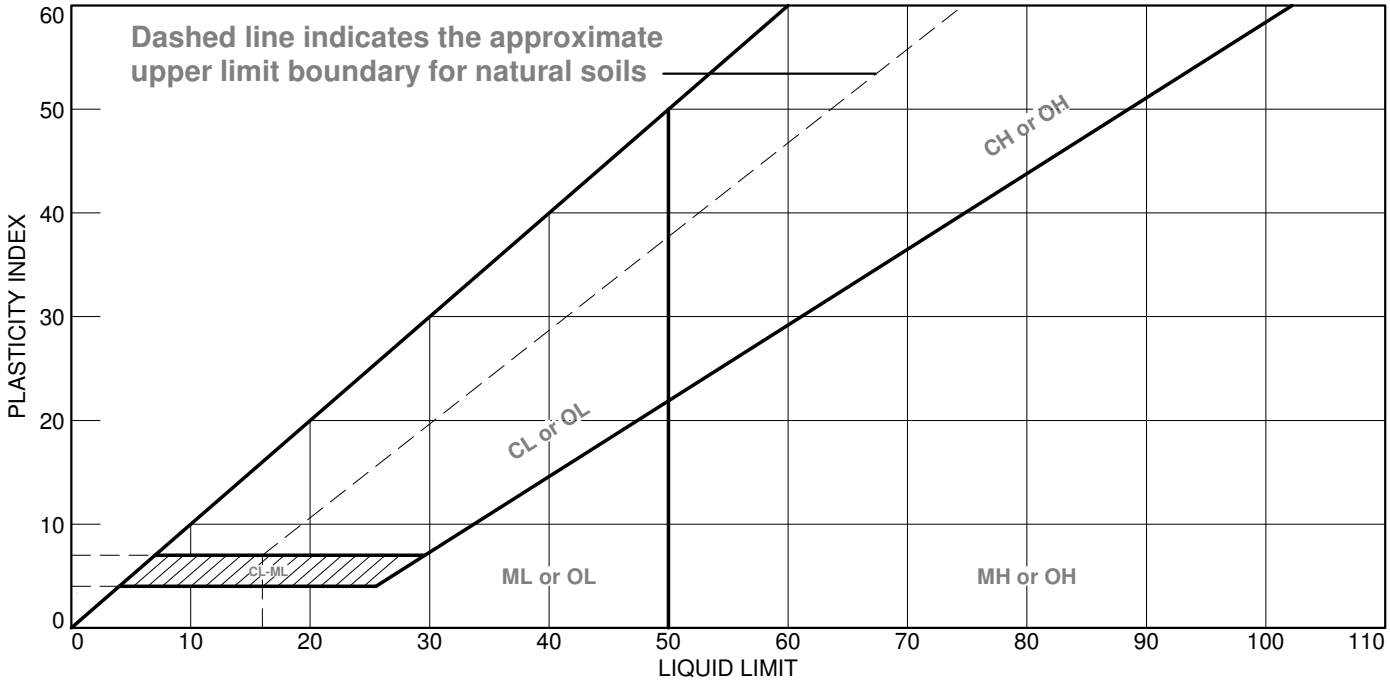
Location: GH11-241, Area A
Sample Number: SPT 9 **Depth:** 49-50.5'

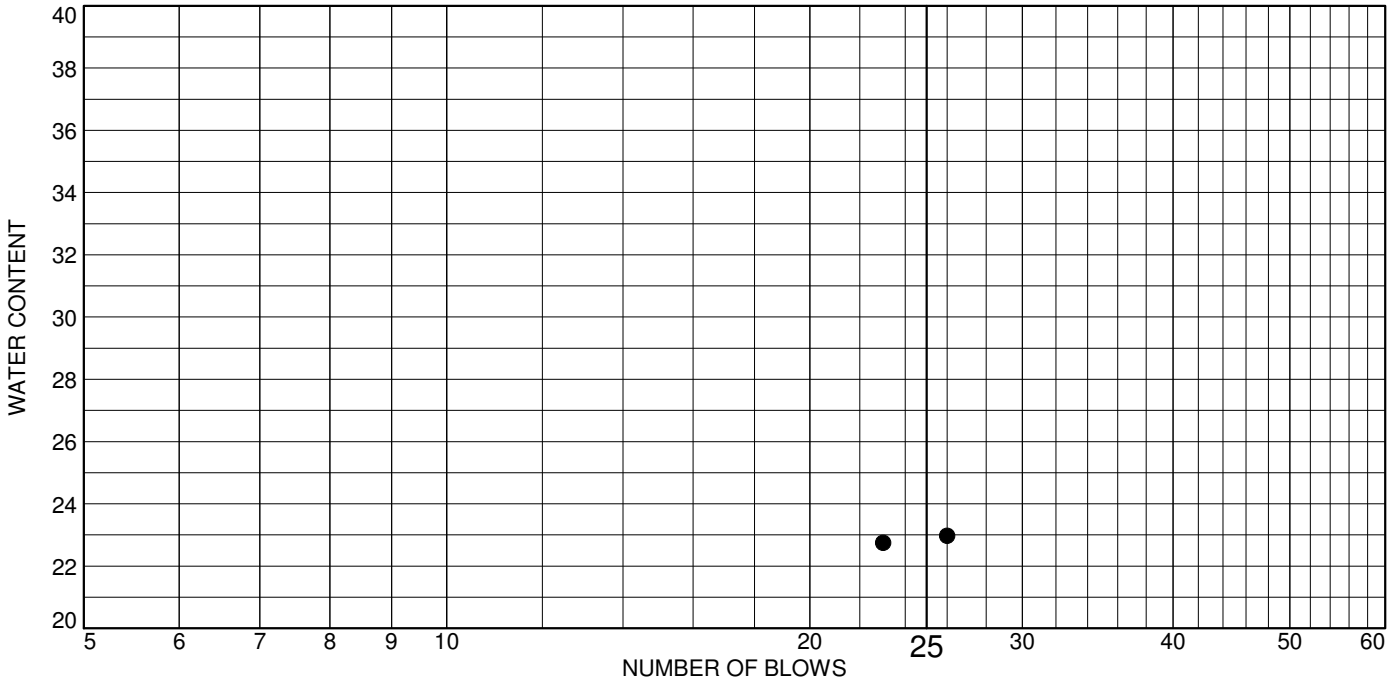
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded sand with silt and gravel	23	NP	NP	26.4	11.9	SW-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

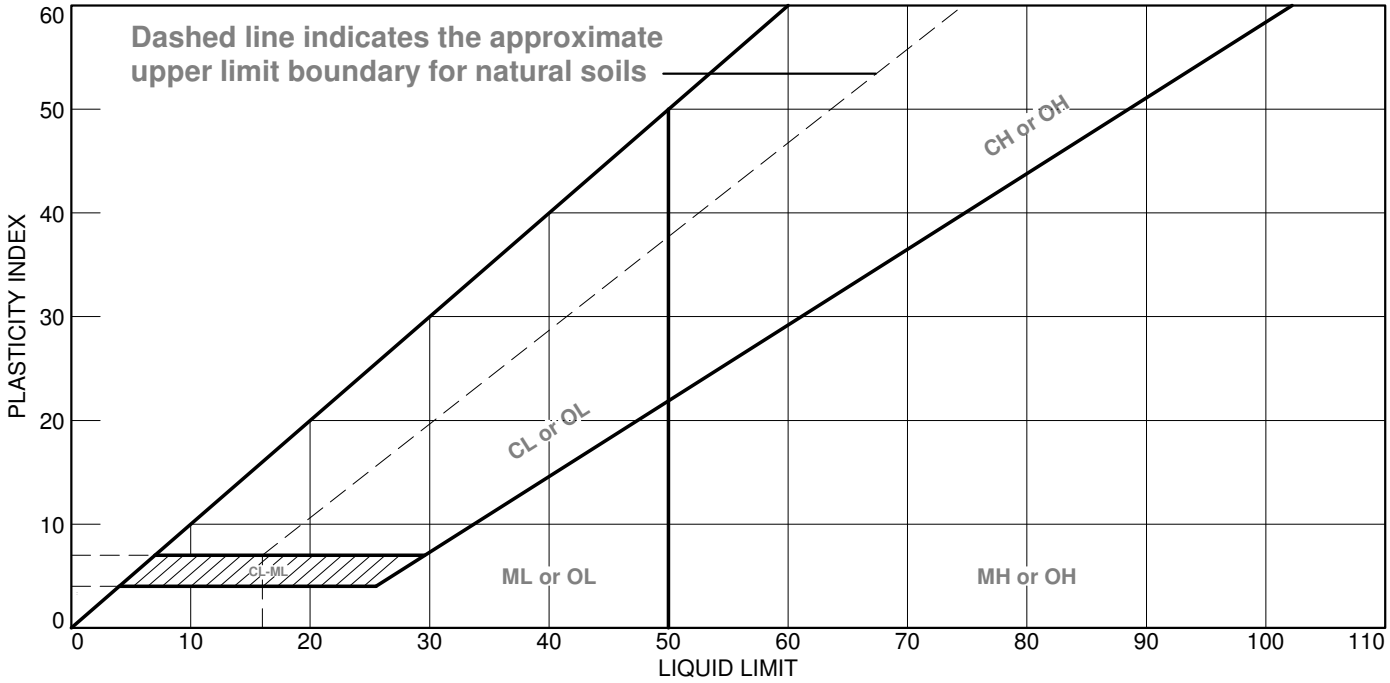
Location: GH11-241, Area A
Sample Number: SPT 11 **Depth:** 59-60.5'

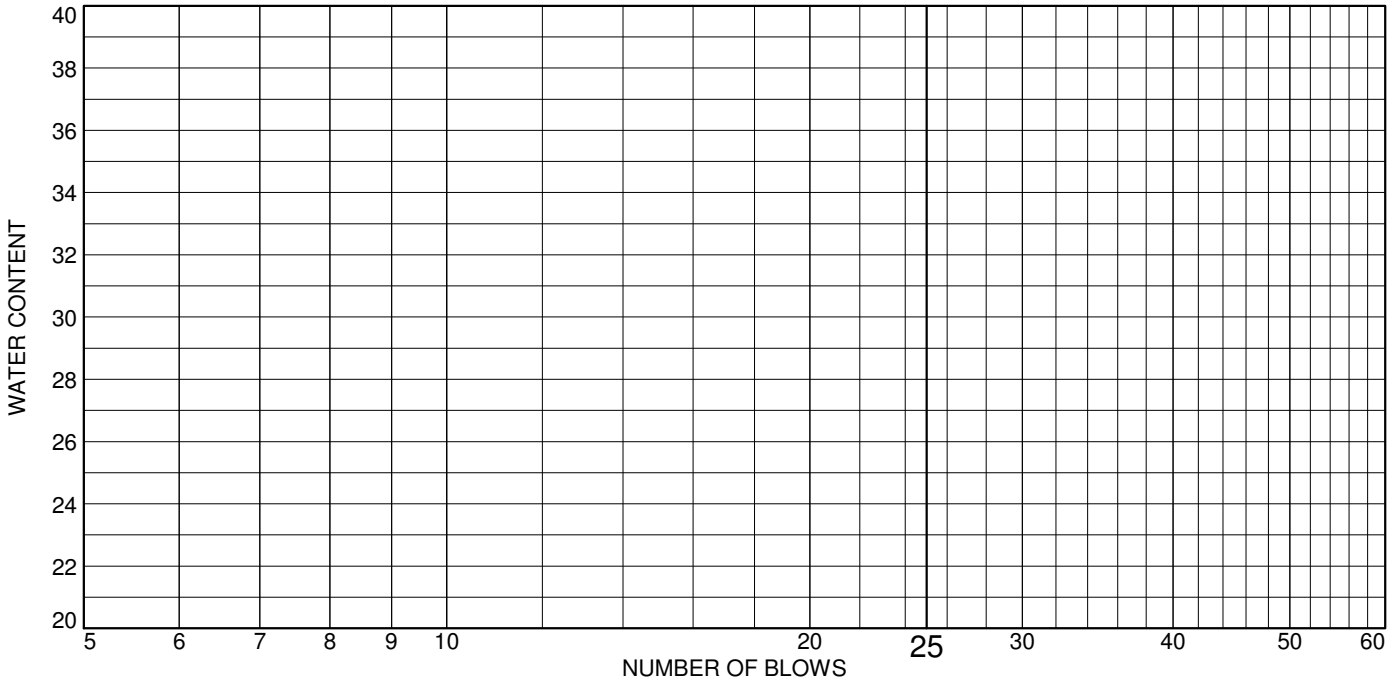
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand	NP	NP	NP	96.6	47.9	SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

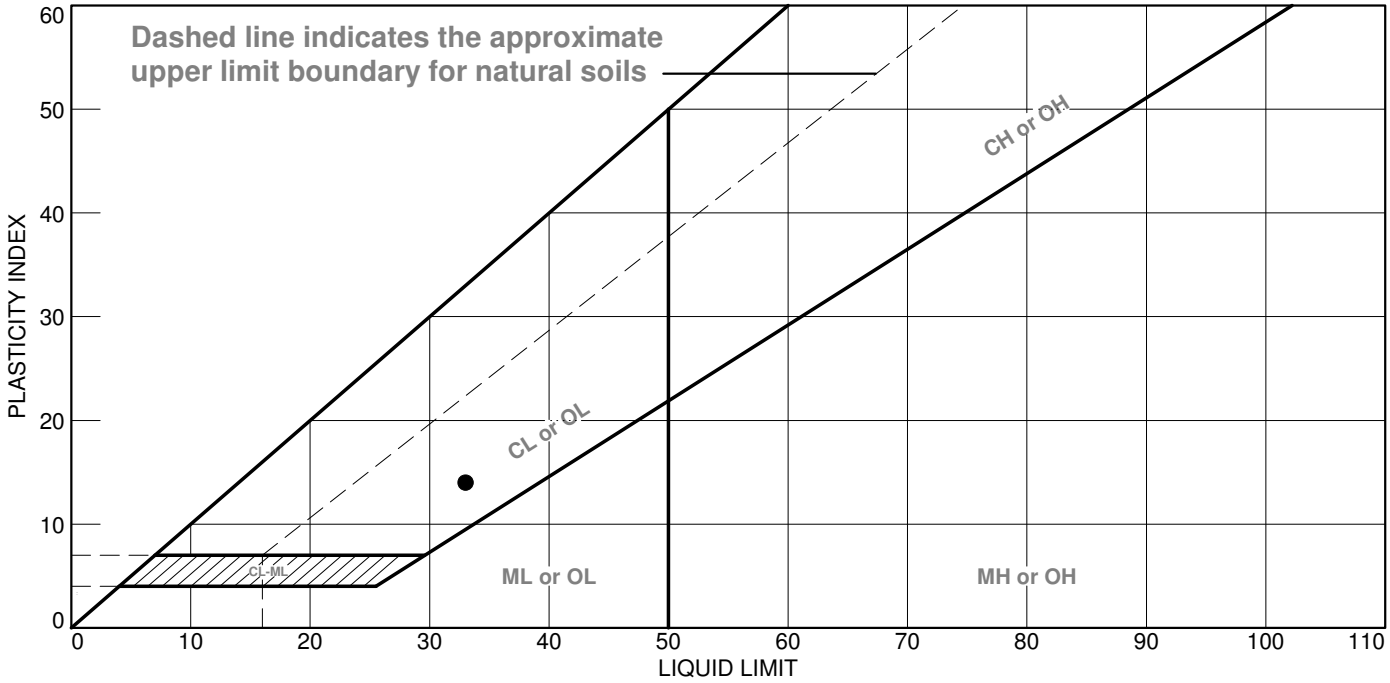
Location: GH11-241, Area A
Sample Number: SPT 15 **Depth:** 79-80.5'

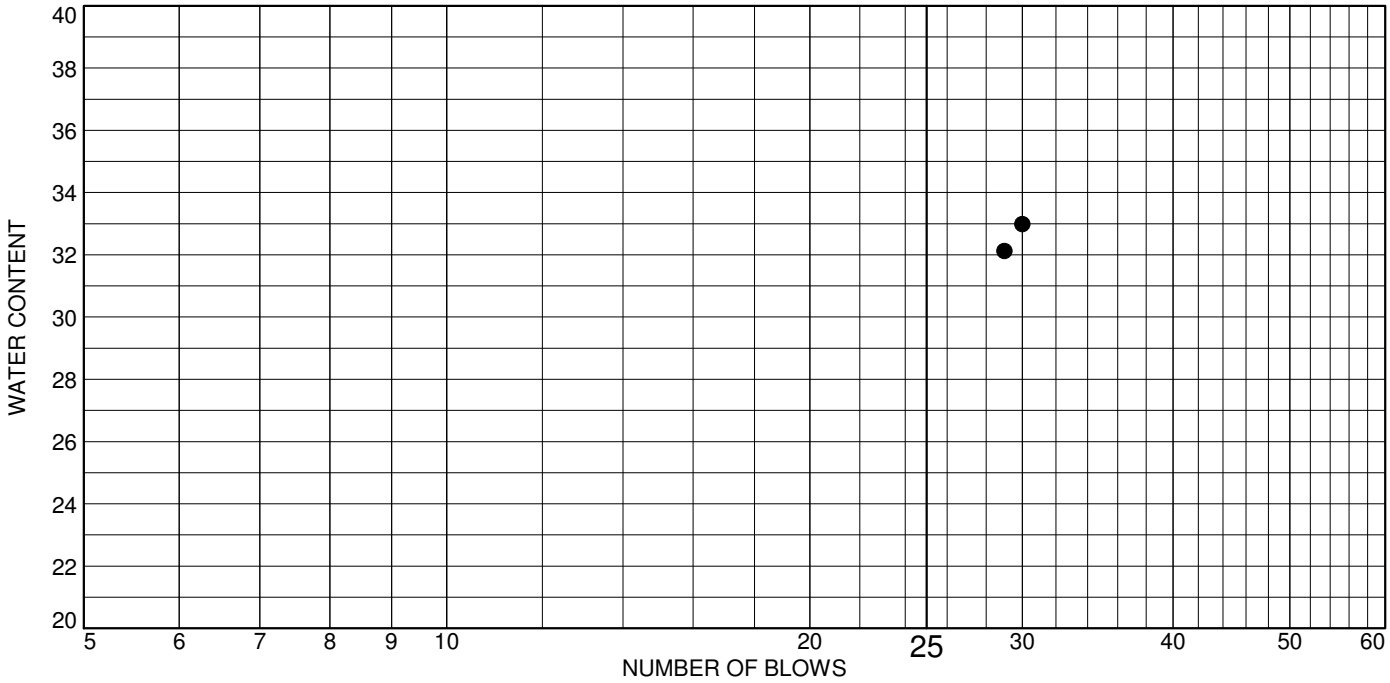
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay with sand	33	19	14	98.9	78.4	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

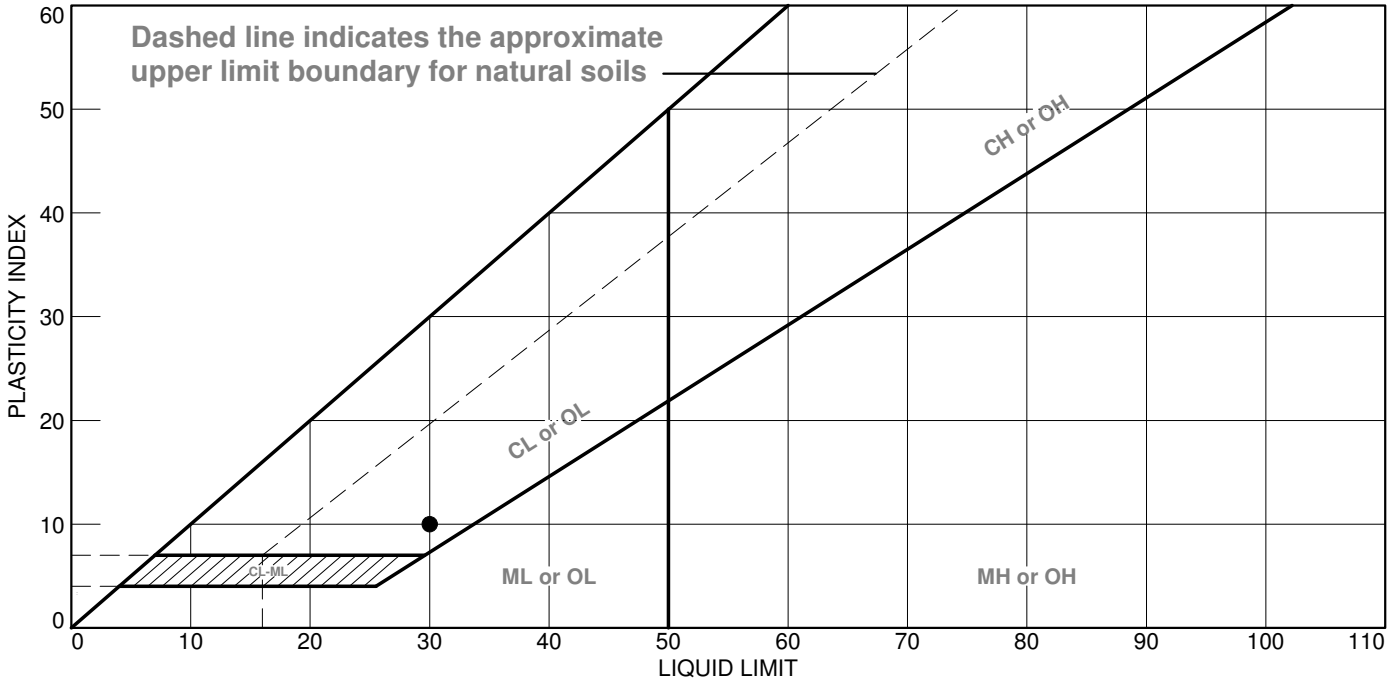
Location: GH11-241, Area A
Sample Number: SPT 16 **Depth:** 84-85.5'

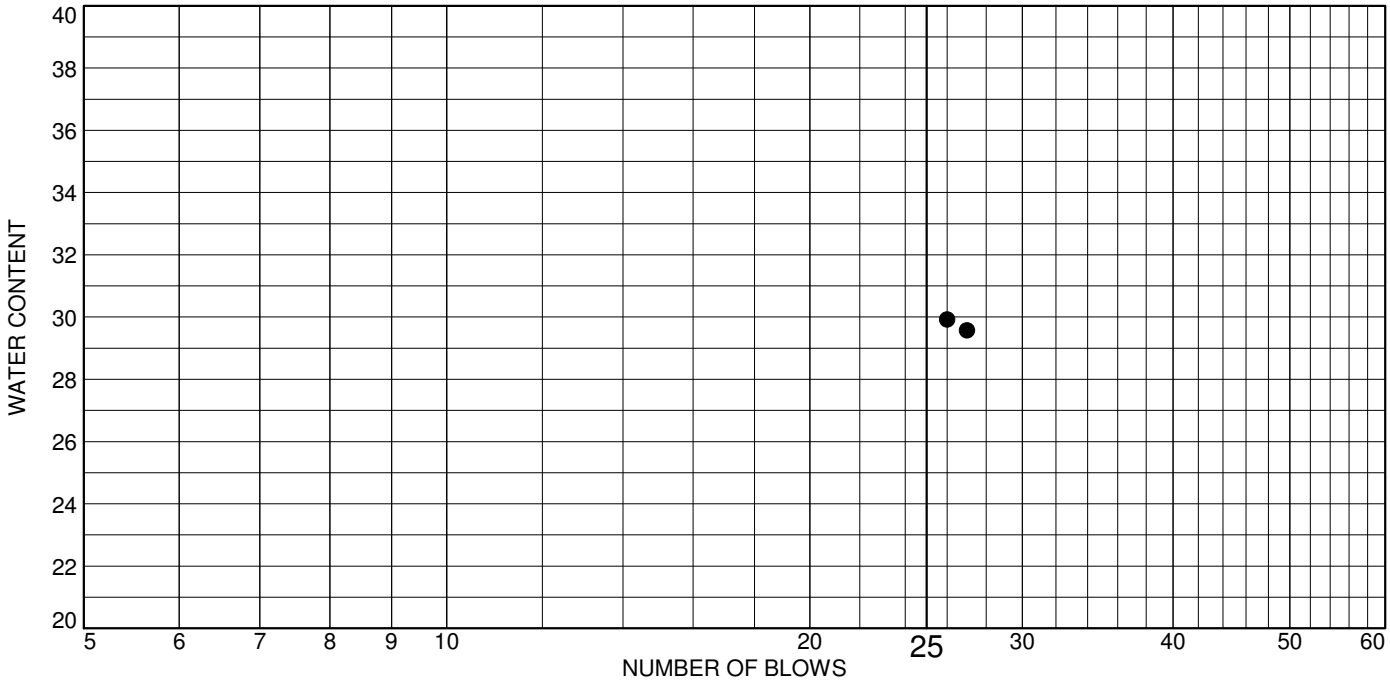
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay with sand	30	20	10	89.4	81.8	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

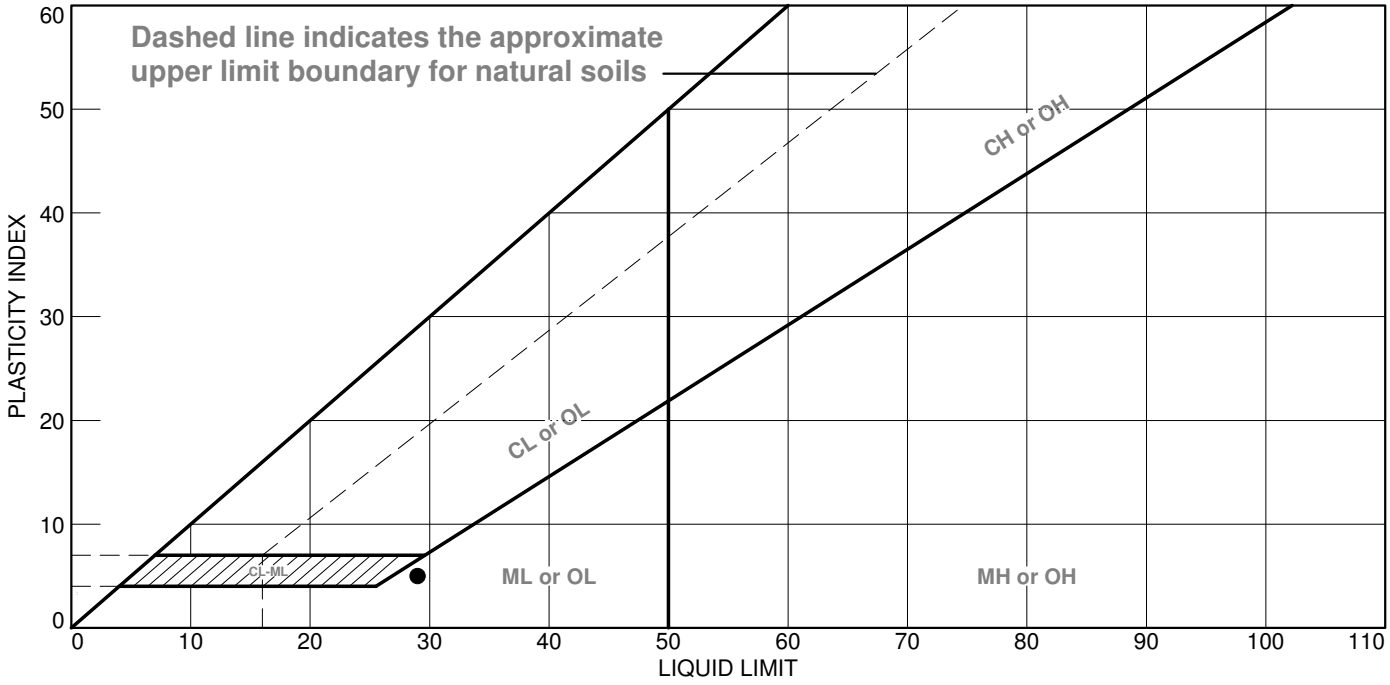
Location: GH11-241, Area A
Sample Number: SPT 17 **Depth:** 90-91.5'

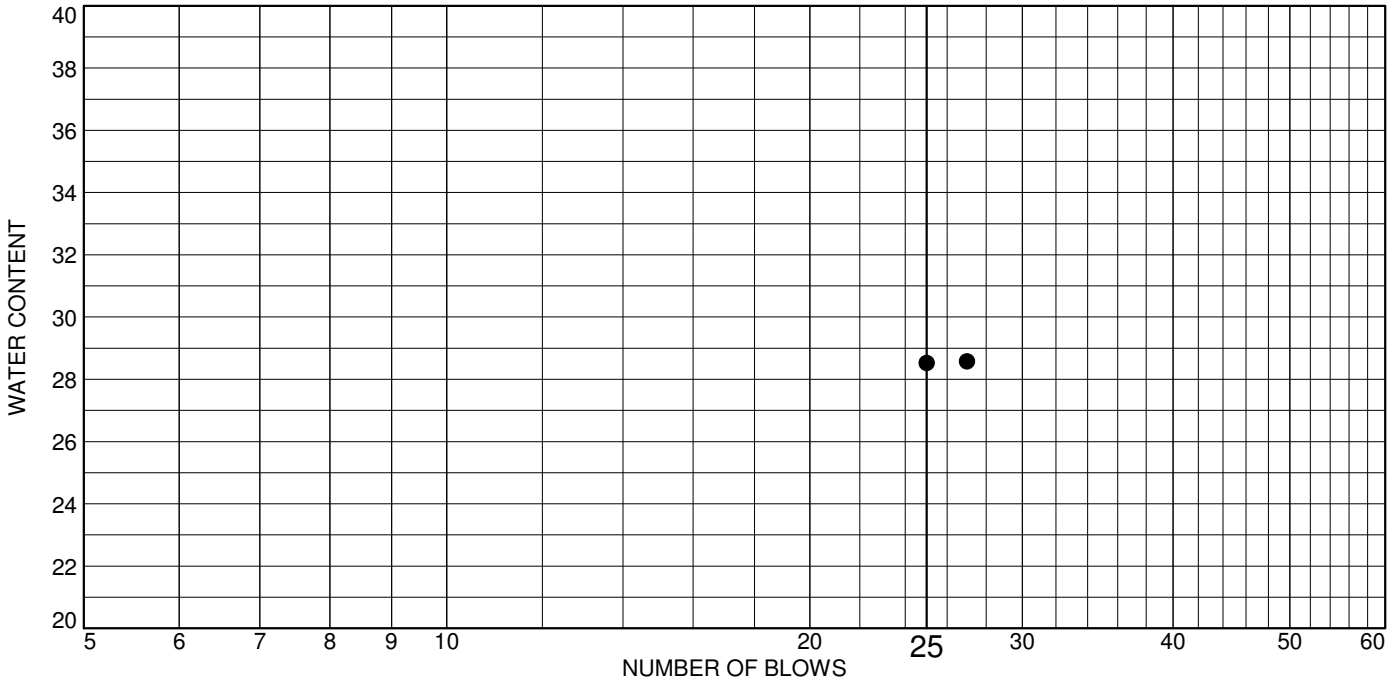
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silt with sand	29	24	5	92.7	83.8	ML

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

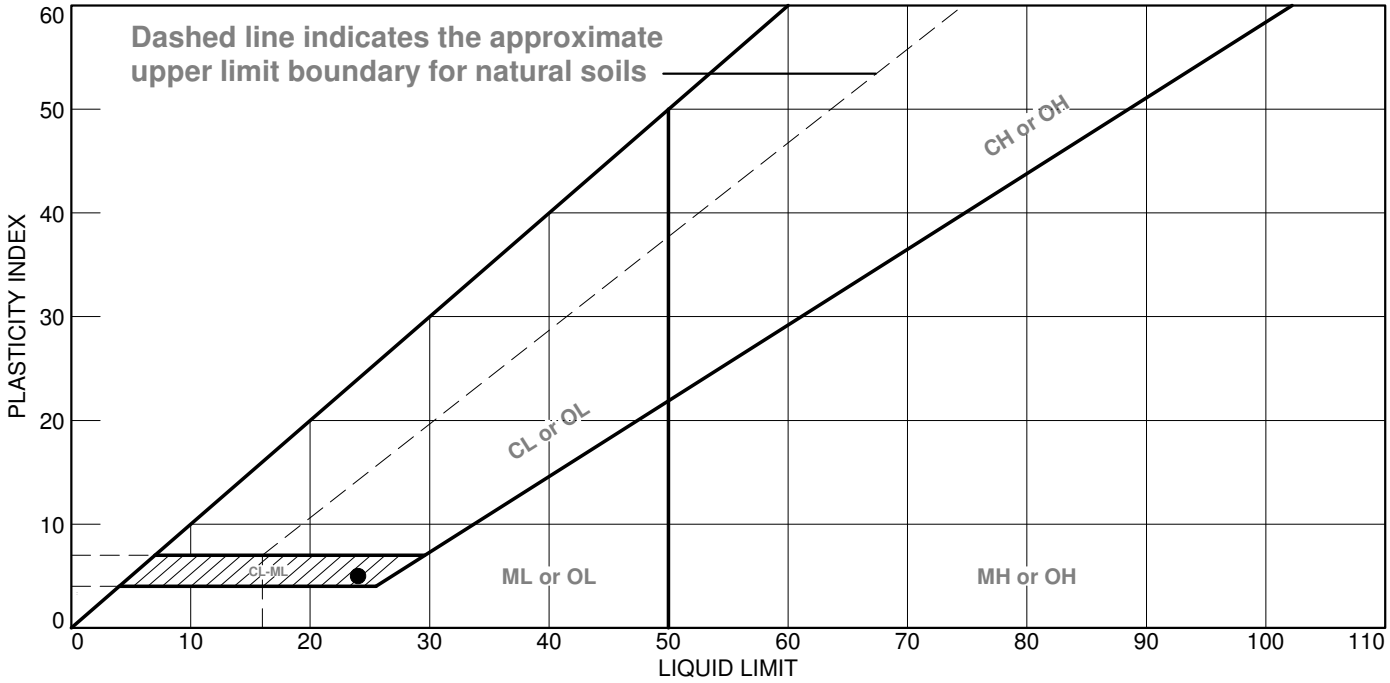
Location: GH11-241, Area A
Sample Number: SPT 18 **Depth:** 95-96.5'

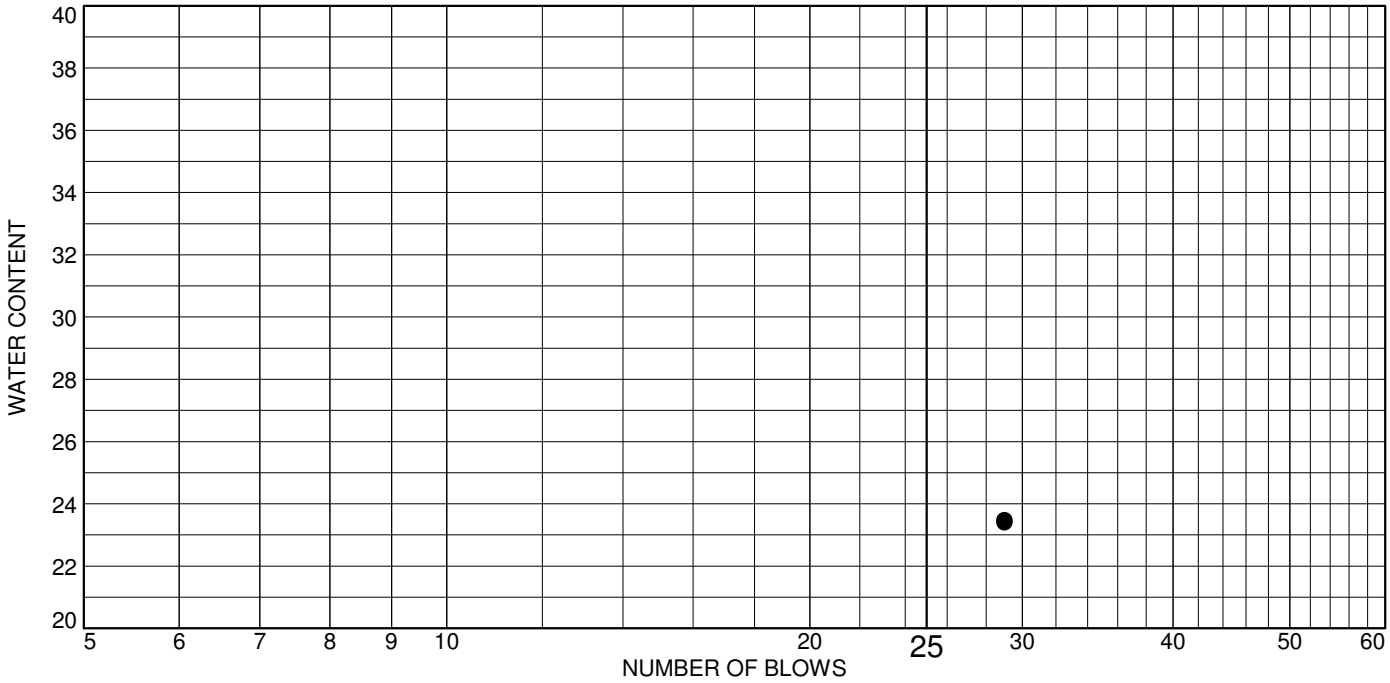
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty, clayey sand with gravel	24	19	5	25.2	13.8	SC-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

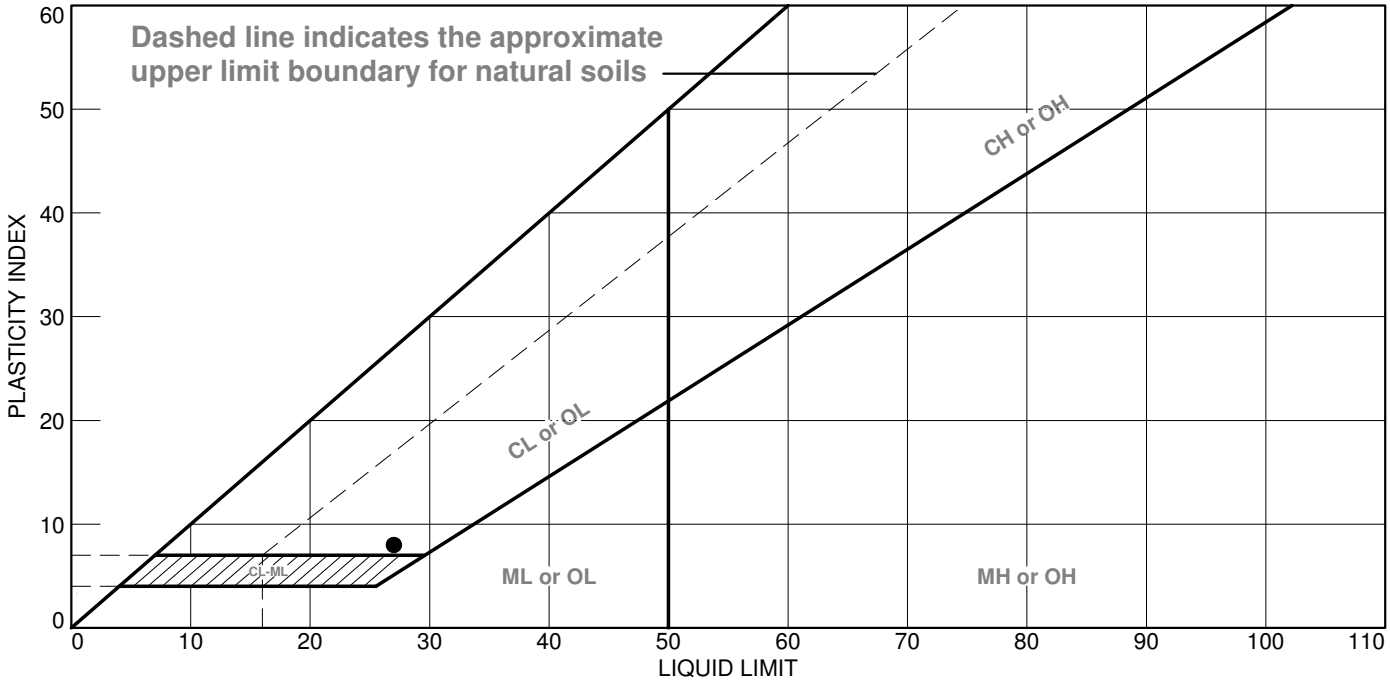
Location: GH11-241, Area A
Sample Number: SPT 25 **Depth:** 129-130.5'

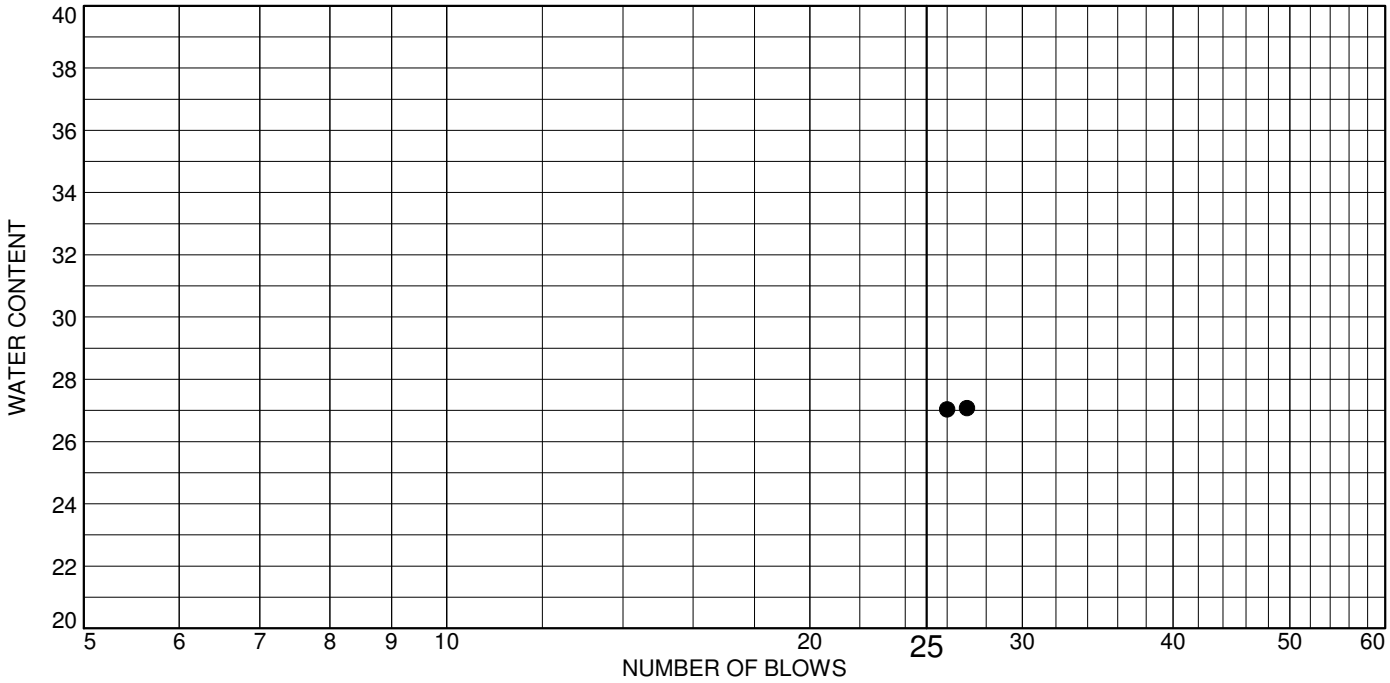
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	27	19	8	28.6	17.2	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

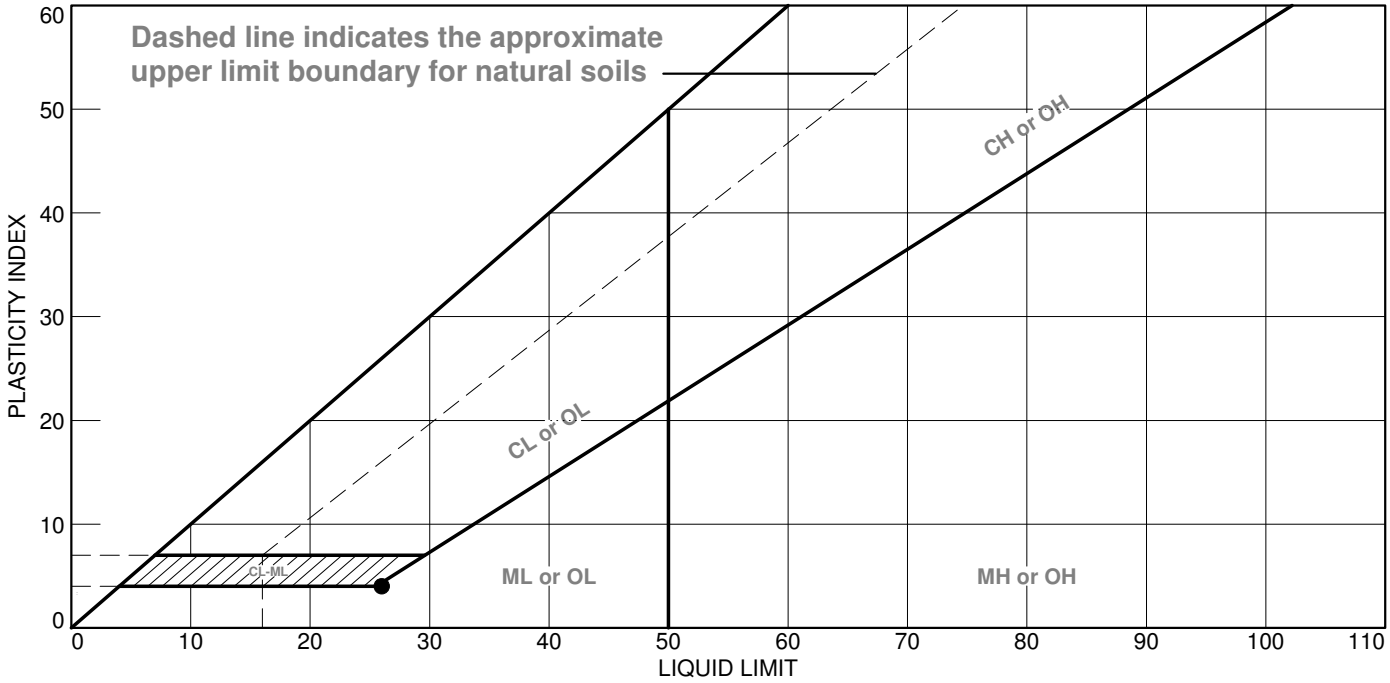
Location: GH11-241, Area A
Sample Number: SPT 26 **Depth:** 134-135.5'

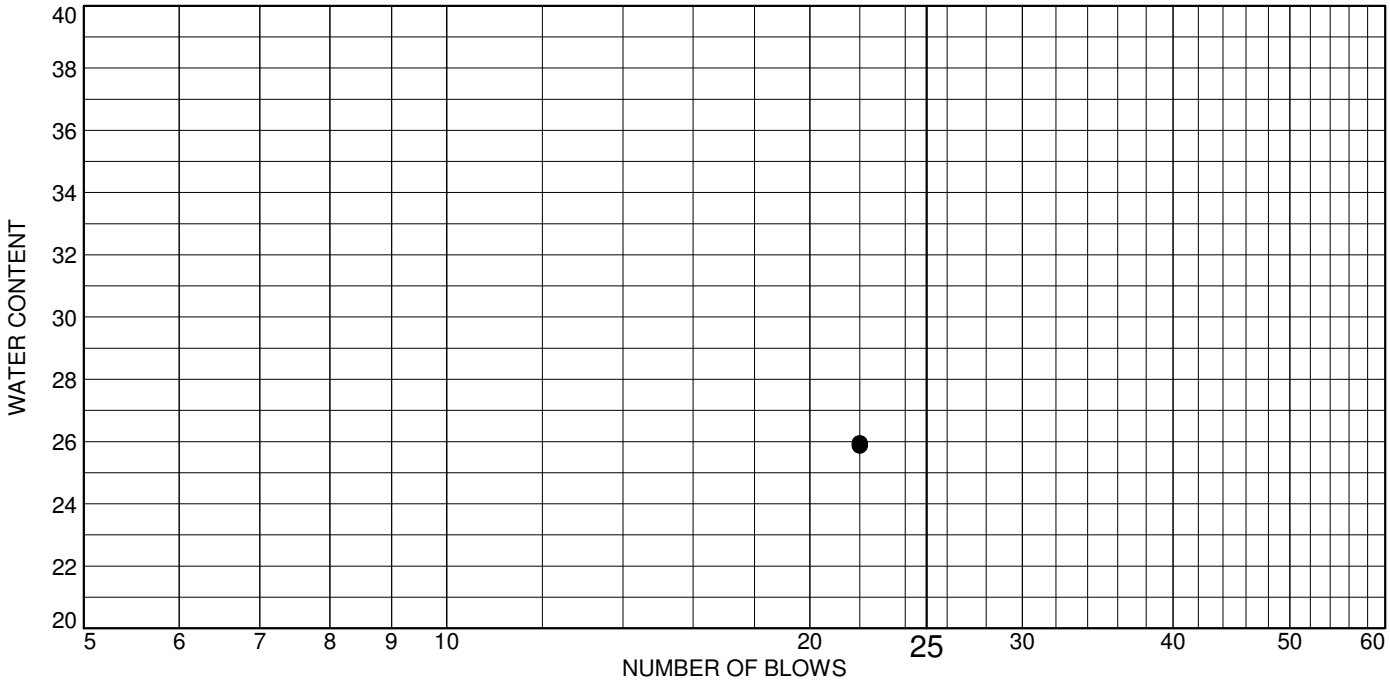
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty, clayey sand with gravel	26	22	4	56.4	40.1	SC-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

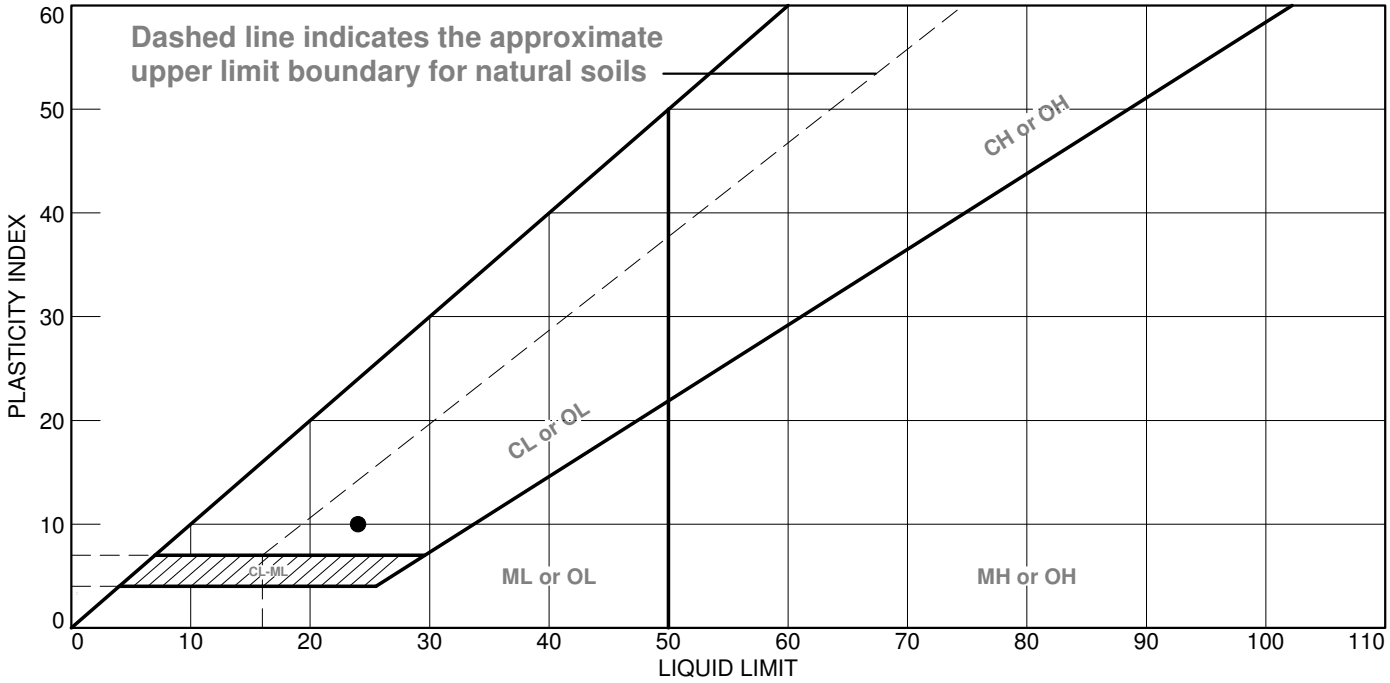
Location: GH11-241, Area A
Sample Number: SPT 32 **Depth:** 169-170.5'

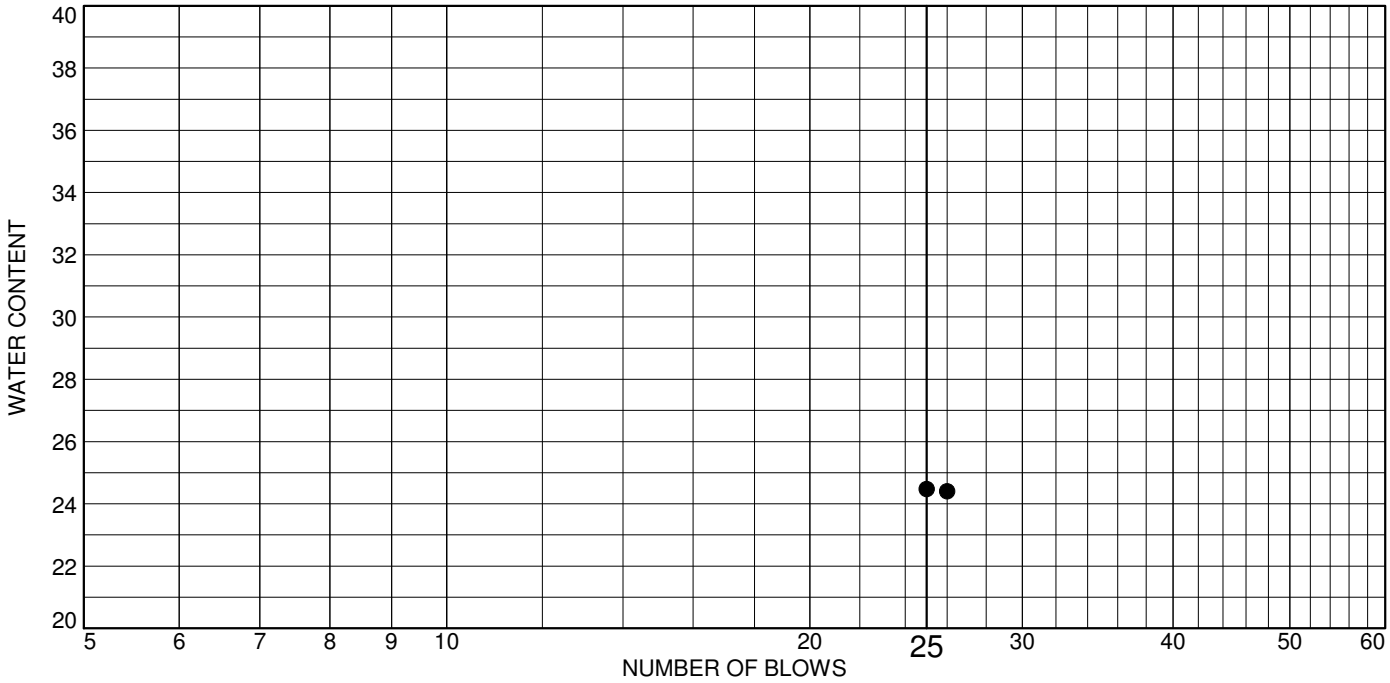
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	24	14	10	61.2	37.5	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

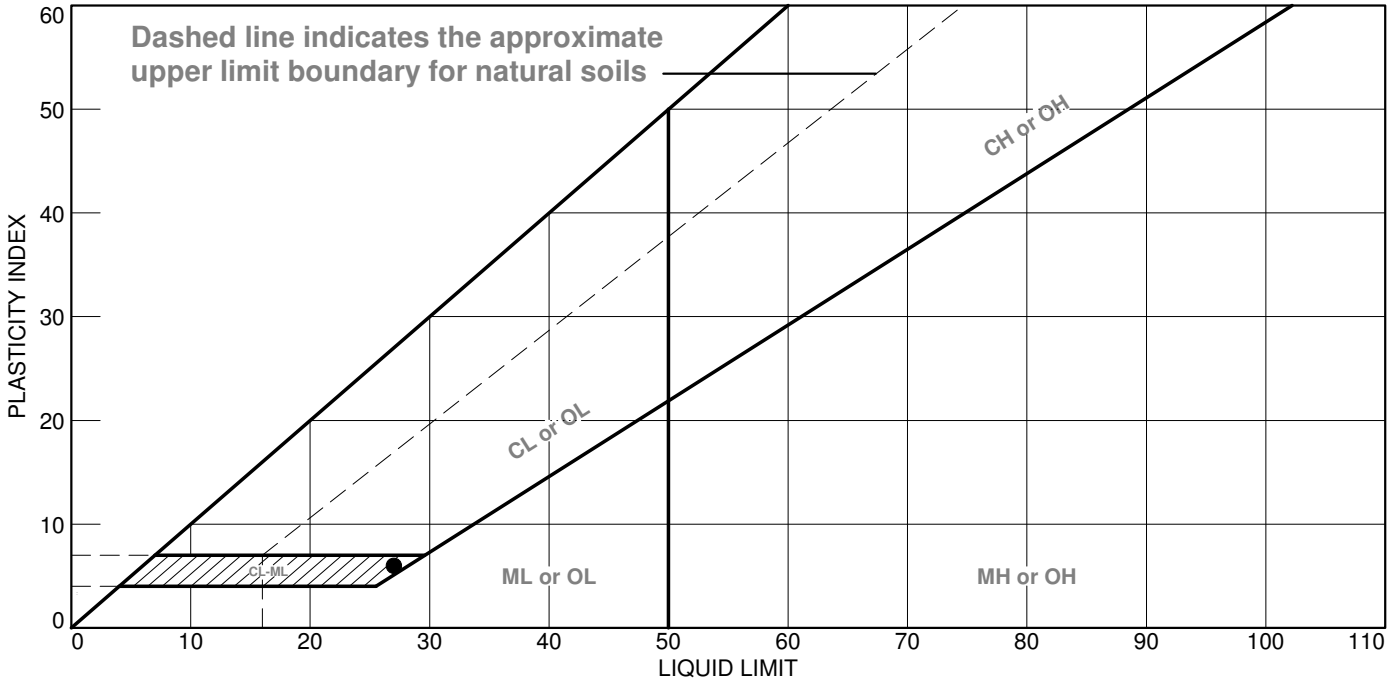
Location: GH11-241, Area A
Sample Number: SPT 37 **Depth:** 194-195.5'

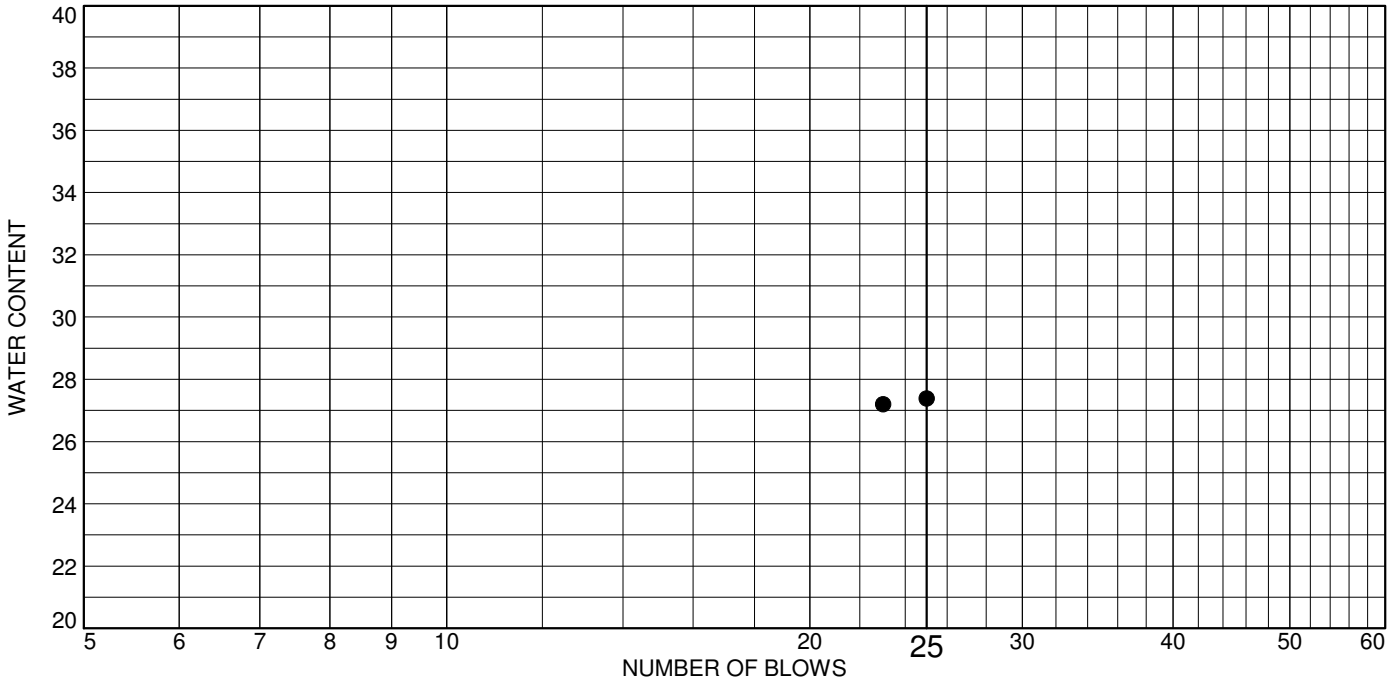
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty, clayey sand with gravel	27	21	6	52.9	41.1	SC-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

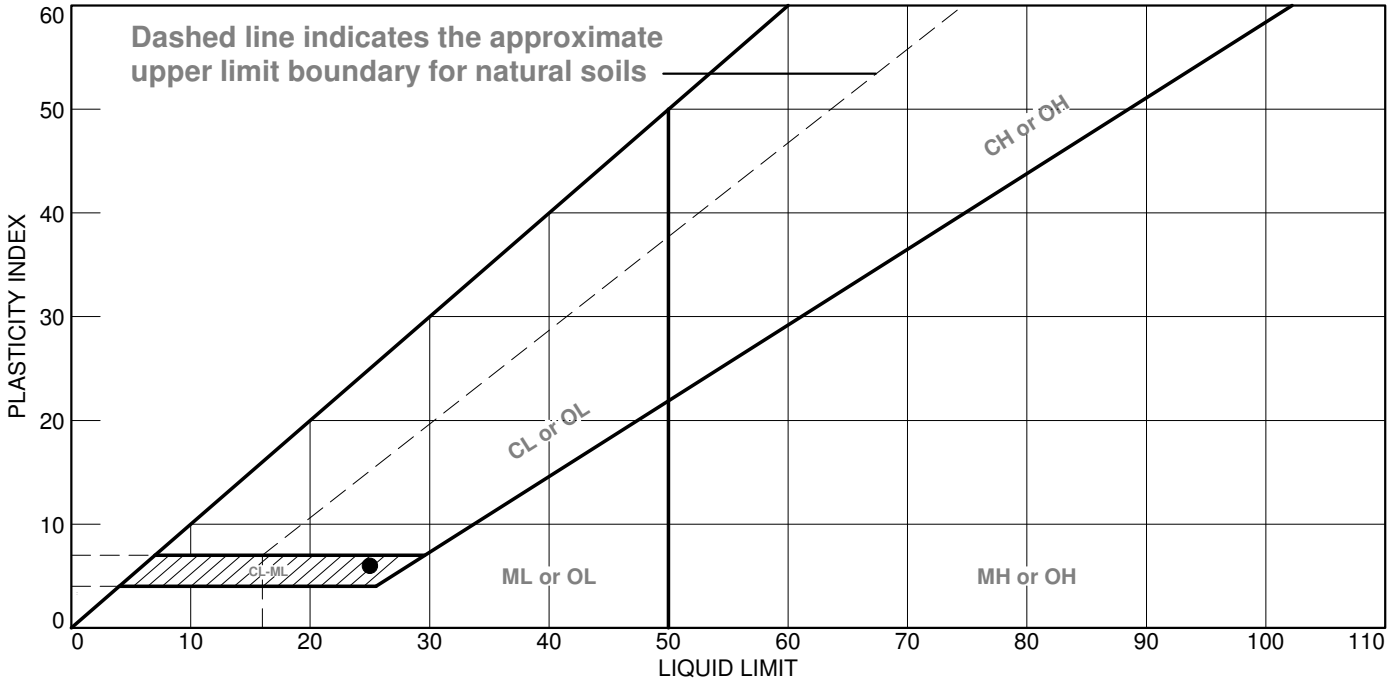
Location: GH11-241, Area A
Sample Number: SPT 39 **Depth:** 204-205.5'

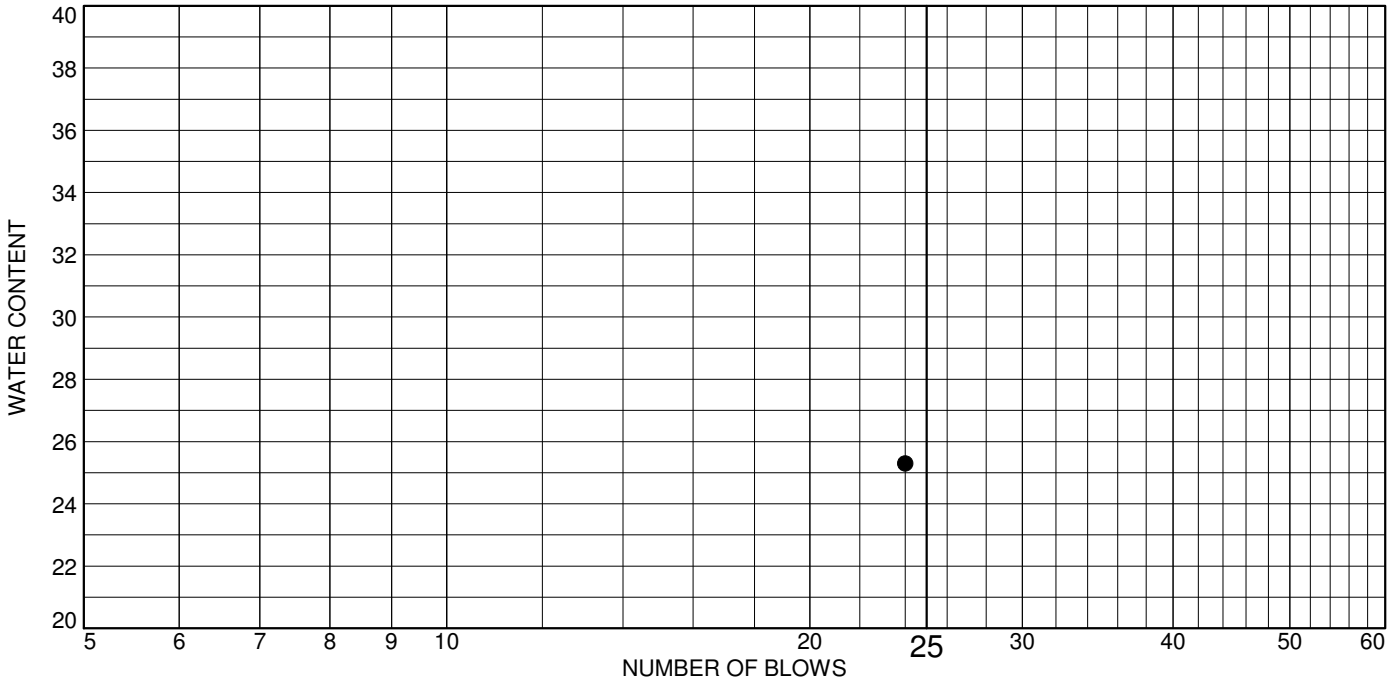
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	well-graded sand with silty clay and gravel	25	19	6	17.9	9.3	SW-SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

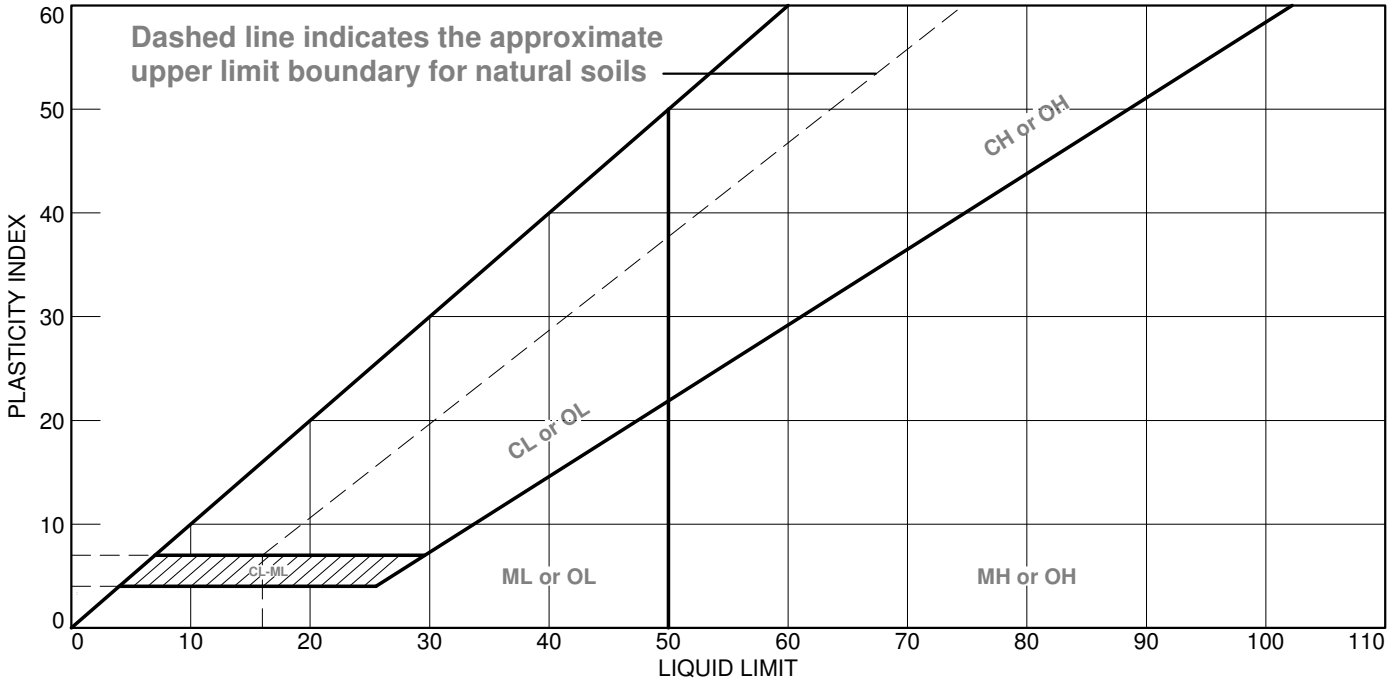
Location: GH11-241, Area A
Sample Number: SPT 45 **Depth:** 239-240.5'

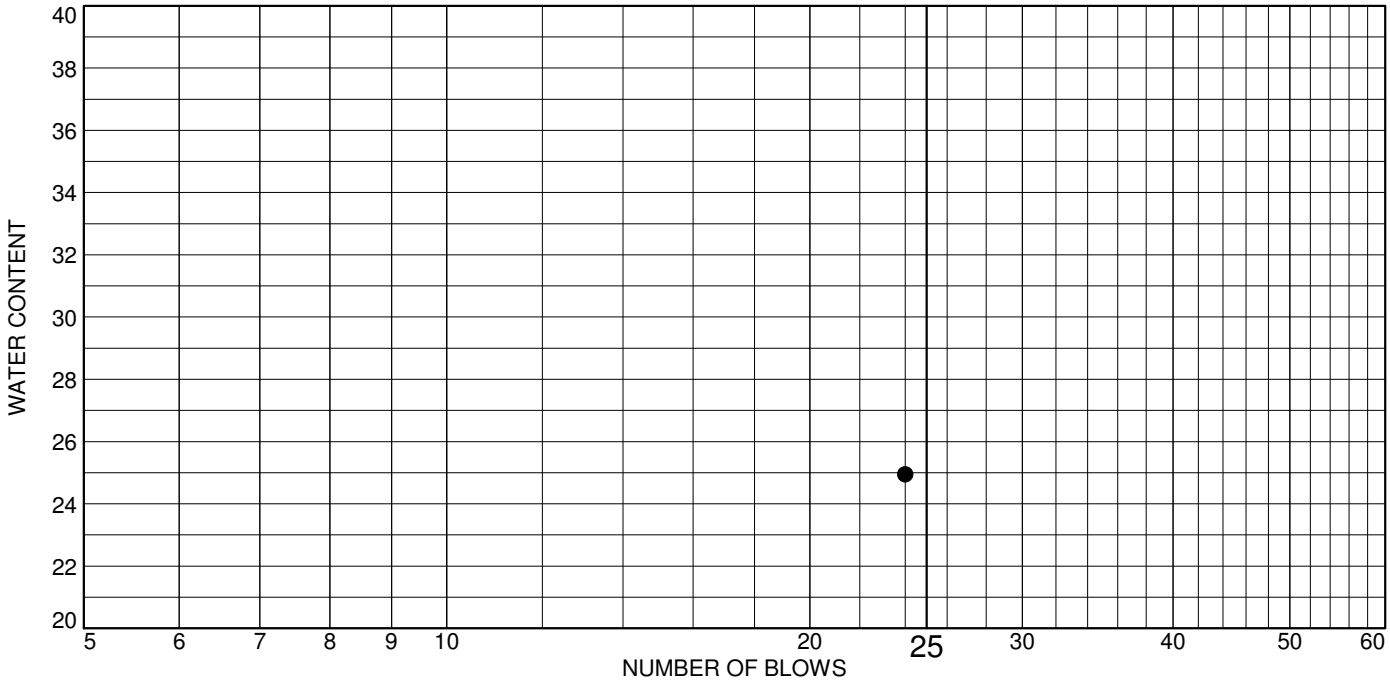
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand	25	NP	NP	45.3	20.3	SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

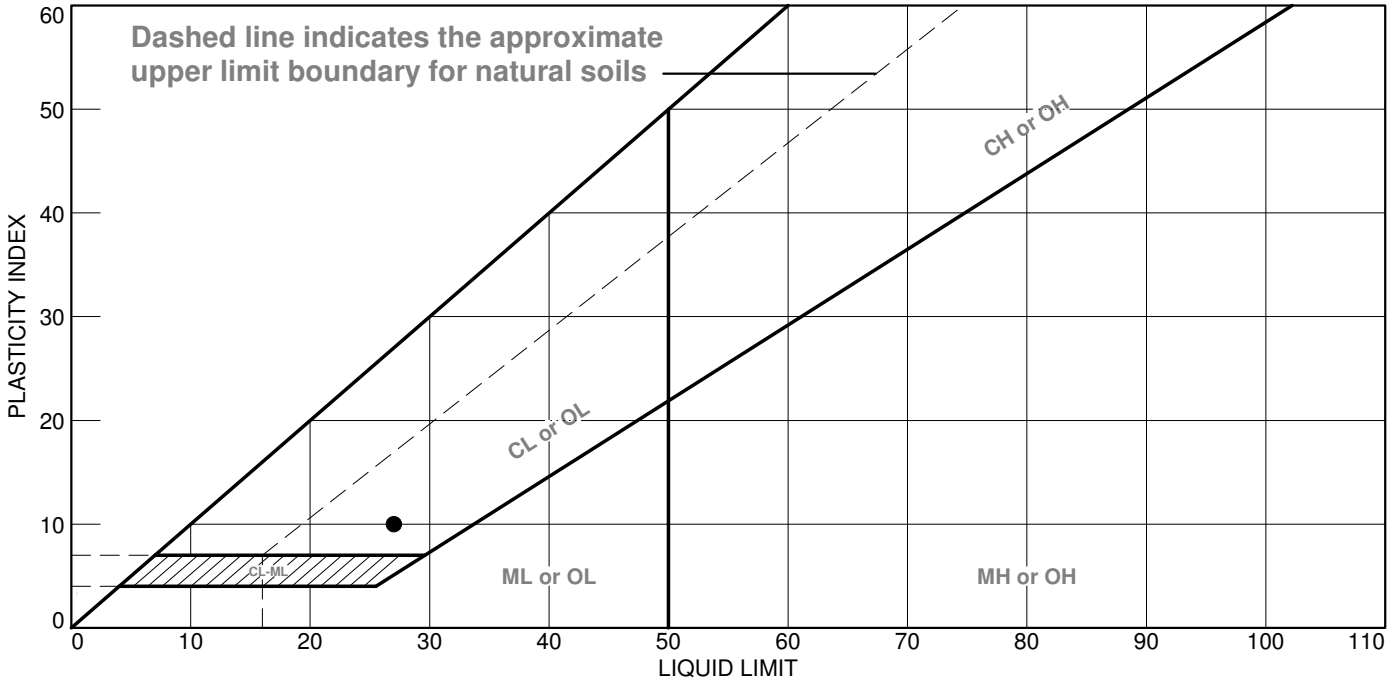
Location: GH11-241, Area A
Sample Number: SPT 54 **Depth:** 329-330.5'

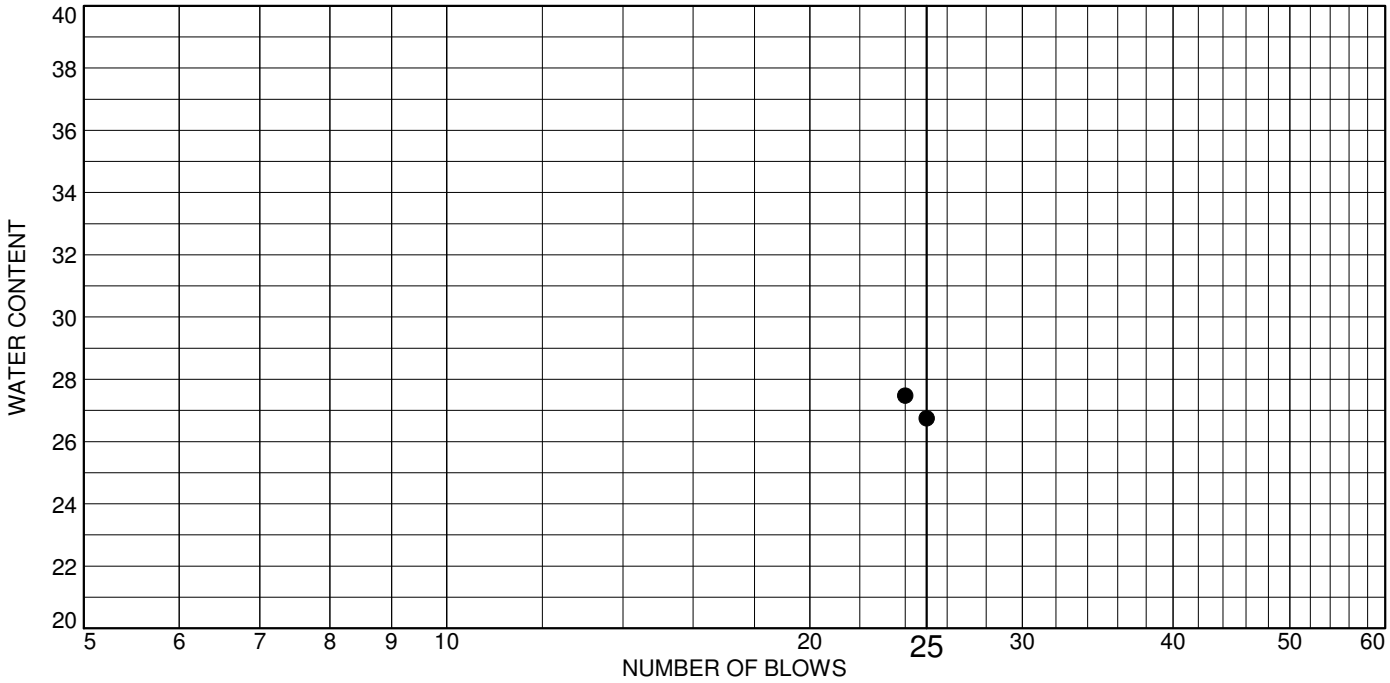
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	27	17	10	39.2	27.3	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

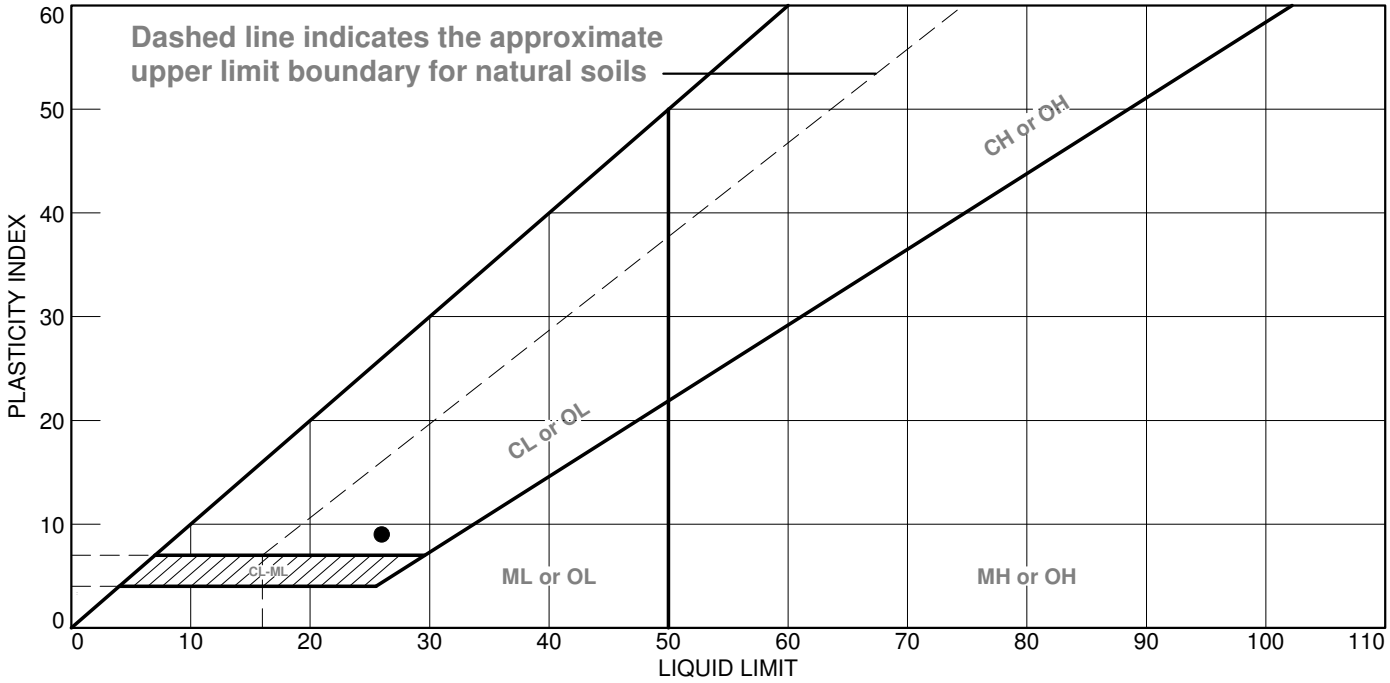
Location: GH11-242, Area A
Sample Number: SPT 2 **Depth:** 10-11.5'

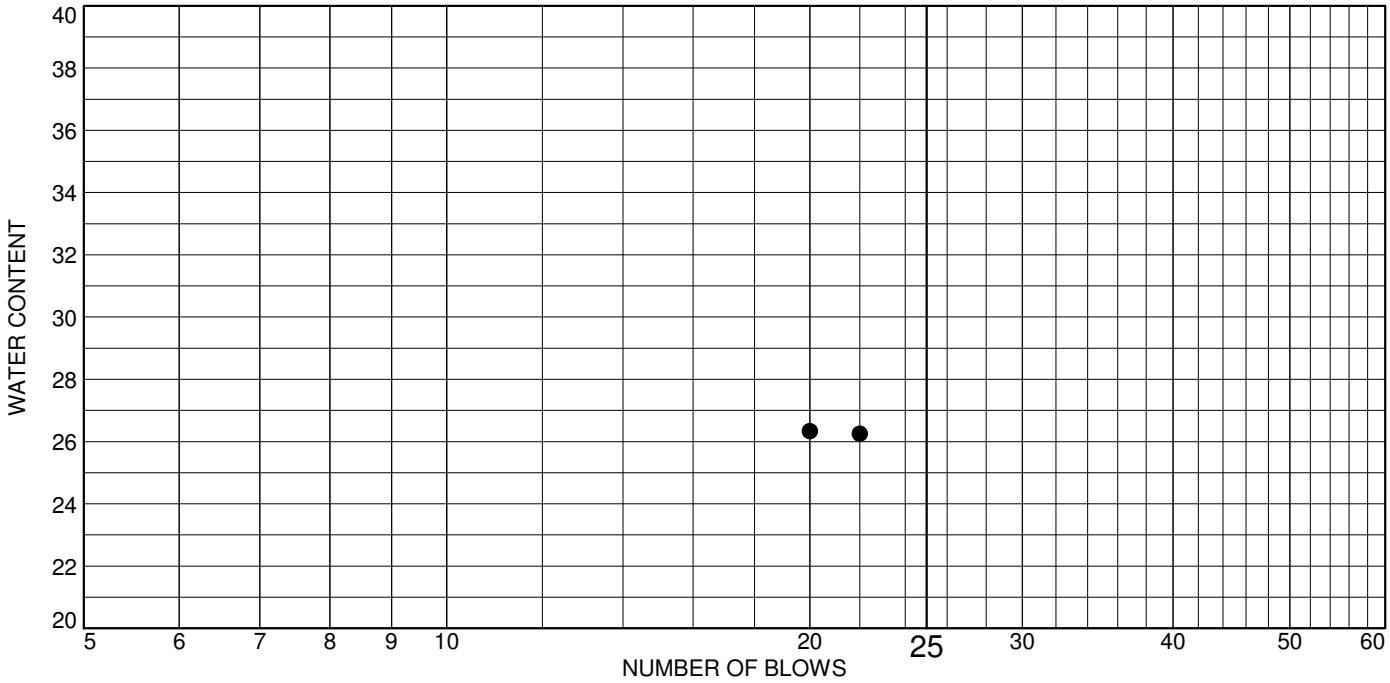
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	26	17	9	25.1	15.6	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

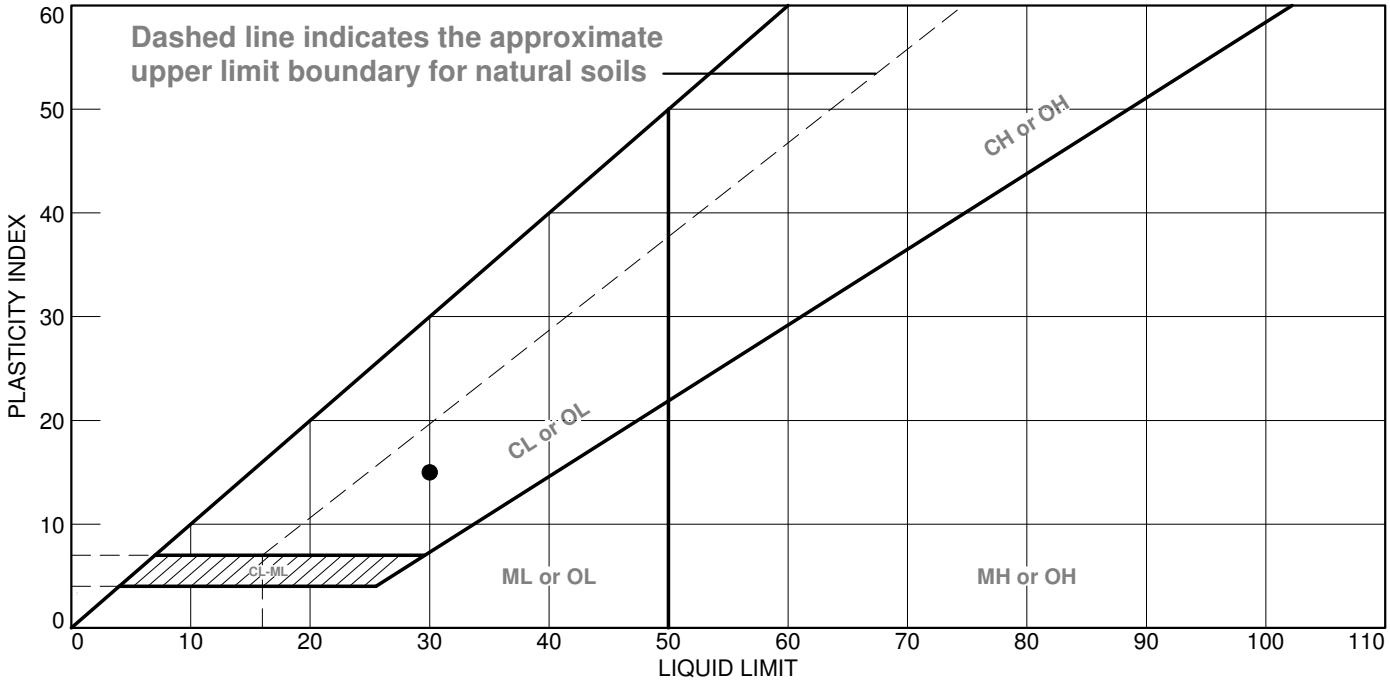
Location: GH11-242, Area A
Sample Number: SPT 5 **Depth:** 25-26.5'

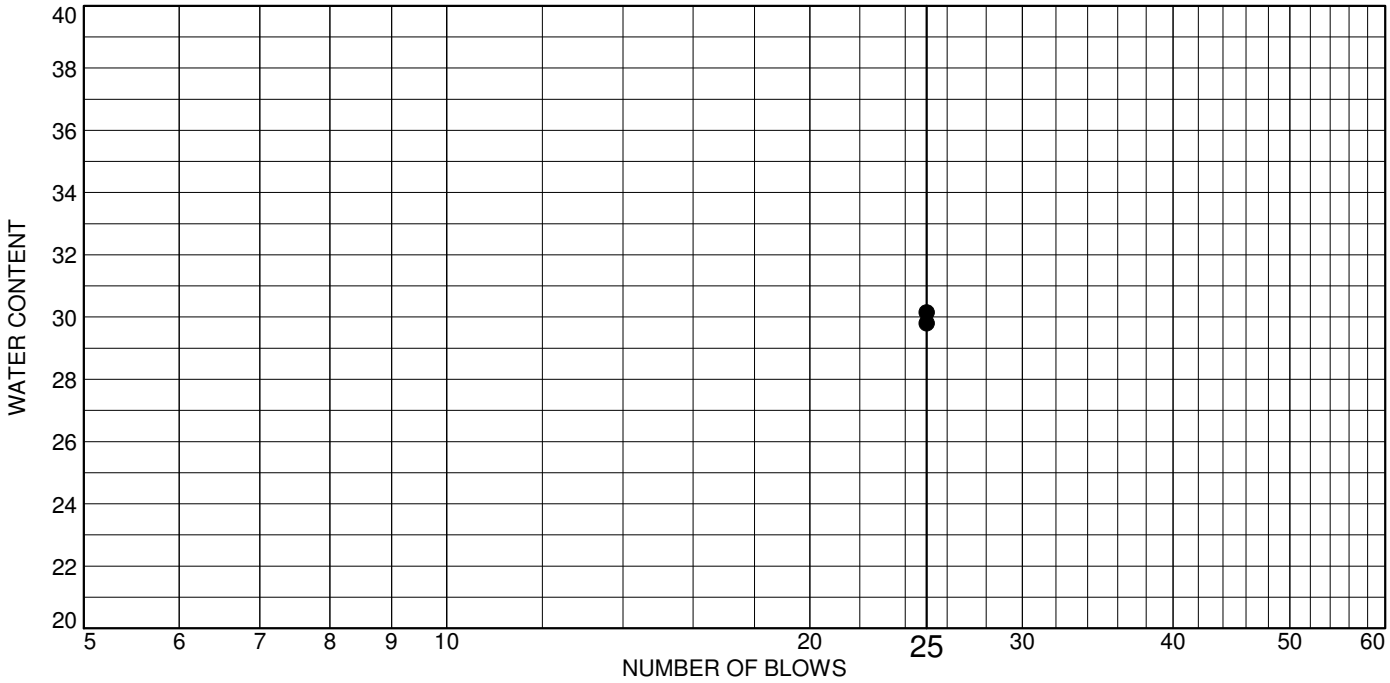
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	30	15	15	44.4	29.8	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

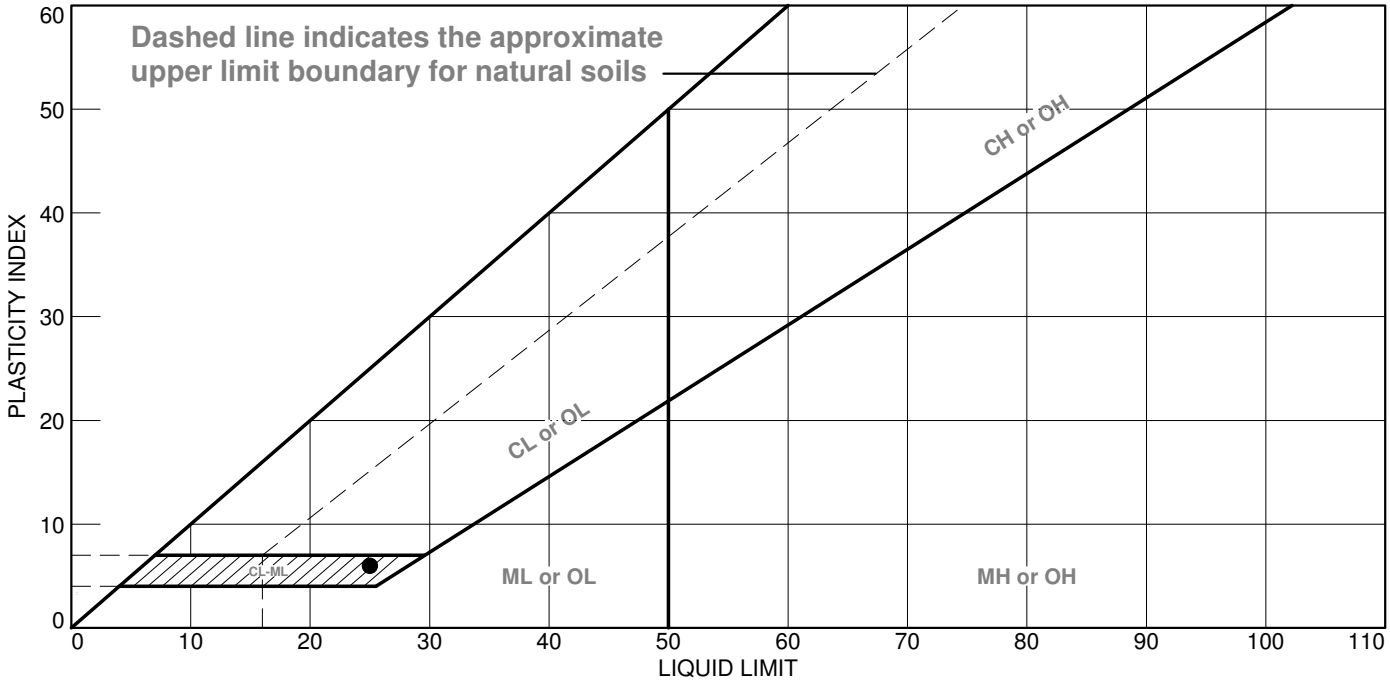
Location: GH11-242, Area A
Sample Number: SPT 6 **Depth:** 30-31.5'

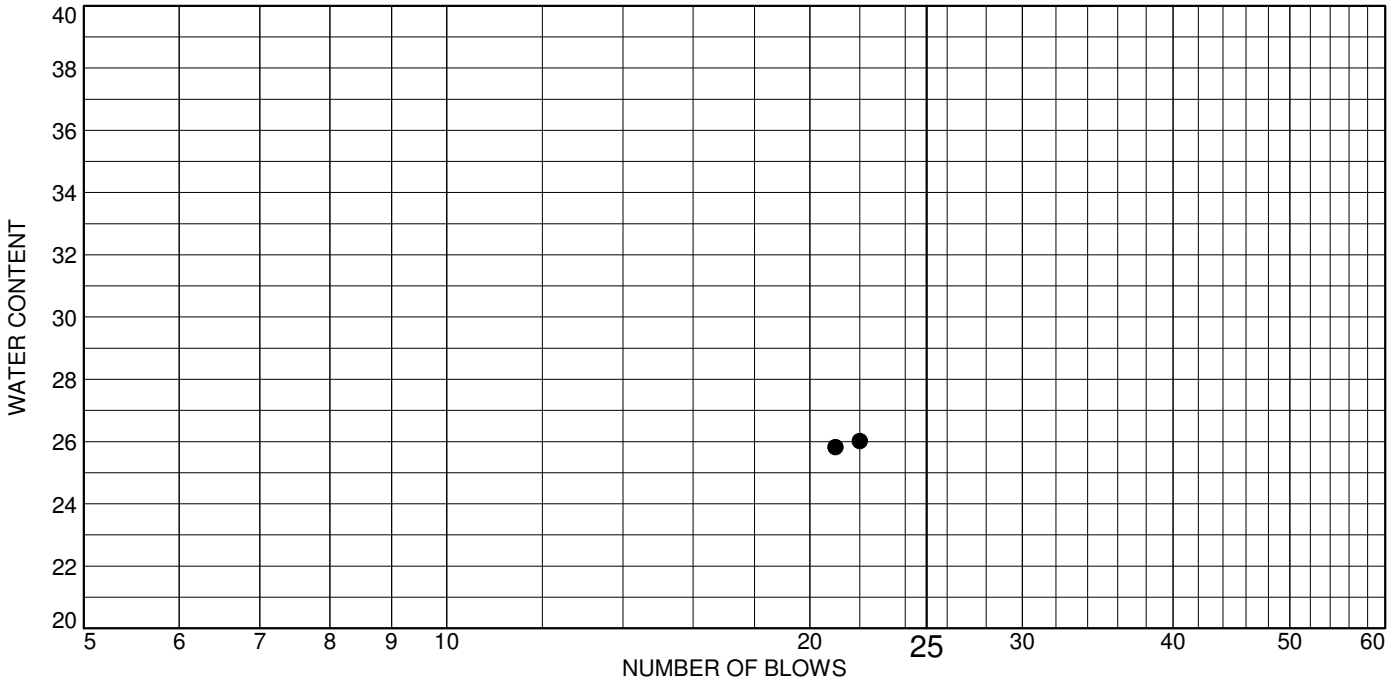
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty clayey gravel with sand	25	19	6	26.7	19.2	GC-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

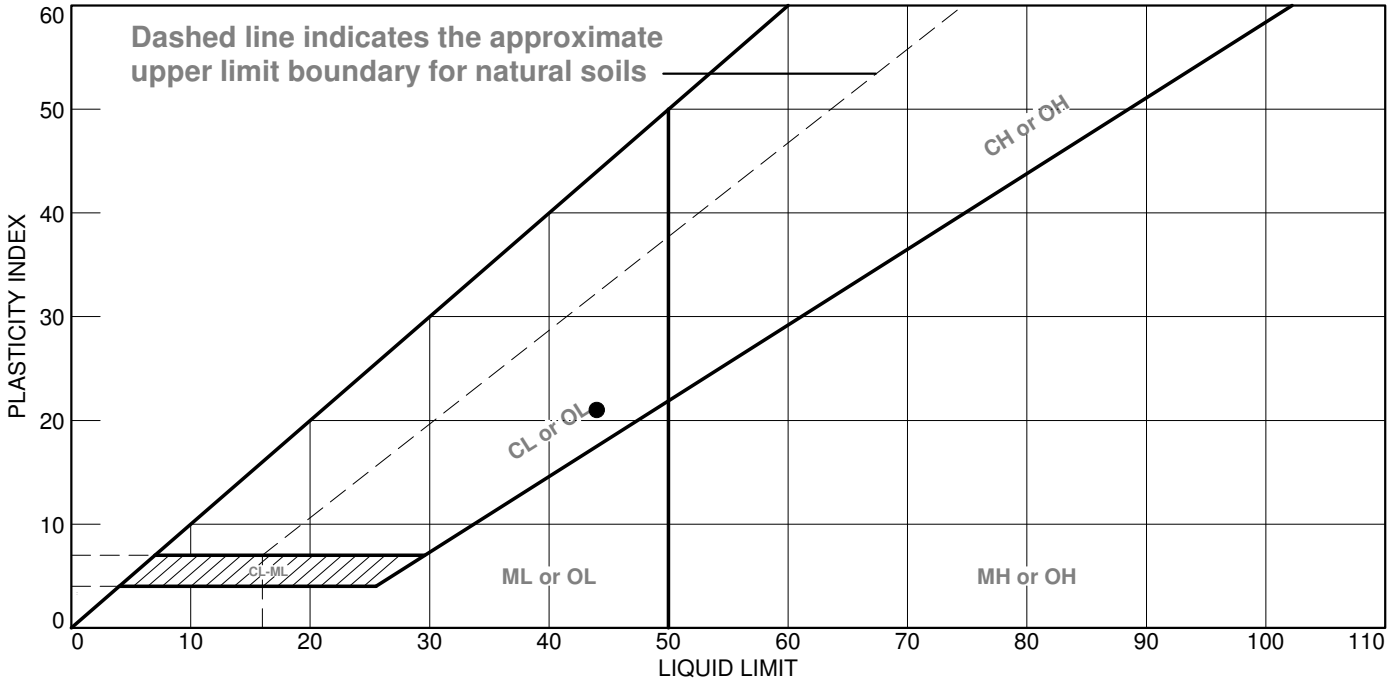
Location: GH11-242, Area A
Sample Number: SPT 11 **Depth:** 55-56.5'

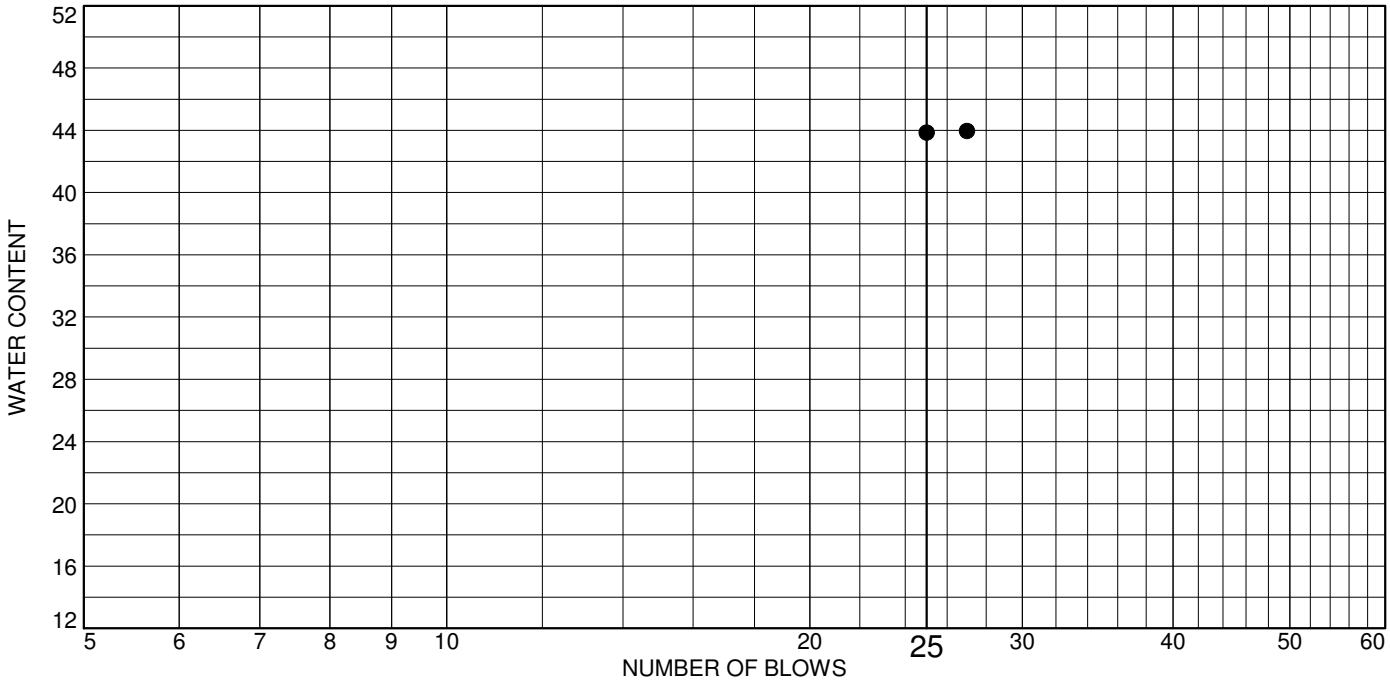
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand	44	23	21	63.7	42.5	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

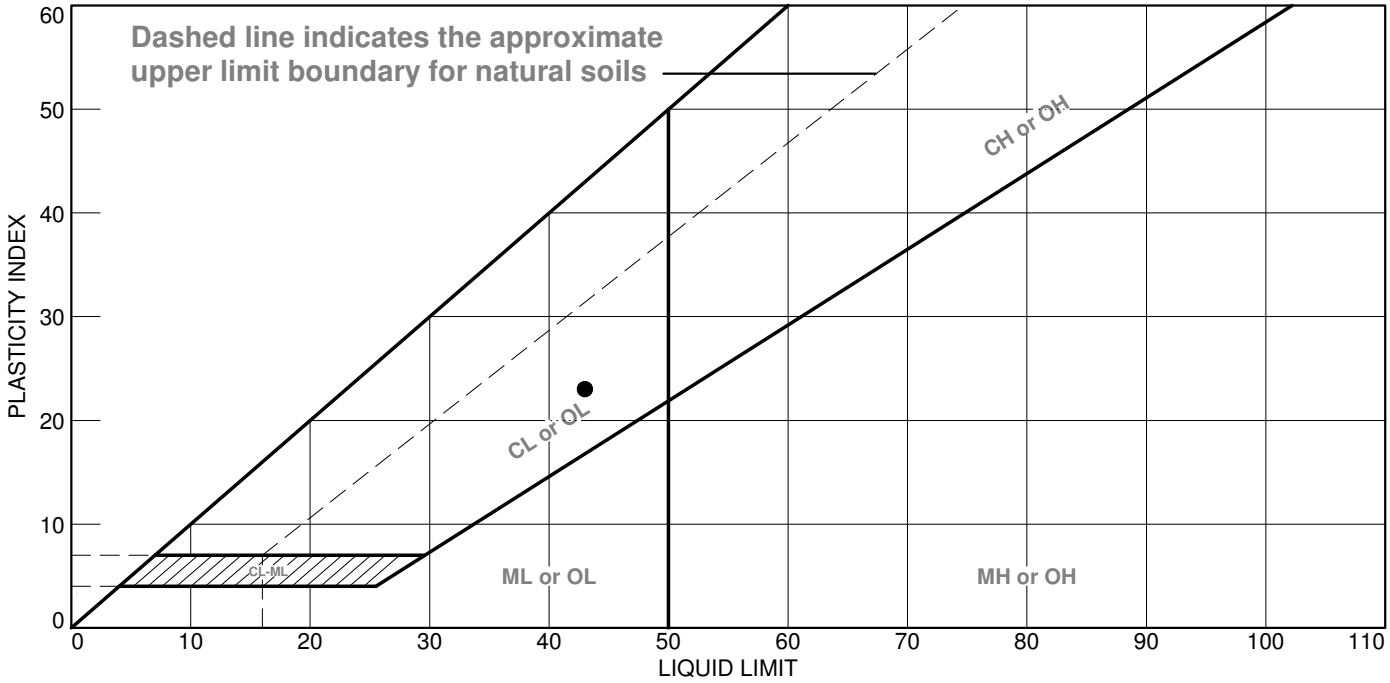
Location: GH11-242, Area A
Sample Number: SPT 13 **Depth:** 65-66.5'

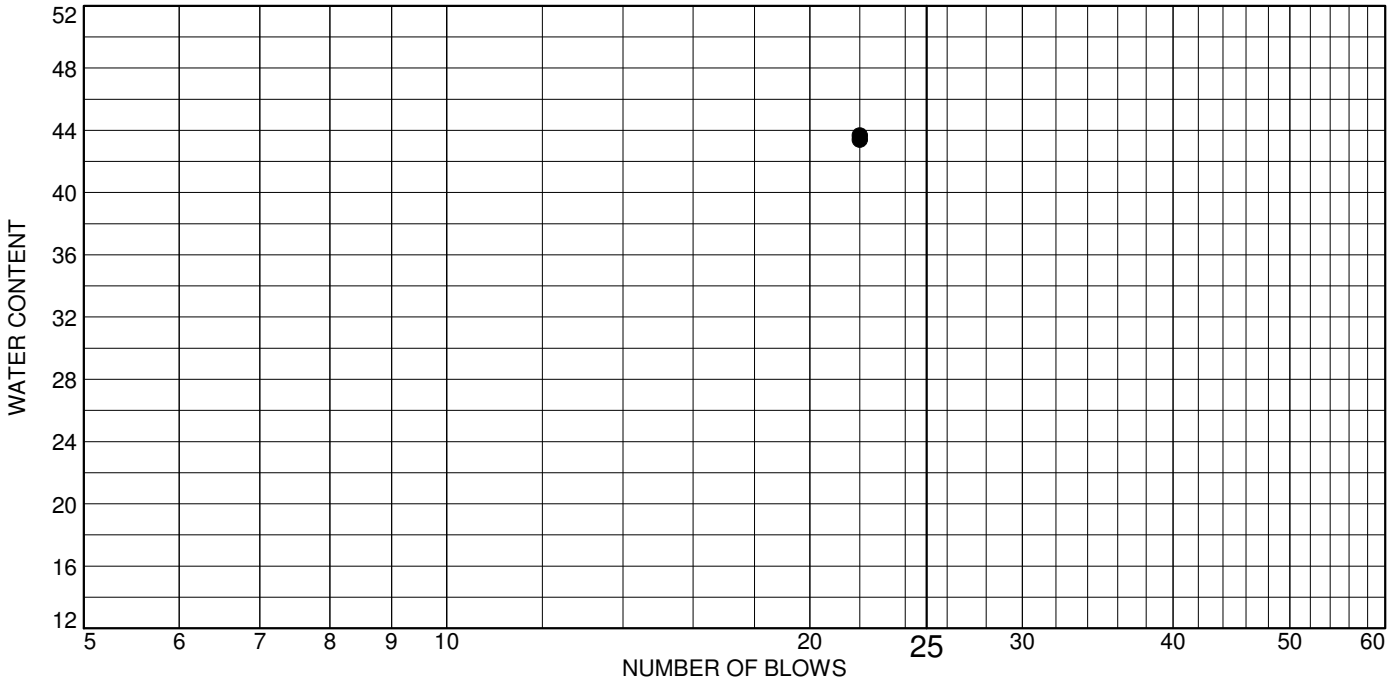
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	lean clay	43	20	23	96.1	92.5	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

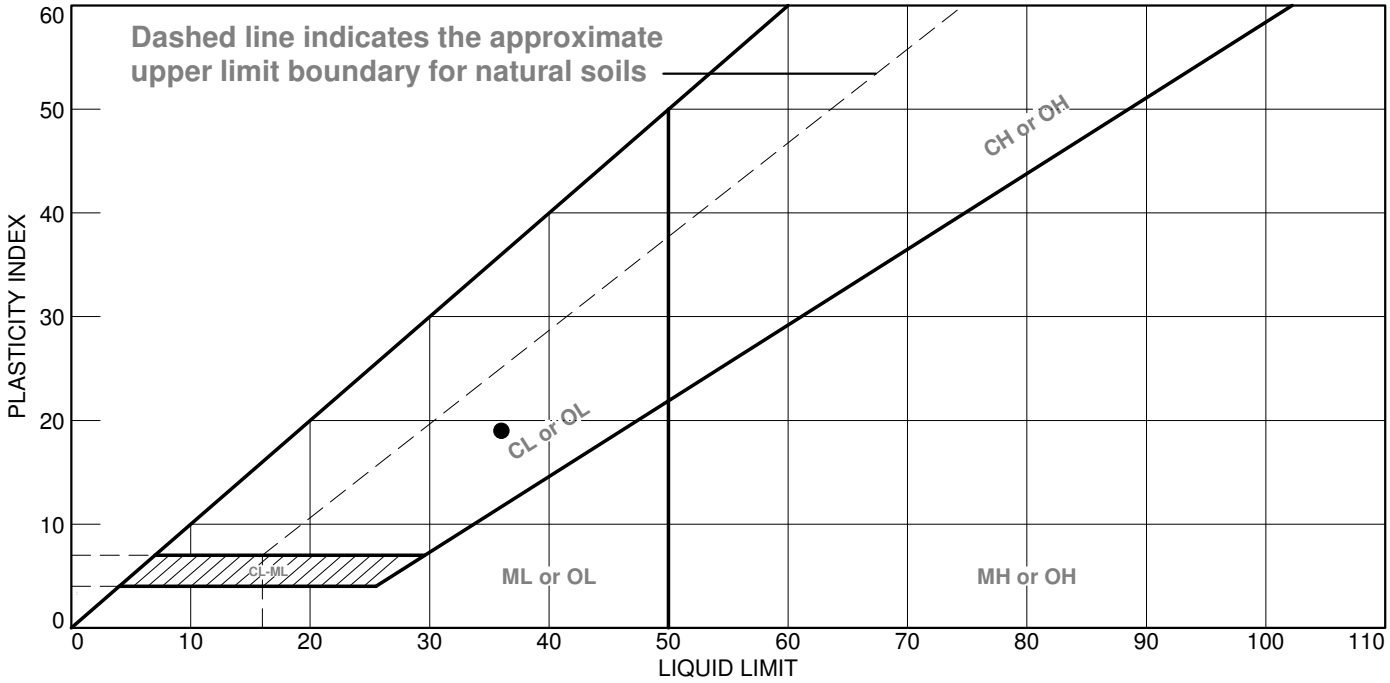
Location: GH11-243, Upper Talarik Creek Area
Sample Number: GH11-243-1 **Depth:** 4-5.5'

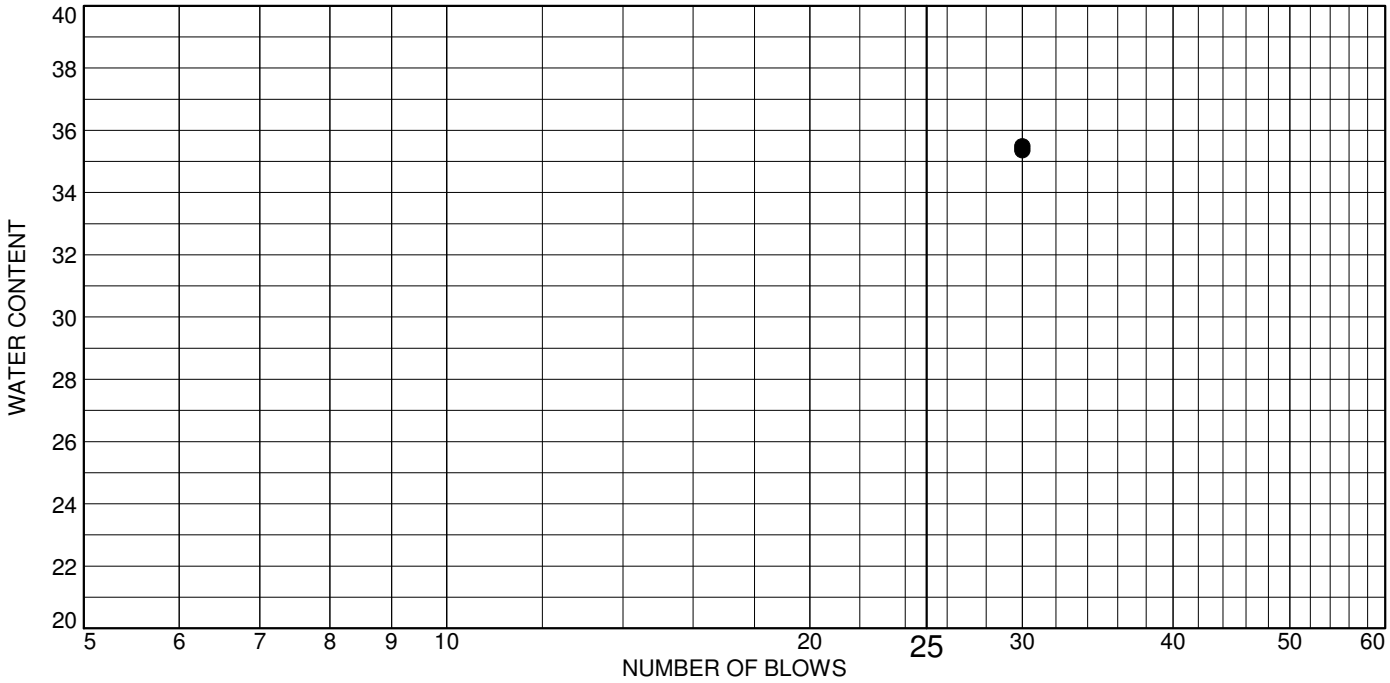
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	36	17	19	56.7	43.7	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

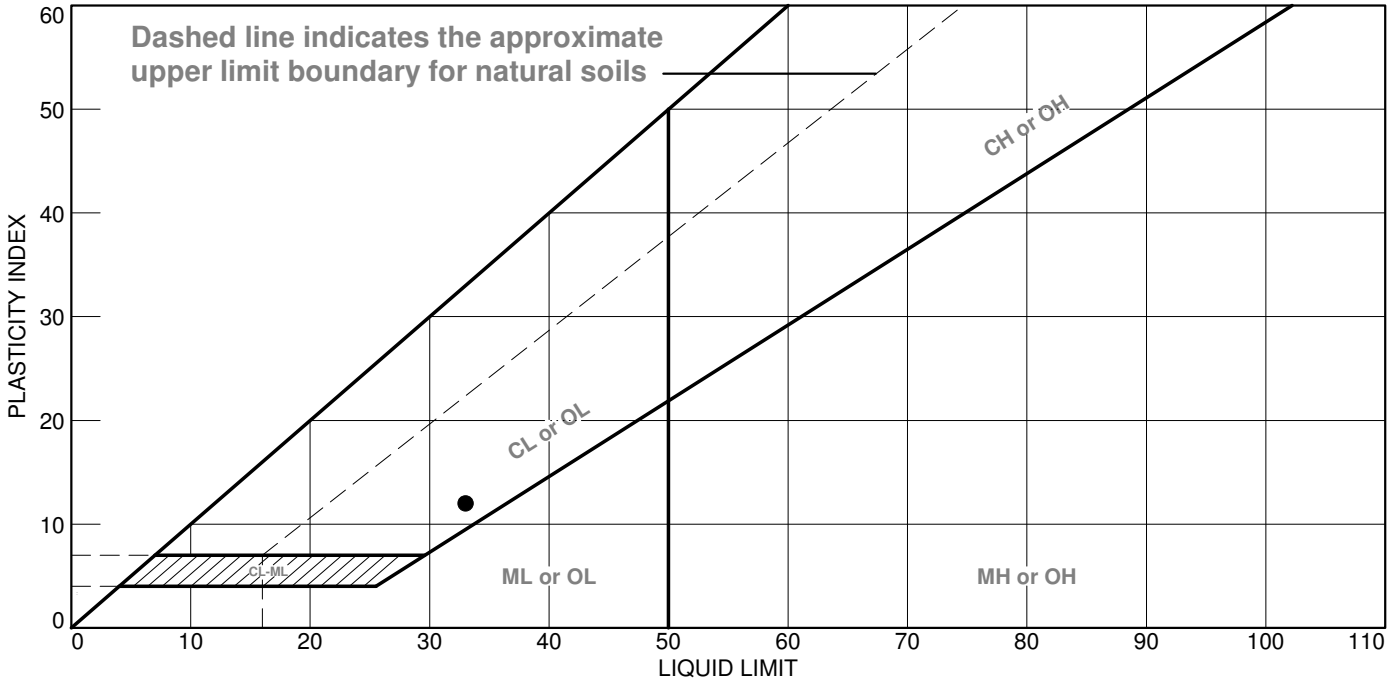
Location: GH11-243, Upper Talarik Creek Area
Sample Number: SPT 1 **Depth:** 5.5-7'

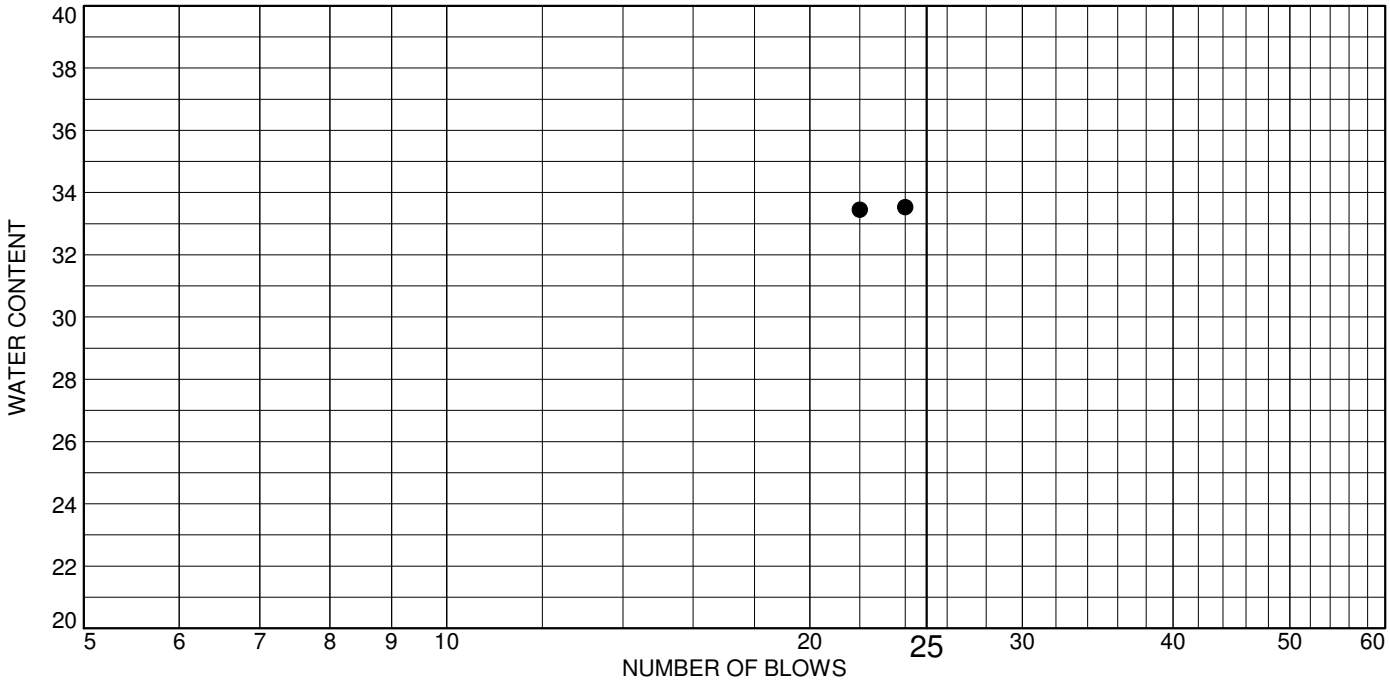
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay with gravel	33	21	12	63.5	56.3	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

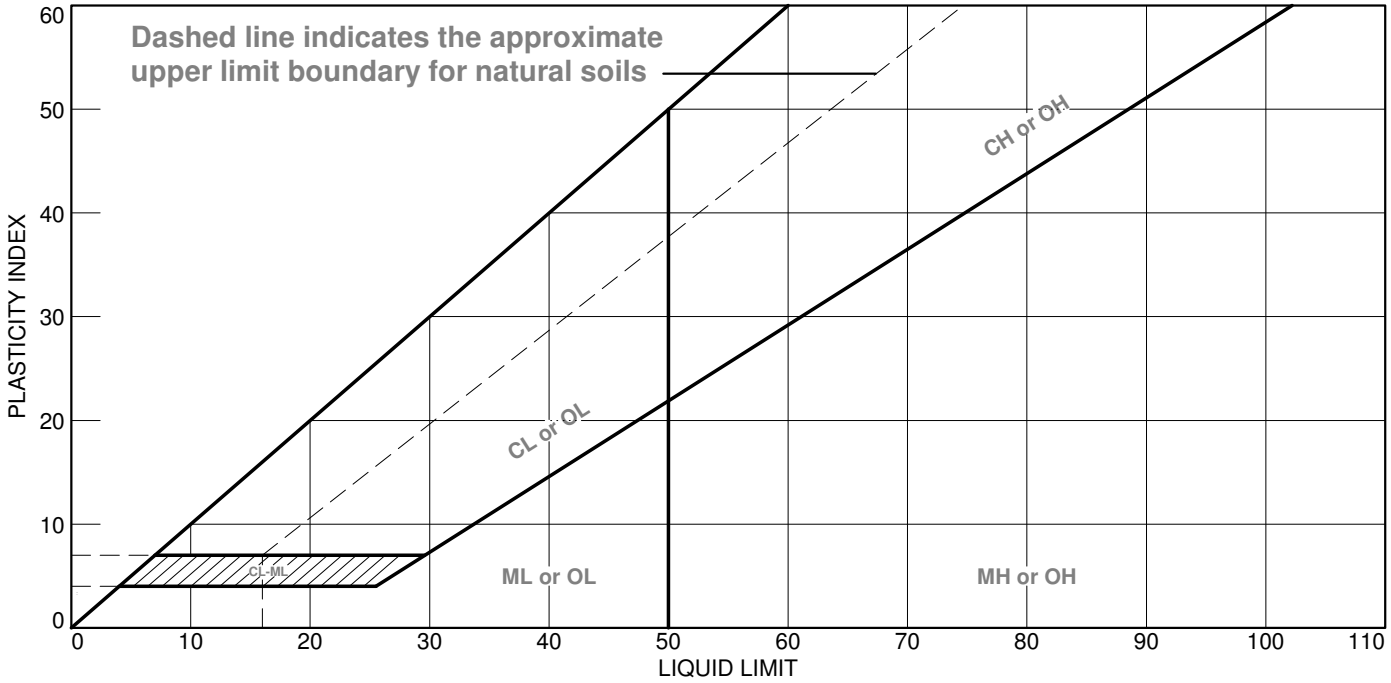
Location: GH11-243, Upper Talarik Creek Area
Sample Number: SPT 2 **Depth:** 9-10.5'

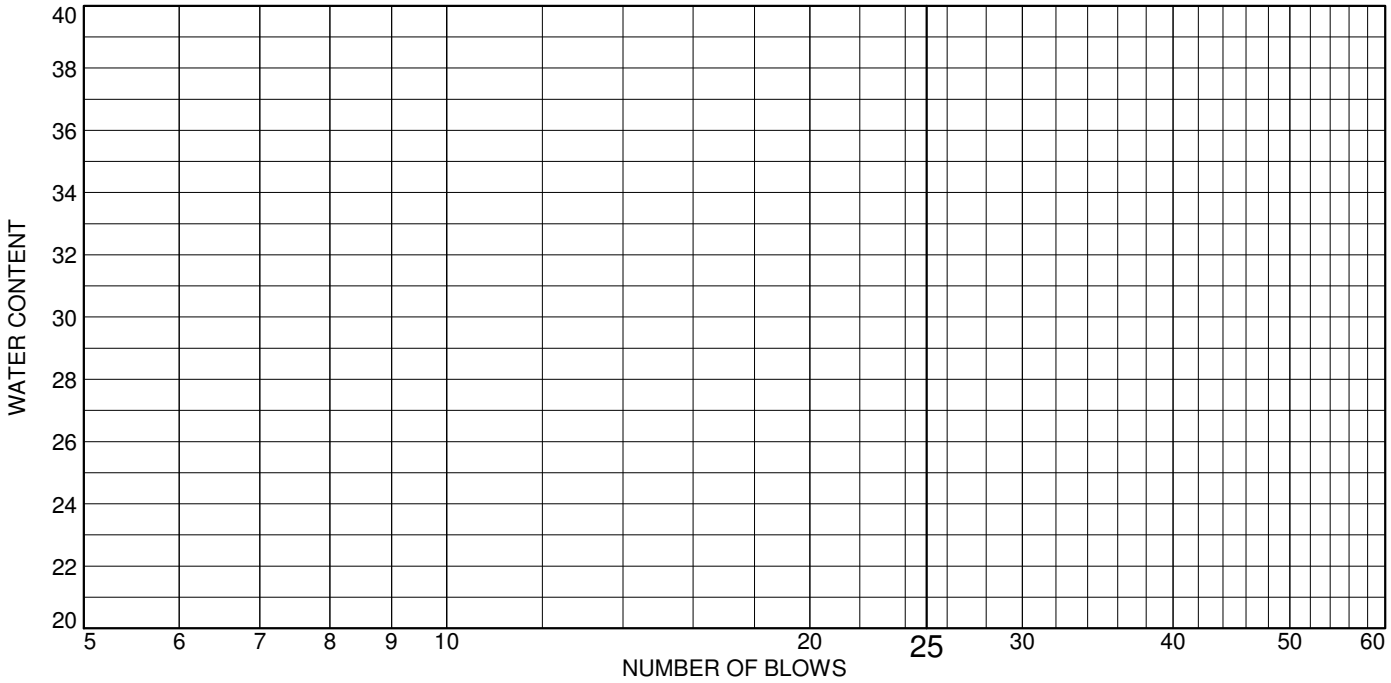
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded gravel with silt and sand	NP	NP	NP	13.6	7.5	GP-GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

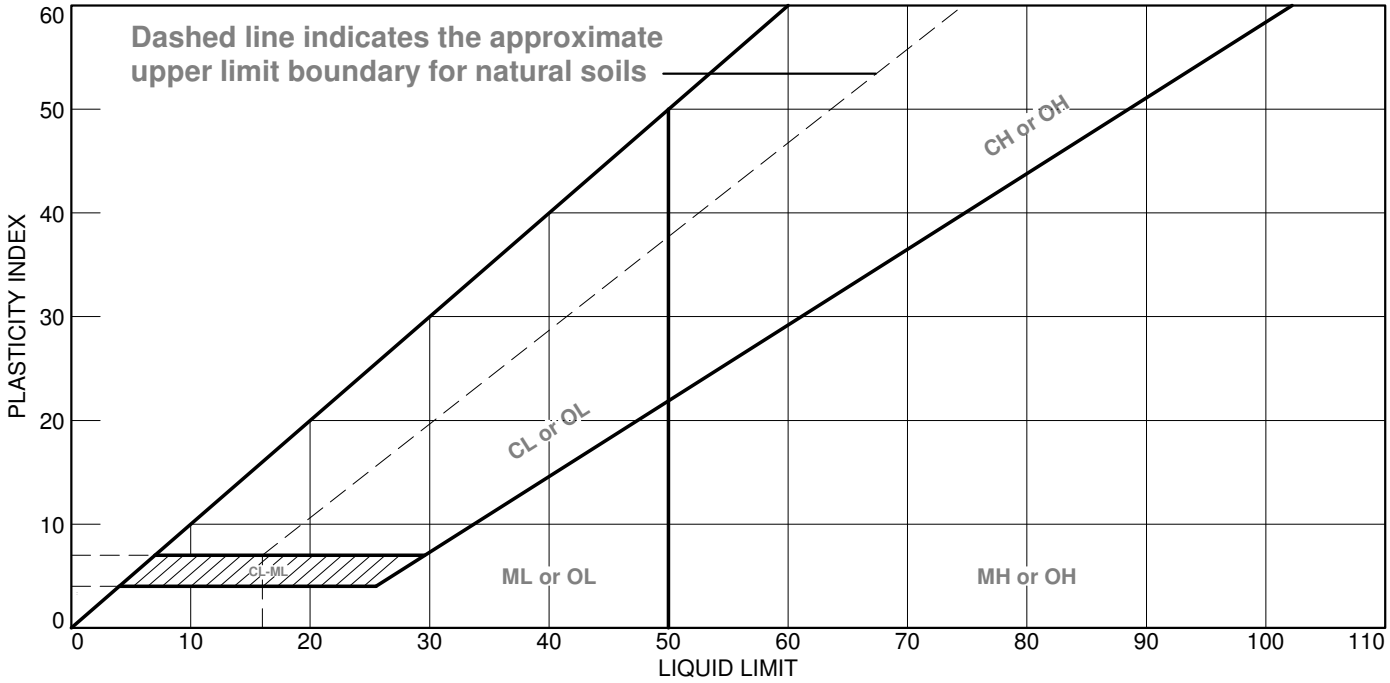
Location: GH11-245-1, Upper Talarik Creek Area
Sample Number: GH11-245-1 **Depth:** 10-10.25'

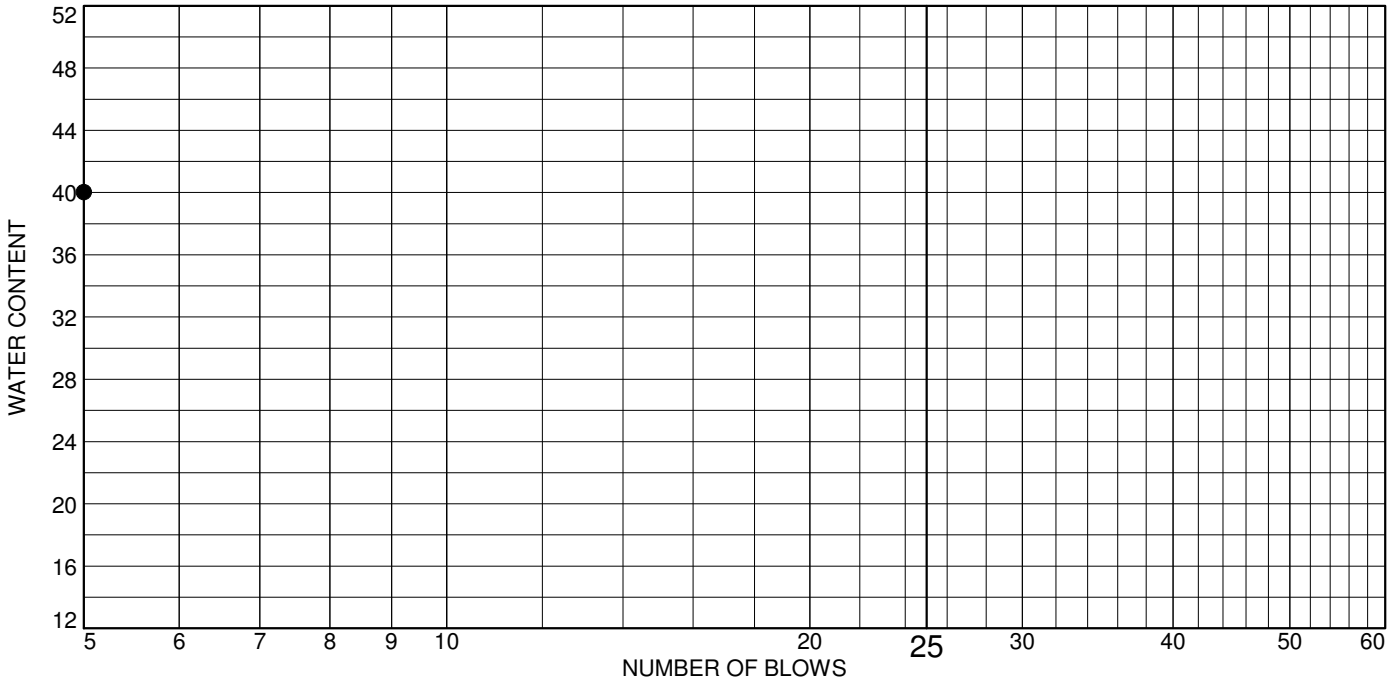
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy silt	33	NP	NP	88.4	60.5	ML

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

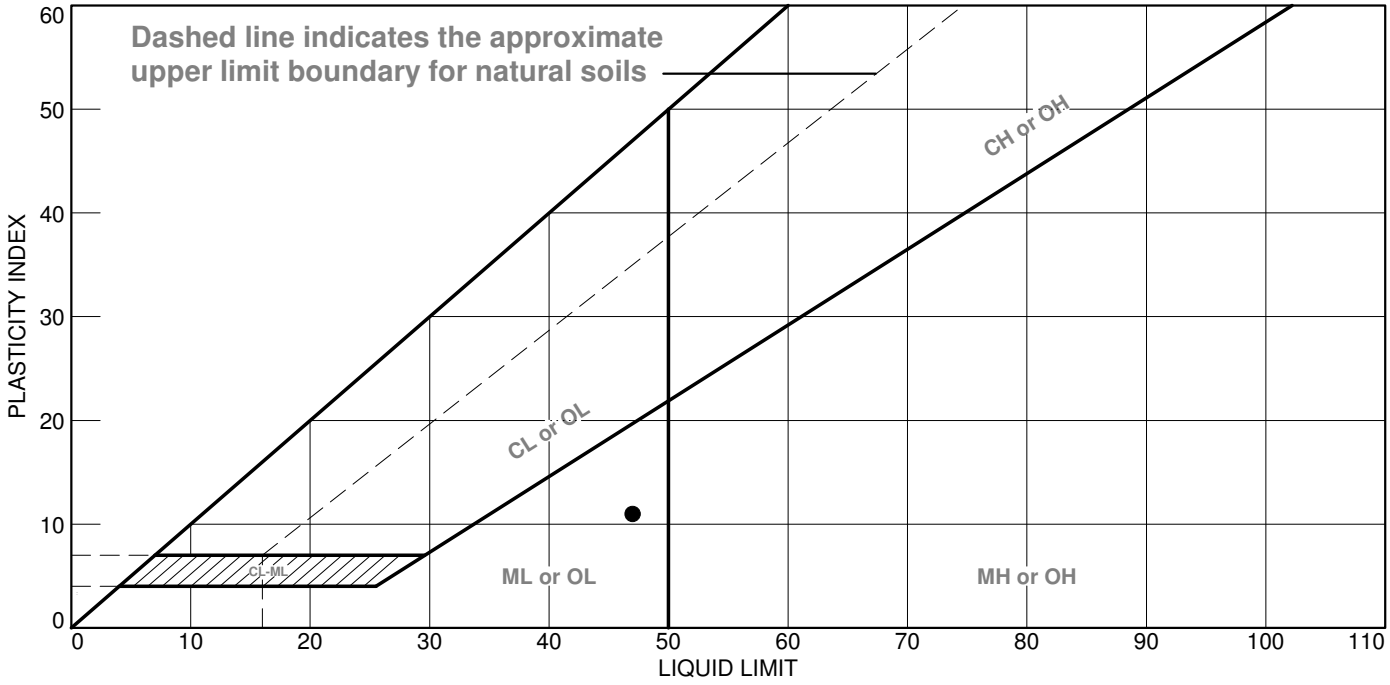
Location: GH11-245, Upper Talarik Creek Area
Sample Number: SPT 1 **Depth:** 5-6.5'

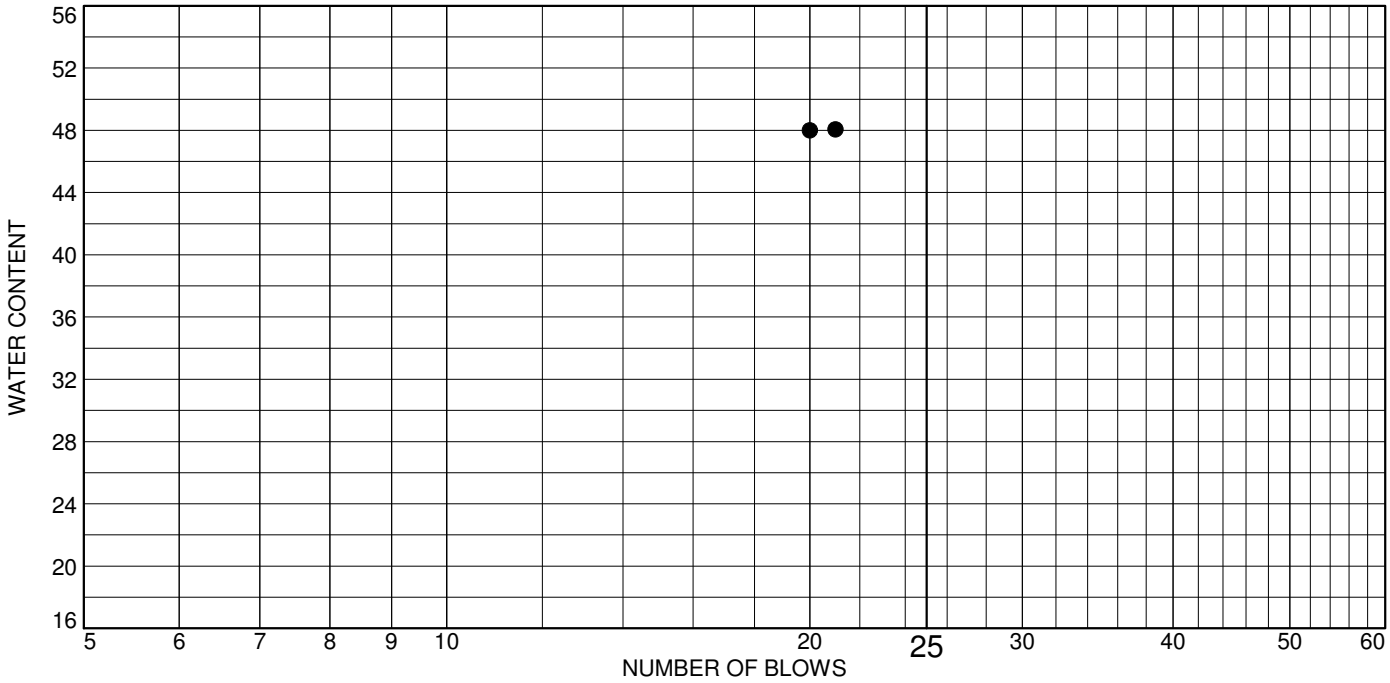
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand	47	36	11	65.7	37.7	SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

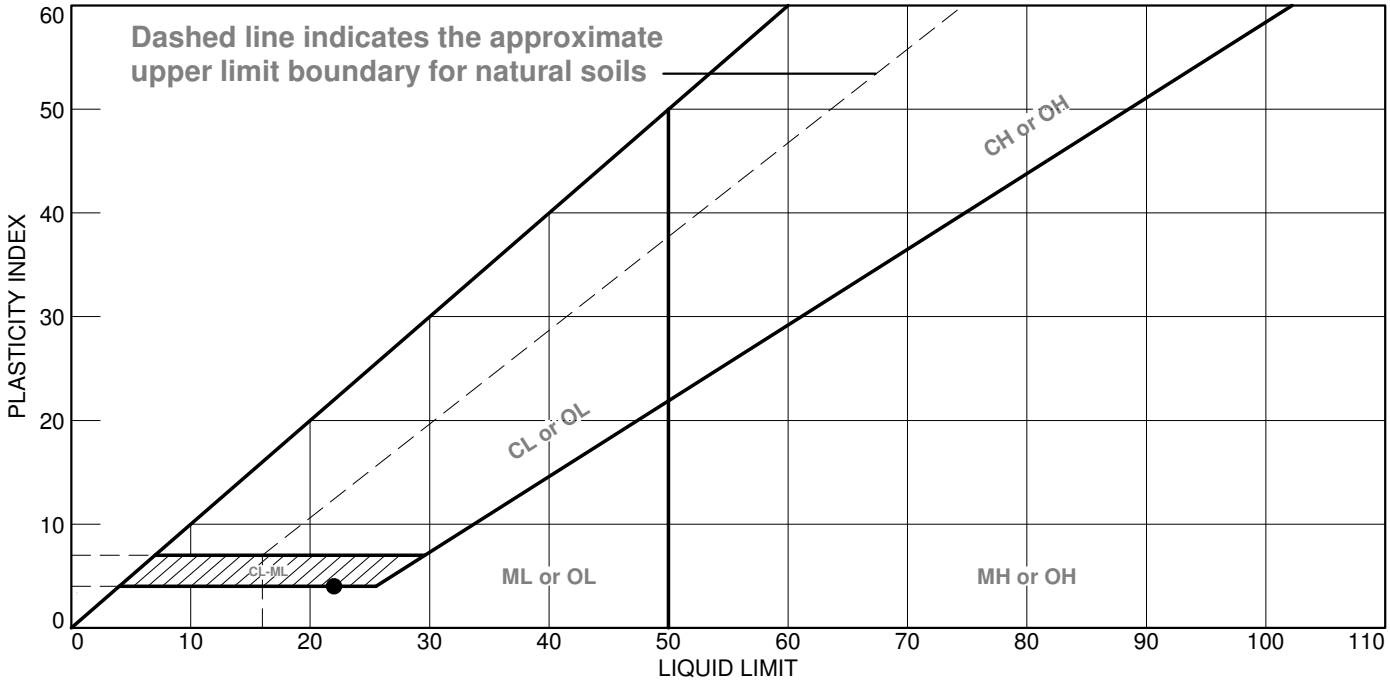
Location: GH11-245, Upper Talarik Creek Area
Sample Number: SPT 2 **Depth:** 15-16.5'

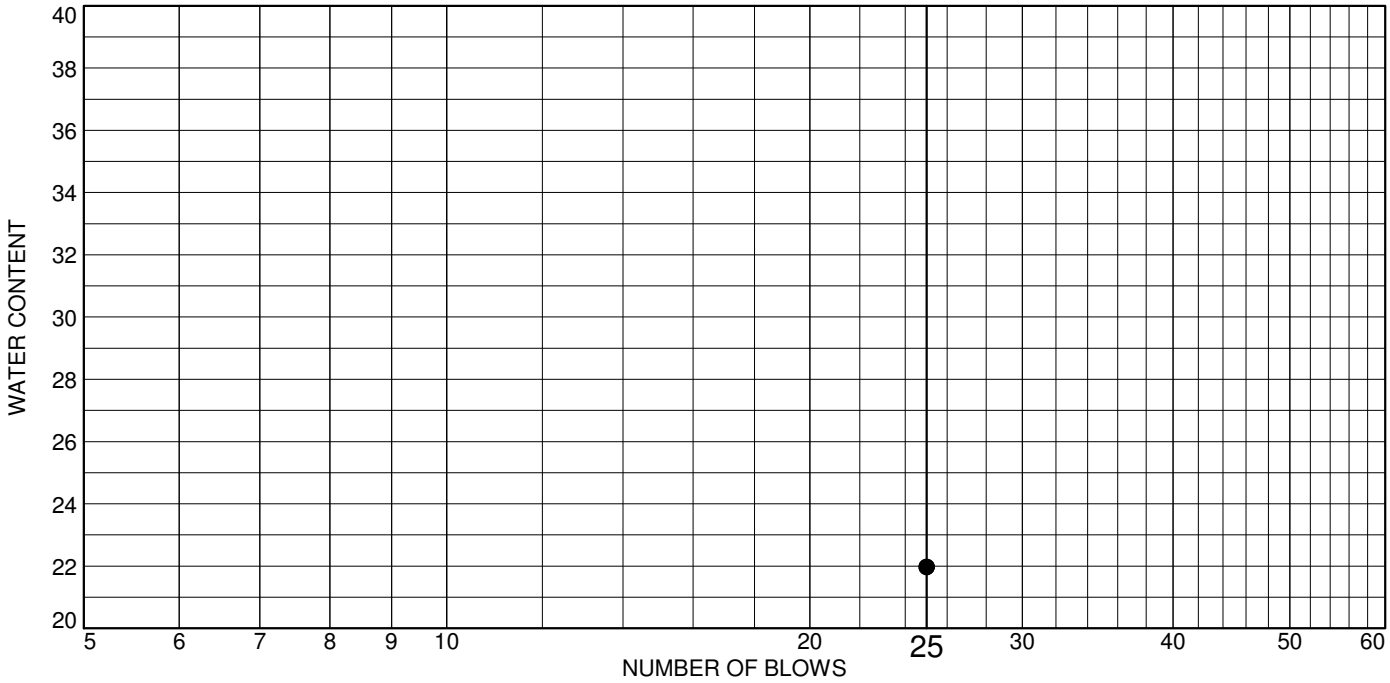
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty, clayey sand	22	18	4	68.2	41.8	SC-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

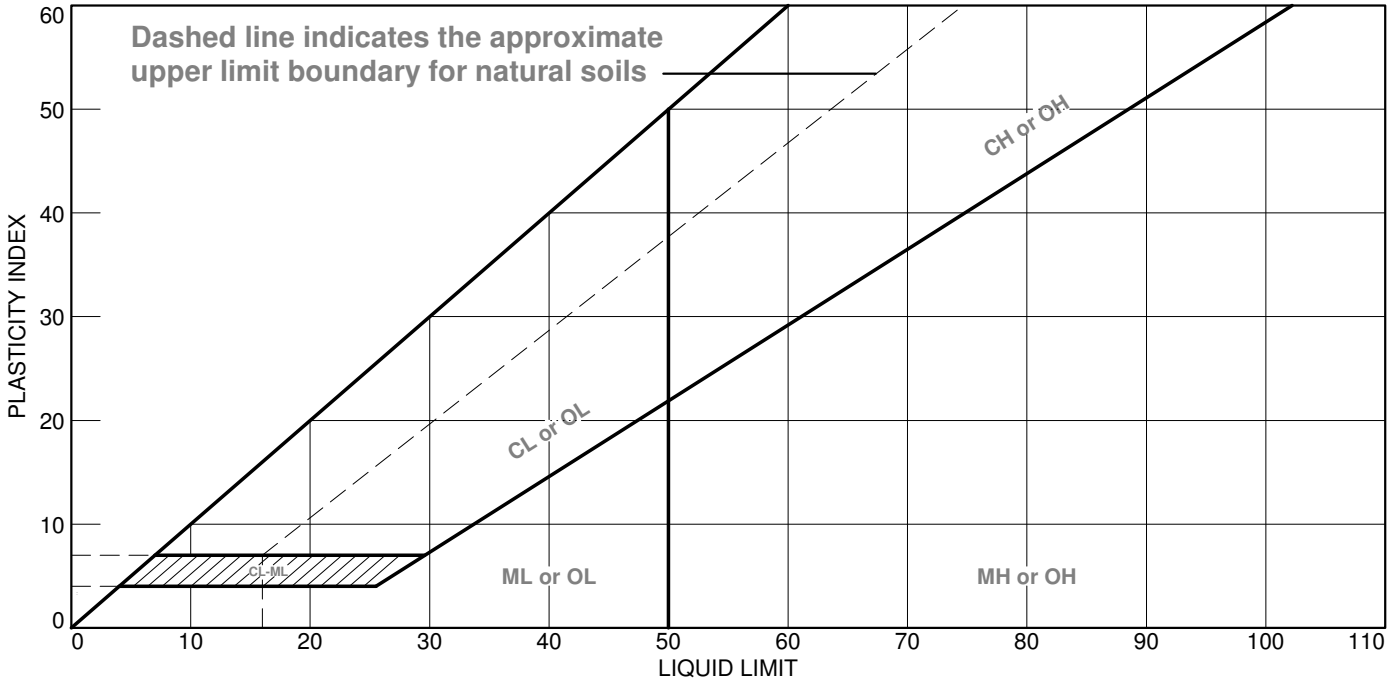
Location: GH11-247, Area E
Sample Number: SPT 1 **Depth:** 4-5.5'

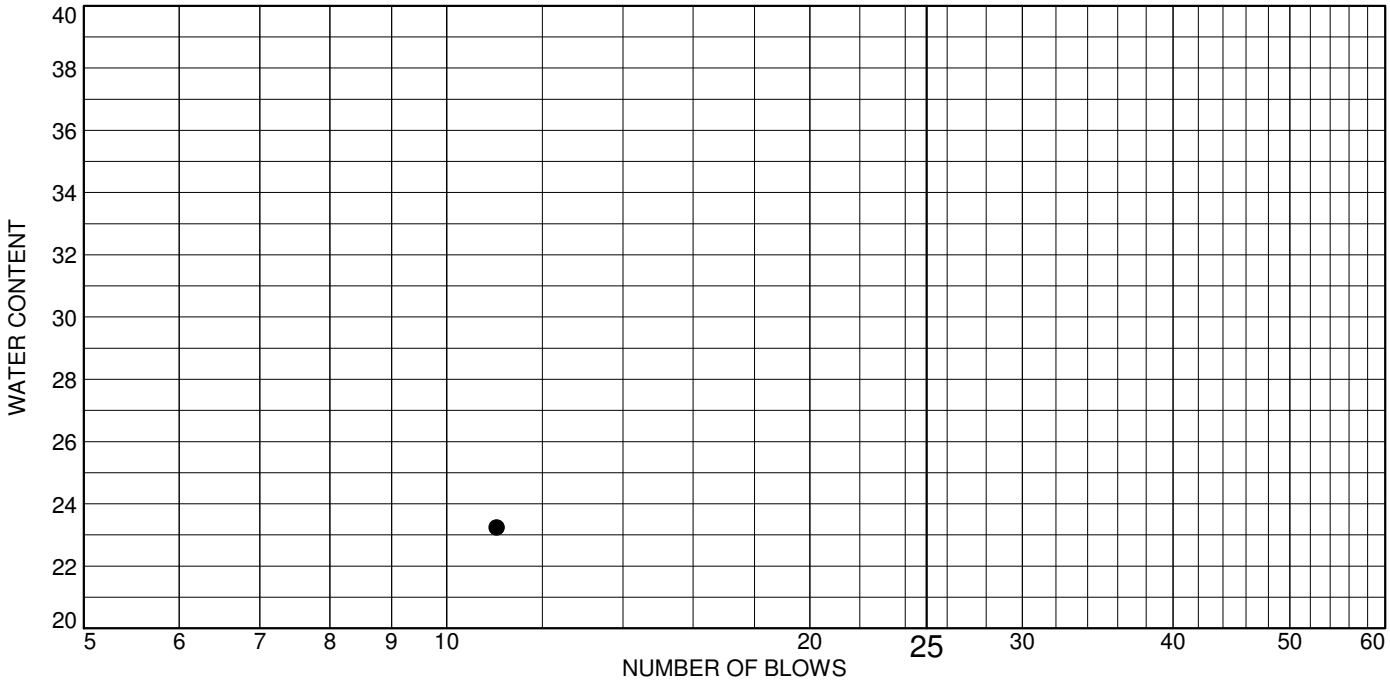
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty gravel with sand	21	NP	NP	31.7	20.3	GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

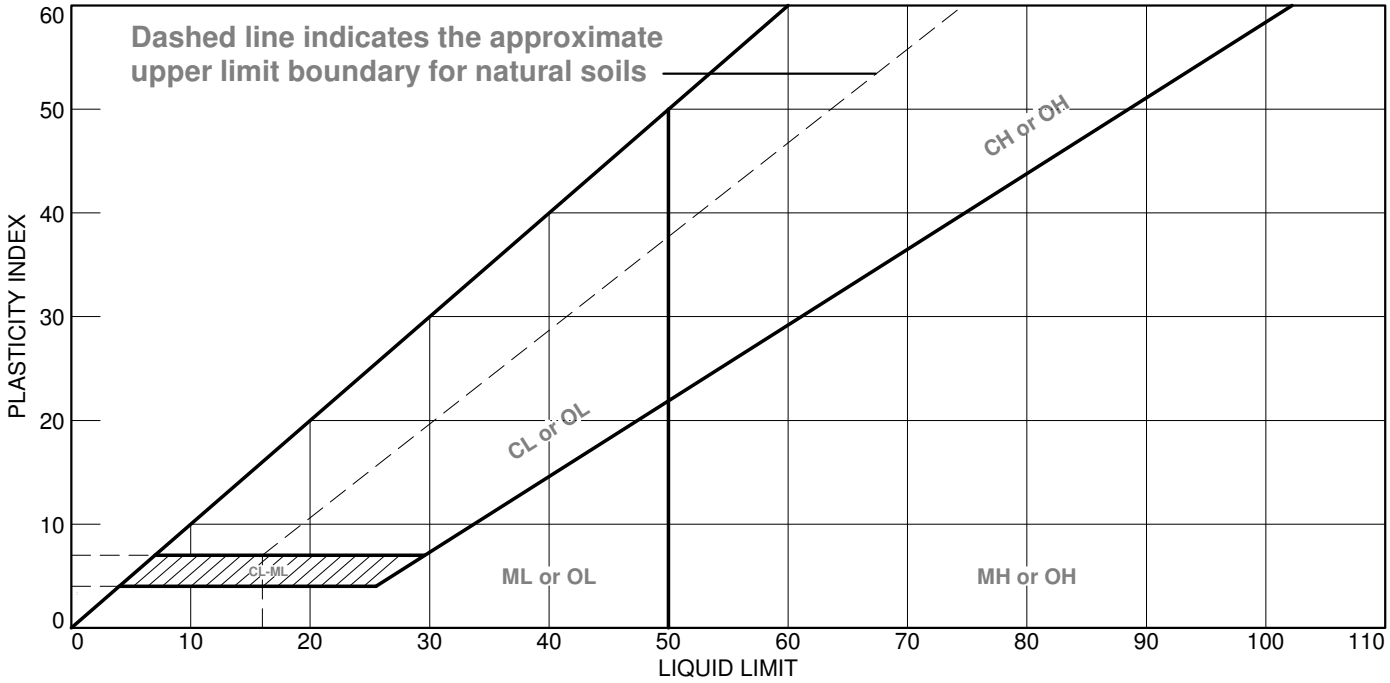
Location: GH11-247, Area E
Sample Number: SPT 3 **Depth:** 14-15.5'

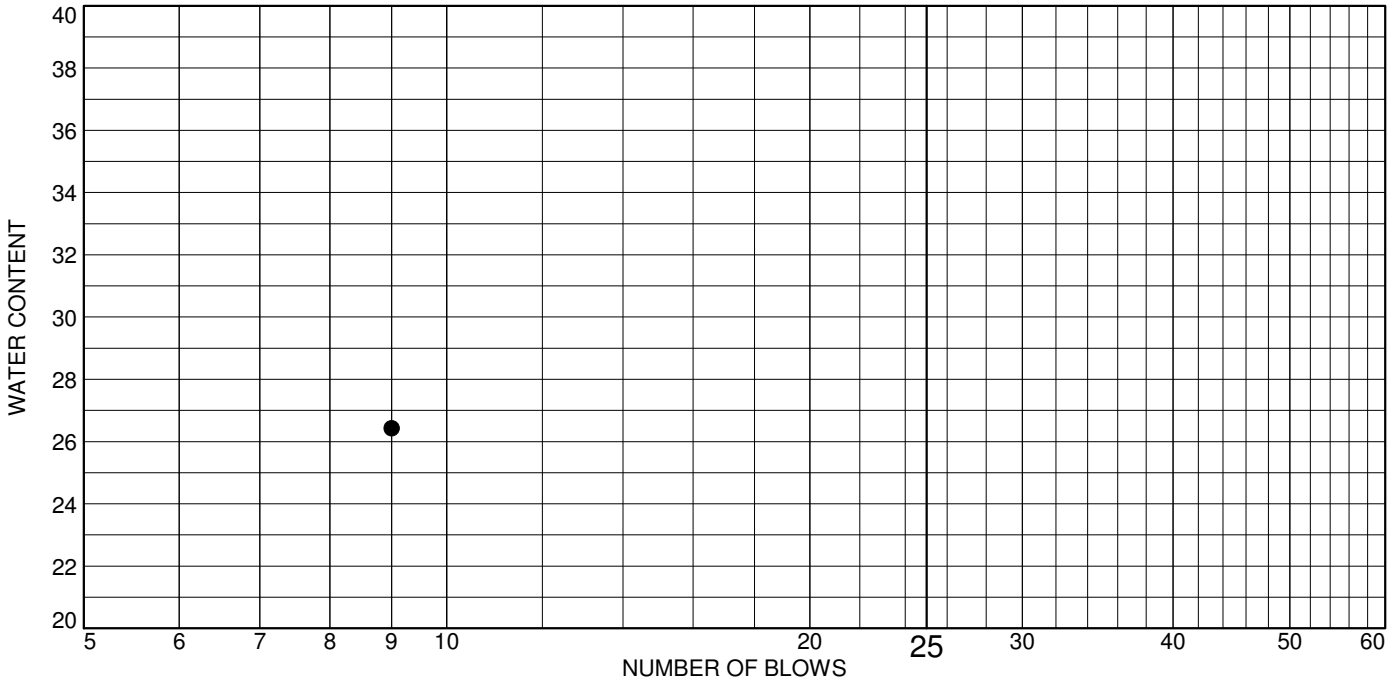
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded sand with silt and gravel	23	NP	NP	21.0	9.9	SP-SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

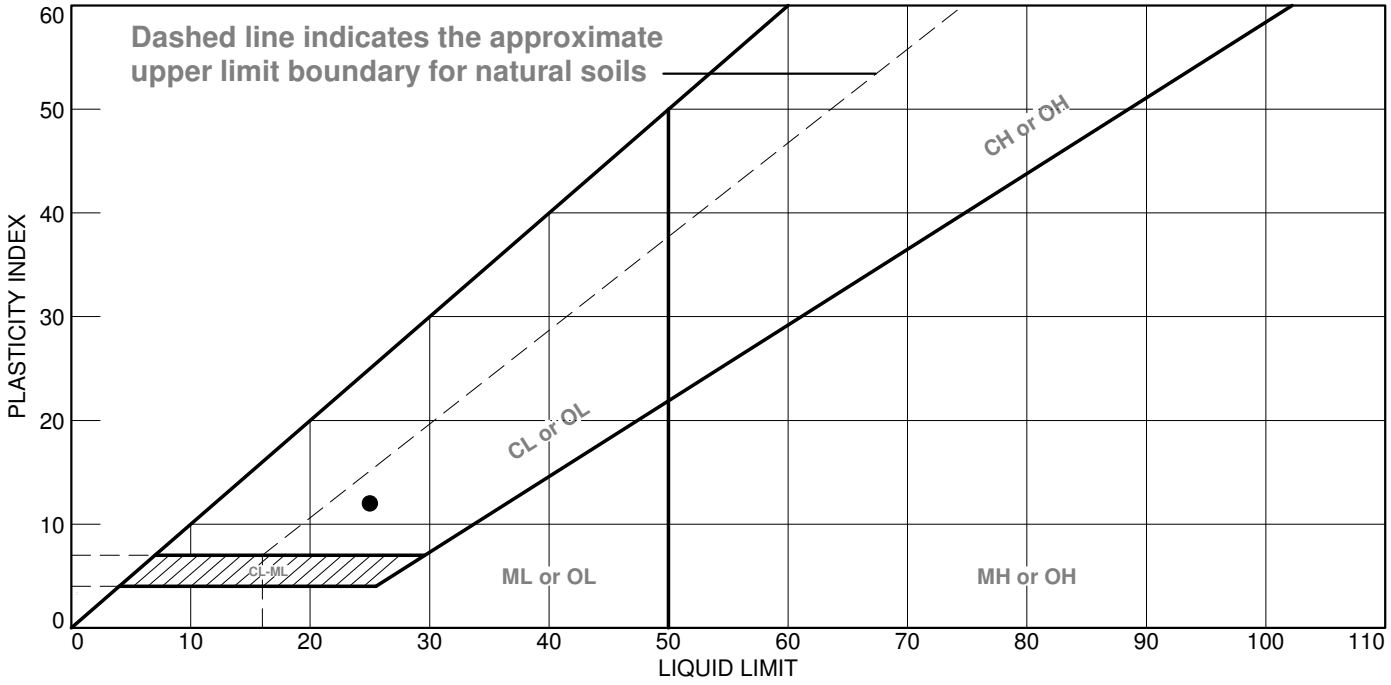
Location: GH11-247, Area E
Sample Number: SPT 4 **Depth:** 19-20.5'

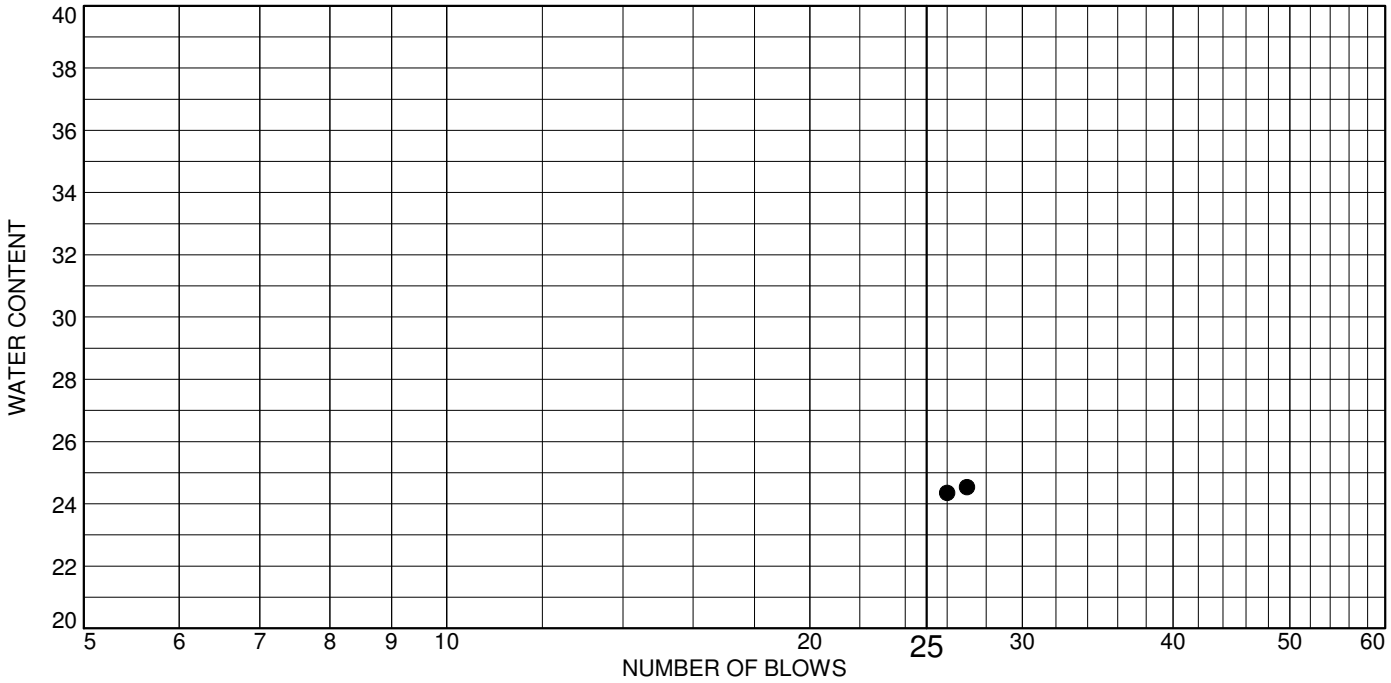
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	25	13	12	45.7	30.3	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

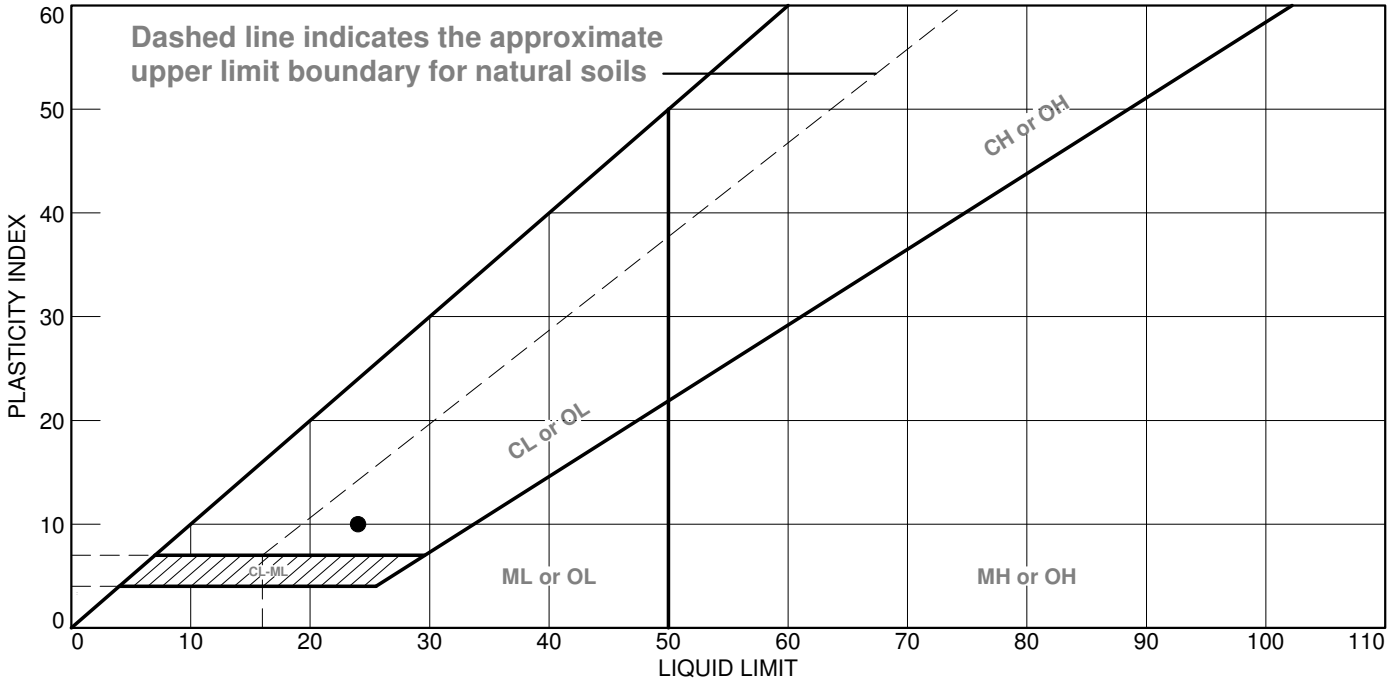
Location: GH11-247, Area E
Sample Number: SPT 7 **Depth:** 34-35.5'

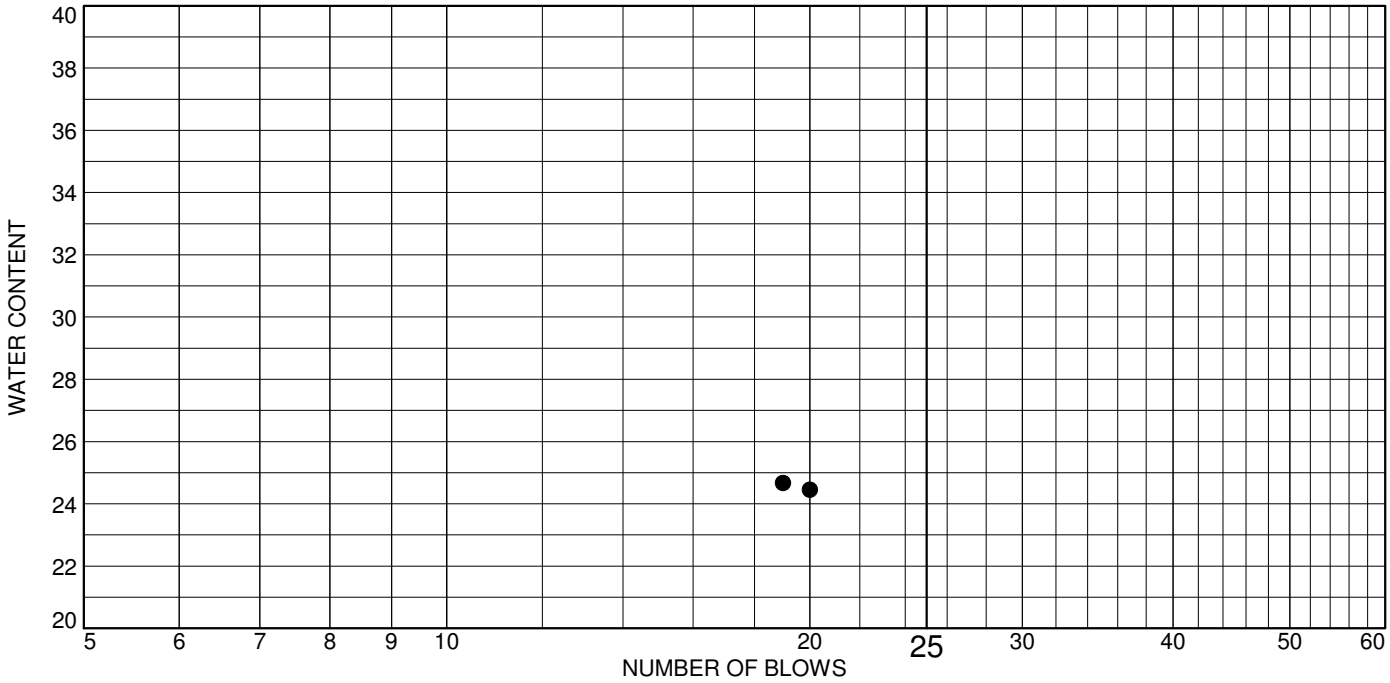
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	24	14	10	34.3	21.9	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

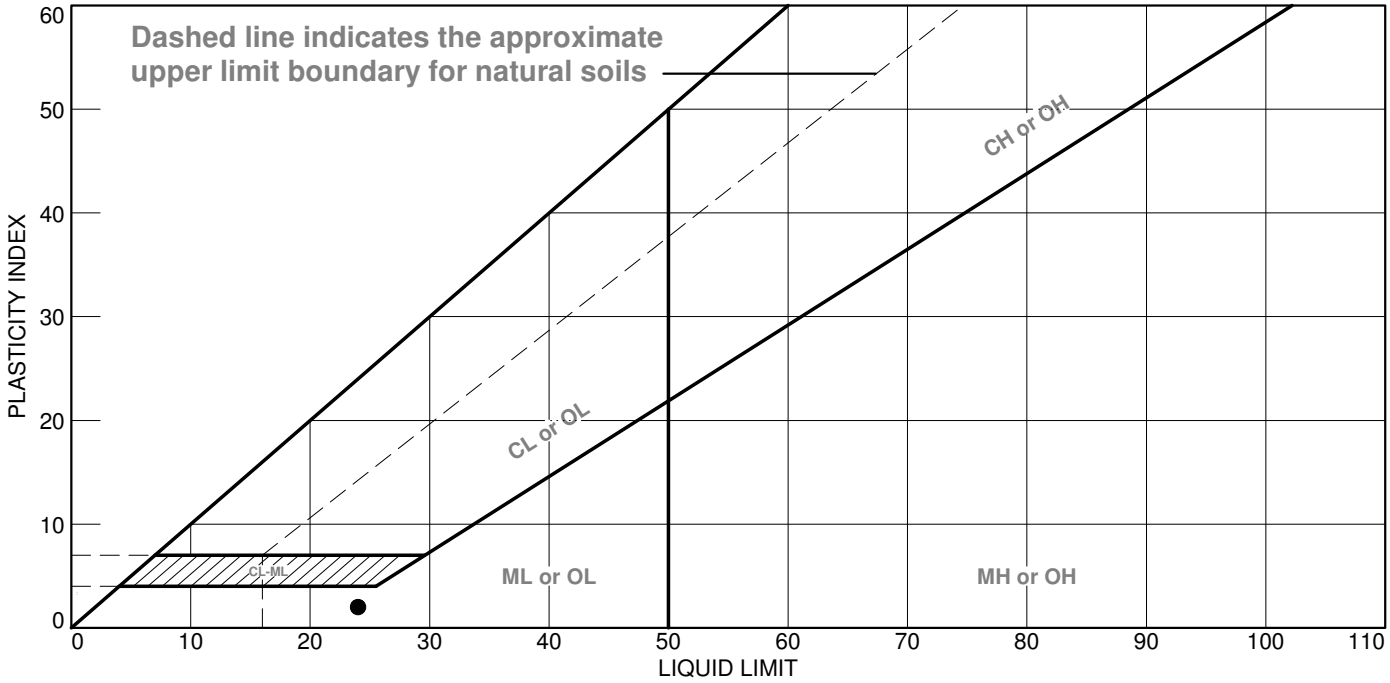
Location: GH11-247, Area E
Sample Number: SPT 11 **Depth:** 54-55.5'

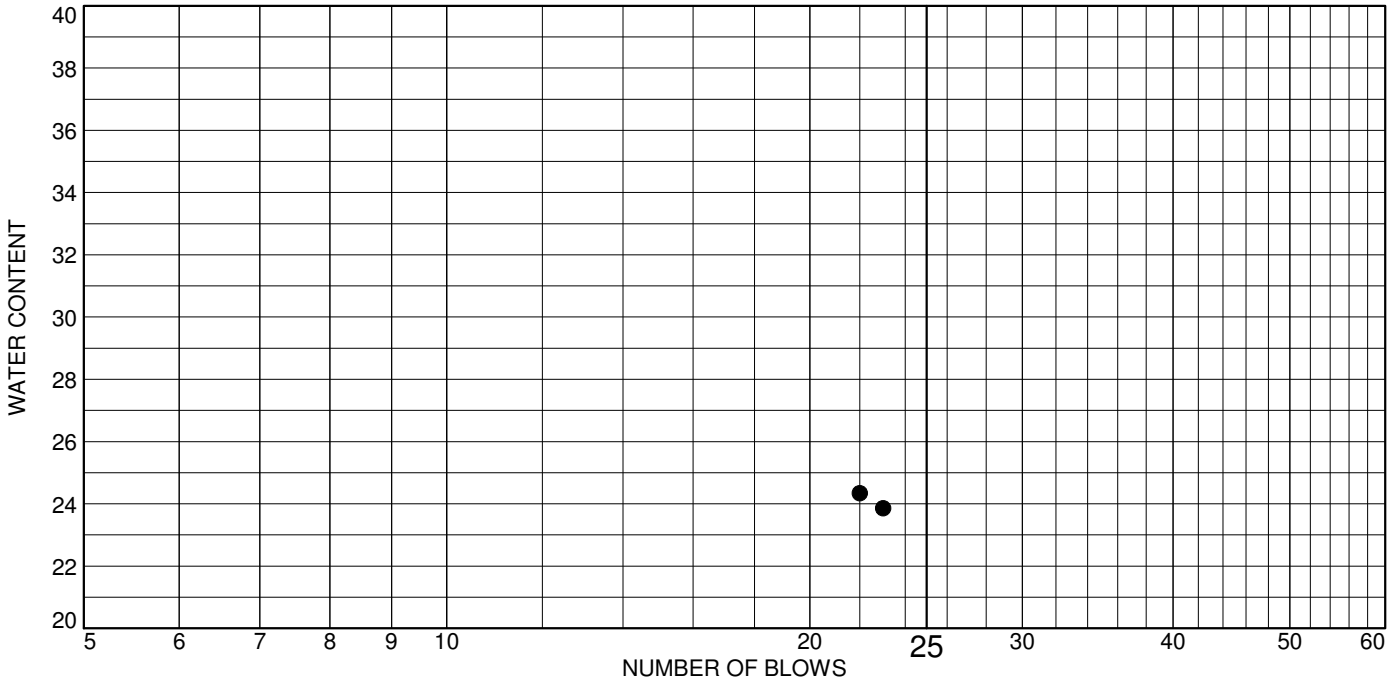
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty gravel with sand	24	22	2	26.6	18.1	GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

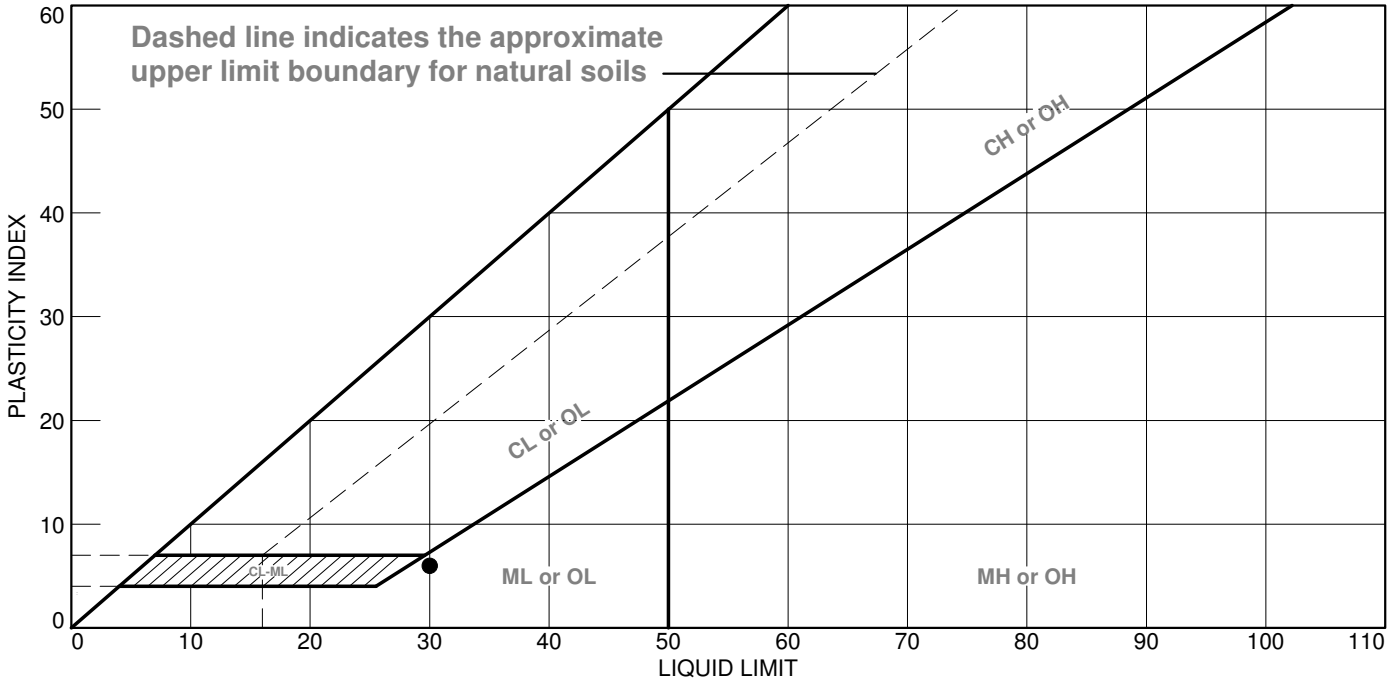
Location: GH11-247, Area E
Sample Number: SPT 13 **Depth:** 64-65.5'

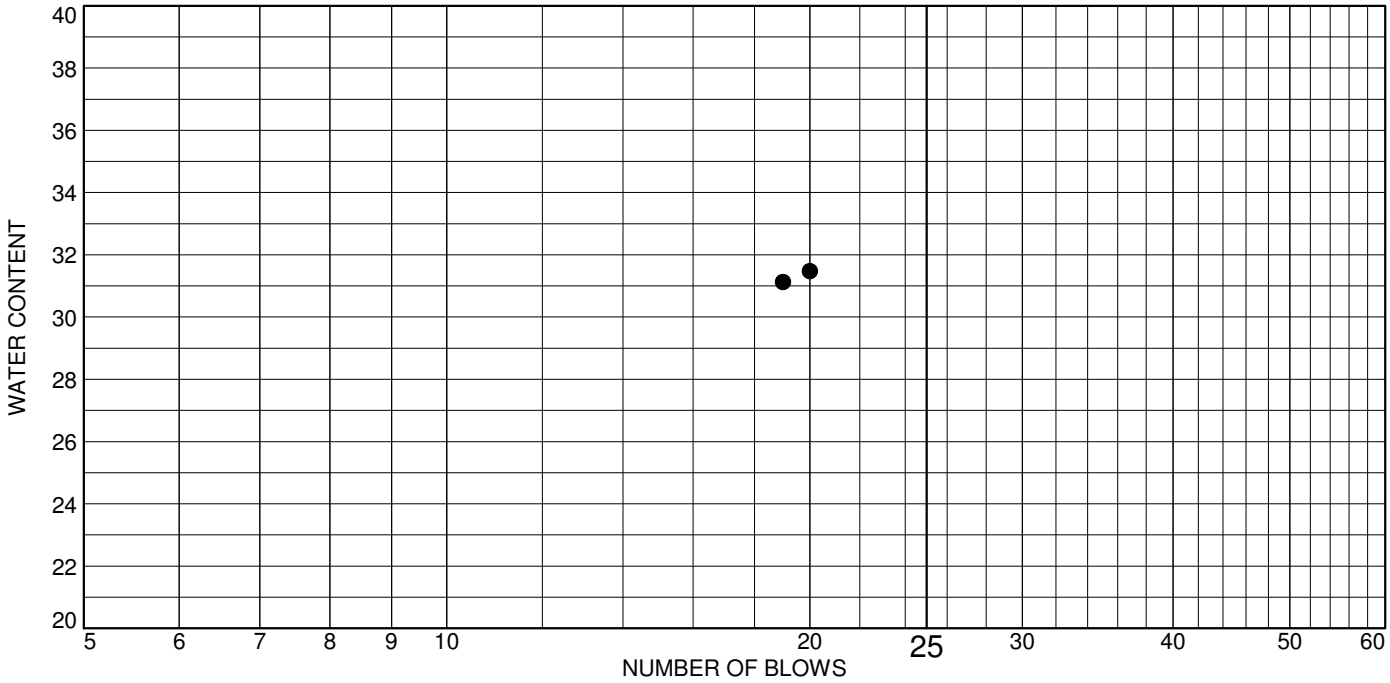
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand with gravel	30	24	6	28.8	18.8	SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

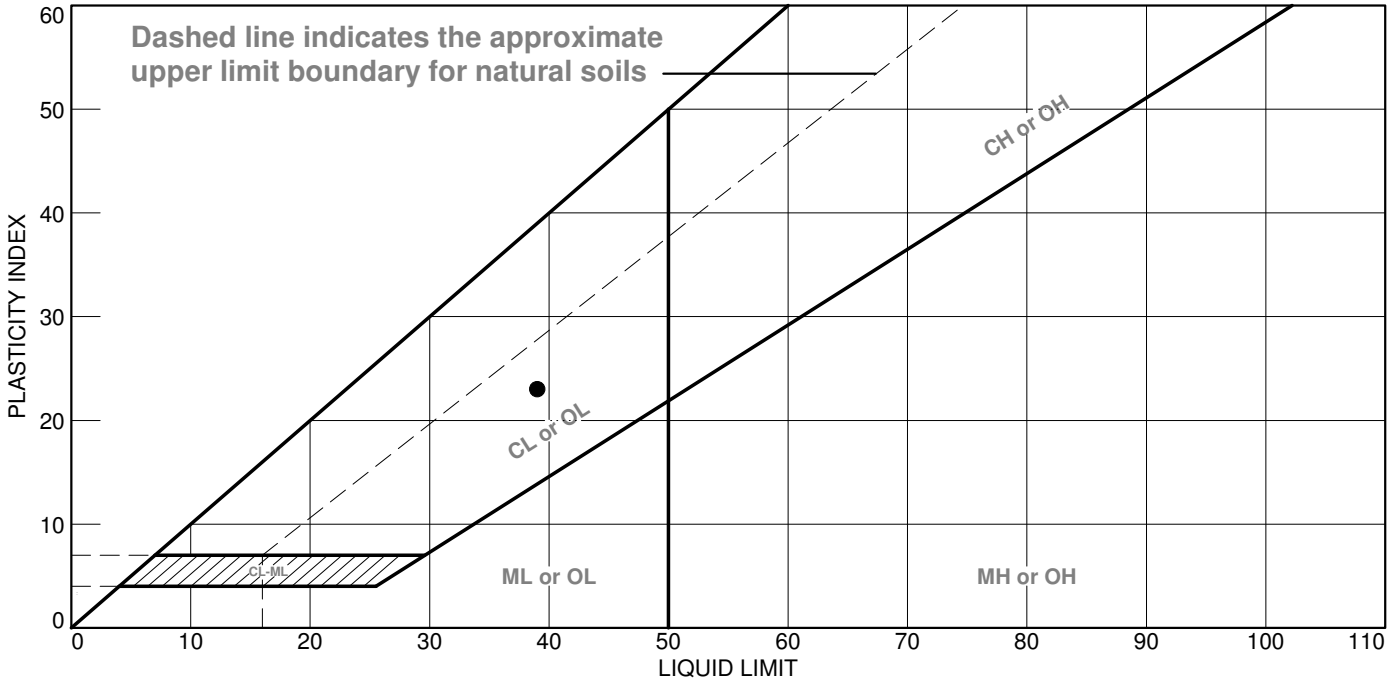
Location: GH11-266S
Sample Number: GH11-266S-1 **Depth:** 25.5-26'

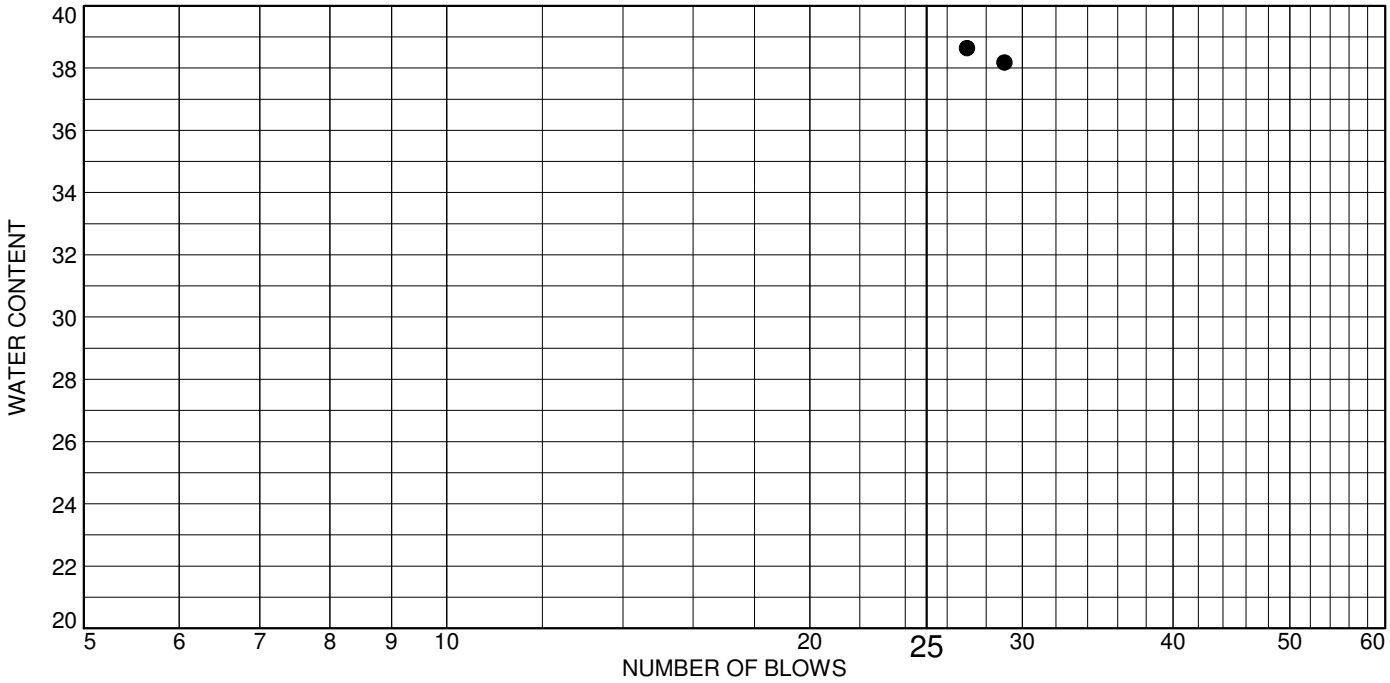
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	39	16	23	62.6	49.5	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

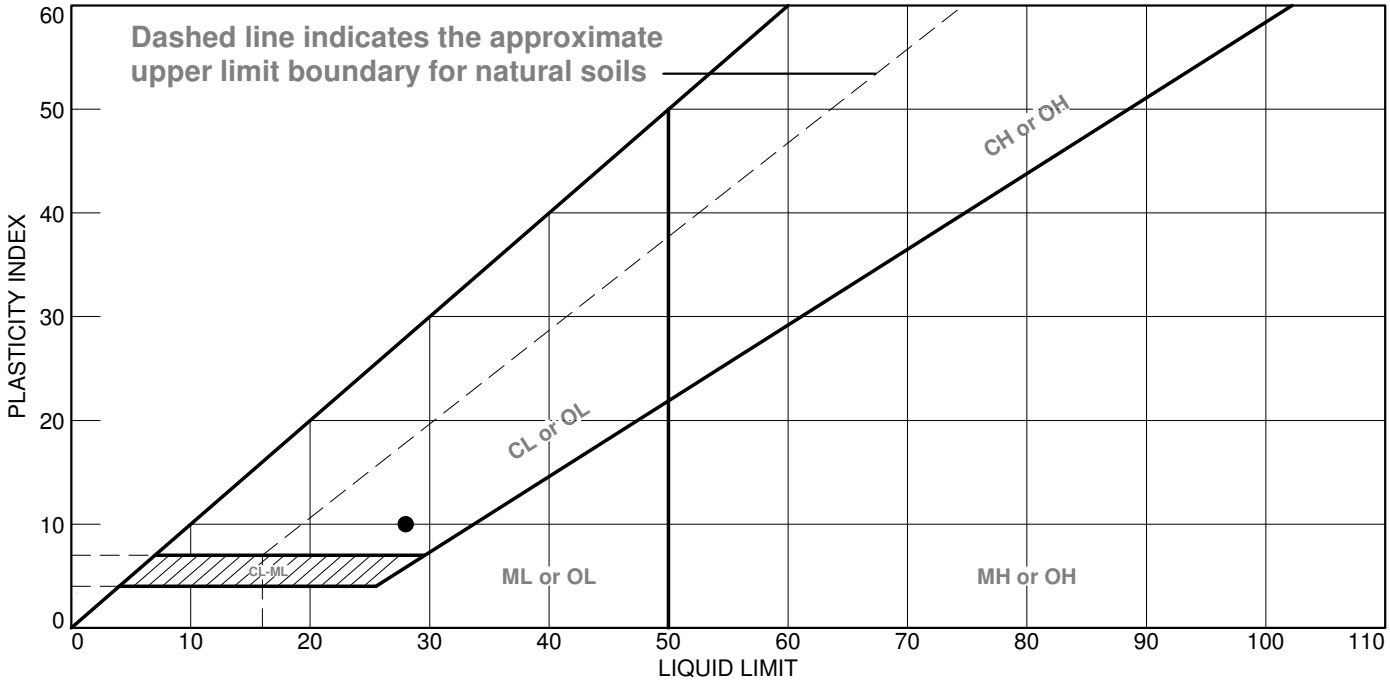
Location: GH11-266S
Sample Number: GH11-266S-2 **Depth:** 38.5-39'

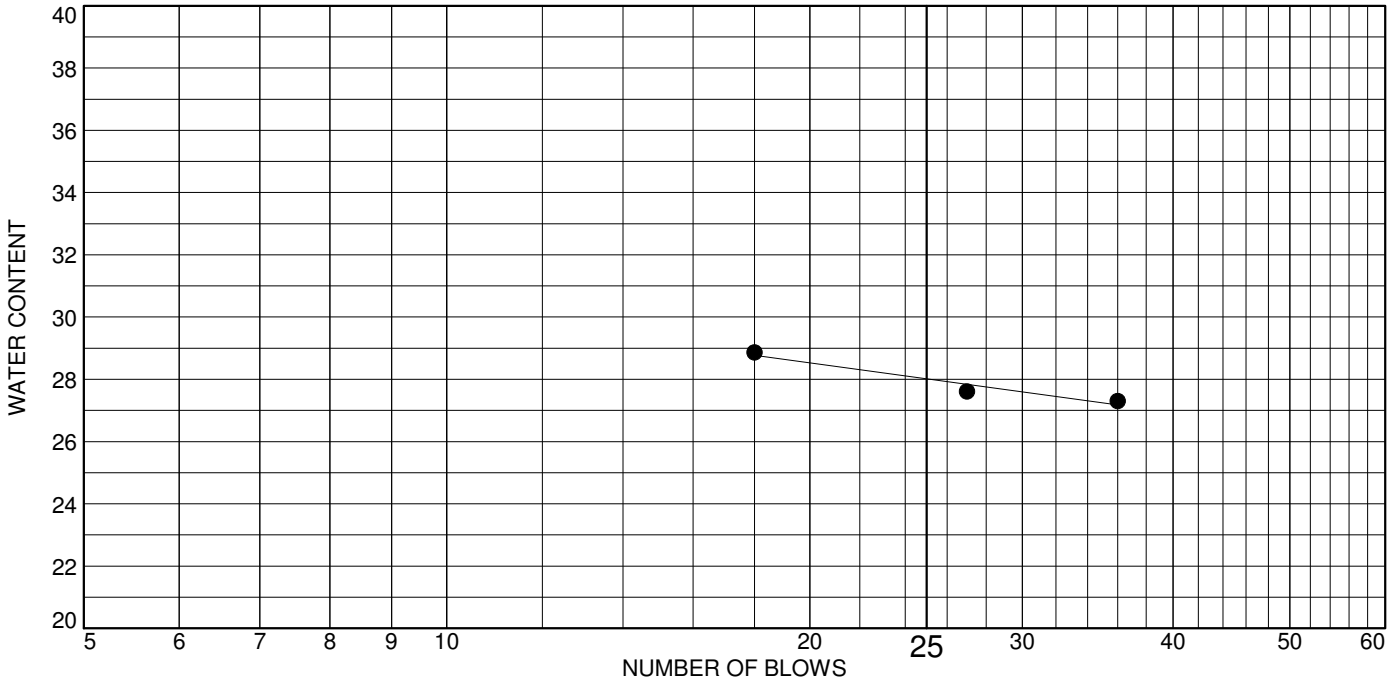
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	28	18	10	64.3	46.8	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

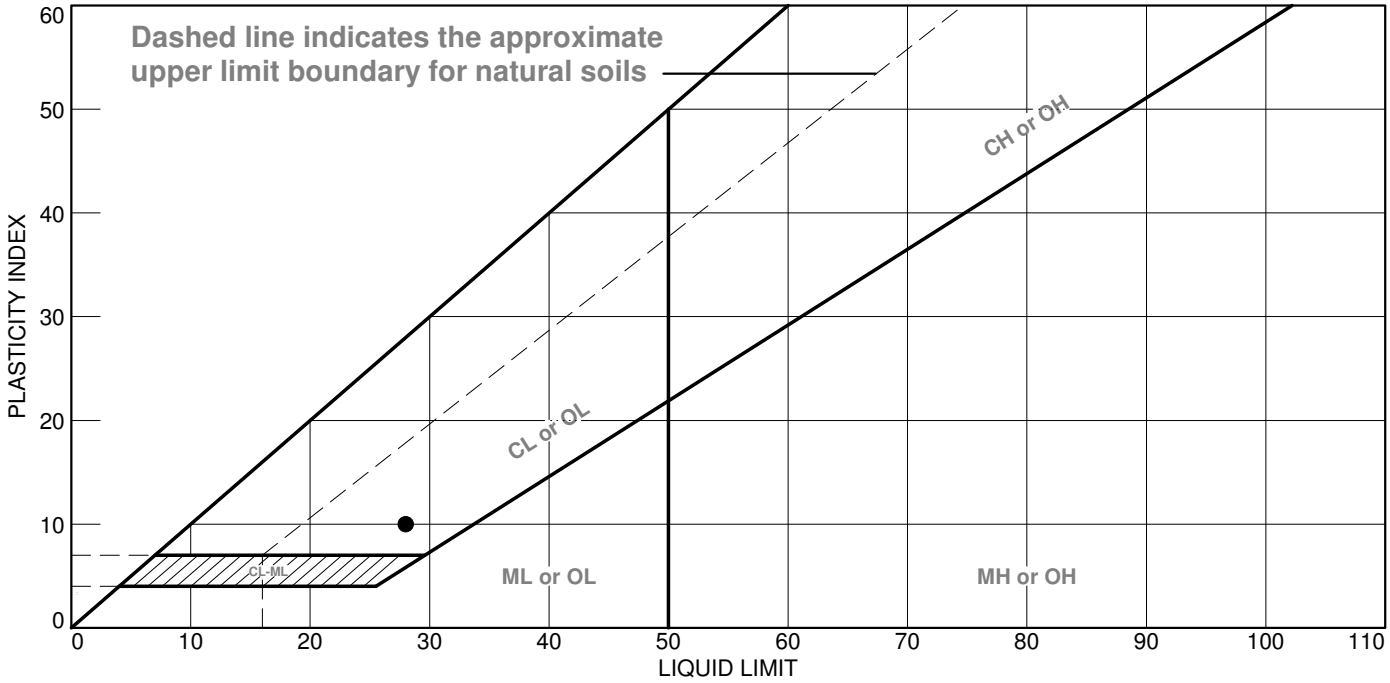
Location: GH11-266S
Sample Number: GH11-266S-3 **Depth:** 56.5-57'

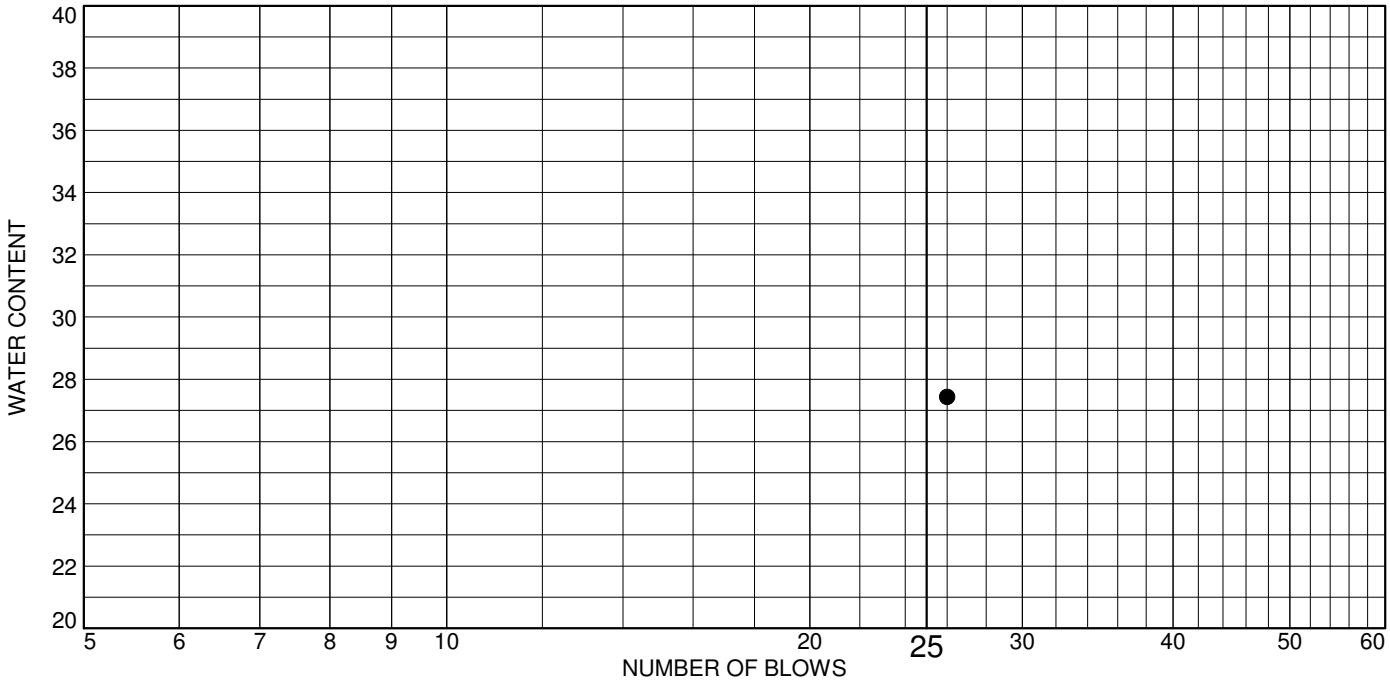
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	poorly graded gravel with clay and sand	28	18	10	19.5	11.3	GP-GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

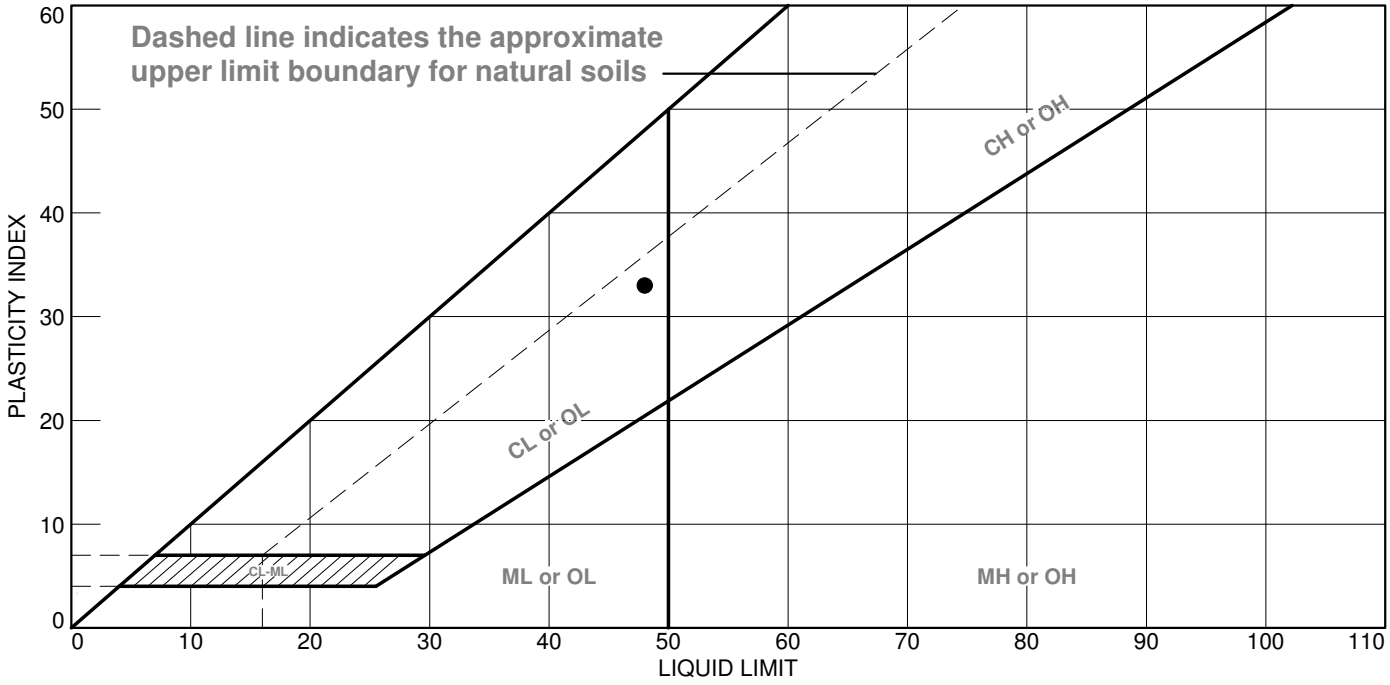
Location: GH11-267S
Sample Number: GH11-267S-1 **Depth:** 7.5-8.0'

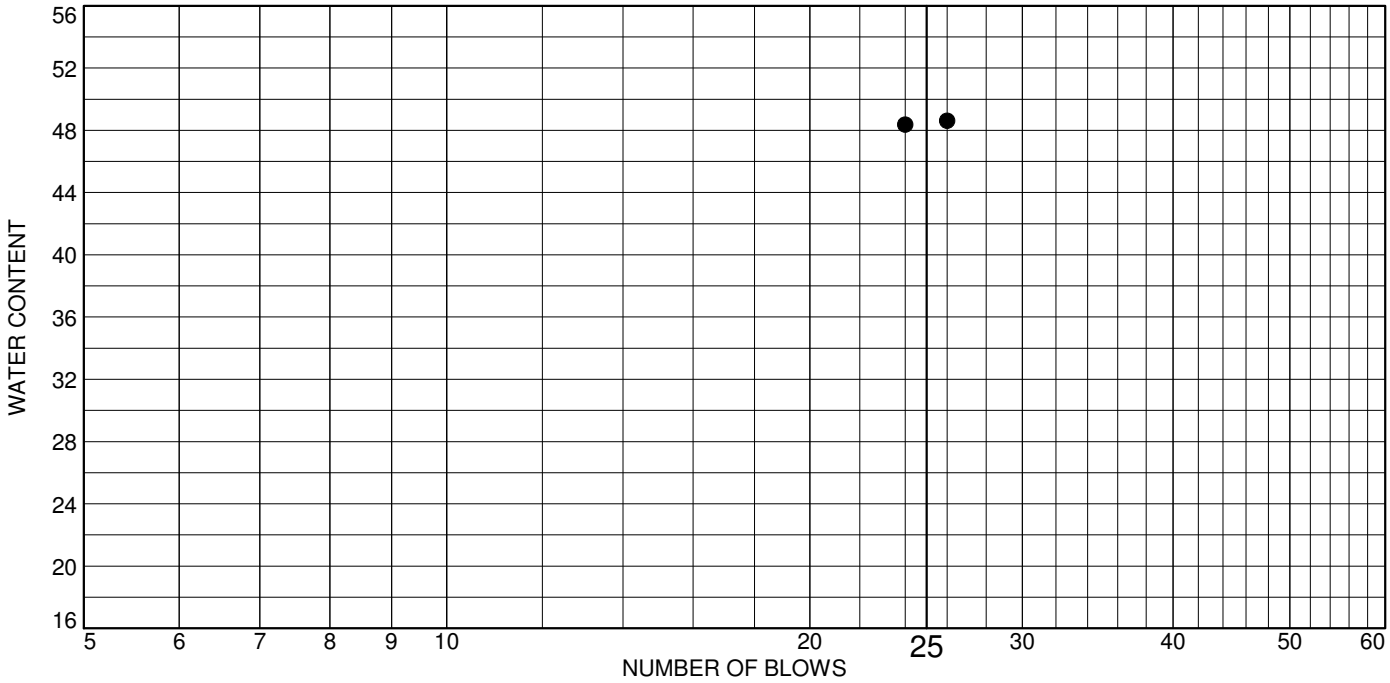
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay with gravel	48	15	33	70.8	57.2	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

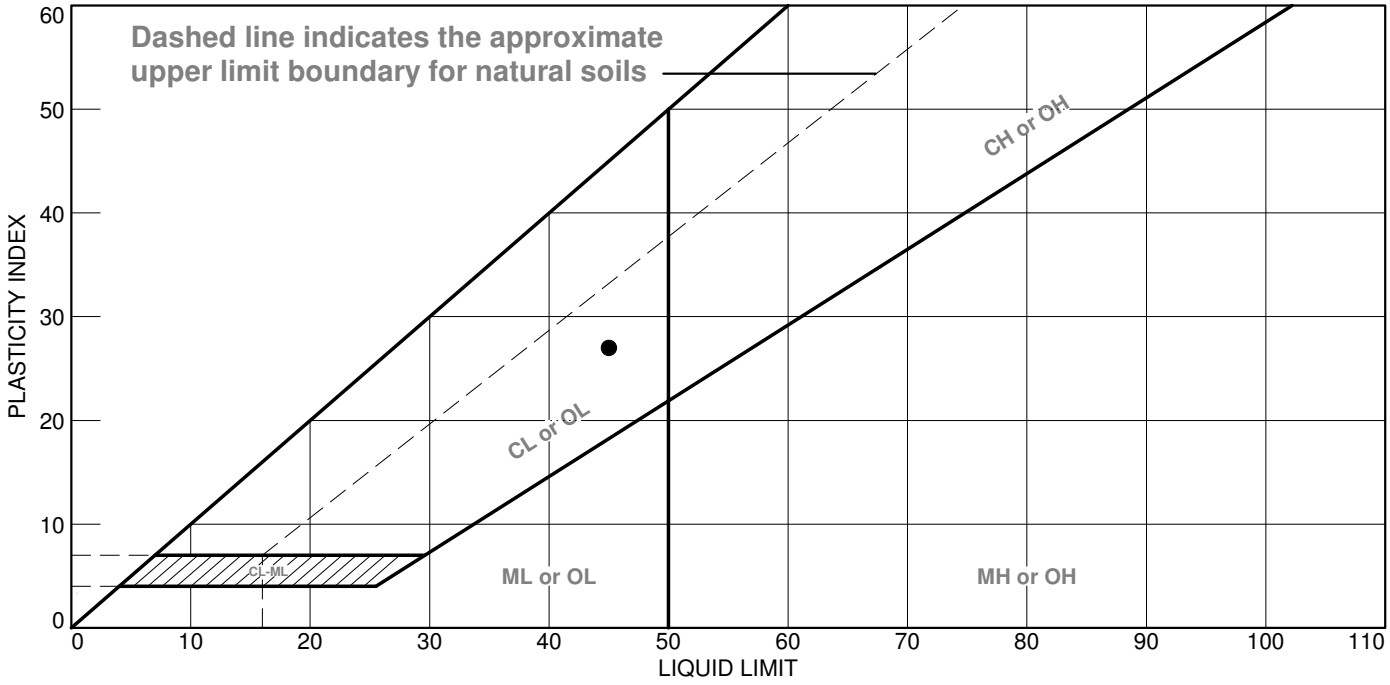
Location: GH11-267S
Sample Number: GH11-267S-2 **Depth:** 29.5-30'

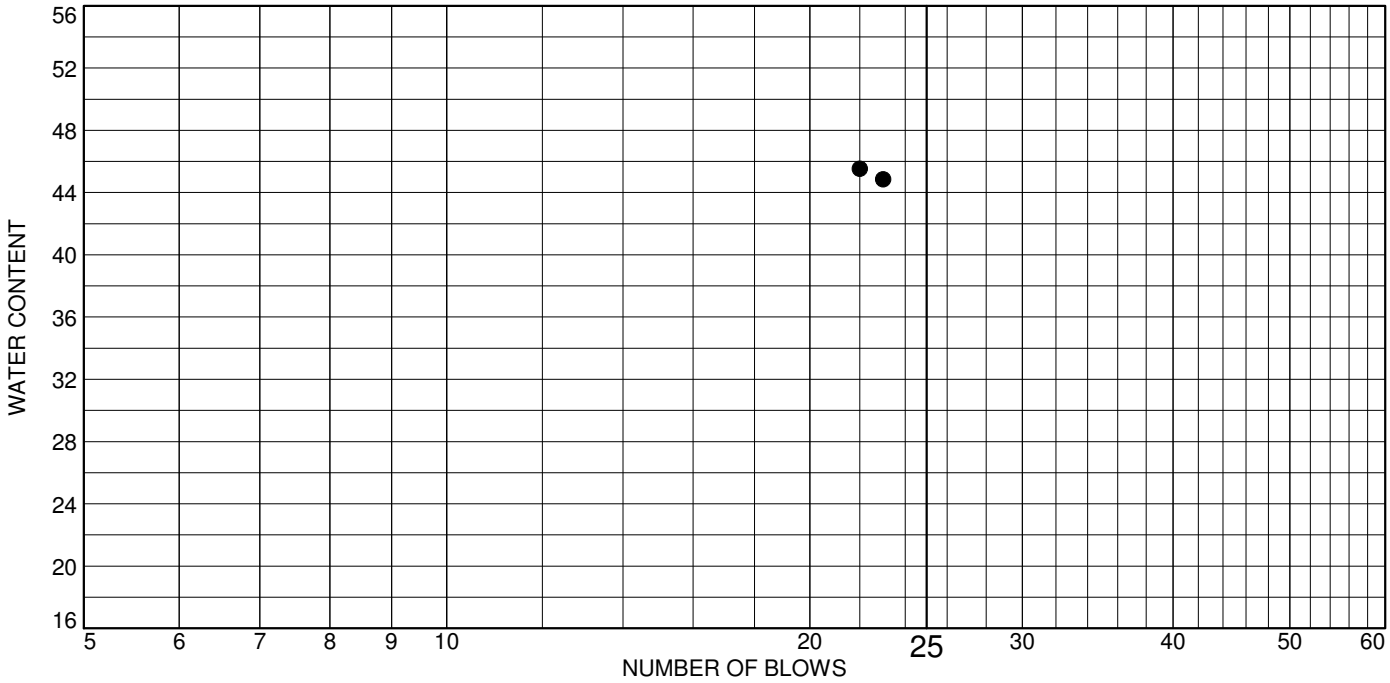
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	45	18	27	28.9	18.4	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

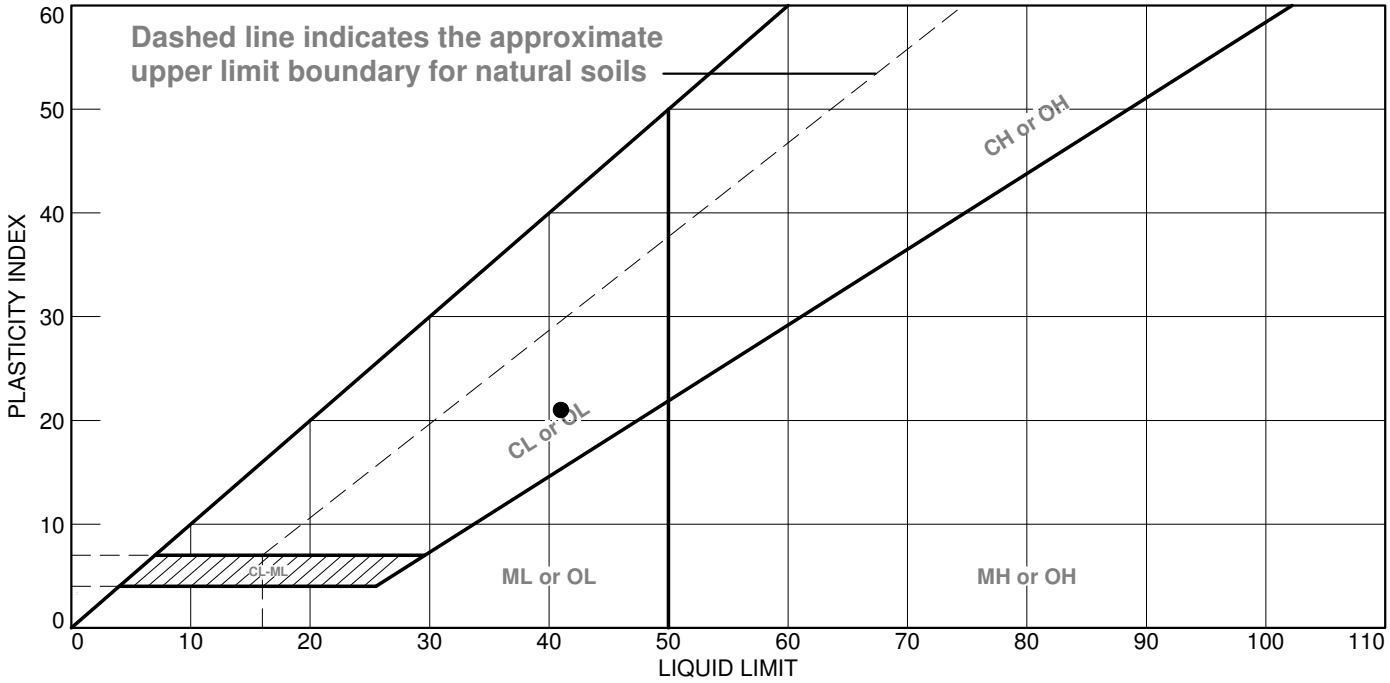
Location: GH11-267S
Sample Number: GH11-267S-3 **Depth:** 44.5-45'

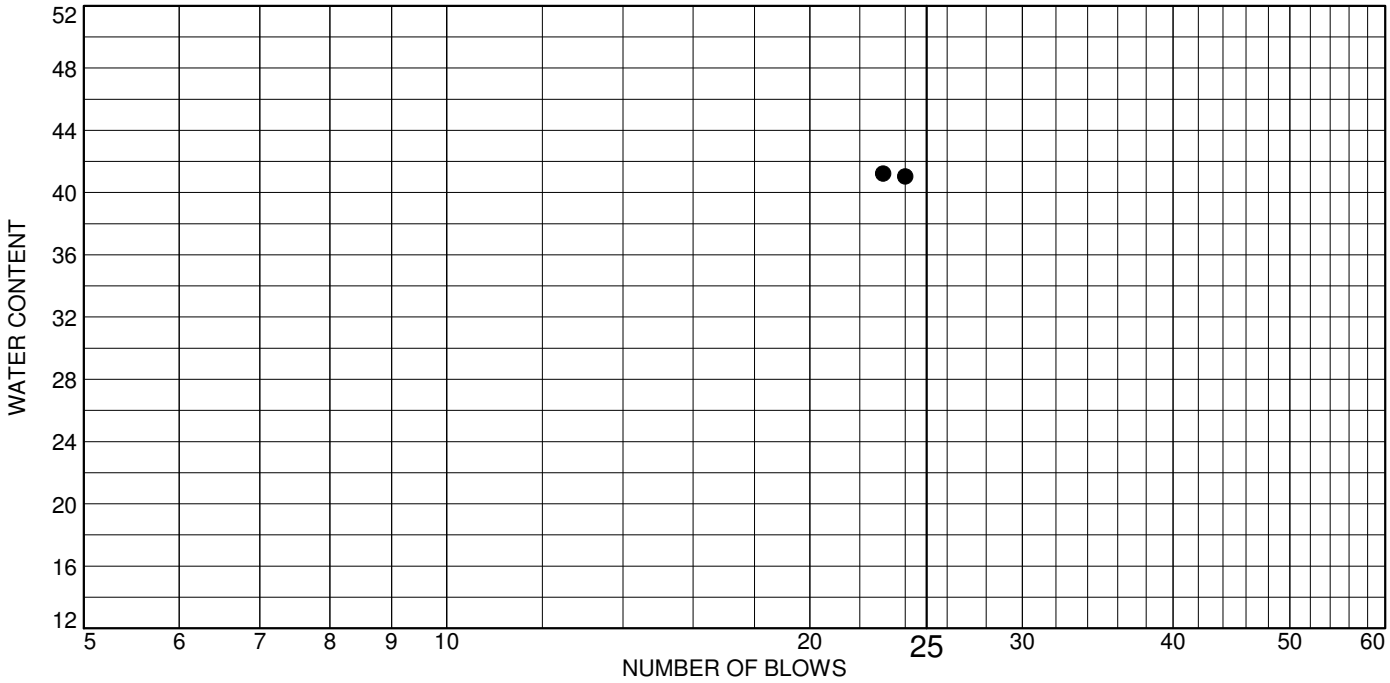
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	41	20	21	49.2	35.7	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

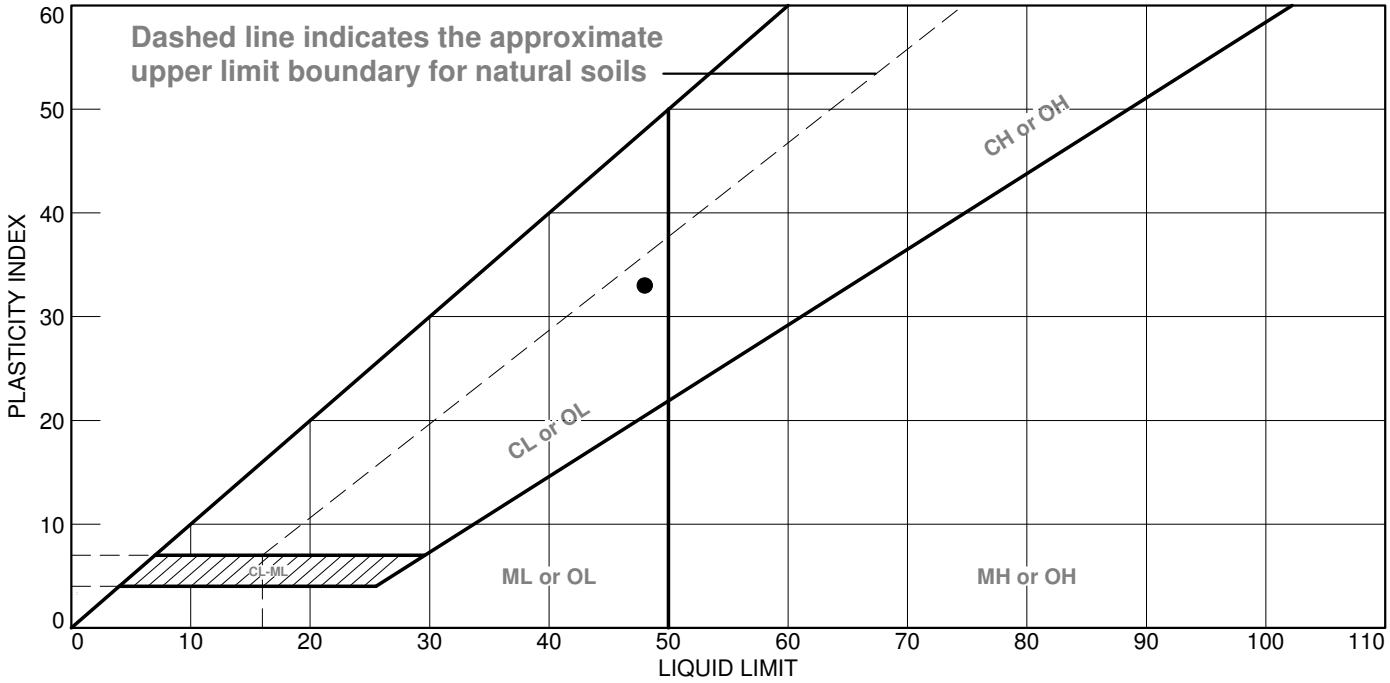
Location: GH11-274, Upper Talarik Creek Area
Sample Number: SPT 3 **Depth:** 14-15.5'

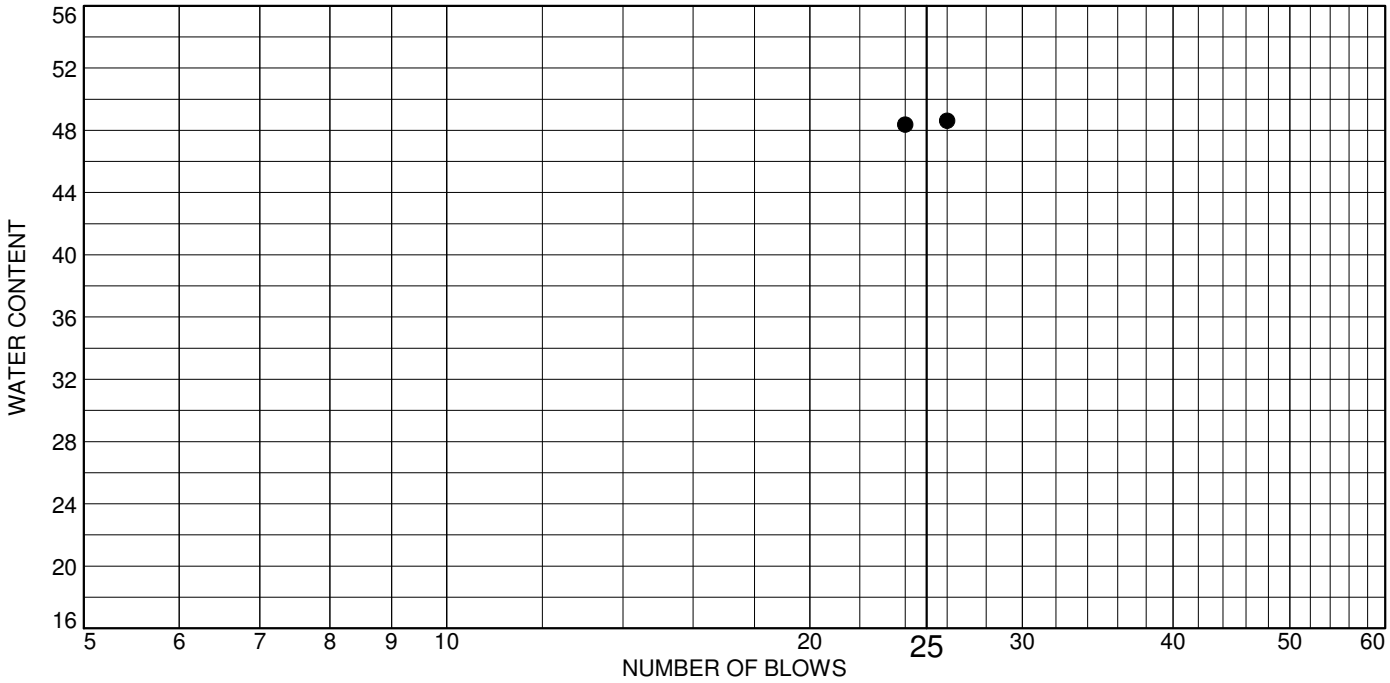
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	48	15	33	45.6	34.8	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-278S

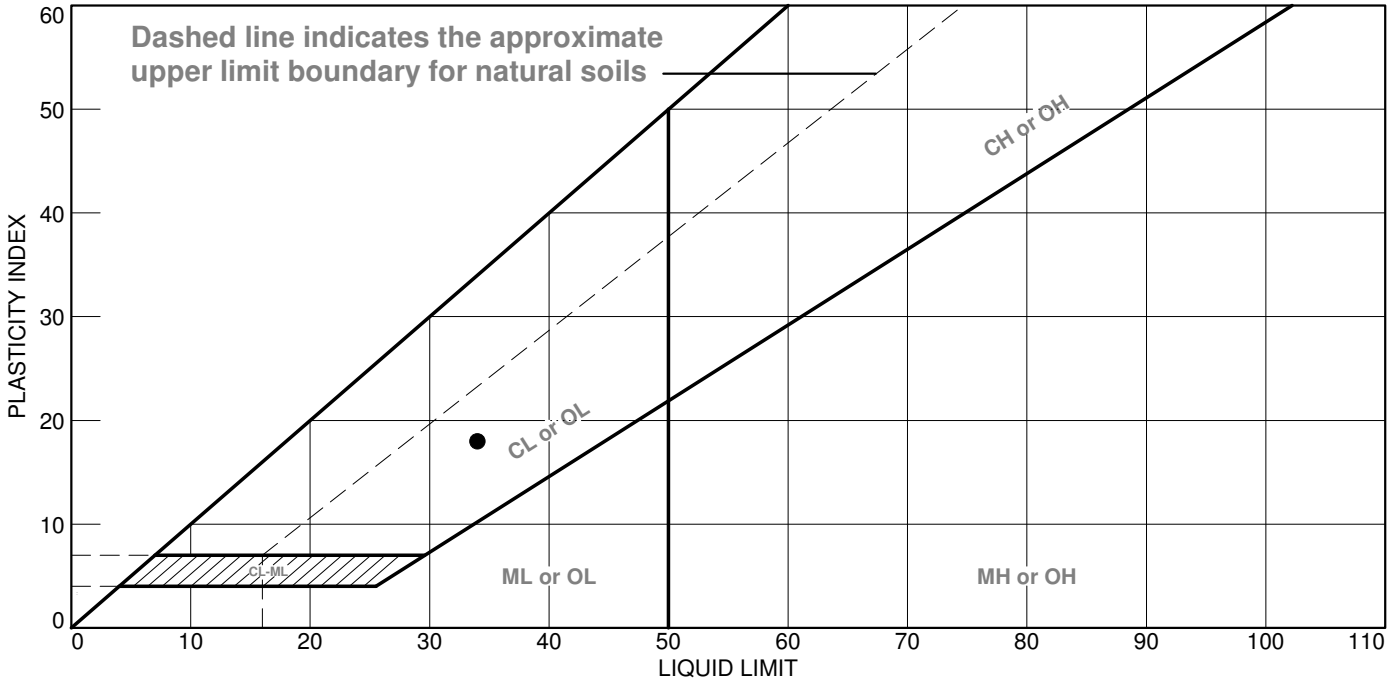
Sample Number: GH11-278S-3 **Depth:** 29.5-30'

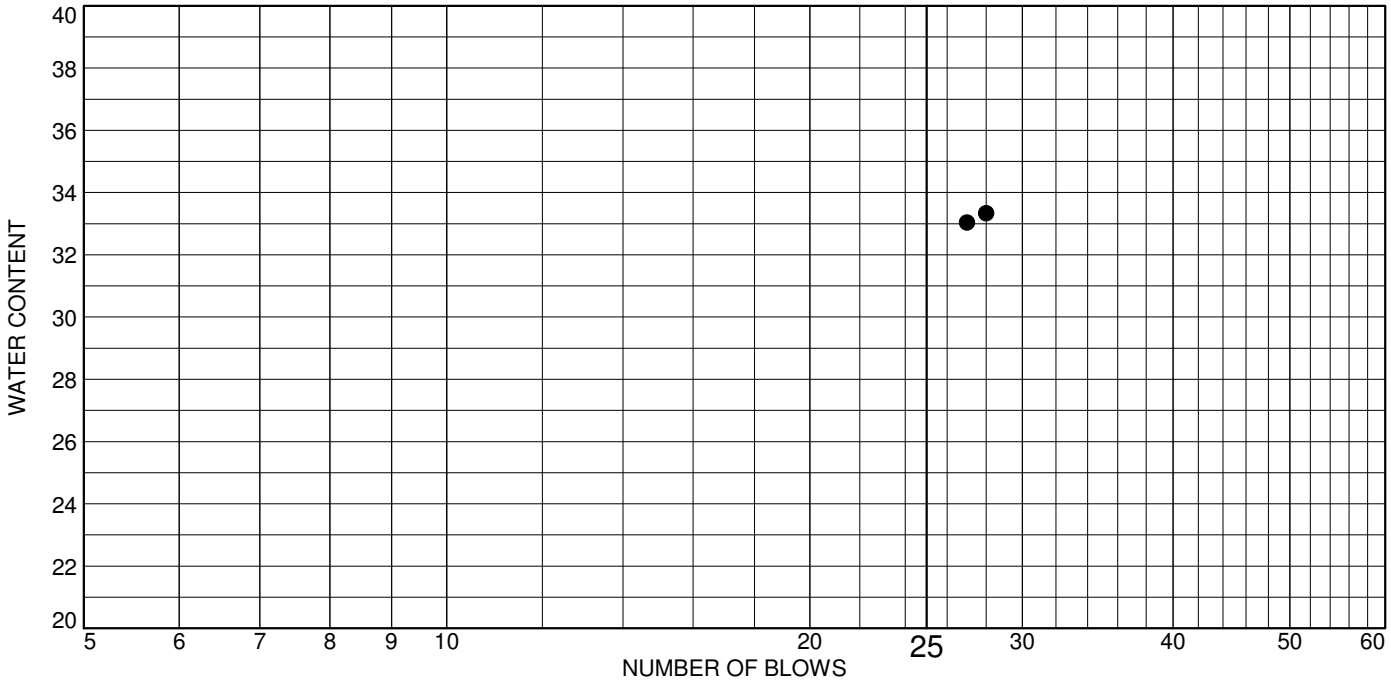
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	34	16	18	54.3	34.2	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

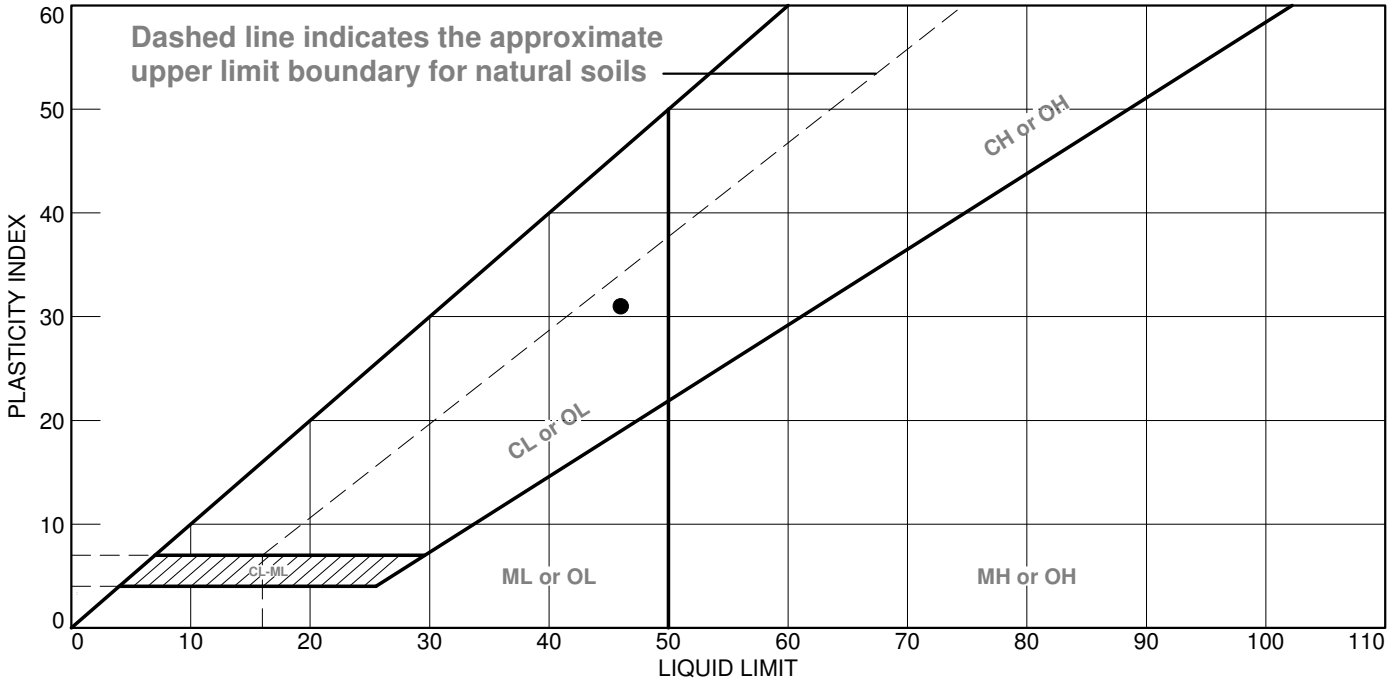
Location: GH11-278S
Sample Number: GH11-278S-1 **Depth:** 17-17.5'

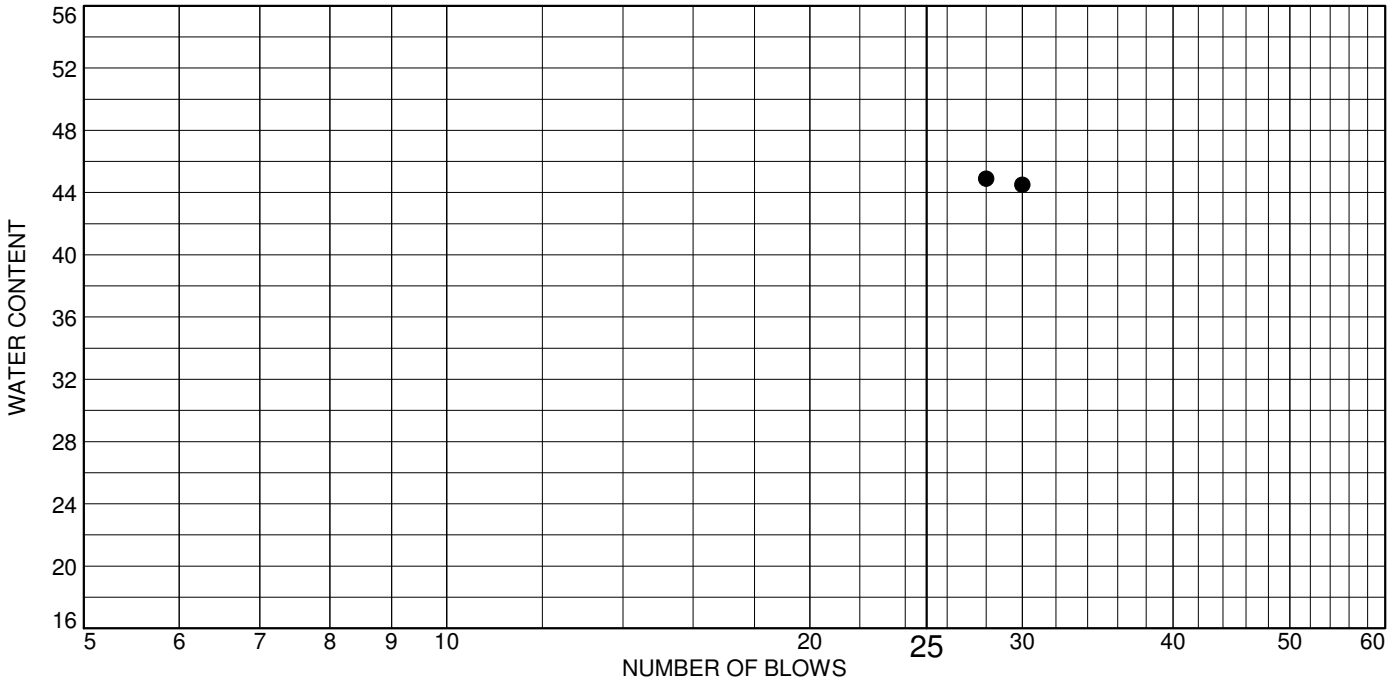
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	46	15	31	63.9	48.9	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

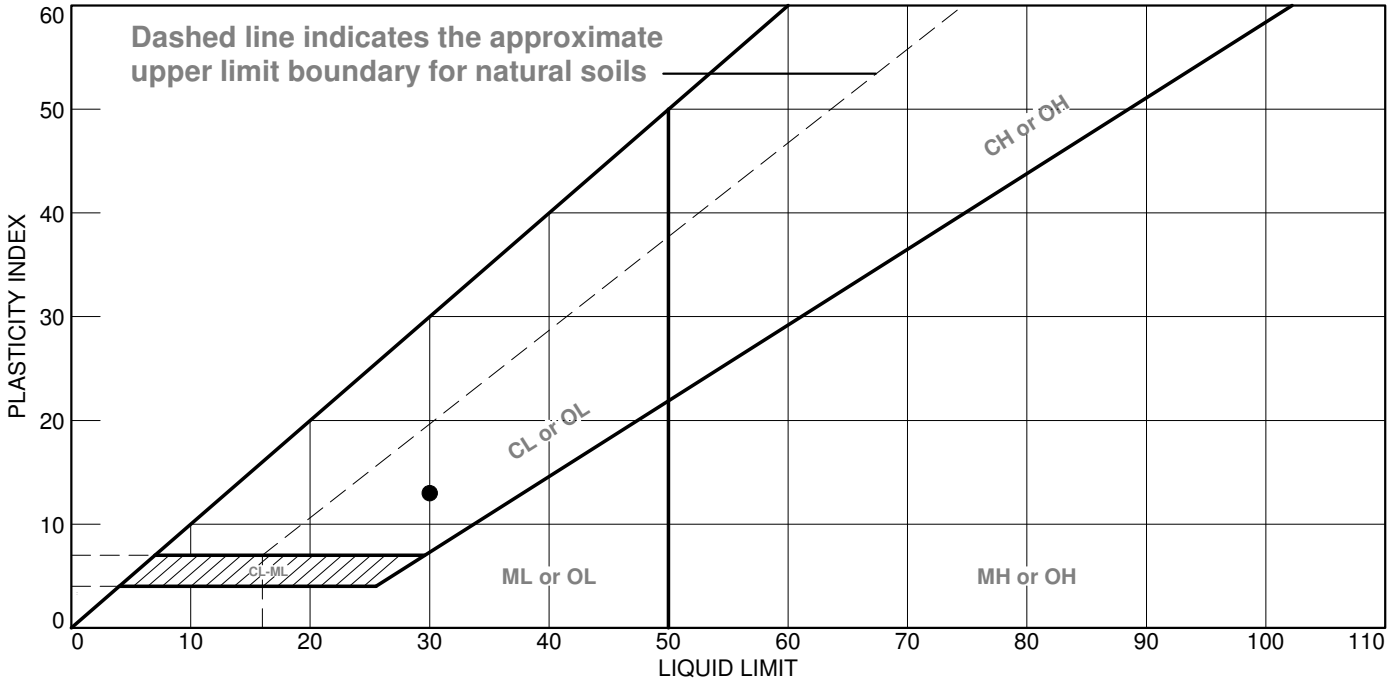
Location: GH11-278S
Sample Number: GH11-278S-2 **Depth:** 23.7-24'

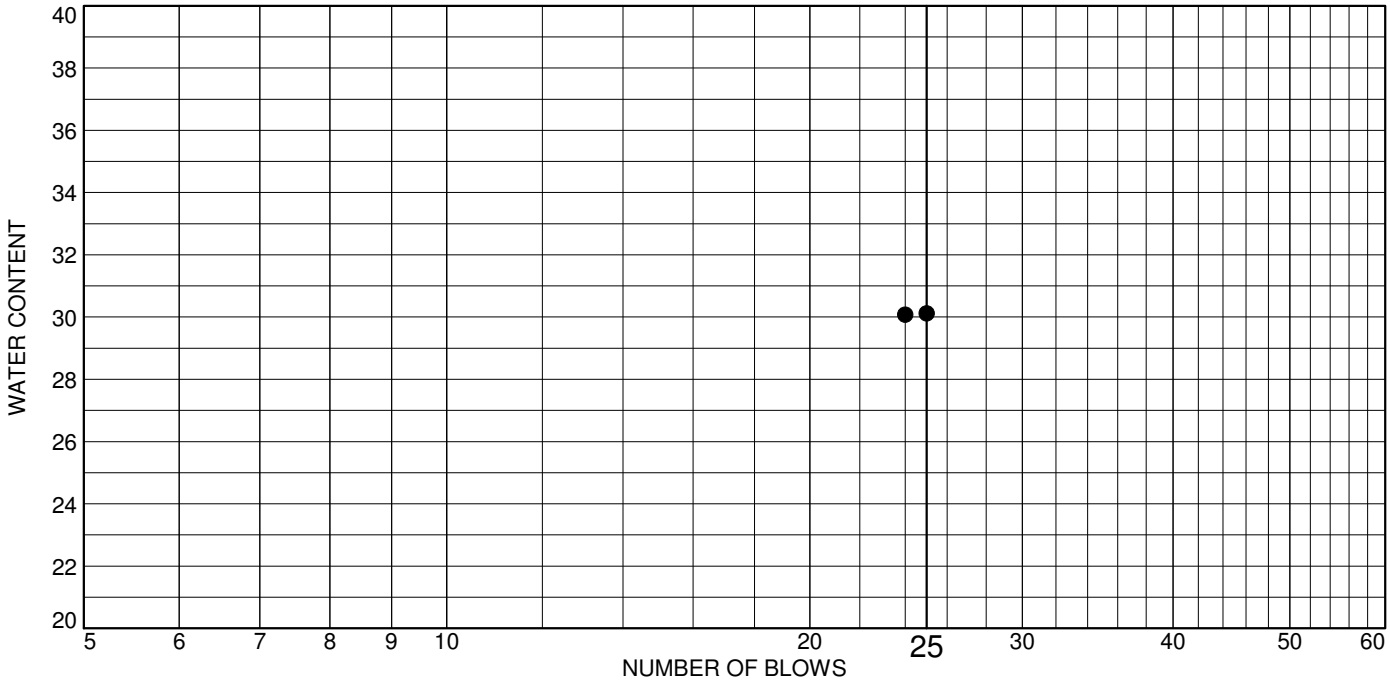
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	30	17	13	39.0	26.8	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-279S

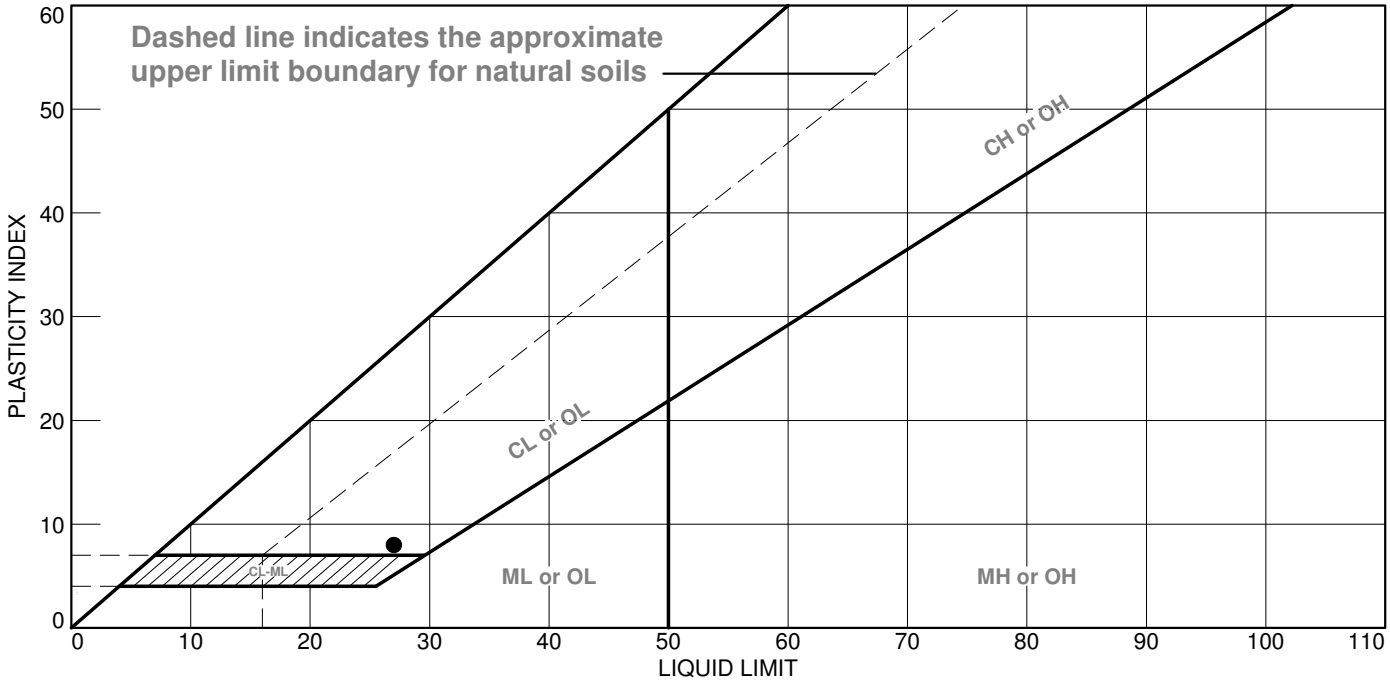
Sample Number: GH11-279S-1 **Depth:** 14-14.5'

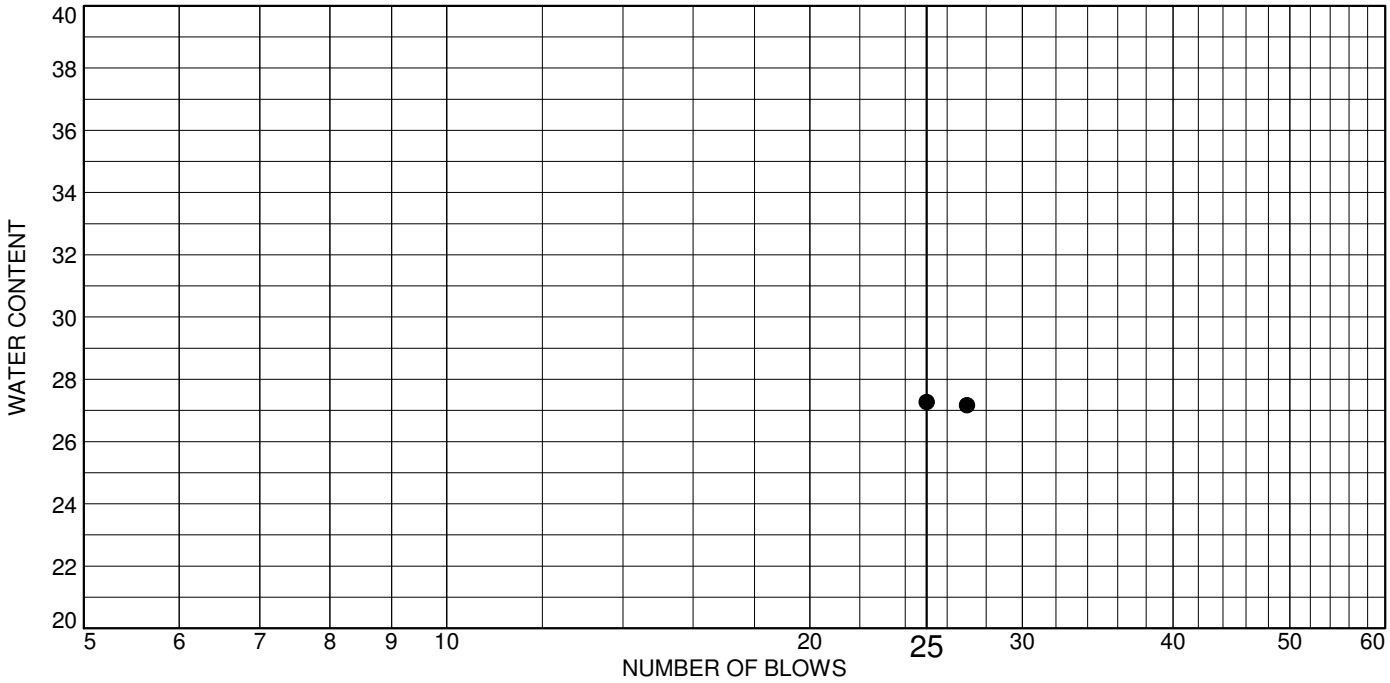
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	27	19	8	49.7	22.7	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

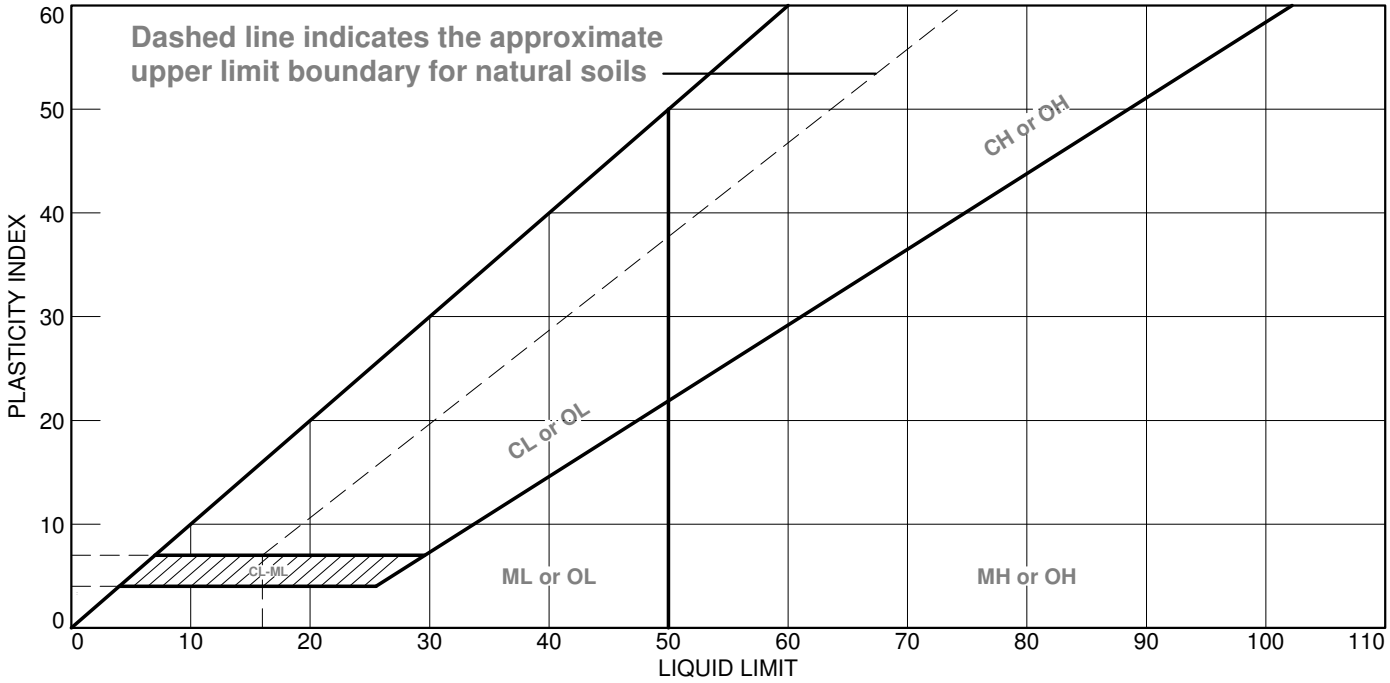
Location: GH11-279S
Sample Number: GH11-279S-2 **Depth:** 35-35.5'

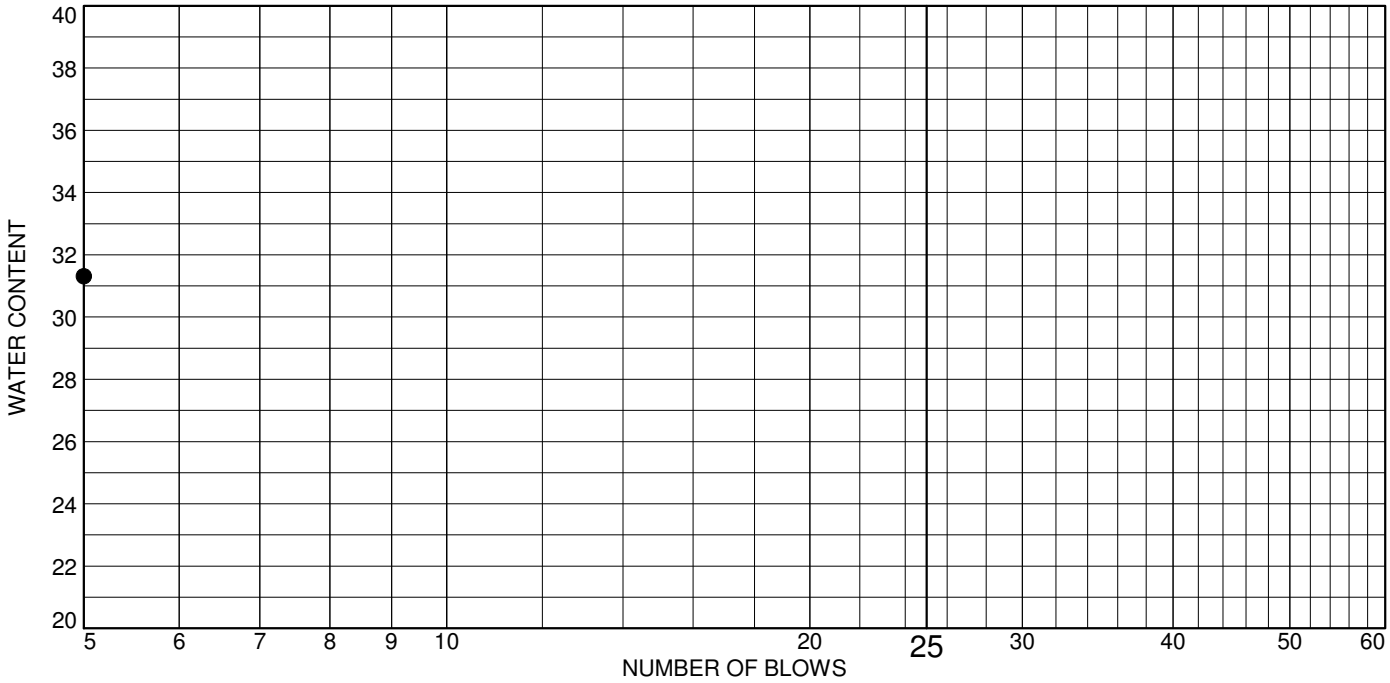
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand	26	NP	NP	72.6	46.1	SM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

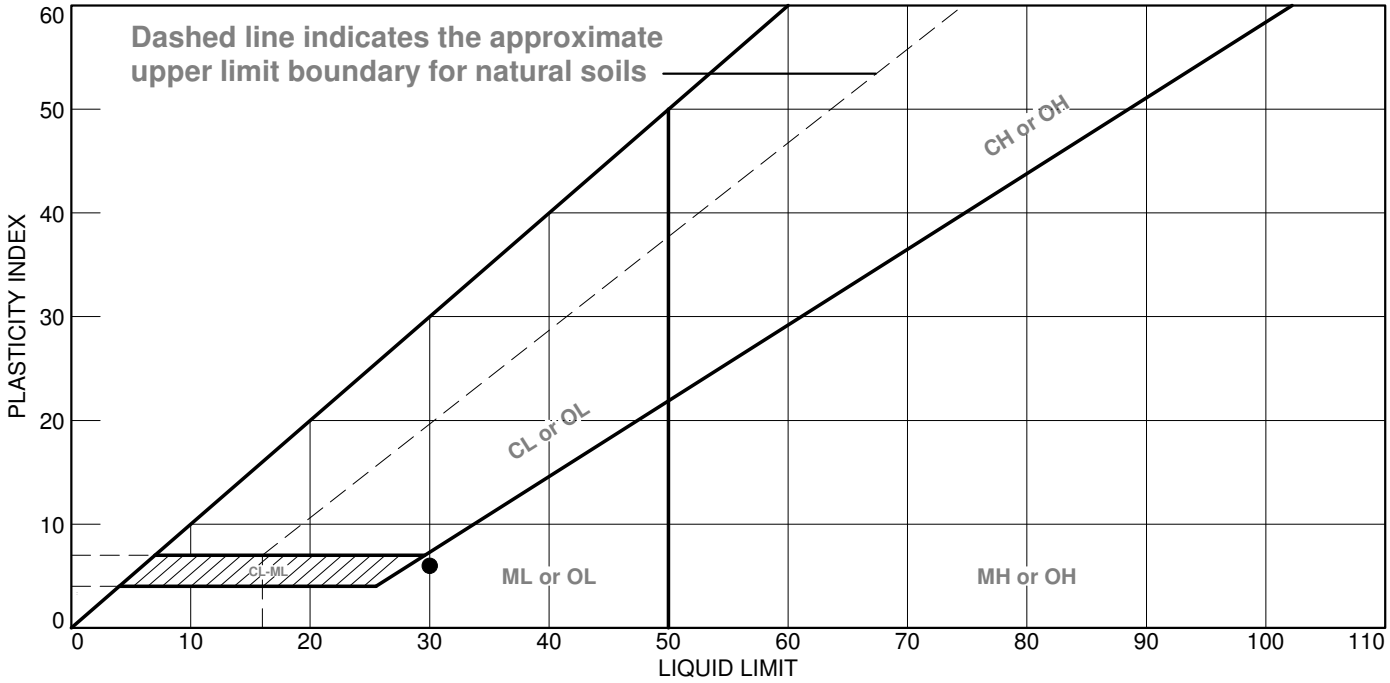
Location: GH11-287, Area E
Sample Number: SPT 1 **Depth:** 4-5.5'

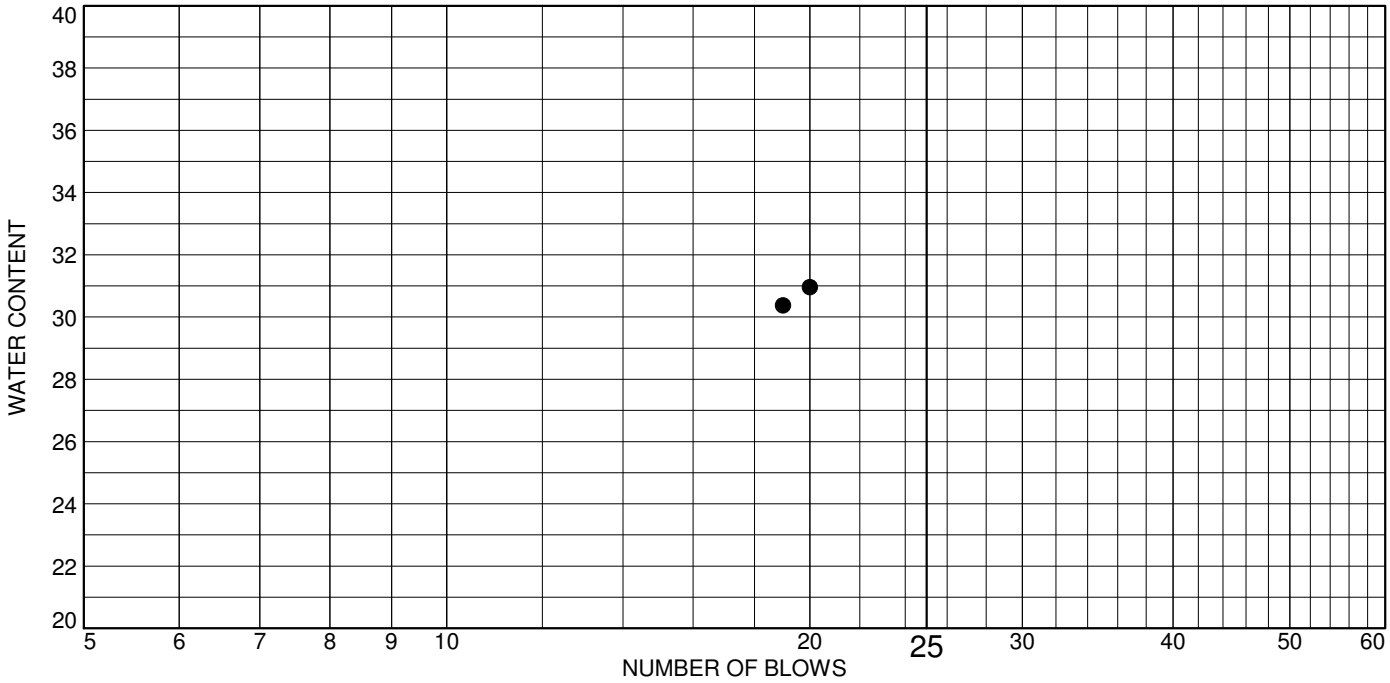
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy silt	30	24	6	93.9	56.9	ML

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

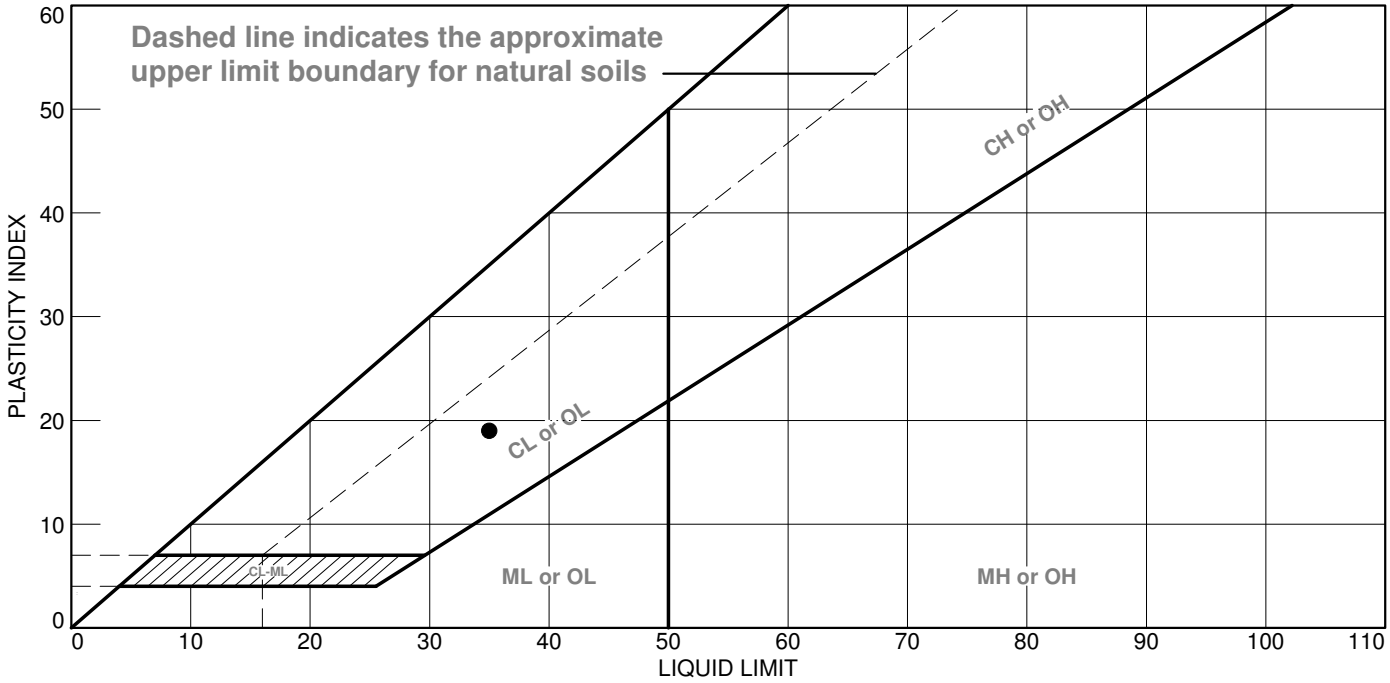
Location: GH11-287, Area E
Sample Number: SPT 2 **Depth:** 9-10.5'

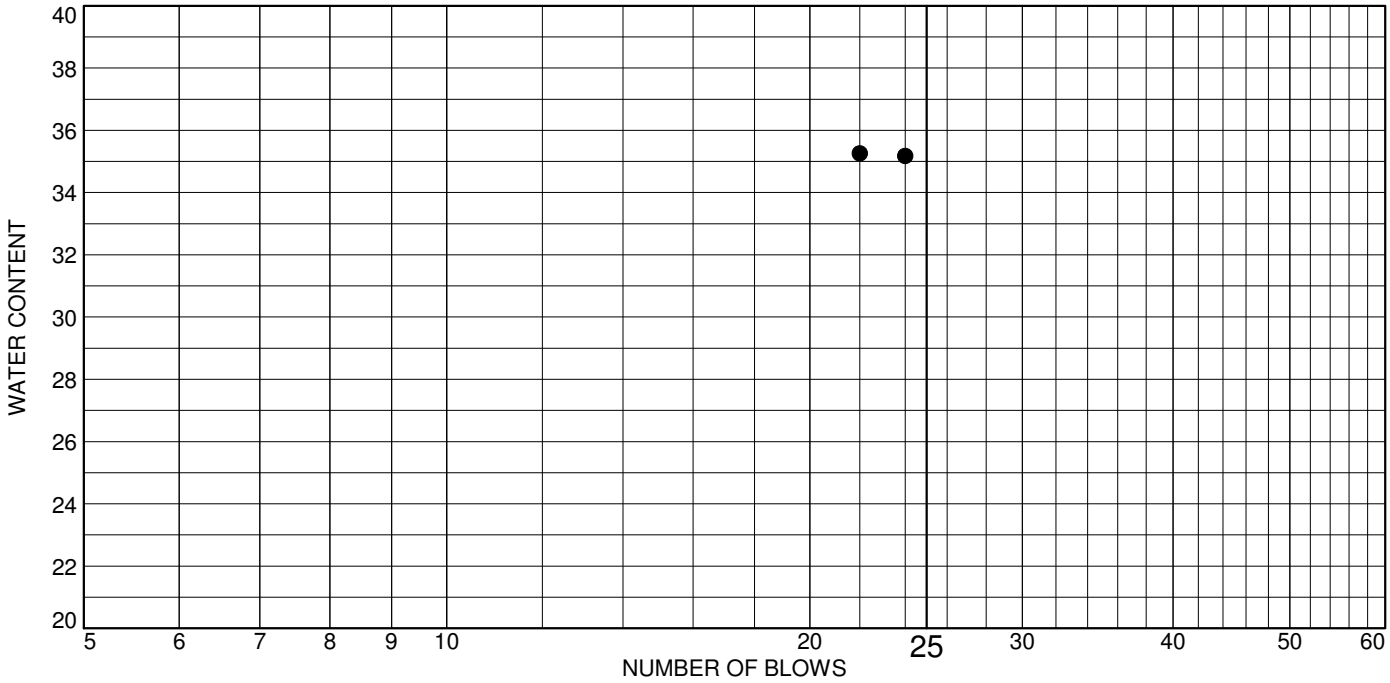
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand with gravel	35	16	19	61.0	45.6	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

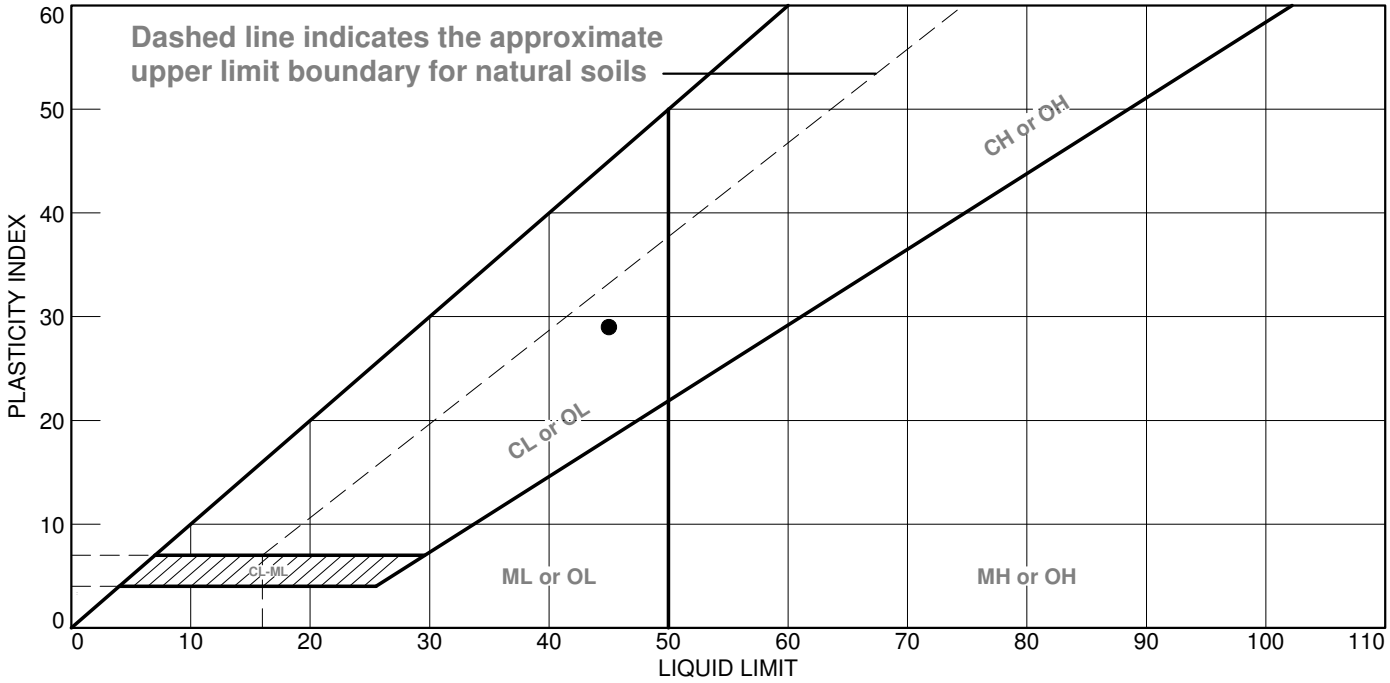
Location: GH11-289S
Sample Number: GH11-289S-1 **Depth:** 19.5-20'

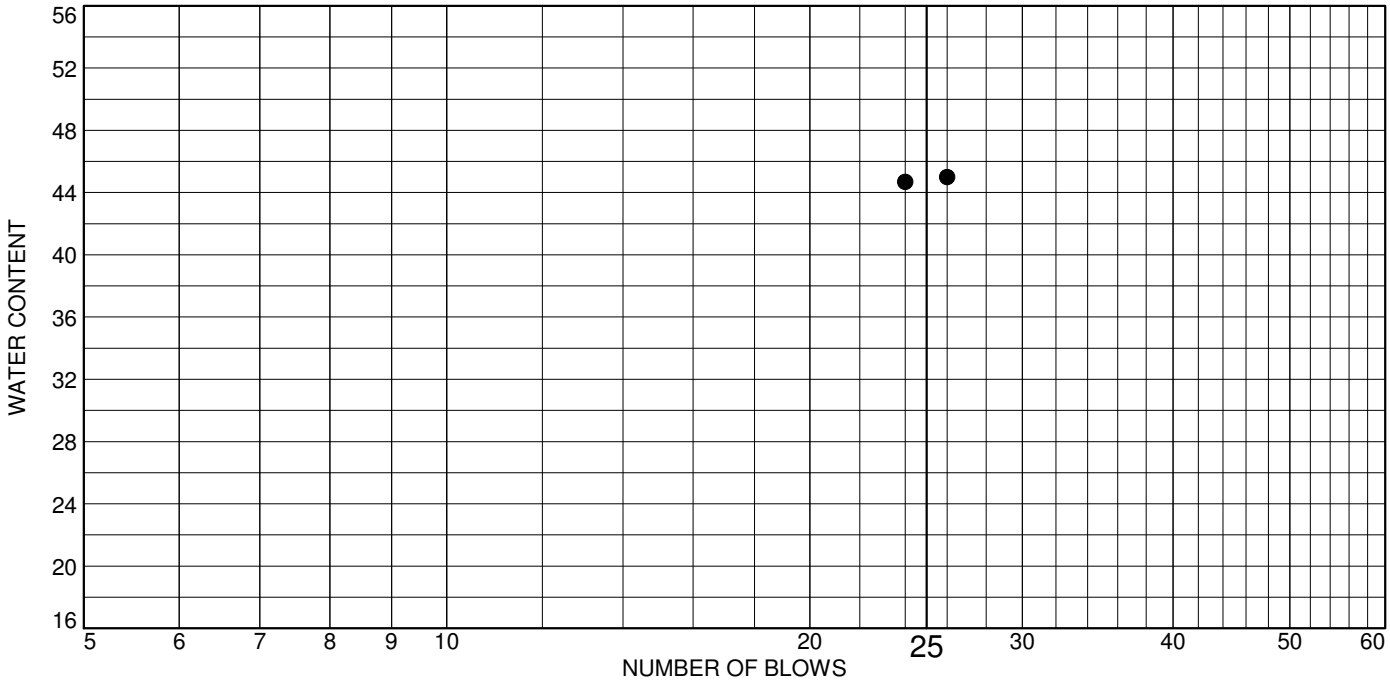
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	gravelly lean clay with sand	45	16	29	60.5	51.7	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

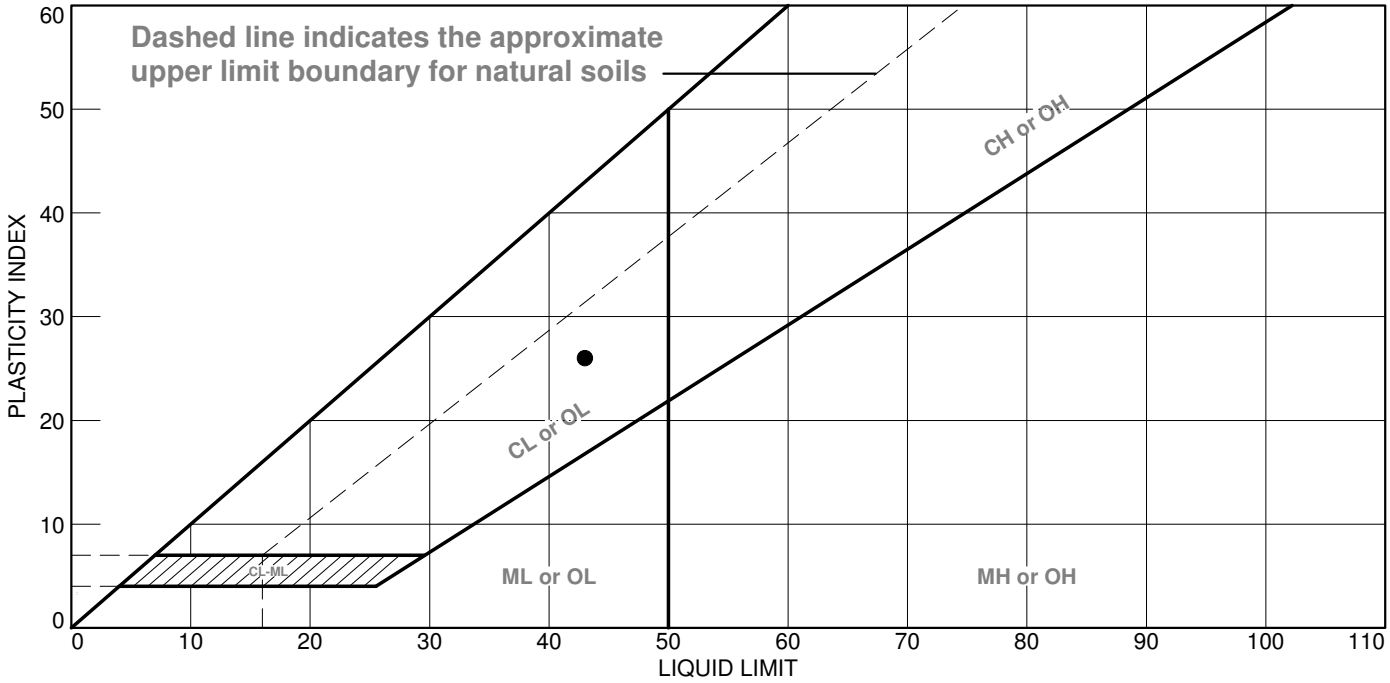
Location: GH11-289S
Sample Number: GH11-289S-2 **Depth:** 25.5-26'

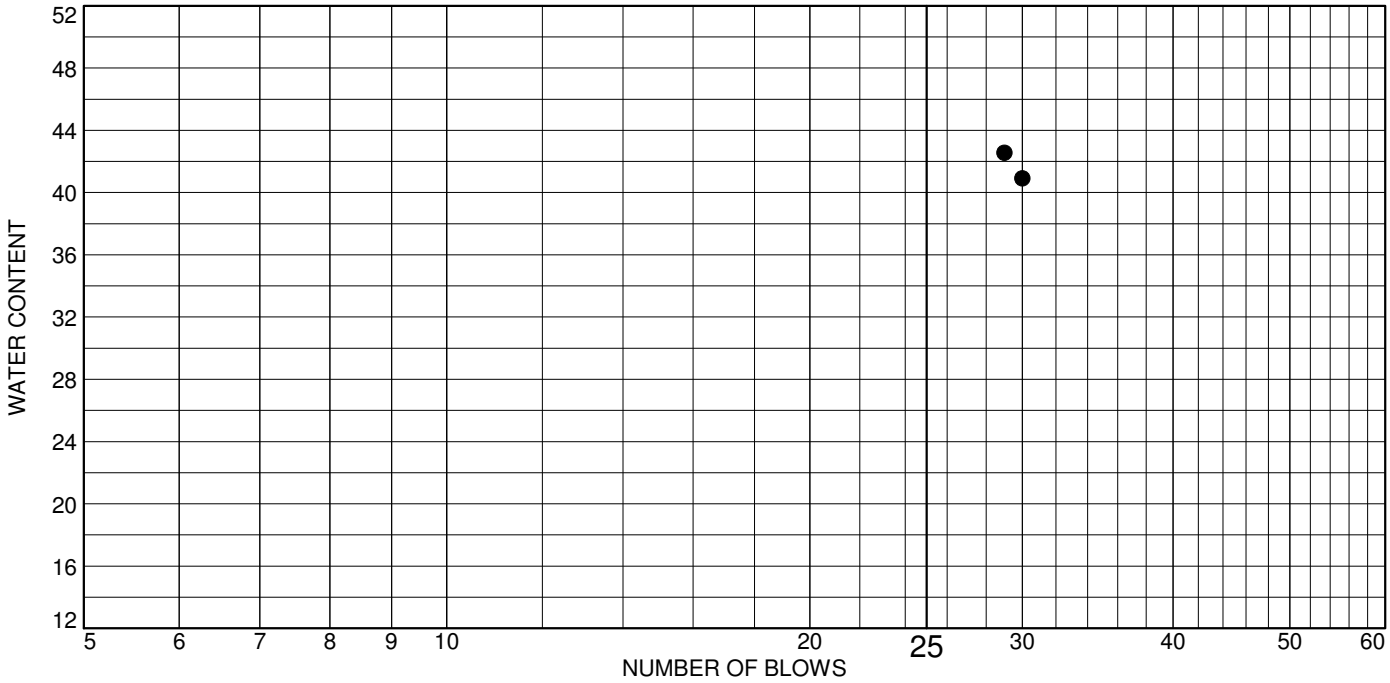
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	sandy lean clay	43	17	26	66.2	50.9	CL

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

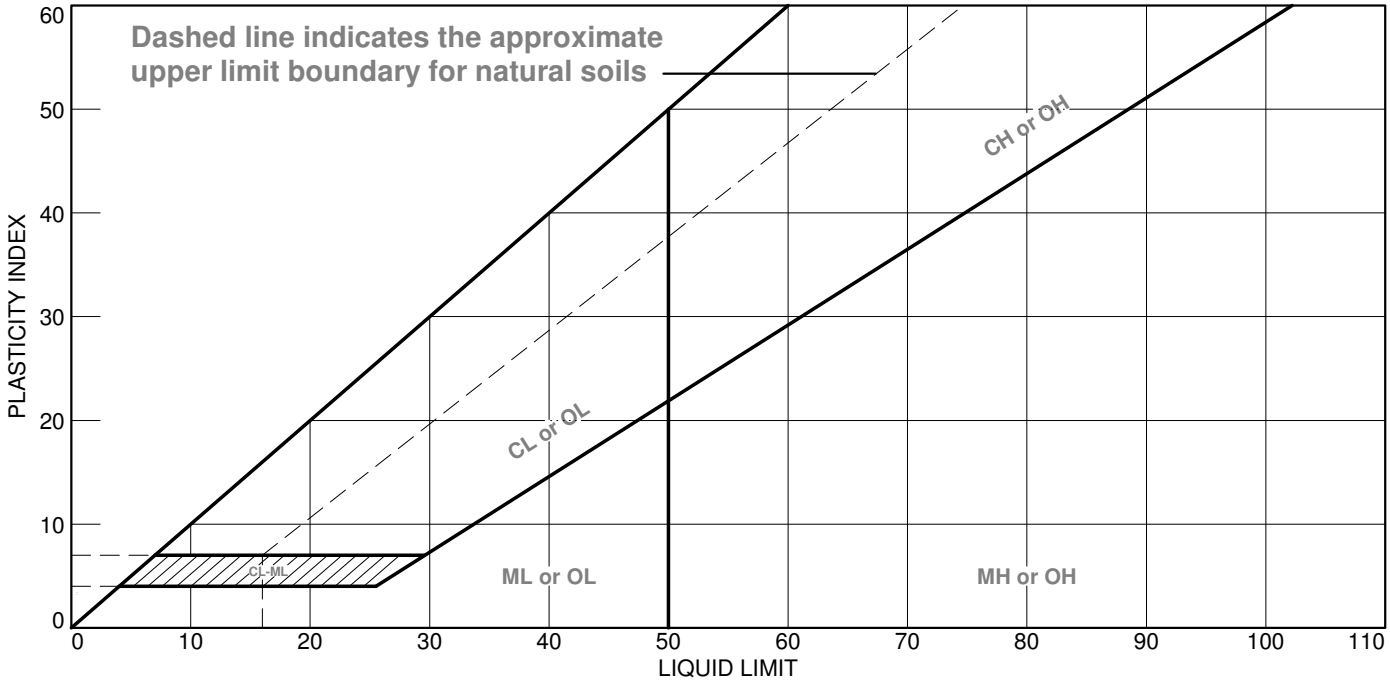
Location: GH11-289S
Sample Number: GH11-289S-3 **Depth:** 33-33.5'

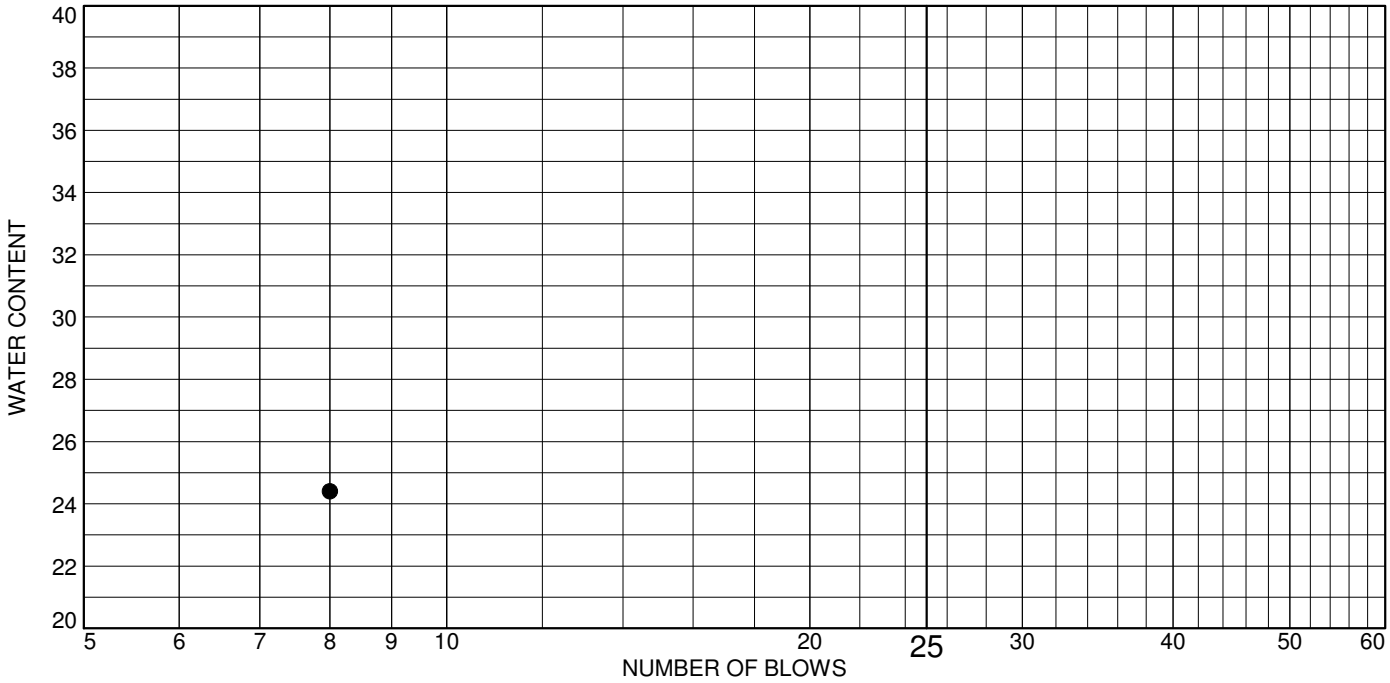
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silt	21	NP	NP	98.5	96.5	ML

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

Location: GH11-290S

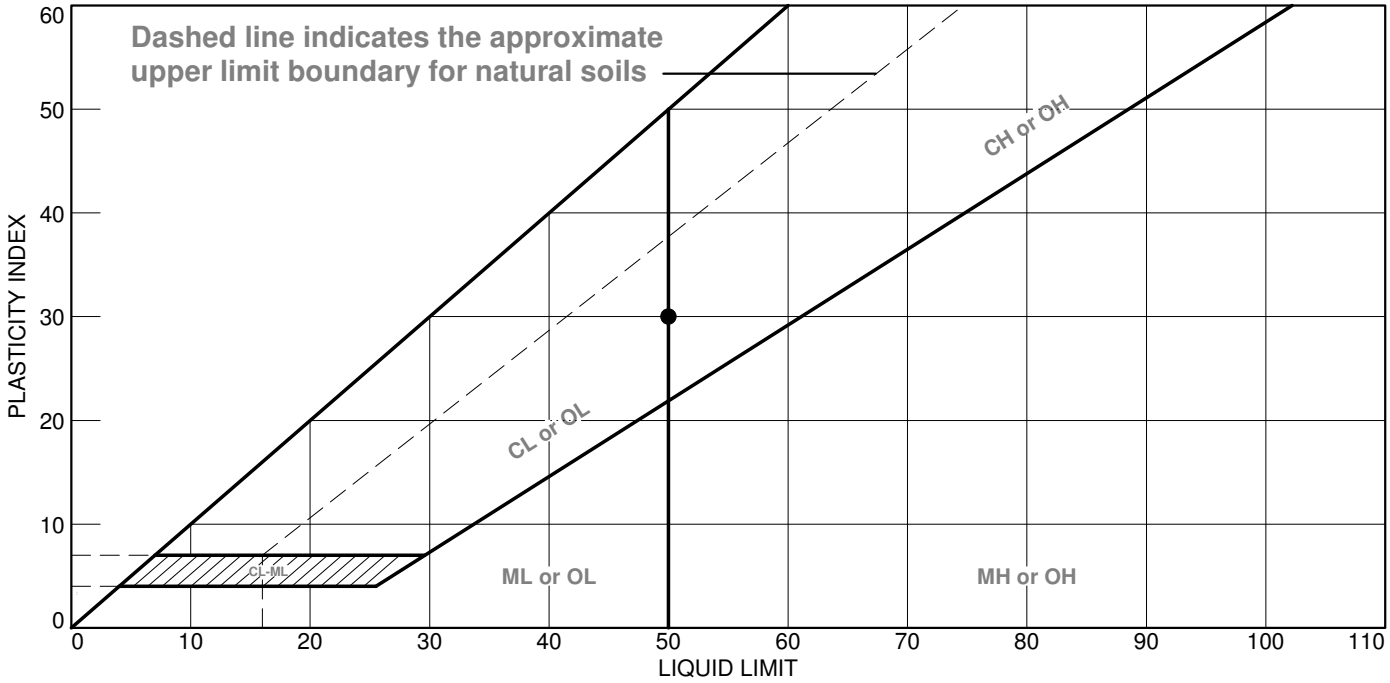
Sample Number: GH11-290S-3 **Depth:** 39.5-40'

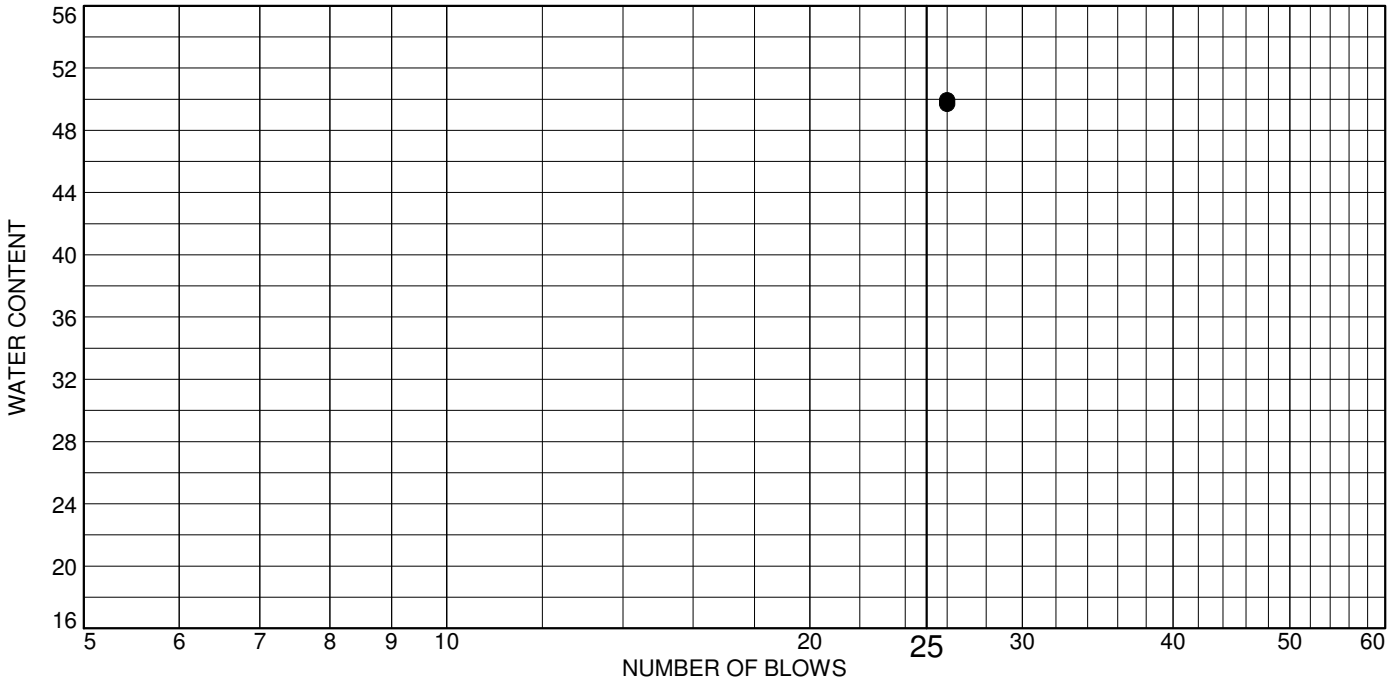
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	fat clay	50	20	30	99.6	98.4	CH

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

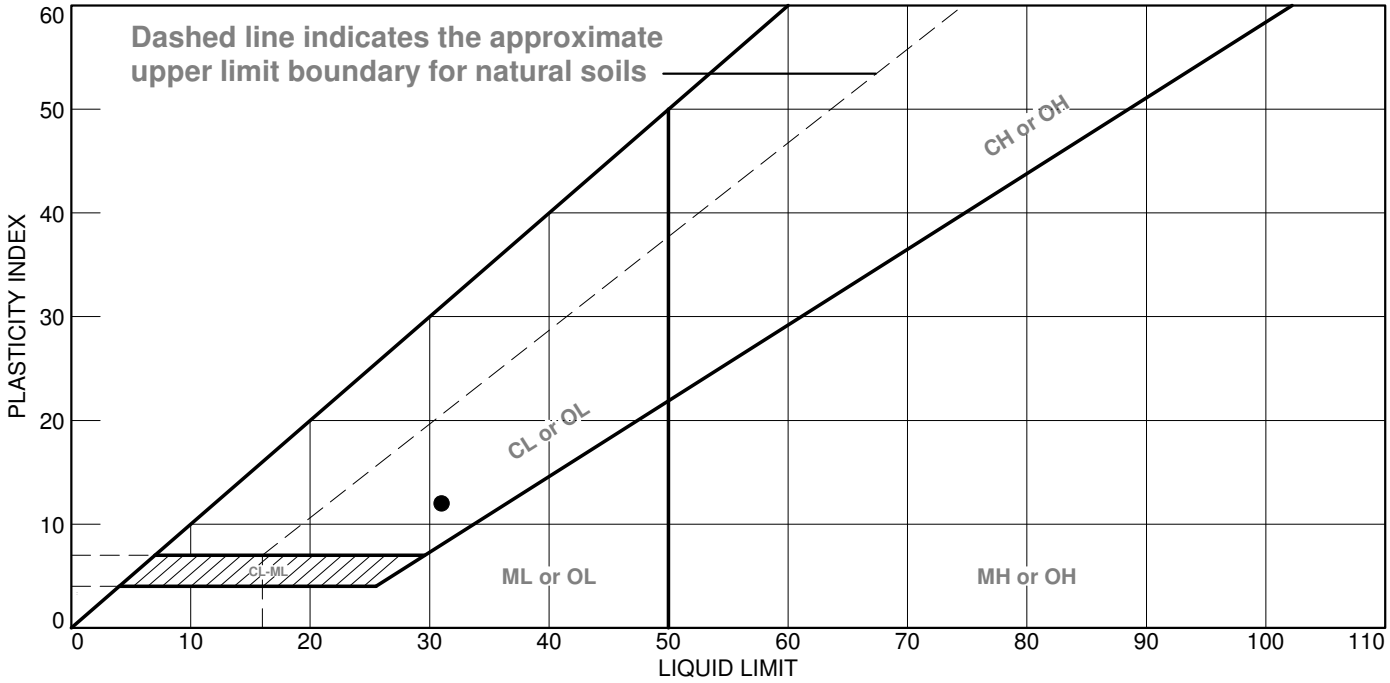
Location: GH11-290S
Sample Number: GH11-290S-1 **Depth:** 29.5-30'

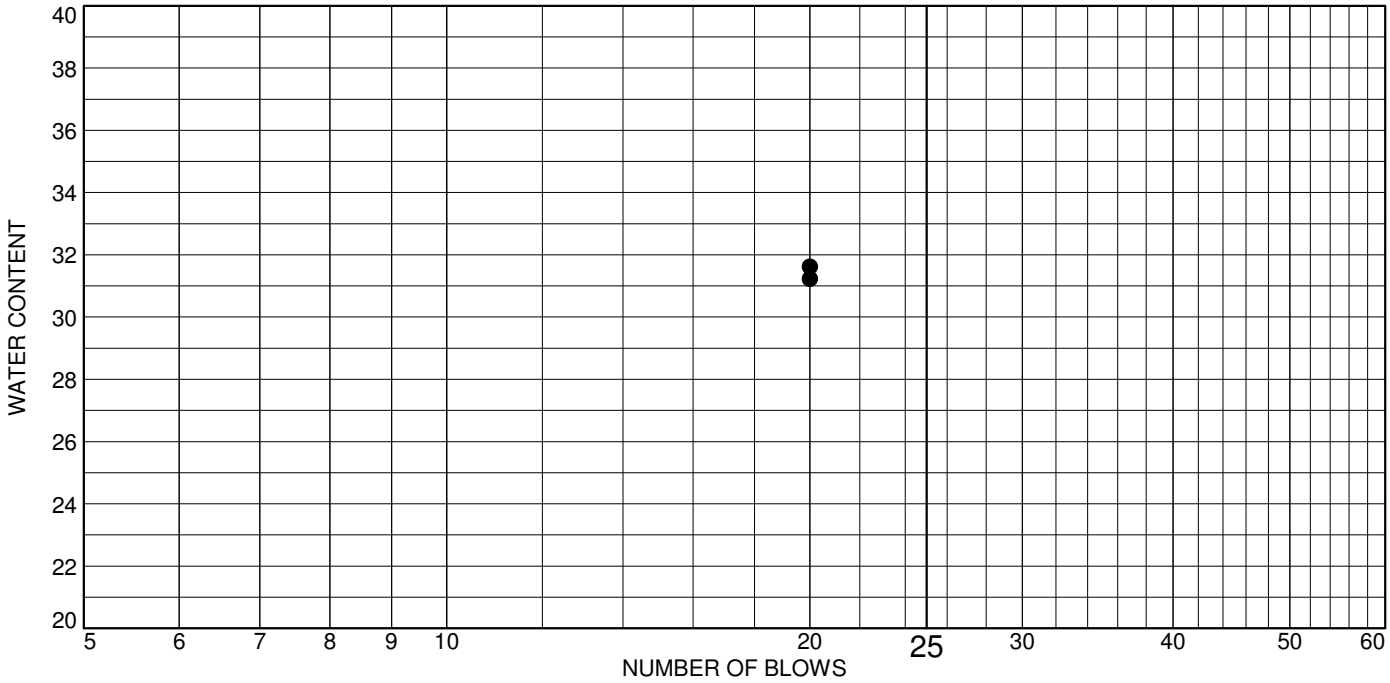
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey sand	31	19	12	97.0	40.1	SC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

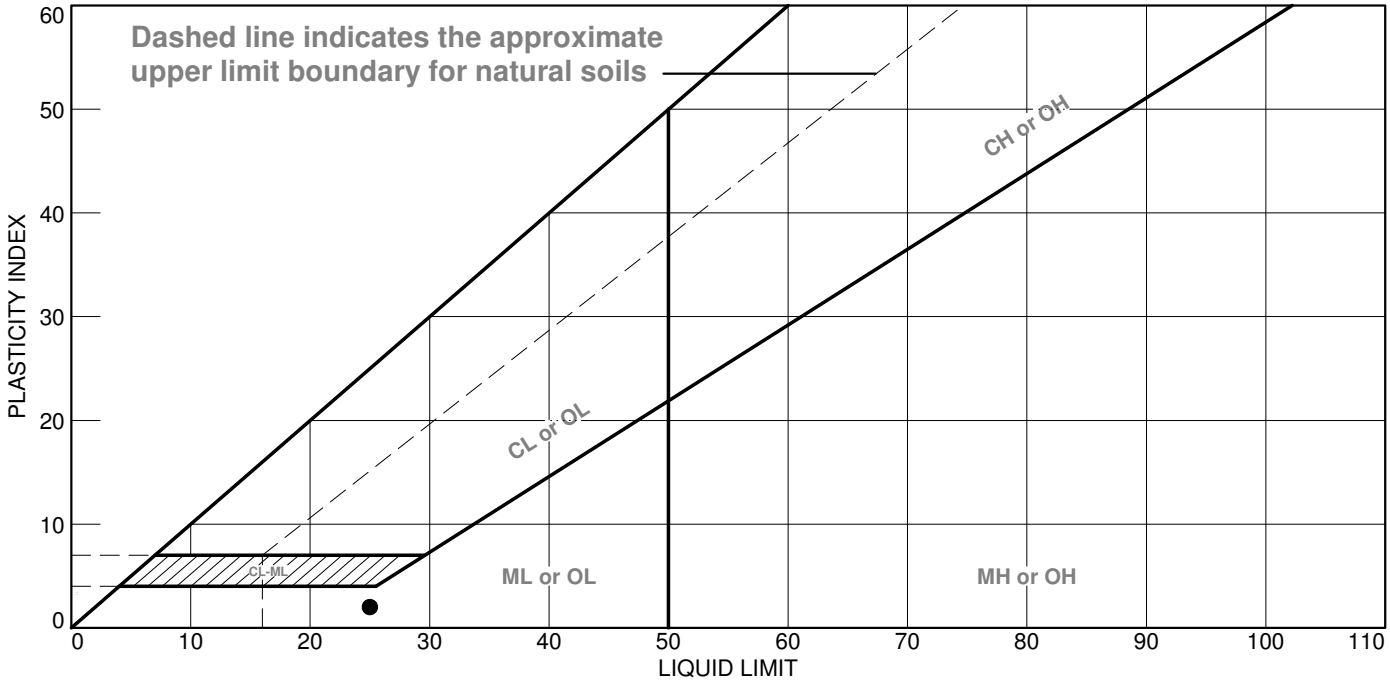
Location: GH11-290S
Sample Number: GH11-290S-2 **Depth:** 34-34.5'

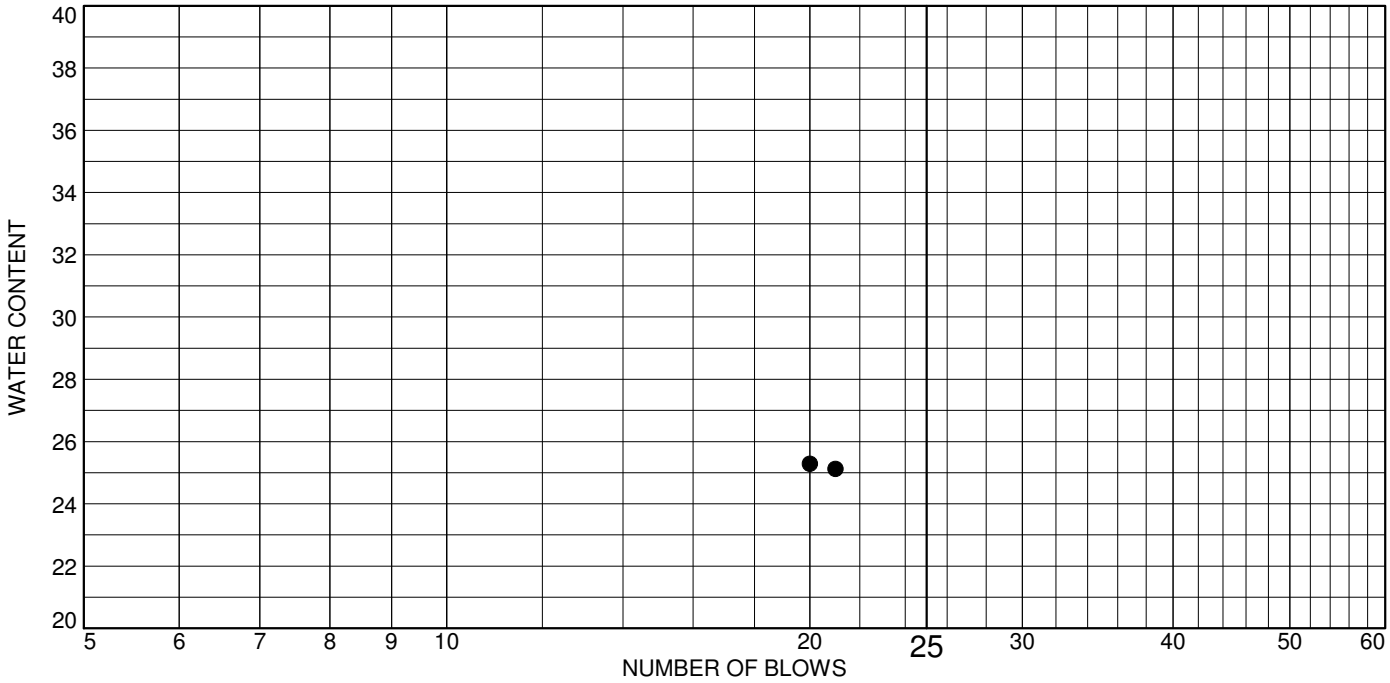
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty gravel with sand	25	23	2	38.4	24.5	GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

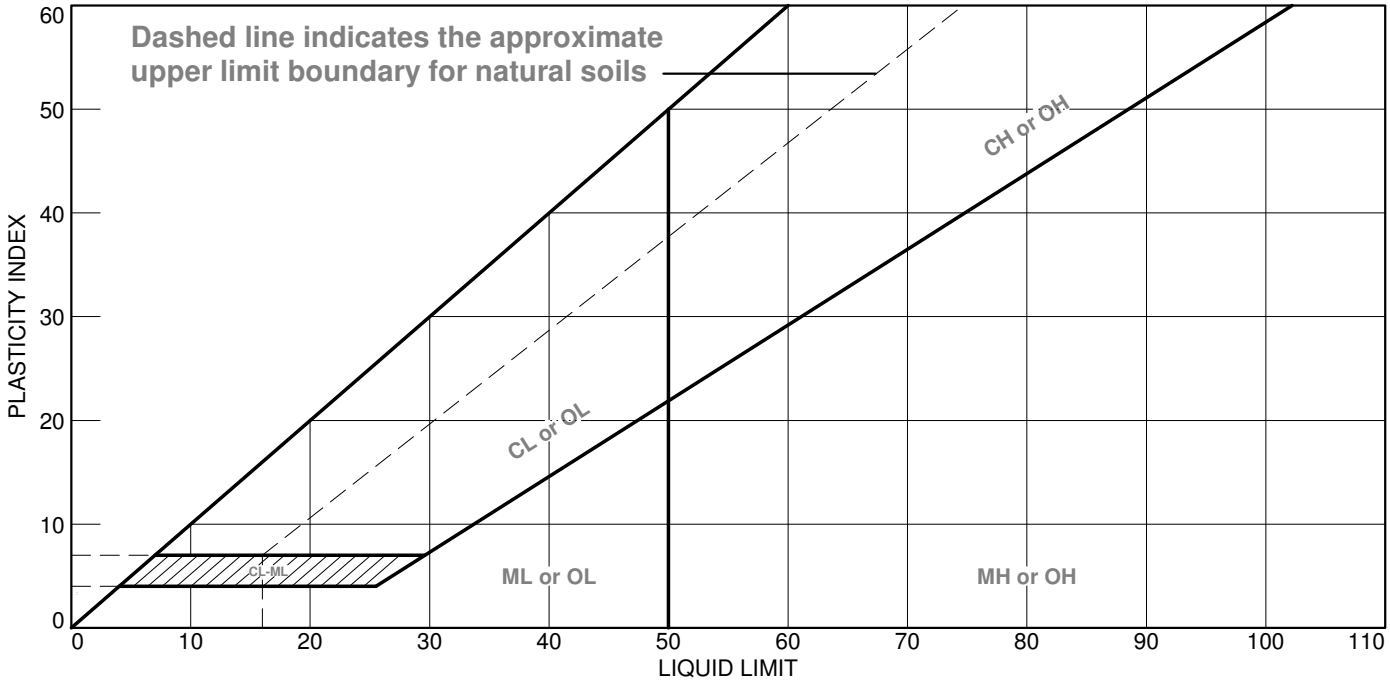
Location: GH11-293, Area E
Sample Number: GH11-293-1 **Depth:** 2-3'

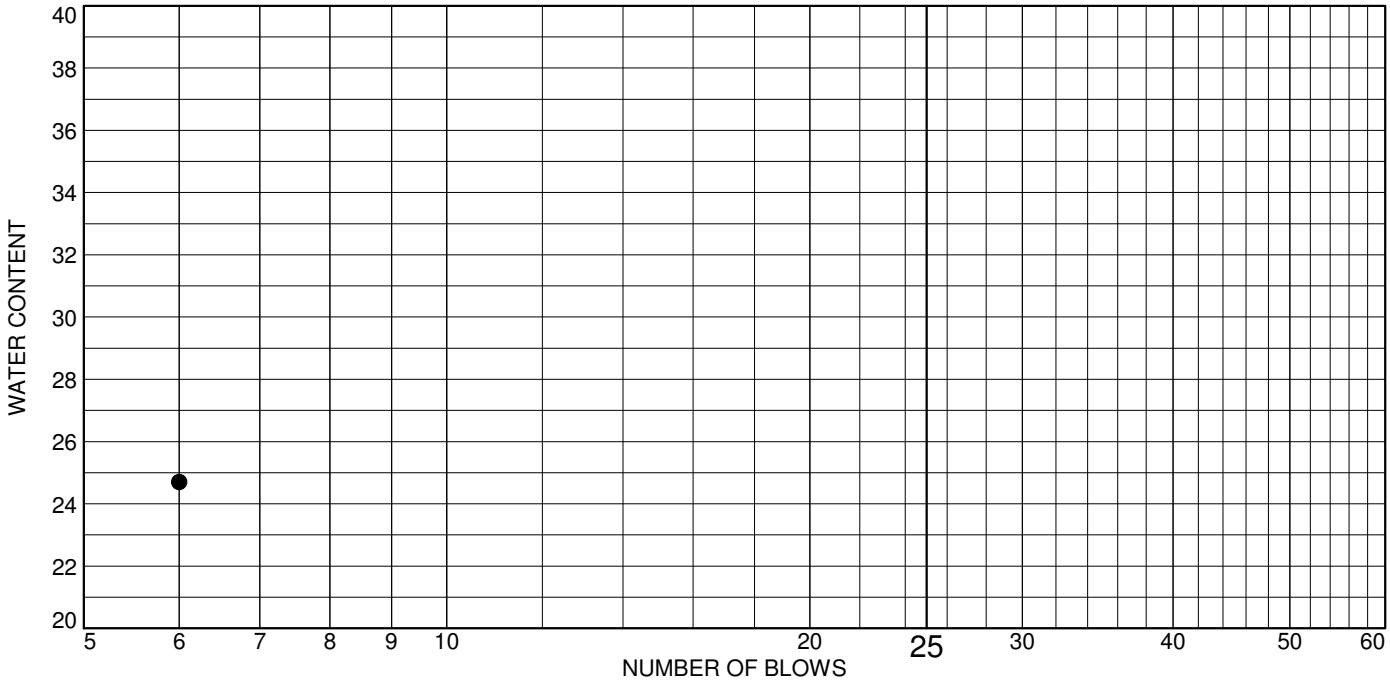
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty gravel	21	NP	NP	21.4	15.0	GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

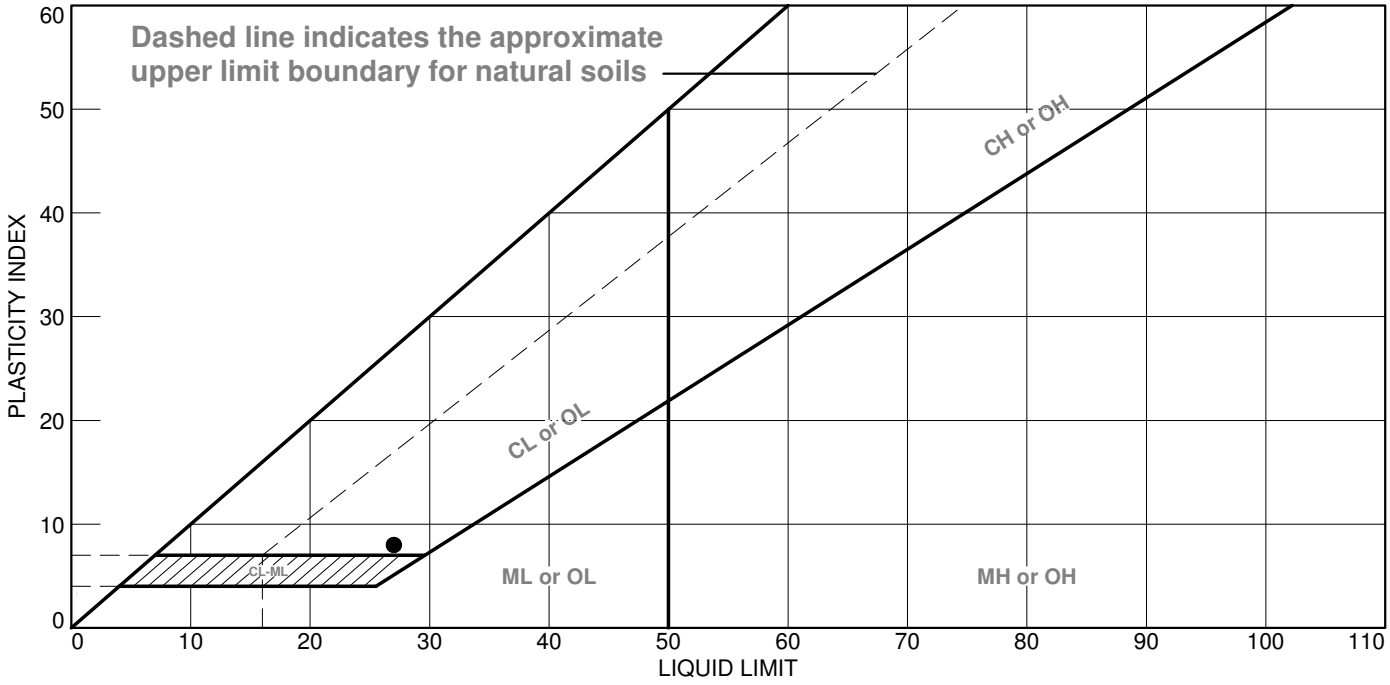
Location: GH11-294, Area E
Sample Number: GH11-294-1 **Depth:** 1-2'

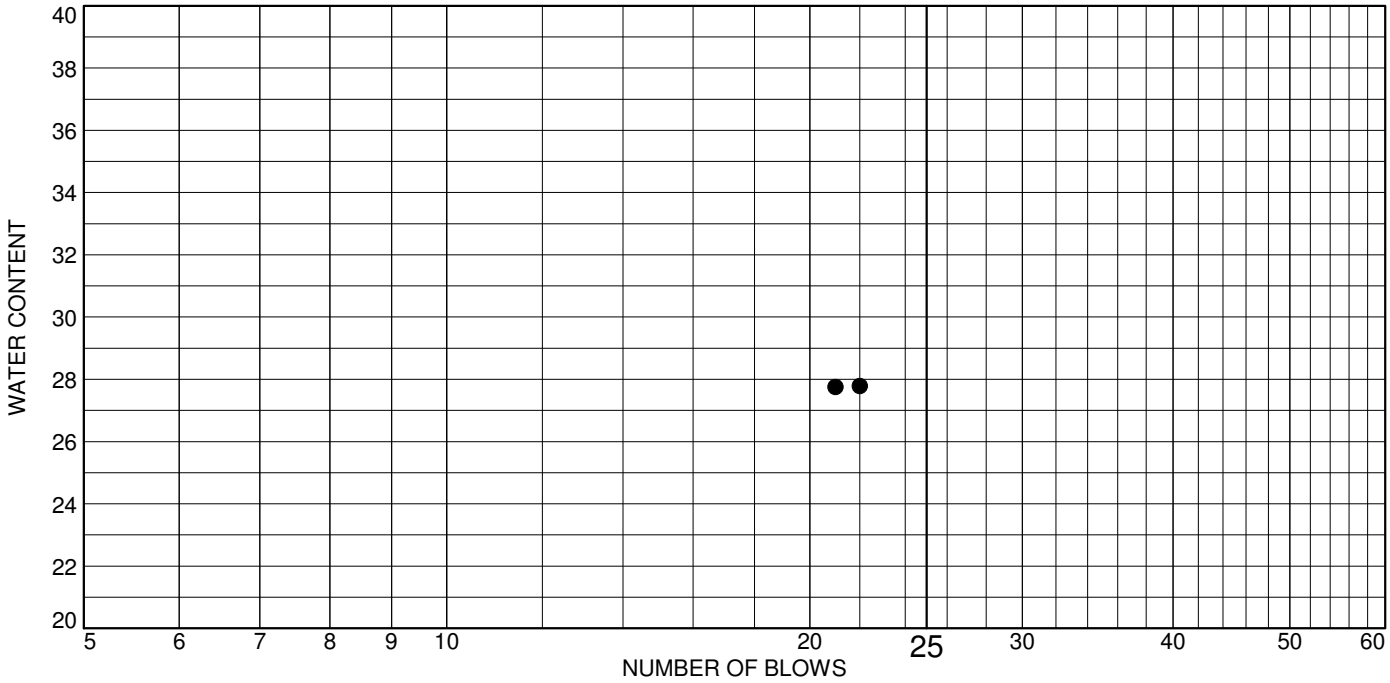
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	clayey gravel with sand	27	19	8	21.6	12.4	GC

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

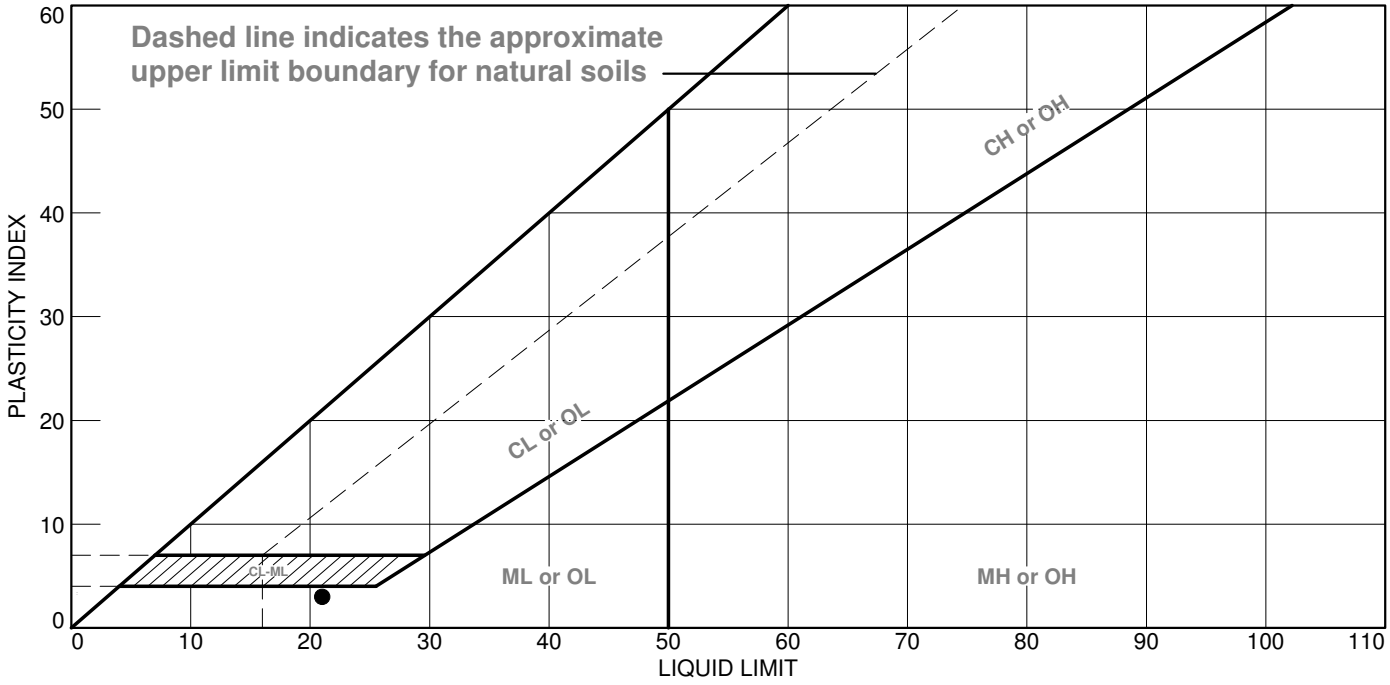
Location: GH11-296, Area E
Sample Number: SPT 1 **Depth:** 4-5.5

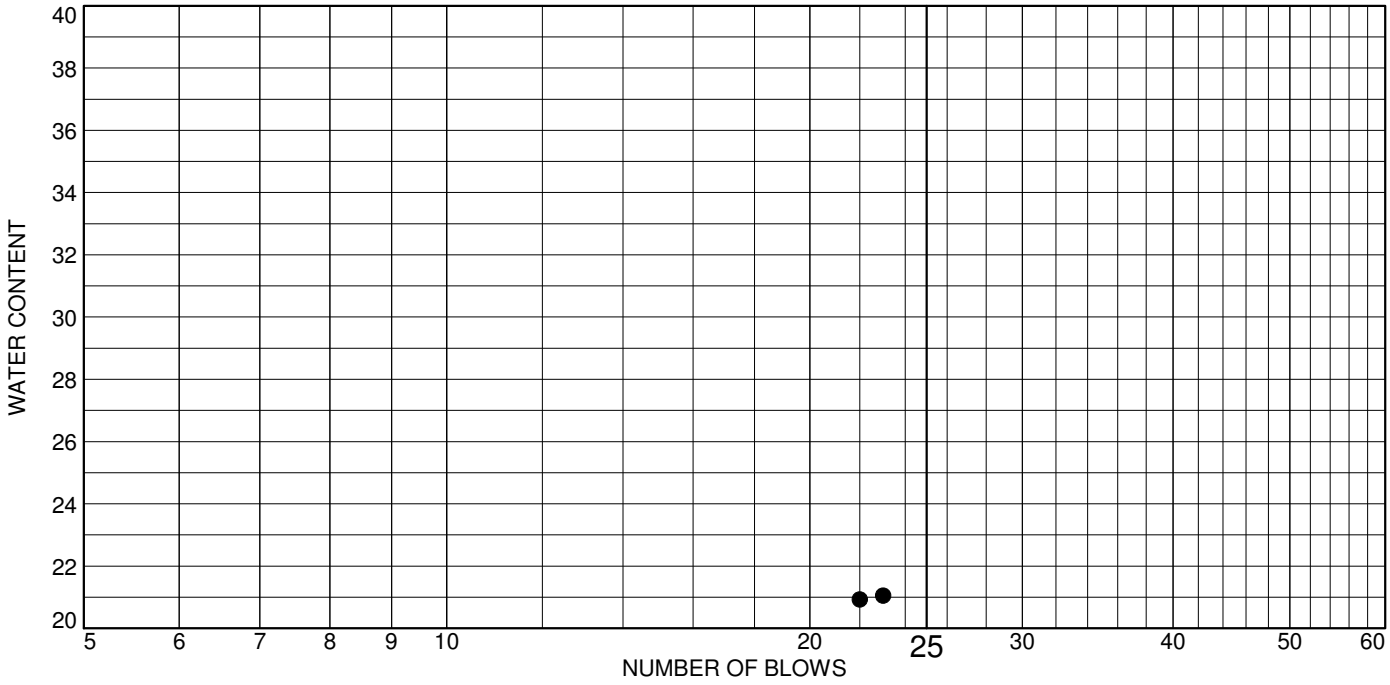
Remarks:

Knight Piésold CONSULTING

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty gravel with sand	21	18	3	39.8	27.9	GM

Project No. 101-77/12 **Client:** Pebble Limited Partnership

Project: Pebble Project

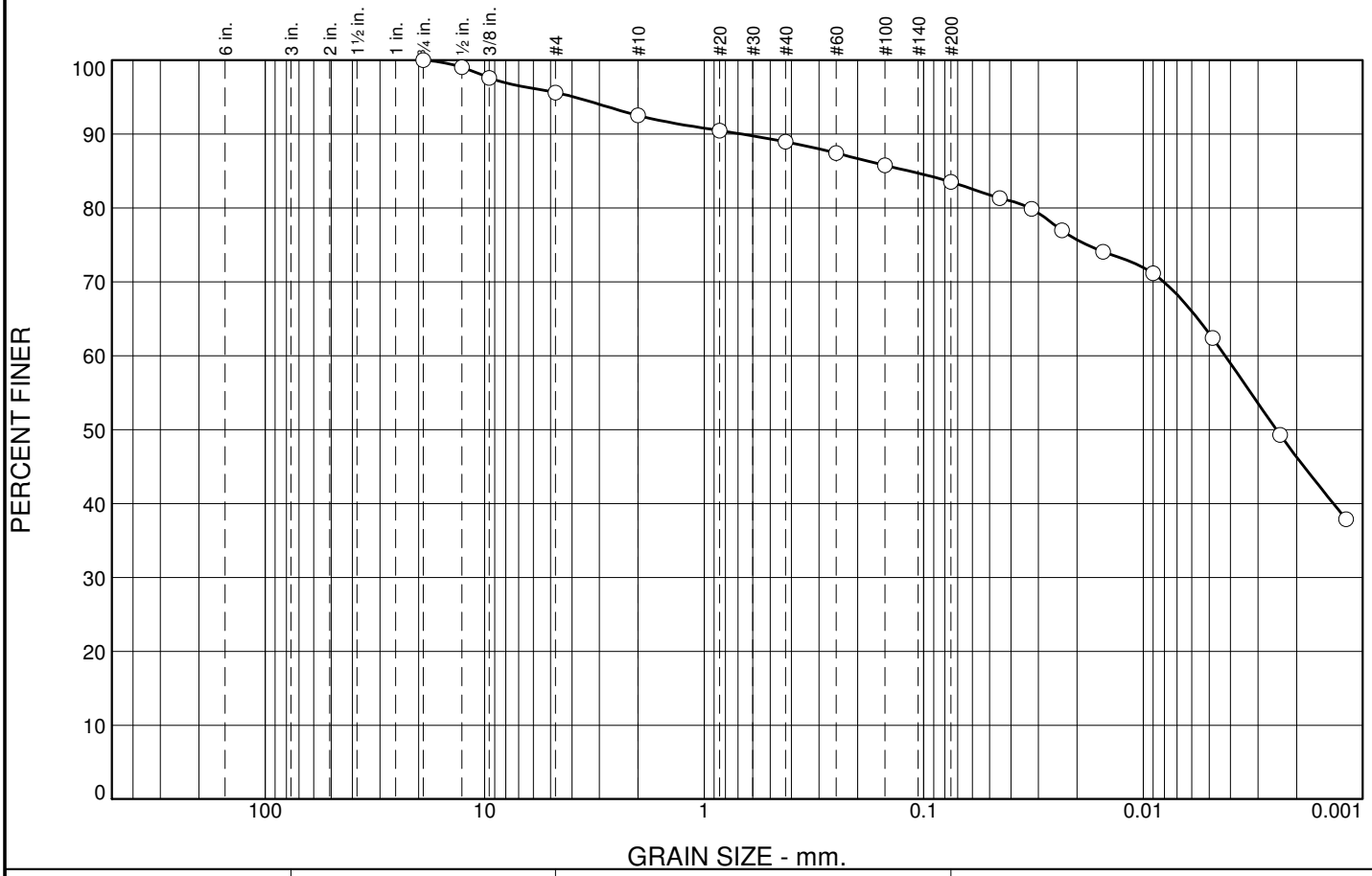
Location: GH11-296, Area E
Sample Number: SPT 2 **Depth:** 9-10.5'

Remarks:

Knight Piésold CONSULTING

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	3.1	3.6	5.4	37.2	46.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	99.1		
0.375	97.6		
#4	95.6		
#10	92.5		
#20	90.5		
#40	88.9		
#60	87.4		
#100	85.7		
#200	83.5		
0.0450 mm.	81.3		
0.0323 mm.	79.9		
0.0234 mm.	77.0		
0.0152 mm.	74.1		
0.0090 mm.	71.1		
0.0048 mm.	62.4		
0.0024 mm.	49.3		
0.0012 mm.	37.9		

* (no specification provided)

Soil Description

lean clay with sand

Atterberg Limits

PL= 17 LL= 44 PI= 27

Coefficients

D_{90}= 0.6765 D_{85}= 0.1171 D_{60}= 0.0042
D_{50}= 0.0025 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(23)

Remarks

As received moisture content - 25.2%

Location: GH11-229, Upper Talarik Creek Area
Sample Number: GH11-229-1 **Depth:** 3-3.75' **Date:** 11/17/11

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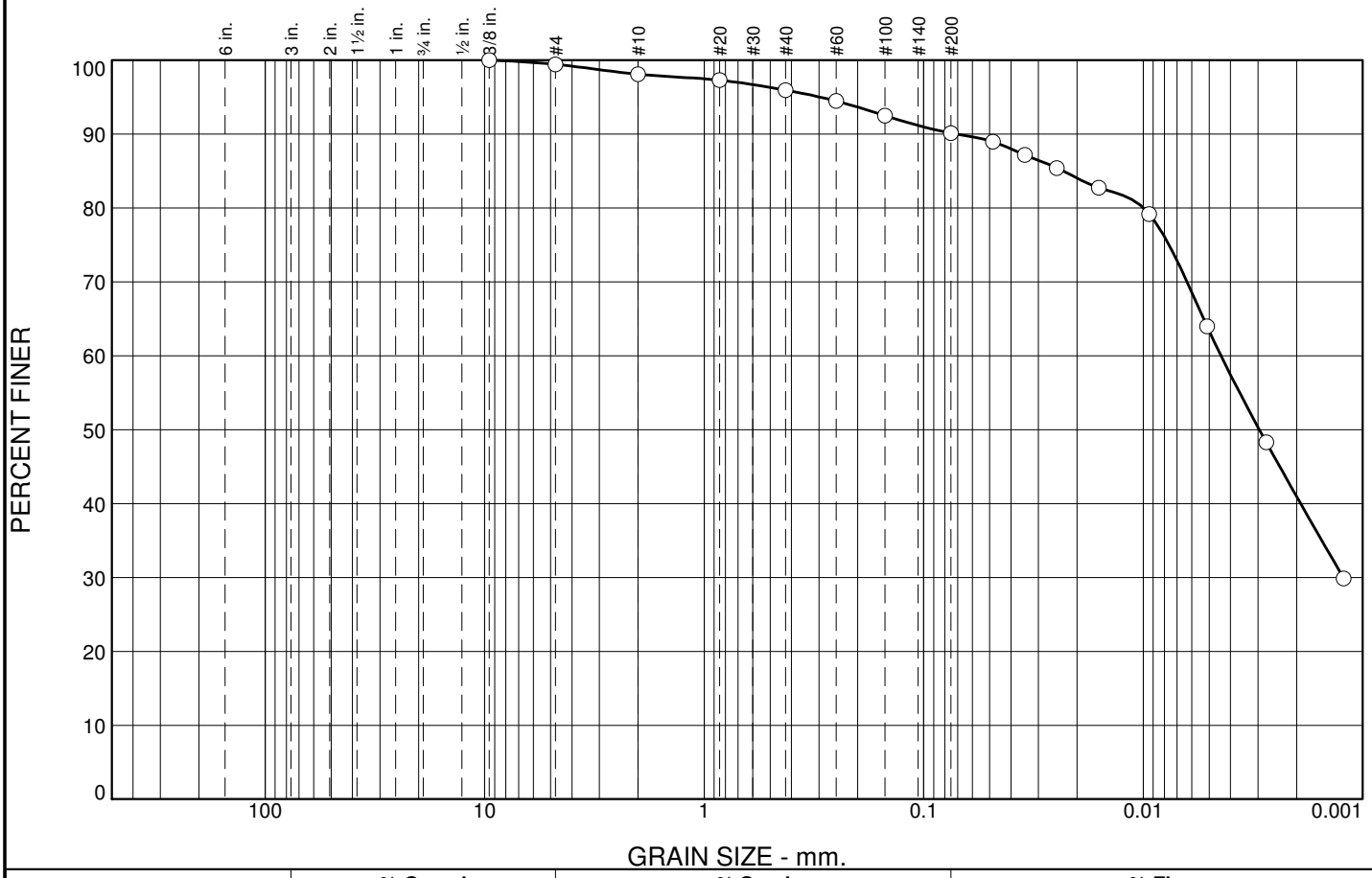
Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	1.3	2.2	5.8	49.1	41.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	99.4		
#10	98.1		
#20	97.3		
#40	95.9		
#60	94.5		
#100	92.5		
#200	90.1		
0.0483 mm.	88.9		
0.0346 mm.	87.2		
0.0247 mm.	85.4		
0.0159 mm.	82.7		
0.0094 mm.	79.2		
0.0051 mm.	64.0		
0.0027 mm.	48.3		
0.0012 mm.	29.9		

* (no specification provided)

Soil Description

lean clay

Atterberg Limits

PL= 21 LL= 47 PI= 26

Coefficients

D_{90}= 0.0711 D_{85}= 0.0232 D_{60}= 0.0044
D_{50}= 0.0030 D_{30}= 0.0012 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(25)

Remarks

Natural MC and Density reported on triaxial compresison report. SpG measured - 2.61

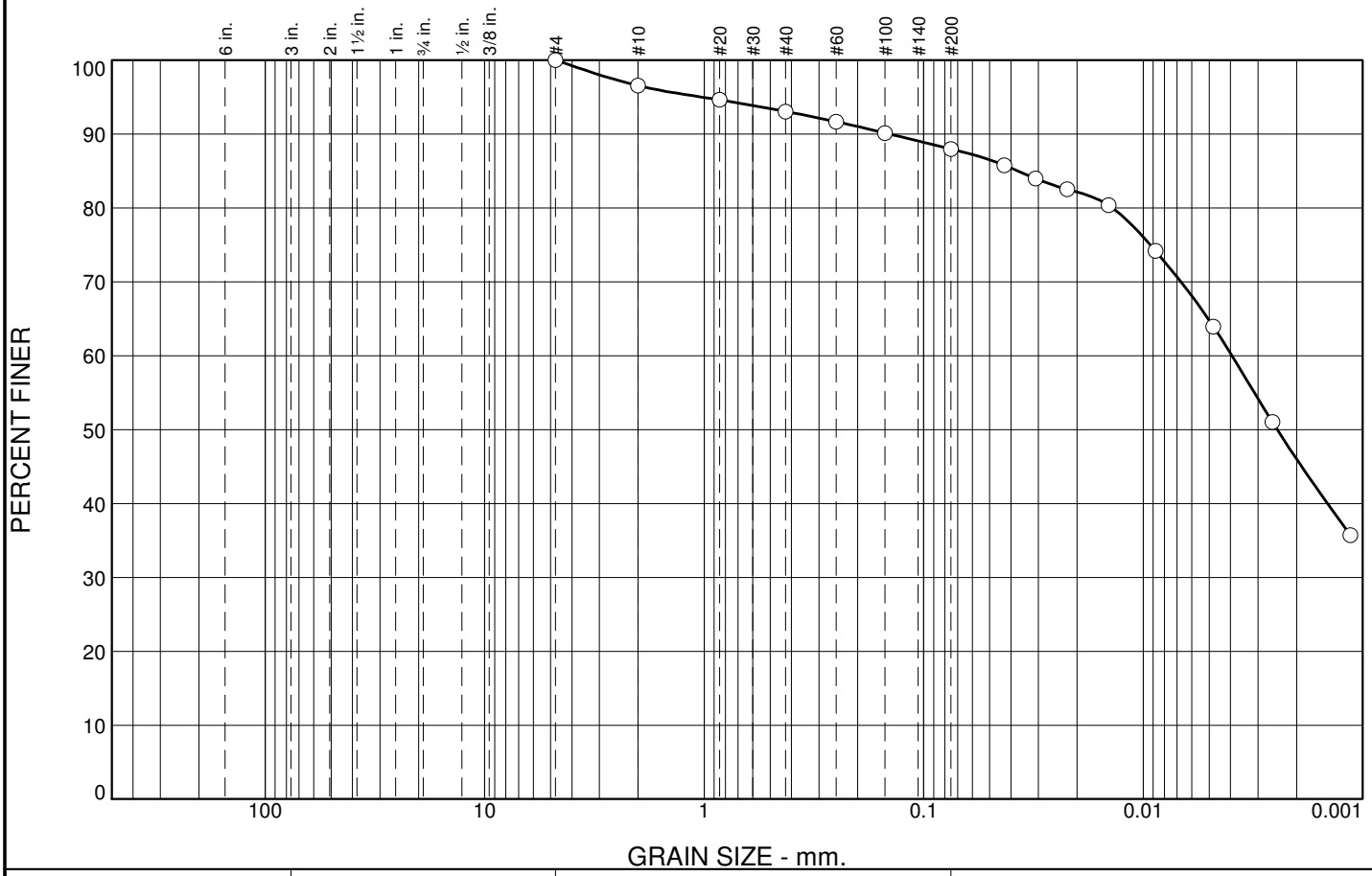
Location: GH11-229, Upper Talarik Creek Area
Sample Number: GH11-229-2 **Depth:** 4-6' **Date:** 10/25/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	3.5	3.5	5.0	42.0	46.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	96.5		
#20	94.6		
#40	93.0		
#60	91.7		
#100	90.1		
#200	88.0		
0.0429 mm.	85.8		
0.0309 mm.	84.0		
0.0222 mm.	82.5		
0.0144 mm.	80.3		
0.0088 mm.	74.2		
0.0048 mm.	63.9		
0.0026 mm.	51.0		
0.0011 mm.	35.7		

* (no specification provided)

Soil Description

fat clay

Atterberg Limits

PL= 21 LL= 50 PI= 29

Coefficients

D_{90}= 0.1438 D_{85}= 0.0373 D_{60}= 0.0039
D_{50}= 0.0025 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(27)

Remarks

As received moisture content - 26.3%

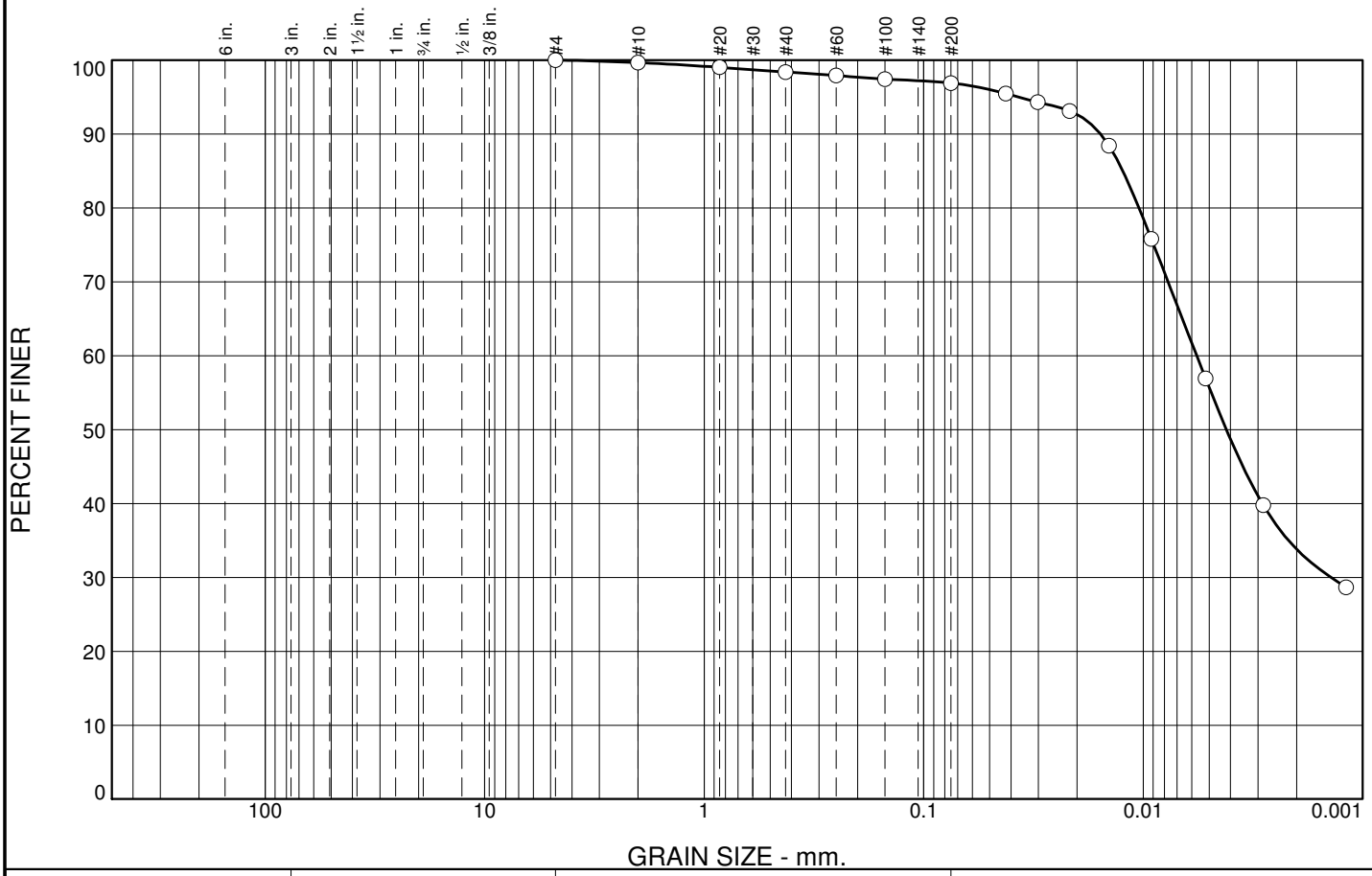
Location: GH11-229, Upper Talarik Creek Area
Sample Number: SPT 1 **Depth:** 6-7.5' **Date:** 9/19/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	1.3	1.5	63.1	33.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	99.0		
#40	98.4		
#60	97.9		
#100	97.4		
#200	96.9		
0.0422 mm.	95.5		
0.0302 mm.	94.3		
0.0216 mm.	93.1		
0.0143 mm.	88.4		
0.0092 mm.	75.8		
0.0052 mm.	56.9		
0.0028 mm.	39.8		
0.0012 mm.	28.7		

* (no specification provided)

Soil Description

fat clay

Atterberg Limits

PL= 18 LL= 58 PI= 40

Coefficients

D_{90}= 0.0157 D_{85}= 0.0124 D_{60}= 0.0057
D_{50}= 0.0042 D_{30}= 0.0014 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(43)

Remarks

As received moisture content - 31.6%

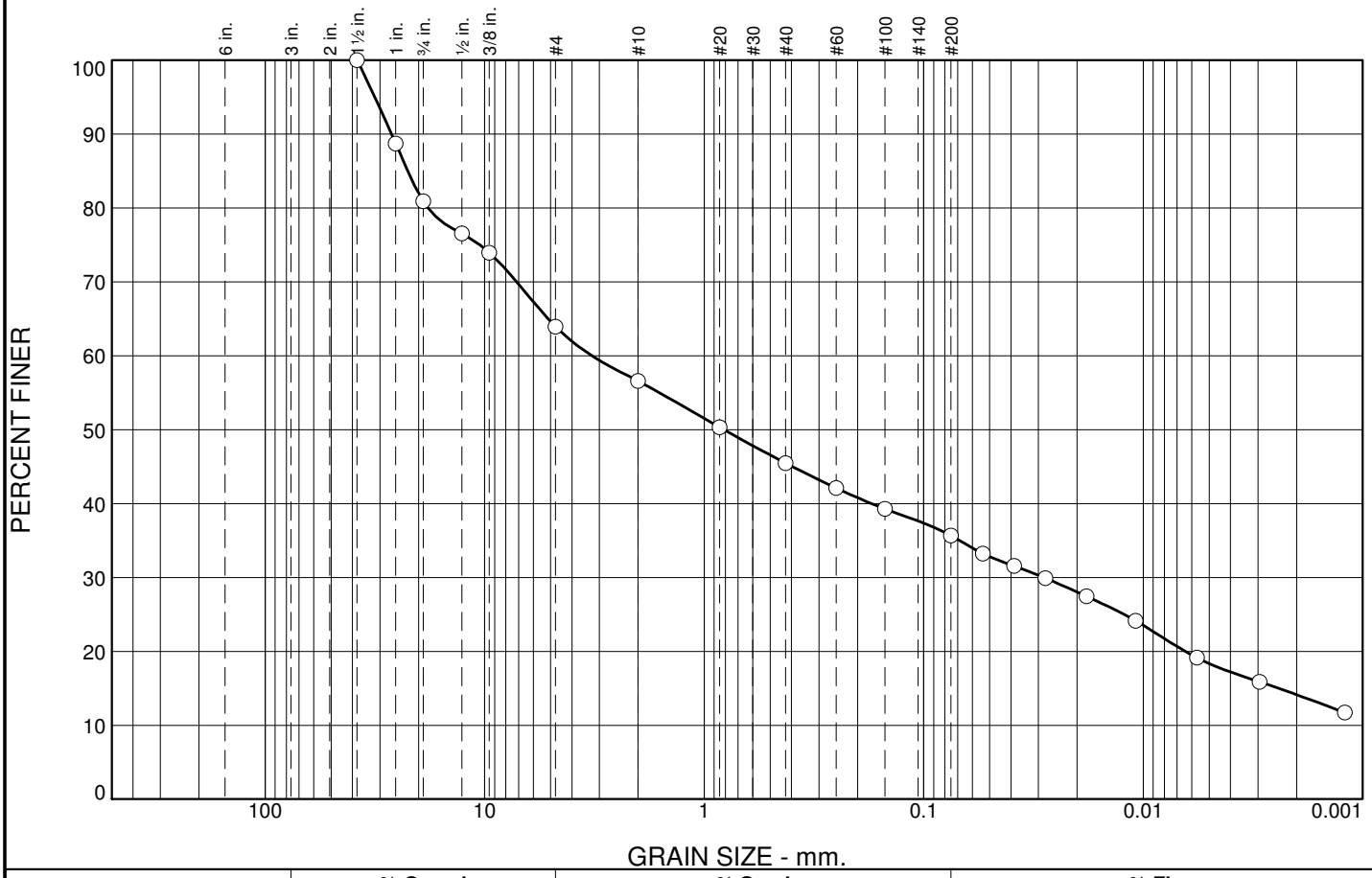
Location: GH11-229, Upper Talarik Creek Area
Sample Number: SPT 2 **Depth:** 9-10.5' **Date:** 9/19/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.1	17.0	7.3	11.1	9.8	21.6	14.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	88.7		
.75	80.9		
.5	76.5		
0.375	73.9		
#4	63.9		
#10	56.6		
#20	50.3		
#40	45.5		
#60	42.1		
#100	39.3		
#200	35.7		
0.0537 mm.	33.2		
0.0387 mm.	31.6		
0.0279 mm.	29.9		
0.0181 mm.	27.4		
0.0108 mm.	24.1		
0.0057 mm.	19.1		
0.0029 mm.	15.9		
0.0012 mm.	11.7		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 14 LL= 40 PI= 26

Coefficients

D_{90}= 26.5435 D_{85}= 22.4042 D_{60}= 3.2415
D_{50}= 0.8131 D_{30}= 0.0283 D_{15}= 0.0024
D_{10}= C_u= C_c=

Classification

USCS= GC AASHTO= A-6(4)

Remarks

As received moisture content - 27.2%

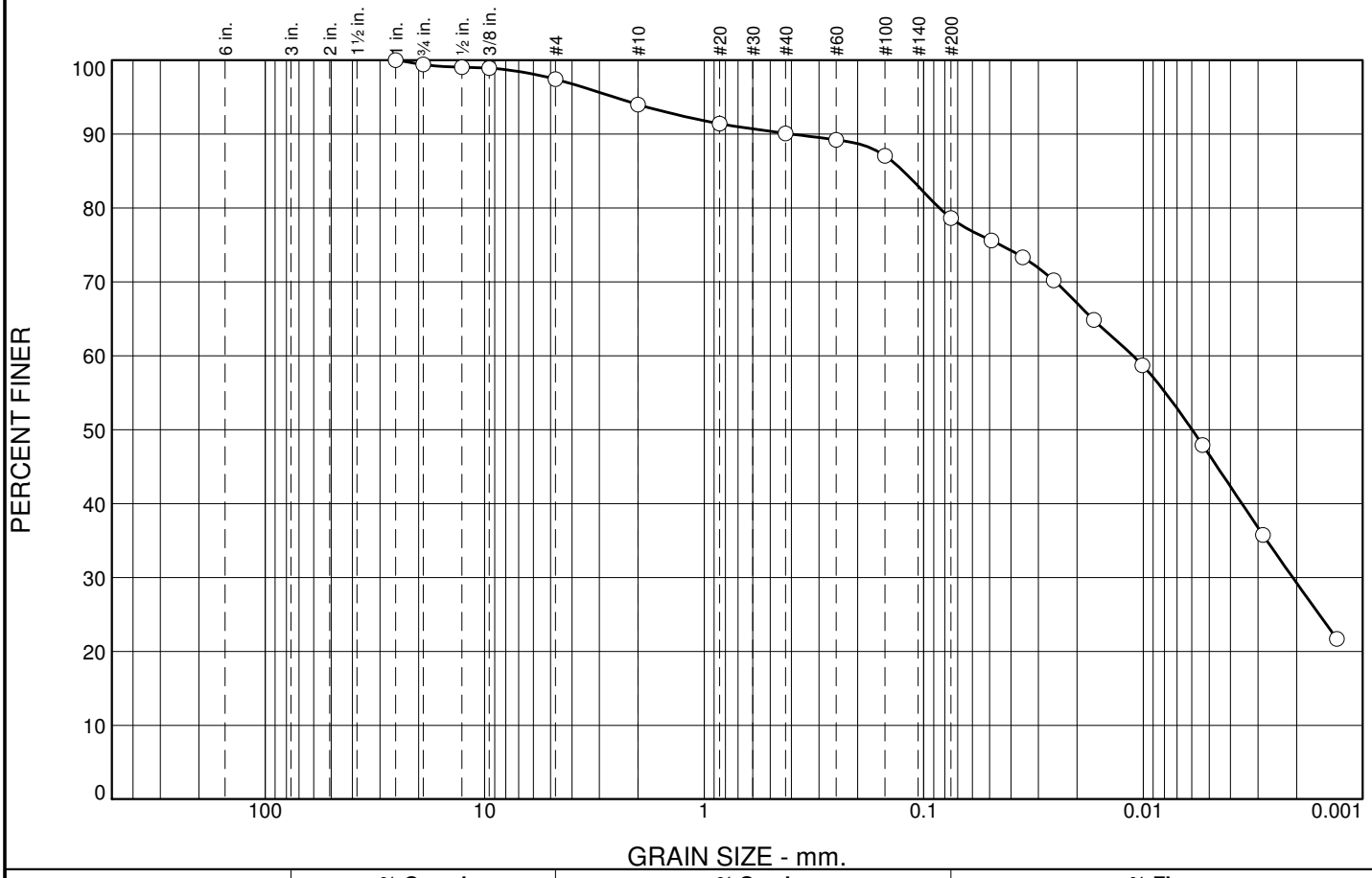
Location: GH11-229, Upper Talarik Creek Area
Sample Number: SPT 3 **Depth:** 14-15.5' **Date:** 9/19/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.6	2.0	3.4	3.9	11.5	49.3	29.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	99.4		
.5	99.0		
0.375	98.9		
#4	97.4		
#10	94.0		
#20	91.4		
#40	90.1		
#60	89.2		
#100	87.1		
#200	78.6		
0.0491 mm.	75.6		
0.0353 mm.	73.3		
0.0256 mm.	70.2		
0.0168 mm.	64.8		
0.0101 mm.	58.7		
0.0054 mm.	47.9		
0.0028 mm.	35.7		
0.0013 mm.	21.7		

* (no specification provided)

Soil Description

lean clay with sand

Atterberg Limits

PL= 19 LL= 37 PI= 18

Coefficients

D_{90}= 0.4039 D_{85}= 0.1240 D_{60}= 0.0111
D_{50}= 0.0060 D_{30}= 0.0021 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(13)

Remarks

As received moisture content - 23.0%

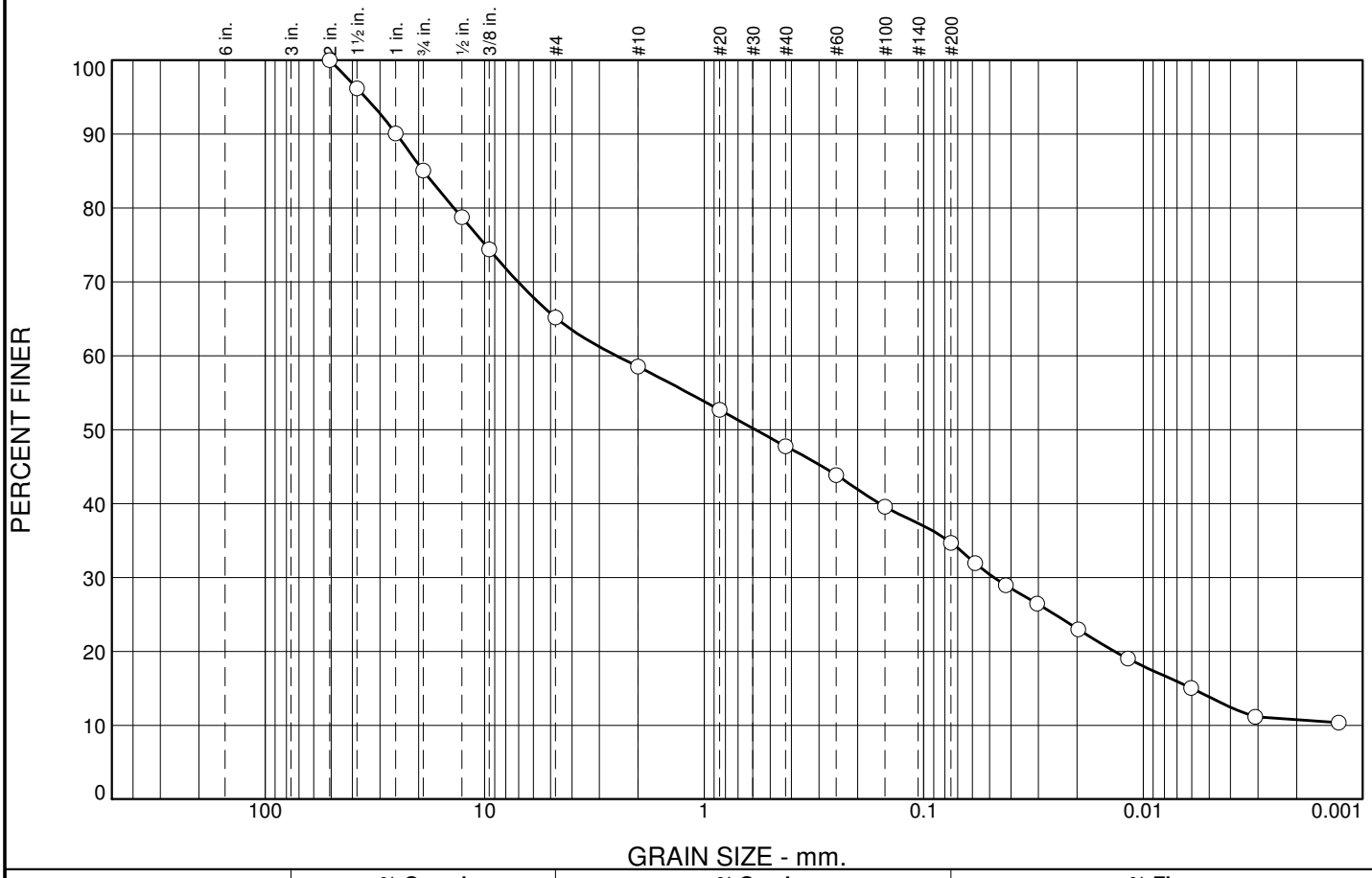
Location: GH11-231, Upper Talarik Creek Area
Sample Number: GH11-231-1 **Depth:** 4.75-5.75' **Date:** 11/15/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.0	19.8	6.7	10.8	13.0	23.9	10.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	96.2		
1	90.1		
.75	85.0		
.5	78.8		
0.375	74.4		
#4	65.2		
#10	58.5		
#20	52.7		
#40	47.7		
#60	43.9		
#100	39.6		
#200	34.7		
0.0582 mm.	31.9		
0.0422 mm.	28.9		
0.0304 mm.	26.5		
0.0198 mm.	23.0		
0.0117 mm.	19.0		
0.0060 mm.	15.0		
0.0031 mm.	11.1		
0.0013 mm.	10.4		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 14 LL= 30 PI= 16

Coefficients

D_{90}= 25.2683 D_{85}= 18.9943 D_{60}= 2.5145
D_{50}= 0.5850 D_{30}= 0.0478 D_{15}= 0.0060
D_{10}= C_u= C_c=

Classification

USCS= GC AASHTO= A-2-6(1)

Remarks

As received moisture content - 11.8%

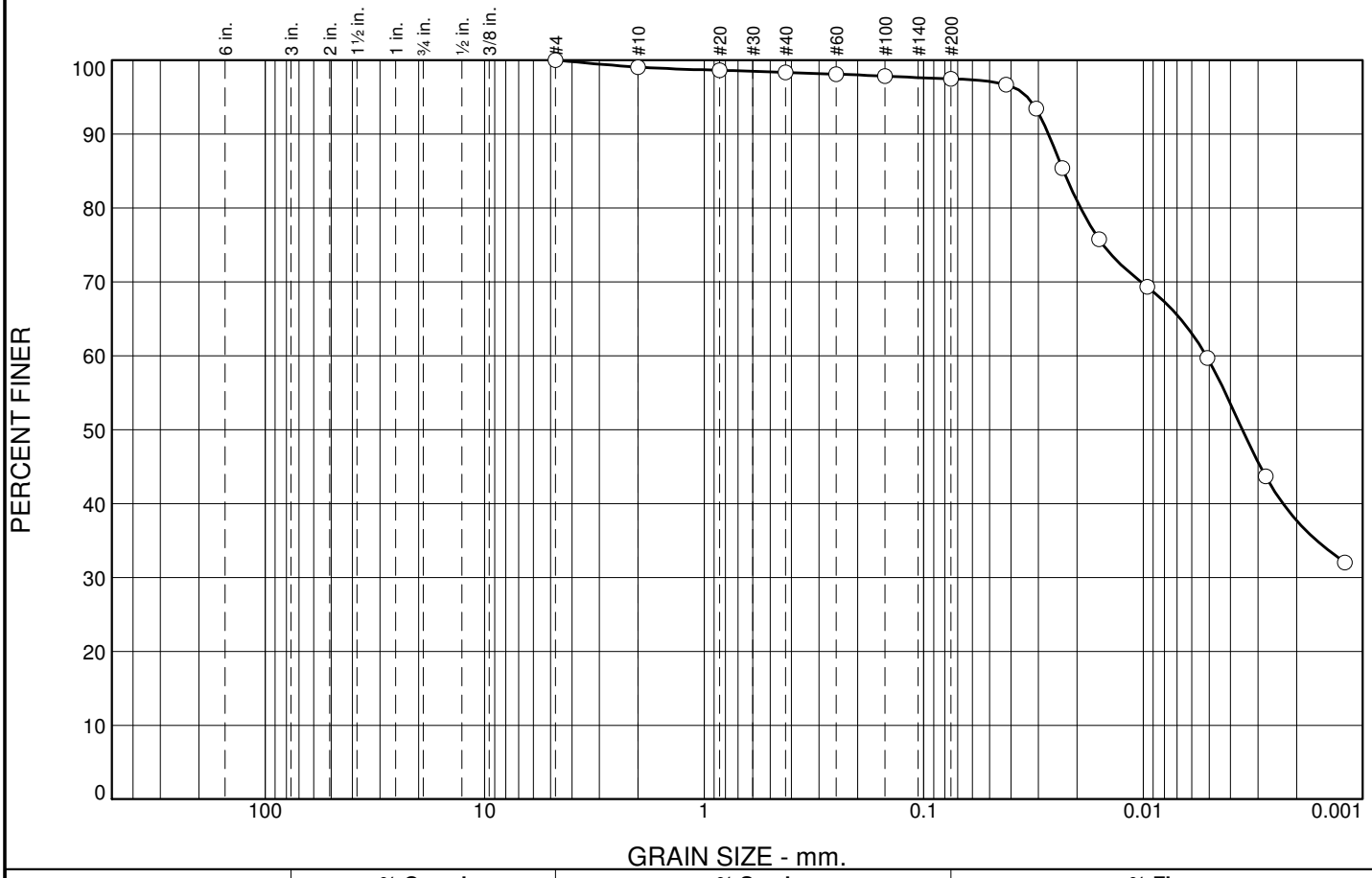
Location: GH11-231, Upper Talarik Creek Area
Sample Number: GH11-231-2 **Depth:** 6.75'-8.0' **Date:** 11/15/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.9	0.8	0.9	59.7	37.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.1		
#20	98.6		
#40	98.3		
#60	98.1		
#100	97.8		
#200	97.4		
0.0421 mm.	96.7		
0.0307 mm.	93.4		
0.0234 mm.	85.4		
0.0159 mm.	75.8		
0.0096 mm.	69.3		
0.0051 mm.	59.7		
0.0028 mm.	43.7		
0.0012 mm.	32.0		

* (no specification provided)

Soil Description

lean clay

Atterberg Limits

PL= 19 LL= 49 PI= 30

Coefficients

D_{90}= 0.0270 D_{85}= 0.0231 D_{60}= 0.0052
D_{50}= 0.0035 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(32)

Remarks

As received moisture content - 32.2%

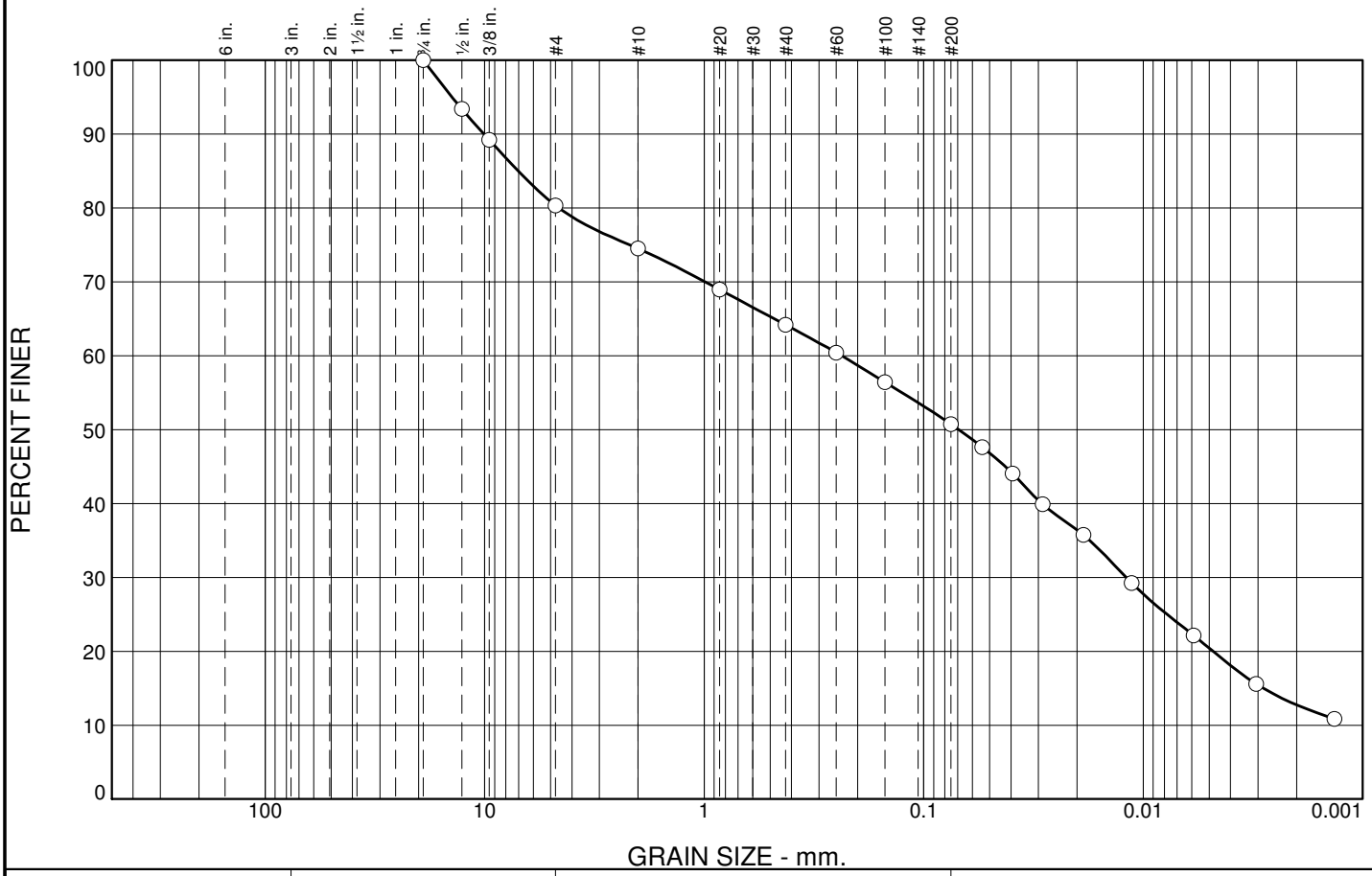
Location: GH11-231, Upper Talarik Creek Area
Sample Number: GH11-231-3 **Depth:** 21.5-22.5' **Date:** 11/15/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.7	5.8	10.3	13.5	37.9	12.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	93.4		
0.375	89.2		
#4	80.3		
#10	74.5		
#20	68.9		
#40	64.2		
#60	60.4		
#100	56.4		
#200	50.7		
0.0540 mm.	47.6		
0.0393 mm.	44.1		
0.0287 mm.	39.9		
0.0187 mm.	35.8		
0.0113 mm.	29.2		
0.0059 mm.	22.1		
0.0031 mm.	15.6		
0.0013 mm.	10.9		

* (no specification provided)

Soil Description

sandy lean clay with gravel

Atterberg Limits

PL= 17 LL= 36 PI= 19

Coefficients

D_{90}= 10.0724 D_{85}= 7.0365 D_{60}= 0.2366
D_{50}= 0.0693 D_{30}= 0.0120 D_{15}= 0.0028
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(6)

Remarks

As received moisture content - 18.6%

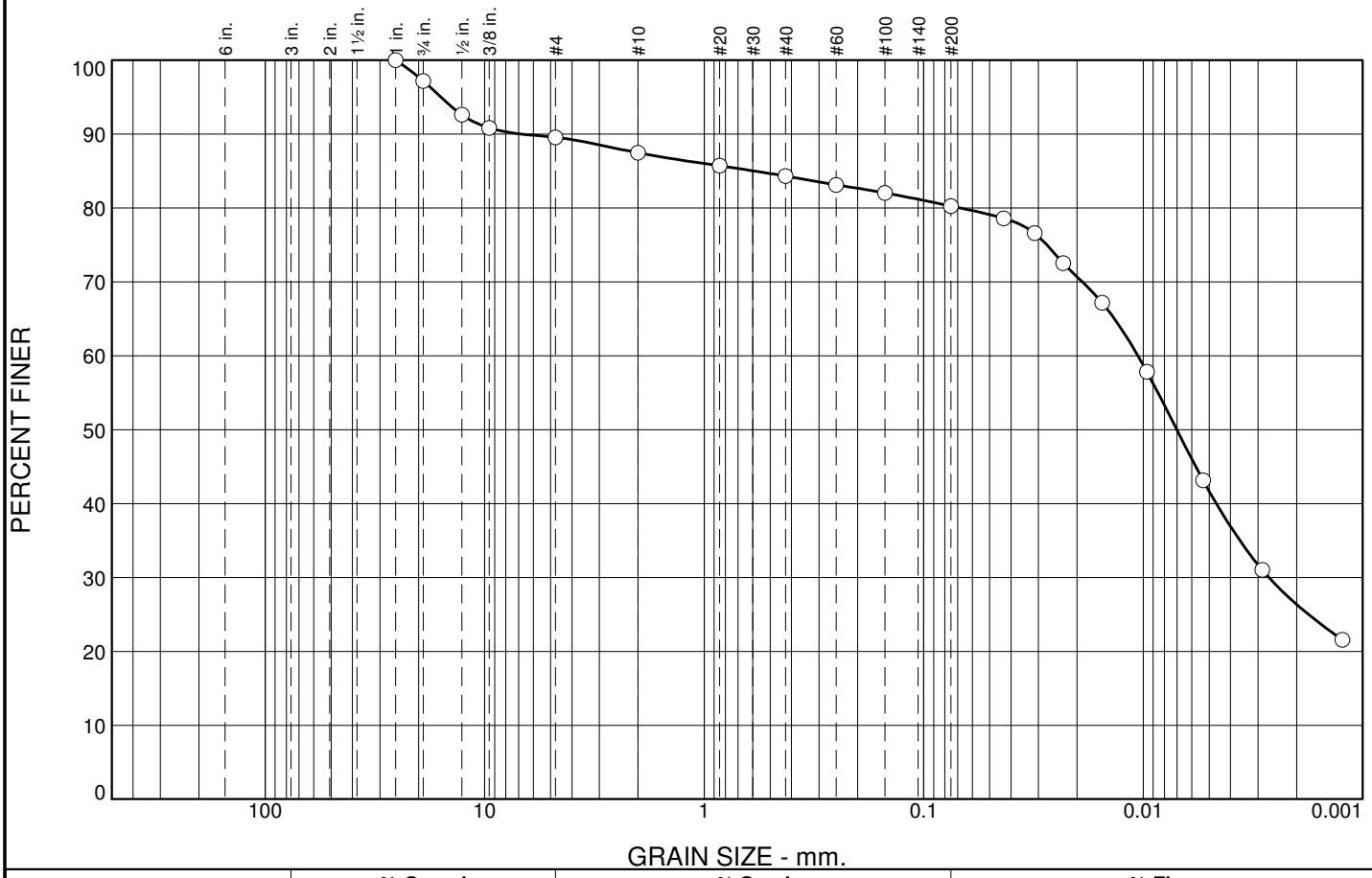
Location: GH11-231, Upper Talarik Creek Area
Sample Number: SPT 1 **Depth:** 9-10.5' **Date:** 11/1/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.8	7.7	2.0	3.2	4.0	54.0	26.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.2		
.5	92.6		
0.375	90.8		
#4	89.5		
#10	87.5		
#20	85.7		
#40	84.3		
#60	83.1		
#100	82.0		
#200	80.3		
0.0432 mm.	78.6		
0.0312 mm.	76.6		
0.0231 mm.	72.5		
0.0154 mm.	67.2		
0.0096 mm.	57.8		
0.0053 mm.	43.1		
0.0029 mm.	31.0		
0.0012 mm.	21.5		

* (no specification provided)

Soil Description

lean clay with gravel

Atterberg Limits

PL= 20 LL= 43 PI= 23

Coefficients

D_{90}= 6.8683 D_{85}= 0.5940 D_{60}= 0.0106
D_{50}= 0.0070 D_{30}= 0.0027 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(18)

Remarks

As received moisture content - 28.4%

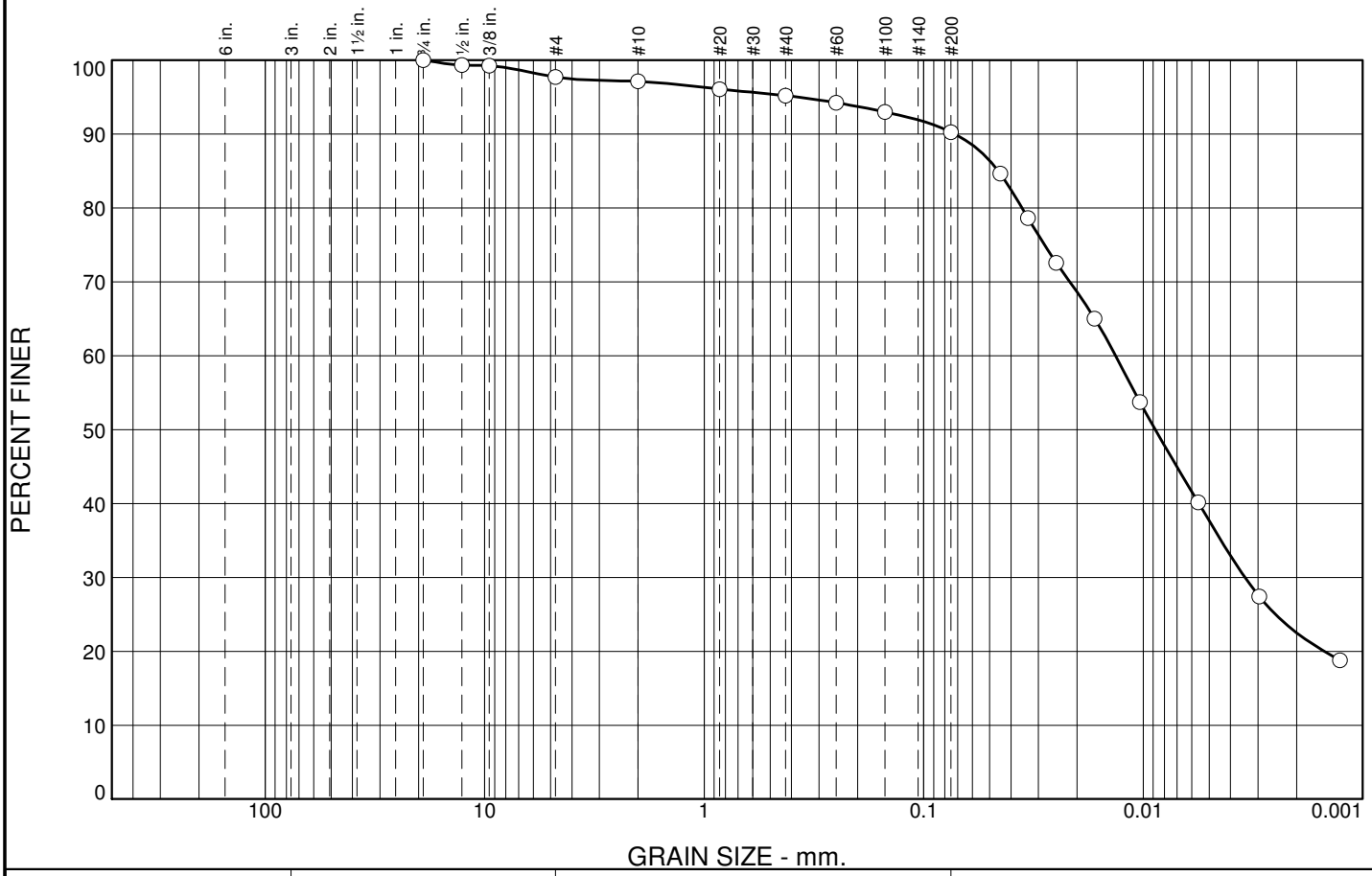
Location: GH11-231, Upper Talarik Creek Area
Sample Number: SPT 3 **Depth:** 19-20.5' **Date:** 11/1/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.3	0.6	1.9	5.0	67.7	22.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	99.3		
0.375	99.2		
#4	97.7		
#10	97.1		
#20	96.1		
#40	95.2		
#60	94.2		
#100	93.0		
#200	90.2		
0.0448 mm.	84.6		
0.0335 mm.	78.6		
0.0249 mm.	72.6		
0.0166 mm.	65.0		
0.0103 mm.	53.7		
0.0056 mm.	40.2		
0.0030 mm.	27.4		
0.0013 mm.	18.8		

* (no specification provided)

Soil Description

lean clay

Atterberg Limits

PL= 22 LL= 36 PI= 14

Coefficients

D_{90}= 0.0722 D_{85}= 0.0457 D_{60}= 0.0134
D_{50}= 0.0088 D_{30}= 0.0034 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(13)

Remarks

As received moisture content - 25.4%

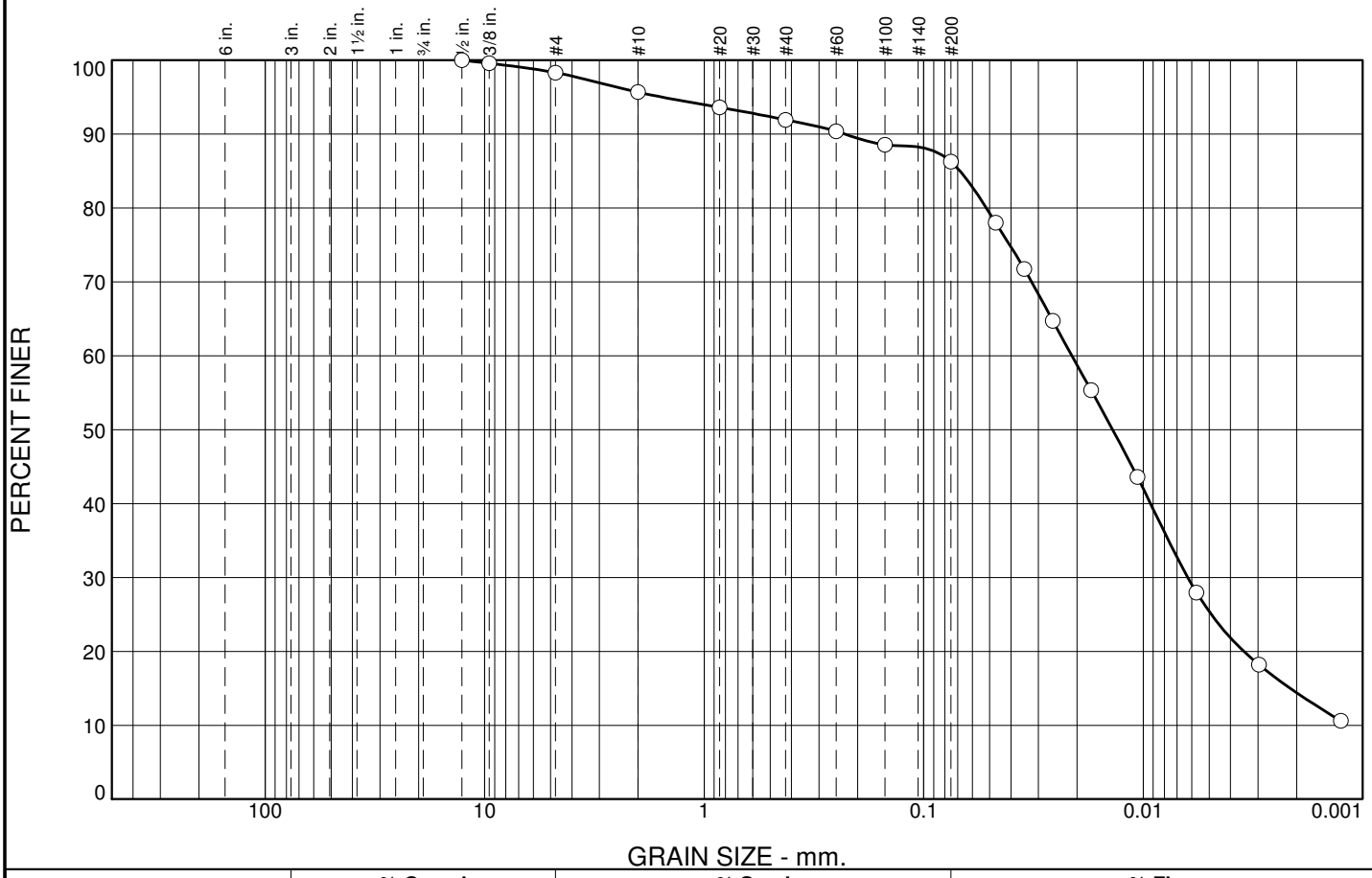
Location: GH11-232, Upper Talarik Creek Area
Sample Number: GH11-232-1 **Depth:** 3-4' **Date:** 11/15/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.7	2.6	3.8	5.6	71.9	14.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
0.375	99.6		
#4	98.3		
#10	95.7		
#20	93.6		
#40	91.9		
#60	90.4		
#100	88.5		
#200	86.3		
0.0470 mm.	78.0		
0.0348 mm.	71.7		
0.0258 mm.	64.7		
0.0173 mm.	55.3		
0.0106 mm.	43.6		
0.0057 mm.	28.0		
0.0030 mm.	18.2		
0.0013 mm.	10.6		

* (no specification provided)

Soil Description

silty clay

Atterberg Limits

PL= 22 LL= 29 PI= 7

Coefficients

D_{90}= 0.2290 D_{85}= 0.0682 D_{60}= 0.0211
D_{50}= 0.0138 D_{30}= 0.0063 D_{15}= 0.0021
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(5)

Remarks

Natural MC and Density reported on triaxial compression report. SpG measured - 2.72

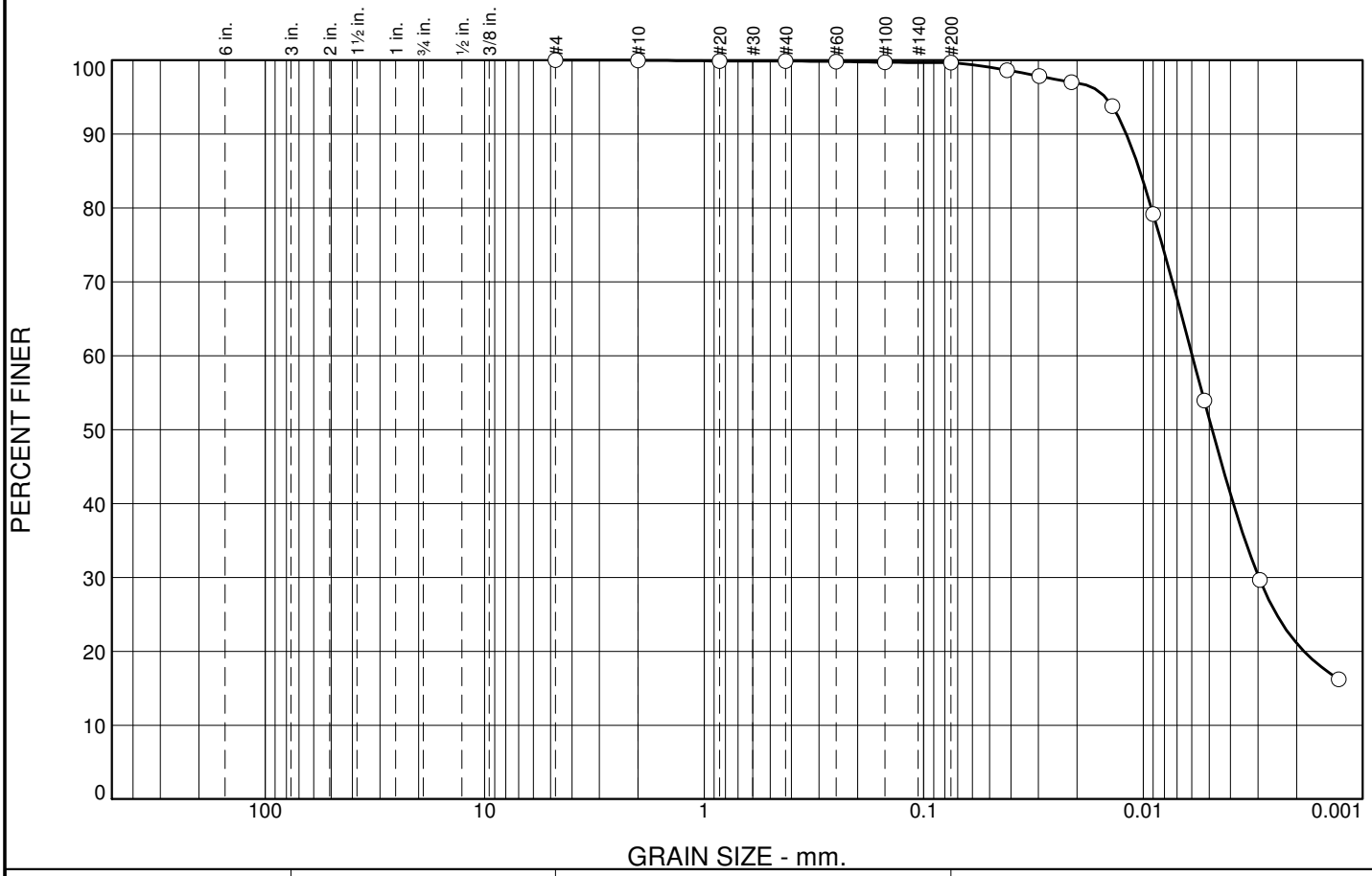
Location: GH11-232, Upper Talarik Creek Area
Sample Number: GH11-232-2 **Depth:** 4-6' **Date:** 9/23/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	0.3	78.5	21.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.9		
#60	99.8		
#100	99.7		
#200	99.6		
0.0417 mm.	98.6		
0.0297 mm.	97.8		
0.0212 mm.	97.0		
0.0138 mm.	93.8		
0.0090 mm.	79.1		
0.0053 mm.	53.9		
0.0029 mm.	29.6		
0.0013 mm.	16.2		

* (no specification provided)

Soil Description

lean clay

Atterberg Limits

PL= 23 LL= 32 PI= 9

Coefficients

D_{90}= 0.0119 D_{85}= 0.0104 D_{60}= 0.0060
D_{50}= 0.0048 D_{30}= 0.0030 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(10)

Remarks

As received moisture content - 29.4%

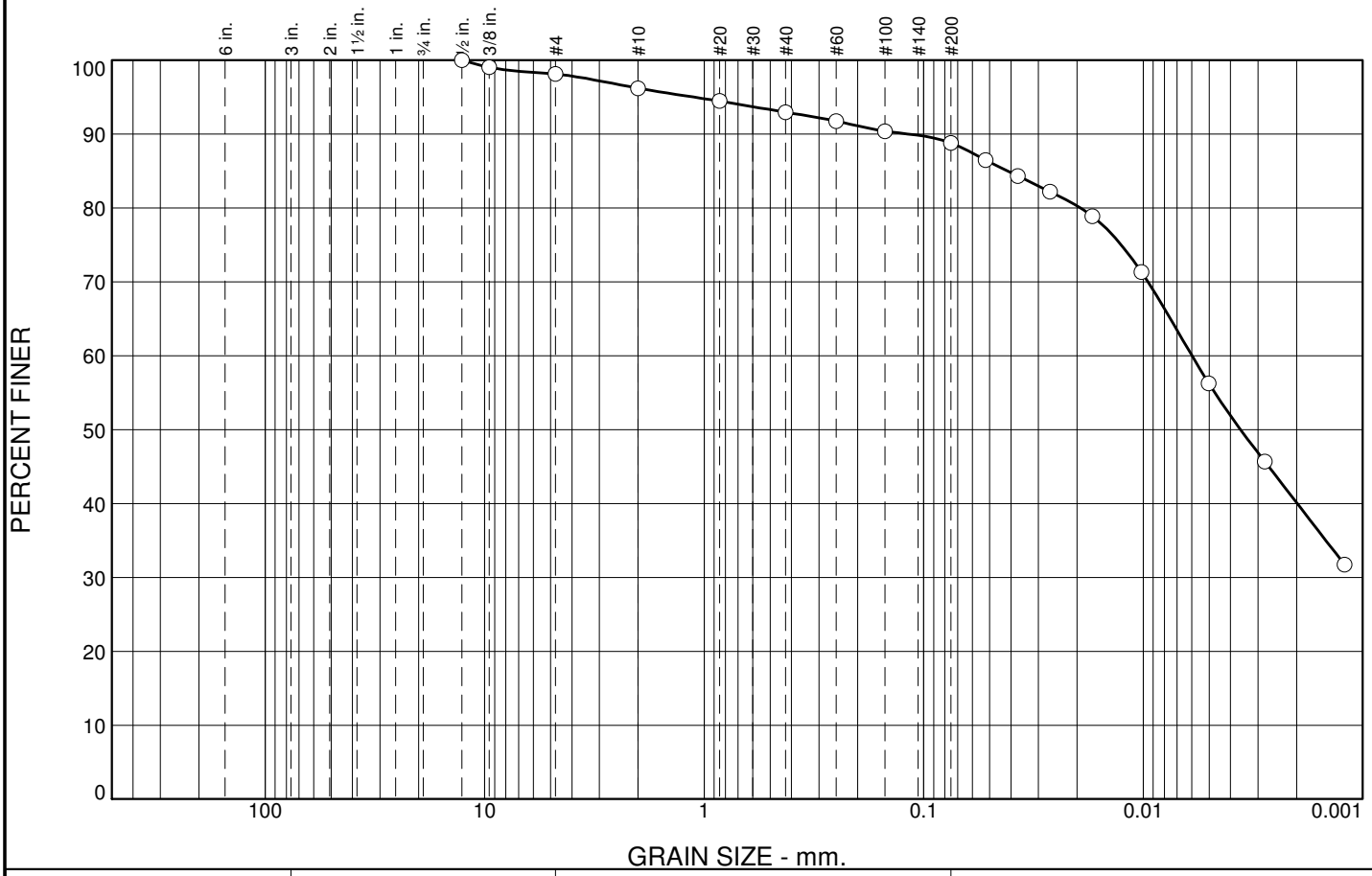
Location: GH11-232, Upper Talarik Creek Area
Sample Number: GH11-232-3 **Depth:** 32.6-33.4' **Date:** 11/15/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.9	1.9	3.3	4.1	48.7	40.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
0.375	99.0		
#4	98.1		
#10	96.2		
#20	94.5		
#40	92.9		
#60	91.7		
#100	90.4		
#200	88.8		
0.0521 mm.	86.5		
0.0372 mm.	84.3		
0.0266 mm.	82.2		
0.0171 mm.	78.9		
0.0102 mm.	71.3		
0.0050 mm.	56.2		
0.0028 mm.	45.7		
0.0012 mm.	31.7		

* (no specification provided)

Soil Description

fat clay

Atterberg Limits

PL= 15 LL= 51 PI= 36

Coefficients

D_{90}= 0.1181 D_{85}= 0.0415 D_{60}= 0.0060
D_{50}= 0.0036 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(33)

Remarks

As received moisture content - 28.8%

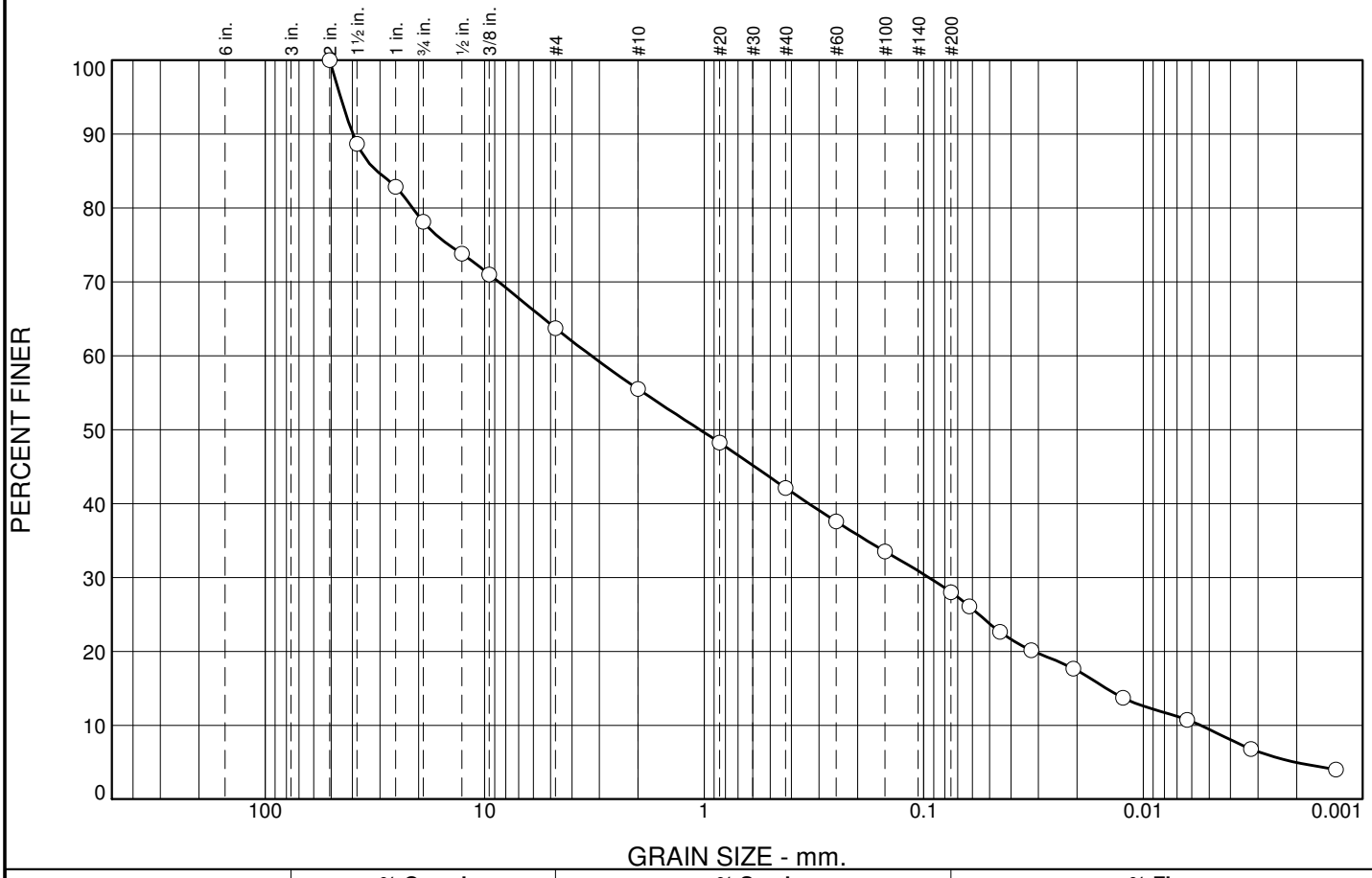
Location: GH11-232, Upper Talarik Creek Area
Sample Number: GH11-232-4 **Depth:** 52-53' **Date:** 10/2/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	21.9	14.4	8.2	13.4	14.1	23.0	5.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	88.7		
1	82.9		
.75	78.1		
.5	73.8		
0.375	71.0		
#4	63.7		
#10	55.5		
#20	48.2		
#40	42.1		
#60	37.6		
#100	33.5		
#200	28.0		
0.0618 mm.	26.1		
0.0449 mm.	22.6		
0.0323 mm.	20.2		
0.0208 mm.	17.7		
0.0123 mm.	13.7		
0.0063 mm.	10.7		
0.0032 mm.	6.8		
0.0013 mm.	4.0		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 19 LL= 31 PI= 12

Coefficients

D_{90}= 39.8239 D_{85}= 31.0018 D_{60}= 3.2682
D_{50}= 1.0469 D_{30}= 0.0947 D_{15}= 0.0147
D_{10}= 0.0055 C_u= 595.29 C_c= 0.50

Classification

USCS= GC AASHTO= A-2-6(0)

Remarks

As received moisture content - 11.7%

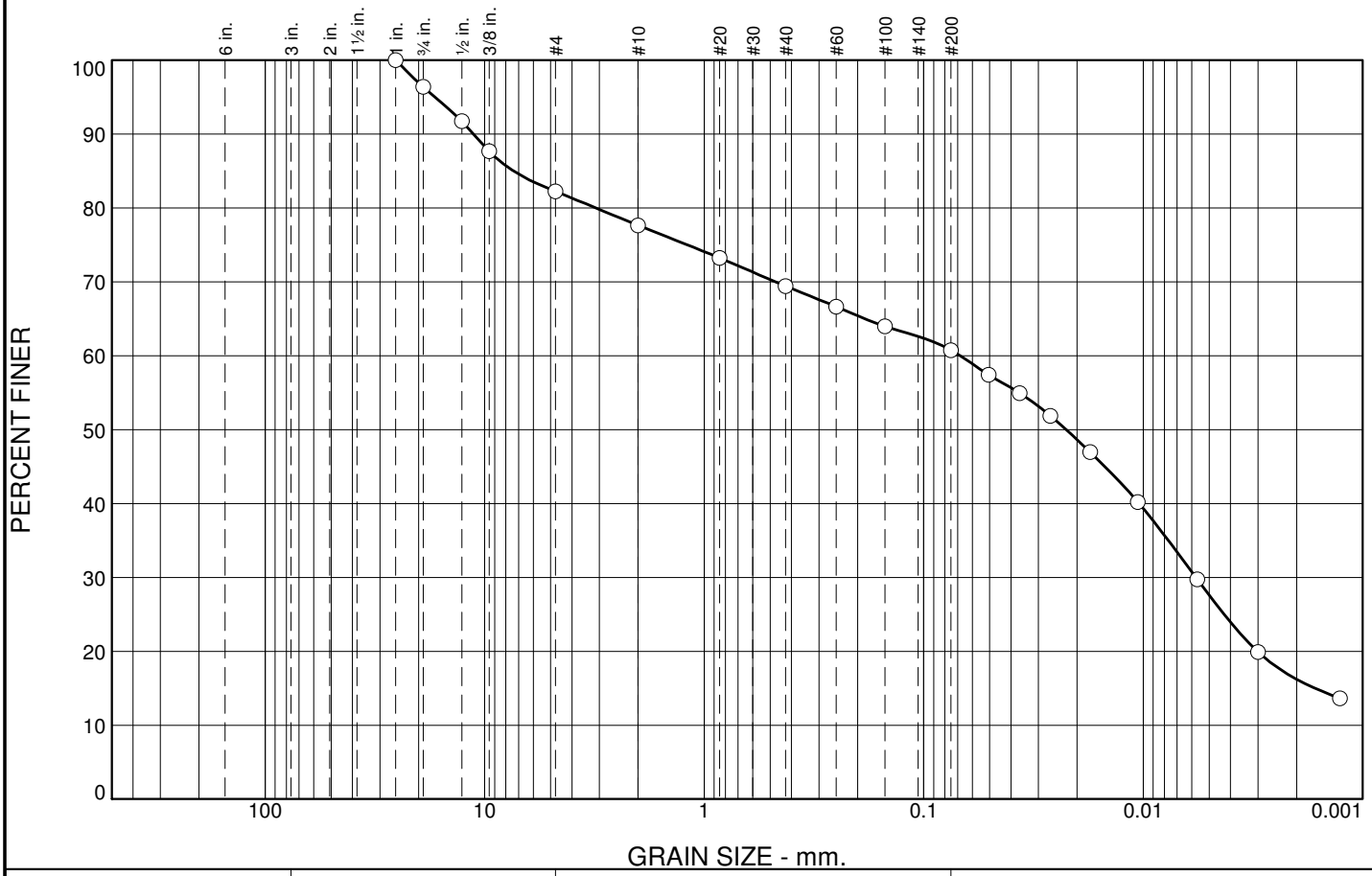
Location: GH11-232, Upper Talarik Creek Area
Sample Number: GH11-232-5 **Depth:** 67.75-68.5' **Date:** 11/21/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.6	14.2	4.6	8.2	8.6	44.6	16.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.4		
.5	91.7		
0.375	87.6		
#4	82.2		
#10	77.6		
#20	73.2		
#40	69.4		
#60	66.6		
#100	64.0		
#200	60.8		
0.0505 mm.	57.4		
0.0365 mm.	54.9		
0.0265 mm.	51.9		
0.0174 mm.	46.9		
0.0106 mm.	40.2		
0.0057 mm.	29.7		
0.0030 mm.	19.9		
0.0013 mm.	13.6		

* (no specification provided)

Soil Description

sandy lean clay with gravel

Atterberg Limits

PL= 19 LL= 36 PI= 17

Coefficients

D_{90}= 11.2527 D_{85}= 7.3891 D_{60}= 0.0681
D_{50}= 0.0225 D_{30}= 0.0057 D_{15}= 0.0016
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(8)

Remarks

As received moisture content - 25.0%

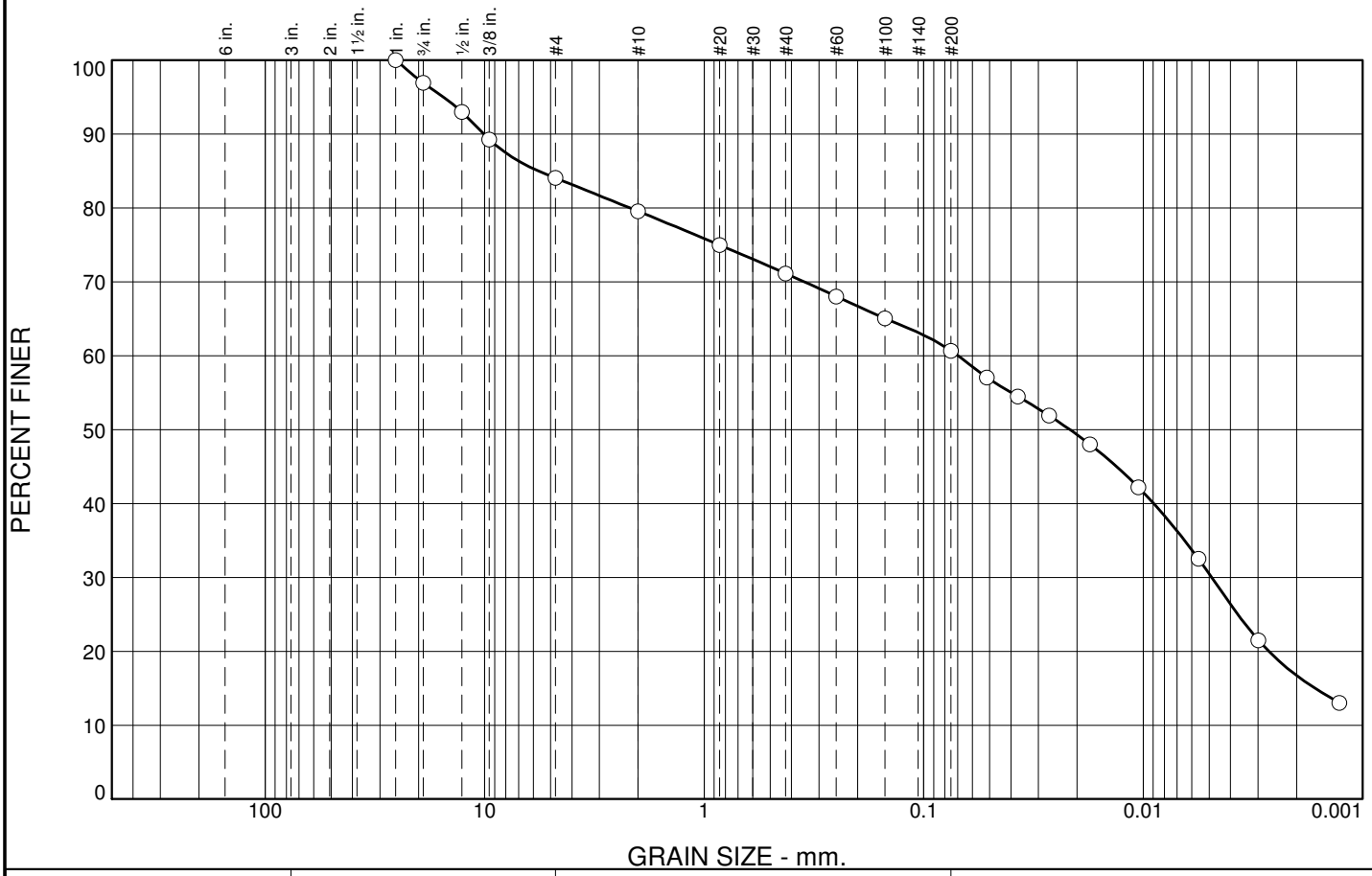
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 2 **Depth:** 9-10.5' **Date:** 11/1/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.1	12.9	4.5	8.4	10.4	44.0	16.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.9		
.5	93.0		
0.375	89.3		
#4	84.0		
#10	79.5		
#20	75.0		
#40	71.1		
#60	68.0		
#100	65.0		
#200	60.7		
0.0515 mm.	57.1		
0.0372 mm.	54.5		
0.0268 mm.	51.9		
0.0175 mm.	48.0		
0.0105 mm.	42.2		
0.0056 mm.	32.5		
0.0030 mm.	21.5		
0.0013 mm.	13.0		

* (no specification provided)

Soil Description

sandy lean clay with gravel

Atterberg Limits

PL= 17 LL= 34 PI= 17

Coefficients

D_{90}= 10.1014 D_{85}= 5.6836 D_{60}= 0.0698
D_{50}= 0.0216 D_{30}= 0.0049 D_{15}= 0.0016
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(8)

Remarks

As received moisture content -18.2%

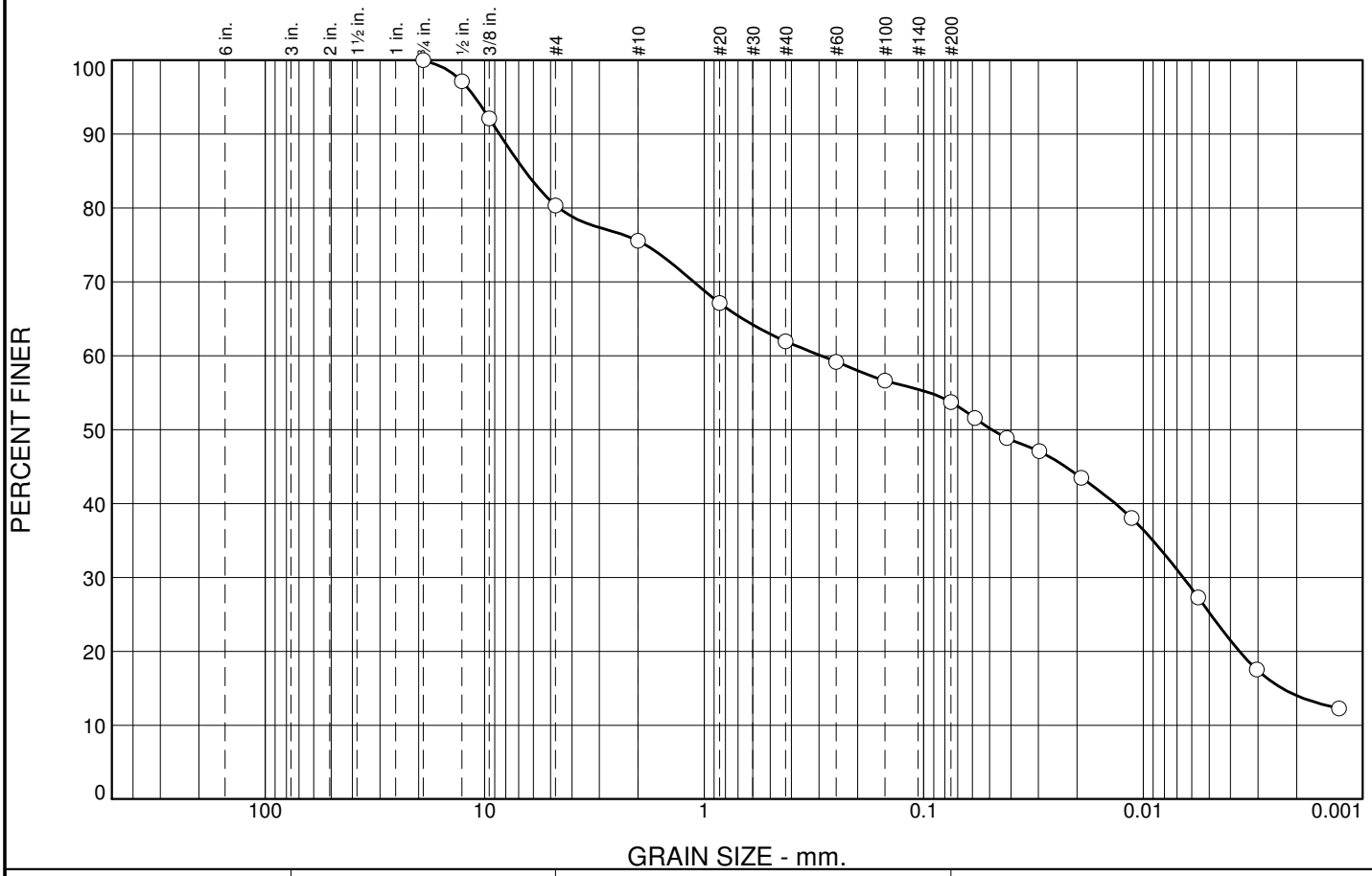
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 3 **Depth:** 14-15.5' **Date:** 11/1/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.7	4.8	13.6	8.2	39.7	14.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.1		
0.375	92.1		
#4	80.3		
#10	75.5		
#20	67.1		
#40	61.9		
#60	59.2		
#100	56.6		
#200	53.7		
0.0584 mm.	51.5		
0.0418 mm.	48.9		
0.0298 mm.	47.1		
0.0191 mm.	43.5		
0.0113 mm.	38.0		
0.0056 mm.	27.3		
0.0030 mm.	17.5		
0.0013 mm.	12.3		

* (no specification provided)

Soil Description

sandy lean clay with gravel

Atterberg Limits

PL= 17 LL= 32 PI= 15

Coefficients

D_{90}= 8.5648 D_{85}= 6.5602 D_{60}= 0.2934
D_{50}= 0.0489 D_{30}= 0.0066 D_{15}= 0.0023
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(5)

Remarks

As received moisture content - 24.1%

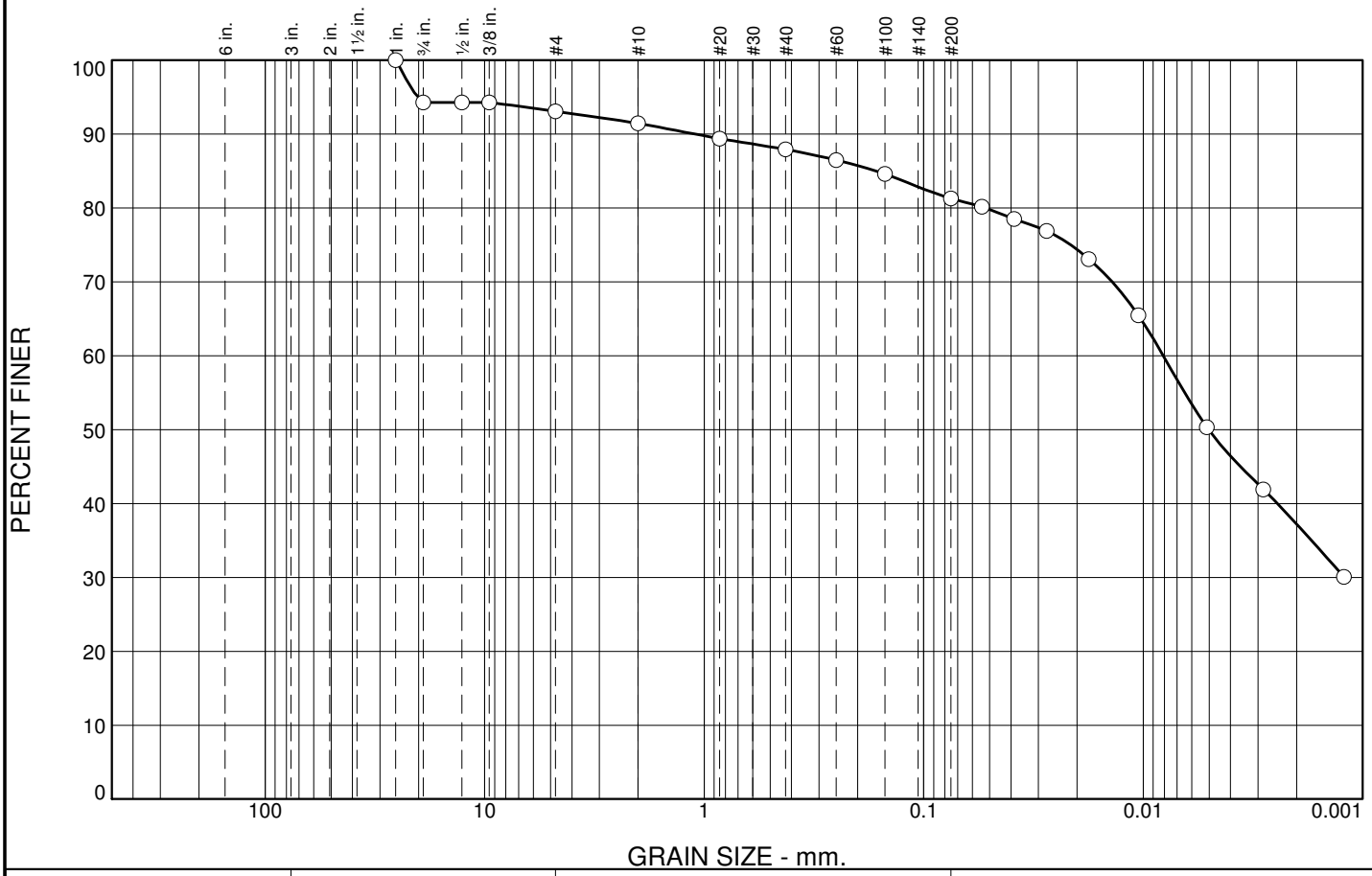
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 5 **Depth:** 24-25.5' **Date:** 10/2/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.7	1.2	1.7	3.5	6.6	44.1	37.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	94.3		
.5	94.3		
0.375	94.3		
#4	93.1		
#10	91.4		
#20	89.4		
#40	87.9		
#60	86.5		
#100	84.6		
#200	81.3		
0.0543 mm.	80.1		
0.0387 mm.	78.5		
0.0275 mm.	76.9		
0.0177 mm.	73.1		
0.0105 mm.	65.4		
0.0051 mm.	50.3		
0.0028 mm.	41.9		
0.0012 mm.	30.1		

* (no specification provided)

Soil Description

fat clay with sand

Atterberg Limits

PL= 15 LL= 51 PI= 36

Coefficients

D_{90}= 1.1065 D_{85}= 0.1653 D_{60}= 0.0081
D_{50}= 0.0050 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(29)

Remarks

As received moisture content 31.7%

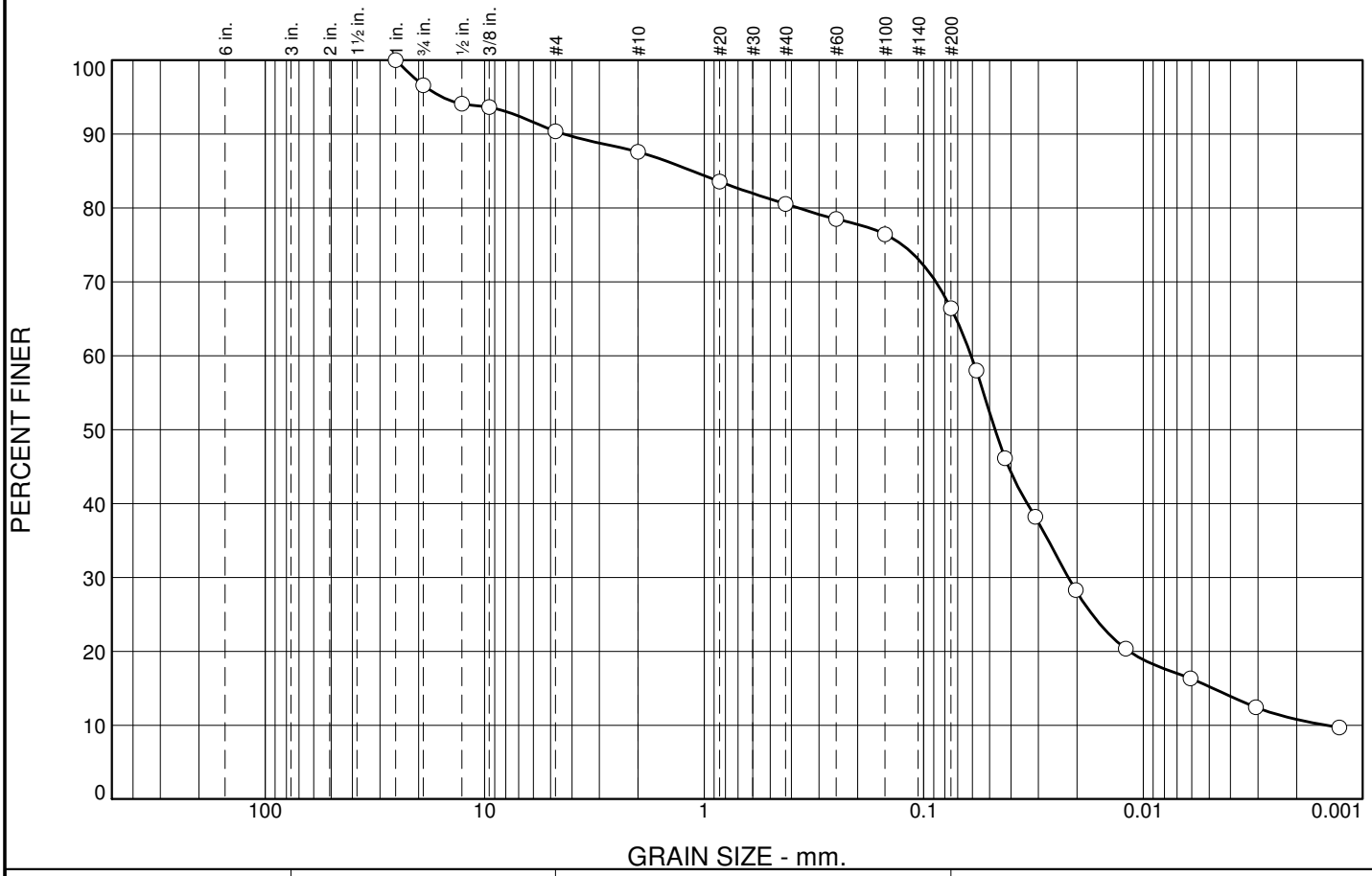
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 8 **Depth:** 39-40.5' **Date:** 10/2/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.4	6.2	2.8	7.1	14.1	55.6	10.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.6		
.5	94.1		
0.375	93.6		
#4	90.4		
#10	87.6		
#20	83.5		
#40	80.5		
#60	78.5		
#100	76.4		
#200	66.4		
0.0576 mm.	58.0		
0.0426 mm.	46.1		
0.0310 mm.	38.2		
0.0203 mm.	28.3		
0.0120 mm.	20.4		
0.0061 mm.	16.3		
0.0031 mm.	12.4		
0.0013 mm.	9.7		

* (no specification provided)

Soil Description

sandy silt

Atterberg Limits

PL= 24 LL= 26 PI= 2

Coefficients

D_{90}= 4.3737 D_{85}= 1.1350 D_{60}= 0.0608
D_{50}= 0.0473 D_{30}= 0.0219 D_{15}= 0.0048
D_{10}= 0.0015 C_u= 41.42 C_c= 5.39

Classification

USCS= ML AASHTO= A-4(0)

Remarks

As received moisture content - 22.5%

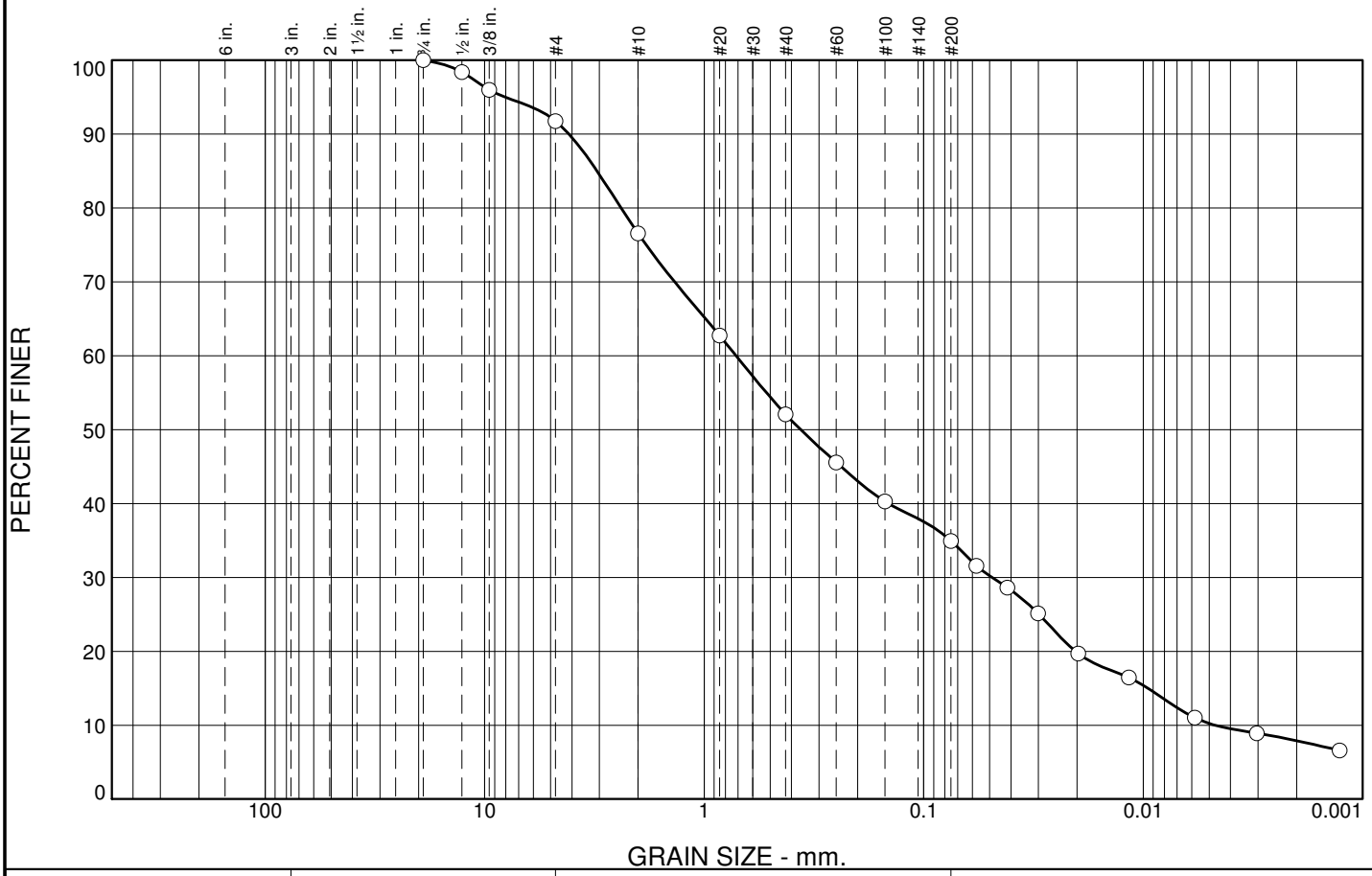
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 12 **Depth:** 59-60.5' **Date:** 10/2/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.3	15.2	24.5	17.1	27.0	7.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	98.4		
0.375	96.0		
#4	91.7		
#10	76.5		
#20	62.7		
#40	52.0		
#60	45.6		
#100	40.3		
#200	34.9		
0.0575 mm.	31.6		
0.0416 mm.	28.6		
0.0301 mm.	25.1		
0.0197 mm.	19.7		
0.0116 mm.	16.5		
0.0058 mm.	11.0		
0.0030 mm.	8.9		
0.0013 mm.	6.6		

* (no specification provided)

Soil Description

clayey sand

Atterberg Limits

PL= 18 LL= 30 PI= 12

Coefficients

D_{90}= 4.1346 D_{85}= 3.0788 D_{60}= 0.7158
D_{50}= 0.3638 D_{30}= 0.0489 D_{15}= 0.0095
D_{10}= 0.0047 C_u= 152.42 C_c= 0.71

Classification

USCS= SC AASHTO= A-2-6(0)

Remarks

As received moisture content - 12.3%

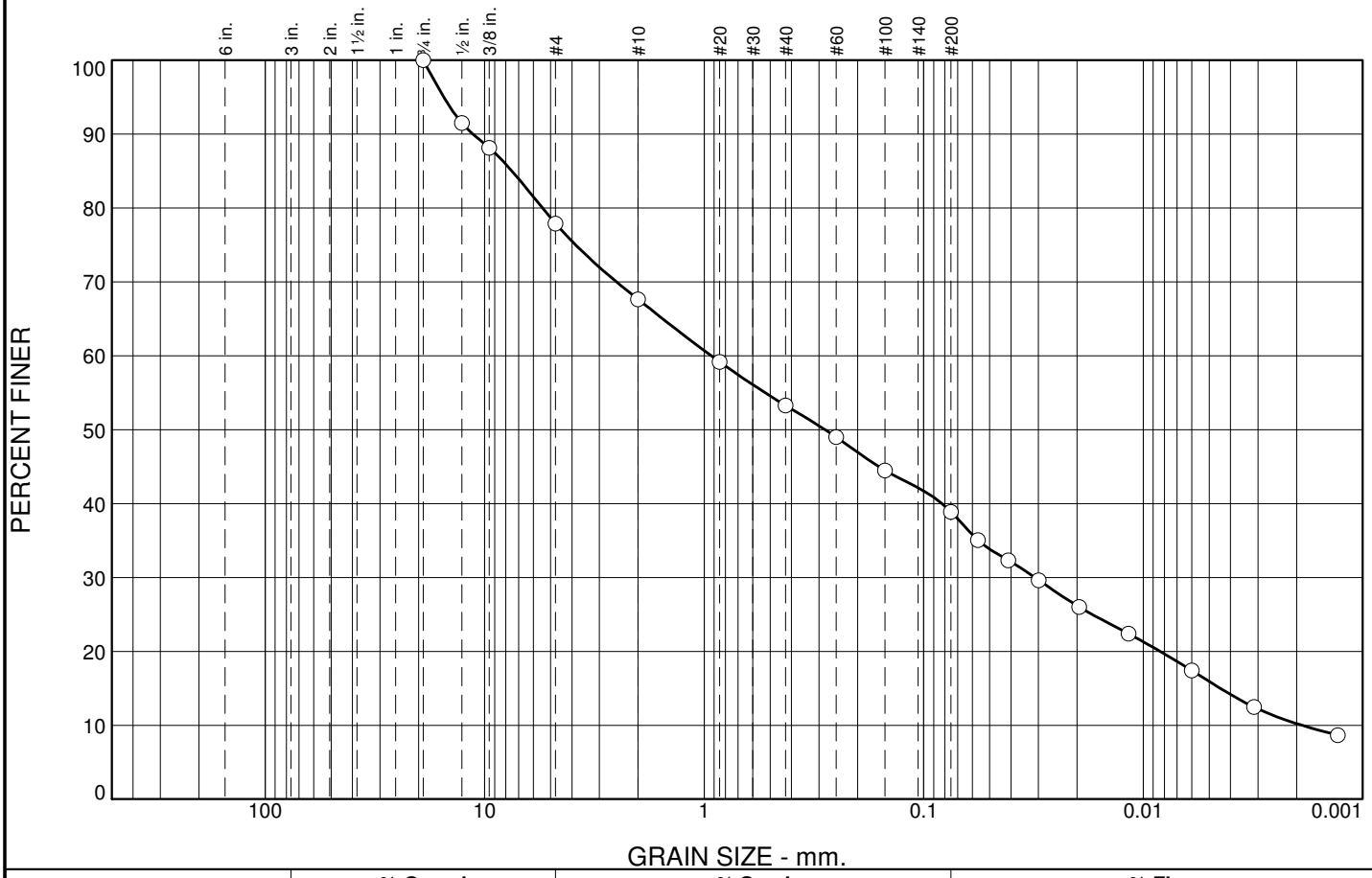
Location: GH11-232, Upper Talarik Creek Area
Sample Number: SPT 14 **Depth:** 69-70.5' **Date:** 10/2/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	22.1	10.3	14.3	14.4	28.7	10.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	91.5		
0.375	88.1		
#4	77.9		
#10	67.6		
#20	59.2		
#40	53.3		
#60	49.0		
#100	44.5		
#200	38.9		
0.0565 mm.	35.0		
0.0411 mm.	32.3		
0.0299 mm.	29.6		
0.0195 mm.	26.0		
0.0116 mm.	22.4		
0.0060 mm.	17.4		
0.0031 mm.	12.5		
0.0013 mm.	8.7		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 17 LL= 37 PI= 20

Coefficients

D_{90}= 11.3222 D_{85}= 7.5189 D_{60}= 0.9290
D_{50}= 0.2817 D_{30}= 0.0312 D_{15}= 0.0045
D_{10}= 0.0019 C_u= 491.59 C_c= 0.55

Classification

USCS= SC AASHTO= A-6(3)

Remarks

As received moisture content - 21.6%

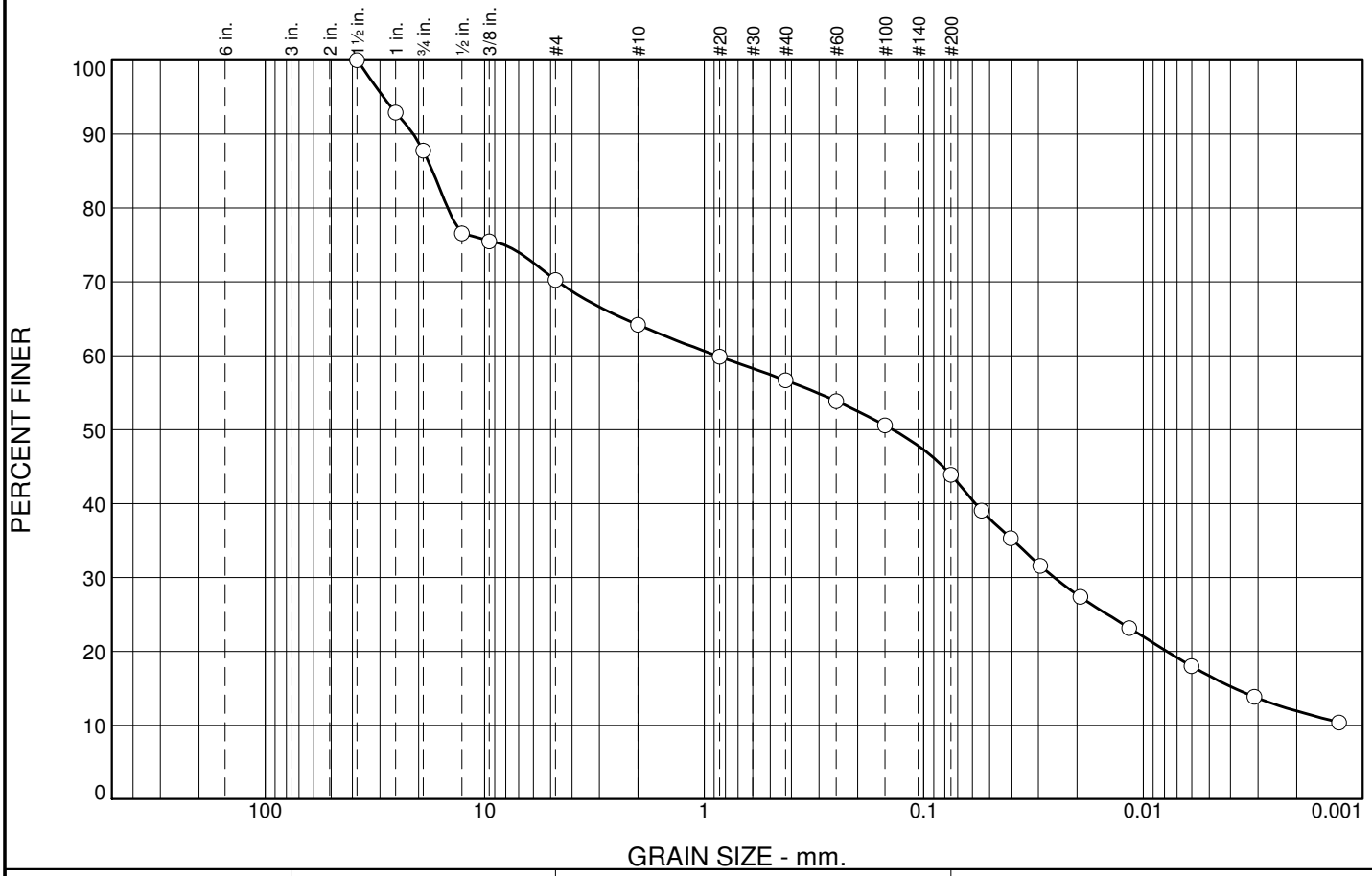
Location: GH11-233, Pebble West Area
Sample Number: SPT 1 **Depth:** 4-5.5' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.2	17.5	6.1	7.5	12.8	32.0	11.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	92.9		
.75	87.8		
.5	76.5		
0.375	75.5		
#4	70.3		
#10	64.2		
#20	59.9		
#40	56.7		
#60	53.9		
#100	50.6		
#200	43.9		
0.0545 mm.	39.0		
0.0401 mm.	35.3		
0.0294 mm.	31.6		
0.0193 mm.	27.4		
0.0116 mm.	23.2		
0.0060 mm.	18.0		
0.0031 mm.	13.8		
0.0013 mm.	10.4		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 16 LL= 36 PI= 20

Coefficients

D_{90}= 21.1406 D_{85}= 17.2918 D_{60}= 0.8757
D_{50}= 0.1388 D_{30}= 0.0255 D_{15}= 0.0038
D_{10}= C_u= C_c=

Classification

USCS= GC AASHTO= A-6(5)

Remarks

As received moisture content - 16.7%

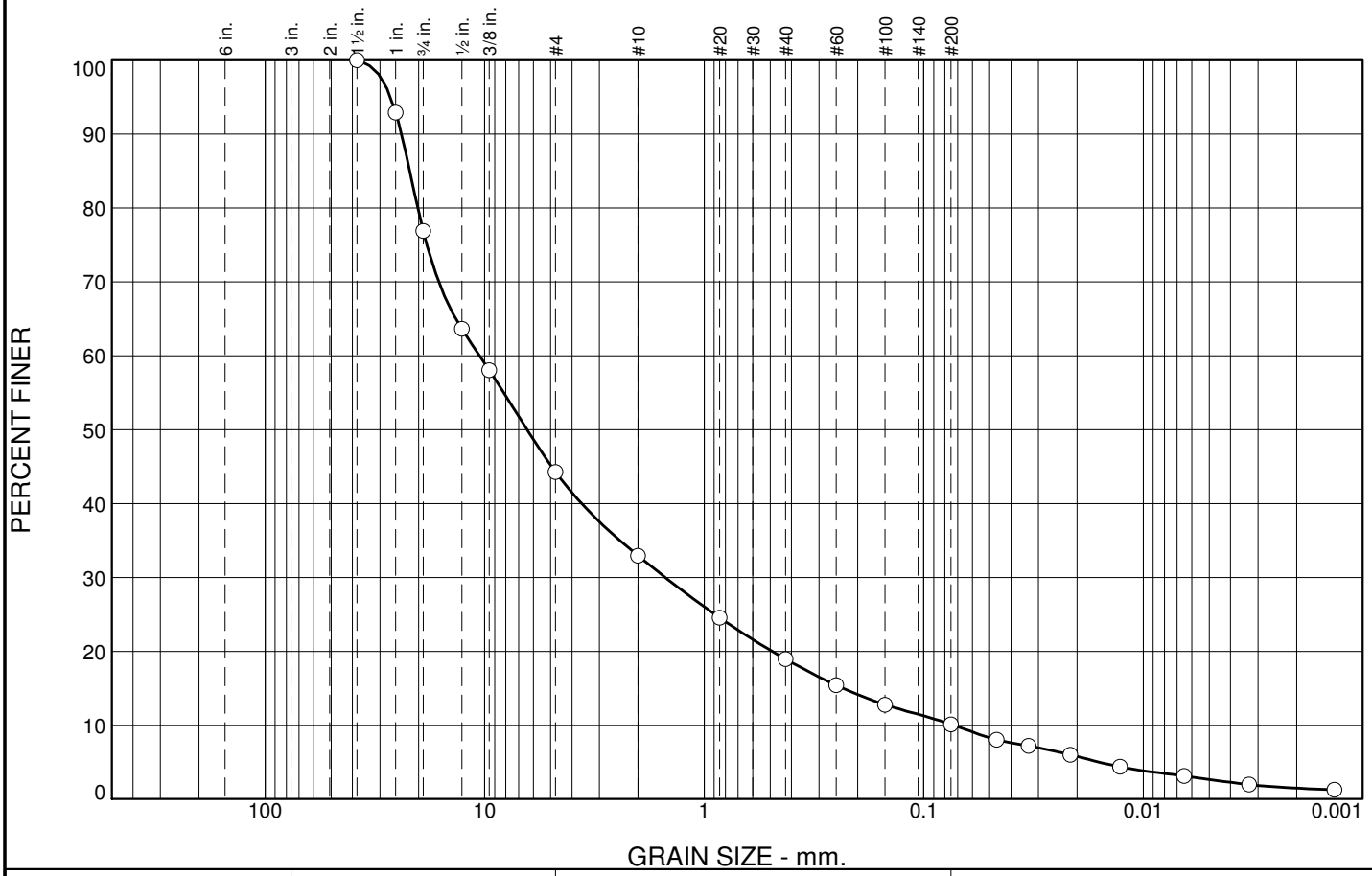
Location: GH11-233, Pebble West Area
Sample Number: SPT 3 **Depth:** 14-15.5' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	23.1	32.6	11.4	14.0	8.8	8.6	1.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	92.9		
.75	76.9		
.5	63.7		
0.375	58.0		
#4	44.3		
#10	32.9		
#20	24.6		
#40	18.9		
#60	15.4		
#100	12.8		
#200	10.1		
0.0465 mm.	8.0		
0.0333 mm.	7.2		
0.0215 mm.	6.0		
0.0127 mm.	4.4		
0.0065 mm.	3.1		
0.0033 mm.	2.0		
0.0013 mm.	1.3		

* (no specification provided)

Soil Description

well-graded gravel with silt and sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 23.9373 D_{85}= 21.9314 D_{60}= 10.5560
D_{50}= 6.4155 D_{30}= 1.5037 D_{15}= 0.2329
D_{10}= 0.0729 C_u= 144.75 C_c= 2.94

Classification

USCS= GW-GM AASHTO= A-1-a

Remarks

As received moisture content - 13.3%

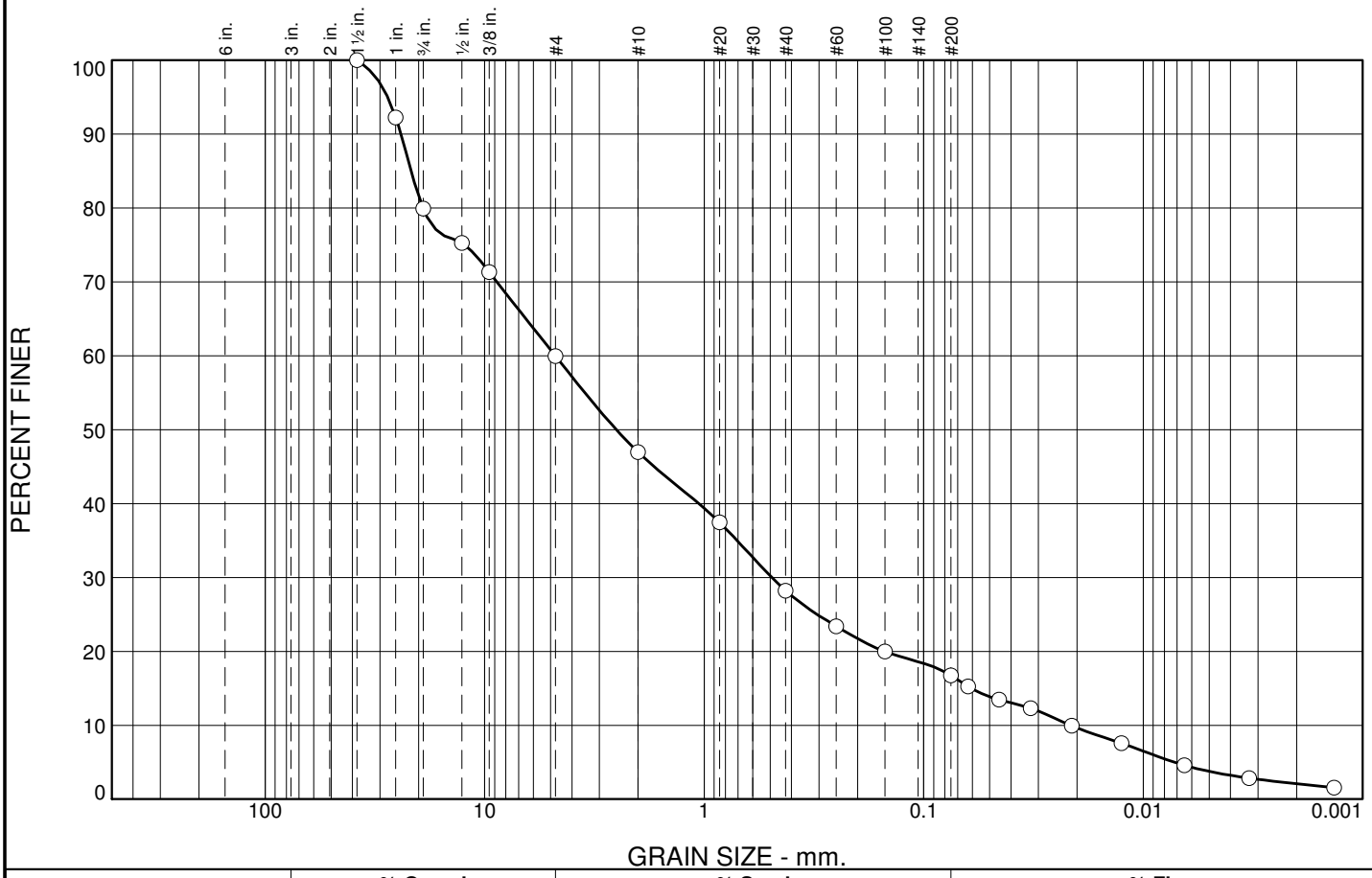
Location: GH11-233, Pebble West Area
Sample Number: SPT 5 **Depth:** 24-25.5' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.1	20.0	12.9	18.8	11.5	14.6	2.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	92.2		
.75	79.9		
.5	75.3		
0.375	71.3		
#4	59.9		
#10	47.0		
#20	37.4		
#40	28.2		
#60	23.4		
#100	20.0		
#200	16.7		
0.0627 mm.	15.2		
0.0453 mm.	13.5		
0.0325 mm.	12.3		
0.0212 mm.	9.9		
0.0125 mm.	7.6		
0.0065 mm.	4.6		
0.0033 mm.	2.9		
0.0013 mm.	1.6		

* (no specification provided)

Soil Description

silty sand with gravel

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 24.0726 D_{85}= 21.6037 D_{60}= 4.7686
D_{50}= 2.5112 D_{30}= 0.4921 D_{15}= 0.0606
D_{10}= 0.0214 C_u= 222.50 C_c= 2.37

Classification

USCS= SM AASHTO= A-1-b

Remarks

As received moisture content - 16.2%

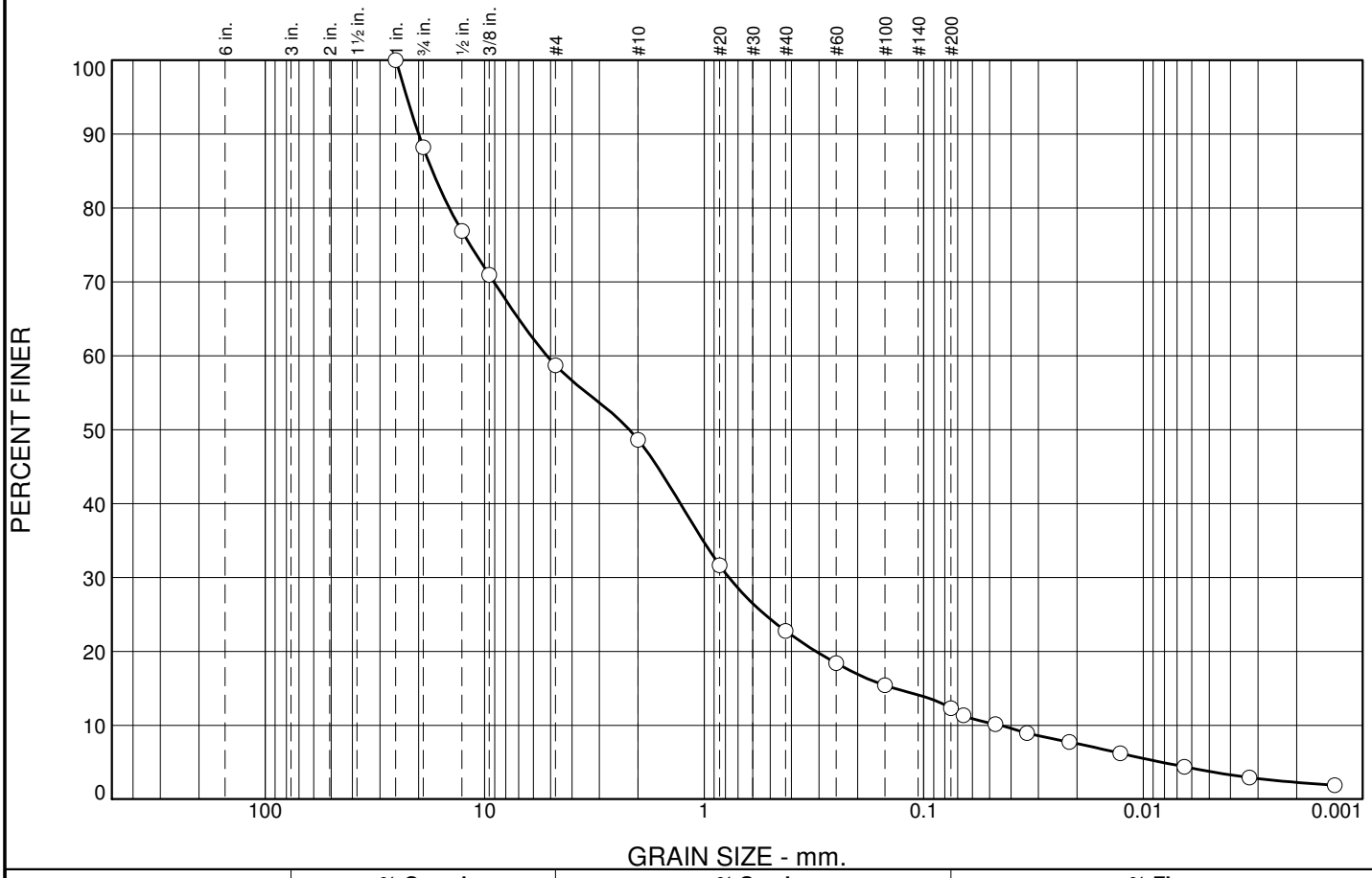
Location: GH11-233, Pebble West Area
Sample Number: SPT 6 **Depth:** 29-30.5' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.8	29.5	10.1	25.8	10.5	10.0	2.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	88.2		
.5	76.9		
0.375	70.9		
#4	58.7		
#10	48.6		
#20	31.6		
#40	22.8		
#60	18.4		
#100	15.4		
#200	12.3		
0.0658 mm.	11.4		
0.0472 mm.	10.2		
0.0338 mm.	8.9		
0.0217 mm.	7.7		
0.0127 mm.	6.2		
0.0065 mm.	4.4		
0.0033 mm.	2.9		
0.0013 mm.	1.9		

* (no specification provided)

Soil Description

silty sand with gravel

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 19.9918 D_{85}= 17.3212 D_{60}= 5.2053
D_{50}= 2.1961 D_{30}= 0.7715 D_{15}= 0.1356
D_{10}= 0.0449 C_u= 115.82 C_c= 2.54

Classification

USCS= SM AASHTO= A-1-a

Remarks

As received moisture content - 12.0%

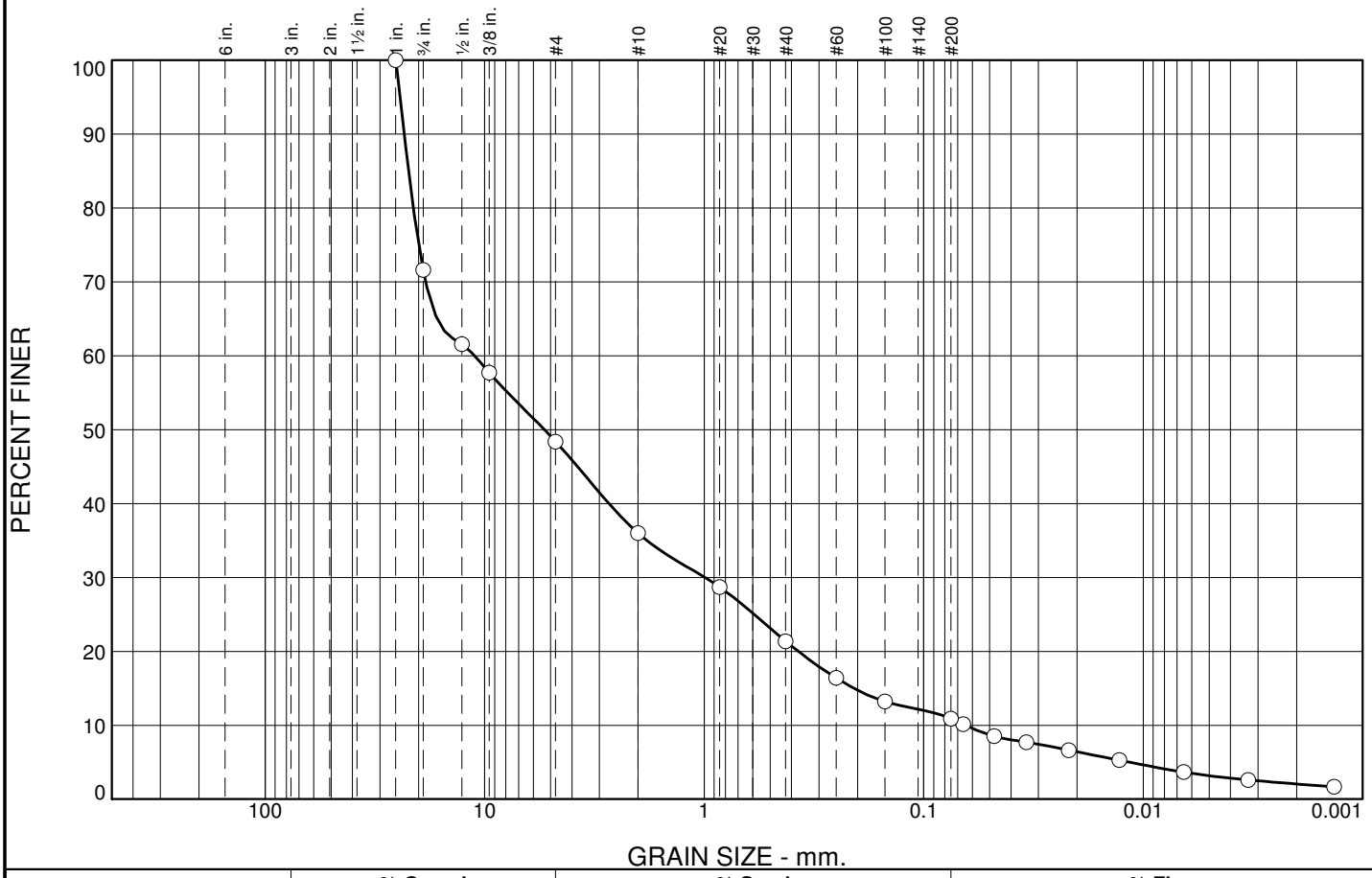
Location: GH11-234, Area E
Sample Number: SPT 2 **Depth:** 10-11.5' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	28.4	23.2	12.4	14.6	10.5	8.8	2.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	71.6		
.5	61.6		
0.375	57.7		
#4	48.4		
#10	36.0		
#20	28.7		
#40	21.4		
#60	16.4		
#100	13.2		
#200	10.9		
0.0661 mm.	10.1		
0.0477 mm.	8.5		
0.0341 mm.	7.7		
0.0218 mm.	6.6		
0.0128 mm.	5.3		
0.0065 mm.	3.7		
0.0033 mm.	2.6		
0.0014 mm.	1.7		

* (no specification provided)

Soil Description

well-graded gravel with silt and sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 23.2544 D_{85}= 22.1973 D_{60}= 11.1126
D_{50}= 5.3486 D_{30}= 0.9933 D_{15}= 0.2074
D_{10}= 0.0645 C_u= 172.19 C_c= 1.38

Classification

USCS= AASHTO=

Remarks

As received moisture content - 11.5%. Insufficient mass to perform Atterbeg Limits test.

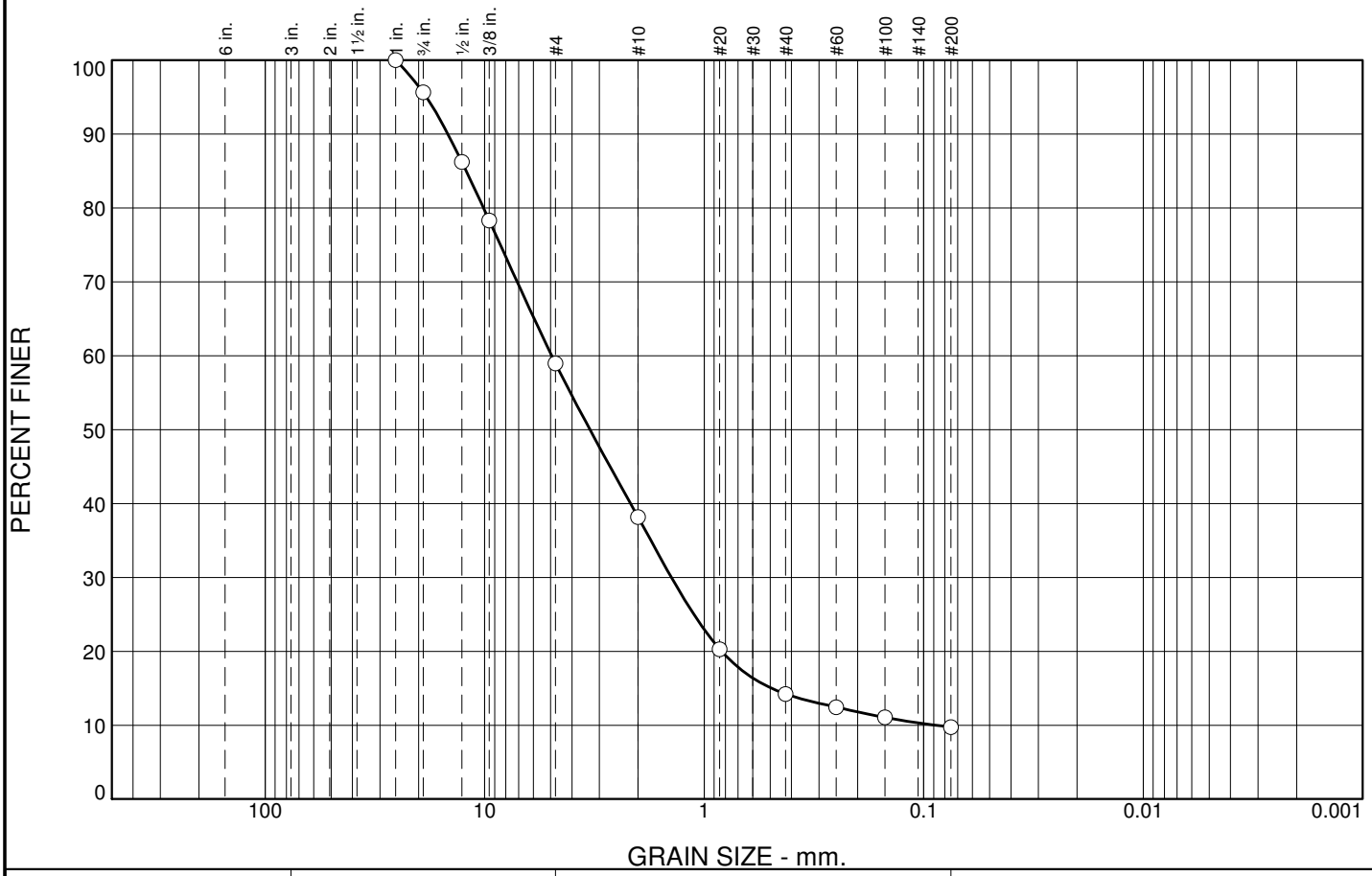
Location: GH11-234, Area E
Sample Number: SPT 3 **Depth:** 15-16.5' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.4	36.6	20.8	24.0	4.5	9.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.6		
.5	86.2		
0.375	78.3		
#4	59.0		
#10	38.2		
#20	20.3		
#40	14.2		
#60	12.4		
#100	11.0		
#200	9.7		

* (no specification provided)

Soil Description

poorly graded sand with silt and gravel

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 14.7093 D_{85}= 12.1317 D_{60}= 4.9434
D_{50}= 3.3155 D_{30}= 1.4087 D_{15}= 0.4933
D_{10}= 0.0882 C_u= 56.04 C_c= 4.55

Classification

USCS= SP-SM AASHTO= A-1-a

Remarks

As received moisture content - 15.3%

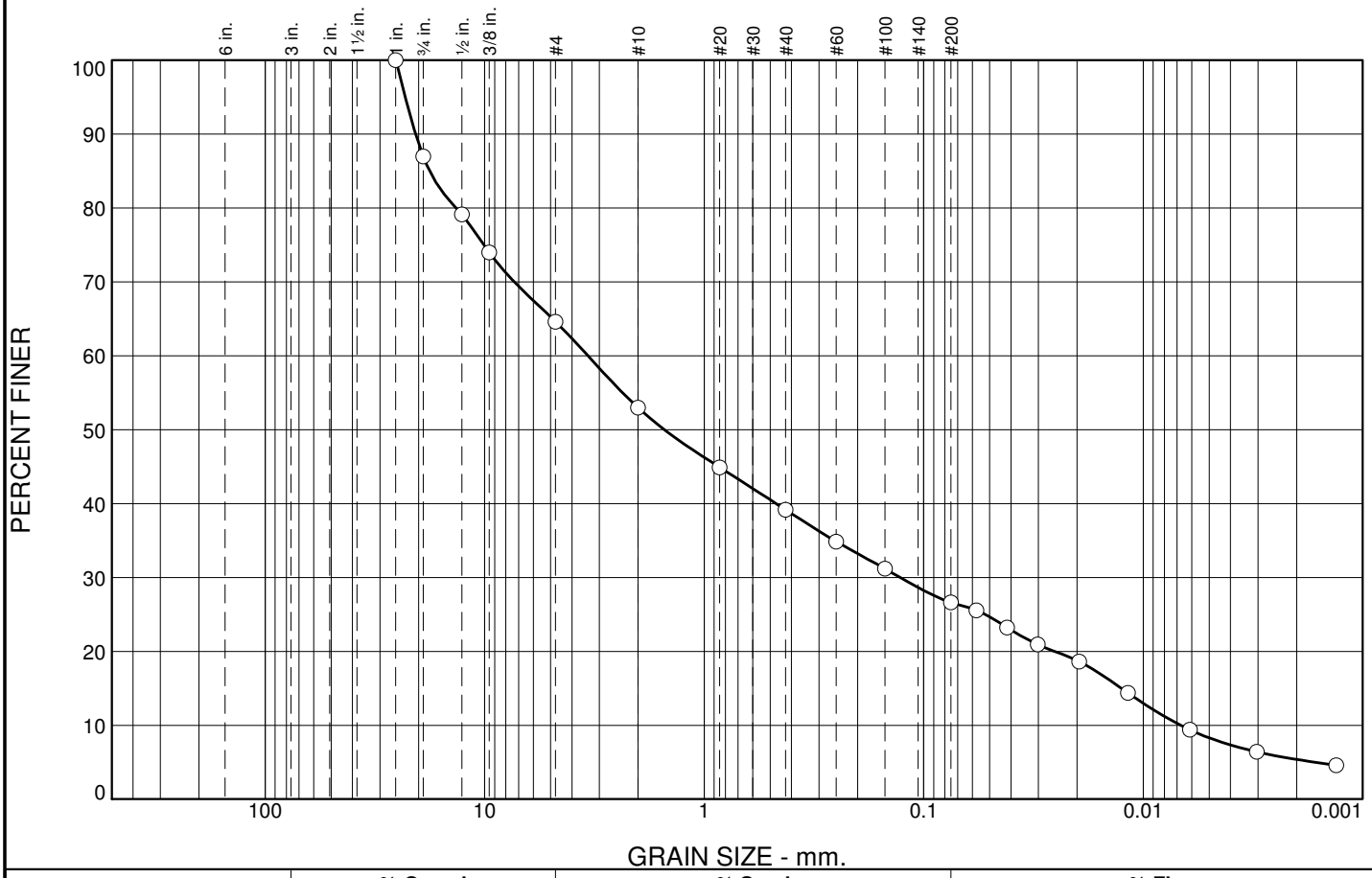
Location: GH11-234, Area E
Sample Number: SPT 5 **Depth:** 25-26.5' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.0	22.4	11.6	13.9	12.5	21.2	5.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	87.0		
.5	79.1		
0.375	74.0		
#4	64.6		
#10	53.0		
#20	44.9		
#40	39.1		
#60	34.9		
#100	31.2		
#200	26.6		
0.0575 mm.	25.5		
0.0417 mm.	23.2		
0.0302 mm.	20.9		
0.0195 mm.	18.6		
0.0117 mm.	14.4		
0.0061 mm.	9.4		
0.0030 mm.	6.4		
0.0013 mm.	4.6		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 17 LL= 25 PI= 8

Coefficients

D_{90}= 20.6258 D_{85}= 17.8272 D_{60}= 3.3830
D_{50}= 1.5213 D_{30}= 0.1281 D_{15}= 0.0126
D_{10}= 0.0067 C_u= 501.55 C_c= 0.72

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

As recived moisture content - 14.2%

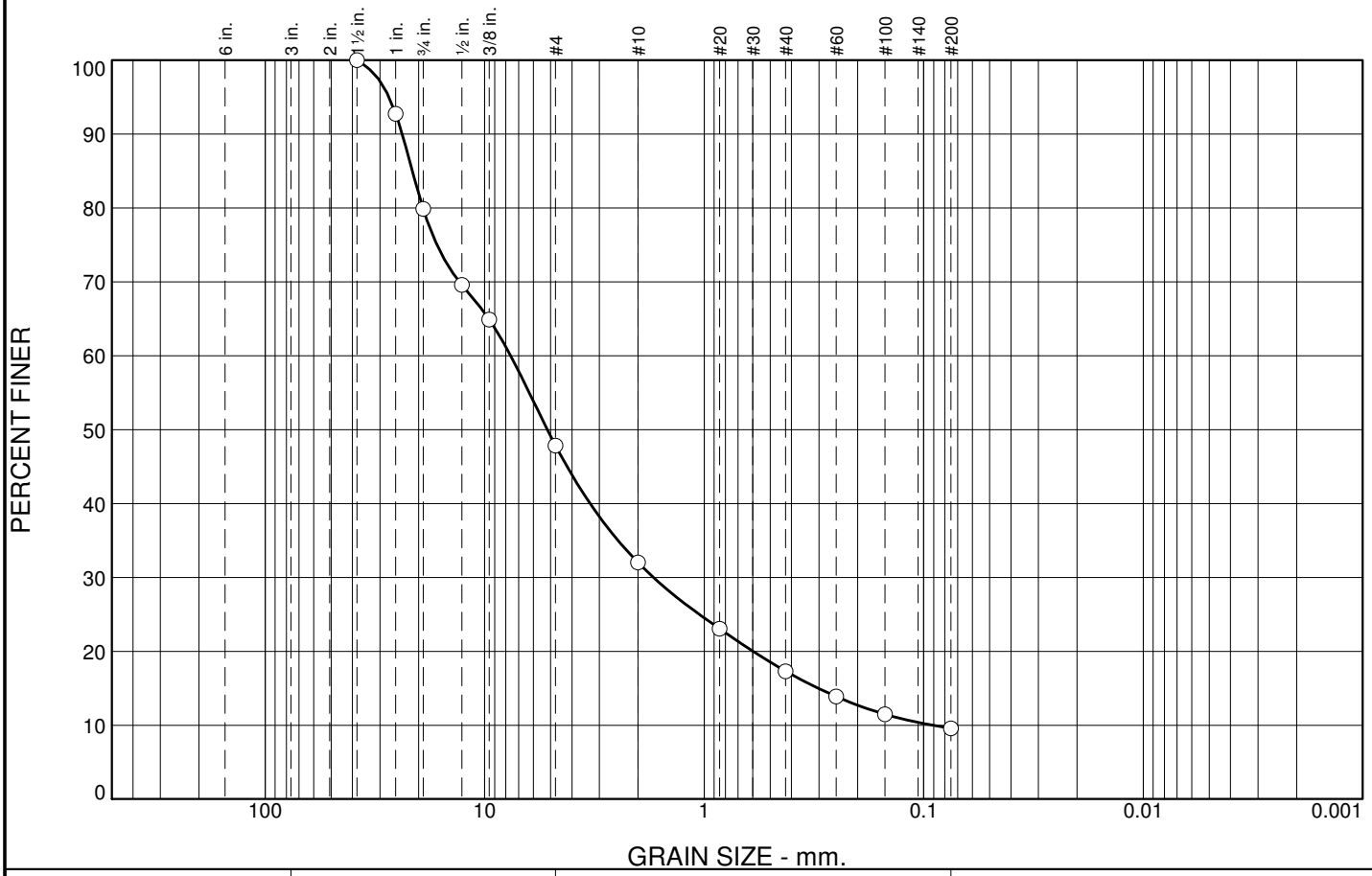
Location: GH11-235, Area E
Sample Number: SPT 1 **Depth:** 4.5-6' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.1	32.1	15.8	14.7	7.8	9.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	92.7		
.75	79.9		
.5	69.6		
0.375	64.9		
#4	47.8		
#10	32.0		
#20	23.1		
#40	17.3		
#60	13.9		
#100	11.5		
#200	9.5		

* (no specification provided)

Soil Description

poorly graded gravel with silt and sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 23.7545 D_{85}= 21.3389 D_{60}= 7.6156
D_{50}= 5.1821 D_{30}= 1.7038 D_{15}= 0.3026
D_{10}= 0.0911 C_u= 83.60 C_c= 4.18

Classification

USCS= GP-GM AASHTO= A-1-a

Remarks

As received moisture content - 13.2%

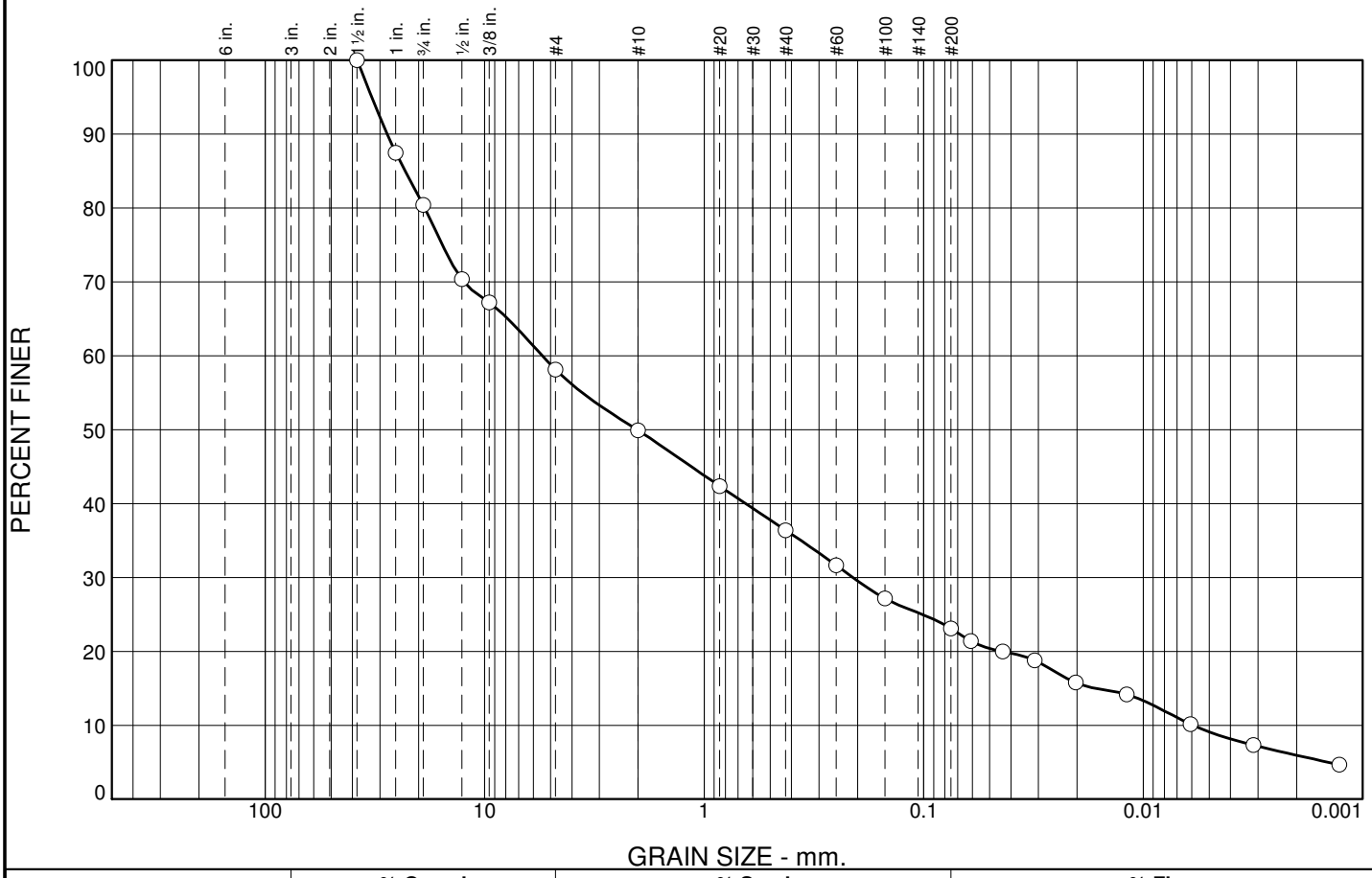
Location: GH11-235, Area E
Sample Number: SPT 2 **Depth:** 9-10.5' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.6	22.3	8.2	13.5	13.3	17.2	5.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	87.5		
.75	80.4		
.5	70.4		
0.375	67.2		
#4	58.1		
#10	49.9		
#20	42.4		
#40	36.4		
#60	31.6		
#100	27.2		
#200	23.1		
0.0609 mm.	21.4		
0.0437 mm.	20.0		
0.0312 mm.	18.8		
0.0203 mm.	15.8		
0.0119 mm.	14.2		
0.0061 mm.	10.1		
0.0031 mm.	7.3		
0.0013 mm.	4.7		

* (no specification provided)

Soil Description

silty gravel with sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 27.8144 D_{85}= 23.0171 D_{60}= 5.4602
D_{50}= 2.0257 D_{30}= 0.2103 D_{15}= 0.0165
D_{10}= 0.0059 C_u= 919.27 C_c= 1.36

Classification

USCS= GM AASHTO= A-1-b

Remarks

As received moisture content - 14.0%

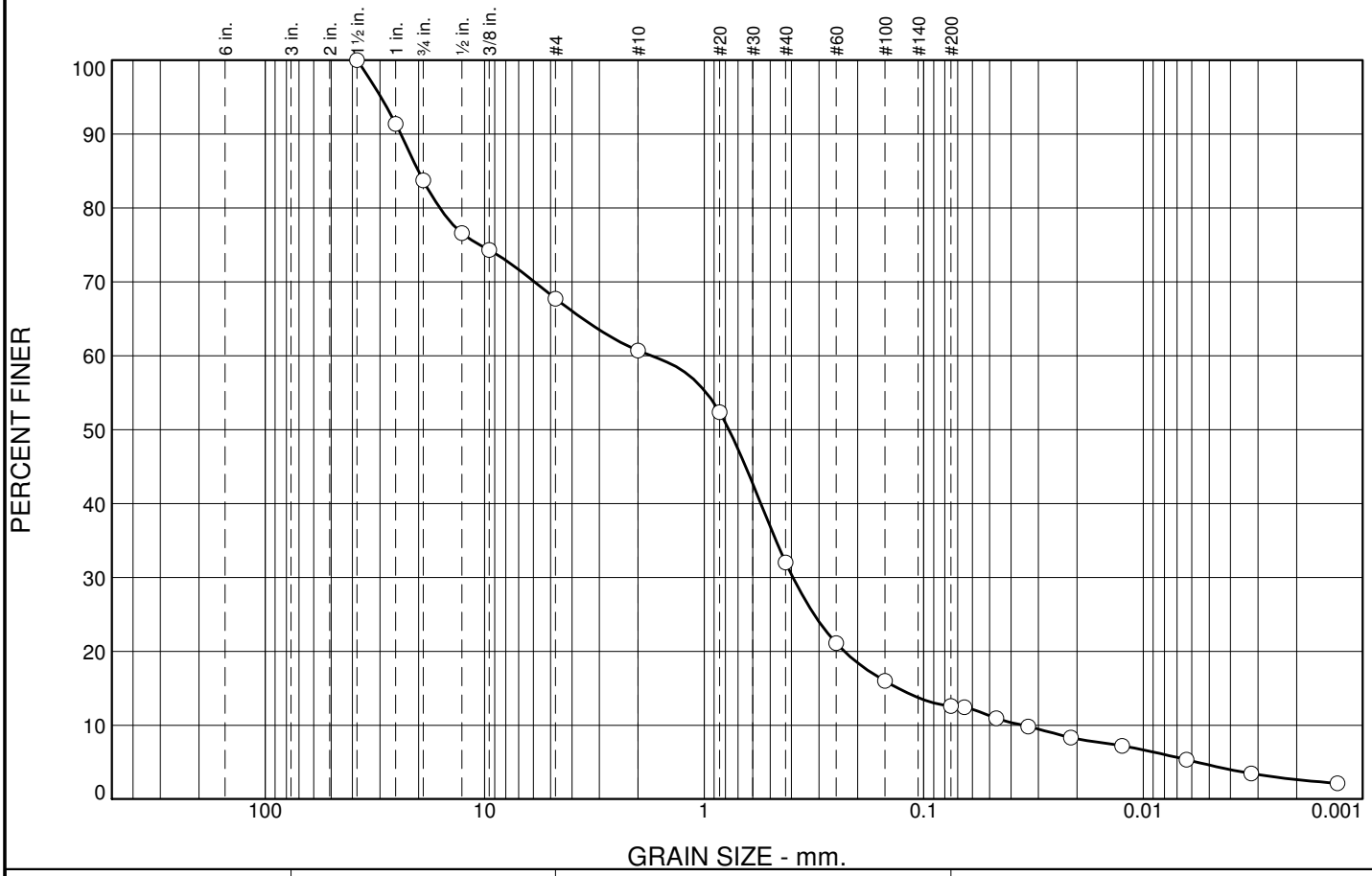
Location: GH11-235, Area E
Sample Number: SPT 4 **Depth:** 19-20.5' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.3	16.0	7.0	28.7	19.4	10.0	2.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	91.3		
.75	83.7		
.5	76.6		
0.375	74.3		
#4	67.7		
#10	60.7		
#20	52.3		
#40	32.0		
#60	21.1		
#100	16.0		
#200	12.6		
0.0652 mm.	12.4		
0.0467 mm.	10.9		
0.0334 mm.	9.8		
0.0214 mm.	8.3		
0.0125 mm.	7.2		
0.0063 mm.	5.3		
0.0032 mm.	3.5		
0.0013 mm.	2.1		

* (no specification provided)

Soil Description

silty sand with gravel

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 24.1198 D_{85}= 20.0329 D_{60}= 1.7383
D_{50}= 0.7713 D_{30}= 0.3940 D_{15}= 0.1309
D_{10}= 0.0354 C_u= 49.08 C_c= 2.52

Classification

USCS= SM AASHTO= A-1-b

Remarks

As received moisture content - 15.9%

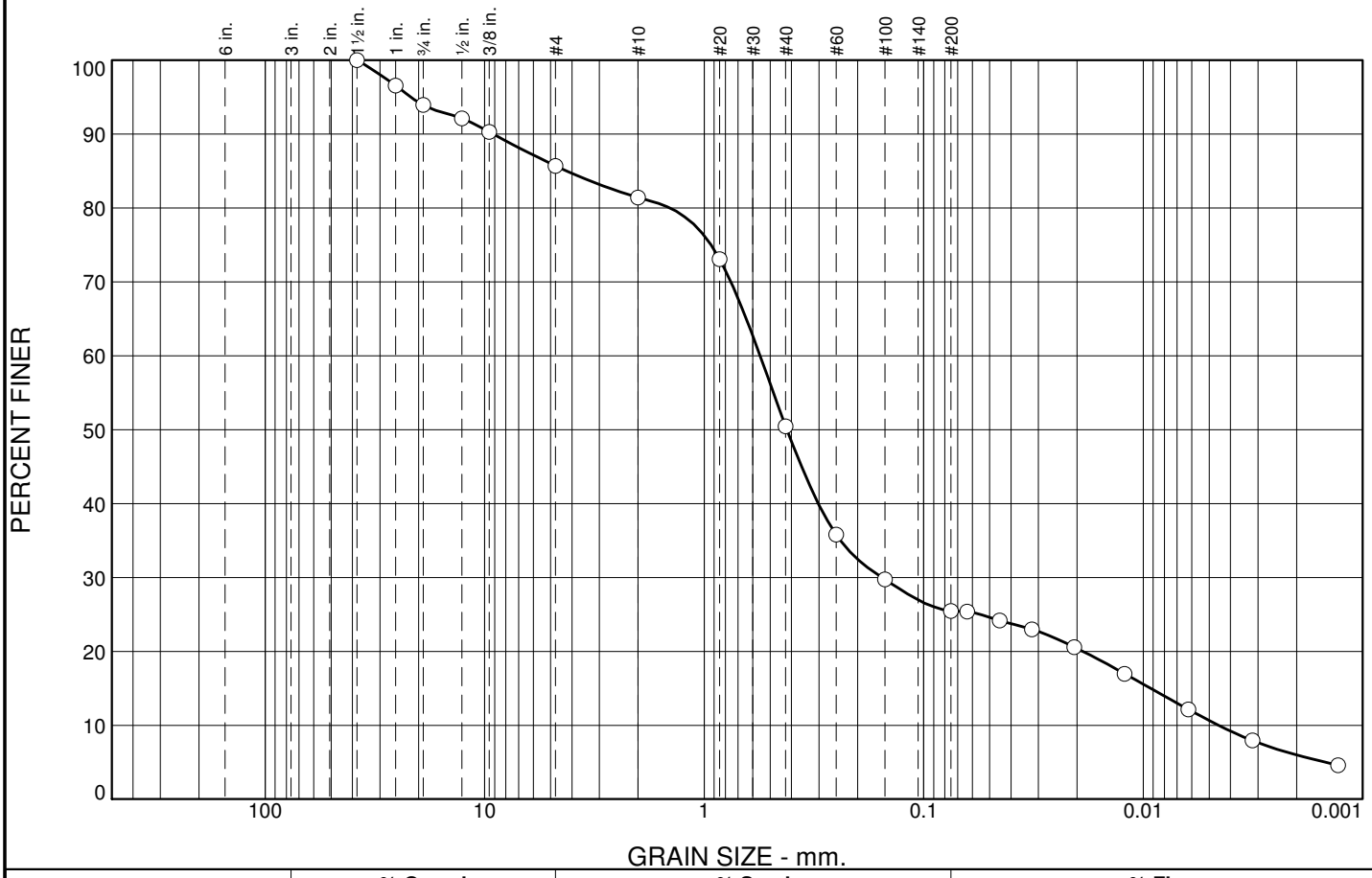
Location: GH11-235, Area E
Sample Number: SPT 7 **Depth:** 34.5-36' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.1	8.2	4.3	31.0	24.9	19.5	6.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	96.5		
.75	93.9		
.5	92.1		
0.375	90.3		
#4	85.7		
#10	81.4		
#20	73.1		
#40	50.4		
#60	35.8		
#100	29.7		
#200	25.5		
0.0633 mm.	25.4		
0.0450 mm.	24.2		
0.0321 mm.	23.0		
0.0206 mm.	20.6		
0.0121 mm.	17.0		
0.0062 mm.	12.1		
0.0032 mm.	7.9		
0.0013 mm.	4.6		

* (no specification provided)

Soil Description

silty, clayey sand

Atterberg Limits

PL= 20 LL= 24 PI= 4

Coefficients

D_{90}= 9.1595 D_{85}= 4.2291 D_{60}= 0.5564
D_{50}= 0.4196 D_{30}= 0.1547 D_{15}= 0.0093
D_{10}= 0.0045 C_u= 122.64 C_c= 9.48

Classification

USCS= SC-SM AASHTO= A-2-4(0)

Remarks

As received moisture content - 22.5%

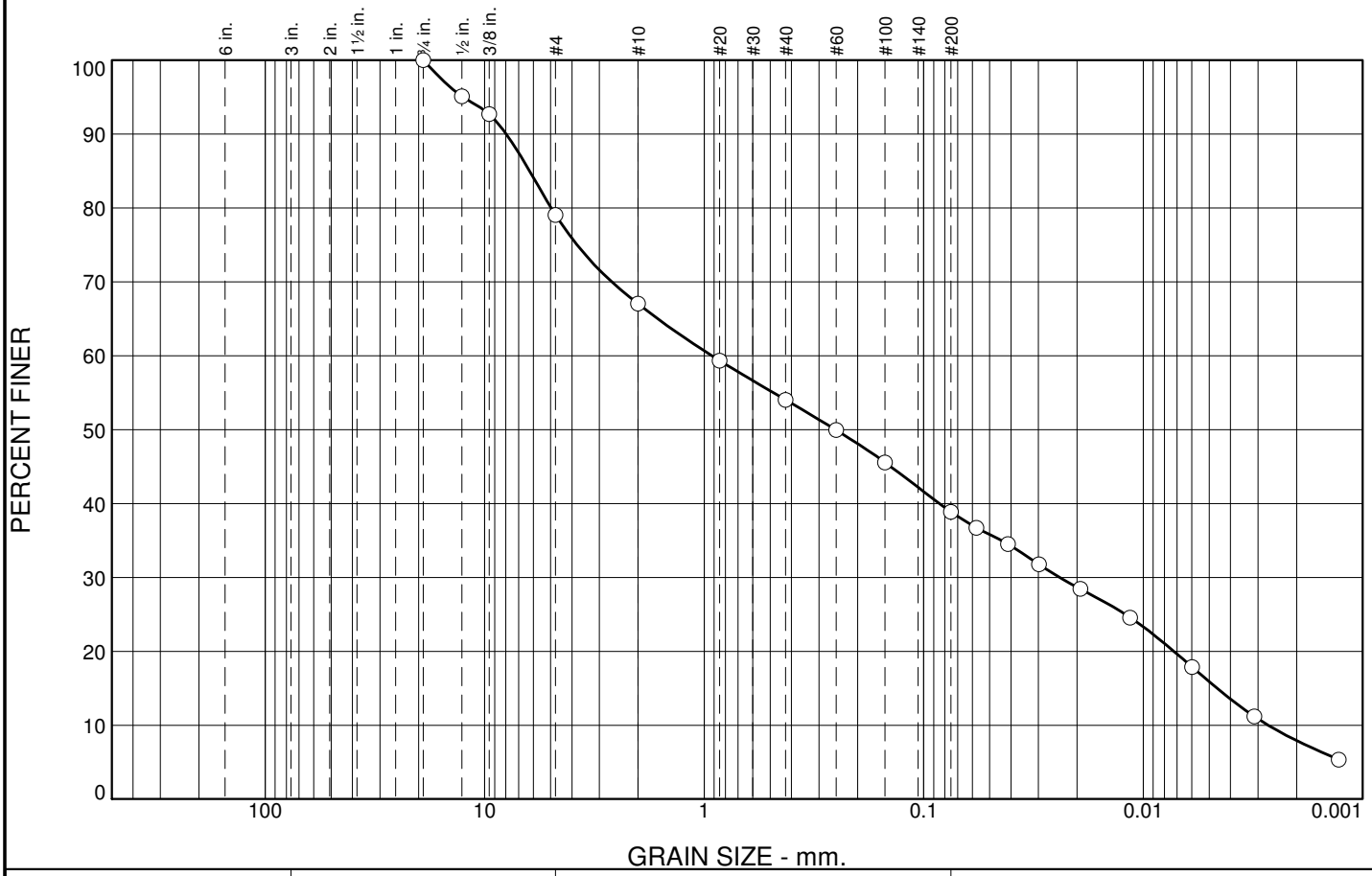
Location: GH11-235, Area E
Sample Number: SPT 9 **Depth:** 44.5-46' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	21.0	12.0	13.0	15.1	31.0	7.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	95.1		
0.375	92.7		
#4	79.0		
#10	67.0		
#20	59.3		
#40	54.0		
#60	49.9		
#100	45.6		
#200	38.9		
0.0575 mm.	36.7		
0.0413 mm.	34.5		
0.0298 mm.	31.7		
0.0193 mm.	28.4		
0.0115 mm.	24.6		
0.0060 mm.	17.9		
0.0031 mm.	11.2		
0.0013 mm.	5.3		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 23 LL= 31 PI= 8

Coefficients

D_{90}= 7.9761 D_{85}= 6.2522 D_{60}= 0.9217
D_{50}= 0.2522 D_{30}= 0.0240 D_{15}= 0.0046
D_{10}= 0.0027 C_u= 342.05 C_c= 0.23

Classification

USCS= SC AASHTO= A-4(0)

Remarks

As received moisture content - 18.4%

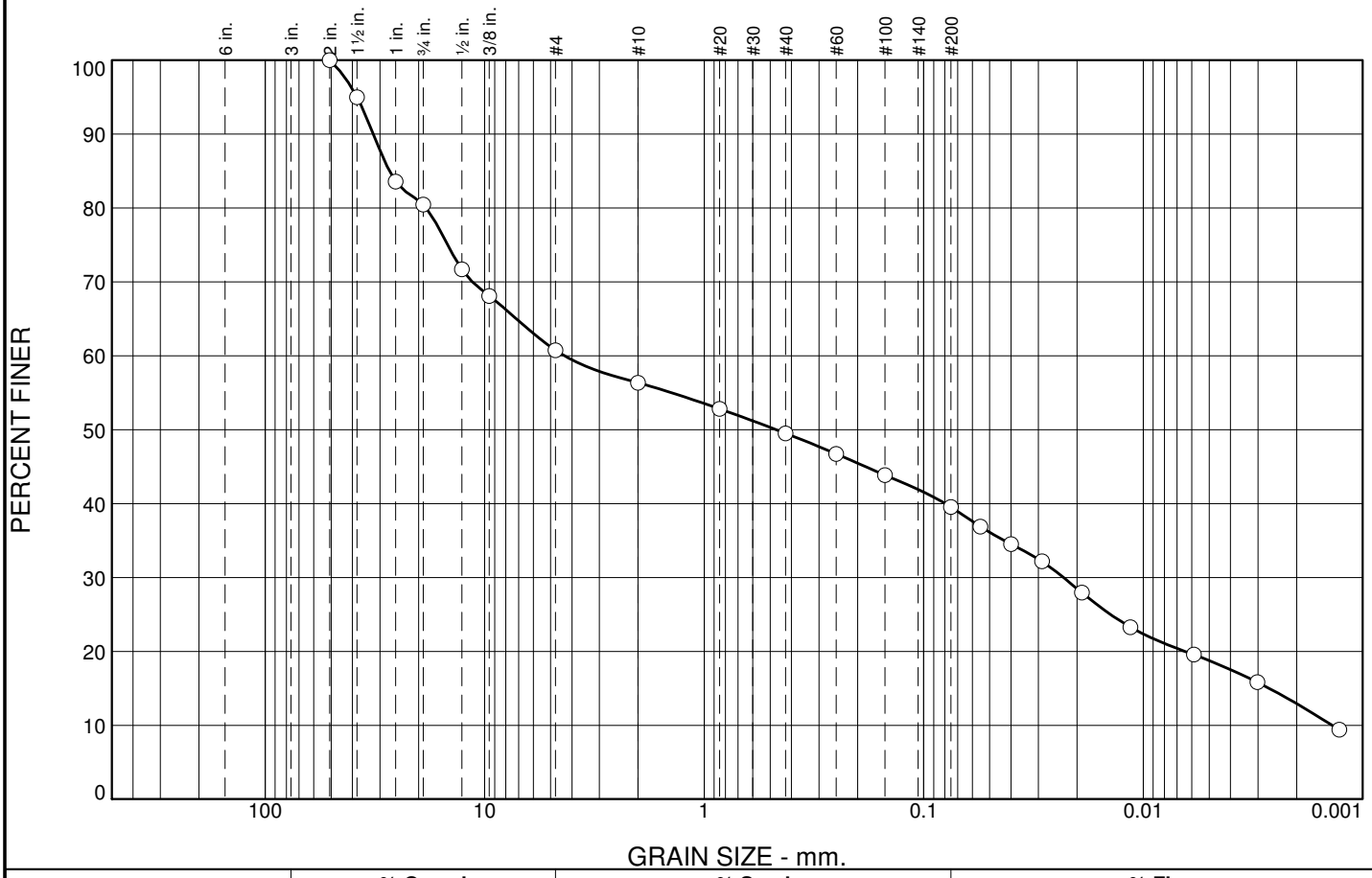
Location: GH11-235, Area E
Sample Number: SPT 10 **Depth:** 50-51.5' **Date:** 10/6/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.6	19.7	4.3	6.9	10.0	26.6	12.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	95.0		
1	83.6		
.75	80.4		
.5	71.7		
0.375	68.1		
#4	60.7		
#10	56.4		
#20	52.8		
#40	49.5		
#60	46.7		
#100	43.8		
#200	39.5		
0.0551 mm.	36.9		
0.0400 mm.	34.5		
0.0289 mm.	32.2		
0.0190 mm.	28.0		
0.0114 mm.	23.3		
0.0059 mm.	19.6		
0.0030 mm.	15.8		
0.0013 mm.	9.4		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 18 LL= 40 PI= 22

Coefficients

D_{90}= 32.2130 D_{85}= 27.1659 D_{60}= 4.3351
D_{50}= 0.4709 D_{30}= 0.0231 D_{15}= 0.0027
D_{10}= 0.0014 C_u= 3152.23 C_c= 0.09

Classification

USCS= GC AASHTO= A-6(4)

Remarks

As received moisture content - 17.5%

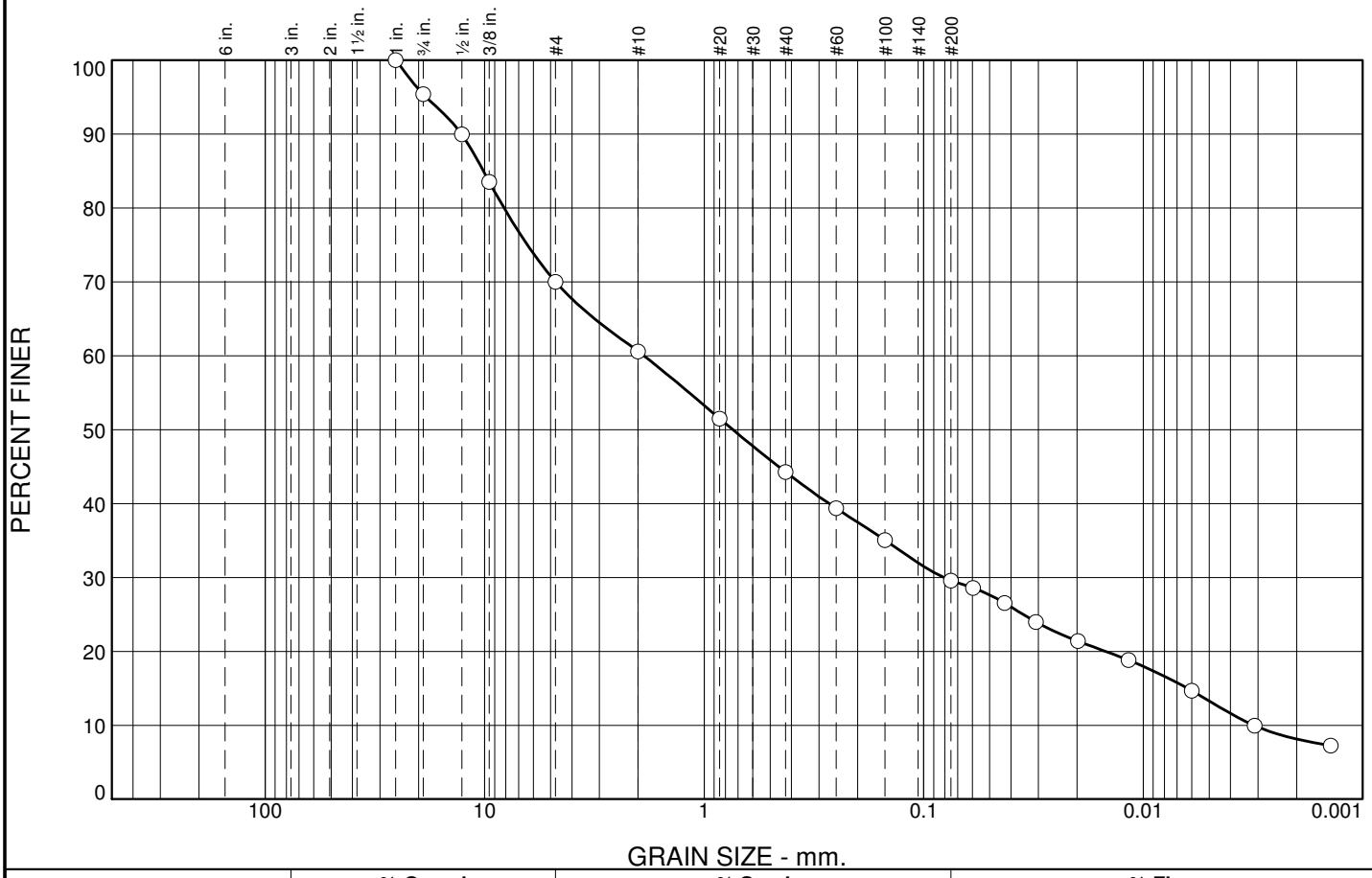
Location: GH11-236, Area E
Sample Number: GH11-236-1 **Depth:** 51-52.5' **Date:** 11/21/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.6	25.4	9.4	16.4	14.6	21.5	8.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.4		
.5	90.0		
0.375	83.5		
#4	70.0		
#10	60.6		
#20	51.5		
#40	44.2		
#60	39.3		
#100	35.1		
#200	29.6		
0.0595 mm.	28.6		
0.0427 mm.	26.5		
0.0308 mm.	24.0		
0.0198 mm.	21.4		
0.0117 mm.	18.8		
0.0060 mm.	14.7		
0.0031 mm.	9.9		
0.0014 mm.	7.2		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 17 LL= 26 PI= 9

Coefficients

D_{90}= 12.7325 D_{85}= 10.1316 D_{60}= 1.8845
D_{50}= 0.7405 D_{30}= 0.0809 D_{15}= 0.0063
D_{10}= 0.0031 C_u= 601.68 C_c= 1.11

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

As received moisture content - 12.7%

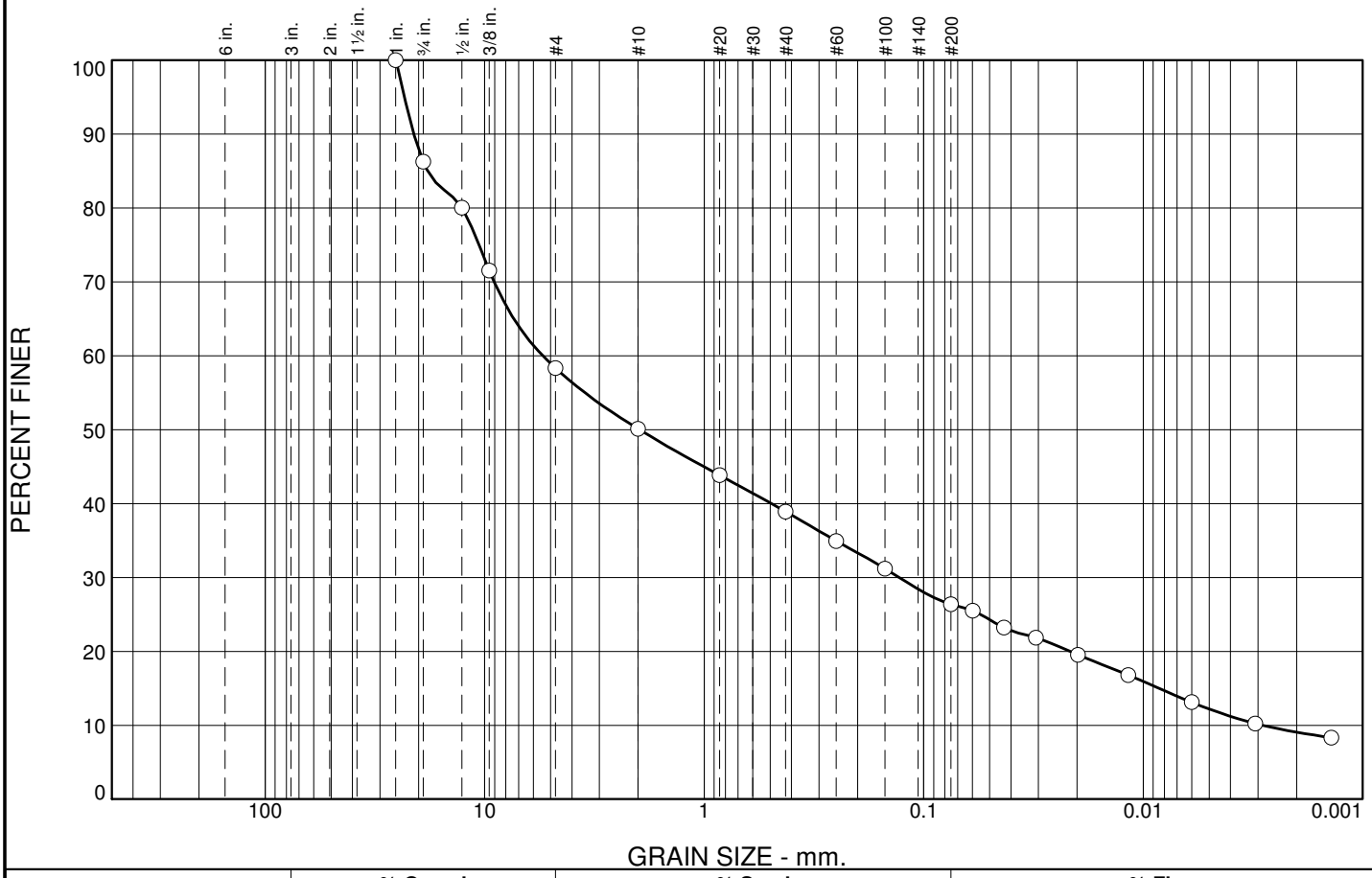
Location: GH11-236, Area E
Sample Number: SPT 1 **Depth:** 4-5.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.8	27.9	8.2	11.2	12.5	17.3	9.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	86.2		
.5	80.0		
0.375	71.5		
#4	58.3		
#10	50.1		
#20	43.8		
#40	38.9		
#60	34.9		
#100	31.2		
#200	26.4		
0.0597 mm.	25.5		
0.0430 mm.	23.2		
0.0308 mm.	21.8		
0.0198 mm.	19.5		
0.0117 mm.	16.8		
0.0060 mm.	13.1		
0.0031 mm.	10.2		
0.0014 mm.	8.3		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 14 LL= 26 PI= 12

Coefficients

D_{90}= 21.0019 D_{85}= 18.1972 D_{60}= 5.4374
D_{50}= 1.9729 D_{30}= 0.1292 D_{15}= 0.0085
D_{10}= 0.0029 C_u= 1902.31 C_c= 1.07

Classification

USCS= GC AASHTO= A-2-6(0)

Remarks

As received moisture content - 11.7%

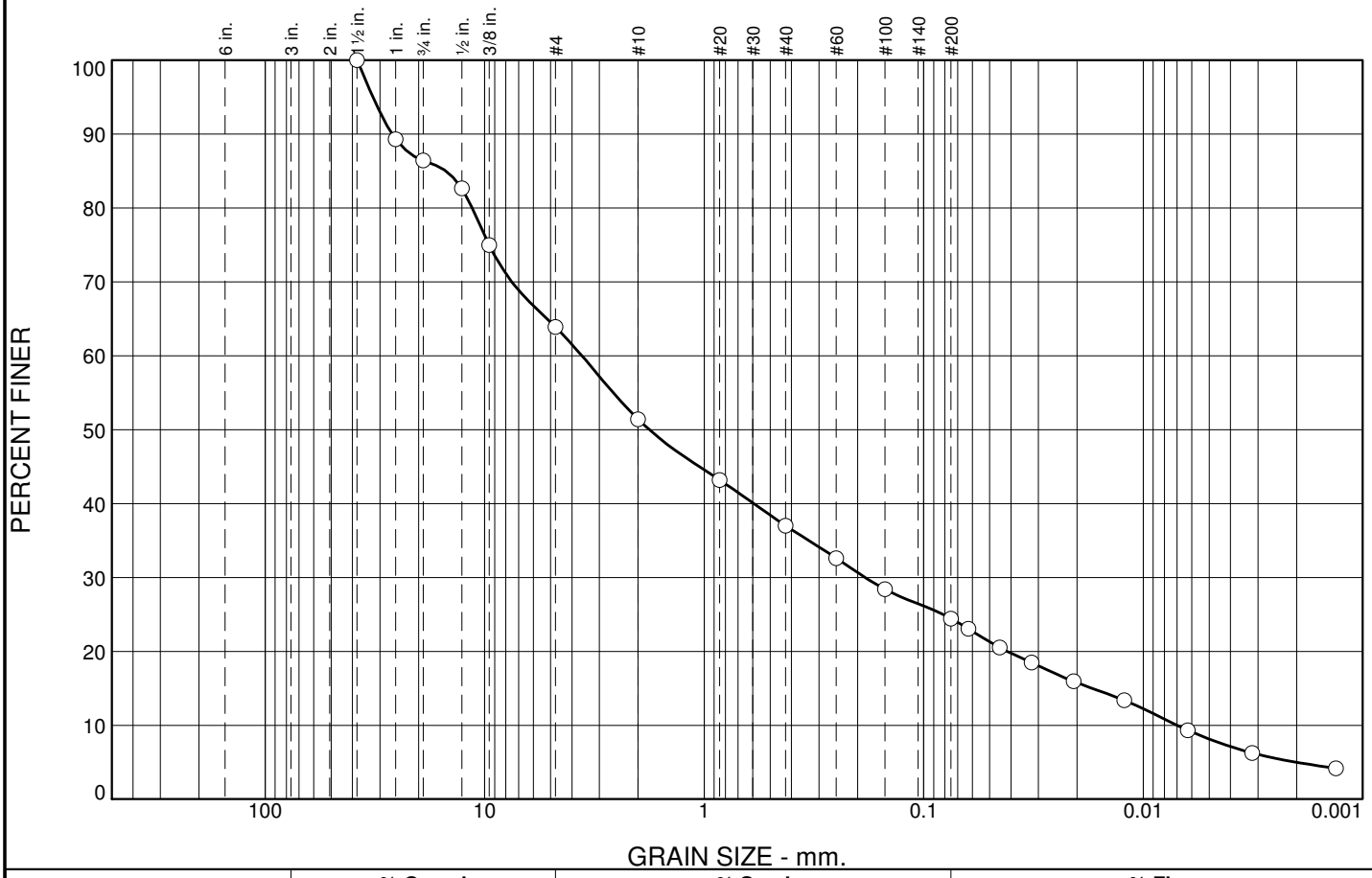
Location: GH11-236, Area E
Sample Number: SPT 3 **Depth:** 14-15.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.6	22.5	12.5	14.4	12.6	19.4	5.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	89.3		
.75	86.4		
.5	82.6		
0.375	75.0		
#4	63.9		
#10	51.4		
#20	43.2		
#40	37.0		
#60	32.6		
#100	28.4		
#200	24.4		
0.0625 mm.	23.0		
0.0450 mm.	20.5		
0.0323 mm.	18.5		
0.0208 mm.	15.9		
0.0122 mm.	13.4		
0.0063 mm.	9.3		
0.0032 mm.	6.3		
0.0013 mm.	4.2		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 28 PI= 13

Coefficients

D_{90}= 26.3974 D_{85}= 15.0337 D_{60}= 3.6086
D_{50}= 1.7796 D_{30}= 0.1849 D_{15}= 0.0171
D_{10}= 0.0070 C_u= 515.65 C_c= 1.35

Classification

USCS= SC AASHTO= A-2-6(0)

Remarks

As received moisture content - 12.7%

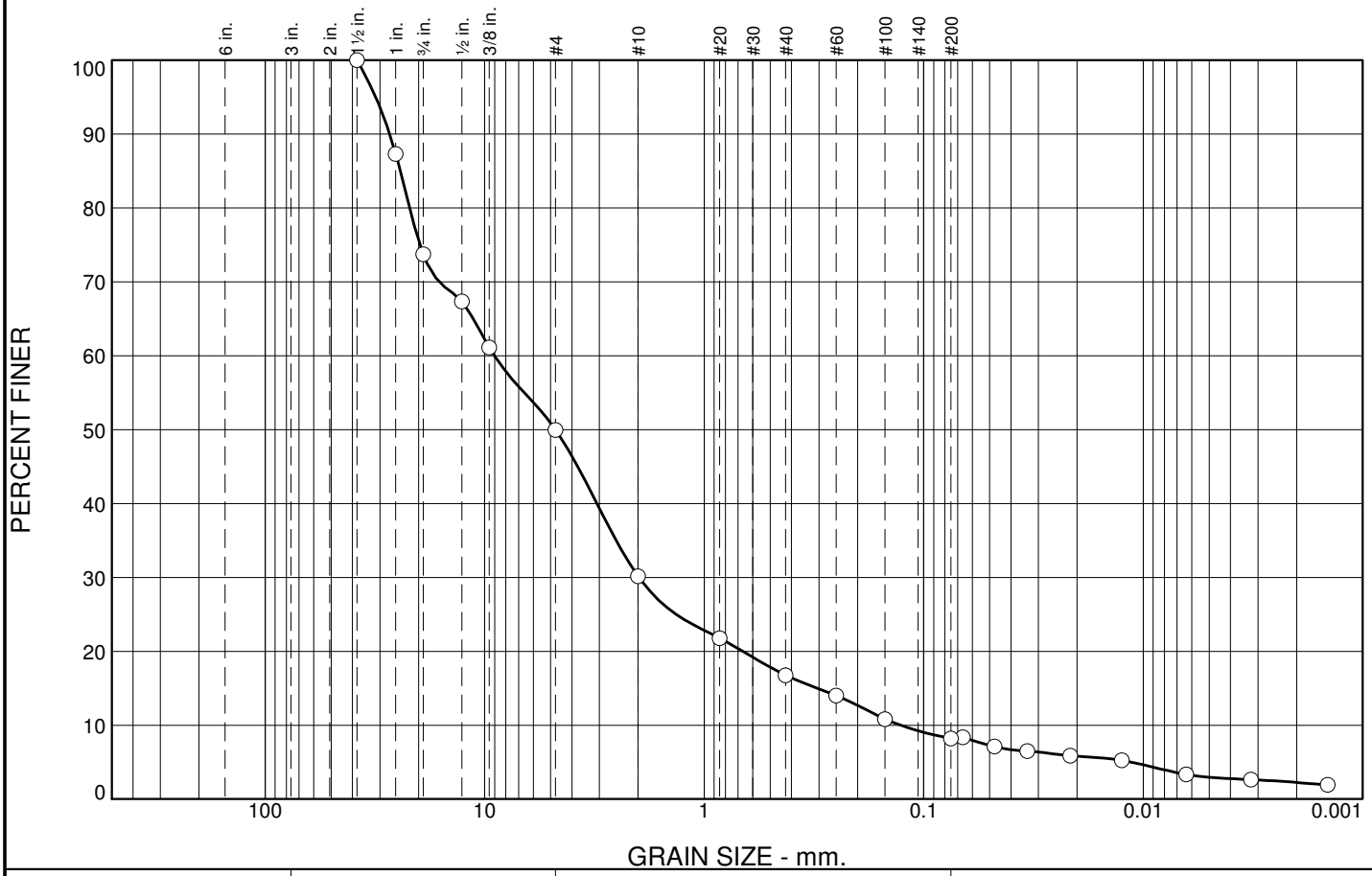
Location: GH11-236, Area E
Sample Number: SPT 5 **Depth:** 24-25.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.3	23.7	19.8	13.4	8.6	6.0	2.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	87.3		
.75	73.7		
.5	67.3		
0.375	61.1		
#4	50.0		
#10	30.2		
#20	21.8		
#40	16.8		
#60	14.0		
#100	10.8		
#200	8.2		
0.0663 mm.	8.4		
0.0475 mm.	7.1		
0.0338 mm.	6.5		
0.0215 mm.	5.9		
0.0125 mm.	5.2		
0.0064 mm.	3.3		
0.0032 mm.	2.6		
0.0014 mm.	1.9		

* (no specification provided)

Soil Description

poorly graded gravel with silt and sand

Atterberg Limits

PL= NP LL= 23 PI= NP

Coefficients

D_{90}= 27.0733 D_{85}= 24.2133 D_{60}= 9.0220
D_{50}= 4.7603 D_{30}= 1.9827 D_{15}= 0.3046
D_{10}= 0.1270 C_u= 71.04 C_c= 3.43

Classification

USCS= GP-GM AASHTO= A-1-a

Remarks

As received moisture content - 12.8%

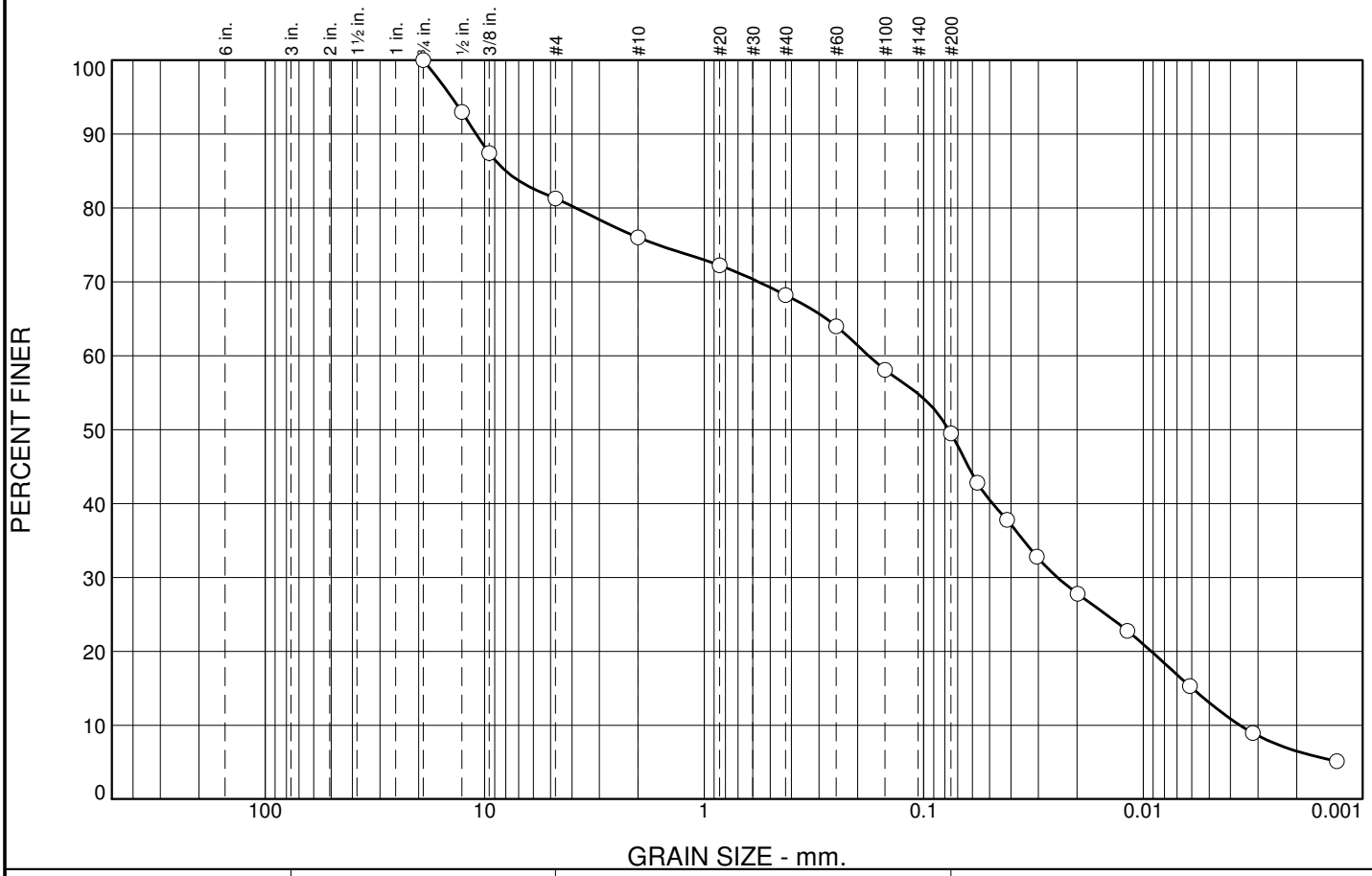
Location: GH11-236, Area E
Sample Number: SPT 7 **Depth:** 34-35.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	18.7	5.3	7.8	18.7	43.0	6.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	93.0		
0.375	87.4		
#4	81.3		
#10	76.0		
#20	72.2		
#40	68.2		
#60	64.0		
#100	58.1		
#200	49.5		
0.0570 mm.	42.8		
0.0417 mm.	37.8		
0.0305 mm.	32.8		
0.0199 mm.	27.8		
0.0118 mm.	22.8		
0.0061 mm.	15.3		
0.0032 mm.	9.0		
0.0013 mm.	5.1		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 20 LL= 32 PI= 12

Coefficients

D_{90}= 10.9464 D_{85}= 8.0174 D_{60}= 0.1782
D_{50}= 0.0768 D_{30}= 0.0246 D_{15}= 0.0060
D_{10}= 0.0036 C_u= 49.17 C_c= 0.93

Classification

USCS= SC AASHTO= A-6(3)

Remarks

As received moisture content - 25.8%

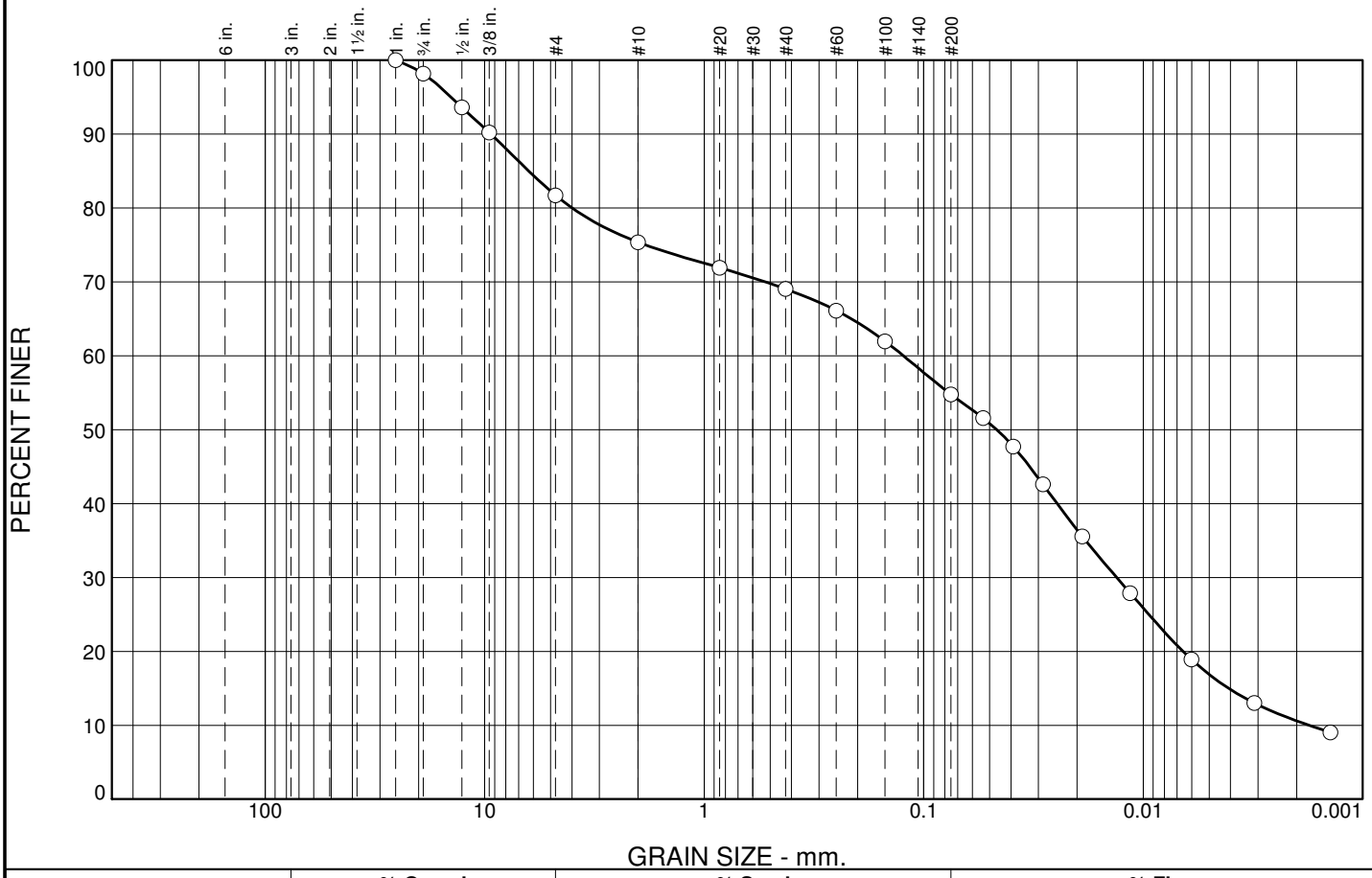
Location: GH11-236, Area E
Sample Number: SPT 10 **Depth:** 49-50.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.8	16.5	6.3	6.4	14.2	44.2	10.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.2		
.5	93.6		
0.375	90.2		
#4	81.7		
#10	75.4		
#20	71.9		
#40	69.0		
#60	66.1		
#100	62.0		
#200	54.8		
0.0536 mm.	51.6		
0.0390 mm.	47.7		
0.0286 mm.	42.6		
0.0189 mm.	35.6		
0.0115 mm.	27.9		
0.0060 mm.	18.9		
0.0031 mm.	13.0		
0.0014 mm.	9.0		

* (no specification provided)

Soil Description

sandy lean clay with gravel

Atterberg Limits

PL= 23 LL= 31 PI= 8

Coefficients

D_{90}= 9.3665 D_{85}= 6.2991 D_{60}= 0.1237
D_{50}= 0.0465 D_{30}= 0.0132 D_{15}= 0.0041
D_{10}= 0.0018 C_u= 70.57 C_c= 0.80

Classification

USCS= CL AASHTO= A-4(2)

Remarks

As received moisture content - 22.7%

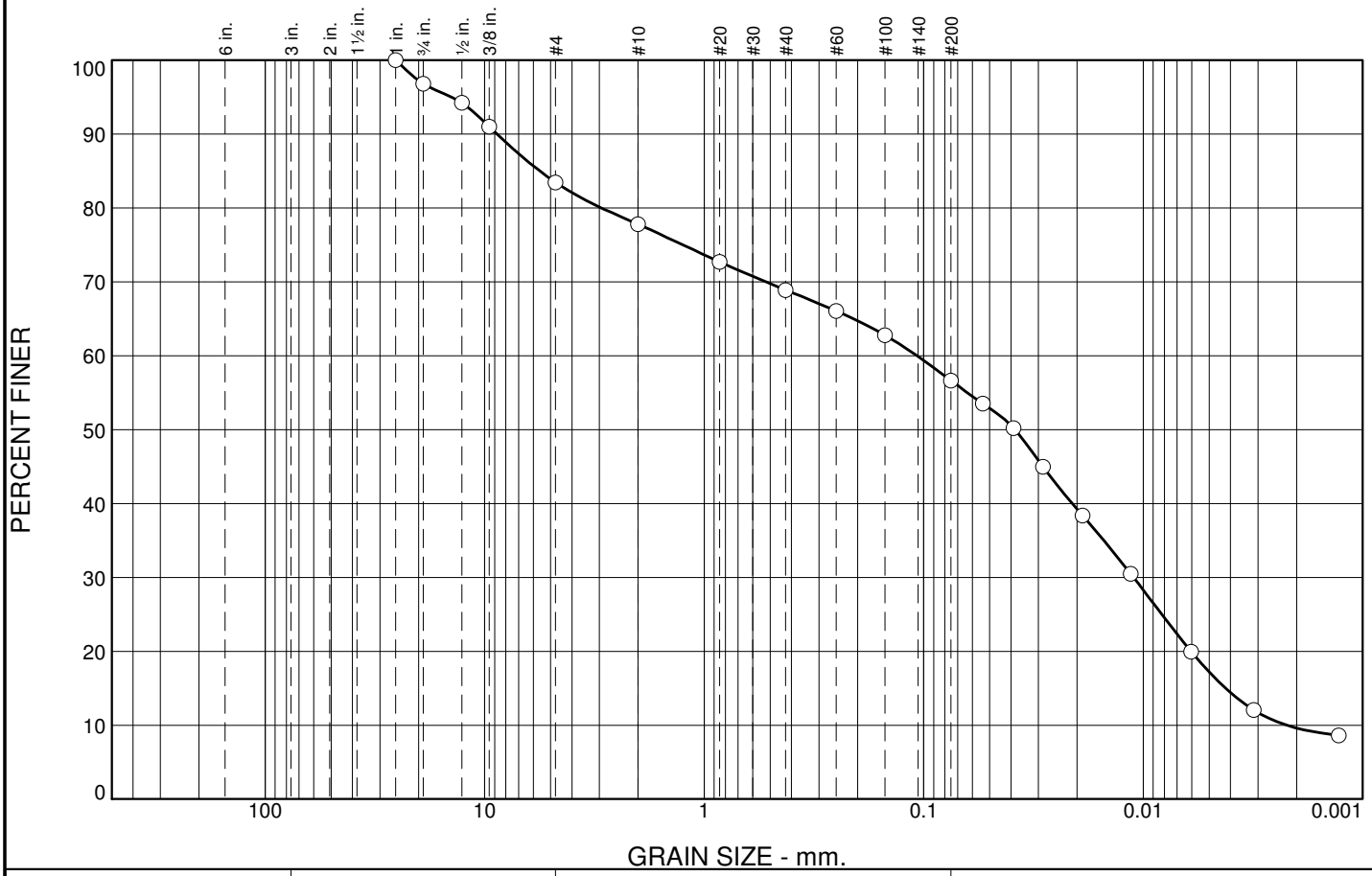
Location: GH11-236, Area E
Sample Number: SPT 12 **Depth:** 59.5-61' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.2	13.4	5.6	8.9	12.3	47.0	9.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.8		
.5	94.2		
0.375	91.0		
#4	83.4		
#10	77.8		
#20	72.7		
#40	68.9		
#60	66.0		
#100	62.8		
#200	56.6		
0.0538 mm.	53.5		
0.0390 mm.	50.2		
0.0286 mm.	44.9		
0.0189 mm.	38.4		
0.0114 mm.	30.5		
0.0060 mm.	19.9		
0.0031 mm.	12.0		
0.0013 mm.	8.6		

* (no specification provided)

Soil Description

sandy silt with gravel

Atterberg Limits

PL= 27 LL= 33 PI= 6

Coefficients

D_{90}= 8.7806 D_{85}= 5.6144 D_{60}= 0.1074
D_{50}= 0.0384 D_{30}= 0.0111 D_{15}= 0.0042
D_{10}= 0.0022 C_u= 48.33 C_c= 0.51

Classification

USCS= ML AASHTO= A-4(2)

Remarks

As received moisture content - 25.6%

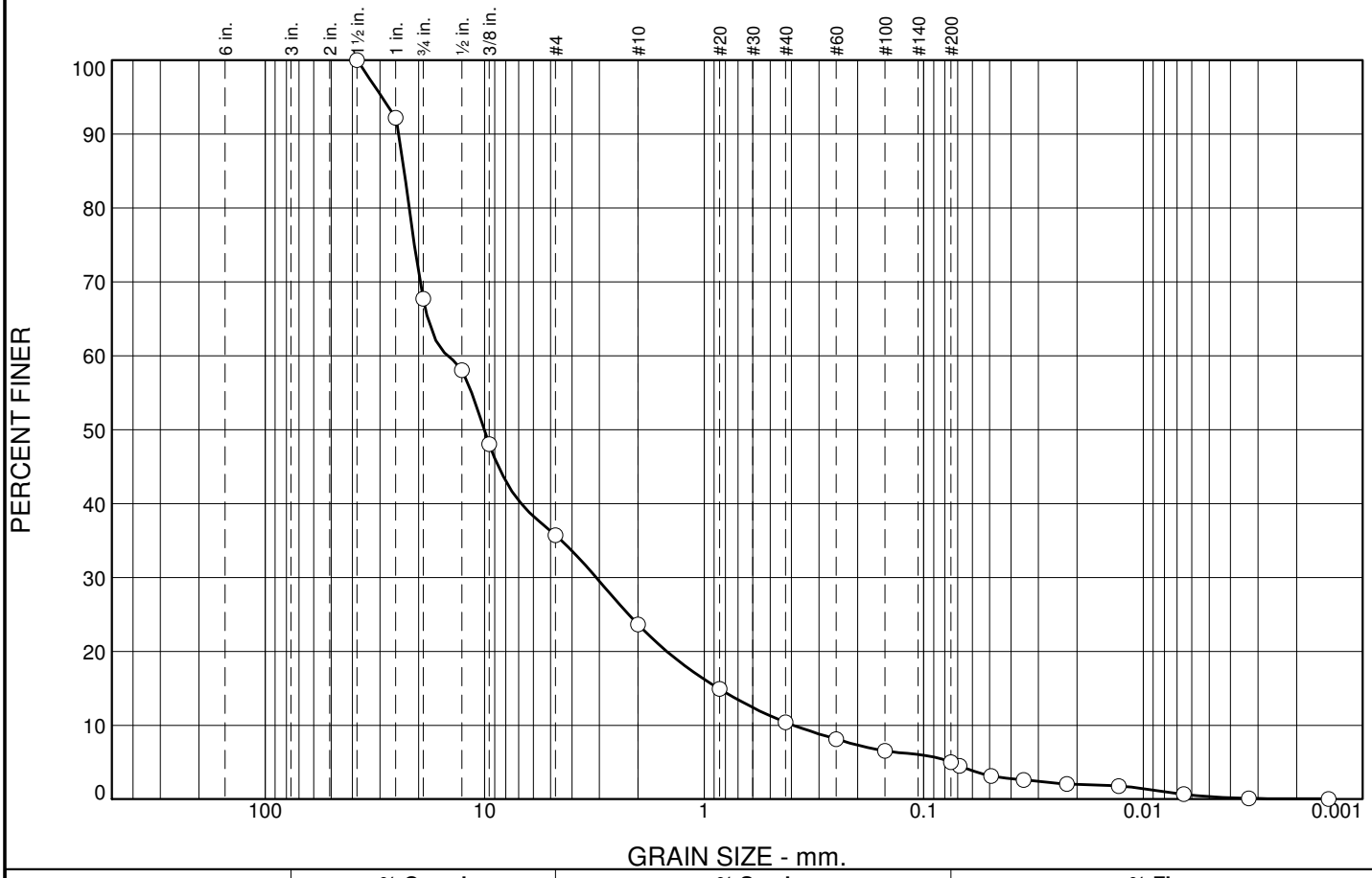
Location: GH11-236, Area E
Sample Number: SPT 15 **Depth:** 74-75.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	32.3	32.0	12.1	13.2	5.4	4.9	0.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	92.2		
.75	67.7		
.5	58.0		
0.375	48.0		
#4	35.7		
#10	23.6		
#20	14.9		
#40	10.4		
#60	8.1		
#100	6.5		
#200	5.0		
0.0686 mm.	4.5		
0.0492 mm.	3.2		
0.0350 mm.	2.6		
0.0223 mm.	2.1		
0.0129 mm.	1.8		
0.0065 mm.	0.7		
0.0033 mm.	0.1		
0.0014 mm.	0.0		

* (no specification provided)

Soil Description

well-graded gravel with silt and sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 24.6609 D_{85}= 23.2572 D_{60}= 14.7038
D_{50}= 10.0447 D_{30}= 3.1038 D_{15}= 0.8606
D_{10}= 0.3924 C_u= 37.47 C_c= 1.67

Classification

USCS= GW-GM AASHTO= A-1-a

Remarks

As received moisture content - 8.4%

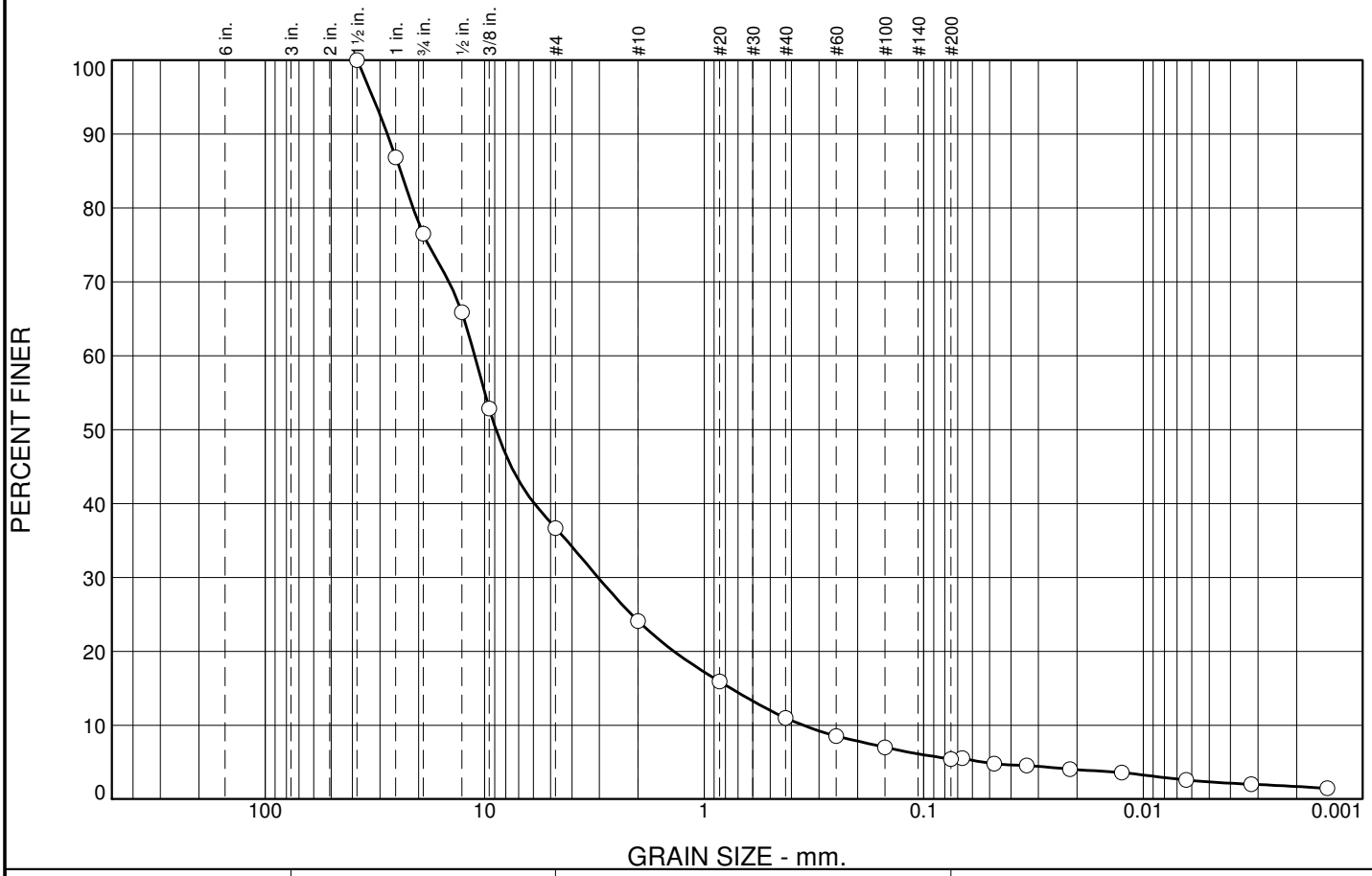
Location: GH11-237, Area E
Sample Number: SPT 2 **Depth:** 9-10.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	23.5	39.8	12.6	13.1	5.6	3.7	1.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	86.8		
.75	76.5		
.5	65.9		
0.375	52.9		
#4	36.7		
#10	24.1		
#20	15.9		
#40	11.0		
#60	8.5		
#100	7.0		
#200	5.4		
0.0668 mm.	5.5		
0.0476 mm.	4.8		
0.0339 mm.	4.5		
0.0216 mm.	4.1		
0.0125 mm.	3.6		
0.0064 mm.	2.6		
0.0032 mm.	2.0		
0.0014 mm.	1.5		

* (no specification provided)

Soil Description

well-graded gravel with silt and sand

Atterberg Limits

PL= NP LL= 22 PI= NP

Coefficients

D_{90}= 27.7511 D_{85}= 24.1809 D_{60}= 11.0958
D_{50}= 8.8681 D_{30}= 3.0430 D_{15}= 0.7572
D_{10}= 0.3544 C_u= 31.31 C_c= 2.35

Classification

USCS= GW-GM AASHTO= A-1-a

Remarks

As received moisture content - 10.7%

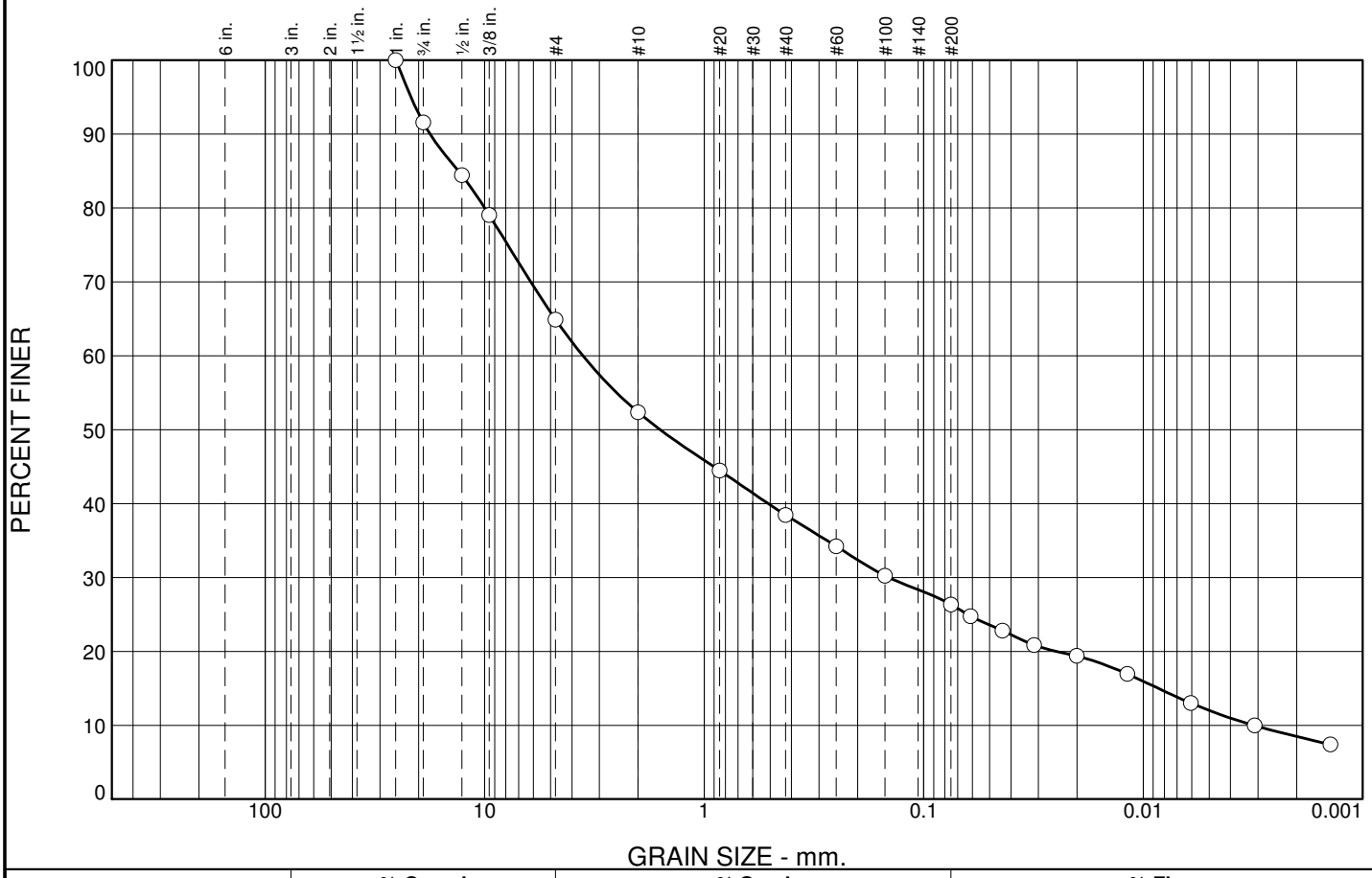
Location: GH11-237, Area E
Sample Number: SPT 6 **Depth:** 29-30.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.5	26.6	12.5	14.0	12.1	17.8	8.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	91.5		
.5	84.4		
0.375	79.0		
#4	64.9		
#10	52.4		
#20	44.5		
#40	38.4		
#60	34.2		
#100	30.2		
#200	26.3		
0.0610 mm.	24.8		
0.0438 mm.	22.8		
0.0314 mm.	20.9		
0.0201 mm.	19.4		
0.0118 mm.	16.9		
0.0061 mm.	13.0		
0.0031 mm.	10.0		
0.0014 mm.	7.4		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 24 PI= 10

Coefficients

D_{90}= 17.7546 D_{85}= 13.1489 D_{60}= 3.5682
D_{50}= 1.5905 D_{30}= 0.1446 D_{15}= 0.0085
D_{10}= 0.0031 C_u= 1141.17 C_c= 1.87

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

As received moisture content - 12.1%

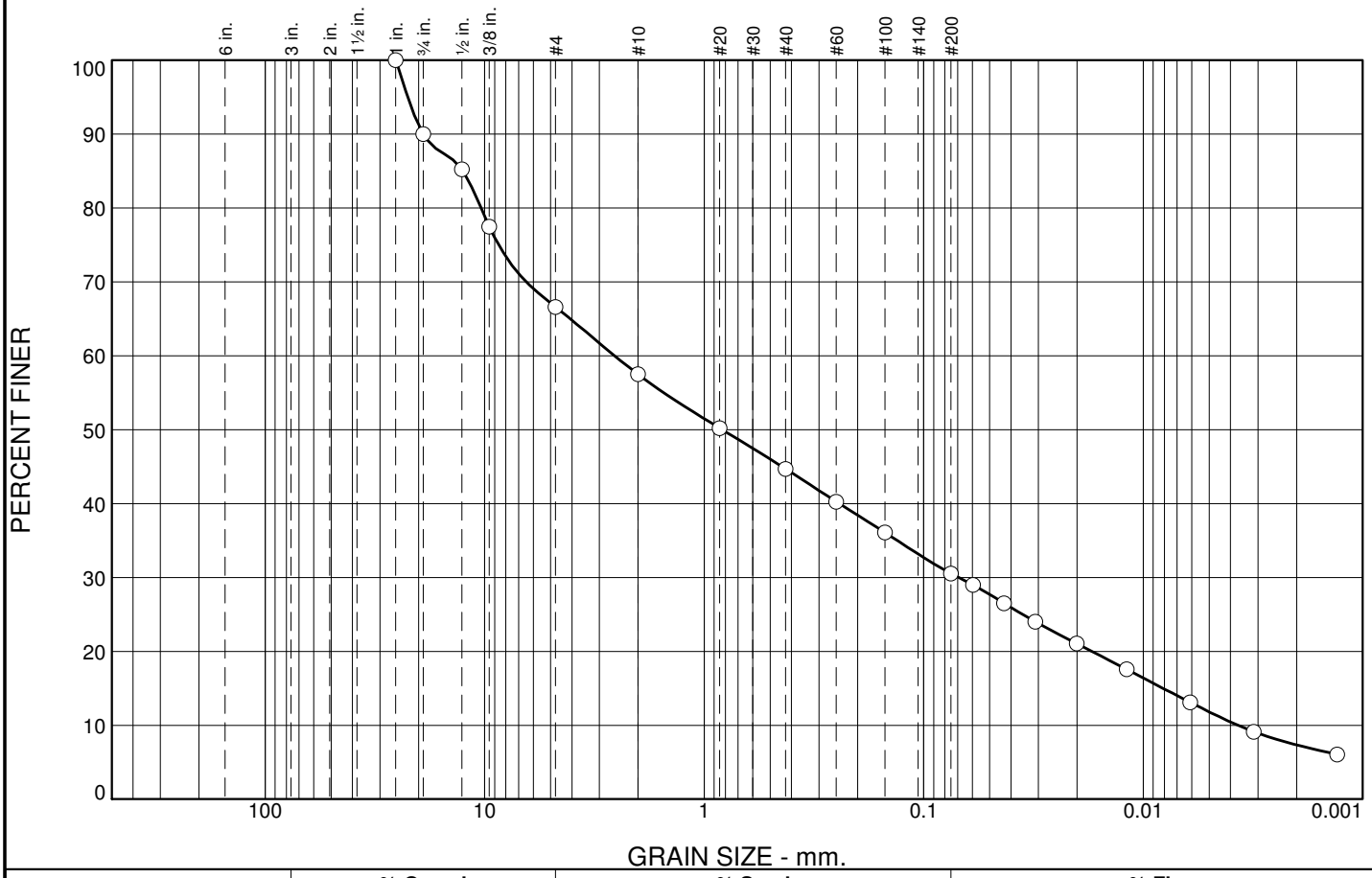
Location: GH11-237, Area E
Sample Number: SPT 10 **Depth:** 49-50.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.0	23.4	9.1	12.8	14.2	23.2	7.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	90.0		
.5	85.2		
0.375	77.5		
#4	66.6		
#10	57.5		
#20	50.2		
#40	44.7		
#60	40.3		
#100	36.1		
#200	30.5		
0.0596 mm.	29.0		
0.0430 mm.	26.5		
0.0310 mm.	24.0		
0.0201 mm.	21.0		
0.0119 mm.	17.6		
0.0061 mm.	13.1		
0.0031 mm.	9.1		
0.0013 mm.	6.1		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 25 PI= 11

Coefficients

D_{90}= 19.0462 D_{85}= 12.5426 D_{60}= 2.5609
D_{50}= 0.8276 D_{30}= 0.0693 D_{15}= 0.0081
D_{10}= 0.0037 C_u= 691.94 C_c= 0.51

Classification

USCS= SC AASHTO= A-2-6(0)

Remarks

As received moisture content - 11.6%

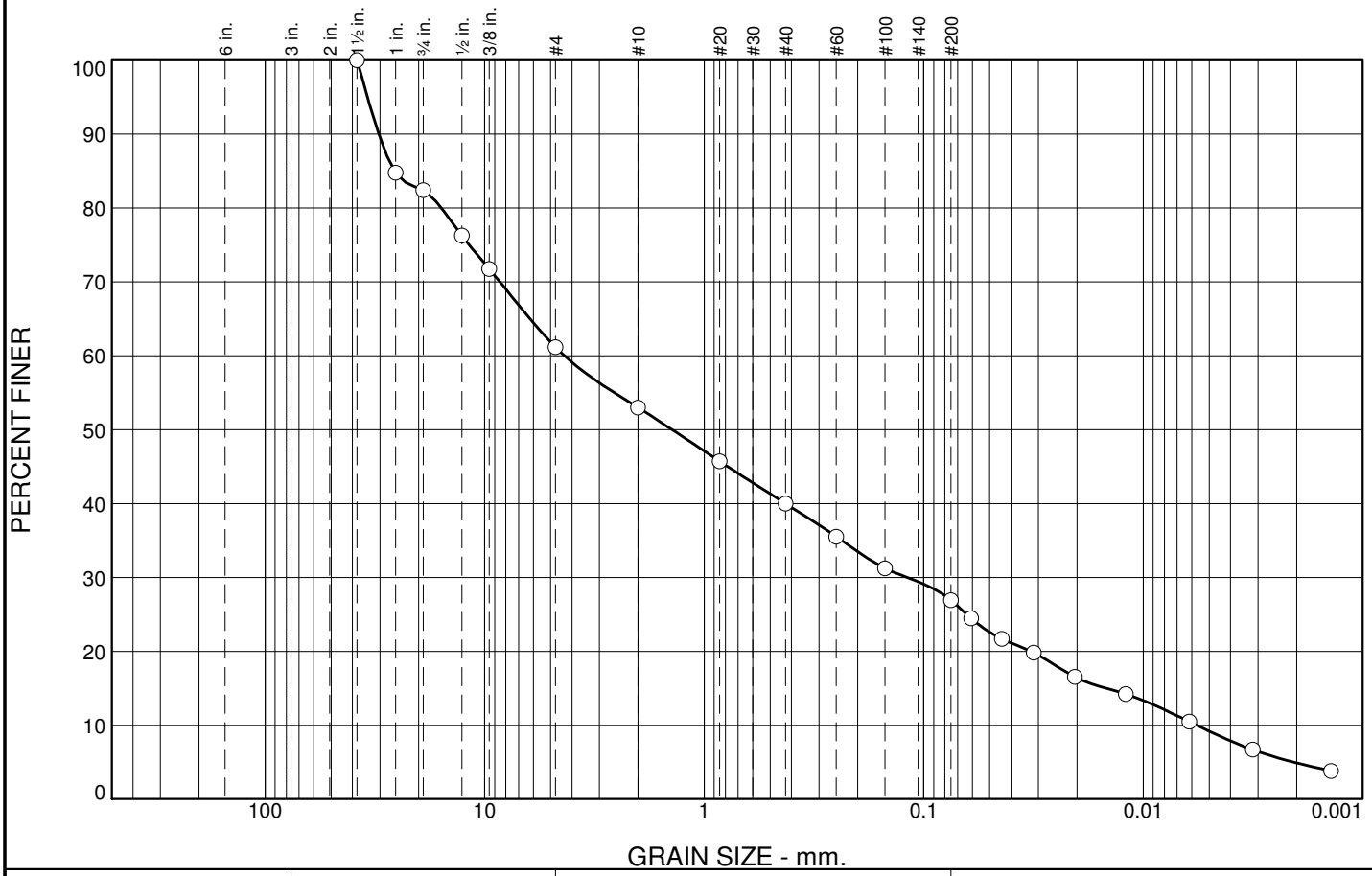
Location: GH11-237, Area E
Sample Number: SPT 11 **Depth:** 54-55.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	17.6	21.3	8.1	13.0	13.1	22.0	4.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	84.7		
.75	82.4		
.5	76.2		
0.375	71.7		
#4	61.1		
#10	53.0		
#20	45.7		
#40	40.0		
#60	35.5		
#100	31.2		
#200	26.9		
0.0608 mm.	24.5		
0.0440 mm.	21.7		
0.0315 mm.	19.8		
0.0205 mm.	16.5		
0.0120 mm.	14.2		
0.0062 mm.	10.5		
0.0032 mm.	6.7		
0.0014 mm.	3.8		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 14 LL= 25 PI= 11

Coefficients

D_{90}= 30.3815 D_{85}= 25.7370 D_{60}= 4.3273
D_{50}= 1.4016 D_{30}= 0.1192 D_{15}= 0.0148
D_{10}= 0.0057 C_u= 758.48 C_c= 0.58

Classification

USCS= GC AASHTO= A-2-6(0)

Remarks

As received moisture content - 11.4%

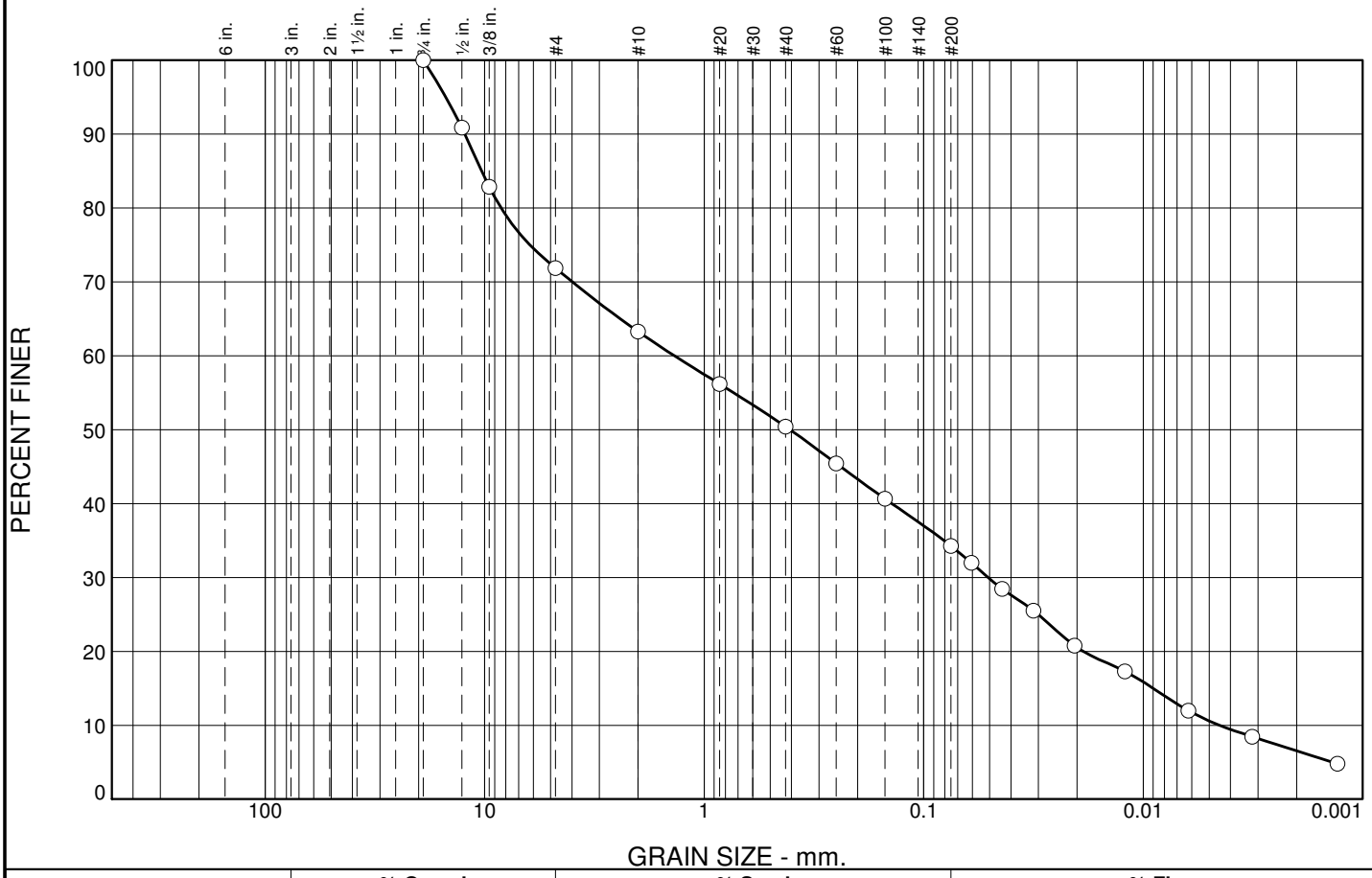
Location: GH11-237, Area E
Sample Number: SPT 12 **Depth:** 59-60.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	28.2	8.5	12.9	16.1	27.8	6.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	90.8		
0.375	82.8		
#4	71.8		
#10	63.3		
#20	56.2		
#40	50.4		
#60	45.4		
#100	40.6		
#200	34.3		
0.0606 mm.	32.0		
0.0439 mm.	28.4		
0.0316 mm.	25.5		
0.0206 mm.	20.8		
0.0121 mm.	17.3		
0.0062 mm.	12.0		
0.0032 mm.	8.4		
0.0013 mm.	4.8		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 29 PI= 14

Coefficients

D_{90}= 12.3119 D_{85}= 10.3223 D_{60}= 1.3658
D_{50}= 0.4066 D_{30}= 0.0509 D_{15}= 0.0090
D_{10}= 0.0045 C_u= 304.75 C_c= 0.42

Classification

USCS= SC AASHTO= A-2-6(1)

Remarks

As received moisture content - 12.6%

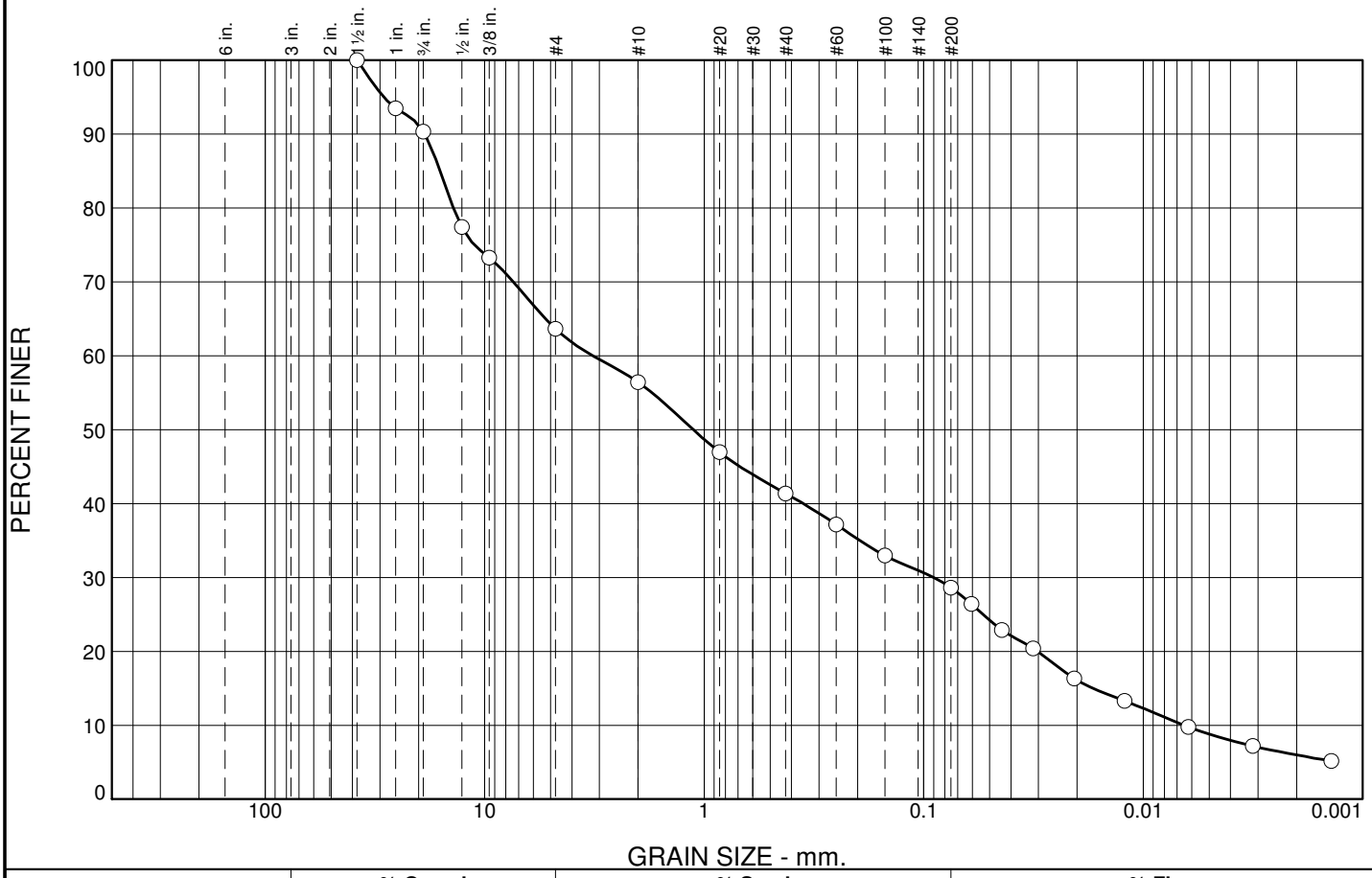
Location: GH11-237, Area E
Sample Number: SPT 16 **Depth:** 79-80.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.7	26.7	7.2	15.0	12.8	22.6	6.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	93.5		
.75	90.3		
.5	77.4		
0.375	73.3		
#4	63.6		
#10	56.4		
#20	46.9		
#40	41.4		
#60	37.2		
#100	33.0		
#200	28.6		
0.0606 mm.	26.4		
0.0440 mm.	22.9		
0.0317 mm.	20.4		
0.0206 mm.	16.3		
0.0122 mm.	13.3		
0.0062 mm.	9.8		
0.0032 mm.	7.2		
0.0014 mm.	5.1		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 15 LL= 27 PI= 12

Coefficients

D_{90}= 18.7744 D_{85}= 15.9738 D_{60}= 3.2118
D_{50}= 1.1211 D_{30}= 0.0901 D_{15}= 0.0170
D_{10}= 0.0065 C_u= 493.56 C_c= 0.39

Classification

USCS= GC AASHTO= A-2-6(0)

Remarks

As received moisture content - 15.6%

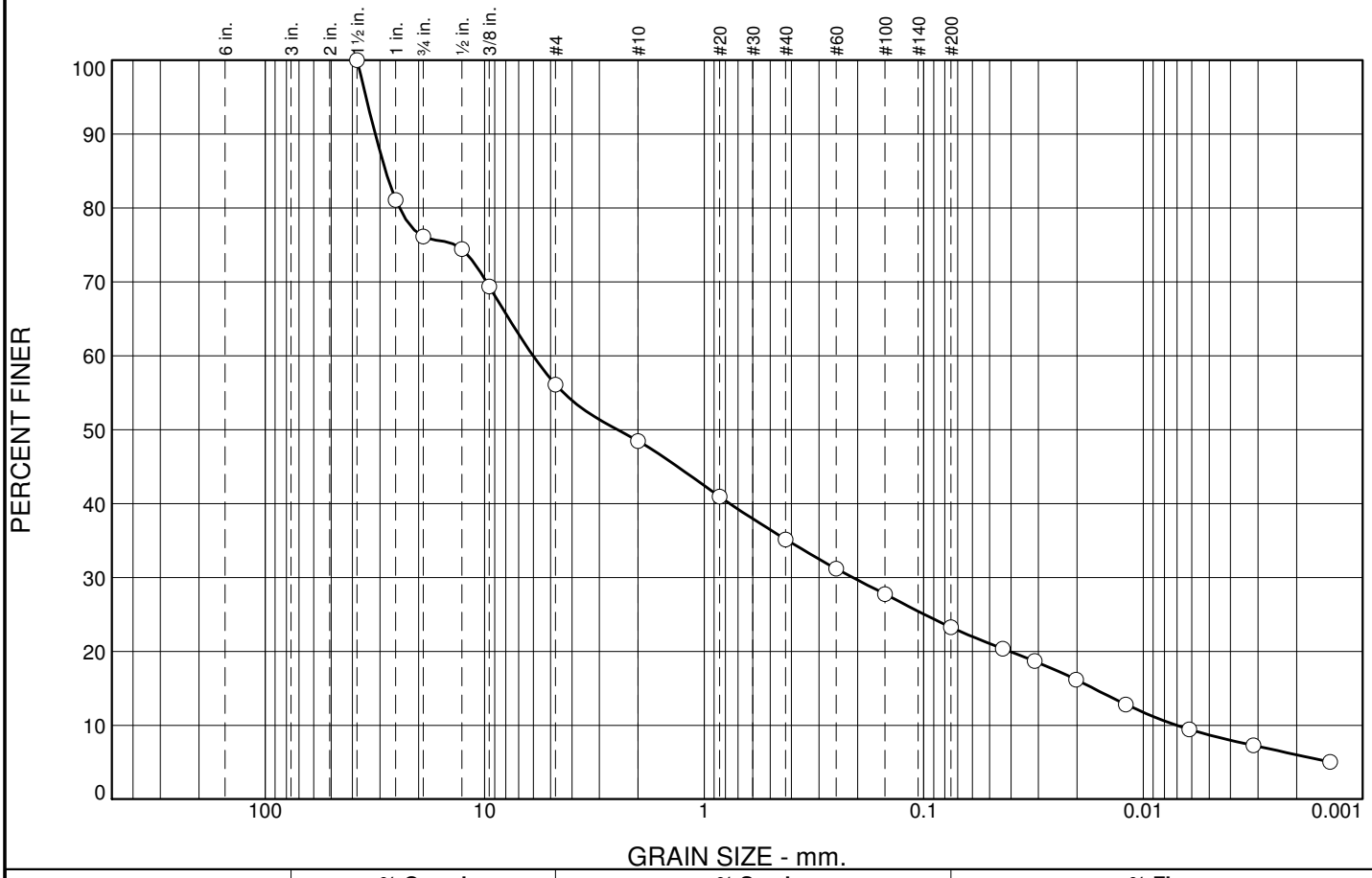
Location: GH11-237, Area E
Sample Number: SPT 17 **Depth:** 84-85.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	23.9	20.0	7.6	13.4	11.9	17.2	6.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	81.1		
.75	76.1		
.5	74.4		
0.375	69.4		
#4	56.1		
#10	48.5		
#20	40.9		
#40	35.1		
#60	31.2		
#100	27.7		
#200	23.2		
0.0435 mm.	20.4		
0.0312 mm.	18.7		
0.0202 mm.	16.2		
0.0120 mm.	12.8		
0.0062 mm.	9.4		
0.0031 mm.	7.3		
0.0014 mm.	5.0		

* (no specification provided)

Soil Description

silty clayey gravel with sand

Atterberg Limits

PL= 19 LL= 24 PI= 5

Coefficients

D_{90}= 31.5303 D_{85}= 28.2734 D_{60}= 6.0199
D_{50}= 2.4866 D_{30}= 0.2105 D_{15}= 0.0169
D_{10}= 0.0070 C_u= 856.25 C_c= 1.05

Classification

USCS= GC-GM AASHTO= A-1-b

Remarks

As received moisture content - 10.9%

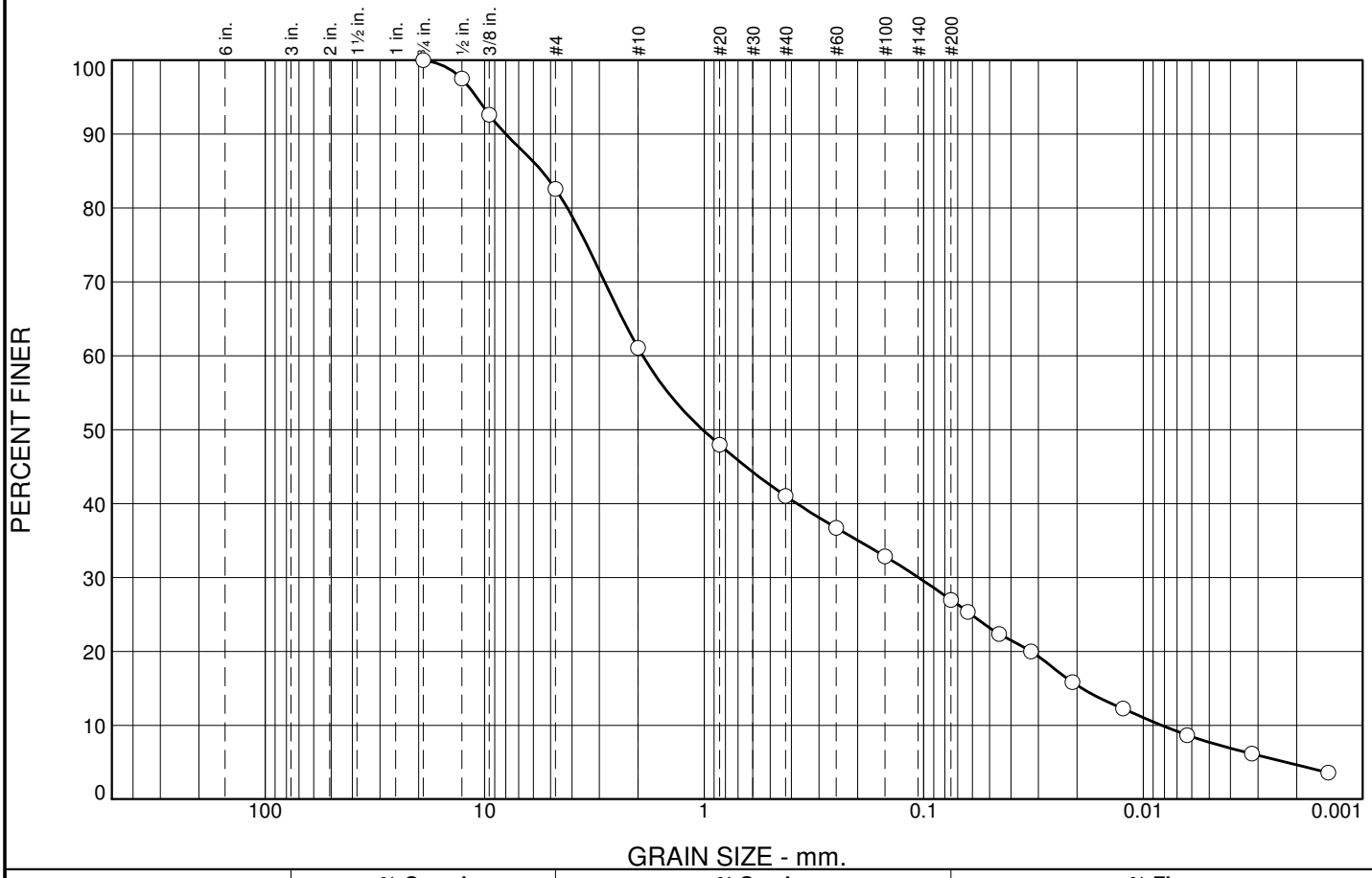
Location: GH11-237, Area E
Sample Number: SPT 19 **Depth:** 94-95.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	17.5	21.4	20.1	14.0	22.4	4.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.5		
0.375	92.6		
#4	82.5		
#10	61.1		
#20	47.9		
#40	41.0		
#60	36.7		
#100	32.9		
#200	27.0		
0.0629 mm.	25.3		
0.0452 mm.	22.4		
0.0324 mm.	20.0		
0.0210 mm.	15.8		
0.0124 mm.	12.3		
0.0063 mm.	8.7		
0.0032 mm.	6.2		
0.0014 mm.	3.6		

* (no specification provided)

Soil Description

silty sand with gravel

Atterberg Limits

PL= NP LL= 24 PI= NP

Coefficients

D_{90}= 8.0173 D_{85}= 5.4968 D_{60}= 1.9050
D_{50}= 1.0168 D_{30}= 0.1057 D_{15}= 0.0190
D_{10}= 0.0082 C_u= 231.11 C_c= 0.71

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

As received moisture content - 16.5%

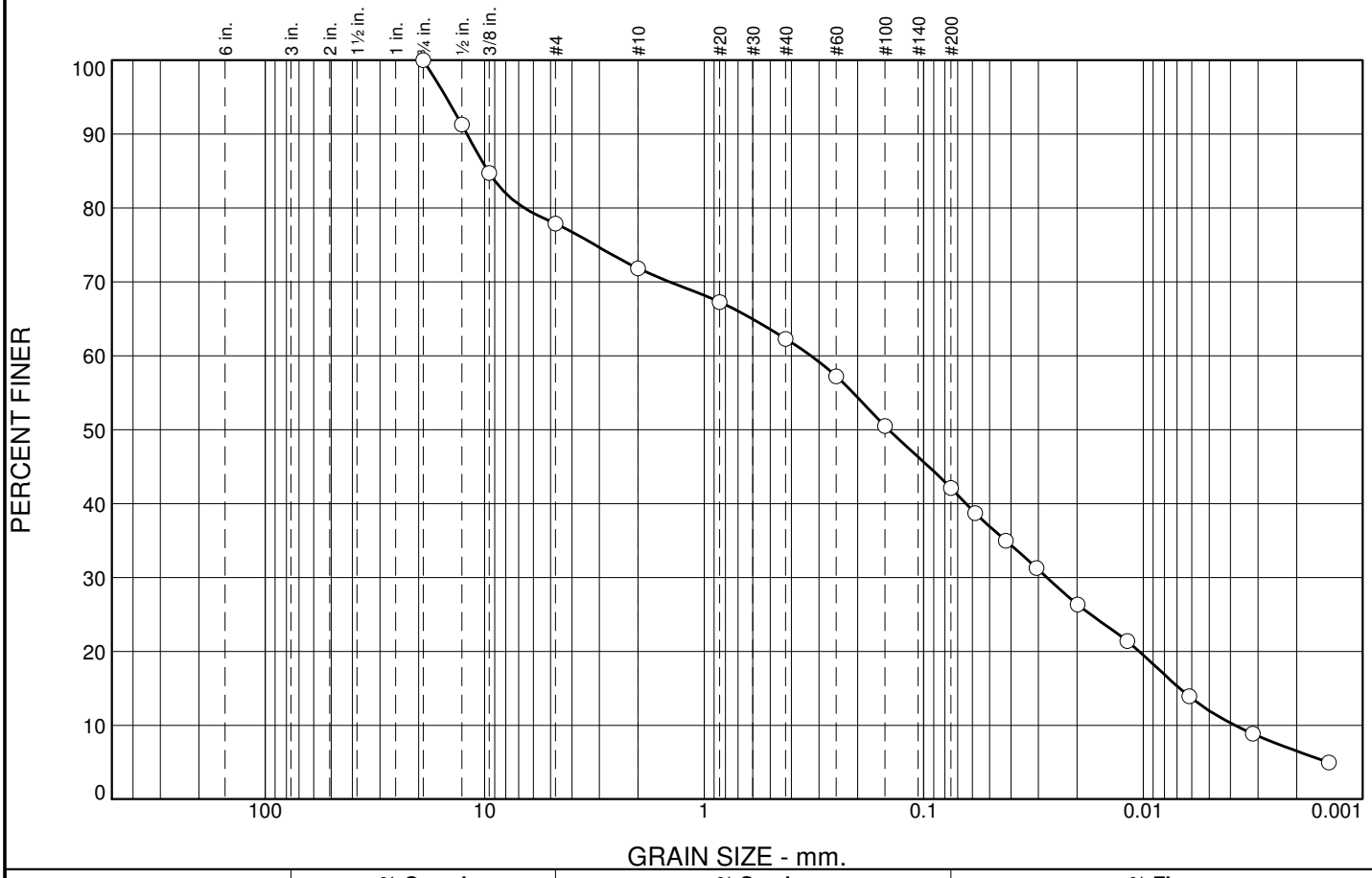
Location: GH11-237, Area E
Sample Number: SPT 21 **Depth:** 104-105.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	22.1	6.1	9.5	20.2	35.6	6.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	91.3		
0.375	84.7		
#4	77.9		
#10	71.8		
#20	67.3		
#40	62.3		
#60	57.2		
#100	50.5		
#200	42.1		
0.0582 mm.	38.7		
0.0422 mm.	35.0		
0.0306 mm.	31.3		
0.0199 mm.	26.3		
0.0118 mm.	21.4		
0.0062 mm.	13.9		
0.0032 mm.	8.9		
0.0014 mm.	5.0		

* (no specification provided)

Soil Description

silty sand with gravel

Atterberg Limits

PL= NP LL= 28 PI= NP

Coefficients

D_{90}= 12.0348 D_{85}= 9.6577 D_{60}= 0.3265
D_{50}= 0.1443 D_{30}= 0.0275 D_{15}= 0.0068
D_{10}= 0.0038 C_u= 85.53 C_c= 0.61

Classification

USCS= SM AASHTO= A-4(0)

Remarks

As received moisture content - 29.1%

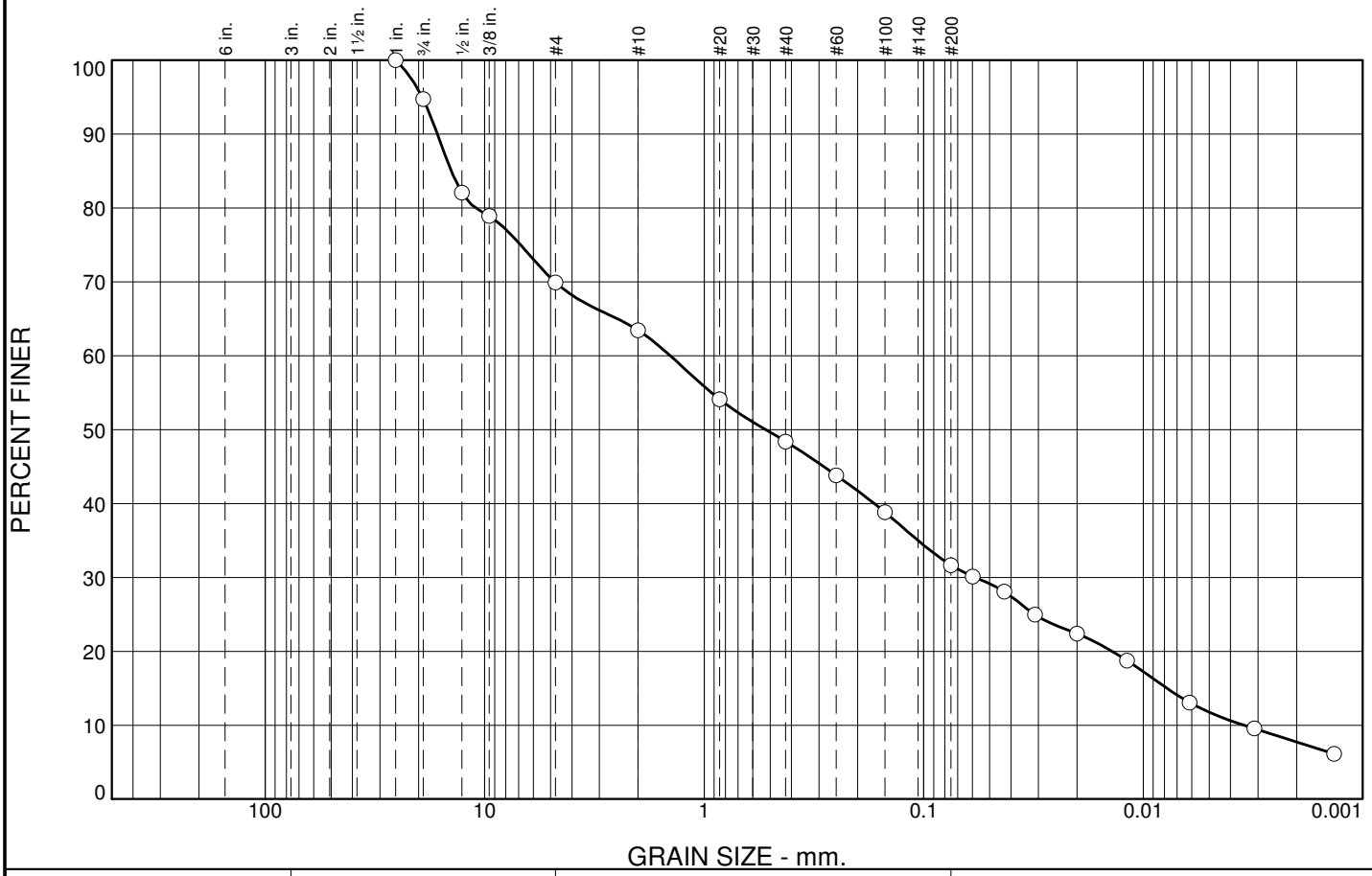
Location: GH11-238, Area A
Sample Number: SPT 1 **Depth:** 3.0-4.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.3	24.8	6.5	15.0	16.8	23.9	7.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	94.7		
.5	82.0		
0.375	78.9		
#4	69.9		
#10	63.4		
#20	54.1		
#40	48.4		
#60	43.8		
#100	38.8		
#200	31.6		
0.0597 mm.	30.1		
0.0429 mm.	28.1		
0.0310 mm.	25.0		
0.0200 mm.	22.4		
0.0118 mm.	18.8		
0.0061 mm.	13.1		
0.0031 mm.	9.6		
0.0013 mm.	6.1		

* (no specification provided)

Soil Description

silty, clayey sand with gravel

Atterberg Limits

PL= 16 LL= 23 PI= 7

Coefficients

D_{90}= 16.4337 D_{85}= 14.1882 D_{60}= 1.4267
D_{50}= 0.5243 D_{30}= 0.0584 D_{15}= 0.0078
D_{10}= 0.0035 C_u= 411.24 C_c= 0.69

Classification

USCS= SC-SM AASHTO= A-2-4(0)

Remarks

As received moisture content - 18.5%

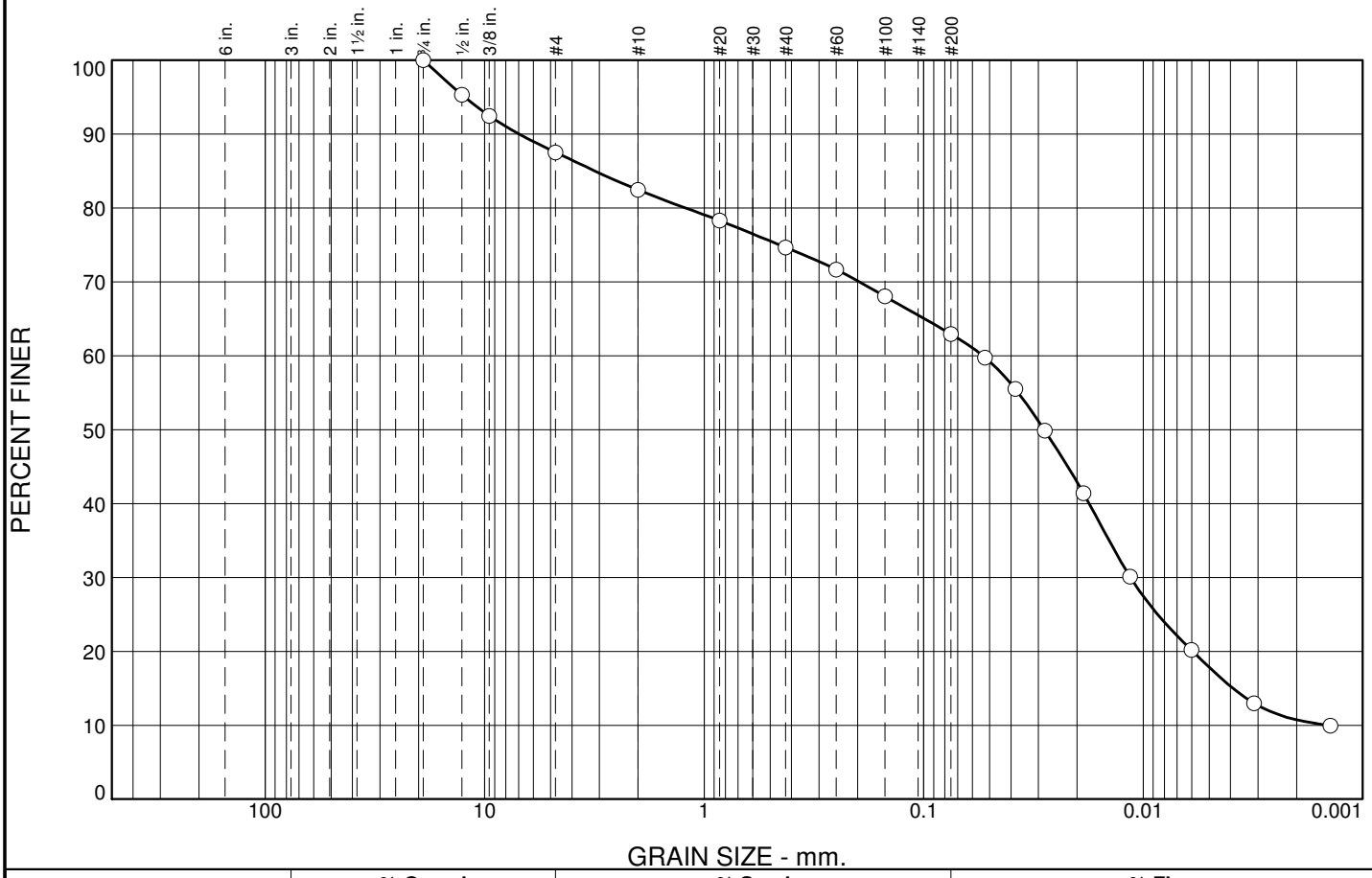
Location: GH11-238, Area A
Sample Number: SPT 5 **Depth:** 23-24.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.5	5.1	7.8	11.7	52.2	10.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	95.3		
0.375	92.5		
#4	87.5		
#10	82.4		
#20	78.3		
#40	74.6		
#60	71.7		
#100	68.0		
#200	62.9		
0.0525 mm.	59.7		
0.0383 mm.	55.5		
0.0281 mm.	49.9		
0.0187 mm.	41.4		
0.0115 mm.	30.1		
0.0060 mm.	20.2		
0.0031 mm.	13.0		
0.0014 mm.	9.9		

* (no specification provided)

Soil Description

sandy silty clay

Atterberg Limits

PL= 19 LL= 25 PI= 6

Coefficients

D_{90}= 6.9721 D_{85}= 3.1486 D_{60}= 0.0538
D_{50}= 0.0283 D_{30}= 0.0114 D_{15}= 0.0039
D_{10}= 0.0014 C_u= 37.31 C_c= 1.69

Classification

USCS= CL-ML AASHTO= A-4(2)

Remarks

As received moisture content - 18.3%

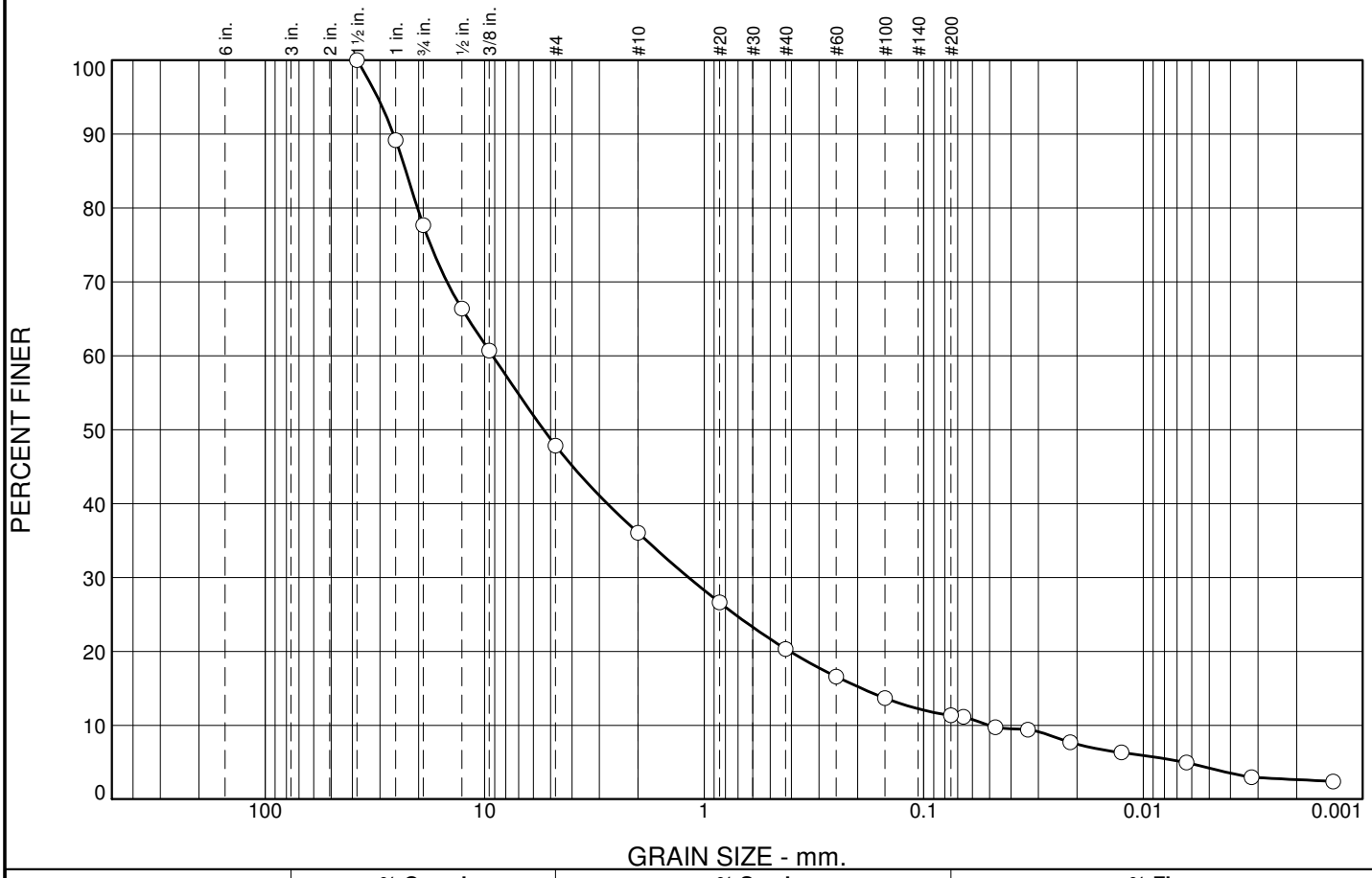
Location: GH11-238, Area A
Sample Number: SPT 7 **Depth:** 33-34.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	22.3	29.9	11.8	15.7	8.9	8.8	2.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	89.1		
.75	77.7		
.5	66.4		
0.375	60.7		
#4	47.8		
#10	36.0		
#20	26.6		
#40	20.3		
#60	16.6		
#100	13.7		
#200	11.4		
0.0658 mm.	11.1		
0.0472 mm.	9.7		
0.0335 mm.	9.4		
0.0215 mm.	7.7		
0.0126 mm.	6.3		
0.0063 mm.	4.9		
0.0032 mm.	2.9		
0.0014 mm.	2.4		

* (no specification provided)

Soil Description

well-graded gravel with siltyclay and sand

Atterberg Limits

PL= 21 LL= 26 PI= 5

Coefficients

D_{90}= 26.0237 D_{85}= 22.8397 D_{60}= 9.1938
D_{50}= 5.3920 D_{30}= 1.1764 D_{15}= 0.1924
D_{10}= 0.0506 C_u= 181.53 C_c= 2.97

Classification

USCS= GW-GC AASHTO= A-1-a

Remarks

As received moisture content - 13.1%

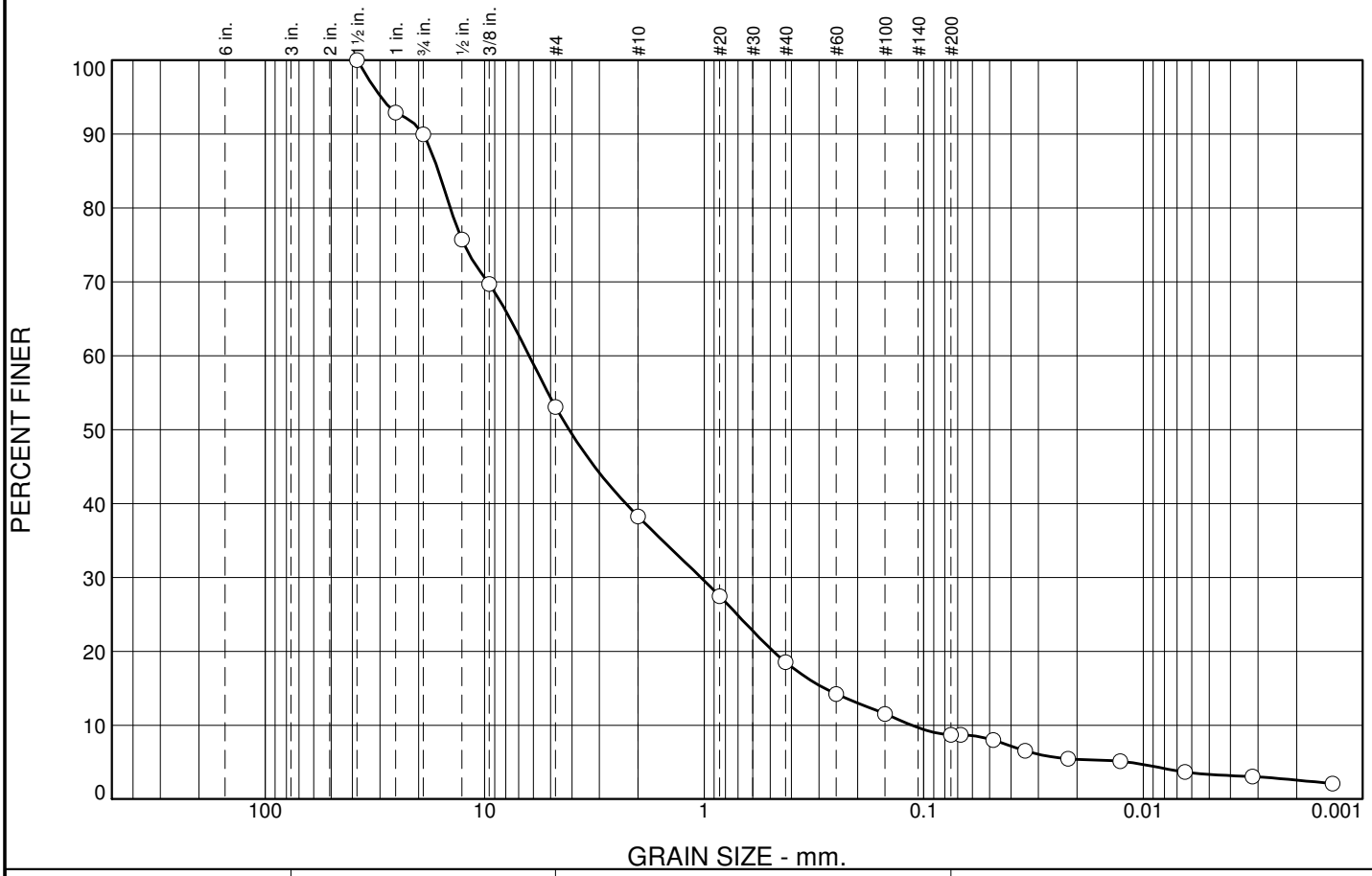
Location: GH11-238, Area A
Sample Number: SPT 8 **Depth:** 38-39.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.0	36.9	14.8	19.8	9.8	6.1	2.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	92.9		
.75	90.0		
.5	75.7		
0.375	69.7		
#4	53.1		
#10	38.3		
#20	27.5		
#40	18.5		
#60	14.2		
#100	11.5		
#200	8.7		
0.0676 mm.	8.7		
0.0481 mm.	8.0		
0.0345 mm.	6.5		
0.0220 mm.	5.5		
0.0127 mm.	5.1		
0.0064 mm.	3.7		
0.0032 mm.	3.0		
0.0014 mm.	2.1		

* (no specification provided)

Soil Description

well-graded gravel with silt and sand

Atterberg Limits

PL= NP LL= 28 PI= NP

Coefficients

D_{90}= 19.0898 D_{85}= 16.2662 D_{60}= 6.2736
D_{50}= 4.1289 D_{30}= 1.0344 D_{15}= 0.2825
D_{10}= 0.1130 C_u= 55.54 C_c= 1.51

Classification

USCS= GW-GM AASHTO= A-1-a

Remarks

As received moisture content - 14.8%

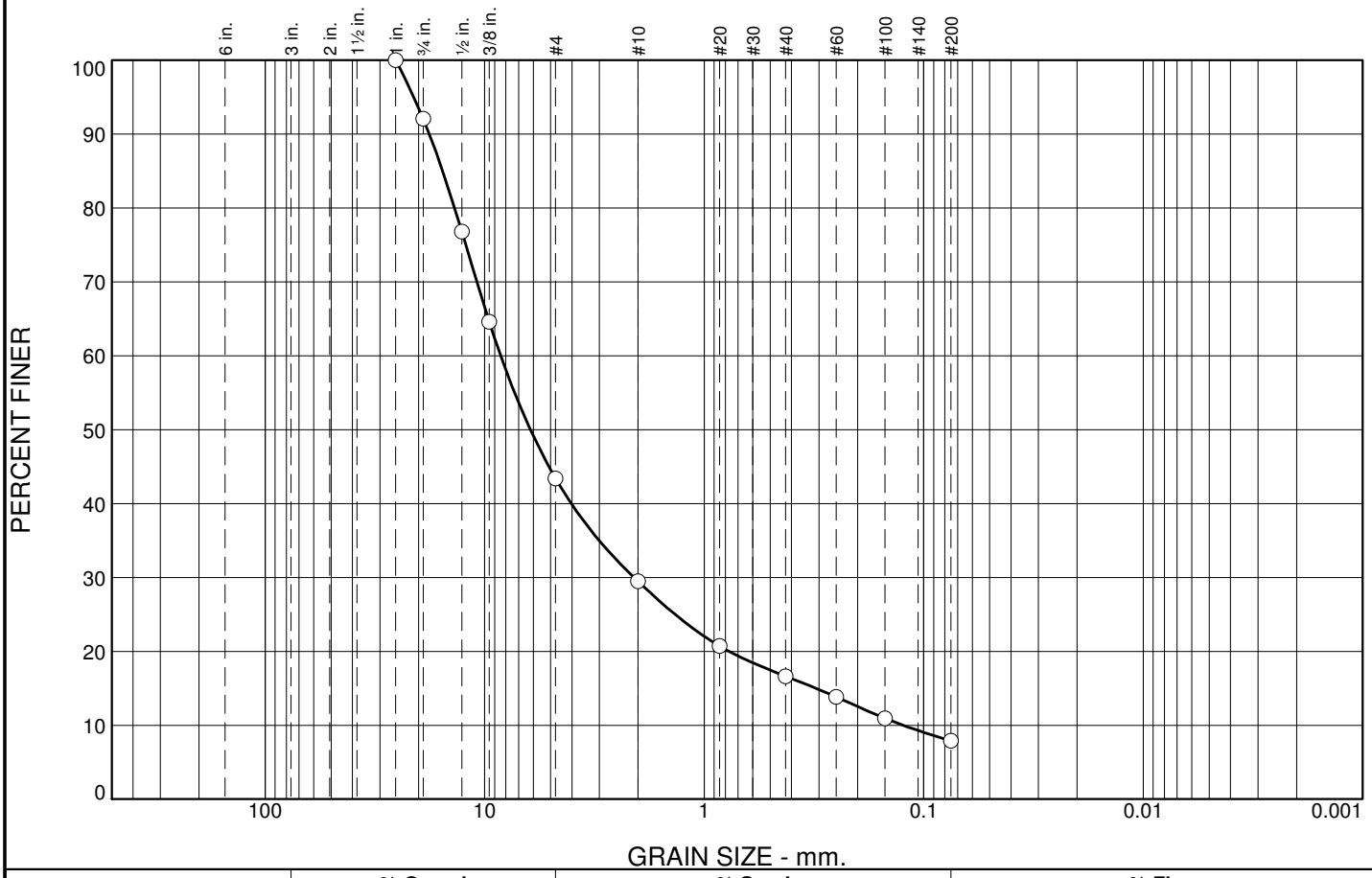
Location: GH11-238, Area A
Sample Number: SPT 10 **Depth:** 48-49.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.9	48.7	13.9	12.9	8.7	7.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	92.1		
.5	76.8		
0.375	64.6		
#4	43.4		
#10	29.5		
#20	20.7		
#40	16.6		
#60	13.8		
#100	10.9		
#200	7.9		

* (no specification provided)

Soil Description

poorly graded gravel with silt and sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 17.8835 D_{85}= 15.5590 D_{60}= 8.4521
D_{50}= 6.1862 D_{30}= 2.0869 D_{15}= 0.3098
D_{10}= 0.1240 C_u= 68.15 C_c= 4.15

Classification

USCS= GP-GM AASHTO= A-1-a

Remarks

As received moisture content - 9.8%

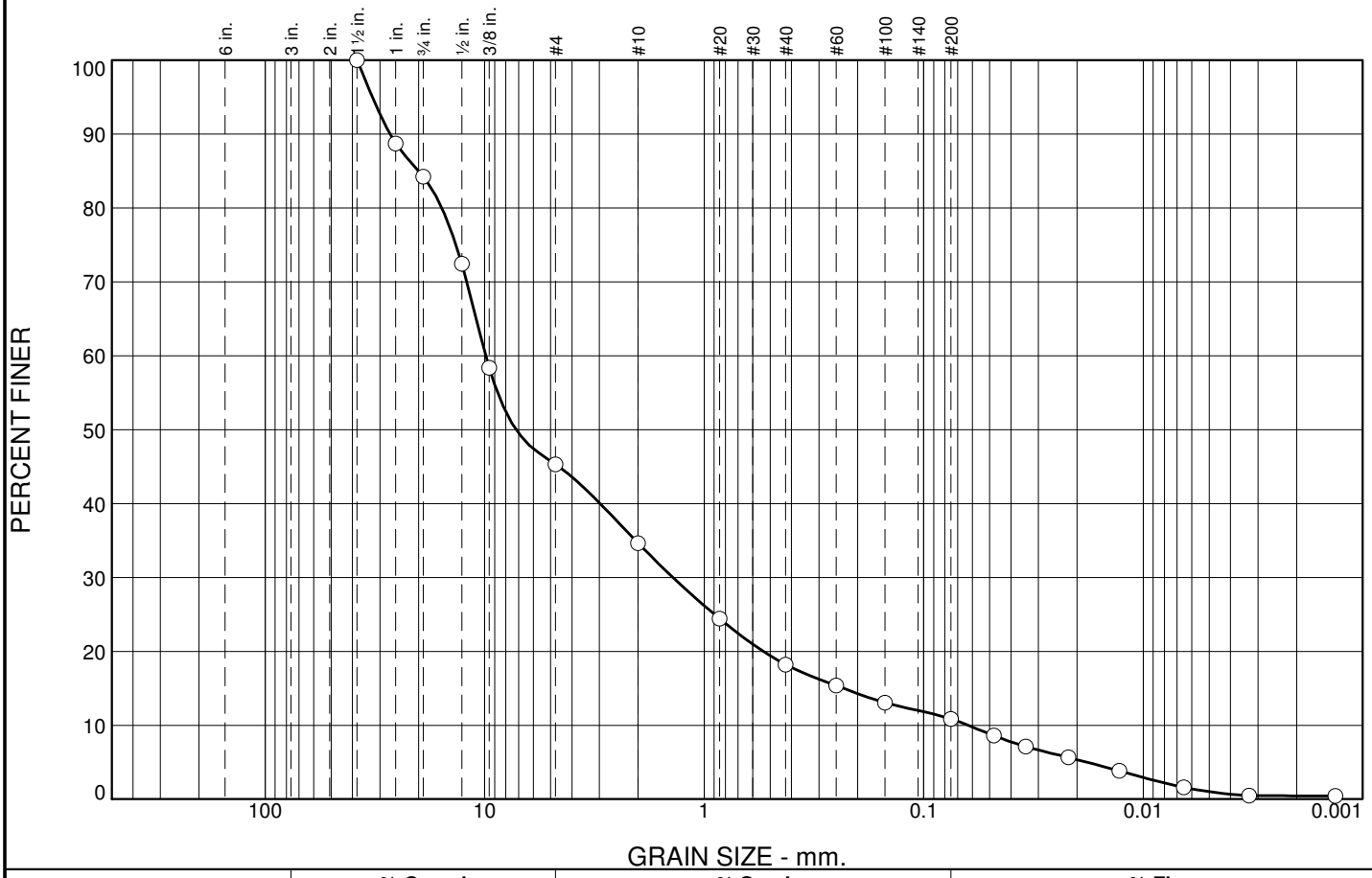
Location: GH11-238, Area A
Sample Number: SPT 14 **Depth:** 68-69.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.8	38.9	10.6	16.5	7.4	10.4	0.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	88.7		
.75	84.2		
.5	72.4		
0.375	58.3		
#4	45.3		
#10	34.7		
#20	24.4		
#40	18.2		
#60	15.4		
#100	13.1		
#200	10.8		
0.0478 mm.	8.6		
0.0342 mm.	7.1		
0.0219 mm.	5.6		
0.0128 mm.	3.8		
0.0065 mm.	1.6		
0.0033 mm.	0.5		
0.0013 mm.	0.4		

* (no specification provided)

Soil Description

poorly graded gravel with silt and sand

Atterberg Limits

PL= 29 LL= 34 PI= 5

Coefficients

D_{90}= 26.9805 D_{85}= 19.9840 D_{60}= 9.8825
D_{50}= 7.1931 D_{30}= 1.3875 D_{15}= 0.2319
D_{10}= 0.0628 C_u= 157.46 C_c= 3.10

Classification

USCS= GP-GM AASHTO= A-1-a

Remarks

as received moisture content - 14.8%

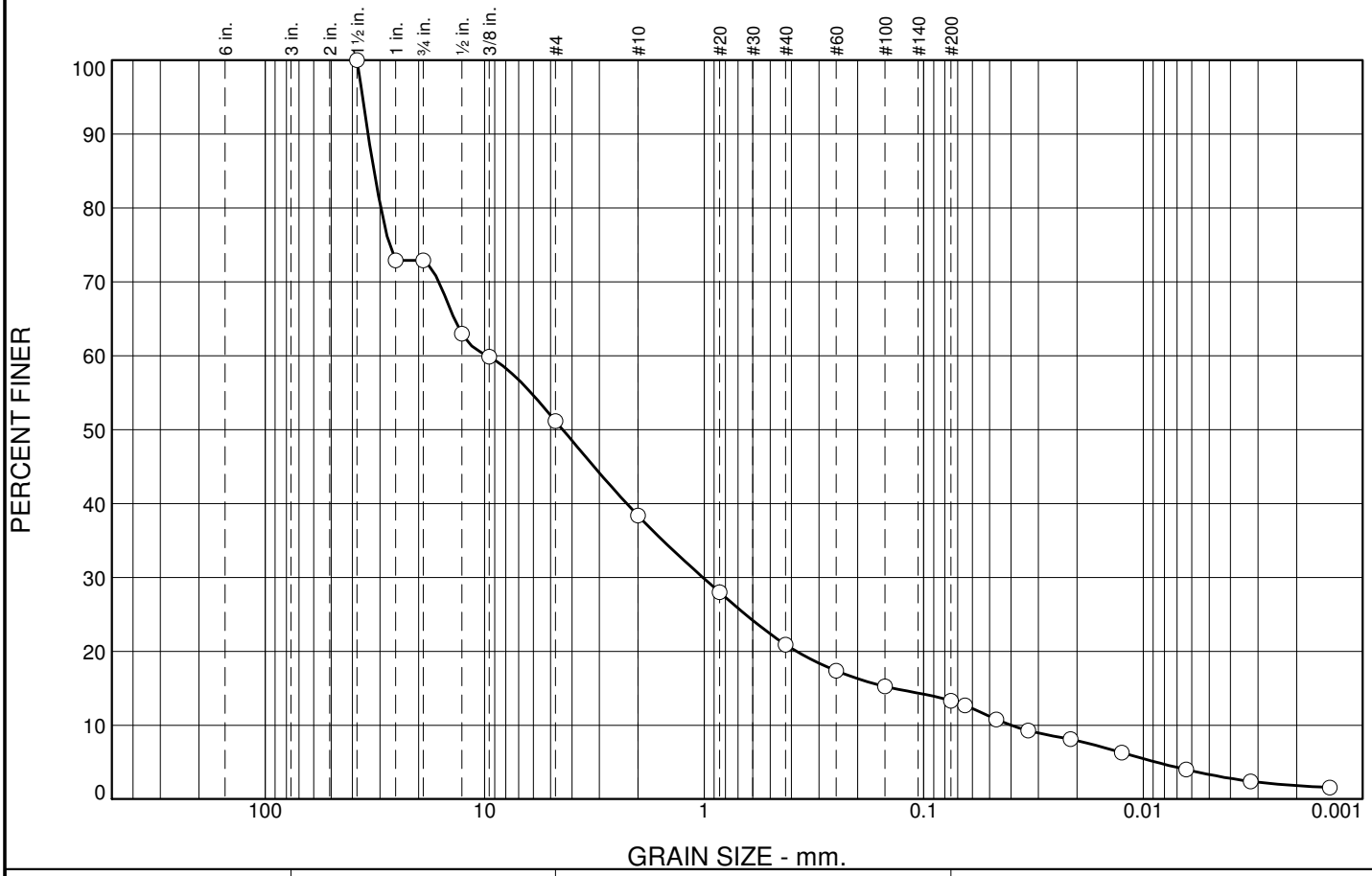
Location: GH11-238, Area A
Sample Number: SPT 16 **Depth:** 78-79.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	27.1	21.8	12.7	17.5	7.6	11.5	1.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	72.9		
.75	72.9		
.5	63.0		
0.375	59.9		
#4	51.1		
#10	38.4		
#20	28.0		
#40	20.9		
#60	17.4		
#100	15.2		
#200	13.3		
0.0648 mm.	12.7		
0.0466 mm.	10.8		
0.0334 mm.	9.3		
0.0214 mm.	8.1		
0.0125 mm.	6.3		
0.0064 mm.	4.0		
0.0032 mm.	2.4		
0.0014 mm.	1.6		

* (no specification provided)

Soil Description

silty gravel with sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 33.9889 D_{85}= 31.9438 D_{60}= 9.7255
D_{50}= 4.4127 D_{30}= 1.0143 D_{15}= 0.1379
D_{10}= 0.0400 C_u= 243.13 C_c= 2.64

Classification

USCS= GM AASHTO= A-1-a

Remarks

As received moisture content - 12.0%

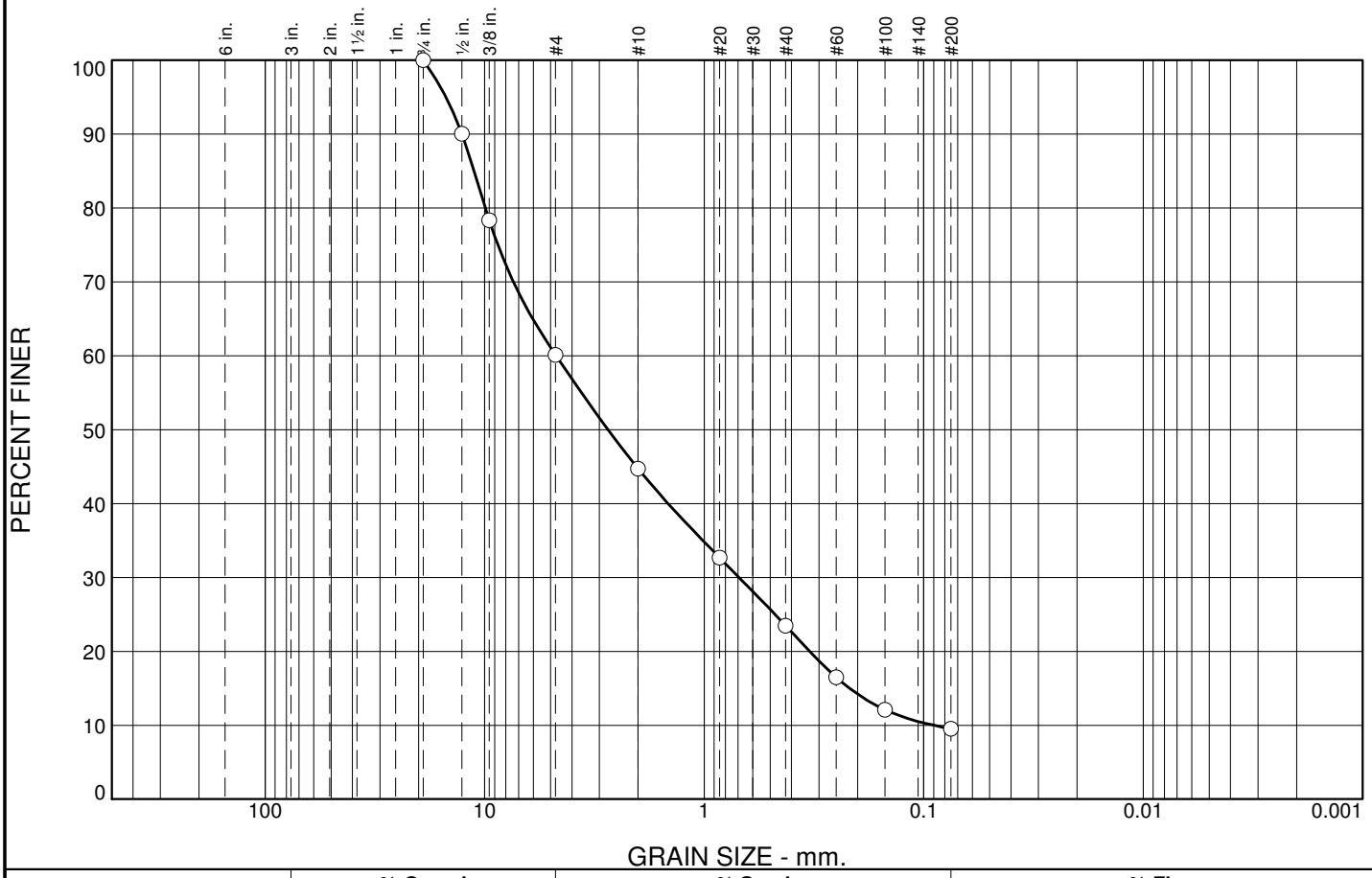
Location: GH11-238, Area A
Sample Number: SPT 17 **Depth:** 83-84.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	39.9	15.4	21.2	14.0	9.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	90.0		
0.375	78.3		
#4	60.1		
#10	44.7		
#20	32.7		
#40	23.5		
#60	16.5		
#100	12.1		
#200	9.5		

* (no specification provided)

Soil Description

well-graded sand with silt and gravel

Atterberg Limits

PL= NP LL= 22 PI= NP

Coefficients

D_{90}= 12.6859 D_{85}= 11.1764 D_{60}= 4.7176
D_{50}= 2.7429 D_{30}= 0.6936 D_{15}= 0.2173
D_{10}= 0.0900 C_u= 52.41 C_c= 1.13

Classification

USCS= SW-SM AASHTO= A-1-a

Remarks

As received moisture content - 14.8%

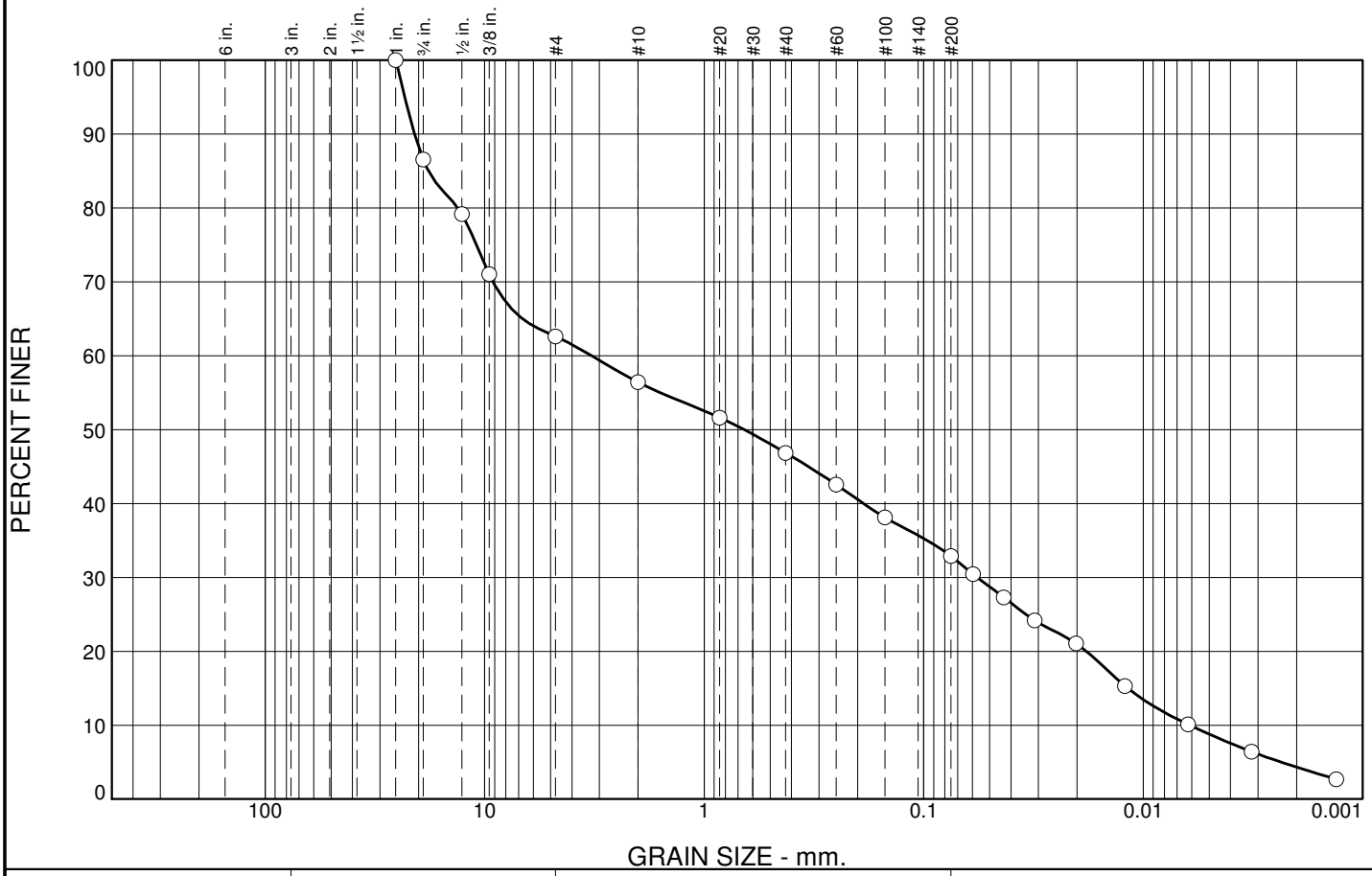
Location: GH11-238, Area A
Sample Number: SPT 20 **Depth:** 98-99.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.5	23.9	6.2	9.6	13.9	28.6	4.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	86.5		
.5	79.2		
0.375	71.0		
#4	62.6		
#10	56.4		
#20	51.6		
#40	46.8		
#60	42.5		
#100	38.1		
#200	32.9		
0.0596 mm.	30.4		
0.0431 mm.	27.3		
0.0312 mm.	24.2		
0.0202 mm.	21.0		
0.0121 mm.	15.3		
0.0062 mm.	10.1		
0.0032 mm.	6.4		
0.0013 mm.	2.7		

* (no specification provided)

Soil Description

silty clayey gravel with sand

Atterberg Limits

PL= 22 LL= 29 PI= 7

Coefficients

D_{90}= 20.8490 D_{85}= 18.0284 D_{60}= 3.2594
D_{50}= 0.6578 D_{30}= 0.0571 D_{15}= 0.0117
D_{10}= 0.0061 C_u= 532.75 C_c= 0.16

Classification

USCS= GC-GM AASHTO= A-2-4(0)

Remarks

As received moisture content - 20.6%

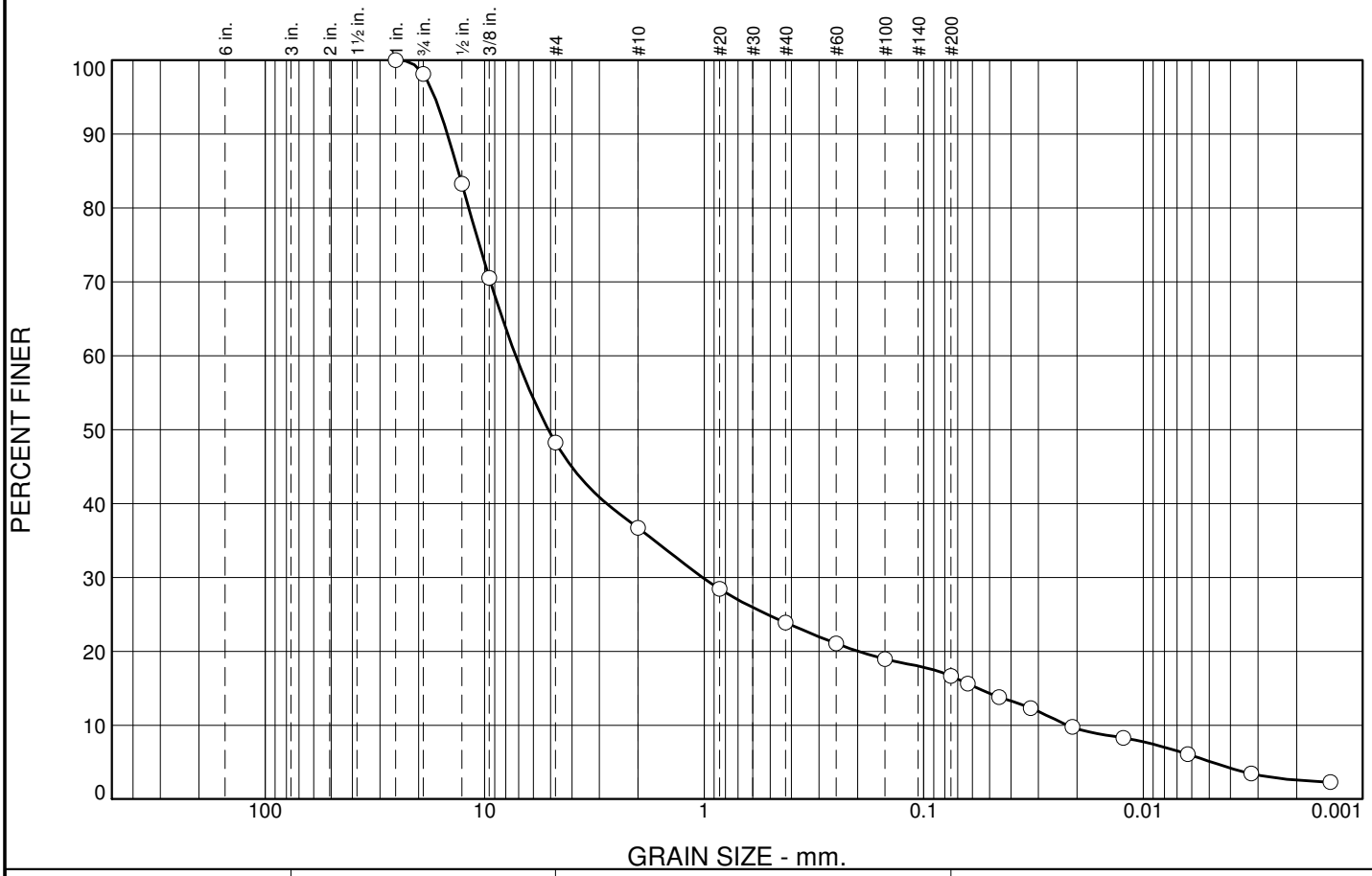
Location: GH11-238, Area A
Sample Number: SPT 21 **Depth:** 103-104.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.9	49.9	11.5	12.8	7.2	14.1	2.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.1		
.5	83.3		
0.375	70.5		
#4	48.2		
#10	36.7		
#20	28.4		
#40	23.9		
#60	21.1		
#100	19.0		
#200	16.7		
0.0629 mm.	15.6		
0.0452 mm.	13.8		
0.0325 mm.	12.3		
0.0210 mm.	9.8		
0.0123 mm.	8.3		
0.0063 mm.	6.1		
0.0032 mm.	3.4		
0.0014 mm.	2.3		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 20 LL= 28 PI= 8

Coefficients

D_{90}= 14.7851 D_{85}= 13.1901 D_{60}= 7.2181
D_{50}= 5.1274 D_{30}= 1.0168 D_{15}= 0.0567
D_{10}= 0.0221 C_u= 327.01 C_c= 6.49

Classification

USCS= GC AASHTO= A-2-4(0)

Remarks

As received moisture content - 17.0%

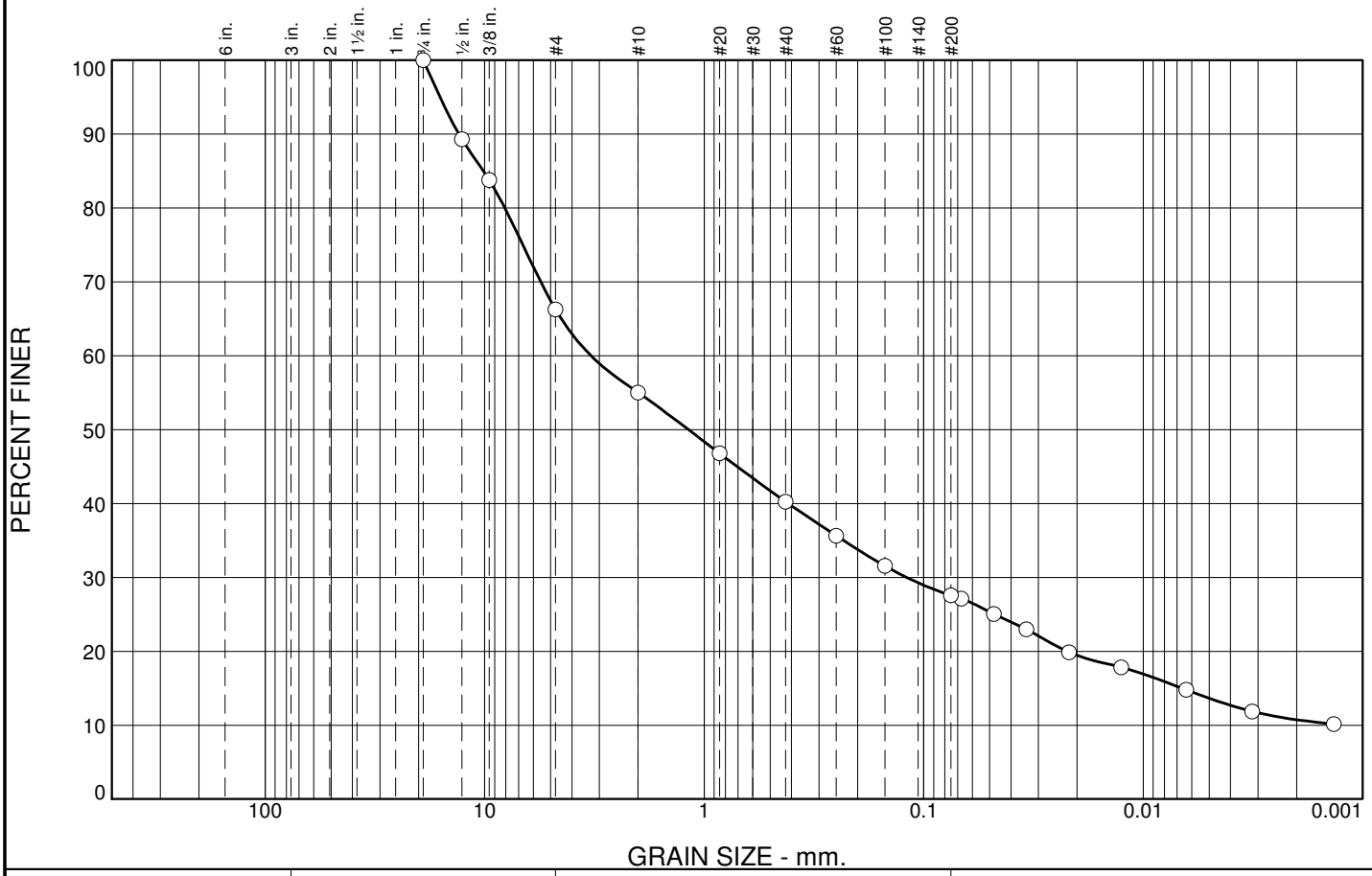
Location: GH11-238, Area A
Sample Number: SPT 22 **Depth:** 108-109.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	33.8	11.2	14.8	12.6	16.9	10.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	89.3		
0.375	83.8		
#4	66.2		
#10	55.0		
#20	46.8		
#40	40.2		
#60	35.6		
#100	31.5		
#200	27.6		
0.0672 mm.	27.1		
0.0478 mm.	25.0		
0.0340 mm.	23.0		
0.0217 mm.	19.9		
0.0126 mm.	17.8		
0.0064 mm.	14.8		
0.0032 mm.	11.9		
0.0014 mm.	10.1		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 16 LL= 26 PI= 10

Coefficients

D_{90}= 13.1164 D_{85}= 10.1374 D_{60}= 3.2785
D_{50}= 1.1788 D_{30}= 0.1196 D_{15}= 0.0066
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

As received moisture content - 9.9%

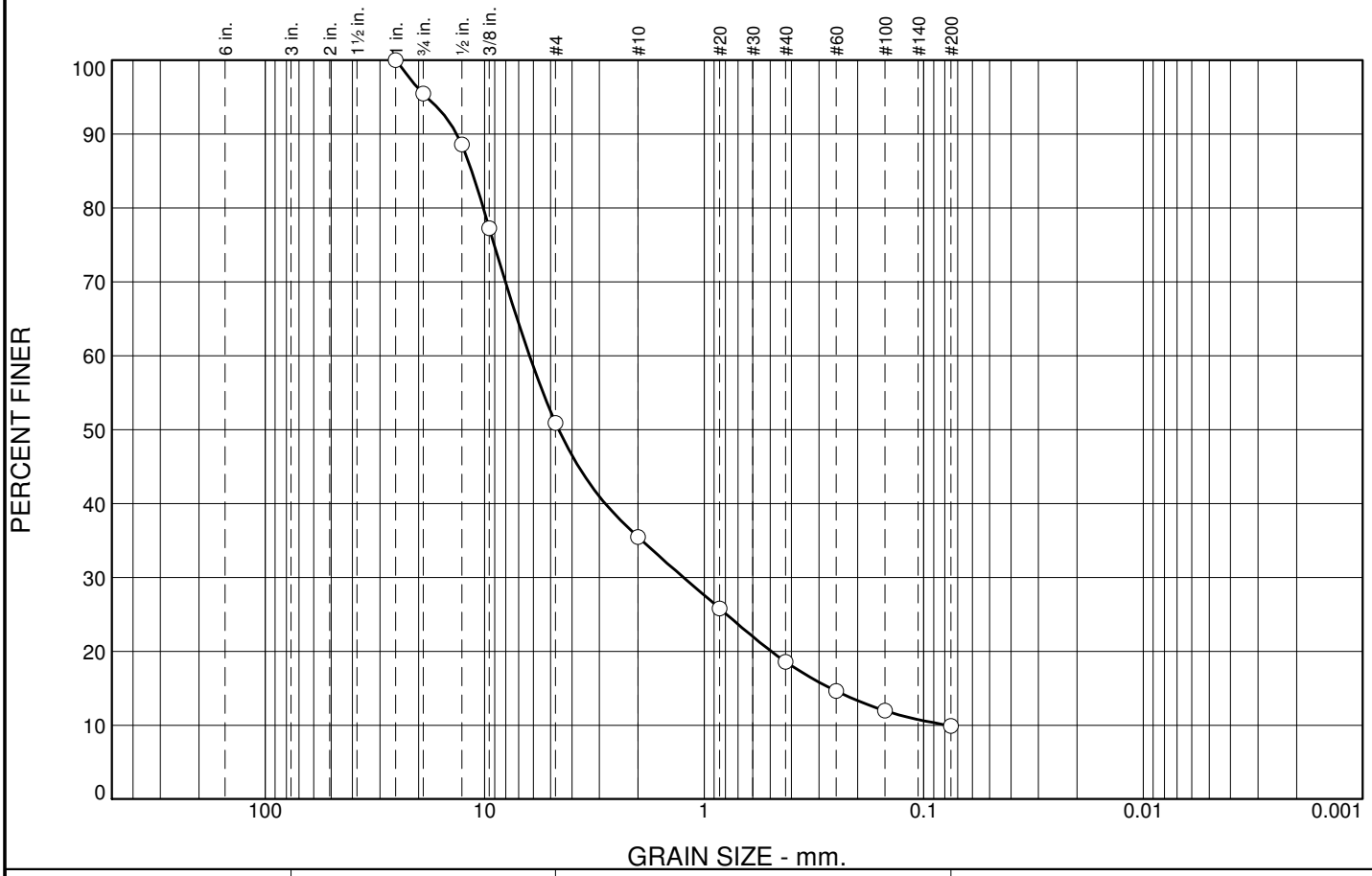
Location: GH11-238, Area A
Sample Number: SPT 26 **Depth:** 128-129.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.6	44.5	15.4	16.9	8.7	9.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.4		
.5	88.6		
0.375	77.3		
#4	50.9		
#10	35.5		
#20	25.8		
#40	18.6		
#60	14.6		
#100	12.0		
#200	9.9		

* (no specification provided)

Soil Description

poorly graded gravel with siltyclay and sand

Atterberg Limits

PL= 20 LL= 24 PI= 4

Coefficients

D_{90}= 13.4005 D_{85}= 11.4467 D_{60}= 6.2497
D_{50}= 4.5977 D_{30}= 1.2419 D_{15}= 0.2649
D_{10}= 0.0784 C_u= 79.71 C_c= 3.15

Classification

USCS= GP-GC AASHTO= A-1-a

Remarks

As received moisture content - 11.7%

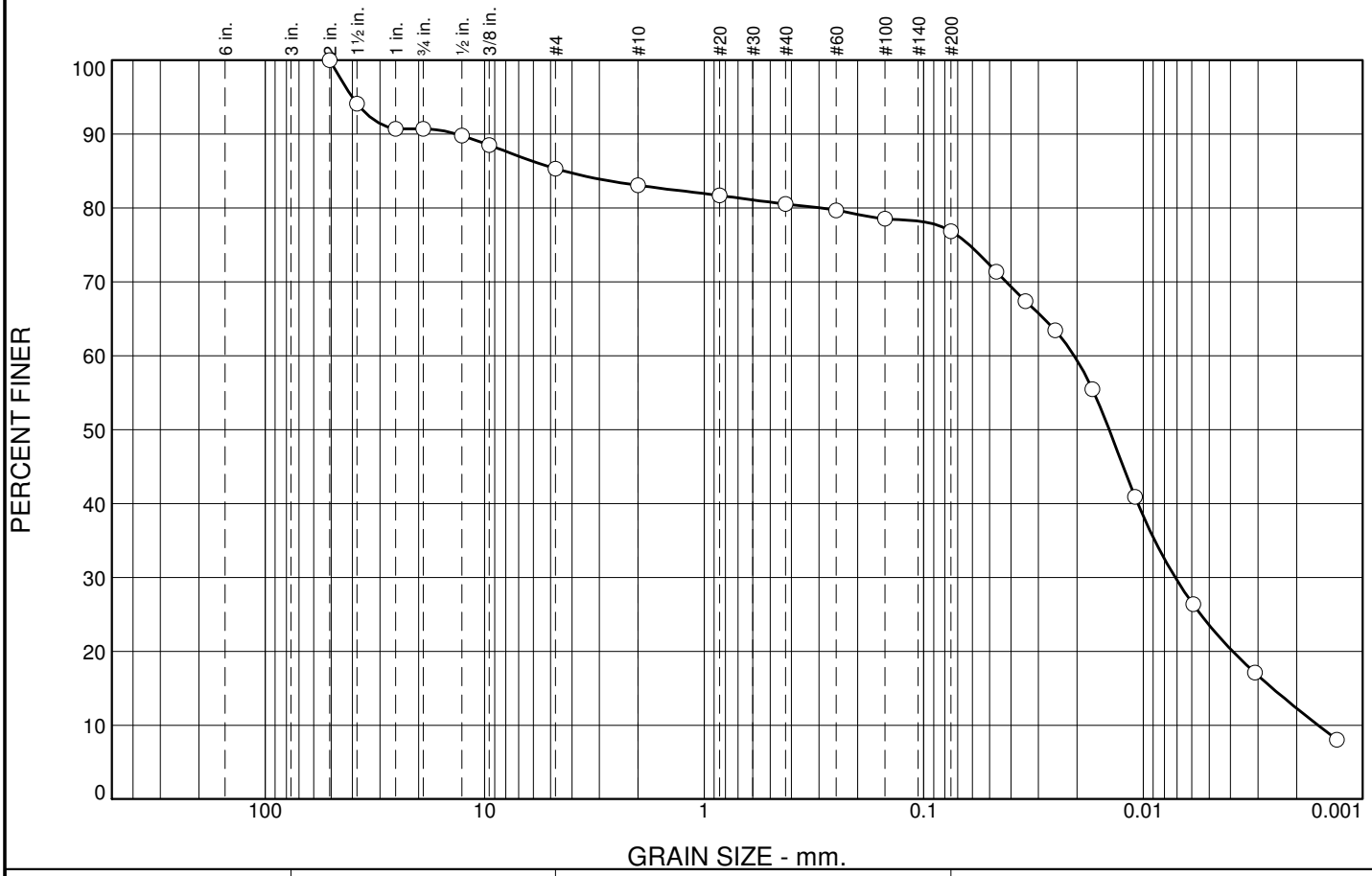
Location: GH11-238, Area A
Sample Number: SPT 29 **Depth:** 143-144.5' **Date:** 11/3/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.3	5.4	2.2	2.6	3.7	64.5	12.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	94.1		
1	90.7		
.75	90.7		
.5	89.8		
0.375	88.5		
#4	85.3		
#10	83.1		
#20	81.7		
#40	80.5		
#60	79.7		
#100	78.5		
#200	76.8		
0.0467 mm.	71.4		
0.0343 mm.	67.4		
0.0252 mm.	63.4		
0.0170 mm.	55.5		
0.0109 mm.	40.9		
0.0059 mm.	26.4		
0.0031 mm.	17.1		
0.0013 mm.	8.0		

* (no specification provided)

Soil Description

lean clay with gravel

Atterberg Limits

PL= 20 LL= 31 PI= 11

Coefficients

D_{90}= 13.4795 D_{85}= 4.3738 D_{60}= 0.0206
D_{50}= 0.0143 D_{30}= 0.0071 D_{15}= 0.0026
D_{10}= 0.0016 C_u= 12.91 C_c= 1.55

Classification

USCS= CL AASHTO= A-6(7)

Remarks

As received moisture content - 22.4%

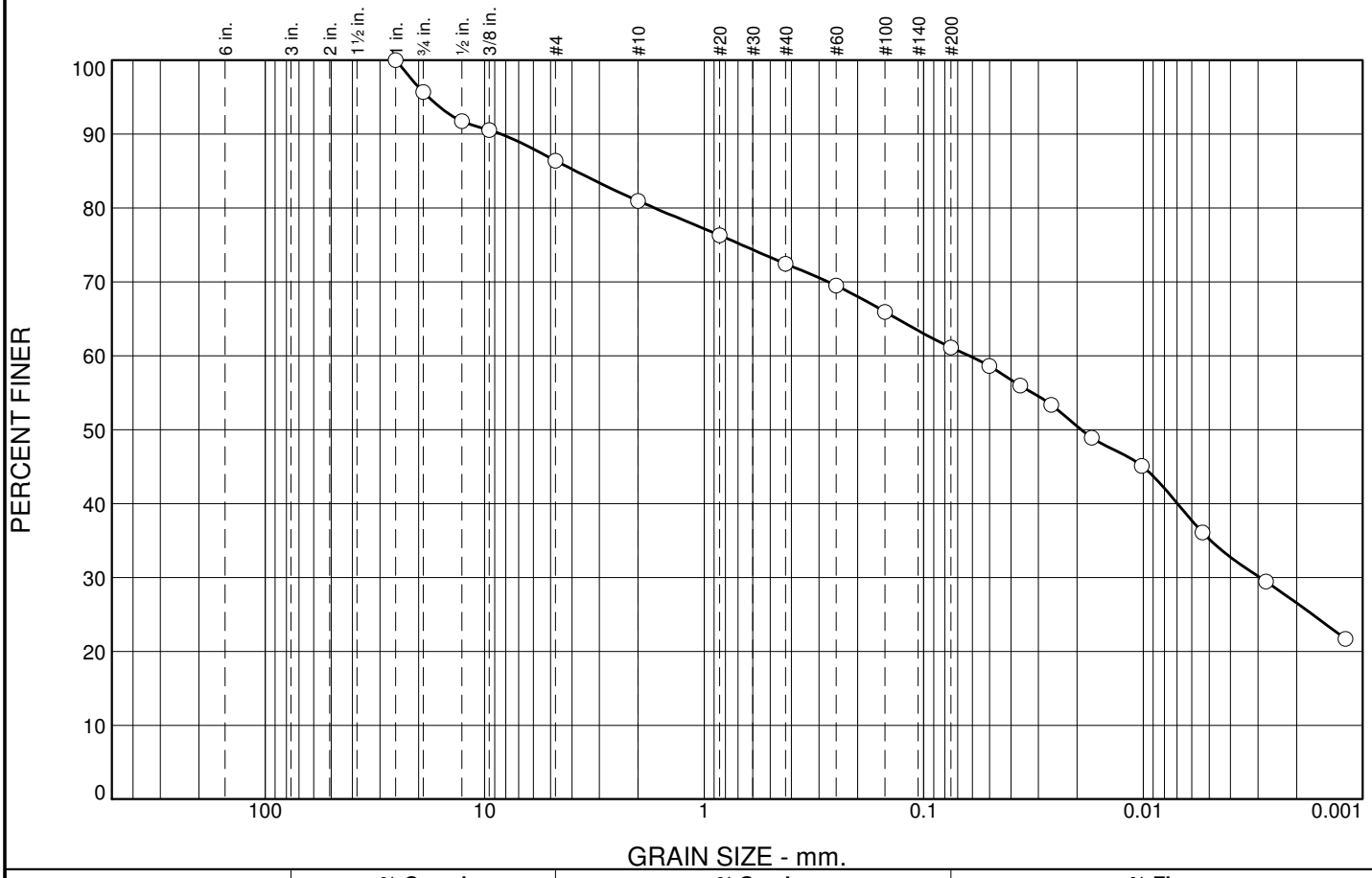
Location: GH11-239, Area A
Sample Number: GH11-239-1 **Depth:** 6-7' **Date:** 11/21/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.3	9.3	5.4	8.6	11.3	34.5	26.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.7		
.5	91.7		
0.375	90.5		
#4	86.4		
#10	81.0		
#20	76.3		
#40	72.4		
#60	69.5		
#100	65.9		
#200	61.1		
0.0502 mm.	58.6		
0.0363 mm.	55.9		
0.0262 mm.	53.4		
0.0171 mm.	48.9		
0.0101 mm.	45.1		
0.0054 mm.	36.1		
0.0028 mm.	29.4		
0.0012 mm.	21.7		

* (no specification provided)

Soil Description

sandy lean clay

Atterberg Limits

PL= 15 LL= 49 PI= 34

Coefficients

D_{90}= 8.4436 D_{85}= 3.8599 D_{60}= 0.0620
D_{50}= 0.0192 D_{30}= 0.0029 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(17)

Remarks

Natural MC and Density reported on triaxial compression report.

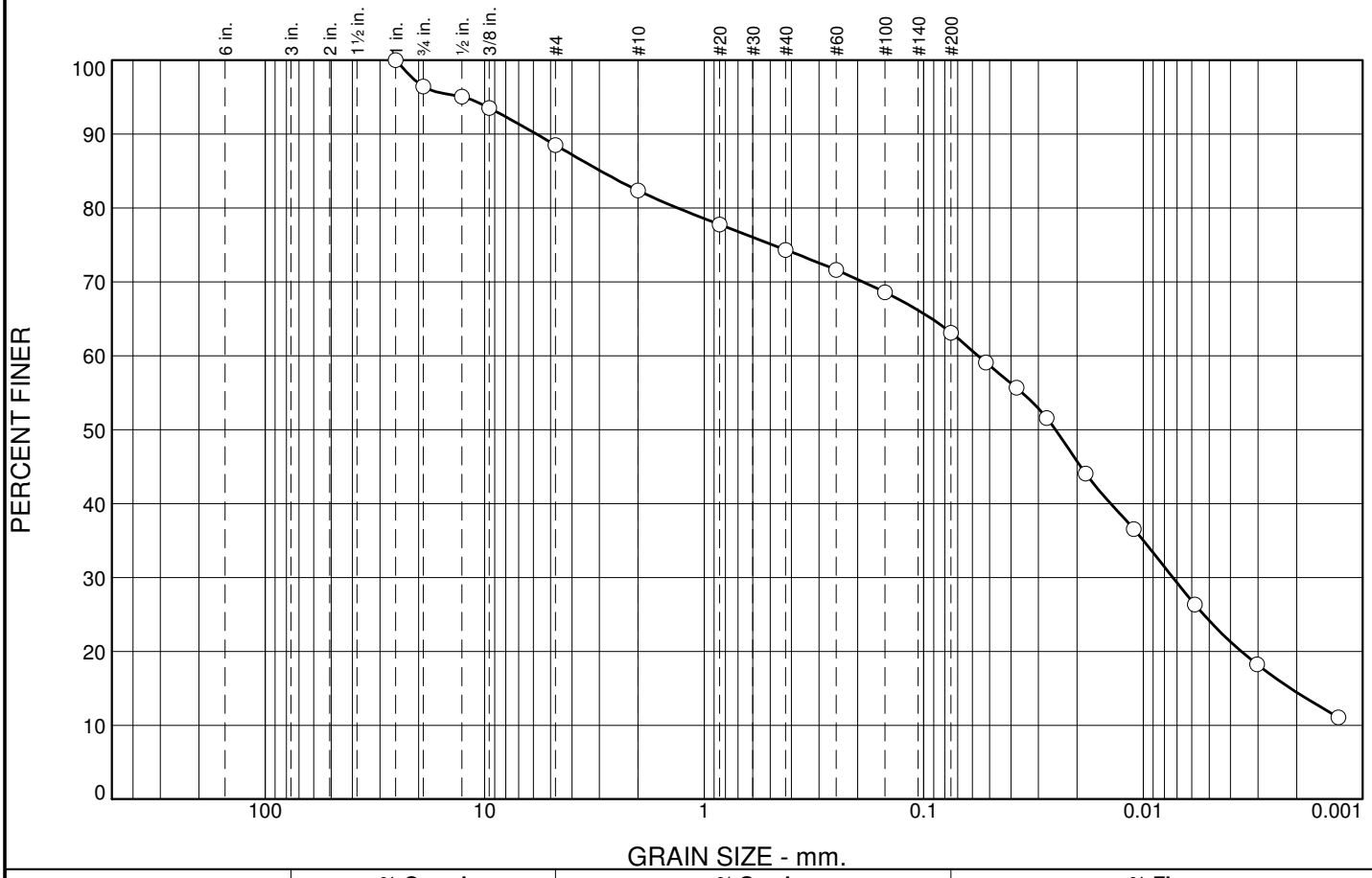
Location: GH11-239, Area A
Sample Number: GH11-239-2 **Depth:** 14-15.5' **Date:** 9/27/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.6	7.9	6.1	8.1	11.2	48.6	14.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.4		
.5	95.1		
0.375	93.5		
#4	88.5		
#10	82.4		
#20	77.8		
#40	74.3		
#60	71.6		
#100	68.6		
#200	63.1		
0.0520 mm.	59.1		
0.0377 mm.	55.7		
0.0275 mm.	51.6		
0.0183 mm.	44.1		
0.0110 mm.	36.6		
0.0058 mm.	26.3		
0.0030 mm.	18.2		
0.0013 mm.	11.1		

* (no specification provided)

Soil Description

sandy lean clay

Atterberg Limits

PL= 19 LL= 30 PI= 11

Coefficients

D_{90}= 5.8167 D_{85}= 2.9668 D_{60}= 0.0566
D_{50}= 0.0251 D_{30}= 0.0073 D_{15}= 0.0021
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(5)

Remarks

As received moisture content - 23.7%

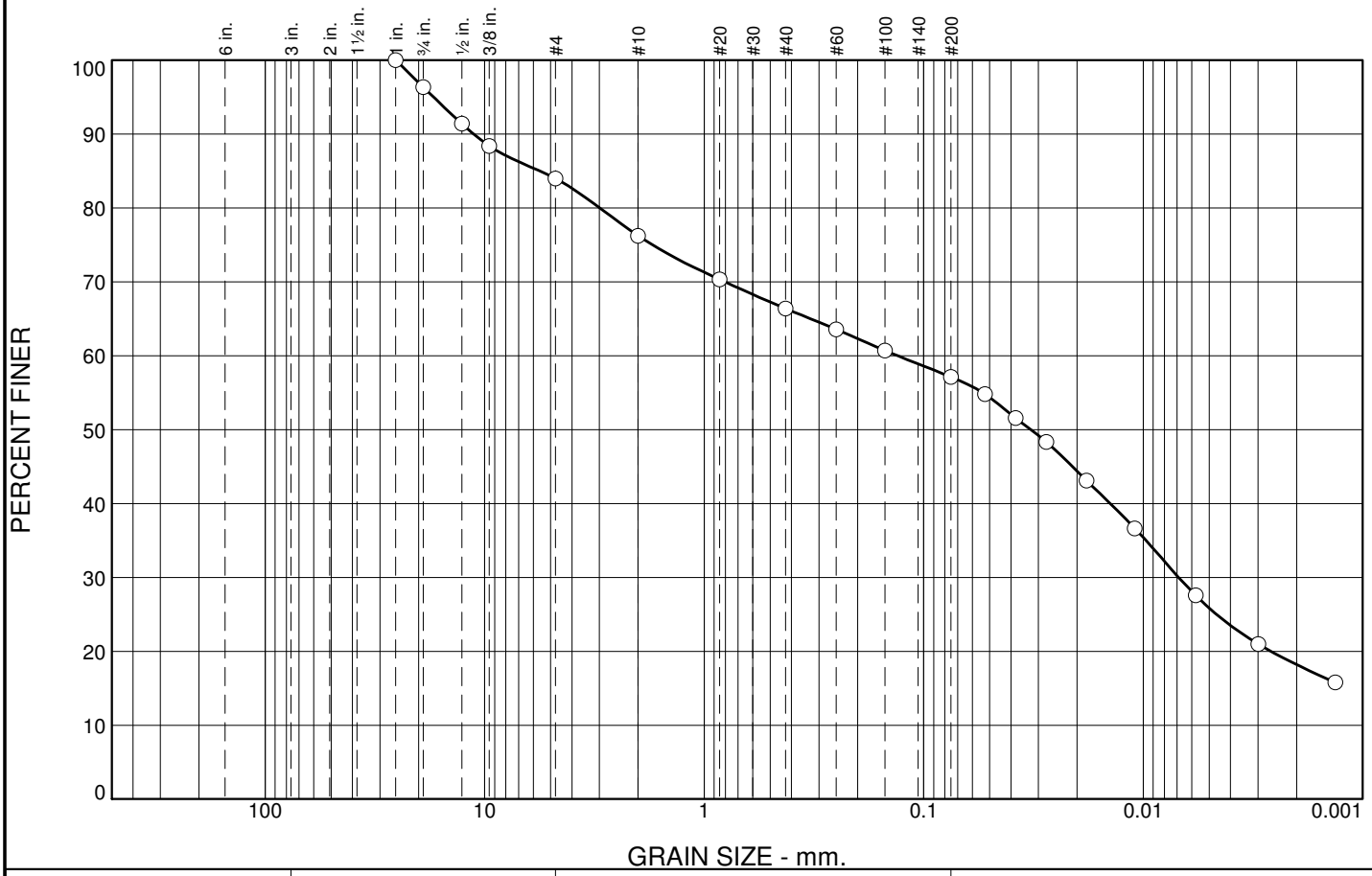
Location: GH11-239, Area A
Sample Number: SPT 1 **Depth:** 4-5.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.6	12.4	7.8	9.8	9.3	38.9	18.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.4		
.5	91.4		
0.375	88.4		
#4	84.0		
#10	76.2		
#20	70.3		
#40	66.4		
#60	63.6		
#100	60.7		
#200	57.1		
0.0526 mm.	54.8		
0.0381 mm.	51.6		
0.0276 mm.	48.3		
0.0181 mm.	43.1		
0.0109 mm.	36.6		
0.0058 mm.	27.6		
0.0030 mm.	21.0		
0.0013 mm.	15.8		

* (no specification provided)

Soil Description

sandy lean clay with gravel

Atterberg Limits

PL= 17 LL= 37 PI= 20

Coefficients

D_{90}= 11.2235 D_{85}= 5.6065 D_{60}= 0.1315
D_{50}= 0.0325 D_{30}= 0.0069 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(8)

Remarks

As received moisture content - 18.4%

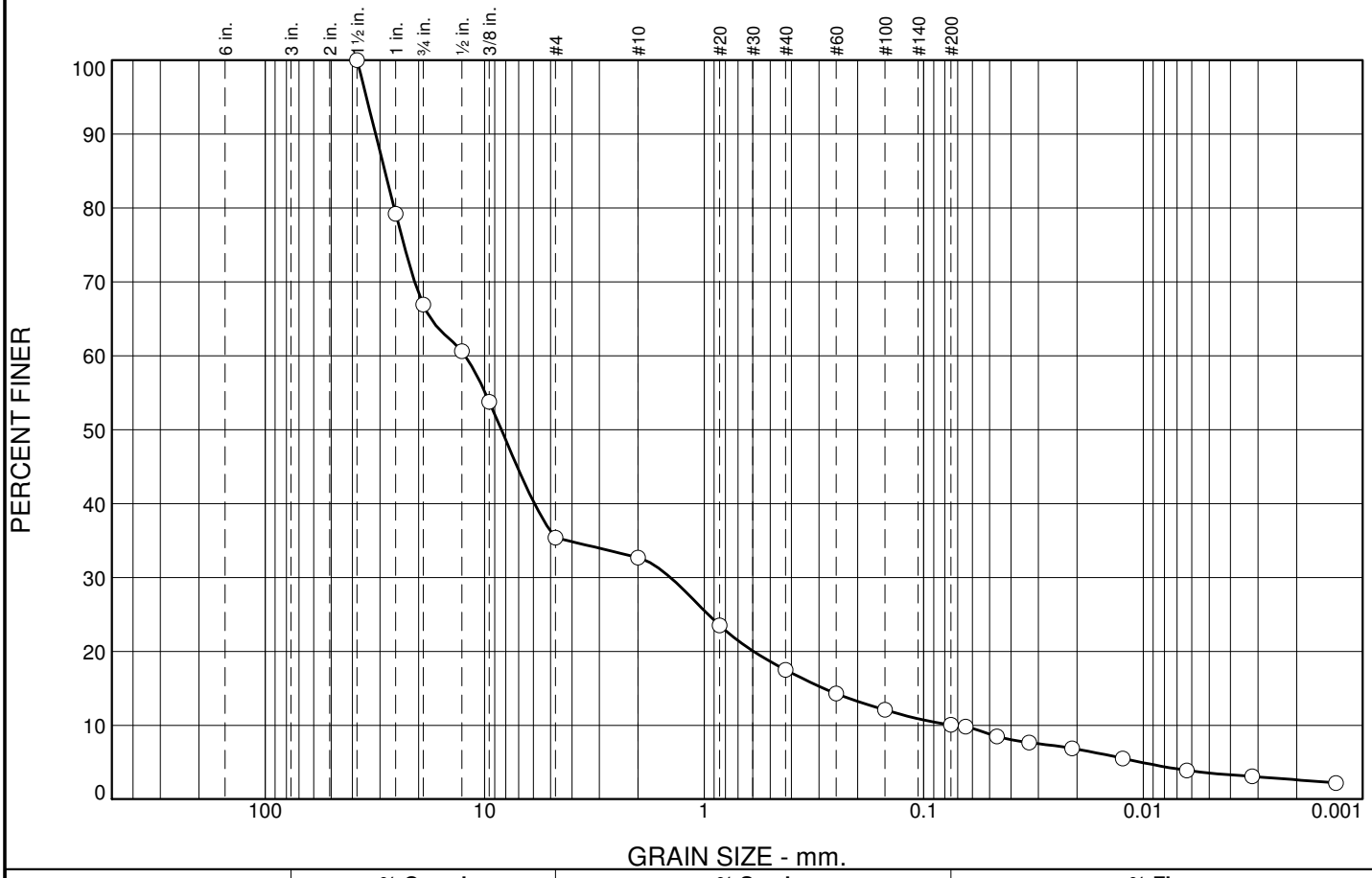
Location: GH11-239, Area A
Sample Number: SPT 5 **Depth:** 24-25.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	33.1	31.5	2.7	15.2	7.4	7.5	2.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	79.2		
.75	66.9		
.5	60.6		
0.375	53.8		
#4	35.4		
#10	32.7		
#20	23.5		
#40	17.5		
#60	14.3		
#100	12.1		
#200	10.1		
0.0644 mm.	9.8		
0.0463 mm.	8.5		
0.0331 mm.	7.7		
0.0211 mm.	6.9		
0.0124 mm.	5.5		
0.0063 mm.	3.9		
0.0032 mm.	3.1		
0.0013 mm.	2.2		

* (no specification provided)

Soil Description

well-graded gravel with siltyclay and sand

Atterberg Limits

PL= 22 LL= 27 PI= 5

Coefficients

D_{90}= 31.4112 D_{85}= 28.4921 D_{60}= 12.2488
D_{50}= 8.3930 D_{30}= 1.4245 D_{15}= 0.2857
D_{10}= 0.0711 C_u= 172.30 C_c= 2.33

Classification

USCS= GW-GC AASHTO= A-1-a

Remarks

As received moisture content - 8.8%

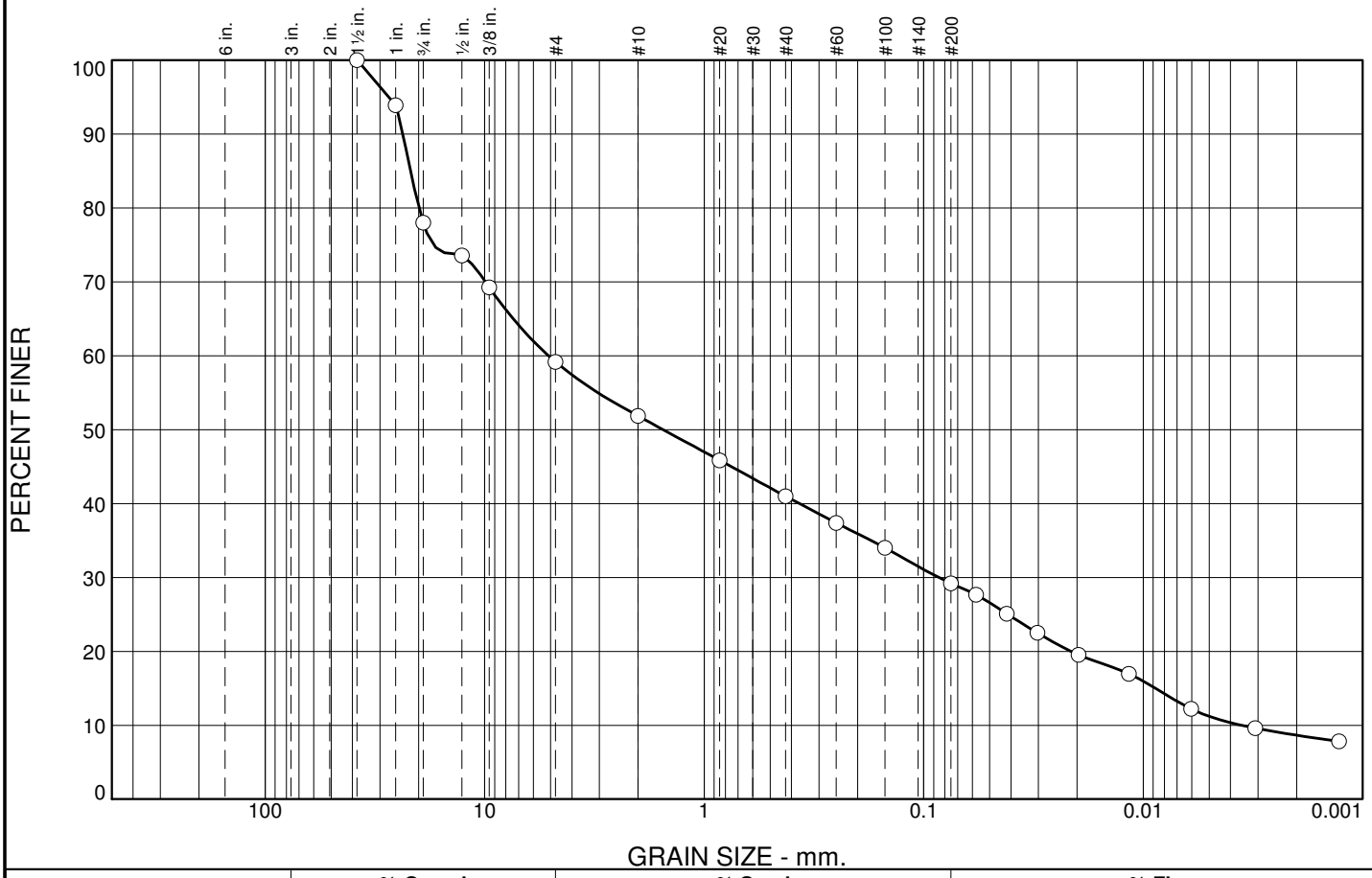
Location: GH11-239, Area A
Sample Number: SPT 6 **Depth:** 29-30.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	22.0	18.8	7.4	10.8	11.8	20.5	8.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	93.9		
.75	78.0		
.5	73.5		
0.375	69.2		
#4	59.2		
#10	51.8		
#20	45.9		
#40	41.0		
#60	37.4		
#100	34.0		
#200	29.2		
0.0577 mm.	27.7		
0.0419 mm.	25.1		
0.0303 mm.	22.5		
0.0197 mm.	19.5		
0.0116 mm.	17.0		
0.0060 mm.	12.2		
0.0031 mm.	9.6		
0.0013 mm.	7.8		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 15 LL= 31 PI= 16

Coefficients

D_{90}= 23.6038 D_{85}= 21.7346 D_{60}= 5.1119
D_{50}= 1.5387 D_{30}= 0.0853 D_{15}= 0.0088
D_{10}= 0.0036 C_u= 1428.76 C_c= 0.40

Classification

USCS= GC AASHTO= A-2-6(1)

Remarks

As received moisture content - 10.3%

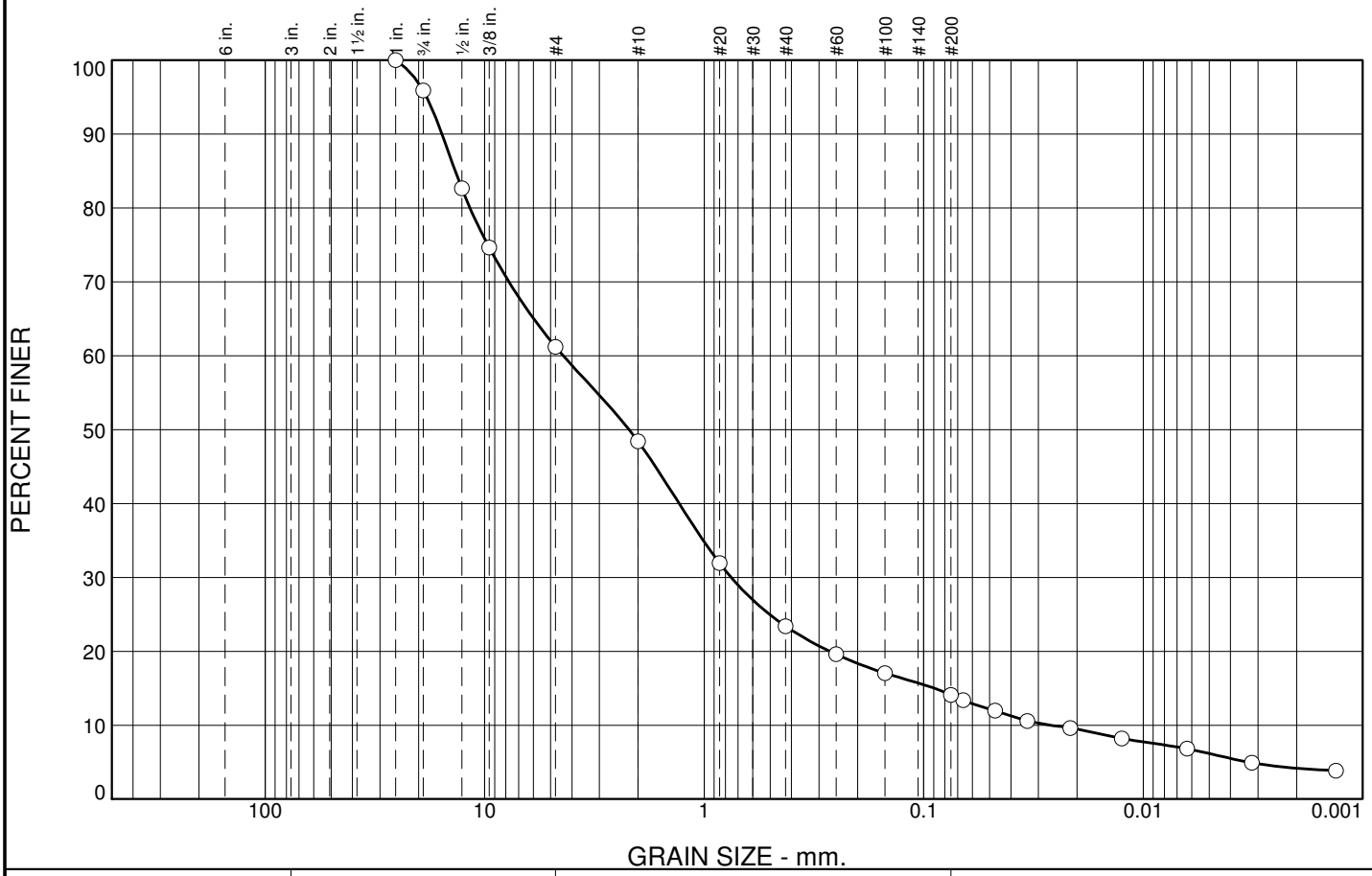
Location: GH11-239, Area A
Sample Number: SPT 11 **Depth:** 54-55.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.1	34.7	12.8	25.0	9.3	9.9	4.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.9		
.5	82.6		
0.375	74.6		
#4	61.2		
#10	48.4		
#20	31.9		
#40	23.4		
#60	19.6		
#100	17.0		
#200	14.1		
0.0661 mm.	13.4		
0.0472 mm.	12.0		
0.0337 mm.	10.6		
0.0215 mm.	9.6		
0.0125 mm.	8.2		
0.0063 mm.	6.8		
0.0032 mm.	4.9		
0.0013 mm.	3.9		

* (no specification provided)

Soil Description

silty, clayey sand with gravel

Atterberg Limits

PL= 20 LL= 27 PI= 7

Coefficients

D_{90}= 15.6652 D_{85}= 13.6113 D_{60}= 4.3855
D_{50}= 2.2000 D_{30}= 0.7531 D_{15}= 0.0894
D_{10}= 0.0264 C_u= 166.14 C_c= 4.90

Classification

USCS= SC-SM AASHTO= A-2-4(0)

Remarks

As received moisture content - 9.5%

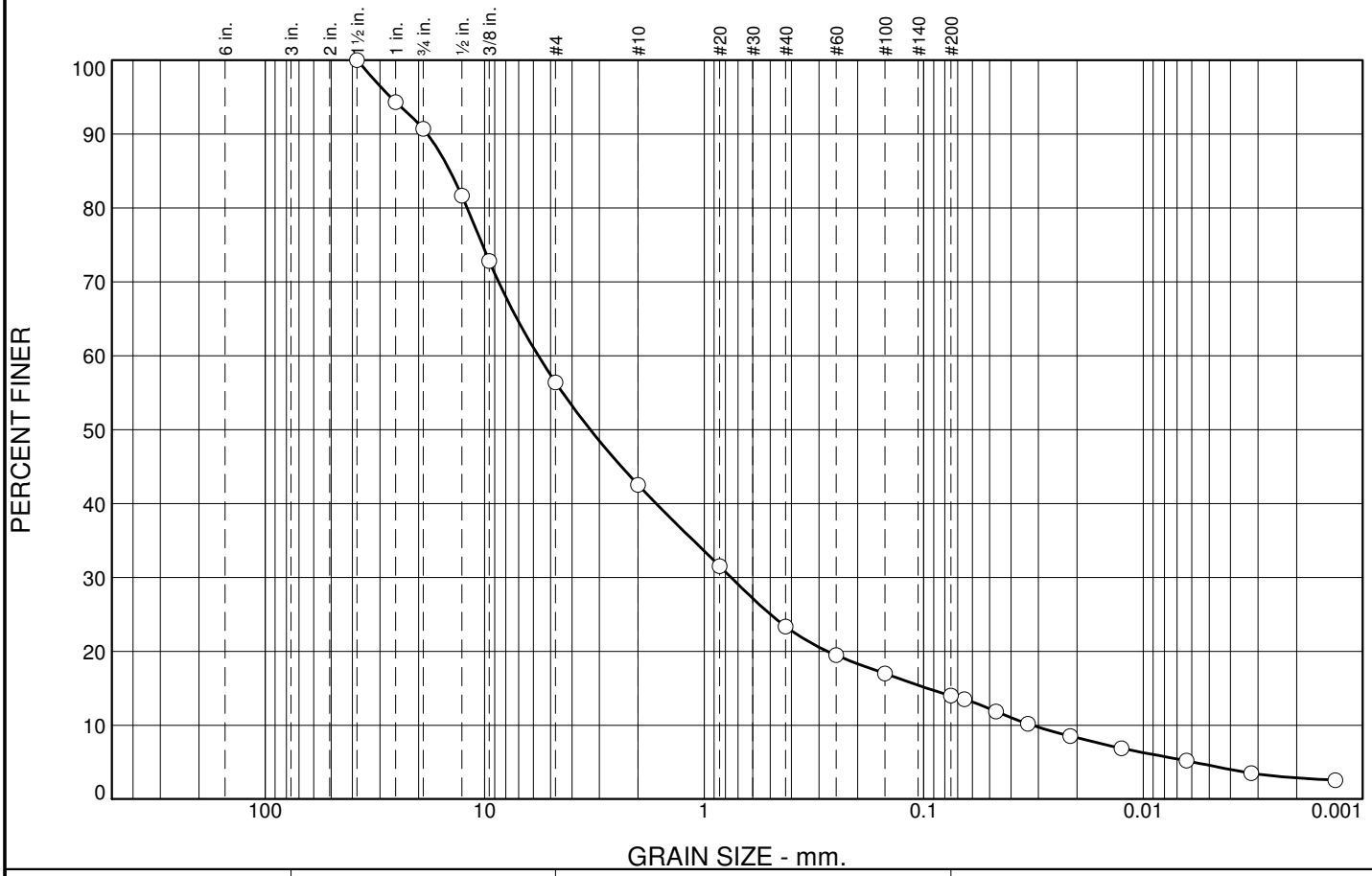
Location: GH11-239, Area A
Sample Number: SPT 12 **Depth:** 59-60.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.3	34.3	13.9	19.2	9.3	11.1	2.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	94.3		
.75	90.7		
.5	81.6		
0.375	72.8		
#4	56.4		
#10	42.5		
#20	31.5		
#40	23.3		
#60	19.5		
#100	17.0		
#200	14.0		
0.0653 mm.	13.5		
0.0468 mm.	11.9		
0.0335 mm.	10.2		
0.0215 mm.	8.5		
0.0125 mm.	6.9		
0.0064 mm.	5.2		
0.0032 mm.	3.5		
0.0013 mm.	2.6		

* (no specification provided)

Soil Description

silty gravel with sand

Atterberg Limits

PL= 23 LL= 28 PI= 5

Coefficients

D_{90}= 18.2375 D_{85}= 14.3800 D_{60}= 5.7011
D_{50}= 3.3029 D_{30}= 0.7541 D_{15}= 0.0968
D_{10}= 0.0322 C_u= 177.17 C_c= 3.10

Classification

USCS= GM AASHTO= A-1-a

Remarks

As received moisture content - 15.4%

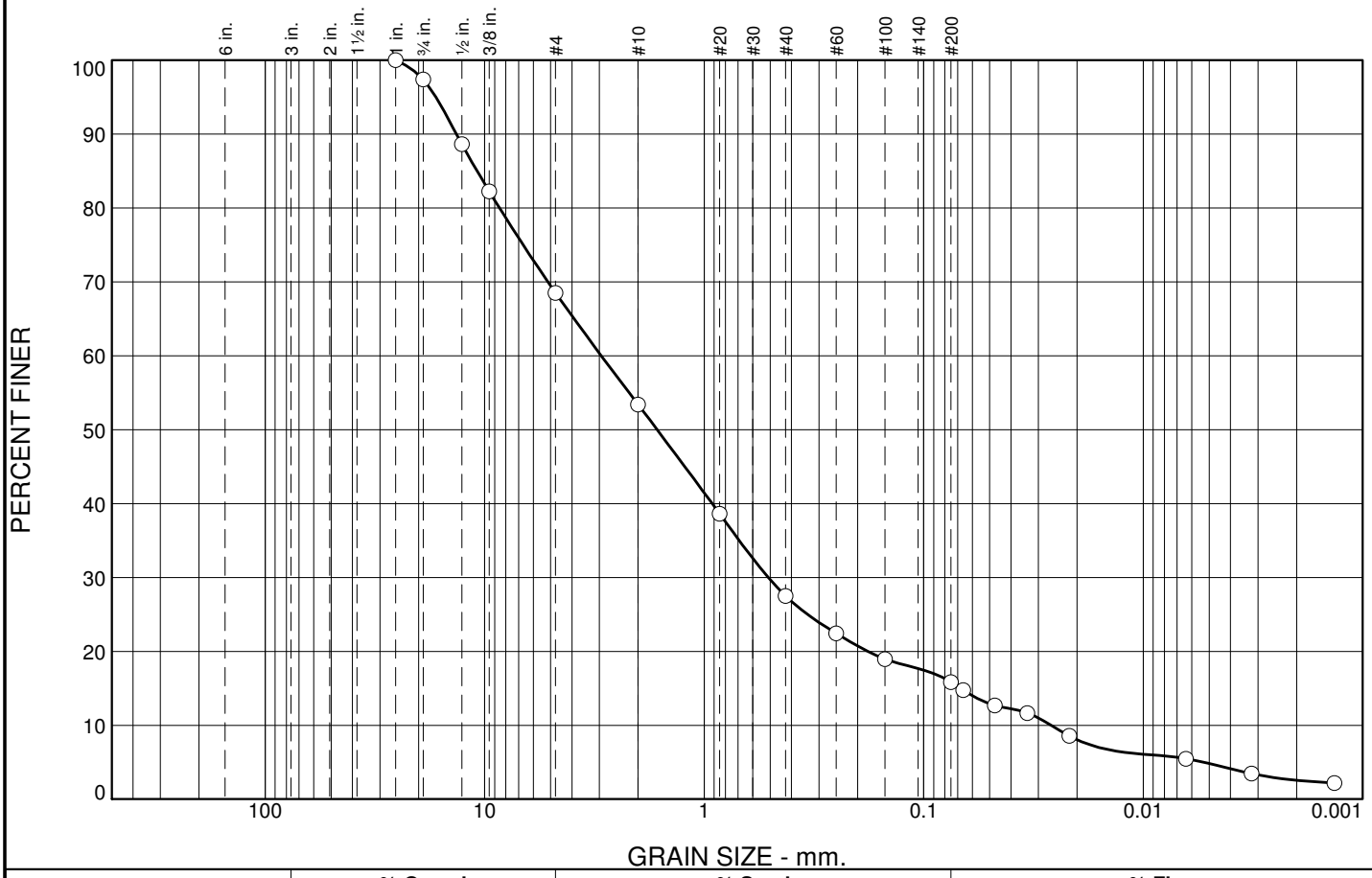
Location: GH11-239, Area A
Sample Number: SPT 14 **Depth:** 69-70.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.6	28.9	15.1	25.9	11.7	13.2	2.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.4		
.5	88.6		
0.375	82.2		
#4	68.5		
#10	53.4		
#20	38.6		
#40	27.5		
#60	22.4		
#100	19.0		
#200	15.8		
0.0661 mm.	14.8		
0.0474 mm.	12.7		
0.0337 mm.	11.7		
0.0217 mm.	8.6		
0.0064 mm.	5.5		
0.0032 mm.	3.5		
0.0013 mm.	2.2		

* (no specification provided)

Soil Description

silty, clayey sand with gravel

Atterberg Limits

PL= 22 LL= 28 PI= 6

Coefficients

D_{90}= 13.4428 D_{85}= 10.8247 D_{60}= 2.9421
D_{50}= 1.6382 D_{30}= 0.5105 D_{15}= 0.0679
D_{10}= 0.0263 C_u= 111.92 C_c= 3.37

Classification

USCS= SC-SM AASHTO= A-1-b

Remarks

As received moisture content - 13.1%

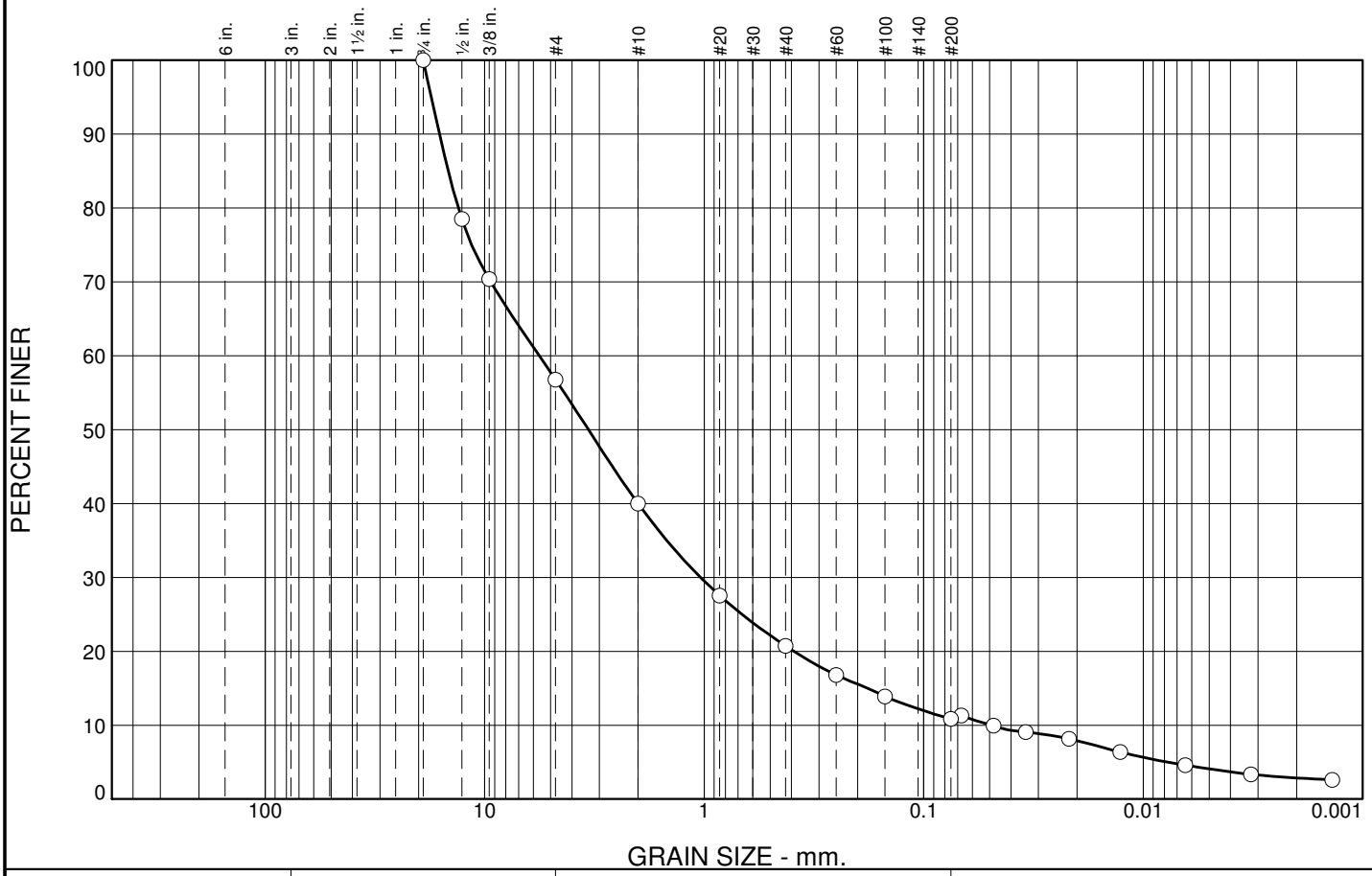
Location: GH11-239, Area A
Sample Number: SPT 16 **Depth:** 79-80.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	43.2	16.8	19.3	9.9	7.9	2.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	78.5		
0.375	70.4		
#4	56.8		
#10	40.0		
#20	27.6		
#40	20.7		
#60	16.8		
#100	13.9		
#200	10.8		
0.0673 mm.	11.3		
0.0481 mm.	9.9		
0.0342 mm.	9.1		
0.0218 mm.	8.2		
0.0127 mm.	6.4		
0.0064 mm.	4.6		
0.0032 mm.	3.4		
0.0014 mm.	2.6		

* (no specification provided)

Soil Description

poorly graded sand with silt and gravel

Atterberg Limits

PL= NP LL= 26 PI= NP

Coefficients

D_{90}= 16.0735 D_{85}= 14.6516 D_{60}= 5.6411
D_{50}= 3.3704 D_{30}= 1.0380 D_{15}= 0.1805
D_{10}= 0.0488 C_u= 115.52 C_c= 3.91

Classification

USCS= SP-SM AASHTO= A-1-a

Remarks

As received moisture content - 13.9%

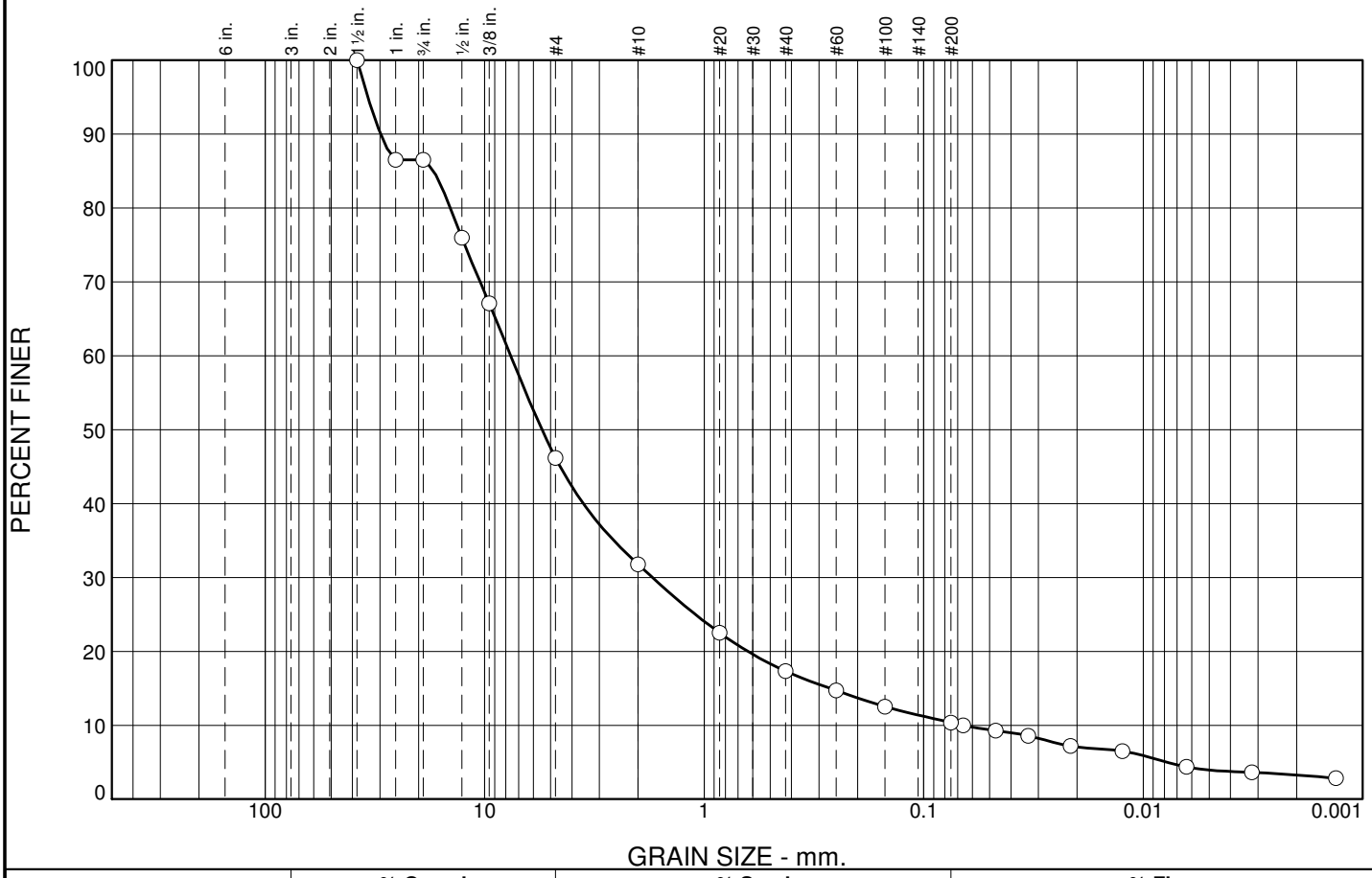
Location: GH11-239, Area A
Sample Number: SPT 18 **Depth:** 89-90.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.5	40.3	14.4	14.5	6.9	7.1	3.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	86.5		
.75	86.5		
.5	76.0		
0.375	67.1		
#4	46.2		
#10	31.8		
#20	22.5		
#40	17.3		
#60	14.7		
#100	12.5		
#200	10.4		
0.0660 mm.	10.0		
0.0469 mm.	9.3		
0.0334 mm.	8.6		
0.0214 mm.	7.2		
0.0124 mm.	6.5		
0.0063 mm.	4.4		
0.0032 mm.	3.6		
0.0013 mm.	2.8		

* (no specification provided)

Soil Description

silty, clayey gravel with sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 29.8422 D_{85}= 17.1327 D_{60}= 7.6065
D_{50}= 5.4824 D_{30}= 1.7225 D_{15}= 0.2669
D_{10}= 0.0665 C_u= 114.33 C_c= 5.86

Classification

USCS= AASHTO=

Remarks

as received moisture content - 14.6%. Insufficient material quantity to perform Atterberg Limits.

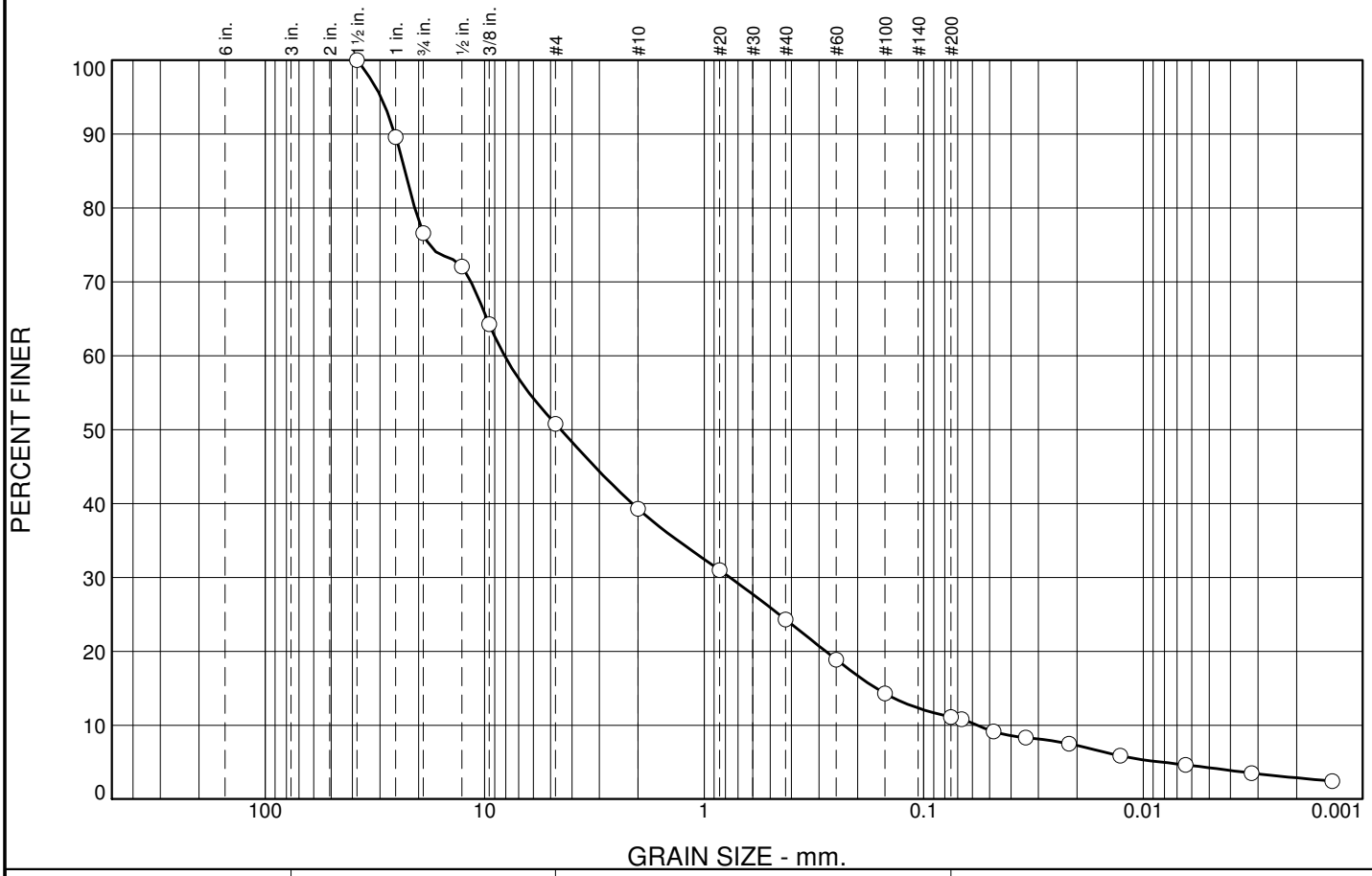
Location: GH11-239, Area A
Sample Number: SPT 20 **Depth:** 99-100.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	23.4	25.8	11.5	15.0	13.2	8.2	2.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	89.6		
.75	76.6		
.5	72.1		
0.375	64.2		
#4	50.8		
#10	39.3		
#20	31.0		
#40	24.3		
#60	18.9		
#100	14.3		
#200	11.1		
0.0671 mm.	10.8		
0.0481 mm.	9.1		
0.0342 mm.	8.3		
0.0218 mm.	7.5		
0.0127 mm.	5.9		
0.0064 mm.	4.6		
0.0032 mm.	3.5		
0.0014 mm.	2.4		

* (no specification provided)

Soil Description

well-graded gravel with silt and sand

Atterberg Limits

PL= NP LL= 23 PI= NP

Coefficients

D_{90}= 25.6429 D_{85}= 23.0620 D_{60}= 8.1110
D_{50}= 4.5022 D_{30}= 0.7633 D_{15}= 0.1645
D_{10}= 0.0569 C_u= 142.57 C_c= 1.26

Classification

USCS= GW-GM AASHTO= A-1-a

Remarks

As received moisture content - 10.2%

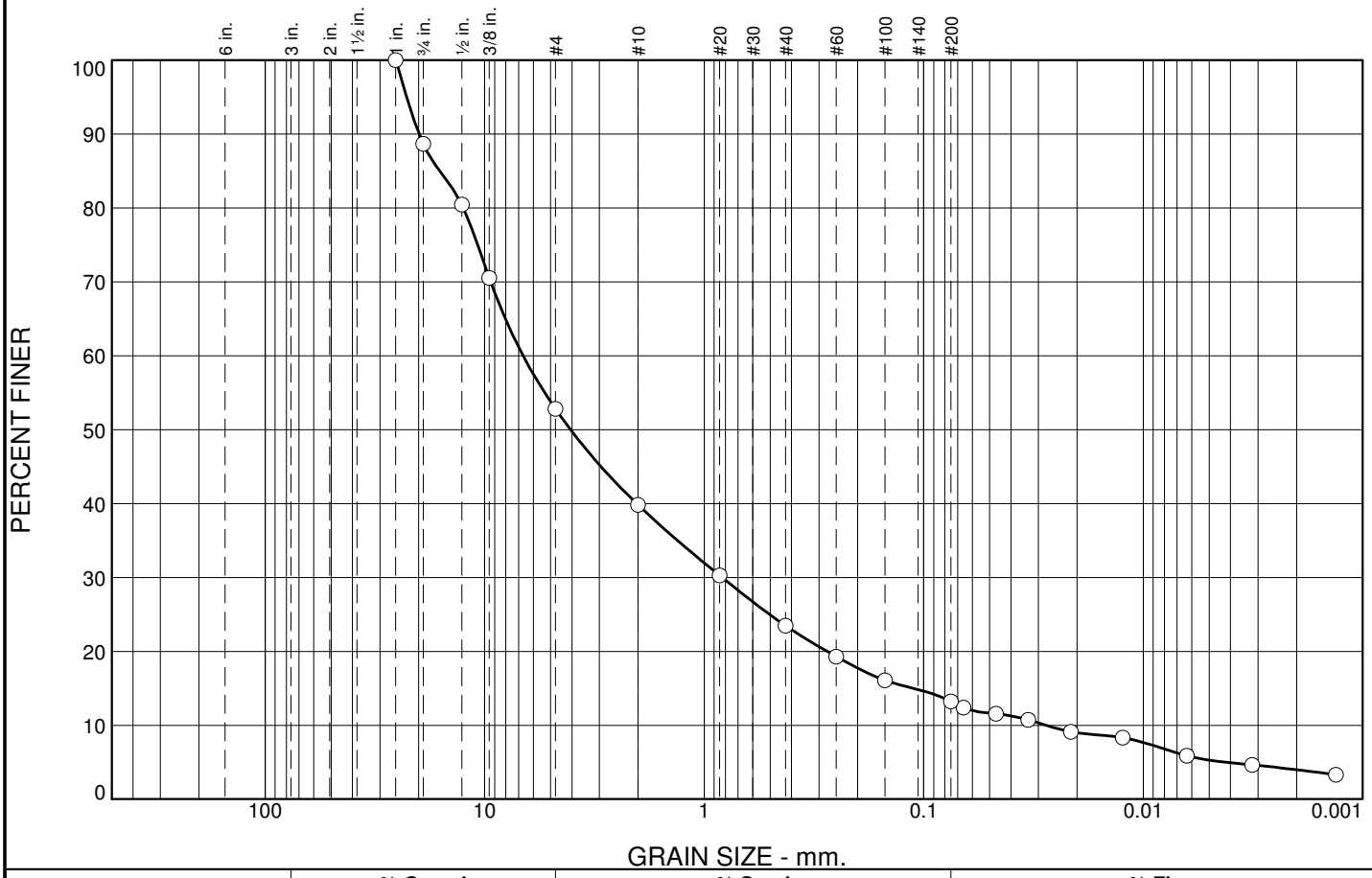
Location: GH11-239, Area A
Sample Number: SPT 21 **Depth:** 104-105.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.3	35.9	13.0	16.3	10.3	9.2	4.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	88.7		
.5	80.4		
0.375	70.5		
#4	52.8		
#10	39.8		
#20	30.3		
#40	23.5		
#60	19.3		
#100	16.1		
#200	13.2		
0.0658 mm.	12.4		
0.0468 mm.	11.6		
0.0334 mm.	10.7		
0.0214 mm.	9.1		
0.0124 mm.	8.3		
0.0063 mm.	5.9		
0.0032 mm.	4.6		
0.0013 mm.	3.3		

* (no specification provided)

Soil Description

silty clayey gravel with sand

Atterberg Limits

PL= 20 LL= 26 PI= 6

Coefficients

D_{90}= 19.8830 D_{85}= 16.0689 D_{60}= 6.6807
D_{50}= 4.0609 D_{30}= 0.8285 D_{15}= 0.1118
D_{10}= 0.0276 C_u= 241.91 C_c= 3.72

Classification

USCS= GC-GM AASHTO= A-1-a

Remarks

As received moisture content - 10.8%

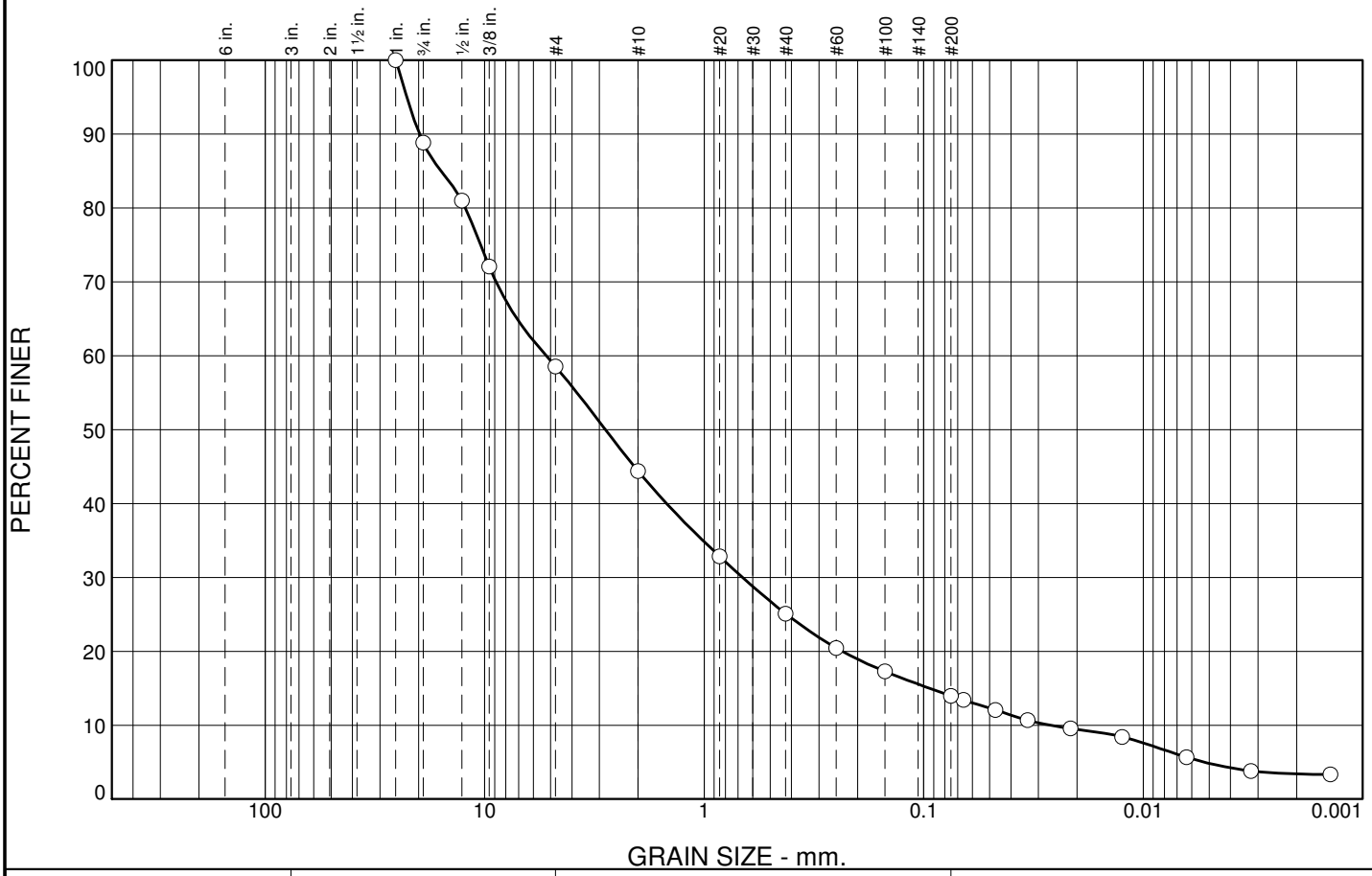
Location: GH11-239, Area A
Sample Number: SPT 23 **Depth:** 114-115.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.2	30.3	14.1	19.3	11.1	10.6	3.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	88.8		
.5	81.0		
0.375	72.0		
#4	58.5		
#10	44.4		
#20	32.8		
#40	25.1		
#60	20.4		
#100	17.3		
#200	14.0		
0.0659 mm.	13.4		
0.0471 mm.	12.0		
0.0336 mm.	10.7		
0.0214 mm.	9.6		
0.0125 mm.	8.4		
0.0064 mm.	5.7		
0.0032 mm.	3.8		
0.0014 mm.	3.3		

* (no specification provided)

Soil Description

silty, clayey sand with gravel

Atterberg Limits

PL= 19 LL= 25 PI= 6

Coefficients

D_{90}= 19.8065 D_{85}= 15.8351 D_{60}= 5.2465
D_{50}= 2.8195 D_{30}= 0.6690 D_{15}= 0.0941
D_{10}= 0.0265 C_u= 197.62 C_c= 3.21

Classification

USCS= SC-SM AASHTO= A-1-a

Remarks

As received moisture content - 11.1%

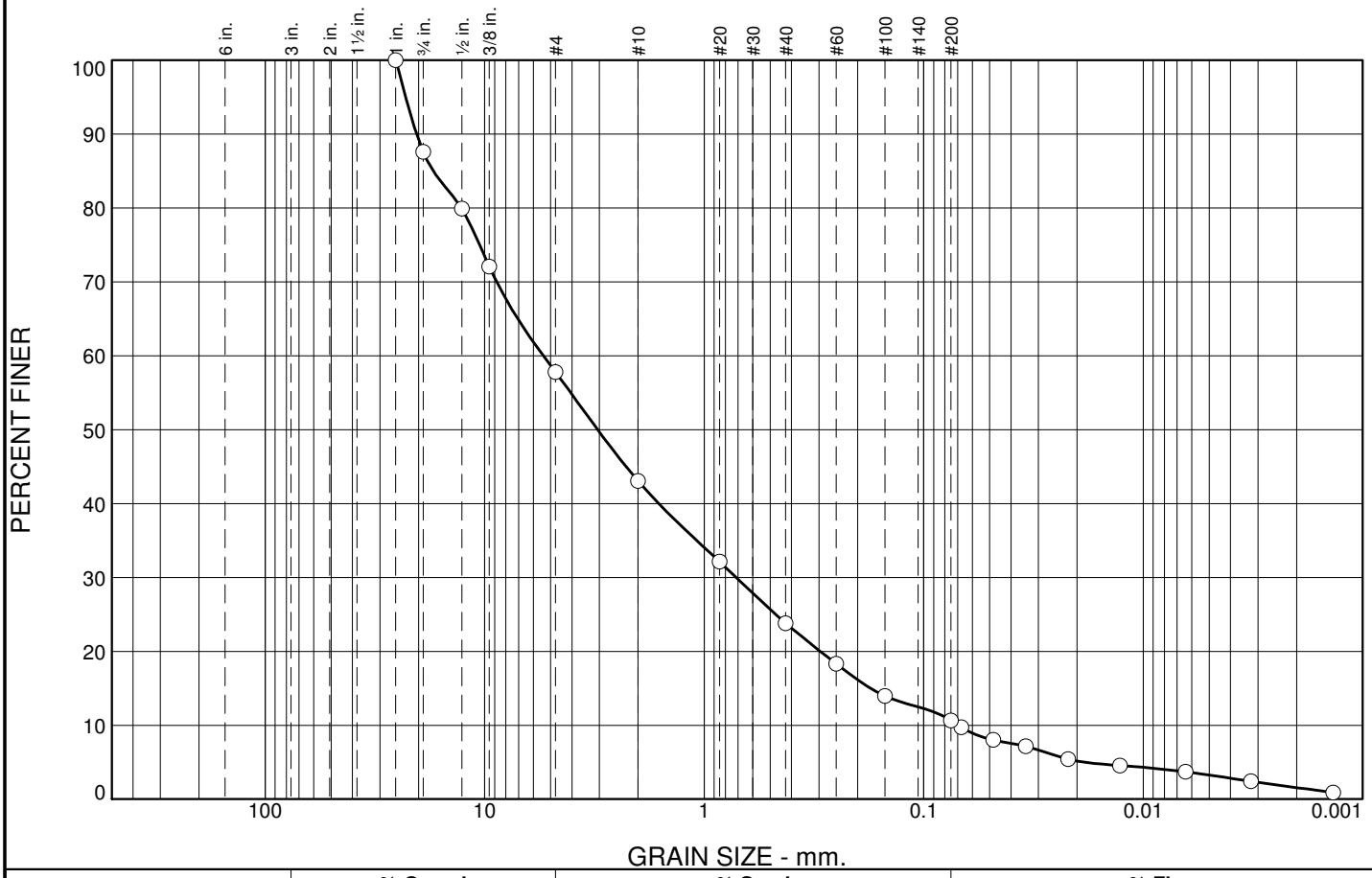
Location: GH11-239, Area A
Sample Number: SPT 25 **Depth:** 124-125.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.4	29.8	14.7	19.3	13.1	9.1	1.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	87.6		
.5	79.9		
0.375	72.1		
#4	57.8		
#10	43.1		
#20	32.1		
#40	23.8		
#60	18.3		
#100	13.9		
#200	10.7		
0.0673 mm.	9.7		
0.0482 mm.	8.0		
0.0343 mm.	7.2		
0.0220 mm.	5.4		
0.0127 mm.	4.6		
0.0064 mm.	3.7		
0.0032 mm.	2.4		
0.0014 mm.	0.9		

* (no specification provided)

Soil Description

well-graded sand with silt and gravel

Atterberg Limits

PL= NP LL= 23 PI= NP

Coefficients

D_{90}= 20.4106 D_{85}= 17.1850 D_{60}= 5.4012
D_{50}= 3.0551 D_{30}= 0.7143 D_{15}= 0.1745
D_{10}= 0.0694 C_u= 77.78 C_c= 1.36

Classification

USCS= SW-SM AASHTO= A-1-a

Remarks

As received moisture content - 12.1%

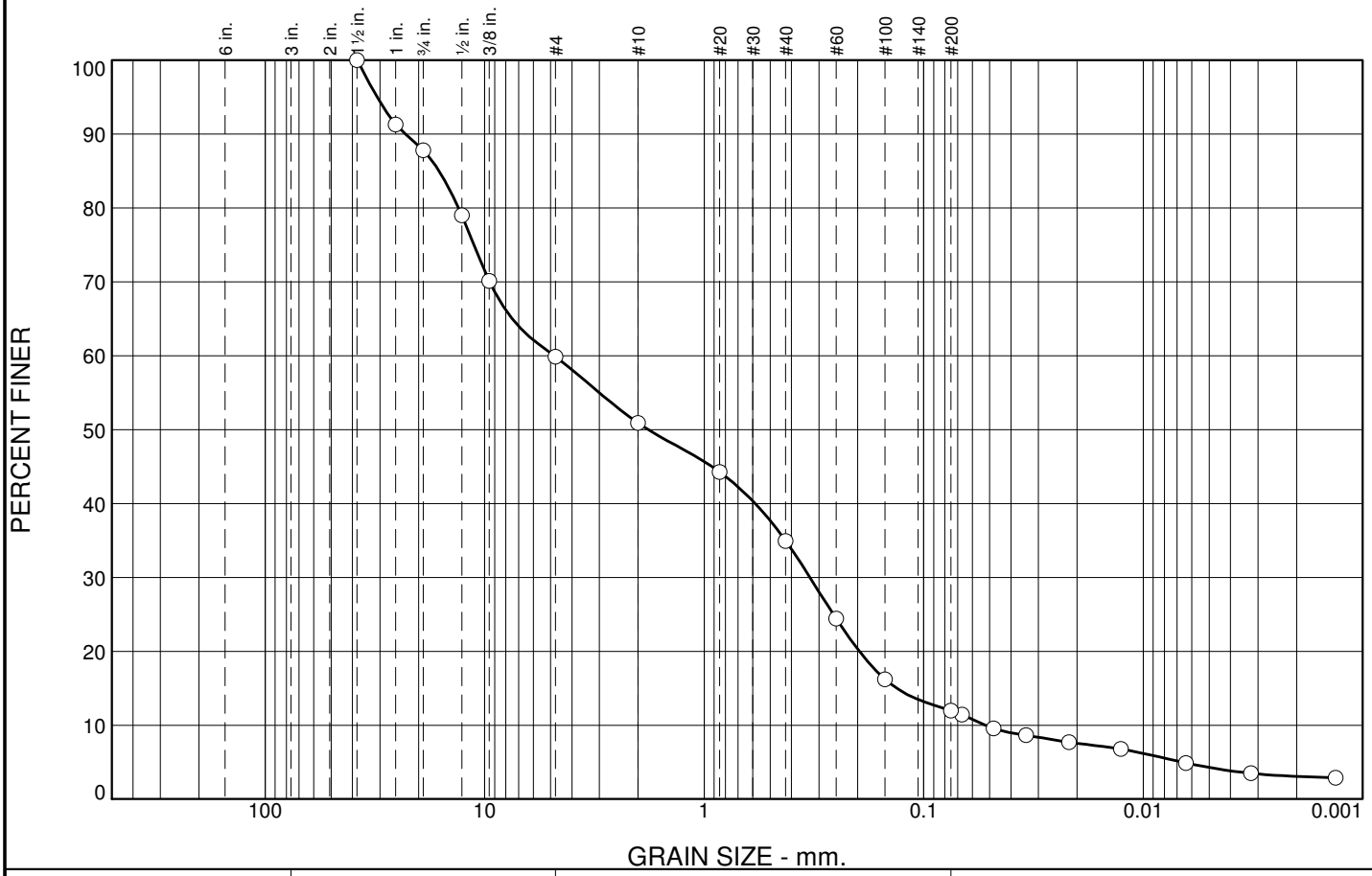
Location: GH11-239, Area A
Sample Number: SPT 29 **Depth:** 149-150.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.2	28.0	8.9	16.0	22.9	8.9	3.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	91.3		
.75	87.8		
.5	79.0		
0.375	70.1		
#4	59.8		
#10	50.9		
#20	44.3		
#40	34.9		
#60	24.4		
#100	16.2		
#200	12.0		
0.0670 mm.	11.4		
0.0480 mm.	9.6		
0.0341 mm.	8.6		
0.0217 mm.	7.7		
0.0126 mm.	6.8		
0.0064 mm.	4.9		
0.0032 mm.	3.5		
0.0013 mm.	2.9		

* (no specification provided)

Soil Description

poorly graded sand with silt and gravel

Atterberg Limits

PL= NP LL= 20 PI= NP

Coefficients

D_{90}= 22.9944 D_{85}= 16.1417 D_{60}= 4.8270
D_{50}= 1.7971 D_{30}= 0.3296 D_{15}= 0.1327
D_{10}= 0.0522 C_u= 92.50 C_c= 0.43

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

As received moisture content - 12.6%

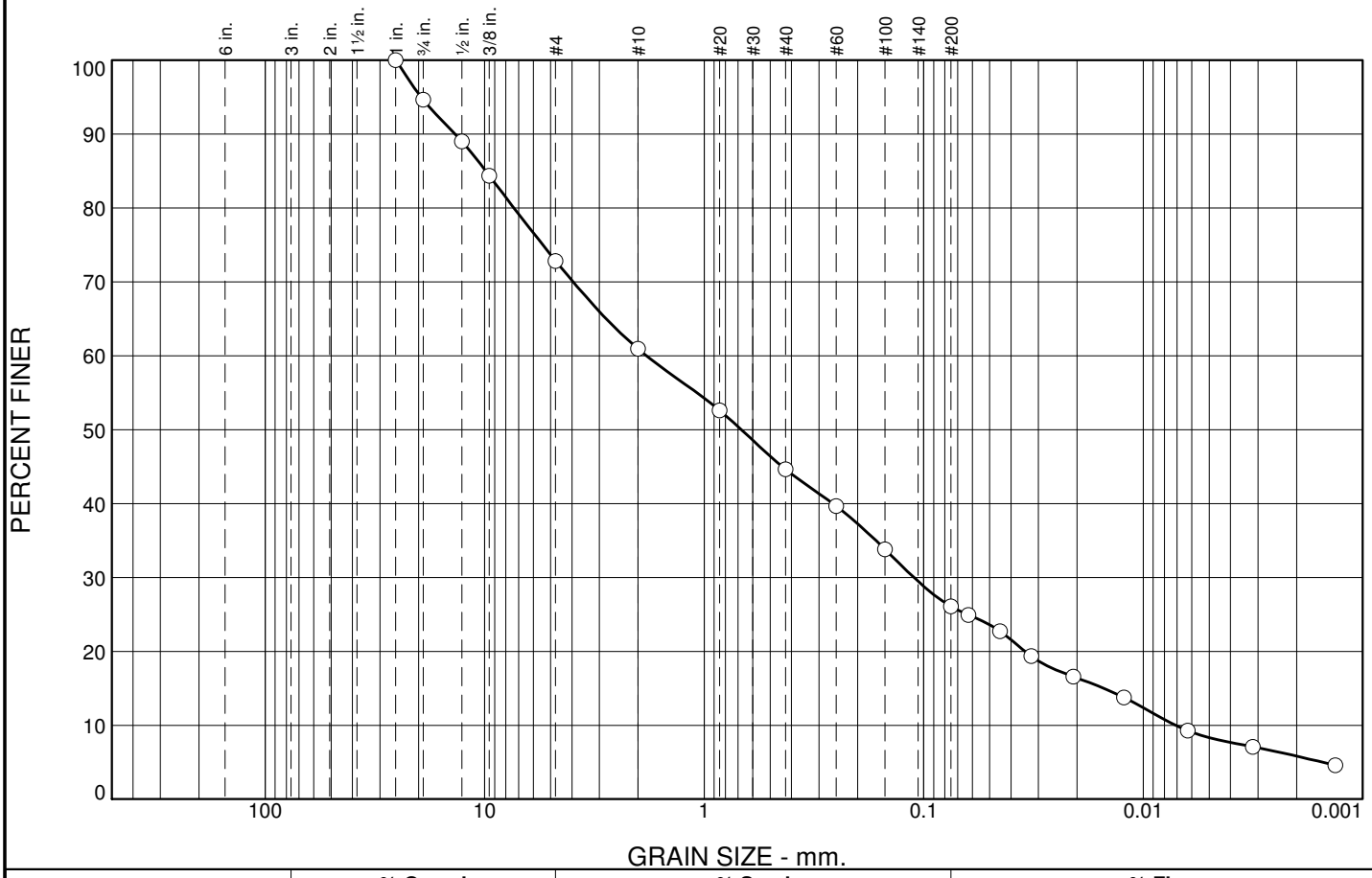
Location: GH11-239, Area A
Sample Number: SPT 31 **Depth:** 159-160.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.4	21.8	11.9	16.3	18.5	20.3	5.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	94.6		
.5	89.0		
0.375	84.4		
#4	72.8		
#10	60.9		
#20	52.6		
#40	44.6		
#60	39.6		
#100	33.8		
#200	26.1		
0.0625 mm.	24.9		
0.0448 mm.	22.7		
0.0324 mm.	19.3		
0.0208 mm.	16.6		
0.0122 mm.	13.8		
0.0063 mm.	9.3		
0.0032 mm.	7.1		
0.0013 mm.	4.6		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 19 LL= 29 PI= 10

Coefficients

D_{90}= 13.6333 D_{85}= 9.8902 D_{60}= 1.8328
D_{50}= 0.6771 D_{30}= 0.1108 D_{15}= 0.0151
D_{10}= 0.0071 C_u= 258.18 C_c= 0.94

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

As received moisture content - 14.9%

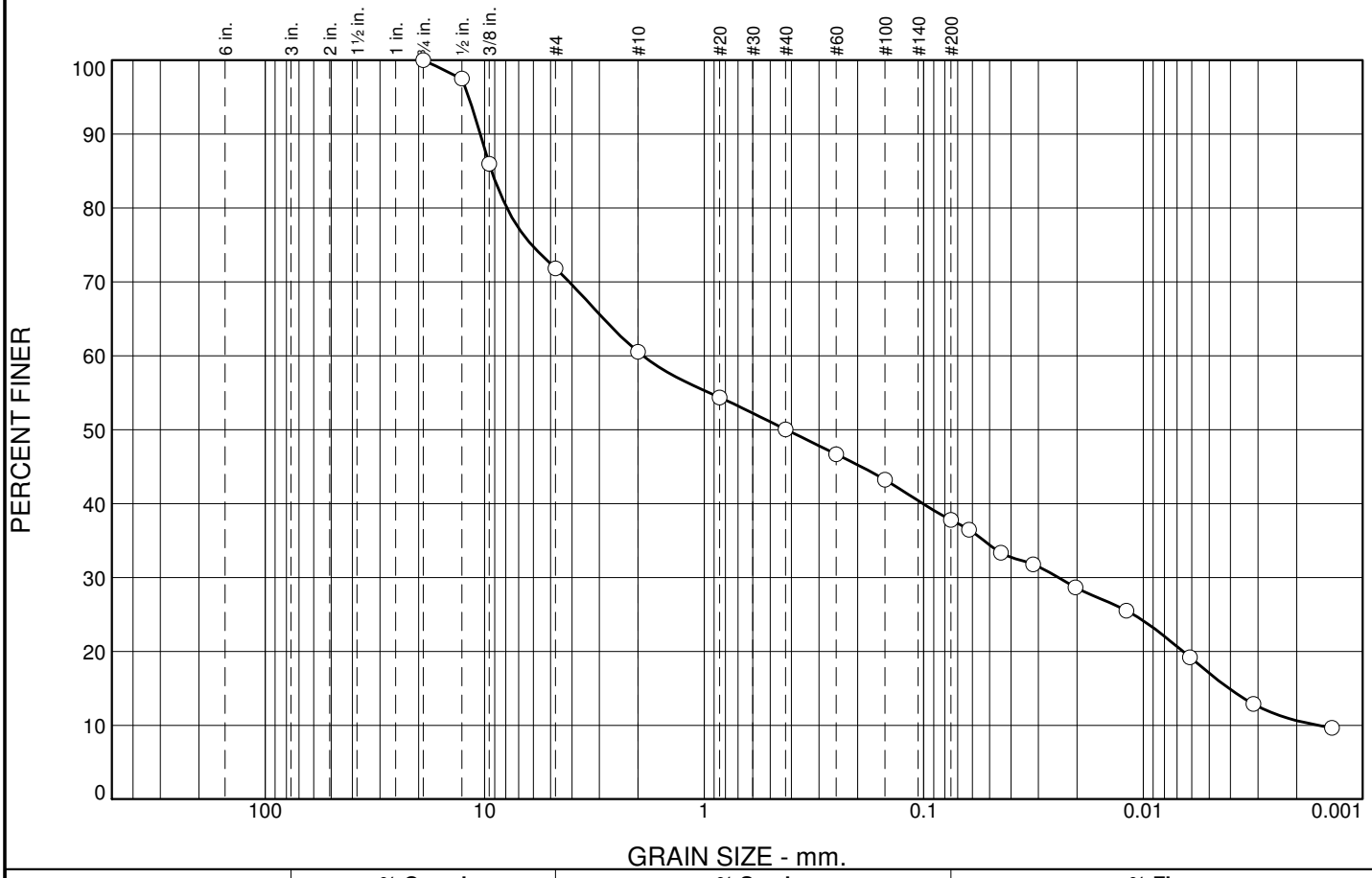
Location: GH11-239, Area A
Sample Number: SPT 33 **Depth:** 169-170.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	28.2	11.3	10.5	12.2	27.2	10.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.5		
0.375	86.0		
#4	71.8		
#10	60.5		
#20	54.4		
#40	50.0		
#60	46.7		
#100	43.2		
#200	37.8		
0.0620 mm.	36.5		
0.0445 mm.	33.3		
0.0317 mm.	31.8		
0.0203 mm.	28.6		
0.0119 mm.	25.5		
0.0061 mm.	19.2		
0.0031 mm.	12.9		
0.0014 mm.	9.6		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 19 LL= 35 PI= 16

Coefficients

D_{90}= 10.4776 D_{85}= 9.2922 D_{60}= 1.9024
D_{50}= 0.4227 D_{30}= 0.0244 D_{15}= 0.0041
D_{10}= 0.0016 C_u= 1188.19 C_c= 0.20

Classification

USCS= SC AASHTO= A-6(2)

Remarks

As received moisture content - 21.0%

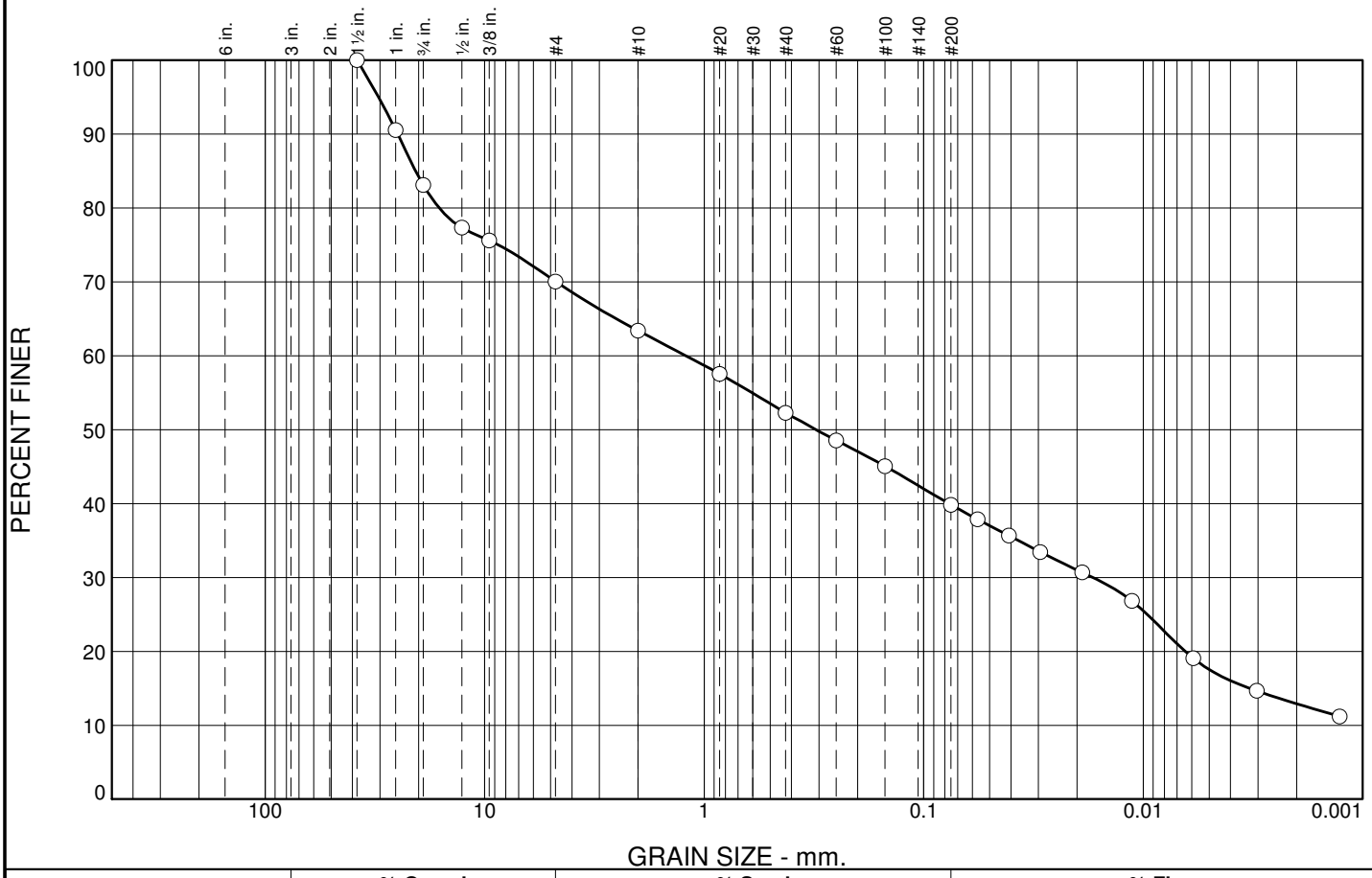
Location: GH11-240, Area A
Sample Number: SPT 2 **Depth:** 8-9.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.9	13.1	6.6	11.1	12.5	26.9	12.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	90.5		
.75	83.1		
.5	77.3		
0.375	75.6		
#4	70.0		
#10	63.4		
#20	57.5		
#40	52.3		
#60	48.5		
#100	45.1		
#200	39.8		
0.0568 mm.	37.9		
0.0409 mm.	35.7		
0.0294 mm.	33.4		
0.0190 mm.	30.7		
0.0113 mm.	26.8		
0.0059 mm.	19.1		
0.0030 mm.	14.7		
0.0013 mm.	11.2		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 17 LL= 35 PI= 18

Coefficients

D_{90}= 24.8987 D_{85}= 20.6240 D_{60}= 1.2108
D_{50}= 0.3092 D_{30}= 0.0170 D_{15}= 0.0033
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(3)

Remarks

As received moisture content - 19.3%

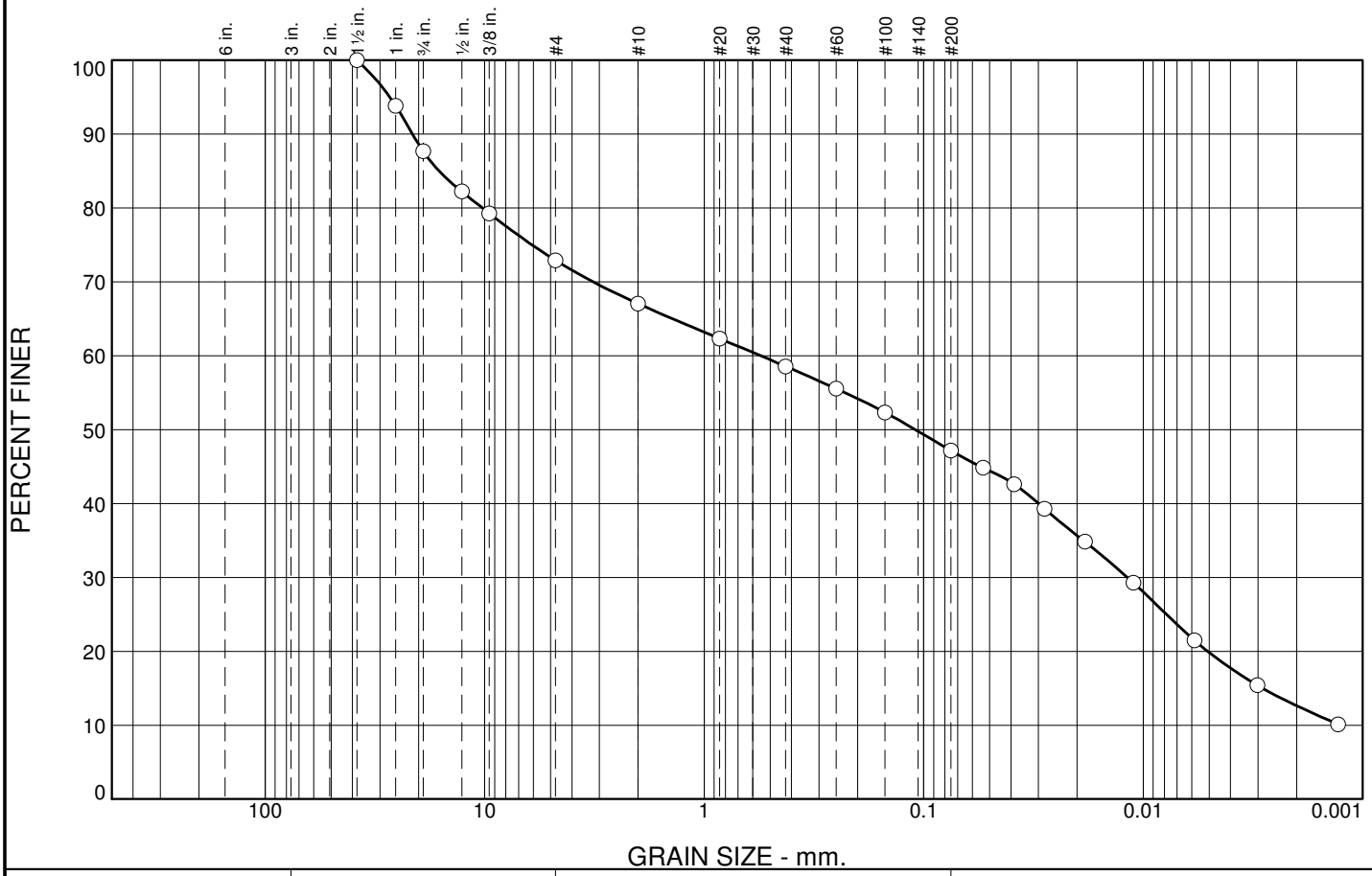
Location: GH11-240, Area A
Sample Number: SPT 4 **Depth:** 18-19.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.3	14.8	5.9	8.5	11.4	34.5	12.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	93.8		
.75	87.7		
.5	82.2		
0.375	79.3		
#4	72.9		
#10	67.0		
#20	62.3		
#40	58.5		
#60	55.5		
#100	52.3		
#200	47.1		
0.0536 mm.	44.8		
0.0387 mm.	42.6		
0.0281 mm.	39.3		
0.0184 mm.	34.8		
0.0111 mm.	29.3		
0.0058 mm.	21.5		
0.0030 mm.	15.4		
0.0013 mm.	10.1		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 17 LL= 32 PI= 15

Coefficients

D_{90}= 21.3113 D_{85}= 16.1667 D_{60}= 0.5537
D_{50}= 0.1093 D_{30}= 0.0118 D_{15}= 0.0029
D_{10}= C_u= C_c=

Classification

USCS= GC AASHTO= A-6(4)

Remarks

As received moisture content - 16.3%

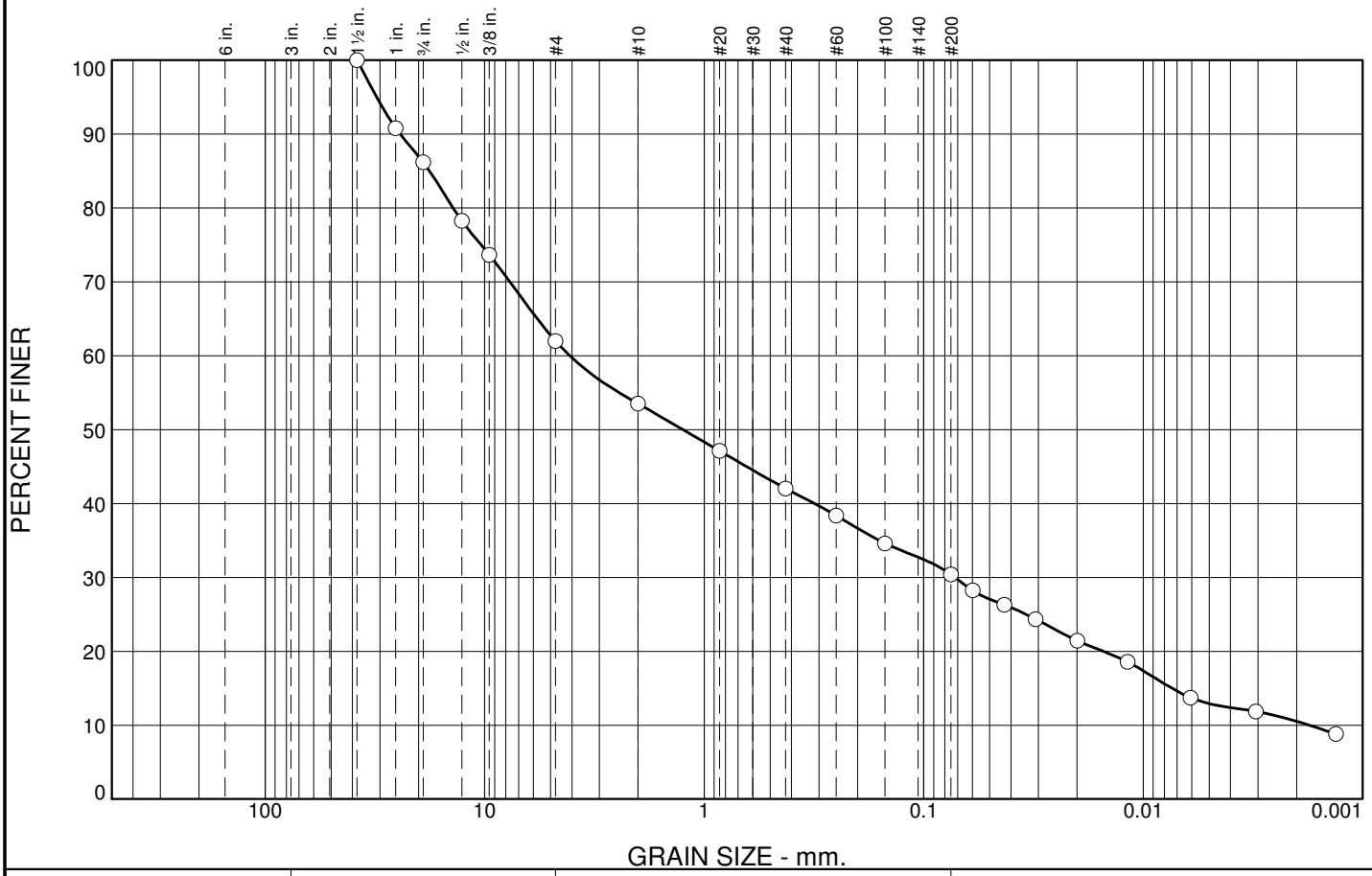
Location: GH11-240, Area A
Sample Number: SPT 5 **Depth:** 23-24.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.8	24.2	8.5	11.5	11.6	19.9	10.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	90.8		
.75	86.2		
.5	78.3		
0.375	73.6		
#4	62.0		
#10	53.5		
#20	47.1		
#40	42.0		
#60	38.4		
#100	34.6		
#200	30.4		
0.0598 mm.	28.2		
0.0430 mm.	26.3		
0.0309 mm.	24.3		
0.0200 mm.	21.4		
0.0118 mm.	18.6		
0.0061 mm.	13.7		
0.0031 mm.	11.9		
0.0013 mm.	8.8		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 15 LL= 29 PI= 14

Coefficients

D_{90}= 24.2943 D_{85}= 17.8532 D_{60}= 4.0992
D_{50}= 1.2509 D_{30}= 0.0720 D_{15}= 0.0074
D_{10}= 0.0018 C_u= 2336.87 C_c= 0.72

Classification

USCS= GC AASHTO= A-2-6(1)

Remarks

As received moisture content - 11.2%

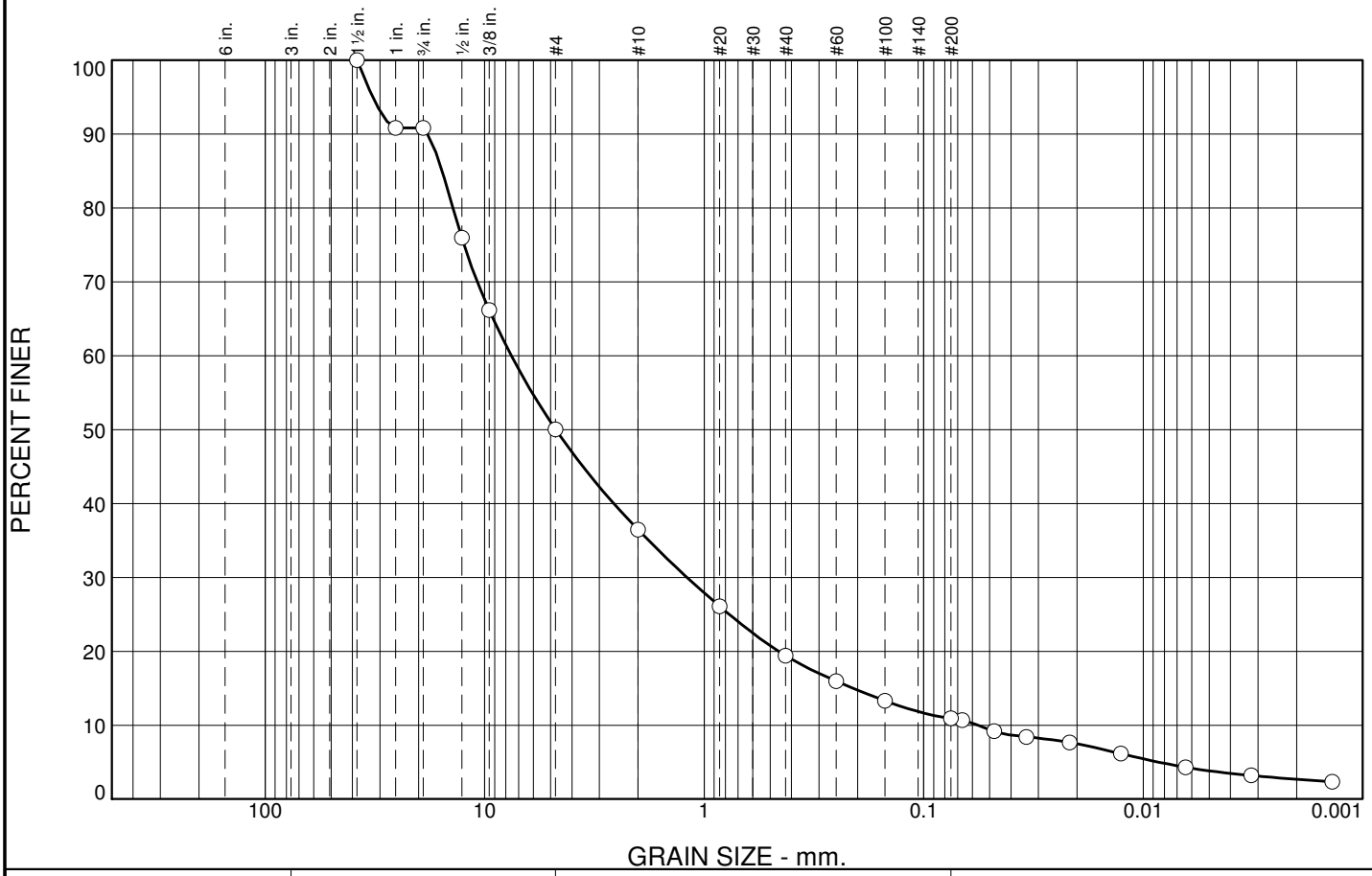
Location: GH11-240, Area A
Sample Number: SPT 8 **Depth:** 38-39.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.2	40.8	13.5	17.1	8.5	8.2	2.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	90.8		
.75	90.8		
.5	75.9		
0.375	66.2		
#4	50.0		
#10	36.5		
#20	26.1		
#40	19.4		
#60	16.0		
#100	13.3		
#200	10.9		
0.0667 mm.	10.7		
0.0478 mm.	9.2		
0.0340 mm.	8.4		
0.0216 mm.	7.7		
0.0126 mm.	6.1		
0.0064 mm.	4.3		
0.0032 mm.	3.2		
0.0014 mm.	2.3		

* (no specification provided)

Soil Description

poorly graded gravel with silt and sand

Atterberg Limits

PL= NP LL= 22 PI= NP

Coefficients

D_{90}= 18.2013 D_{85}= 15.6269 D_{60}= 7.5544
D_{50}= 4.7410 D_{30}= 1.1974 D_{15}= 0.2101
D_{10}= 0.0565 C_u= 133.70 C_c= 3.36

Classification

USCS= GP-GM AASHTO= A-1-a

Remarks

As received moisture content - 9.2%

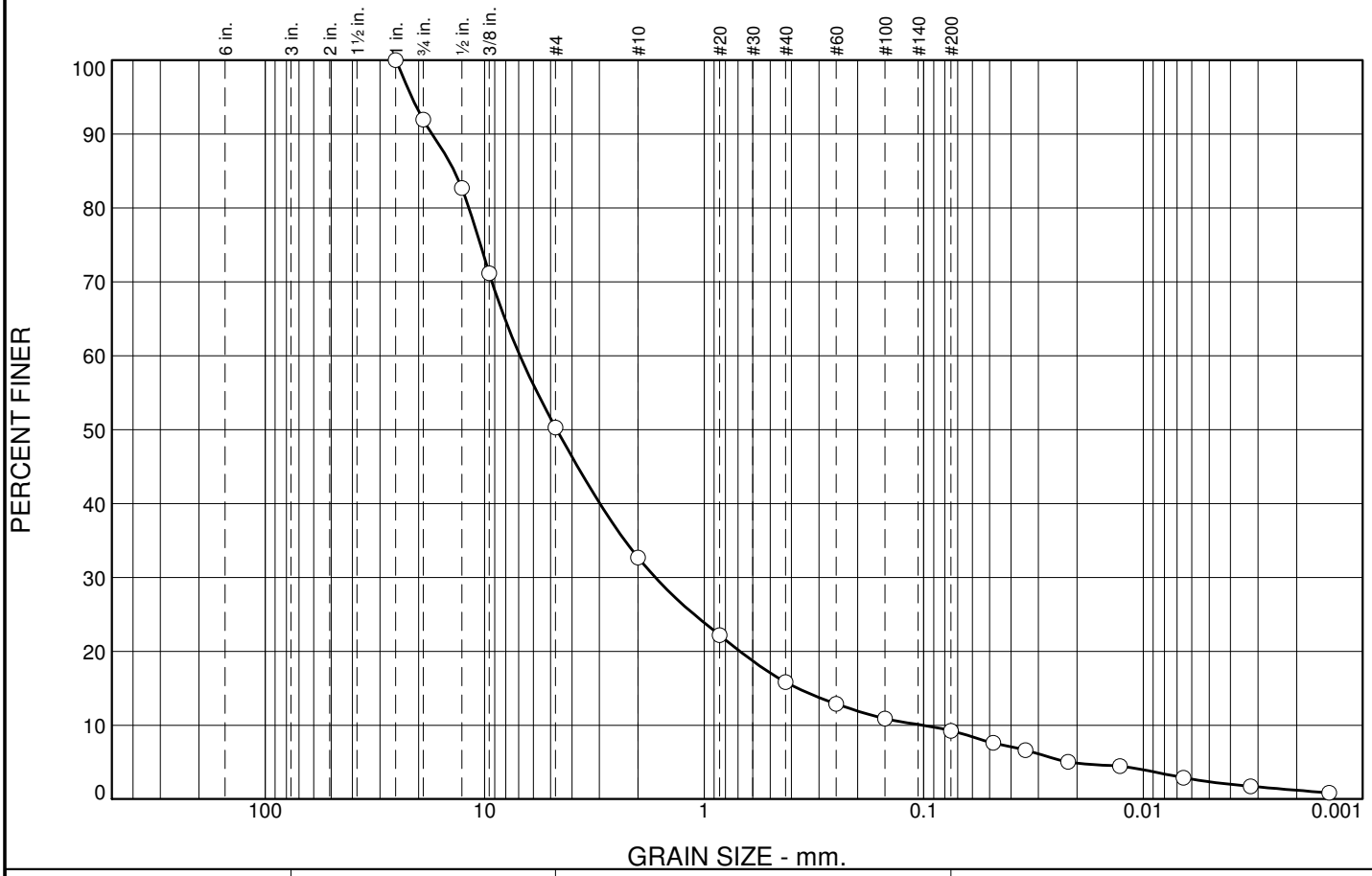
Location: GH11-240, Area A
Sample Number: SPT 11 **Depth:** 53-54.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.1	41.6	17.6	16.9	6.6	8.0	1.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	91.9		
.5	82.7		
0.375	71.1		
#4	50.3		
#10	32.7		
#20	22.2		
#40	15.8		
#60	12.9		
#100	10.9		
#200	9.2		
0.0482 mm.	7.6		
0.0343 mm.	6.6		
0.0220 mm.	5.0		
0.0127 mm.	4.4		
0.0066 mm.	2.9		
0.0032 mm.	1.7		
0.0014 mm.	0.8		

* (no specification provided)

Soil Description

poorly graded gravel with silt and sand

Atterberg Limits

PL= 19 LL= 22 PI= 3

Coefficients

D_{90}= 17.3921 D_{85}= 13.7423 D_{60}= 6.9091
D_{50}= 4.6947 D_{30}= 1.6708 D_{15}= 0.3757
D_{10}= 0.1014 C_u= 68.11 C_c= 3.98

Classification

USCS= GP-GM AASHTO= A-1-a

Remarks

As received moisture content - 9.3%

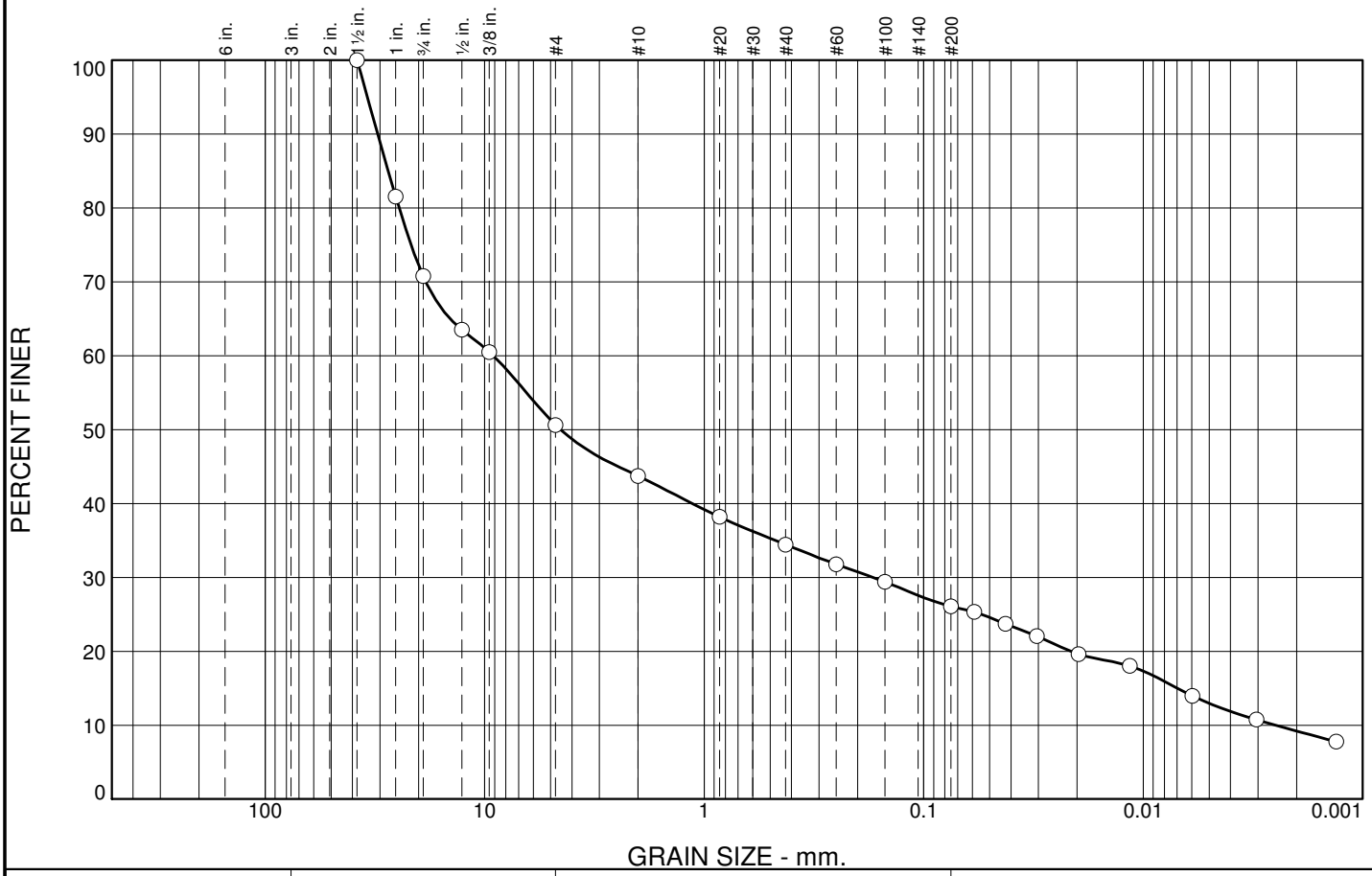
Location: GH11-240, Area A
Sample Number: SPT 12 **Depth:** 58-59.5' **Date:** 11/15/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	29.2	20.2	6.9	9.3	8.3	16.9	9.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	81.5		
.75	70.8		
.5	63.5		
0.375	60.5		
#4	50.6		
#10	43.7		
#20	38.2		
#40	34.4		
#60	31.8		
#100	29.4		
#200	26.1		
0.0589 mm.	25.3		
0.0423 mm.	23.7		
0.0305 mm.	22.1		
0.0197 mm.	19.6		
0.0115 mm.	18.0		
0.0060 mm.	14.0		
0.0030 mm.	10.8		
0.0013 mm.	7.8		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 16 LL= 32 PI= 16

Coefficients

D_{90}= 30.7352 D_{85}= 27.5119 D_{60}= 9.1358
D_{50}= 4.5112 D_{30}= 0.1704 D_{15}= 0.0070
D_{10}= 0.0025 C_u= 3660.05 C_c= 1.27

Classification

USCS= GC AASHTO= A-2-6(1)

Remarks

As received moisture content - 14.1%

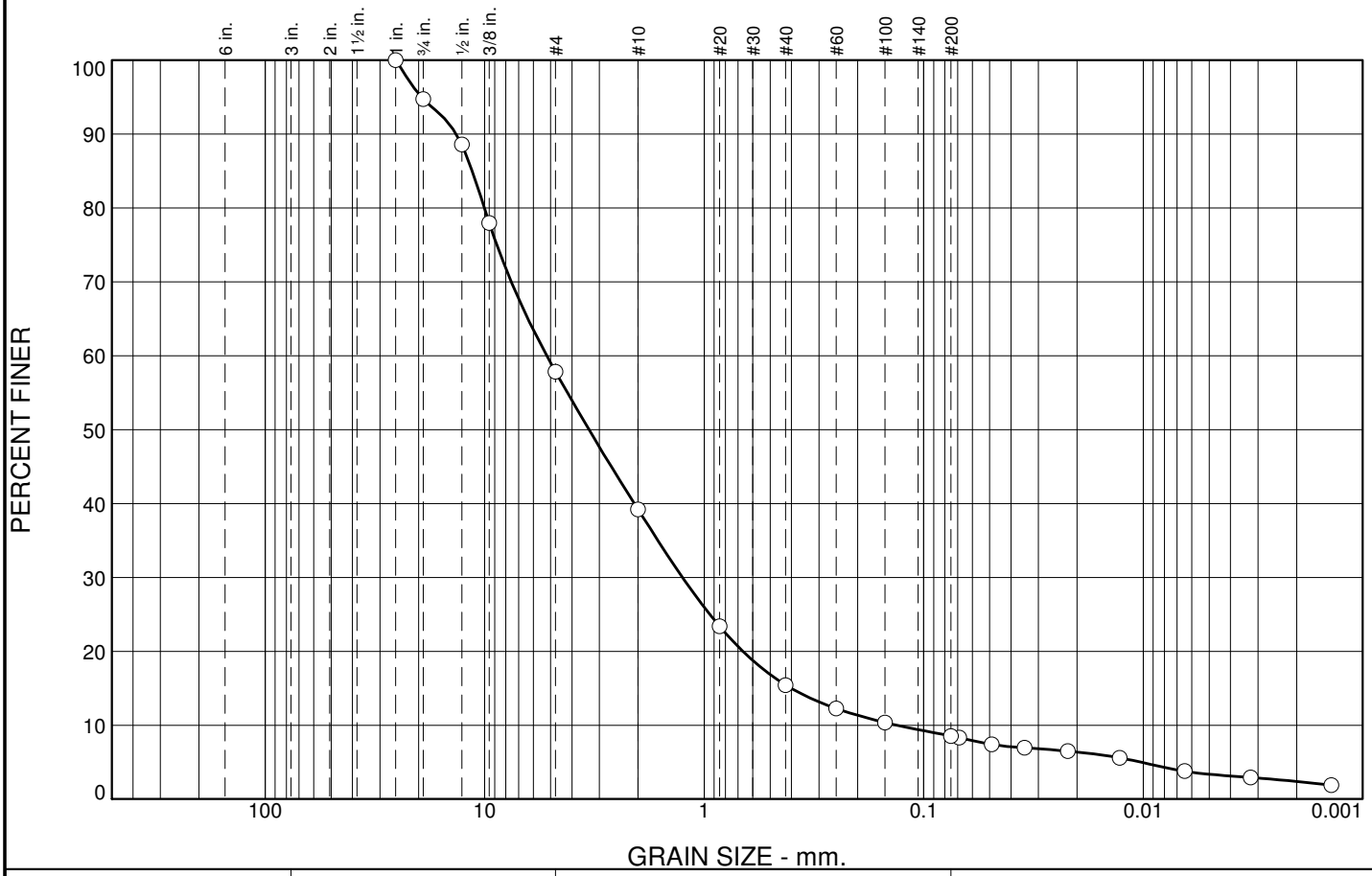
Location: GH11-240, Area A
Sample Number: SPT 14 **Depth:** 68-69.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.3	36.9	18.6	23.8	6.9	6.1	2.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	94.7		
.5	88.6		
0.375	78.0		
#4	57.8		
#10	39.2		
#20	23.4		
#40	15.4		
#60	12.3		
#100	10.4		
#200	8.5		
0.0688 mm.	8.3		
0.0489 mm.	7.4		
0.0347 mm.	6.9		
0.0220 mm.	6.5		
0.0128 mm.	5.6		
0.0065 mm.	3.8		
0.0032 mm.	2.9		
0.0014 mm.	1.9		

* (no specification provided)

Soil Description

well-graded sand with silt and gravel

Atterberg Limits

PL= NP LL= 25 PI= NP

Coefficients

D_{90}= 13.4610 D_{85}= 11.3923 D_{60}= 5.2084
D_{50}= 3.3470 D_{30}= 1.2548 D_{15}= 0.4019
D_{10}= 0.1325 C_u= 39.30 C_c= 2.28

Classification

USCS= SW-SM AASHTO= A-1-a

Remarks

As recived moisture content - 12.2%

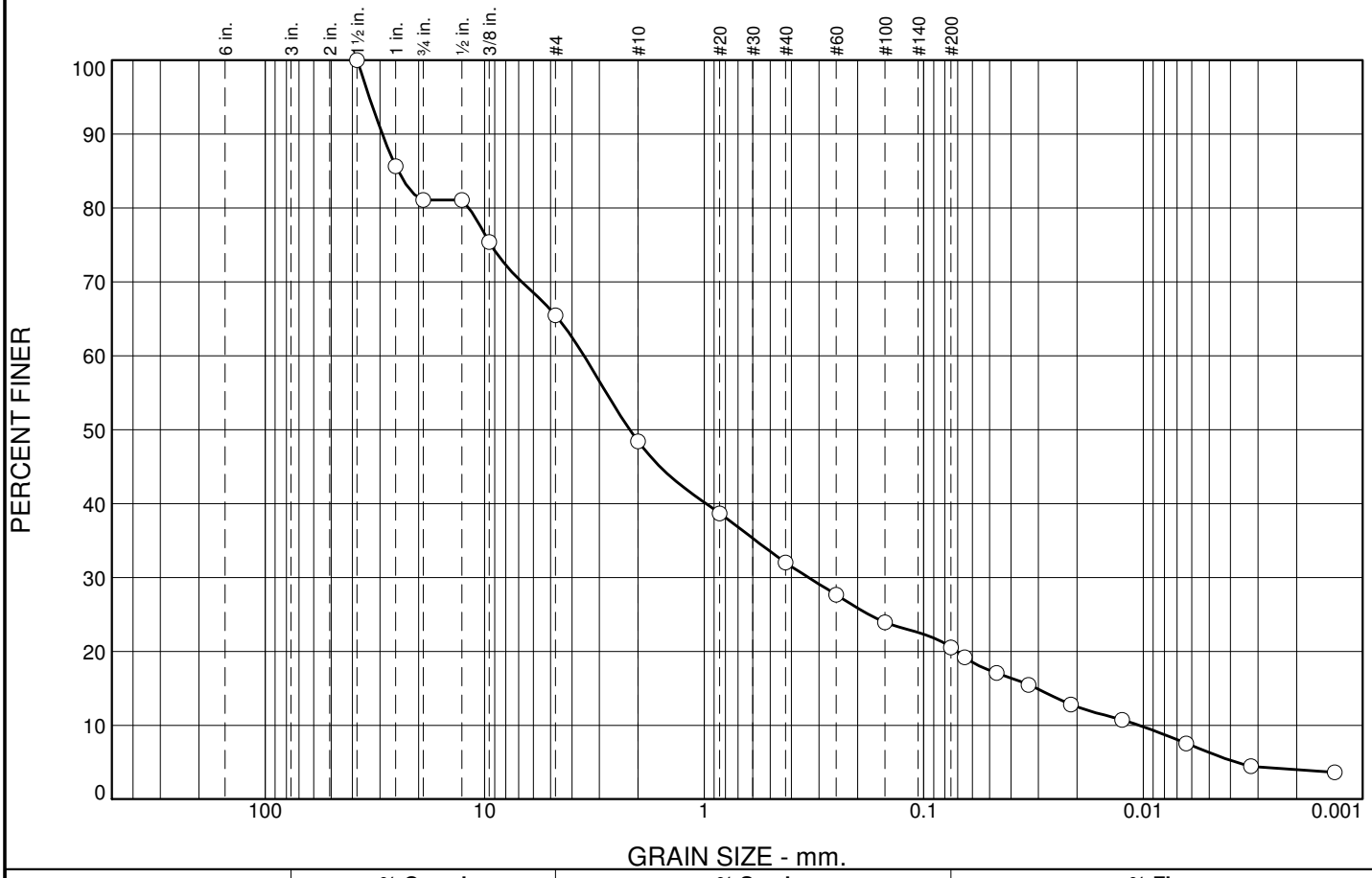
Location: GH11-240, Area A
Sample Number: SPT 17 **Depth:** 83-84.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.0	15.5	17.1	16.4	11.5	16.5	4.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	85.6		
.75	81.0		
.5	81.0		
0.375	75.4		
#4	65.5		
#10	48.4		
#20	38.7		
#40	32.0		
#60	27.7		
#100	23.9		
#200	20.5		
0.0649 mm.	19.2		
0.0465 mm.	17.1		
0.0332 mm.	15.5		
0.0214 mm.	12.8		
0.0125 mm.	10.7		
0.0064 mm.	7.6		
0.0032 mm.	4.4		
0.0013 mm.	3.6		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 21 LL= 29 PI= 8

Coefficients

D_{90}= 29.2761 D_{85}= 24.7743 D_{60}= 3.5300
D_{50}= 2.1842 D_{30}= 0.3354 D_{15}= 0.0306
D_{10}= 0.0104 C_u= 338.16 C_c= 3.05

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

As received moisture content - 15.3%

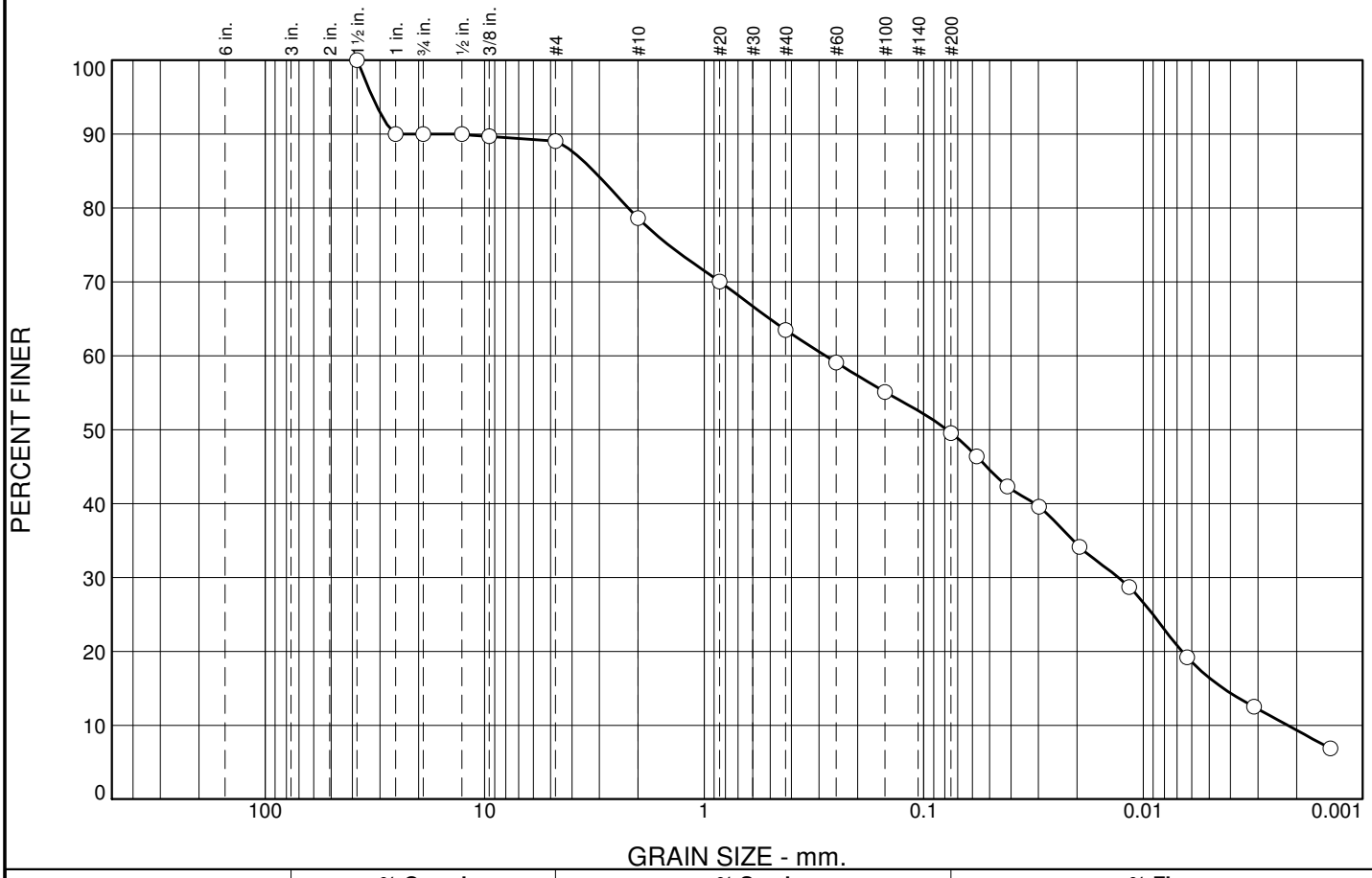
Location: GH11-240, Area A
Sample Number: SPT 18 **Depth:** 88-89.5' **Date:** 11/15/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.0	1.0	10.4	15.1	14.0	40.2	9.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	90.0		
.75	90.0		
.5	90.0		
0.375	89.7		
#4	89.0		
#10	78.6		
#20	70.0		
#40	63.5		
#60	59.1		
#100	55.1		
#200	49.5		
0.0572 mm.	46.4		
0.0415 mm.	42.3		
0.0299 mm.	39.6		
0.0195 mm.	34.1		
0.0116 mm.	28.7		
0.0063 mm.	19.2		
0.0031 mm.	12.5		
0.0014 mm.	6.9		

* (no specification provided)

Soil Description

silty sand

Atterberg Limits

PL= 28 LL= 37 PI= 9

Coefficients

D_{90}= 25.4527 D_{85}= 3.1844 D_{60}= 0.2803
D_{50}= 0.0785 D_{30}= 0.0129 D_{15}= 0.0043
D_{10}= 0.0022 C_u= 127.43 C_c= 0.27

Classification

USCS= SM AASHTO= A-4(2)

Remarks

As received moisture content - 28.1%

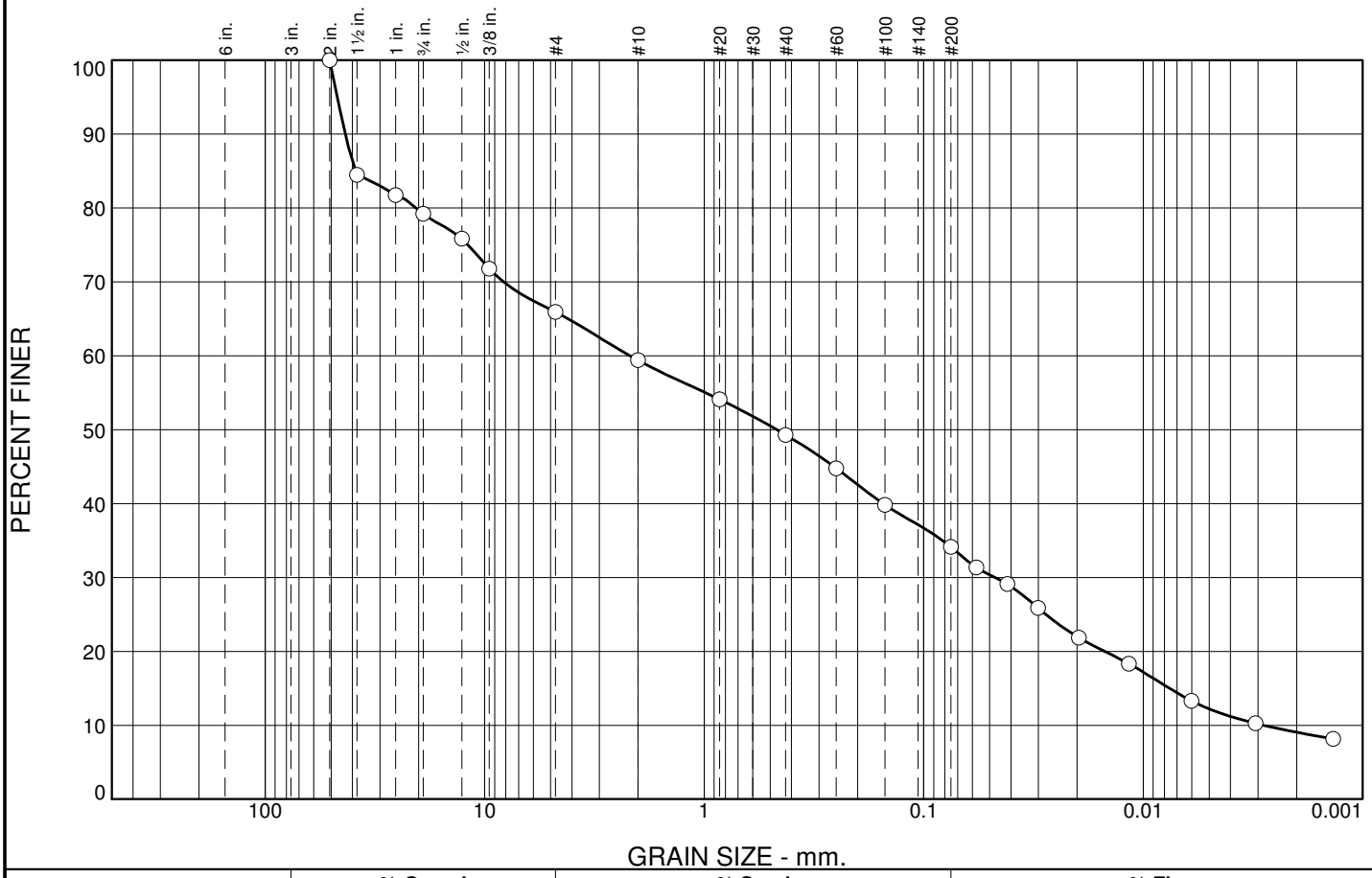
Location: GH11-240, Area A
Sample Number: SPT 19 **Depth:** 93-94.5' **Date:** 11/15/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.8	13.3	6.5	10.1	15.2	25.0	9.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	84.5		
1	81.7		
.75	79.2		
.5	75.8		
0.375	71.8		
#4	65.9		
#10	59.4		
#20	54.1		
#40	49.3		
#60	44.8		
#100	39.8		
#200	34.1		
0.0576 mm.	31.4		
0.0415 mm.	29.1		
0.0301 mm.	25.9		
0.0196 mm.	21.9		
0.0116 mm.	18.3		
0.0060 mm.	13.3		
0.0031 mm.	10.3		
0.0014 mm.	8.2		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 16 LL= 32 PI= 16

Coefficients

D_{90}= 43.1691 D_{85}= 38.7017 D_{60}= 2.1775
D_{50}= 0.4672 D_{30}= 0.0473 D_{15}= 0.0076
D_{10}= 0.0028 C_u= 768.88 C_c= 0.36

Classification

USCS= GC AASHTO= A-2-6(1)

Remarks

As received moisture content - 14.3%. SpG - 2.73. Shelby tube dry density - 103.8pcf.

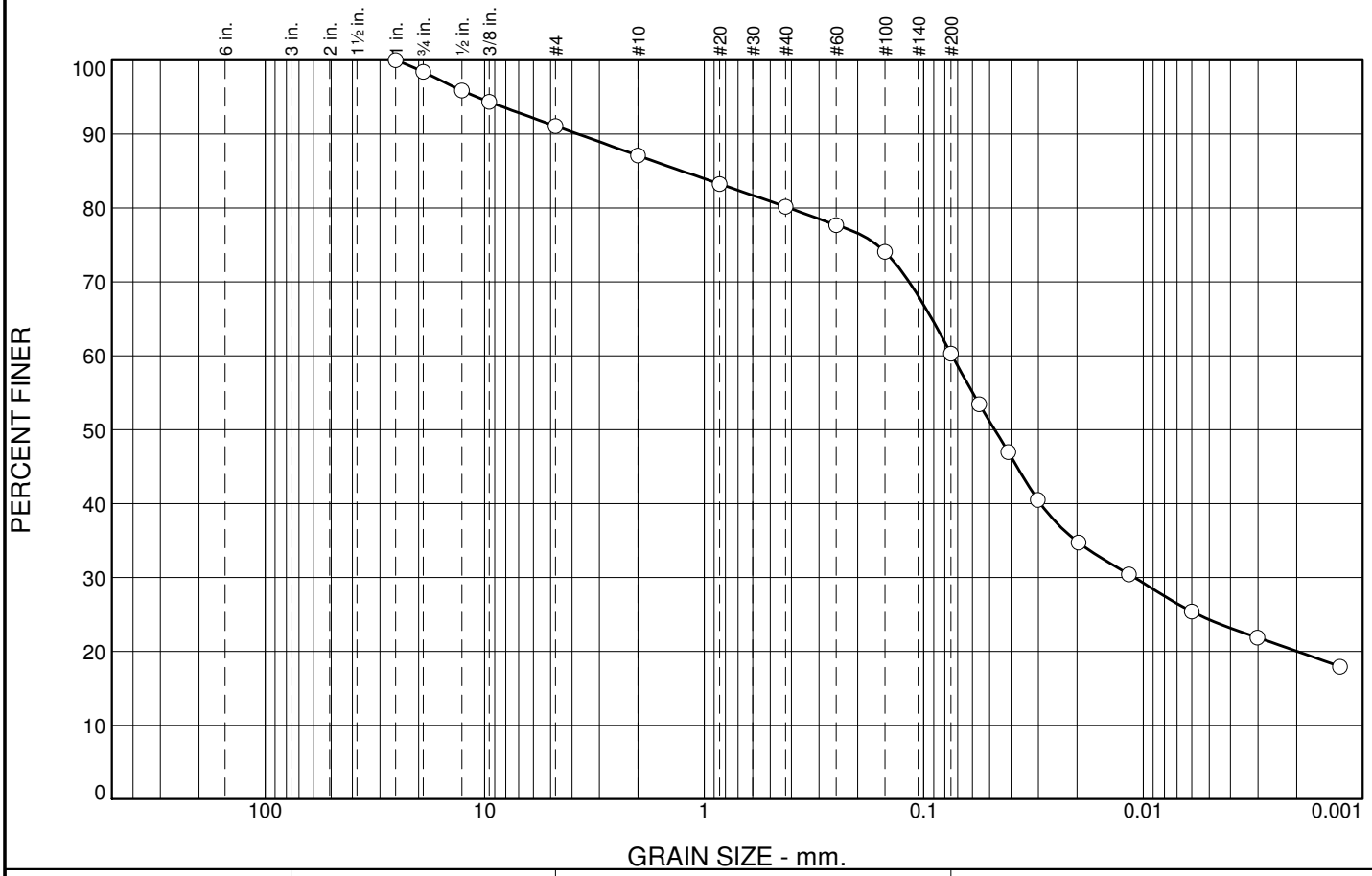
Location: GH11-241, Area A
Sample Number: GH11-241-1 **Depth:** 19-20.5' **Date:** 11/23/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.6	7.3	4.0	7.0	19.8	40.3	20.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.4		
.5	95.9		
0.375	94.3		
#4	91.1		
#10	87.1		
#20	83.2		
#40	80.1		
#60	77.7		
#100	74.1		
#200	60.3		
0.0558 mm.	53.4		
0.0411 mm.	47.0		
0.0302 mm.	40.5		
0.0197 mm.	34.7		
0.0116 mm.	30.4		
0.0060 mm.	25.4		
0.0030 mm.	21.9		
0.0013 mm.	17.9		

* (no specification provided)

Soil Description

sandy lean clay

Atterberg Limits

PL= 18 LL= 32 PI= 14

Coefficients

D_{90}= 3.7657 D_{85}= 1.2642 D_{60}= 0.0742
D_{50}= 0.0475 D_{30}= 0.0110 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(6)

Remarks

As received moisture content - 22.2%

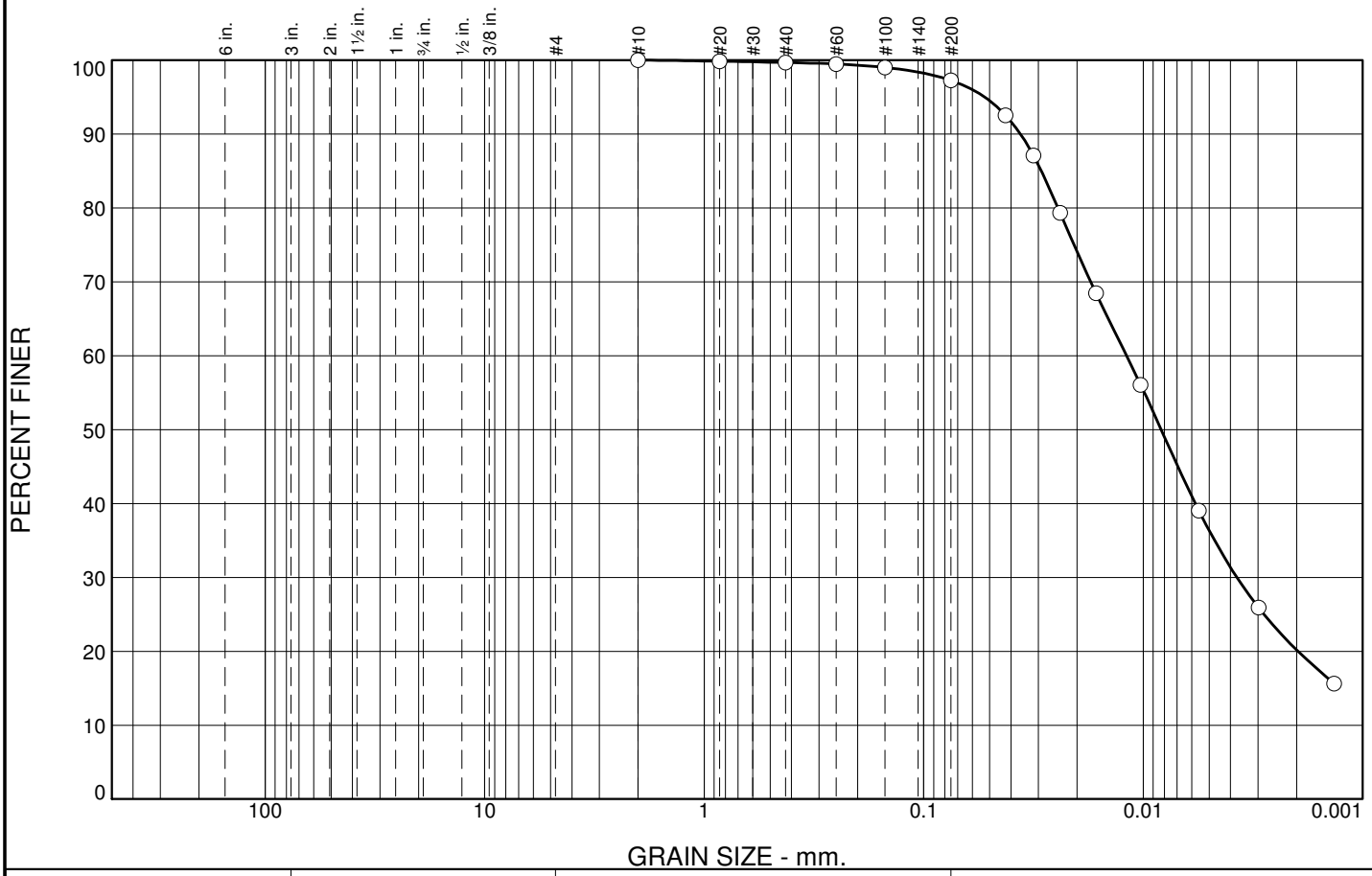
Location: GH11-241, Area A
Sample Number: GH11-241-2 **Depth:** 82.5-83' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	2.5	77.0	20.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	99.7		
#60	99.5		
#100	99.0		
#200	97.2		
0.0423 mm.	92.5		
0.0316 mm.	87.1		
0.0239 mm.	79.3		
0.0164 mm.	68.5		
0.0103 mm.	56.1		
0.0056 mm.	39.0		
0.0030 mm.	25.9		
0.0014 mm.	15.6		

* (no specification provided)

Soil Description

lean clay

Atterberg Limits

PL= 20 LL= 40 PI= 20

Coefficients

D_{90}= 0.0362 D_{85}= 0.0291 D_{60}= 0.0119
D_{50}= 0.0083 D_{30}= 0.0037 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(21)

Remarks

As received moisture content - 27.0%

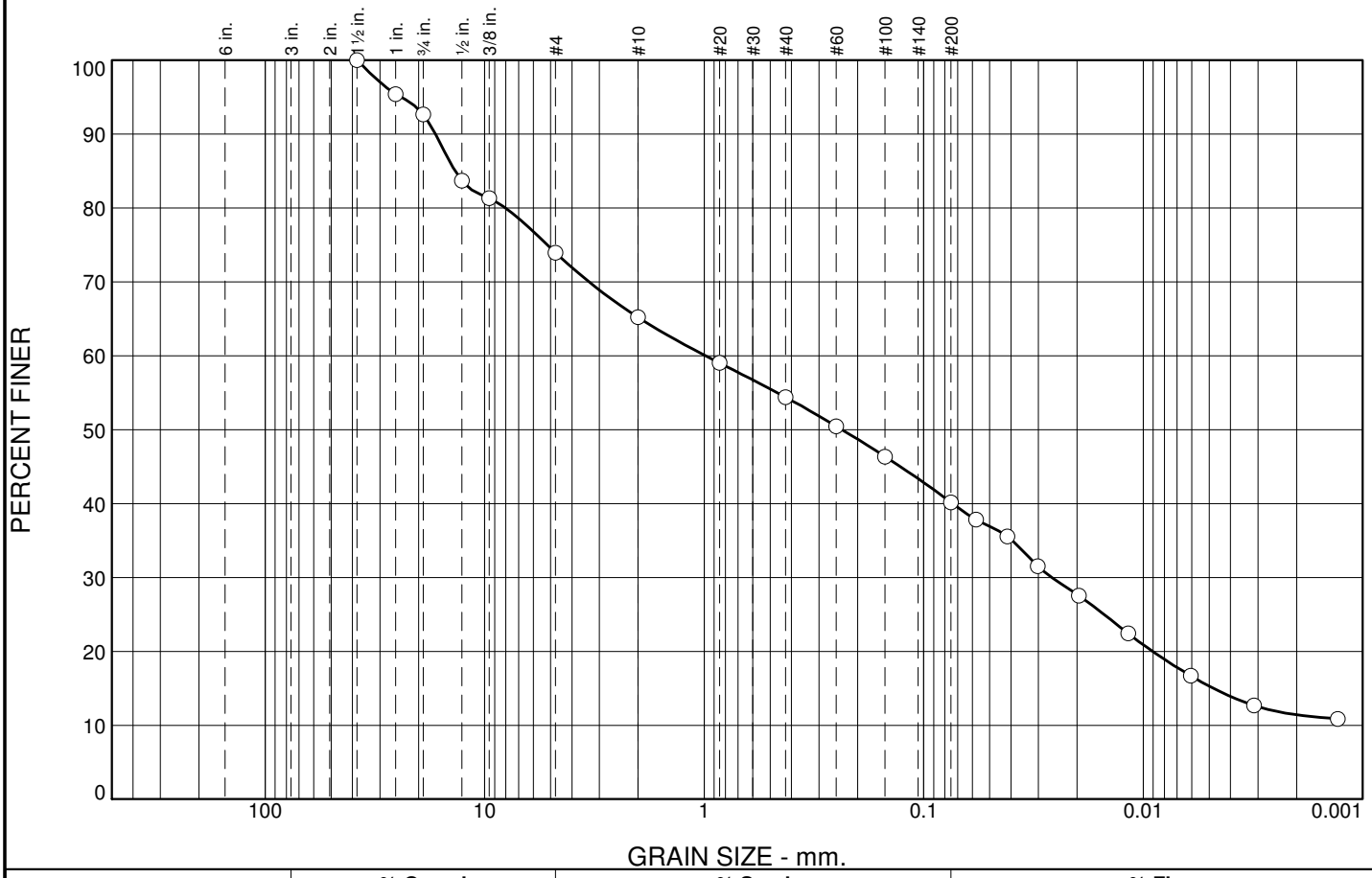
Location: GH11-241, Area A
Sample Number: GH11-241-3 **Depth:** 213.5-214' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.4	18.7	8.7	10.8	14.2	28.8	11.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	95.4		
.75	92.6		
.5	83.7		
0.375	81.3		
#4	73.9		
#10	65.2		
#20	59.0		
#40	54.4		
#60	50.5		
#100	46.4		
#200	40.2		
0.0577 mm.	37.8		
0.0415 mm.	35.5		
0.0302 mm.	31.5		
0.0196 mm.	27.5		
0.0117 mm.	22.4		
0.0061 mm.	16.7		
0.0031 mm.	12.7		
0.0013 mm.	10.9		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 17 LL= 33 PI= 16

Coefficients

D_{90}= 16.7826 D_{85}= 13.6278 D_{60}= 0.9863
D_{50}= 0.2357 D_{30}= 0.0261 D_{15}= 0.0048
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

As received moisture content - 15.2%

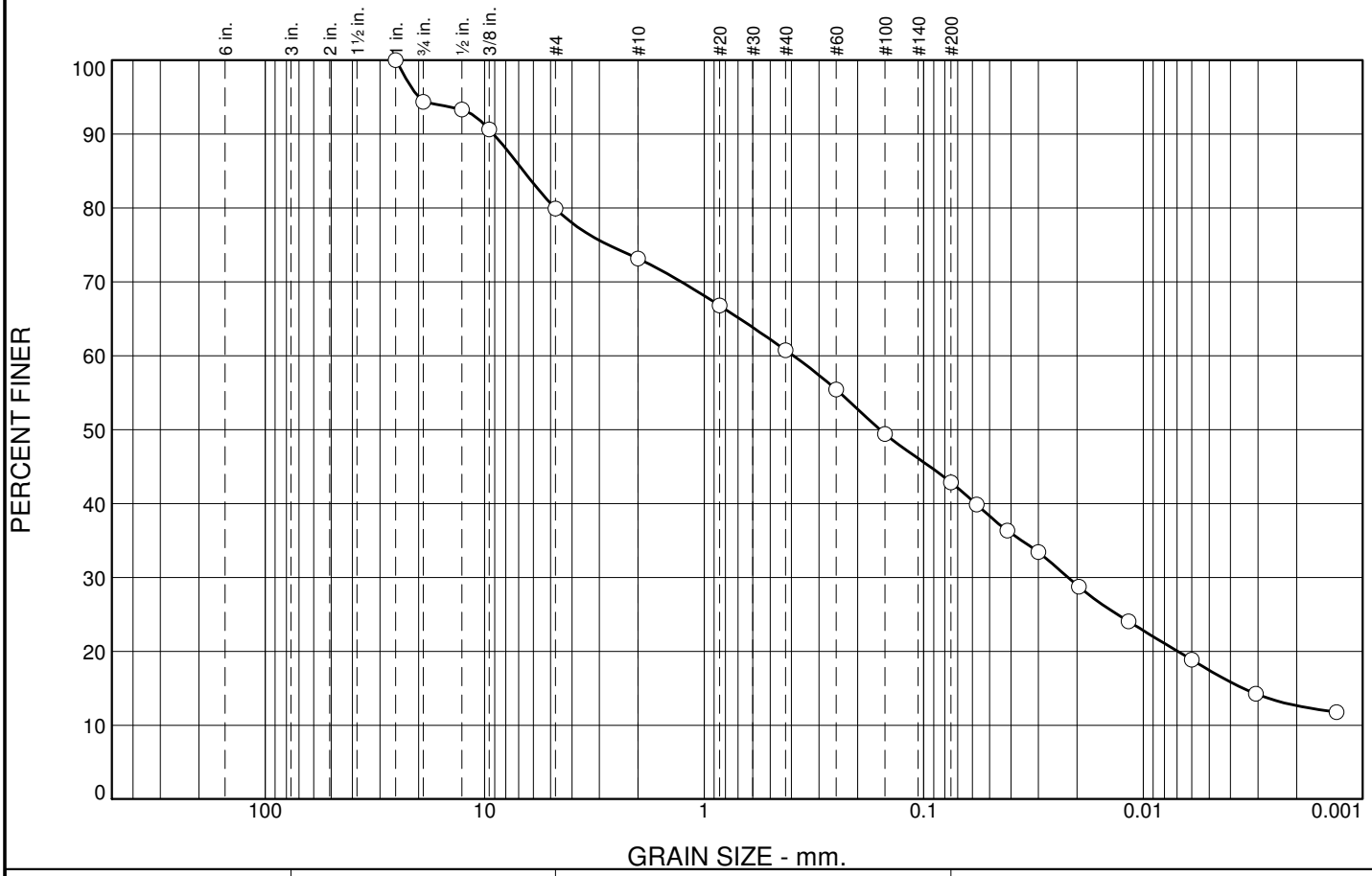
Location: GH11-241, Area A
Sample Number: SPT 1 **Depth:** 4-5.5' **Date:** 11/10/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.6	14.5	6.8	12.4	17.8	30.3	12.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	94.4		
.5	93.3		
0.375	90.6		
#4	79.9		
#10	73.1		
#20	66.8		
#40	60.7		
#60	55.4		
#100	49.4		
#200	42.9		
0.0573 mm.	39.8		
0.0416 mm.	36.3		
0.0300 mm.	33.4		
0.0196 mm.	28.7		
0.0117 mm.	24.0		
0.0060 mm.	18.8		
0.0031 mm.	14.2		
0.0013 mm.	11.8		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 32 PI= 17

Coefficients

D_{90}= 9.1221 D_{85}= 6.6508 D_{60}= 0.3928
D_{50}= 0.1583 D_{30}= 0.0220 D_{15}= 0.0035
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(3)

Remarks

As received moisture content - 14.5%

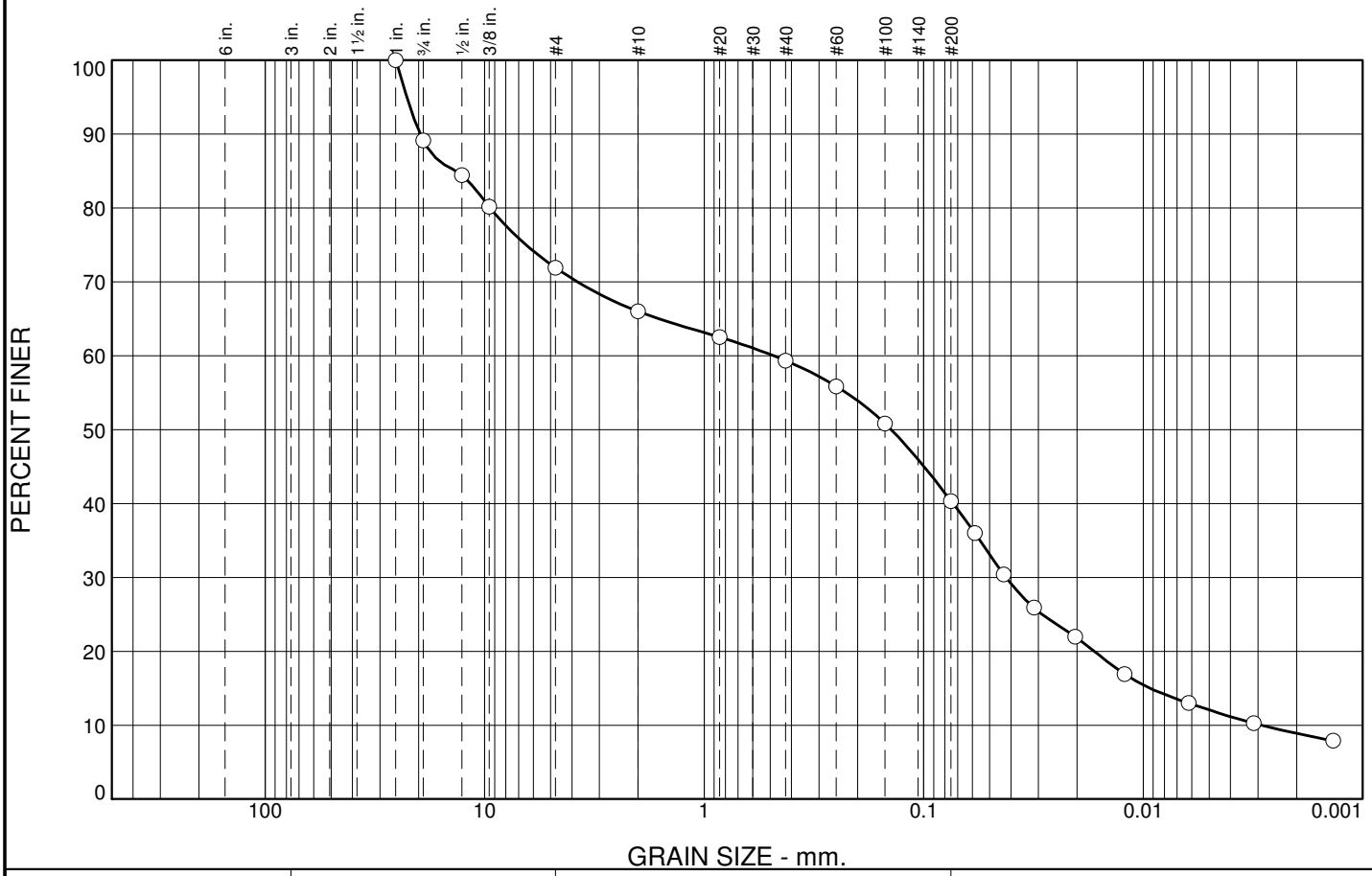
Location: GH11-241, Area A
Sample Number: SPT 3 **Depth:** 14-15.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.9	17.2	5.9	6.7	19.0	31.4	8.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	89.1		
.5	84.4		
0.375	80.2		
#4	71.9		
#10	66.0		
#20	62.5		
#40	59.3		
#60	55.9		
#100	50.8		
#200	40.3		
0.0585 mm.	36.0		
0.0431 mm.	30.4		
0.0314 mm.	25.9		
0.0204 mm.	22.0		
0.0121 mm.	16.9		
0.0062 mm.	13.0		
0.0031 mm.	10.3		
0.0014 mm.	7.9		

* (no specification provided)

Soil Description

silty, clayey sand with gravel

Atterberg Limits

PL= 19 LL= 26 PI= 7

Coefficients

D_{90}= 19.6648 D_{85}= 13.5470 D_{60}= 0.4837
D_{50}= 0.1407 D_{30}= 0.0421 D_{15}= 0.0093
D_{10}= 0.0029 C_u= 166.56 C_c= 1.26

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

As received moisture content - 17.4%

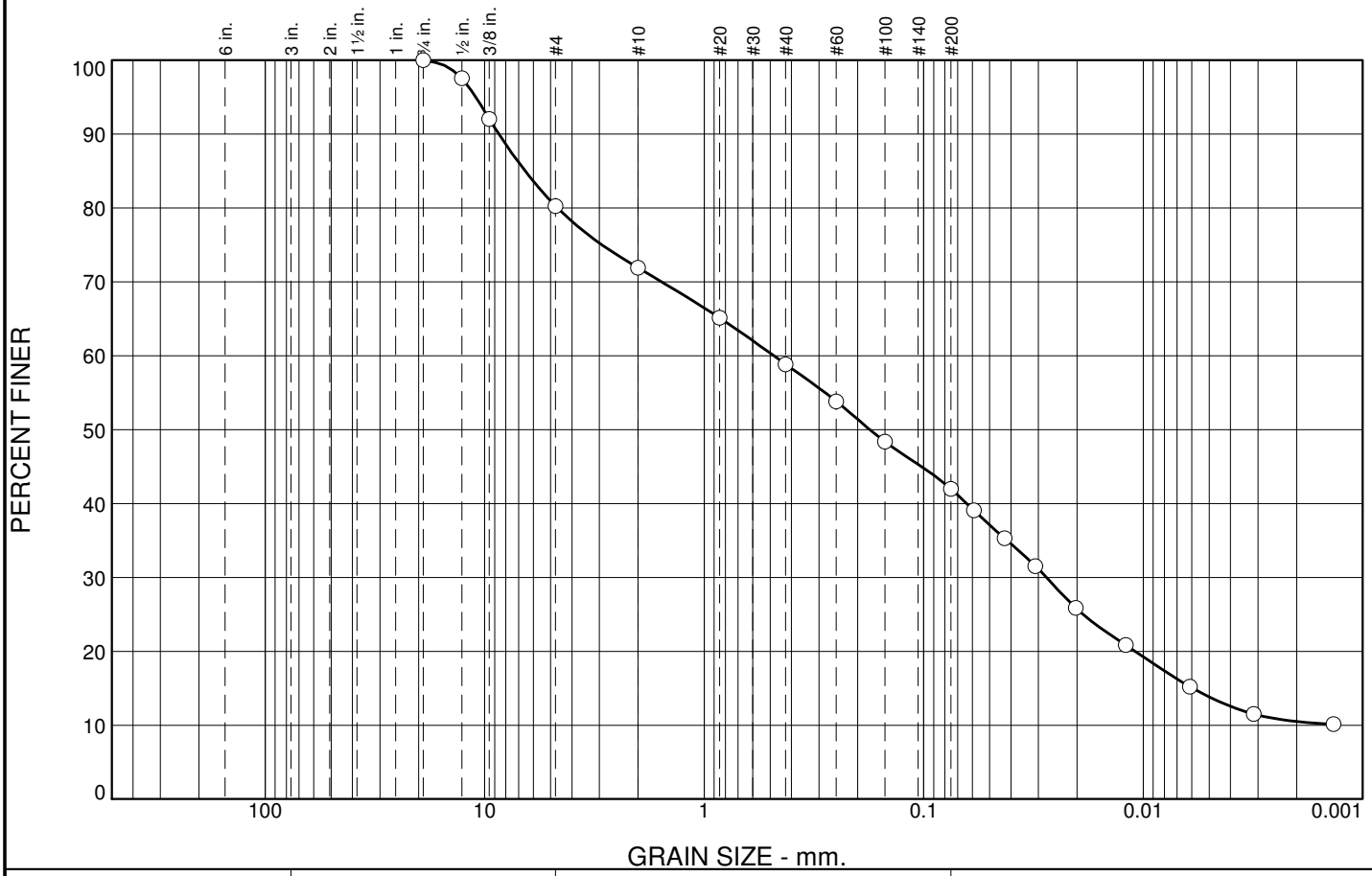
Location: GH11-241, Area A
Sample Number: SPT 5 **Depth:** 29-30.5' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.8	8.3	13.1	16.8	31.5	10.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.5		
0.375	92.0		
#4	80.2		
#10	71.9		
#20	65.1		
#40	58.8		
#60	53.8		
#100	48.4		
#200	42.0		
0.0590 mm.	39.1		
0.0428 mm.	35.3		
0.0310 mm.	31.5		
0.0202 mm.	25.9		
0.0120 mm.	20.9		
0.0061 mm.	15.2		
0.0031 mm.	11.5		
0.0014 mm.	10.1		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 30 PI= 15

Coefficients

D_{90}= 8.6126 D_{85}= 6.5424 D_{60}= 0.4823
D_{50}= 0.1760 D_{30}= 0.0276 D_{15}= 0.0059
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

As received moisture content - 17.2%

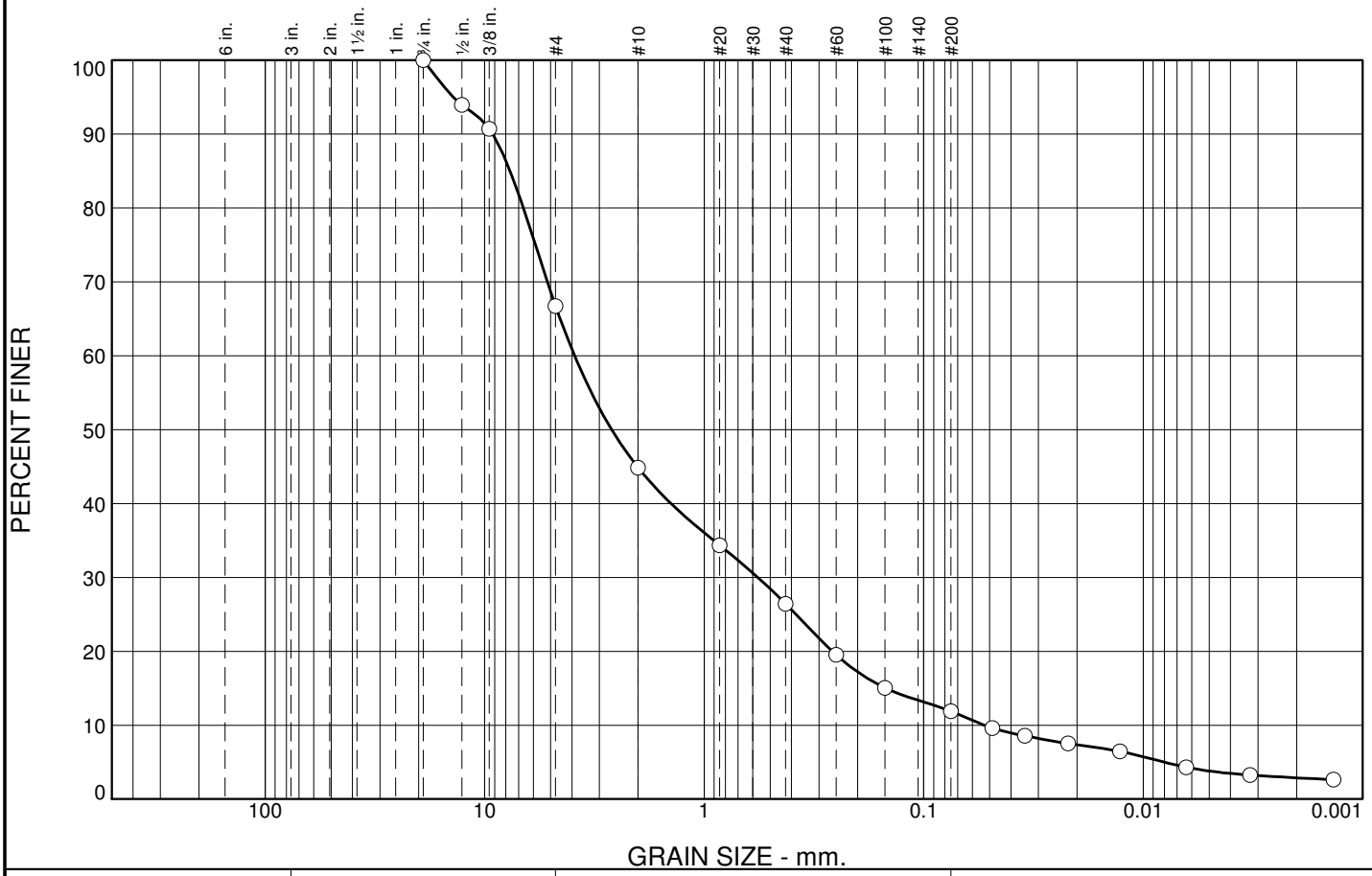
Location: GH11-241, Area A
Sample Number: SPT 9 **Depth:** 49-50.5' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	33.3	21.8	18.5	14.5	9.0	2.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	93.9		
0.375	90.7		
#4	66.7		
#10	44.9		
#20	34.4		
#40	26.4		
#60	19.5		
#100	15.0		
#200	11.9		
0.0486 mm.	9.6		
0.0345 mm.	8.6		
0.0220 mm.	7.5		
0.0128 mm.	6.5		
0.0064 mm.	4.3		
0.0033 mm.	3.3		
0.0014 mm.	2.6		

* (no specification provided)

Soil Description

well-graded sand with silt and gravel

Atterberg Limits

PL= NP LL= 23 PI= NP

Coefficients

D_{90}= 9.1885 D_{85}= 7.6609 D_{60}= 3.8939
D_{50}= 2.6380 D_{30}= 0.5702 D_{15}= 0.1488
D_{10}= 0.0528 C_u= 73.74 C_c= 1.58

Classification

USCS= SW-SM AASHTO= A-1-a

Remarks

As received moisture content - 12.8%

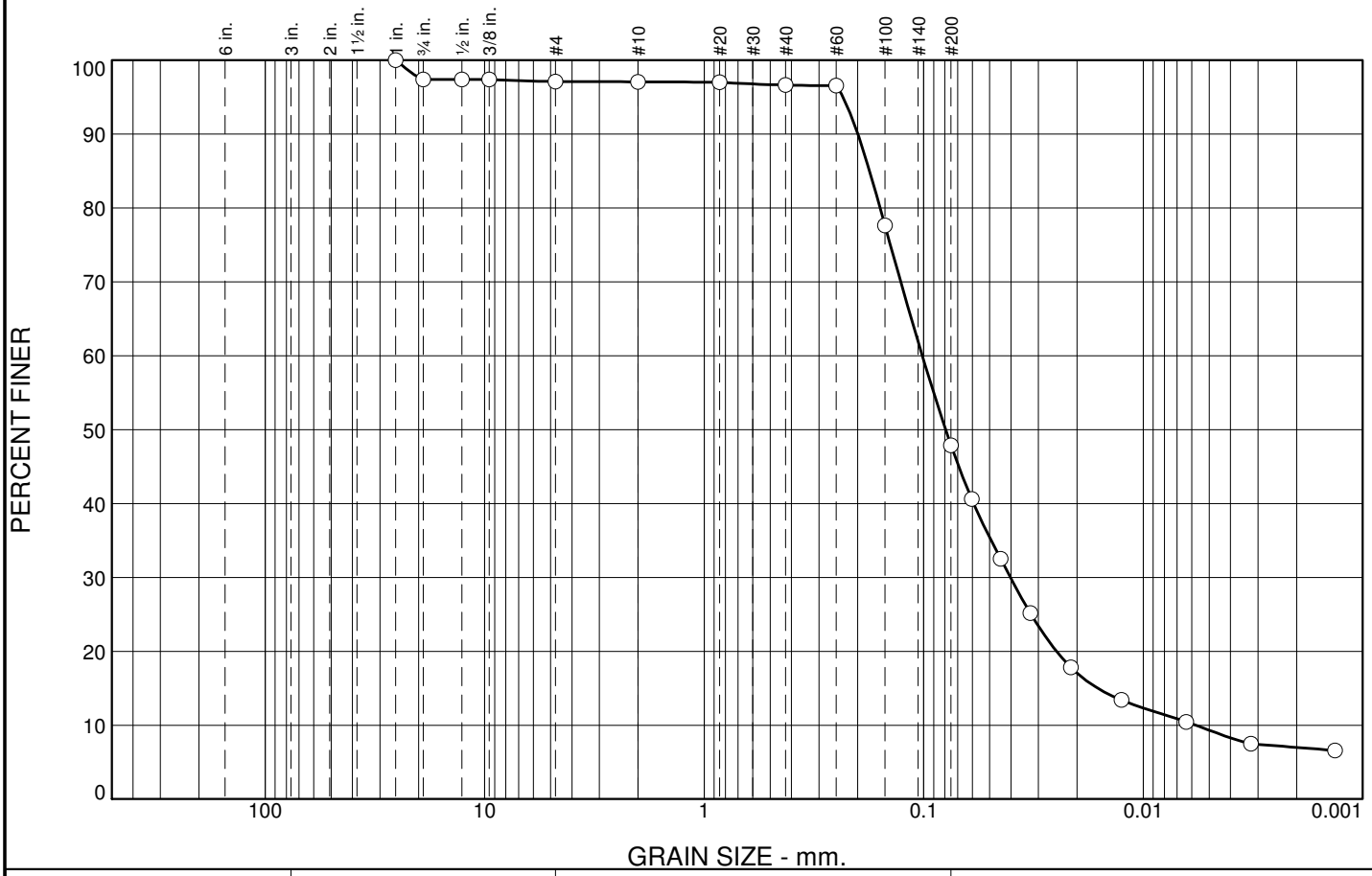
Location: GH11-241, Area A
Sample Number: SPT 11 **Depth:** 59-60.5' **Date:** 11/10/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.6	0.3	0.0	0.5	48.7	40.9	7.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.4		
.5	97.4		
0.375	97.4		
#4	97.1		
#10	97.1		
#20	97.0		
#40	96.6		
#60	96.5		
#100	77.6		
#200	47.9		
0.0604 mm.	40.6		
0.0446 mm.	32.5		
0.0326 mm.	25.2		
0.0213 mm.	17.8		
0.0126 mm.	13.4		
0.0064 mm.	10.4		
0.0032 mm.	7.5		
0.0013 mm.	6.6		

* (no specification provided)

Soil Description

silty sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.1993 D_{85}= 0.1765 D_{60}= 0.1015
D_{50}= 0.0794 D_{30}= 0.0402 D_{15}= 0.0161
D_{10}= 0.0058 C_u= 17.57 C_c= 2.76

Classification

USCS= SM AASHTO= A-4(0)

Remarks

As received moisture content - 23.4%

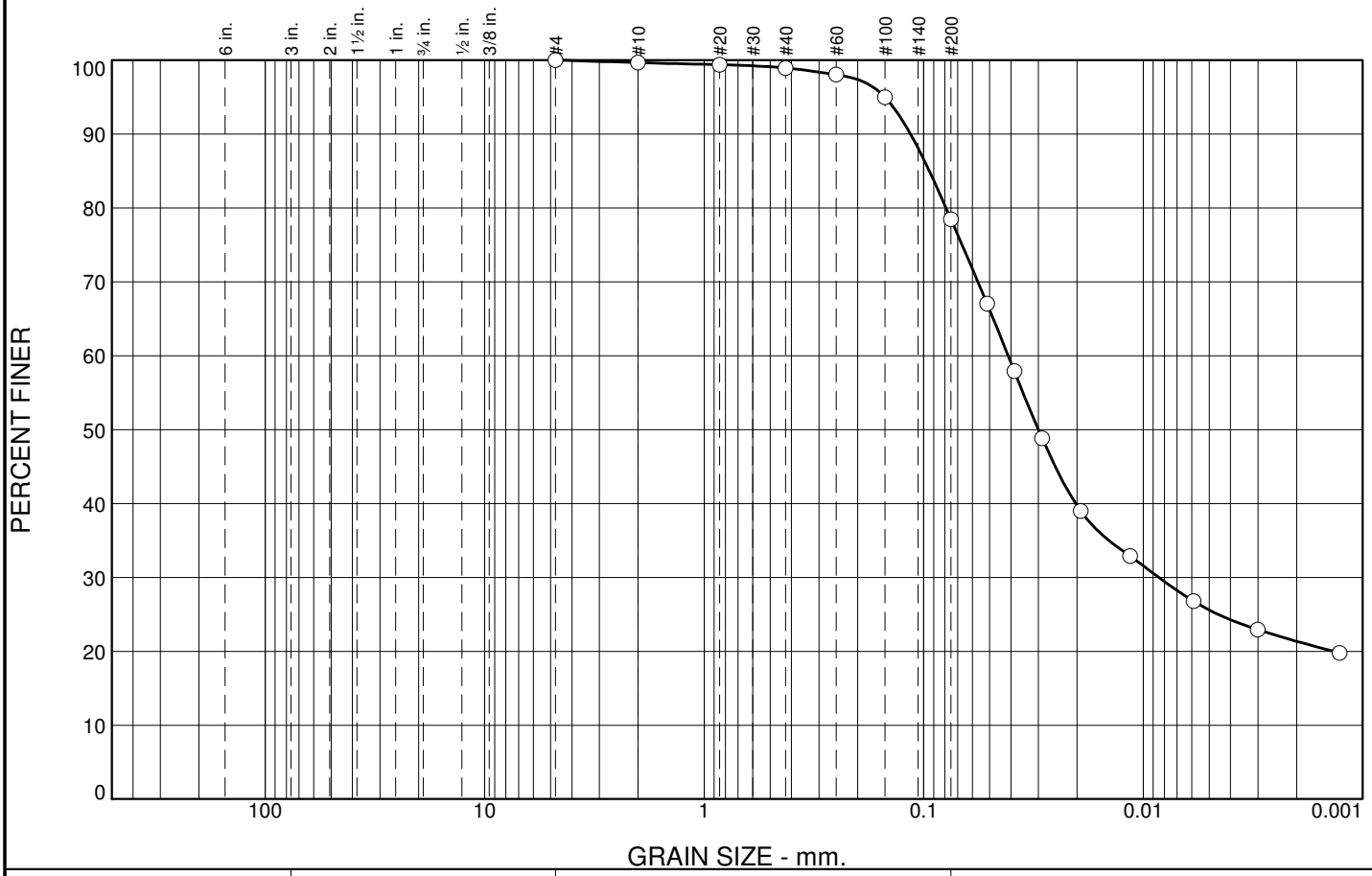
Location: GH11-241, Area A
Sample Number: SPT 15 **Depth:** 79-80.5' **Date:** 11/10/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	0.8	20.5	57.1	21.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	99.4		
#40	98.9		
#60	98.0		
#100	95.0		
#200	78.4		
0.0514 mm.	67.0		
0.0386 mm.	57.9		
0.0288 mm.	48.8		
0.0192 mm.	39.0		
0.0115 mm.	32.9		
0.0059 mm.	26.8		
0.0030 mm.	22.9		
0.0013 mm.	19.8		

* (no specification provided)

Soil Description

lean clay with sand

Atterberg Limits

PL= 19 LL= 33 PI= 14

Coefficients

D_{90}= 0.1148 D_{85}= 0.0943 D_{60}= 0.0412
D_{50}= 0.0300 D_{30}= 0.0085 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(10)

Remarks

As received moisture content - 25.6%

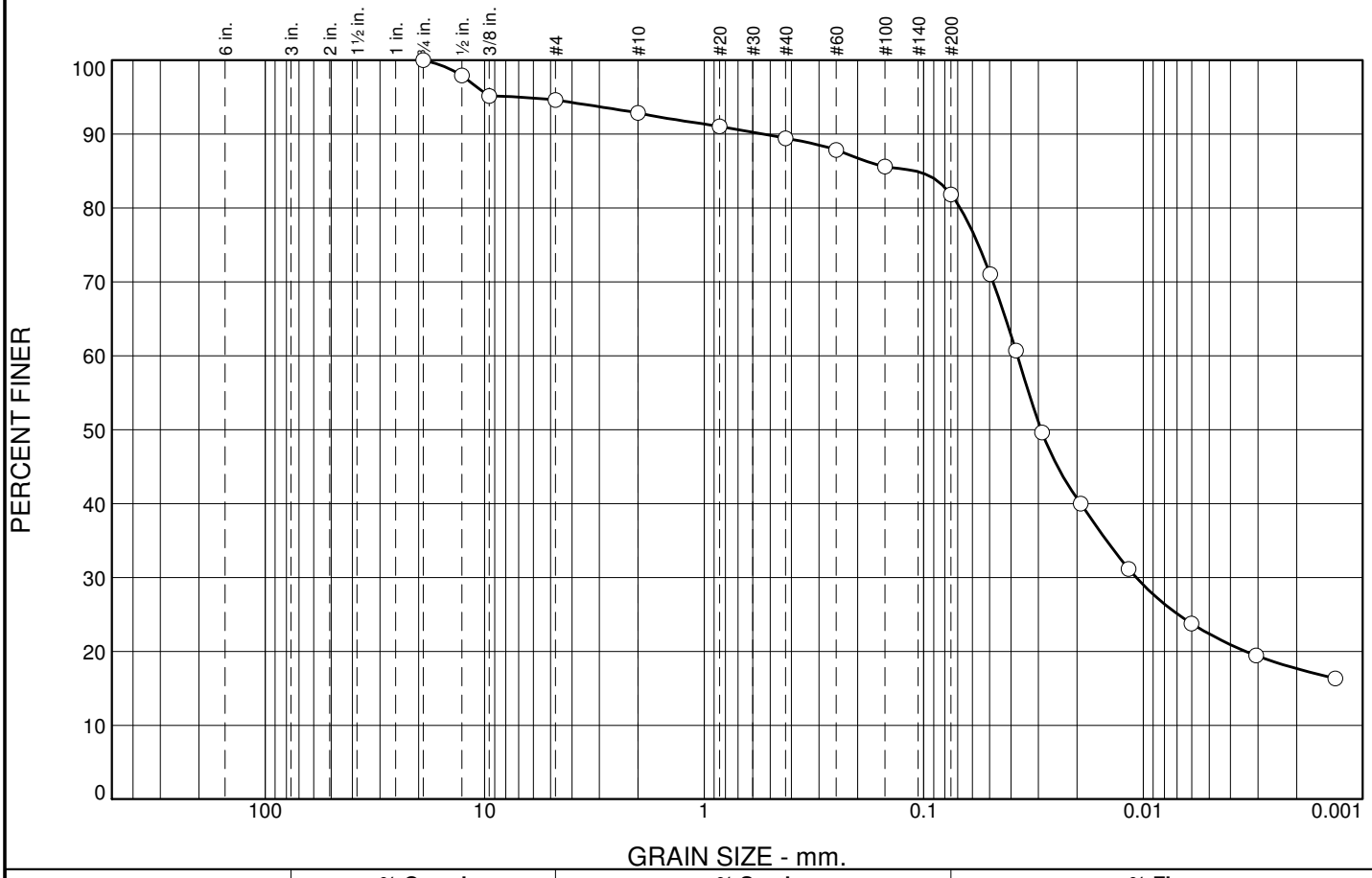
Location: GH11-241, Area A
Sample Number: SPT 16 **Depth:** 84-85.5' **Date:** 11/9/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.4	1.7	3.5	7.6	64.1	17.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.9		
0.375	95.1		
#4	94.6		
#10	92.9		
#20	91.0		
#40	89.4		
#60	87.8		
#100	85.6		
#200	81.8		
0.0498 mm.	71.0		
0.0380 mm.	60.7		
0.0288 mm.	49.6		
0.0193 mm.	40.0		
0.0116 mm.	31.1		
0.0060 mm.	23.8		
0.0031 mm.	19.4		
0.0013 mm.	16.3		

* (no specification provided)

Soil Description

lean clay with sand

Atterberg Limits

PL= 20 LL= 30 PI= 10

Coefficients

D_{90}= 0.5412 D_{85}= 0.1089 D_{60}= 0.0374
D_{50}= 0.0292 D_{30}= 0.0108 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(7)

Remarks

As received moisture content - 24.7%

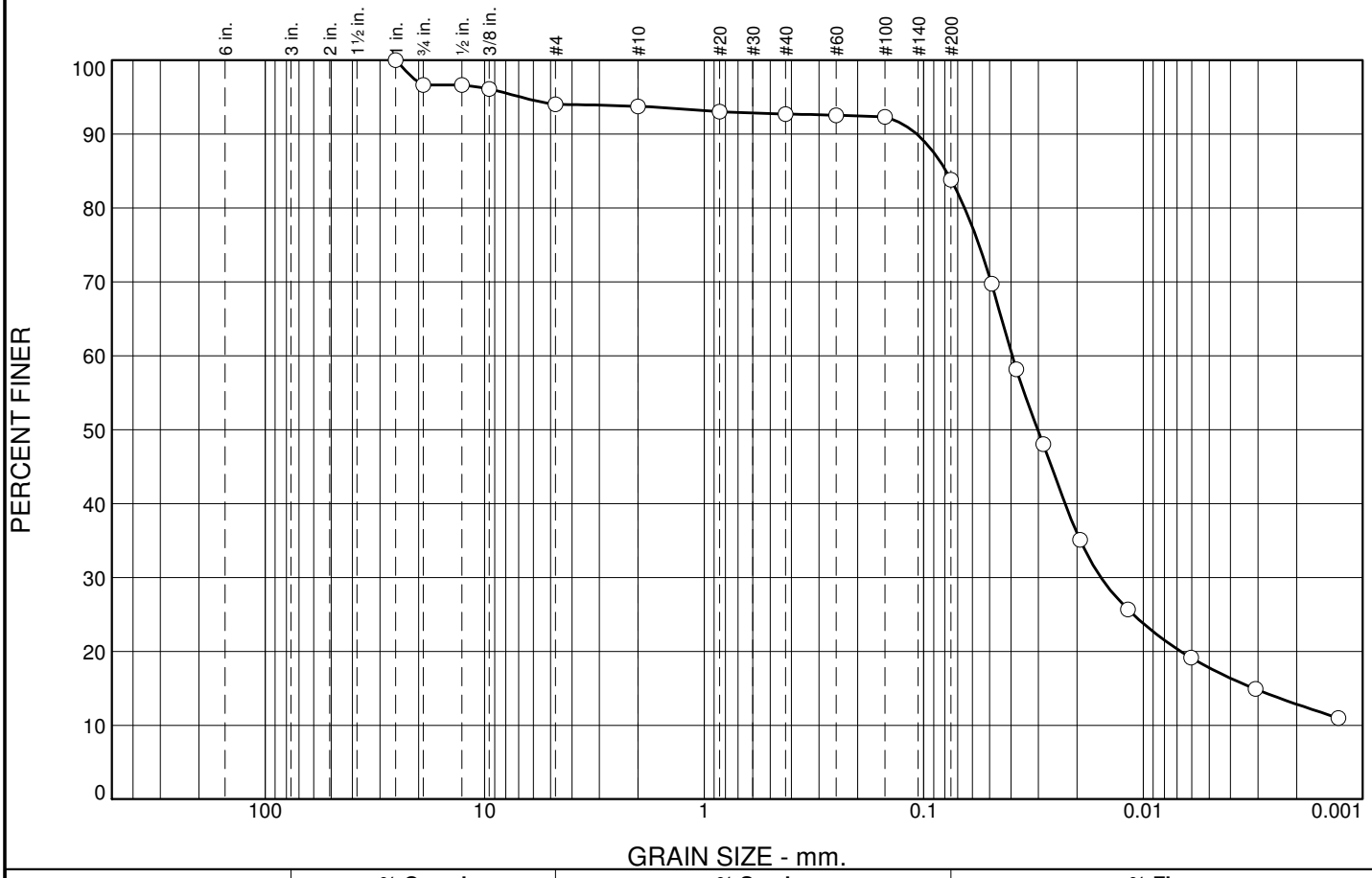
Location: GH11-241, Area A
Sample Number: SPT 17 **Depth:** 90-91.5' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.4	2.6	0.3	1.0	8.9	70.9	12.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.6		
.5	96.6		
0.375	96.1		
#4	94.0		
#10	93.7		
#20	93.0		
#40	92.7		
#60	92.5		
#100	92.3		
#200	83.8		
0.0490 mm.	69.7		
0.0378 mm.	58.2		
0.0285 mm.	48.1		
0.0194 mm.	35.1		
0.0117 mm.	25.7		
0.0060 mm.	19.1		
0.0031 mm.	14.9		
0.0013 mm.	11.0		

* (no specification provided)

Soil Description

silt with sand

Atterberg Limits

PL= 24 LL= 29 PI= 5

Coefficients

D_{90}= 0.1076 D_{85}= 0.0790 D_{60}= 0.0395
D_{50}= 0.0302 D_{30}= 0.0156 D_{15}= 0.0031
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(4)

Remarks

As received moisture content - 26.3%

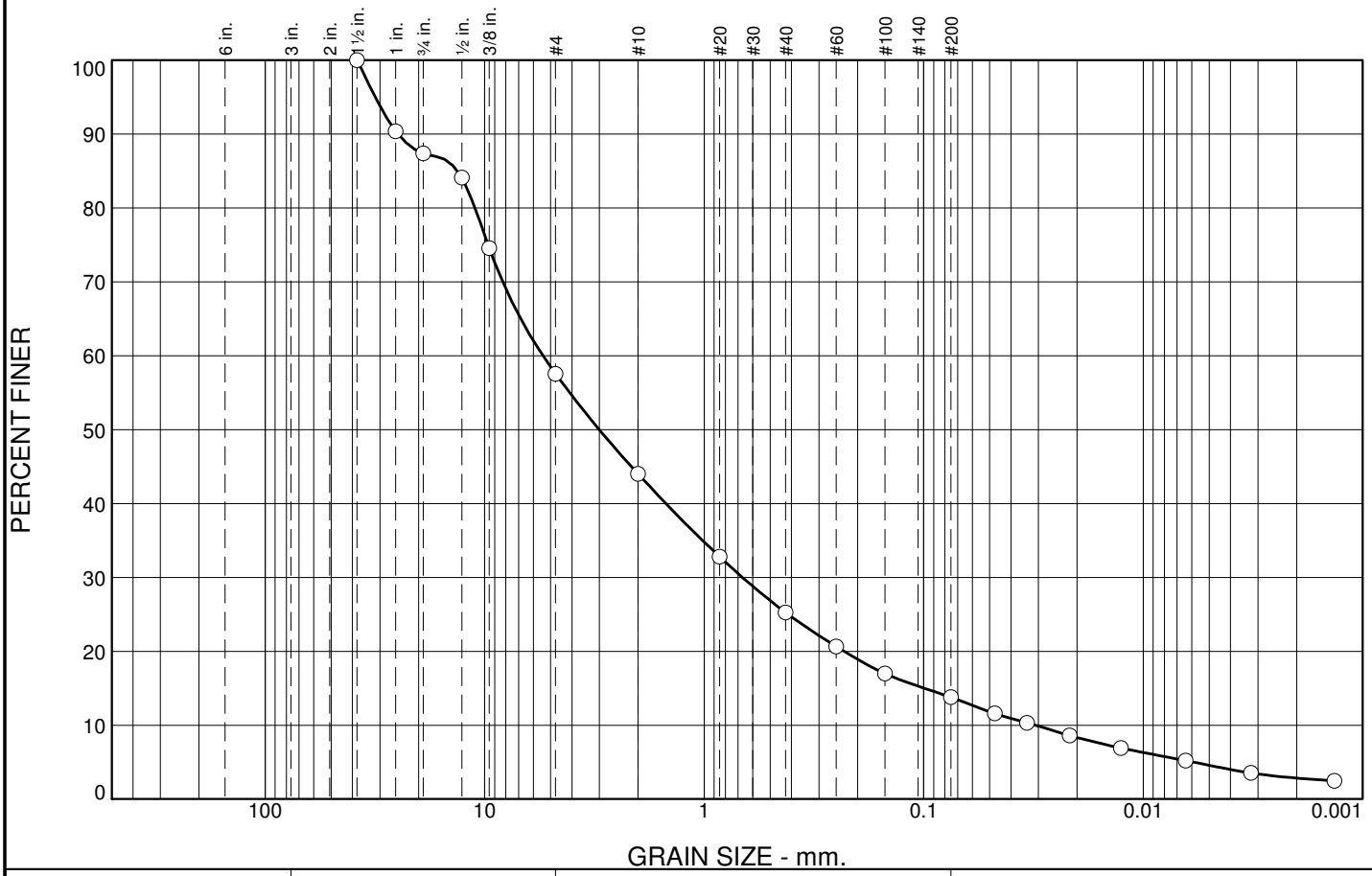
Location: GH11-241, Area A
Sample Number: SPT 18 **Depth:** 95-96.5' **Date:** 11/5/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.6	29.8	13.6	18.8	11.4	11.0	2.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	90.4		
.75	87.4		
.5	84.1		
0.375	74.6		
#4	57.6		
#10	44.0		
#20	32.8		
#40	25.2		
#60	20.6		
#100	17.0		
#200	13.8		
0.0474 mm.	11.6		
0.0338 mm.	10.3		
0.0216 mm.	8.6		
0.0126 mm.	6.9		
0.0064 mm.	5.2		
0.0032 mm.	3.5		
0.0013 mm.	2.5		

* (no specification provided)

Soil Description

silty, clayey sand with gravel

Atterberg Limits

PL= 19 LL= 24 PI= 5

Coefficients

D_{90}= 24.8339 D_{85}= 13.2697 D_{60}= 5.4211
D_{50}= 3.0086 D_{30}= 0.6692 D_{15}= 0.0994
D_{10}= 0.0310 C_u= 174.78 C_c= 2.66

Classification

USCS= SC-SM AASHTO= A-1-a

Remarks

As received moisture content - 12.7%

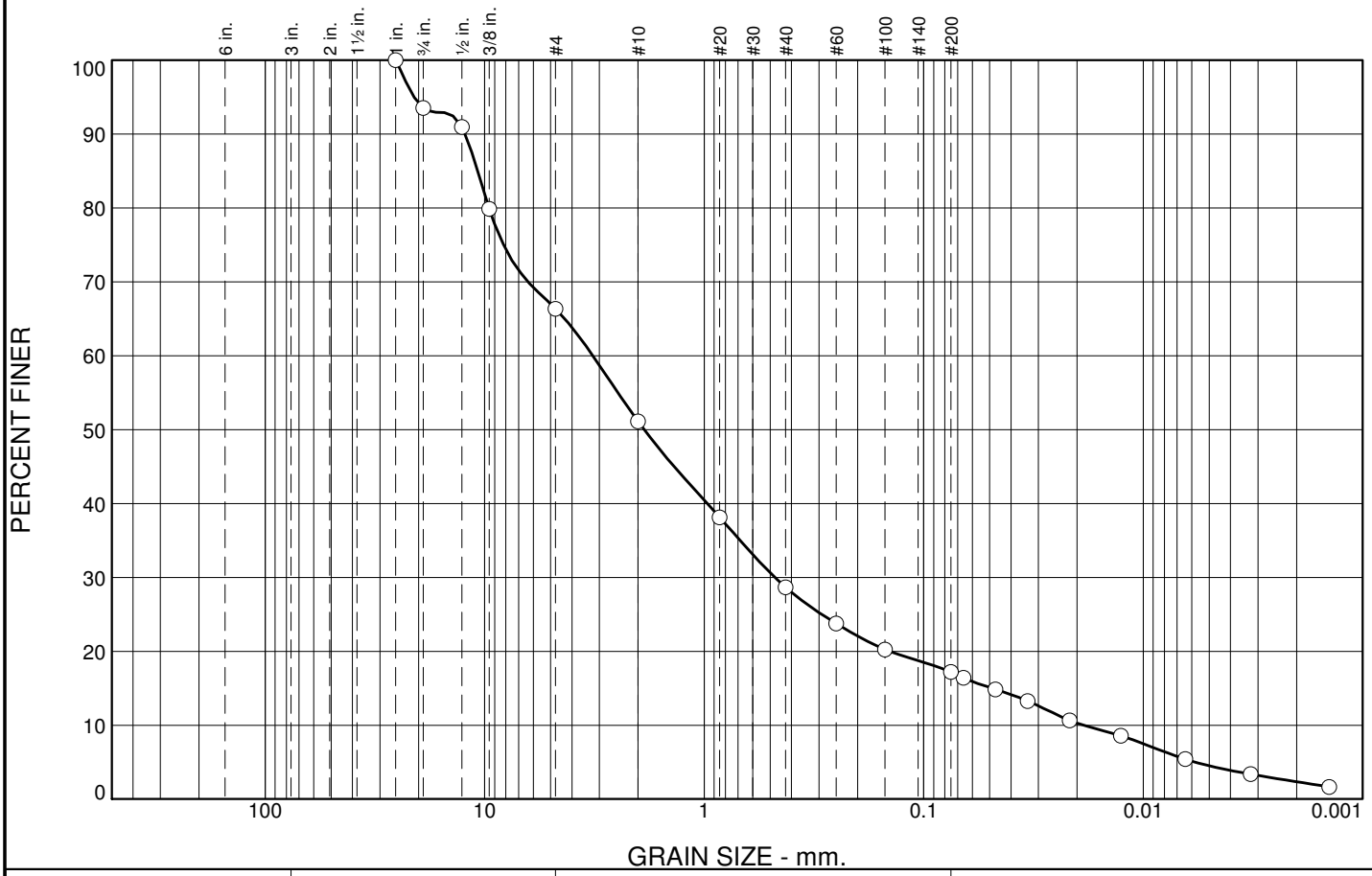
Location: GH11-241, Area A
Sample Number: SPT 25 **Depth:** 129-130.5' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.5	27.2	15.2	22.5	11.4	14.9	2.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	93.5		
.5	90.9		
0.375	79.9		
#4	66.3		
#10	51.1		
#20	38.1		
#40	28.6		
#60	23.8		
#100	20.2		
#200	17.2		
0.0659 mm.	16.4		
0.0470 mm.	14.9		
0.0336 mm.	13.3		
0.0216 mm.	10.7		
0.0126 mm.	8.6		
0.0064 mm.	5.4		
0.0032 mm.	3.4		
0.0014 mm.	1.6		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 19 LL= 27 PI= 8

Coefficients

D_{90}= 12.2684 D_{85}= 10.7574 D_{60}= 3.2182
D_{50}= 1.8760 D_{30}= 0.4760 D_{15}= 0.0487
D_{10}= 0.0187 C_u= 172.30 C_c= 3.77

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

As received moisture content - 15.1%

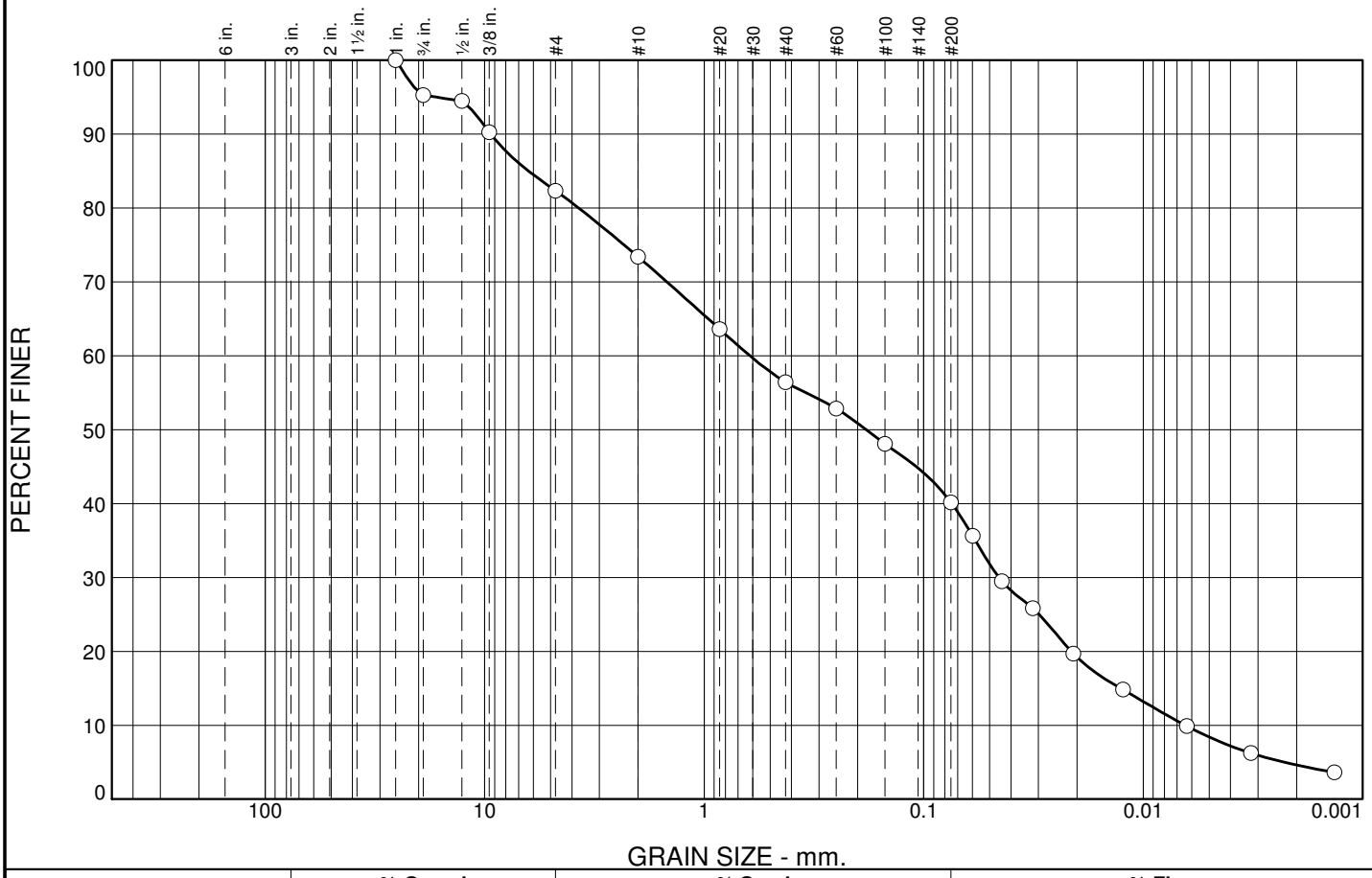
Location: GH11-241, Area A
Sample Number: SPT 26 **Depth:** 134-135.5' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.8	12.9	8.9	17.0	16.3	35.5	4.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.2		
.5	94.5		
0.375	90.2		
#4	82.3		
#10	73.4		
#20	63.6		
#40	56.4		
#60	52.8		
#100	48.1		
#200	40.1		
0.0598 mm.	35.6		
0.0440 mm.	29.5		
0.0318 mm.	25.8		
0.0208 mm.	19.7		
0.0123 mm.	14.8		
0.0063 mm.	9.9		
0.0032 mm.	6.2		
0.0013 mm.	3.6		

* (no specification provided)

Soil Description

silty, clayey sand with gravel

Atterberg Limits

PL= 22 LL= 26 PI= 4

Coefficients

D_{90}= 9.3886 D_{85}= 6.3185 D_{60}= 0.6194
D_{50}= 0.1829 D_{30}= 0.0455 D_{15}= 0.0126
D_{10}= 0.0064 C_u= 96.33 C_c= 0.52

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

As received moisture content - 18.8%

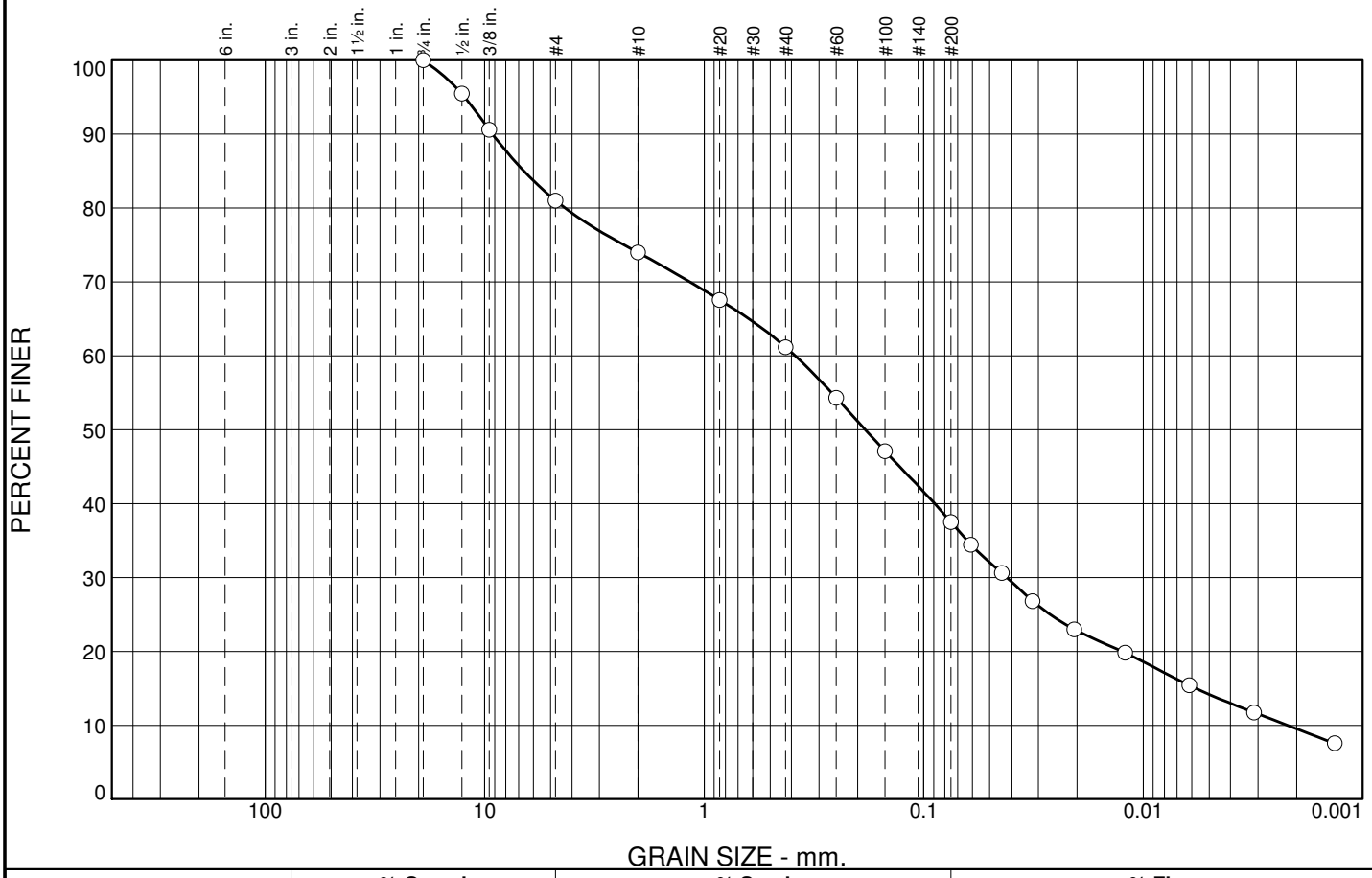
Location: GH11-241, Area A
Sample Number: SPT 32 **Depth:** 169-170.5' **Date:** 11/10/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.0	7.0	12.8	23.7	28.0	9.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	95.5		
0.375	90.6		
#4	81.0		
#10	74.0		
#20	67.5		
#40	61.2		
#60	54.3		
#100	47.1		
#200	37.5		
0.0609 mm.	34.4		
0.0441 mm.	30.6		
0.0319 mm.	26.8		
0.0206 mm.	23.0		
0.0121 mm.	19.8		
0.0062 mm.	15.4		
0.0031 mm.	11.7		
0.0013 mm.	7.6		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 24 PI= 10

Coefficients

D_{90}= 9.2154 D_{85}= 6.6380 D_{60}= 0.3847
D_{50}= 0.1845 D_{30}= 0.0418 D_{15}= 0.0058
D_{10}= 0.0022 C_u= 174.73 C_c= 2.06

Classification

USCS= SC AASHTO= A-4(0)

Remarks

As received moisture content - 13.7%

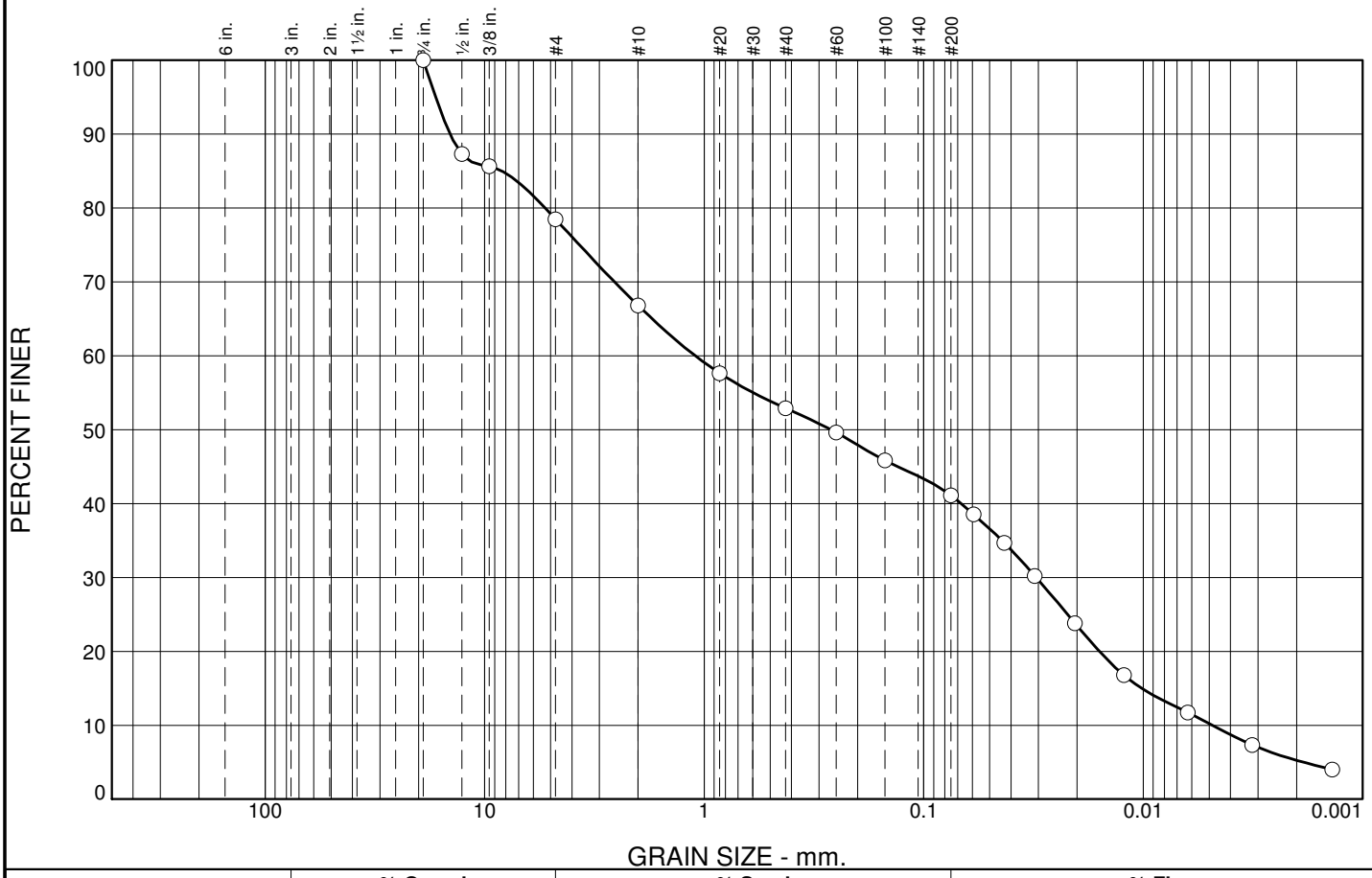
Location: GH11-241, Area A
Sample Number: SPT 37 **Depth:** 194-195.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	21.5	11.7	13.9	11.8	35.8	5.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	87.3		
0.375	85.6		
#4	78.5		
#10	66.8		
#20	57.6		
#40	52.9		
#60	49.6		
#100	45.8		
#200	41.1		
0.0592 mm.	38.5		
0.0429 mm.	34.7		
0.0312 mm.	30.2		
0.0204 mm.	23.8		
0.0122 mm.	16.8		
0.0063 mm.	11.7		
0.0032 mm.	7.3		
0.0014 mm.	4.0		

* (no specification provided)

Soil Description

silty, clayey sand with gravel

Atterberg Limits

PL= 21 LL= 27 PI= 6

Coefficients

D_{90}= 14.3702 D_{85}= 8.3788 D_{60}= 1.0988
D_{50}= 0.2647 D_{30}= 0.0307 D_{15}= 0.0101
D_{10}= 0.0048 C_u= 227.28 C_c= 0.18

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

As received moisture content - 16.7%

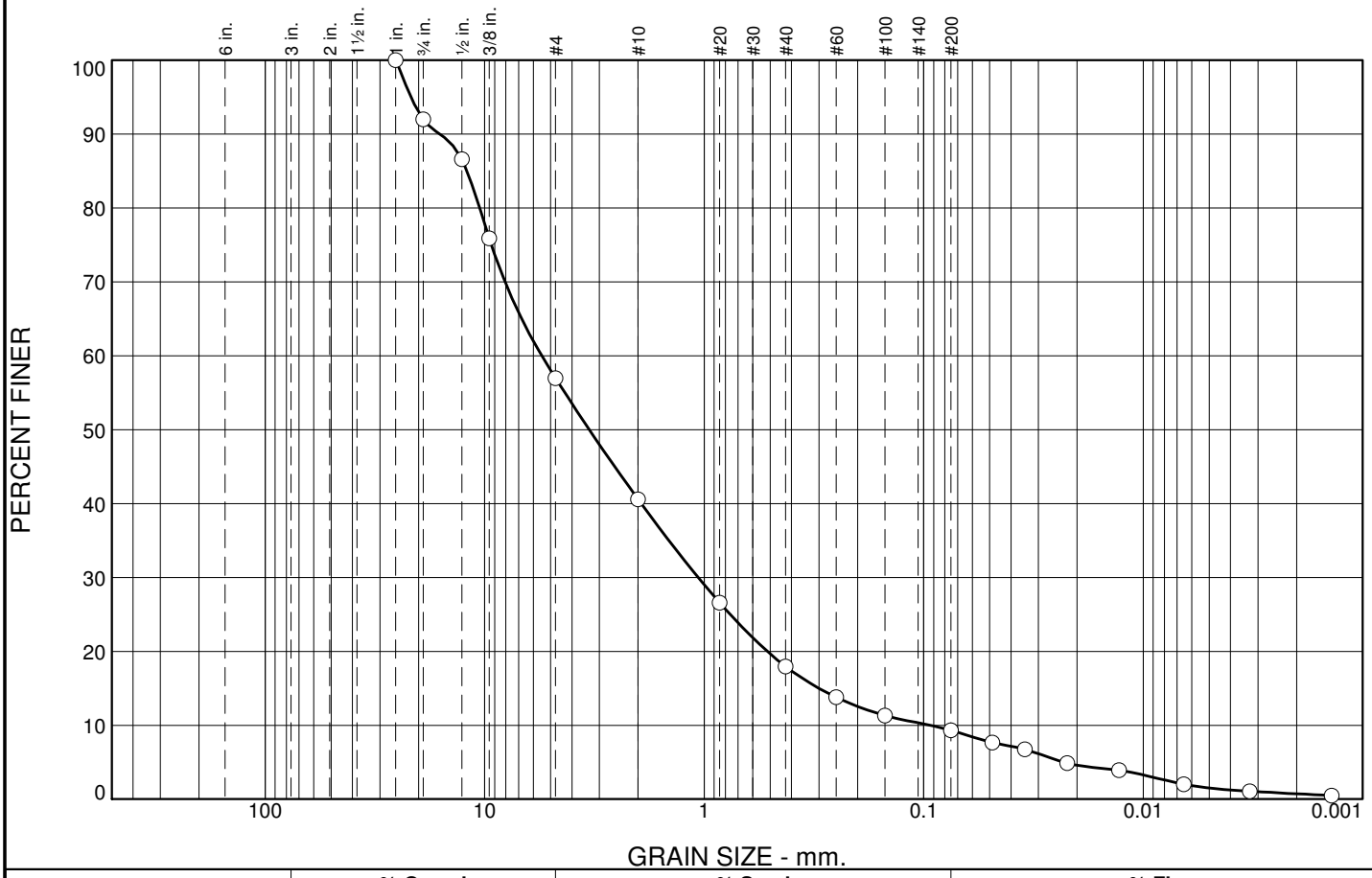
Location: GH11-241, Area A
Sample Number: SPT 39 **Depth:** 204-205.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.0	35.0	16.4	22.7	8.6	8.6	0.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	92.0		
.5	86.6		
0.375	75.9		
#4	57.0		
#10	40.6		
#20	26.6		
#40	17.9		
#60	13.8		
#100	11.3		
#200	9.3		
0.0487 mm.	7.7		
0.0346 mm.	6.7		
0.0222 mm.	4.9		
0.0129 mm.	3.9		
0.0065 mm.	2.0		
0.0033 mm.	1.1		
0.0014 mm.	0.5		

* (no specification provided)

Soil Description

well-graded sand with silty clay and gravel

Atterberg Limits

PL= 19 LL= 25 PI= 6

Coefficients

D_{90}= 16.0808 D_{85}= 12.0321 D_{60}= 5.4923
D_{50}= 3.3387 D_{30}= 1.0640 D_{15}= 0.2998
D_{10}= 0.0936 C_u= 58.68 C_c= 2.20

Classification

USCS= SW-SC AASHTO= A-1-a

Remarks

As received moisture content - 12.6%

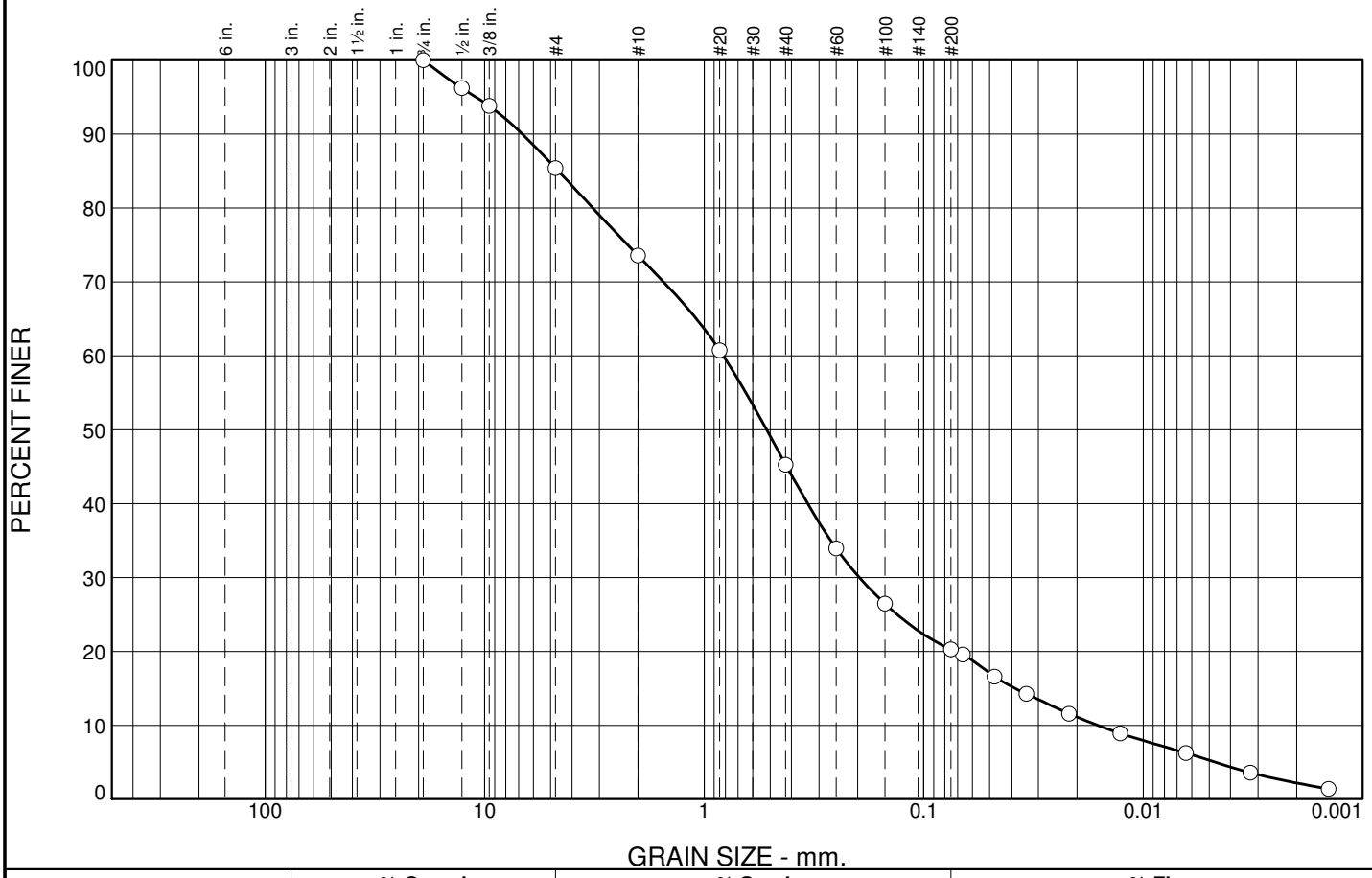
Location: GH11-241, Area A
Sample Number: SPT 45 **Depth:** 239-240.5' **Date:** 11/10/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.6	11.9	28.2	25.0	18.1	2.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	96.2		
0.375	93.8		
#4	85.4		
#10	73.5		
#20	60.7		
#40	45.3		
#60	33.9		
#100	26.4		
#200	20.3		
0.0662 mm.	19.6		
0.0475 mm.	16.6		
0.0340 mm.	14.2		
0.0218 mm.	11.6		
0.0127 mm.	8.9		
0.0064 mm.	6.2		
0.0032 mm.	3.6		
0.0014 mm.	1.4		

* (no specification provided)

Soil Description

silty sand

Atterberg Limits

PL= NP LL= 25 PI= NP

Coefficients

D_{90}= 6.7386 D_{85}= 4.6256 D_{60}= 0.8183
D_{50}= 0.5198 D_{30}= 0.1966 D_{15}= 0.0384
D_{10}= 0.0161 C_u= 50.74 C_c= 2.93

Classification

USCS= SM AASHTO= A-1-b

Remarks

As received moisture content - 19.6%

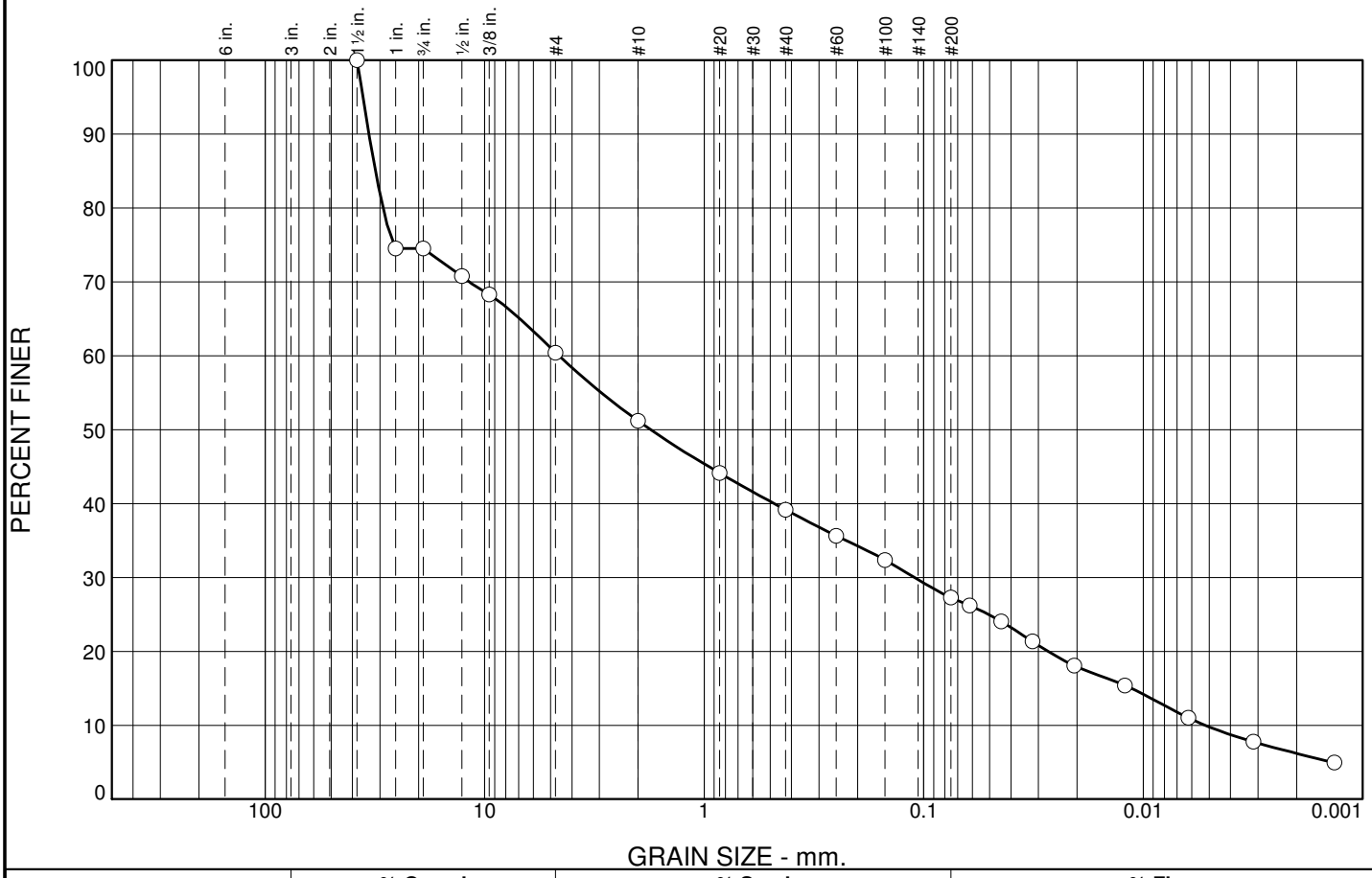
Location: GH11-241, Area A
Sample Number: SPT 54 **Depth:** 329-330.5' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	25.5	14.1	9.2	12.0	11.9	21.1	6.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	74.5		
.75	74.5		
.5	70.8		
0.375	68.3		
#4	60.4		
#10	51.2		
#20	44.1		
#40	39.2		
#60	35.6		
#100	32.4		
#200	27.3		
0.0618 mm.	26.2		
0.0443 mm.	24.0		
0.0319 mm.	21.3		
0.0206 mm.	18.1		
0.0121 mm.	15.4		
0.0062 mm.	11.0		
0.0031 mm.	7.8		
0.0013 mm.	4.9		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 17 LL= 27 PI= 10

Coefficients

D_{90}= 33.6747 D_{85}= 31.4653 D_{60}= 4.5873
D_{50}= 1.7536 D_{30}= 0.1103 D_{15}= 0.0113
D_{10}= 0.0052 C_u= 879.36 C_c= 0.51

Classification

USCS= GC AASHTO= A-2-4(0)

Remarks

As received moisture content - 14.7%

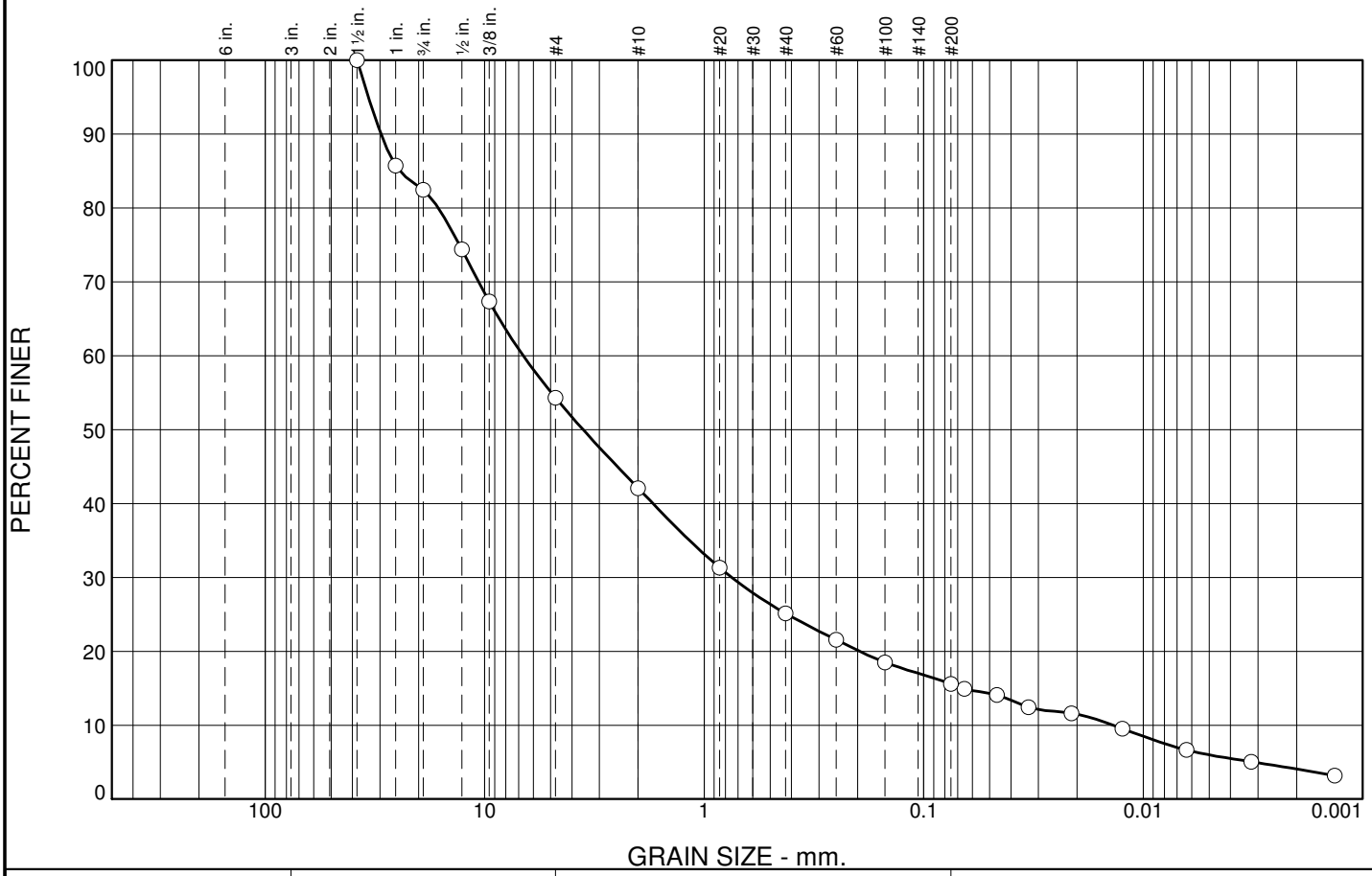
Location: GH11-242, Area A
Sample Number: SPT 2 **Depth:** 10-11.5' **Date:** 11/12/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	17.5	28.2	12.2	17.0	9.5	11.5	4.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	85.7		
.75	82.5		
.5	74.4		
0.375	67.3		
#4	54.3		
#10	42.1		
#20	31.3		
#40	25.1		
#60	21.6		
#100	18.5		
#200	15.6		
0.0652 mm.	14.9		
0.0464 mm.	14.1		
0.0333 mm.	12.4		
0.0212 mm.	11.6		
0.0124 mm.	9.5		
0.0063 mm.	6.7		
0.0032 mm.	5.1		
0.0013 mm.	3.2		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 17 LL= 26 PI= 9

Coefficients

D_{90}= 29.6989 D_{85}= 24.3934 D_{60}= 6.6699
D_{50}= 3.5632 D_{30}= 0.7490 D_{15}= 0.0664
D_{10}= 0.0137 C_u= 486.70 C_c= 6.14

Classification

USCS= GC AASHTO= A-2-4(0)

Remarks

As received moisture content - 10.5%

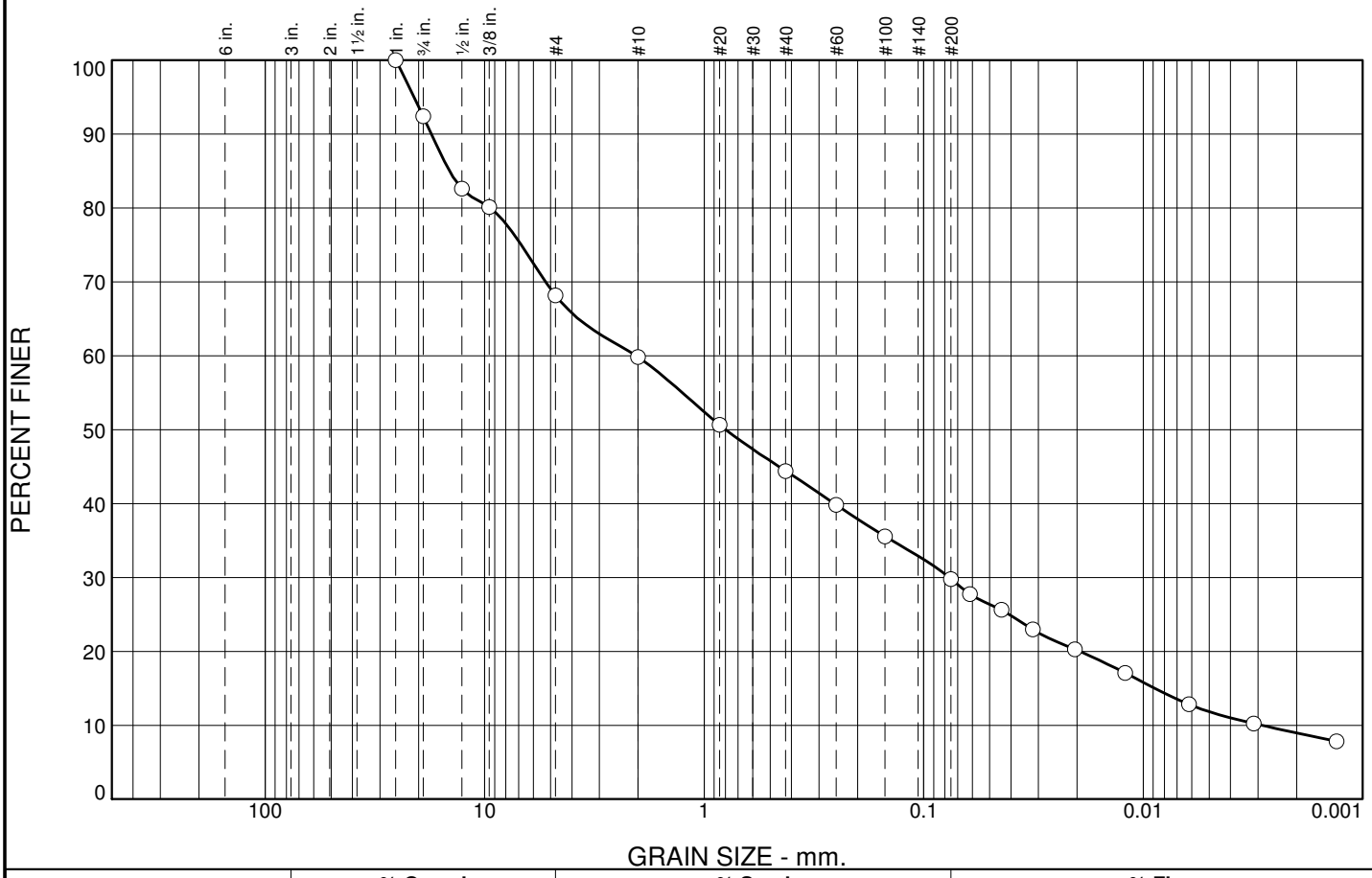
Location: GH11-242, Area A
Sample Number: SPT 5 **Depth:** 25-26.5' **Date:** 11/10/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.6	24.2	8.4	15.4	14.6	20.8	9.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	92.4		
.5	82.6		
0.375	80.1		
#4	68.2		
#10	59.8		
#20	50.6		
#40	44.4		
#60	39.8		
#100	35.6		
#200	29.8		
0.0615 mm.	27.7		
0.0442 mm.	25.6		
0.0318 mm.	22.9		
0.0205 mm.	20.3		
0.0121 mm.	17.1		
0.0062 mm.	12.8		
0.0031 mm.	10.2		
0.0013 mm.	7.8		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 30 PI= 15

Coefficients

D_{90}= 17.4957 D_{85}= 14.4486 D_{60}= 2.0451
D_{50}= 0.7987 D_{30}= 0.0765 D_{15}= 0.0088
D_{10}= 0.0029 C_u= 709.79 C_c= 0.99

Classification

USCS= SC AASHTO= A-2-6(1)

Remarks

As received moisture content - 13.1%

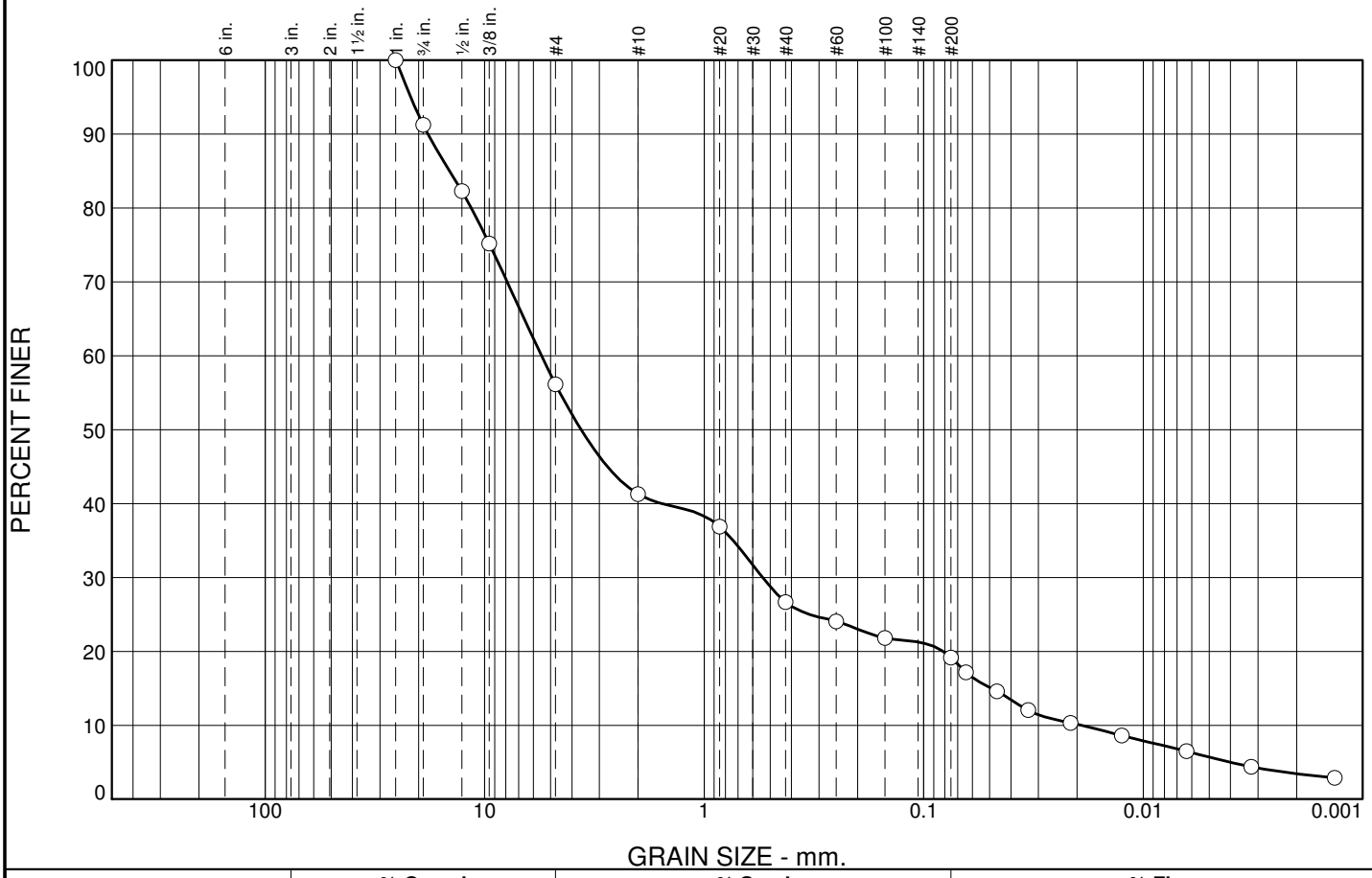
Location: GH11-242, Area A
Sample Number: SPT 6 **Depth:** 30-31.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.8	35.1	14.8	14.6	7.5	15.8	3.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	91.2		
.5	82.3		
0.375	75.2		
#4	56.1		
#10	41.3		
#20	36.9		
#40	26.7		
#60	24.1		
#100	21.8		
#200	19.2		
0.0641 mm.	17.2		
0.0463 mm.	14.6		
0.0334 mm.	12.0		
0.0214 mm.	10.3		
0.0125 mm.	8.6		
0.0064 mm.	6.5		
0.0032 mm.	4.4		
0.0013 mm.	2.9		

* (no specification provided)

Soil Description

silty clayey gravel with sand

Atterberg Limits

PL= 19 LL= 25 PI= 6

Coefficients

D_{90}= 18.1395 D_{85}= 14.4399 D_{60}= 5.5109
D_{50}= 3.6388 D_{30}= 0.5422 D_{15}= 0.0491
D_{10}= 0.0191 C_u= 288.12 C_c= 2.79

Classification

USCS= GC-GM AASHTO= A-1-b

Remarks

As received moisture content - 10.6%

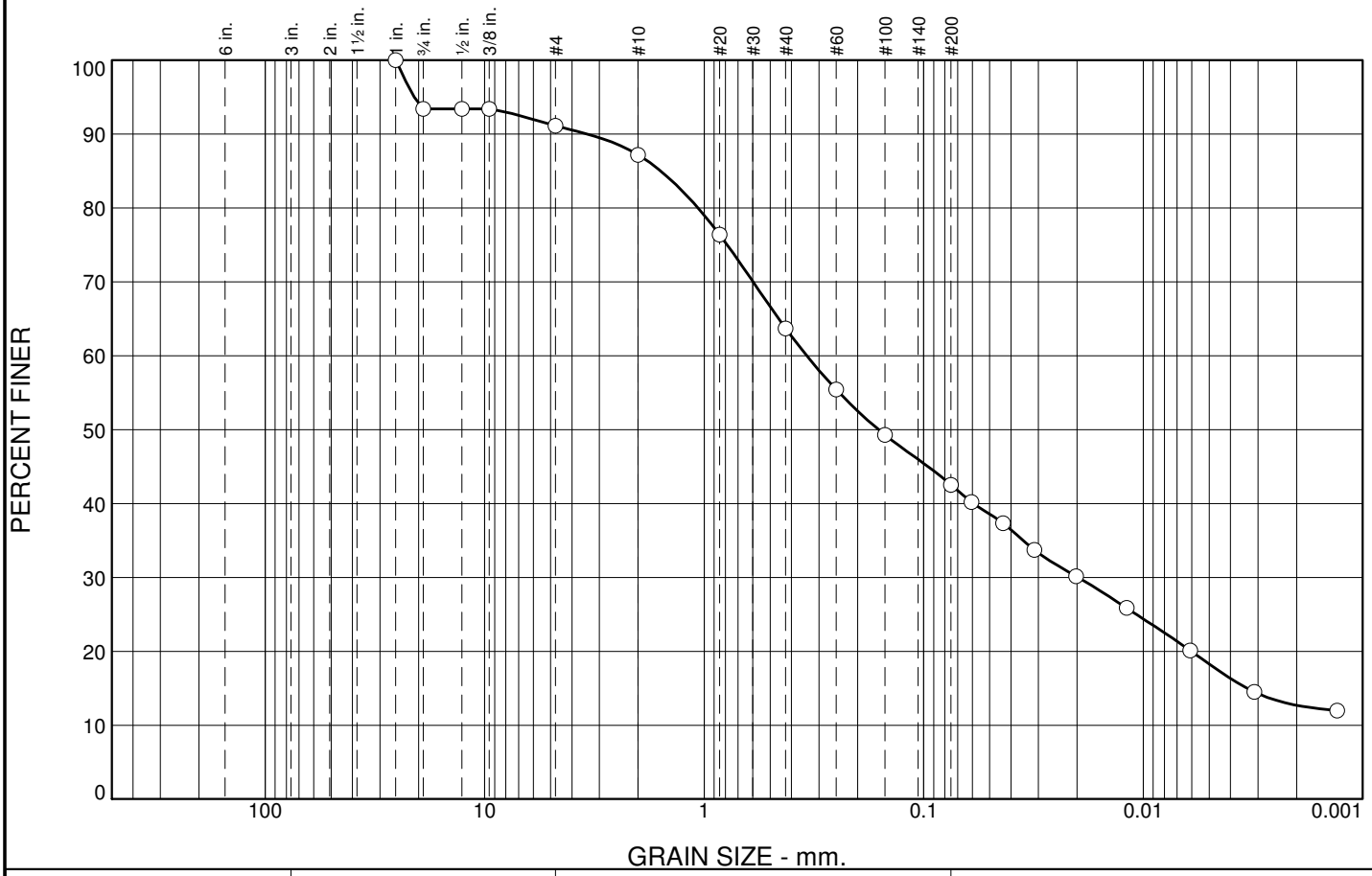
Location: GH11-242, Area A
Sample Number: SPT 11 **Depth:** 55-56.5' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.6	2.3	3.9	23.5	21.2	29.8	12.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	93.4		
.5	93.4		
0.375	93.4		
#4	91.1		
#10	87.2		
#20	76.4		
#40	63.7		
#60	55.4		
#100	49.3		
#200	42.5		
0.0605 mm.	40.2		
0.0435 mm.	37.3		
0.0313 mm.	33.7		
0.0202 mm.	30.2		
0.0119 mm.	25.9		
0.0061 mm.	20.1		
0.0031 mm.	14.5		
0.0013 mm.	12.0		

* (no specification provided)

Soil Description

clayey sand

Atterberg Limits

PL= 23 LL= 44 PI= 21

Coefficients

D_{90}= 3.4168 D_{85}= 1.5785 D_{60}= 0.3409
D_{50}= 0.1605 D_{30}= 0.0198 D_{15}= 0.0034
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-7-6(5)

Remarks

As received moisture content - 23.3%

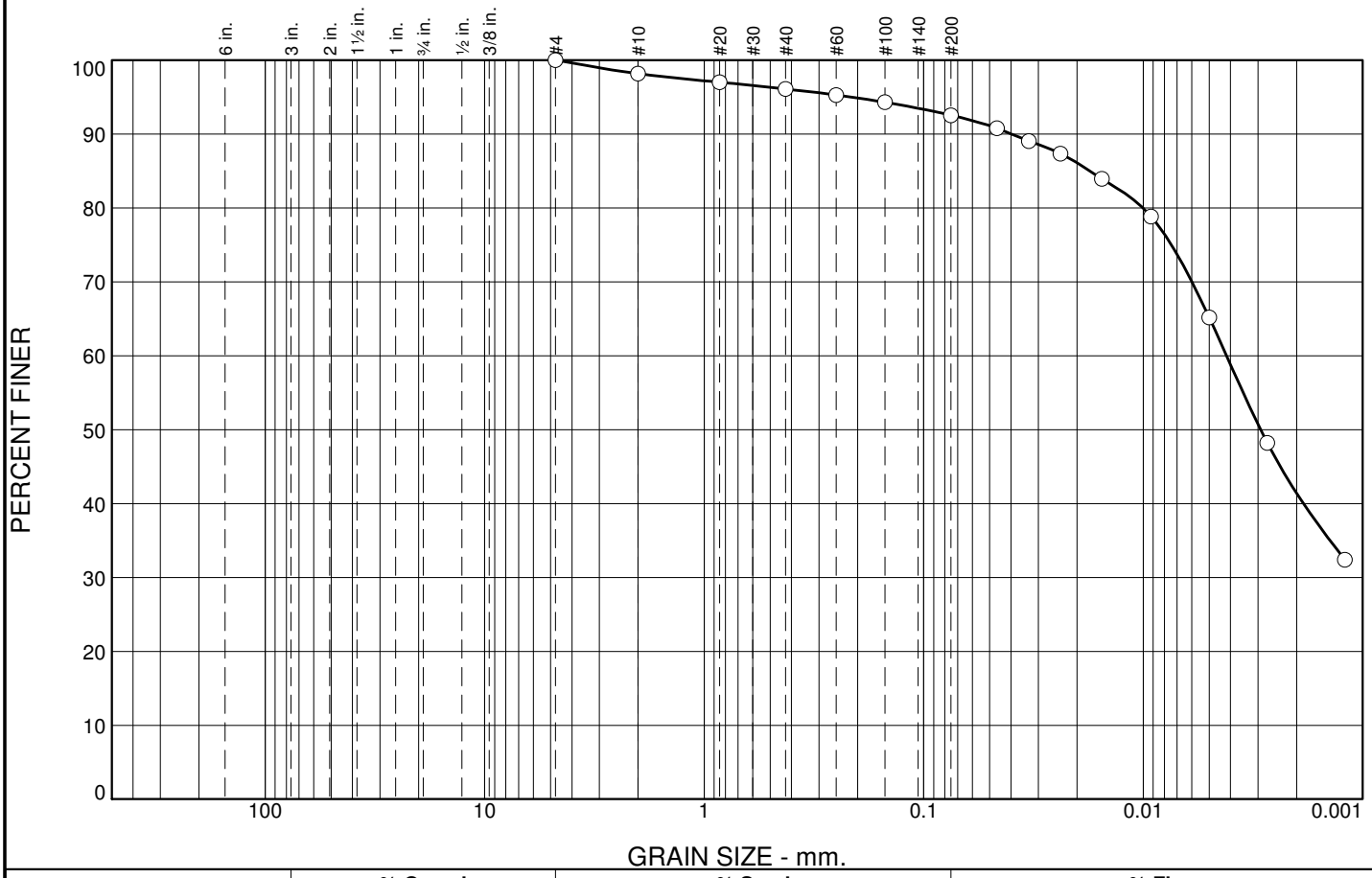
Location: GH11-242, Area A
Sample Number: SPT 13 **Depth:** 65-66.5' **Date:** 11/9/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.8	2.1	3.6	51.1	41.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.2		
#20	97.0		
#40	96.1		
#60	95.3		
#100	94.3		
#200	92.5		
0.0463 mm.	90.8		
0.0332 mm.	89.1		
0.0238 mm.	87.3		
0.0154 mm.	83.9		
0.0092 mm.	78.8		
0.0050 mm.	65.2		
0.0027 mm.	48.2		
0.0012 mm.	32.4		

* (no specification provided)

Soil Description

lean clay

Atterberg Limits

PL= 20 LL= 43 PI= 23

Coefficients

D_{90}= 0.0398 D_{85}= 0.0175 D_{60}= 0.0042
D_{50}= 0.0029 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(22)

Remarks

SpG - 2.72. As received moisture content and dry density are reported on Triaxial Compression report.

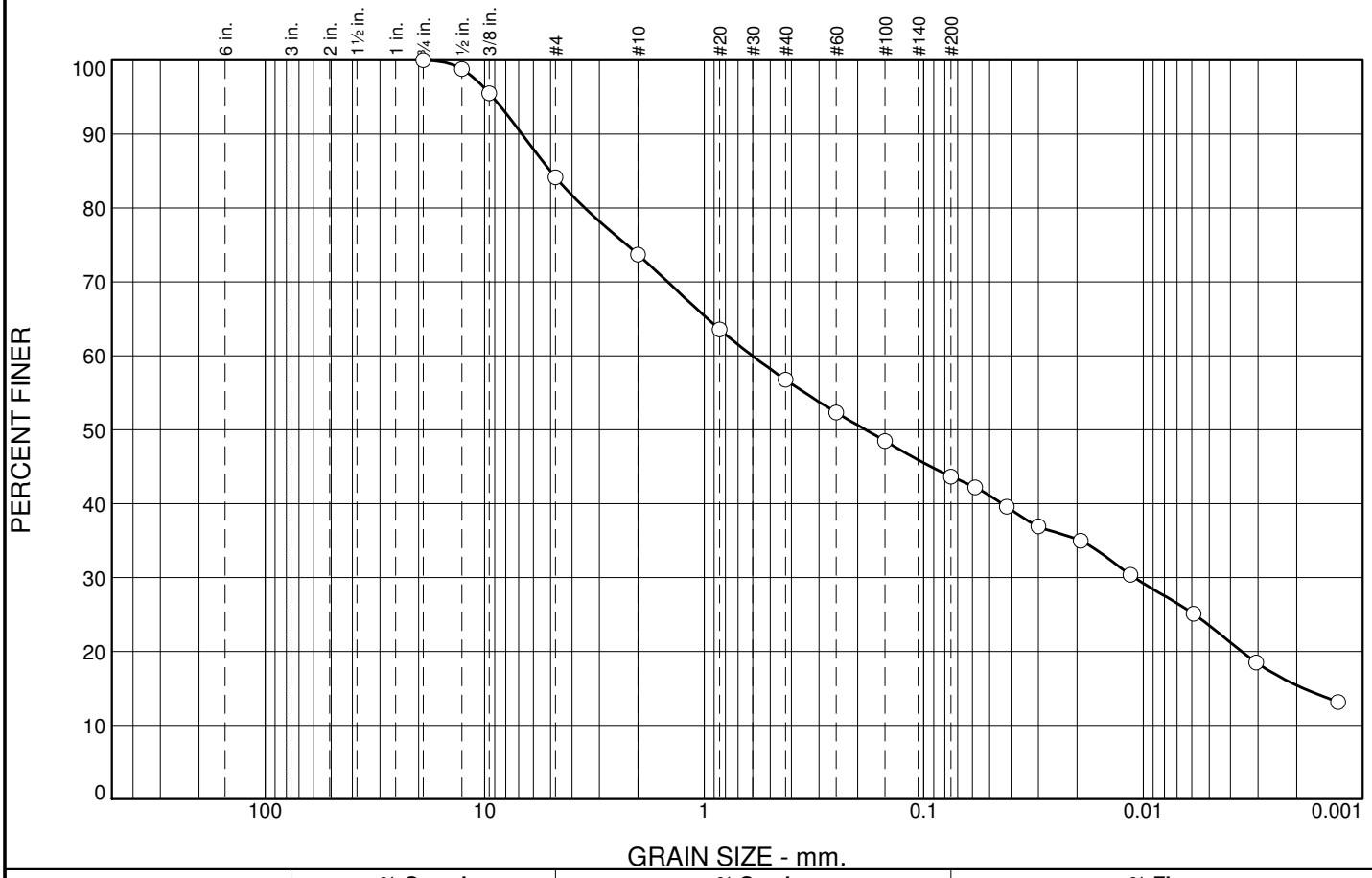
Location: GH11-243, Upper Talarik Creek Area
Sample Number: GH11-243-1 **Depth:** 4-5.5' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	15.9	10.4	17.0	13.0	28.3	15.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	98.8		
0.375	95.5		
#4	84.1		
#10	73.7		
#20	63.6		
#40	56.7		
#60	52.3		
#100	48.5		
#200	43.7		
0.0582 mm.	42.2		
0.0418 mm.	39.6		
0.0301 mm.	36.9		
0.0192 mm.	35.0		
0.0114 mm.	30.3		
0.0059 mm.	25.1		
0.0031 mm.	18.5		
0.0013 mm.	13.1		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 17 LL= 36 PI= 19

Coefficients

D_{90}= 6.7662 D_{85}= 5.0187 D_{60}= 0.6040
D_{50}= 0.1846 D_{30}= 0.0110 D_{15}= 0.0019
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(4)

Remarks

As received moisture content - 19.3%

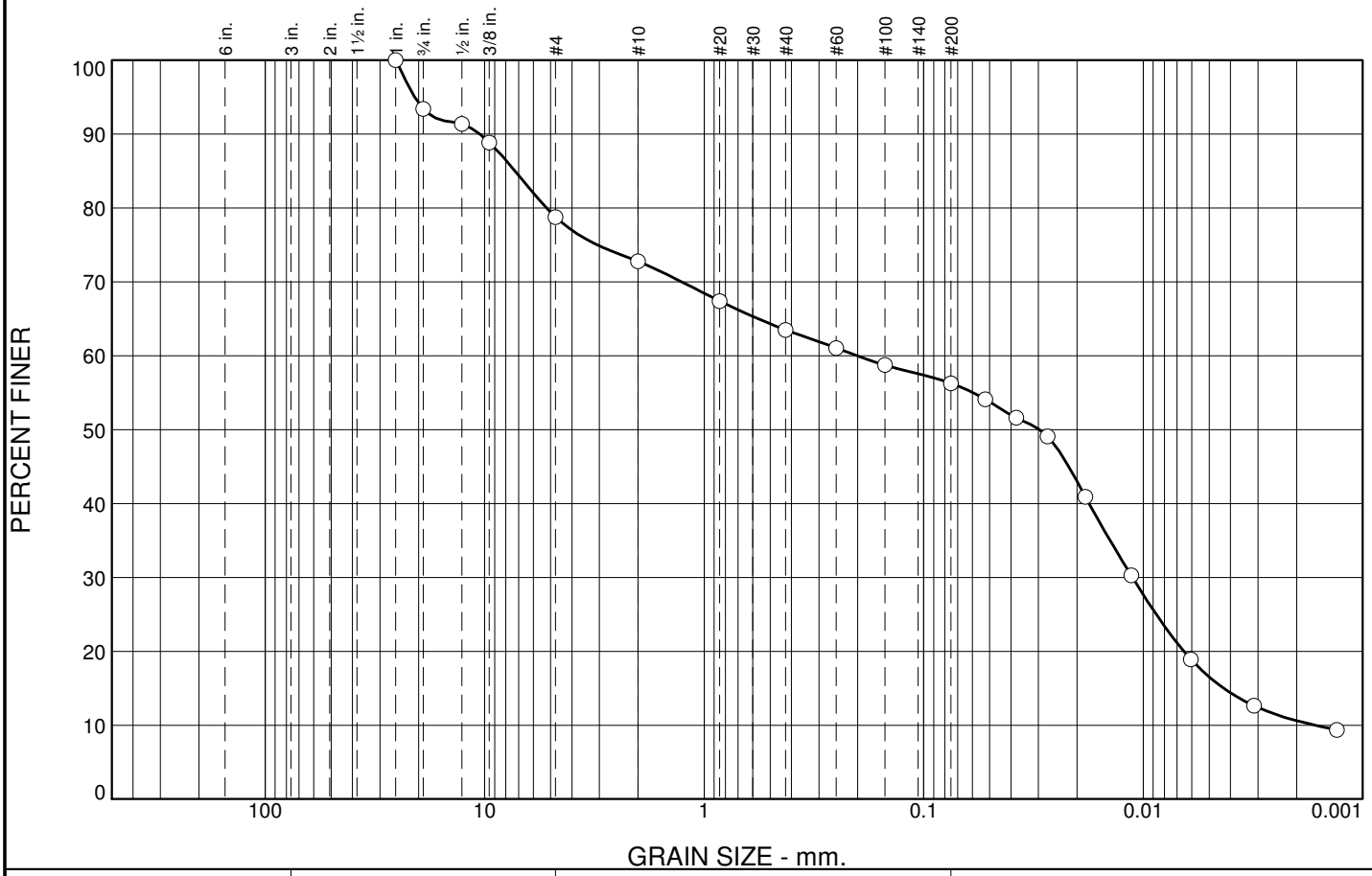
Location: GH11-243, Upper Talarik Creek Area
Sample Number: SPT 1 **Depth:** 5.5-7' **Date:** 11/12/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.6	14.6	6.0	9.3	7.2	45.7	10.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	93.4		
.5	91.4		
0.375	88.8		
#4	78.8		
#10	72.8		
#20	67.4		
#40	63.5		
#60	61.0		
#100	58.7		
#200	56.3		
0.0524 mm.	54.1		
0.0378 mm.	51.6		
0.0273 mm.	49.1		
0.0183 mm.	40.9		
0.0113 mm.	30.3		
0.0061 mm.	18.9		
0.0031 mm.	12.6		
0.0013 mm.	9.4		

* (no specification provided)

Soil Description

sandy lean clay with gravel

Atterberg Limits

PL= 21 LL= 33 PI= 12

Coefficients

D_{90}= 10.5506 D_{85}= 7.2754 D_{60}= 0.2008
D_{50}= 0.0296 D_{30}= 0.0112 D_{15}= 0.0043
D_{10}= 0.0016 C_u= 122.13 C_c= 0.38

Classification

USCS= CL AASHTO= A-6(4)

Remarks

As received moisture content - 21.1%

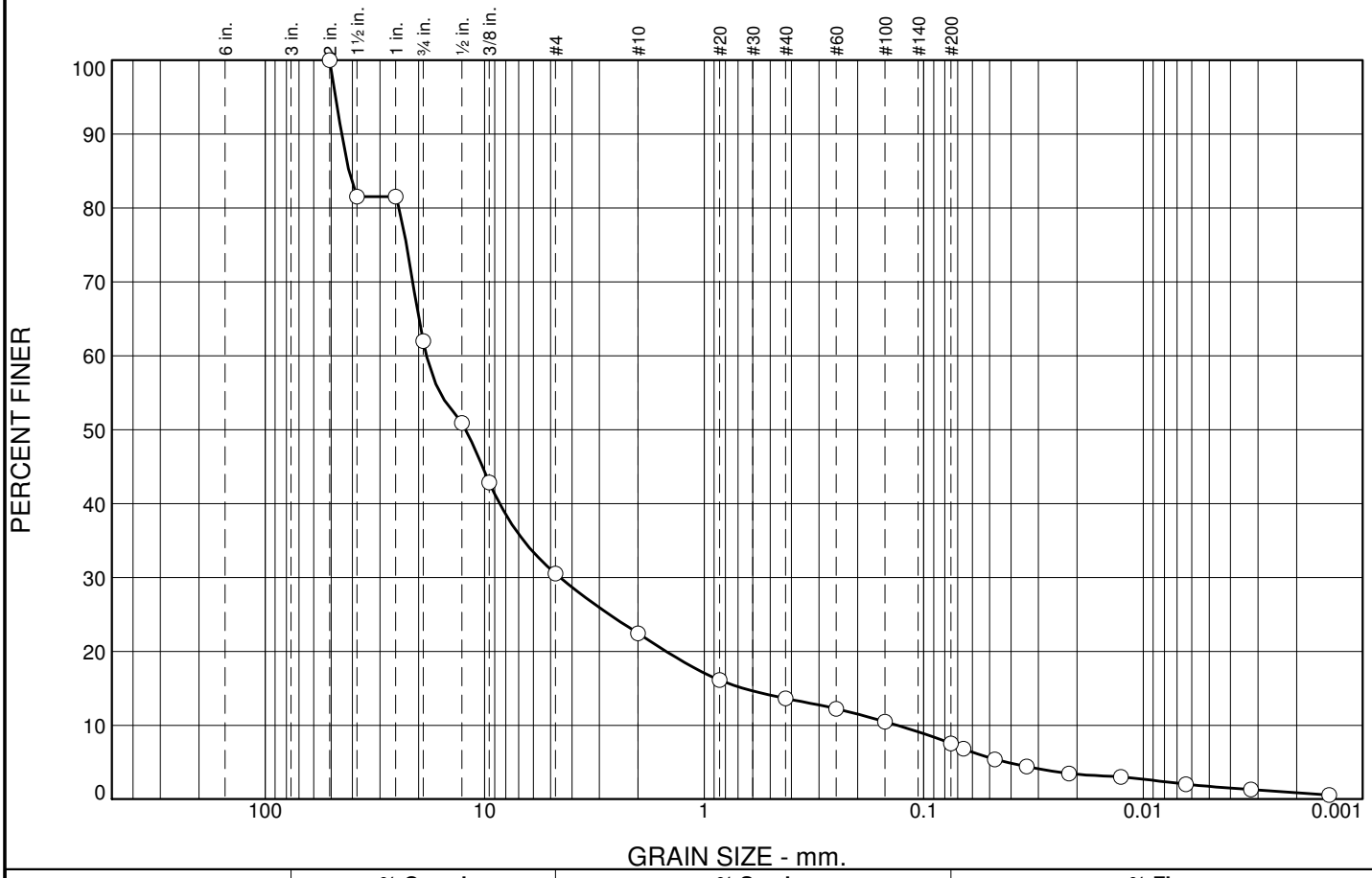
Location: GH11-243, Upper Talarik Creek Area
Sample Number: SPT 2 **Depth:** 9-10.5' **Date:** 11/12/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	38.0	31.5	8.1	8.8	6.1	6.6	0.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	81.5		
1	81.5		
.75	62.0		
.5	50.9		
0.375	42.9		
#4	30.5		
#10	22.4		
#20	16.1		
#40	13.6		
#60	12.2		
#100	10.5		
#200	7.5		
0.0657 mm.	6.8		
0.0473 mm.	5.4		
0.0339 mm.	4.4		
0.0217 mm.	3.5		
0.0126 mm.	3.0		
0.0064 mm.	2.0		
0.0032 mm.	1.3		
0.0014 mm.	0.5		

* (no specification provided)

Soil Description

poorly graded gravel with silt and sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 44.8671 D_{85}= 41.5260 D_{60}= 18.3921
D_{50}= 12.1965 D_{30}= 4.5364 D_{15}= 0.6643
D_{10}= 0.1321 C_u= 139.23 C_c= 8.47

Classification

USCS= GP-GM AASHTO= A-1-a

Remarks

As received moisture content - 15.5%. Natural density not able to be determined in the as received condition.

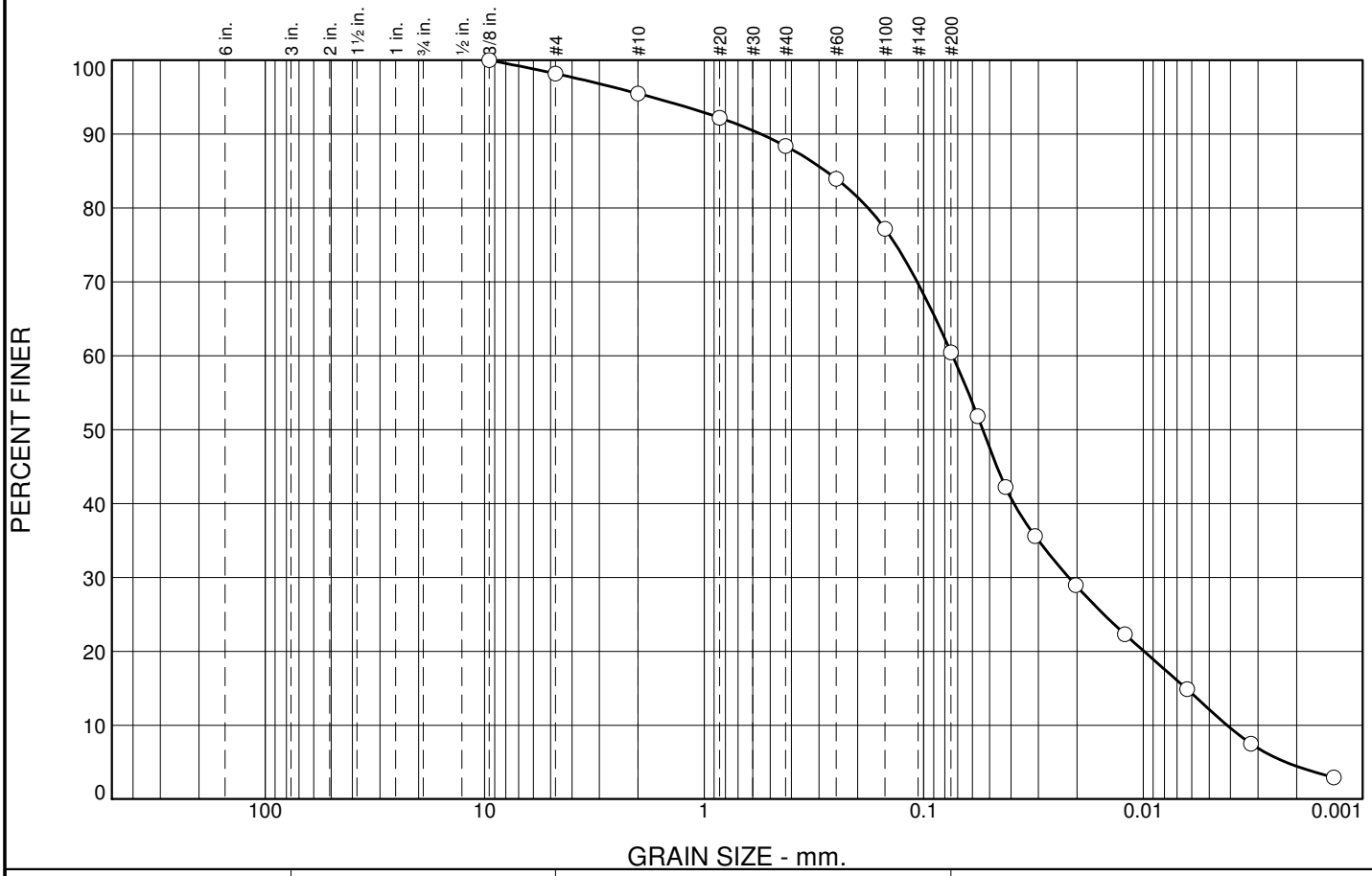
Location: GH11-245-1, Upper Talarik Creek Area
Sample Number: GH11-245-1 **Depth:** 10-10.25' **Date:** 11/23/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.8	2.7	7.1	27.9	56.1	4.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	98.2		
#10	95.5		
#20	92.2		
#40	88.4		
#60	83.9		
#100	77.2		
#200	60.5		
0.0567 mm.	51.8		
0.0424 mm.	42.2		
0.0310 mm.	35.6		
0.0203 mm.	29.0		
0.0121 mm.	22.3		
0.0063 mm.	14.9		
0.0032 mm.	7.5		
0.0014 mm.	2.9		

* (no specification provided)

Soil Description

sandy silt

Atterberg Limits

PL= NP LL= 33 PI= NP

Coefficients

D_{90}= 0.5519 D_{85}= 0.2793 D_{60}= 0.0738
D_{50}= 0.0538 D_{30}= 0.0218 D_{15}= 0.0064
D_{10}= 0.0041 C_u= 17.80 C_c= 1.55

Classification

USCS= ML AASHTO= A-4(0)

Remarks

As received moisture content - 48.4%

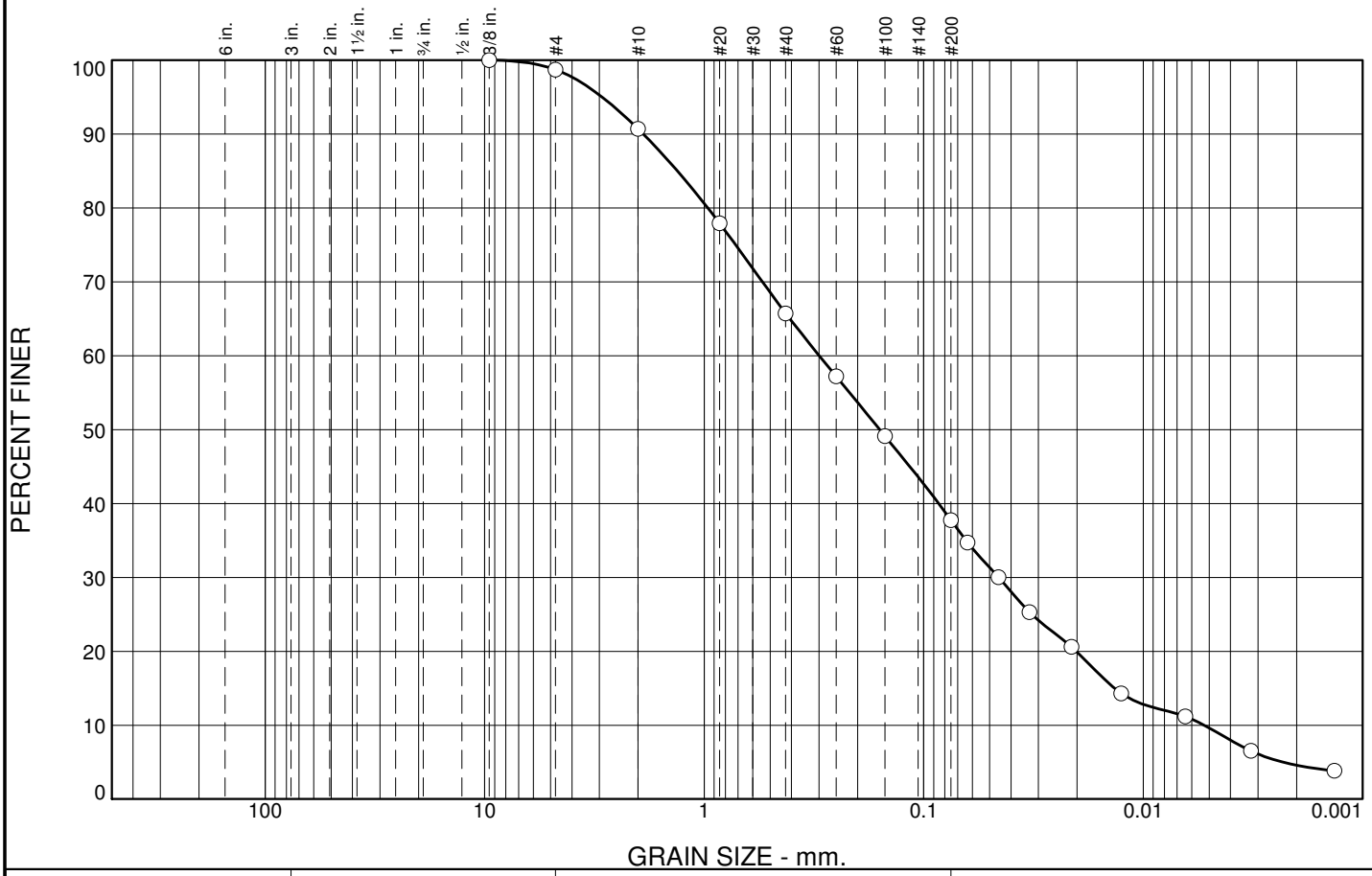
Location: GH11-245, Upper Talarik Creek Area
Sample Number: SPT 1 **Depth:** 5-6.5' **Date:** 11/11/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.3	8.0	25.0	28.0	33.1	4.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	98.7		
#10	90.7		
#20	77.9		
#40	65.7		
#60	57.2		
#100	49.1		
#200	37.7		
0.0631 mm.	34.7		
0.0456 mm.	30.0		
0.0329 mm.	25.3		
0.0212 mm.	20.6		
0.0126 mm.	14.3		
0.0064 mm.	11.2		
0.0032 mm.	6.5		
0.0013 mm.	3.8		

* (no specification provided)

Soil Description

silty sand

Atterberg Limits

PL= 36 LL= 47 PI= 11

Coefficients

D_{90}= 1.8969 D_{85}= 1.3247 D_{60}= 0.2989
D_{50}= 0.1586 D_{30}= 0.0456 D_{15}= 0.0135
D_{10}= 0.0053 C_u= 56.71 C_c= 1.32

Classification

USCS= SM AASHTO= A-7-5(1)

Remarks

As received moisture content - 36.9%

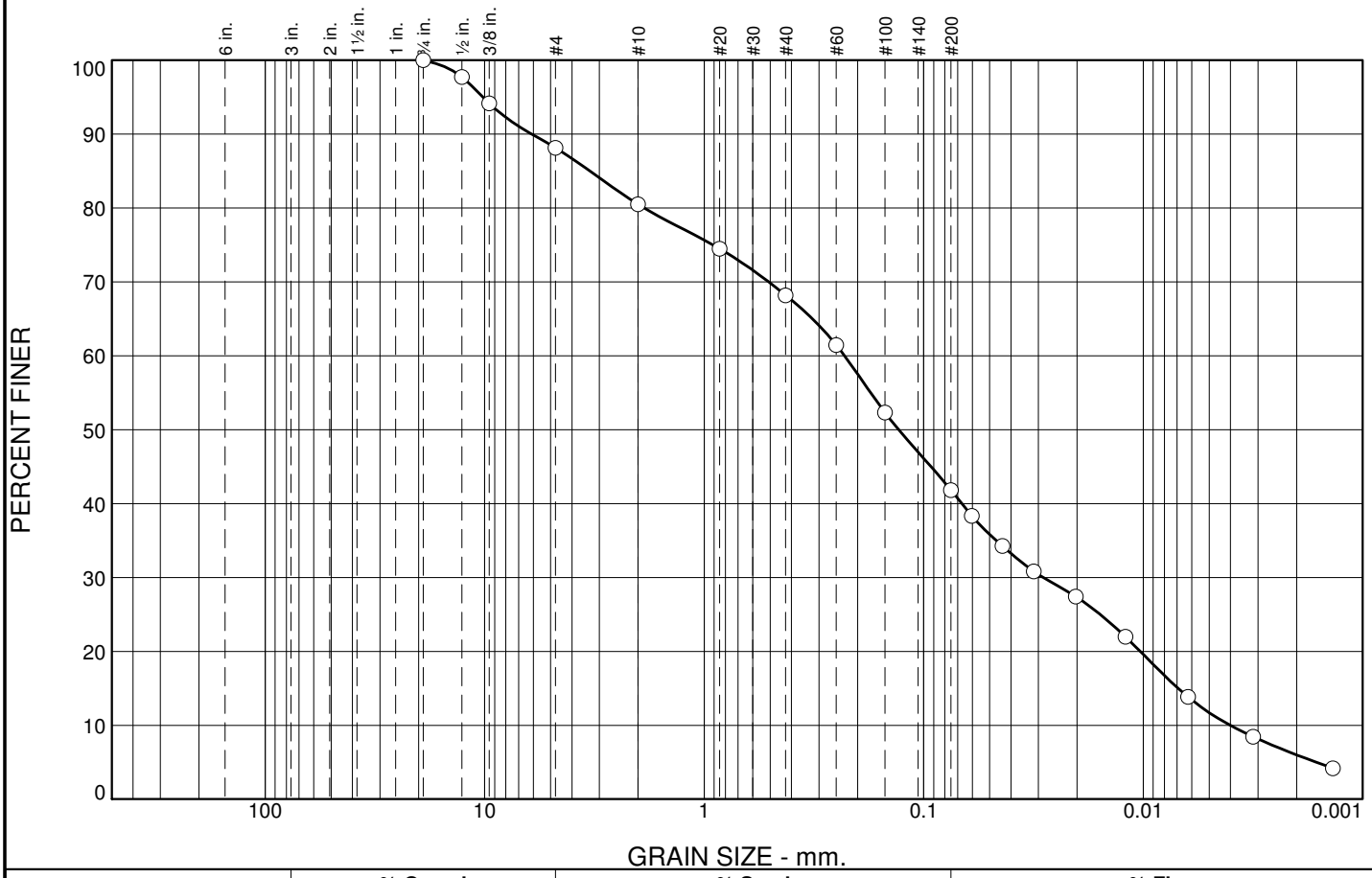
Location: GH11-245, Upper Talarik Creek Area
Sample Number: SPT 2 **Depth:** 15-16.5' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.9	7.6	12.3	26.4	35.8	6.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.7		
0.375	94.1		
#4	88.1		
#10	80.5		
#20	74.5		
#40	68.2		
#60	61.4		
#100	52.3		
#200	41.8		
0.0603 mm.	38.3		
0.0437 mm.	34.2		
0.0315 mm.	30.8		
0.0203 mm.	27.4		
0.0120 mm.	22.0		
0.0062 mm.	13.8		
0.0032 mm.	8.5		
0.0014 mm.	4.2		

* (no specification provided)

Soil Description

silty, clayey sand

Atterberg Limits

PL= 18 LL= 22 PI= 4

Coefficients

D_{90}= 6.1126 D_{85}= 3.3186 D_{60}= 0.2294
D_{50}= 0.1300 D_{30}= 0.0285 D_{15}= 0.0069
D_{10}= 0.0040 C_u= 57.20 C_c= 0.88

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

As received moisture content - 17.8%

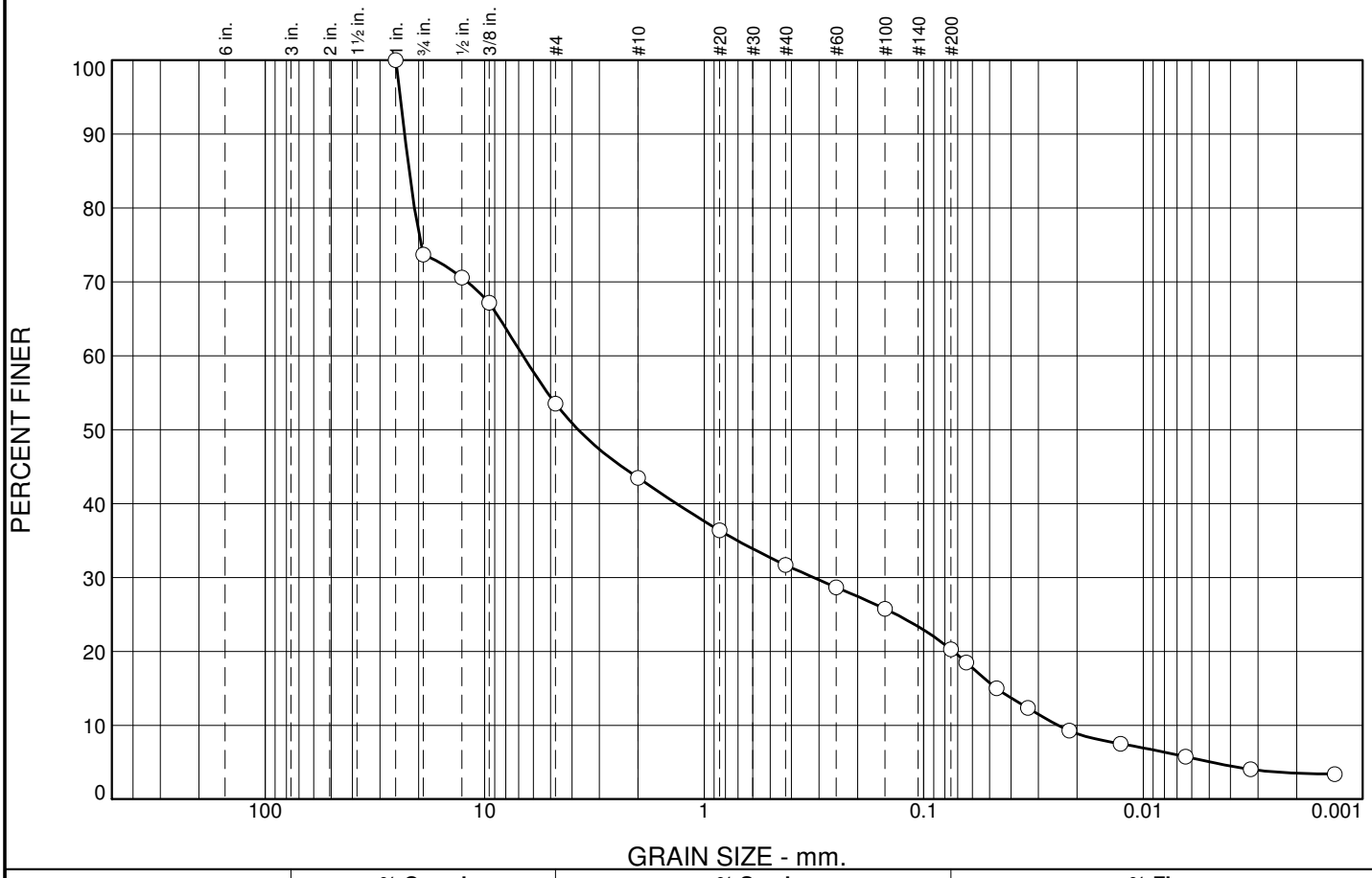
Location: GH11-247, Area E
Sample Number: SPT 1 **Depth:** 4-5.5' **Date:** 11/7/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.3	20.2	10.0	11.8	11.4	16.8	3.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	73.7		
.5	70.6		
0.375	67.1		
#4	53.5		
#10	43.5		
#20	36.4		
#40	31.7		
#60	28.7		
#100	25.8		
#200	20.3		
0.0639 mm.	18.5		
0.0465 mm.	15.0		
0.0335 mm.	12.3		
0.0217 mm.	9.3		
0.0127 mm.	7.5		
0.0064 mm.	5.8		
0.0032 mm.	4.0		
0.0013 mm.	3.4		

* (no specification provided)

Soil Description

silty gravel with sand

Atterberg Limits

PL= NP LL= 21 PI= NP

Coefficients

D_{90}= 23.1684 D_{85}= 22.0502 D_{60}= 6.6907
D_{50}= 3.7521 D_{30}= 0.3182 D_{15}= 0.0465
D_{10}= 0.0244 C_u= 273.72 C_c= 0.62

Classification

USCS= GM AASHTO= A-1-b

Remarks

As received moisture content - 12.0%

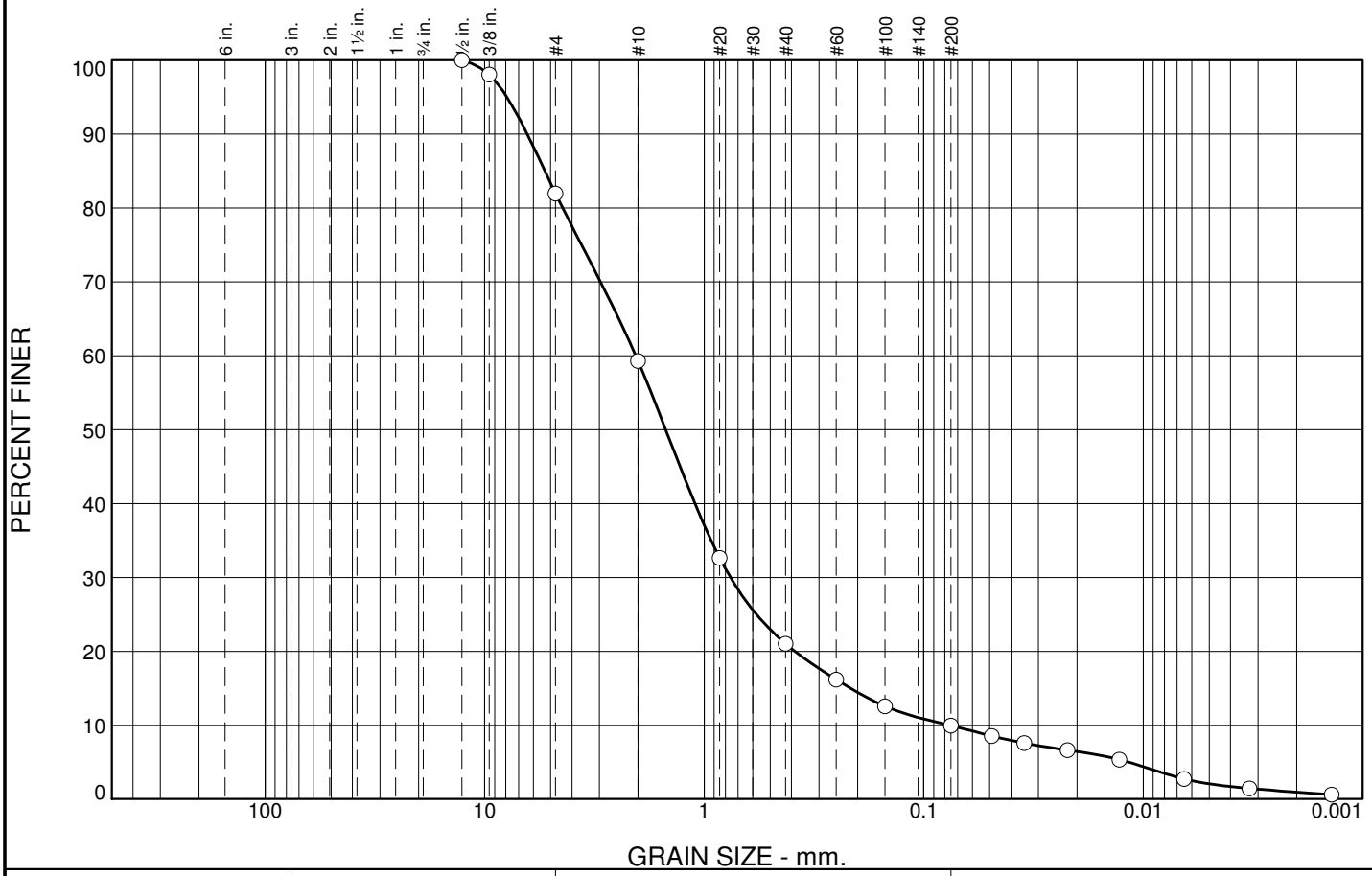
Location: GH11-247, Area E
Sample Number: SPT 3 **Depth:** 14-15.5' **Date:** 11/9/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	18.1	22.6	38.3	11.1	9.0	0.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
0.375	98.0		
#4	81.9		
#10	59.3		
#20	32.6		
#40	21.0		
#60	16.2		
#100	12.6		
#200	9.9		
0.0490 mm.	8.5		
0.0348 mm.	7.6		
0.0221 mm.	6.6		
0.0128 mm.	5.3		
0.0065 mm.	2.7		
0.0033 mm.	1.4		
0.0014 mm.	0.6		

* (no specification provided)

Soil Description

poorly graded sand with silt and gravel

Atterberg Limits

PL= NP LL= 23 PI= NP

Coefficients

D_{90}= 6.4004 D_{85}= 5.3162 D_{60}= 2.0495
D_{50}= 1.4972 D_{30}= 0.7589 D_{15}= 0.2153
D_{10}= 0.0765 C_u= 26.81 C_c= 3.68

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

As received moisture content - 13.6%

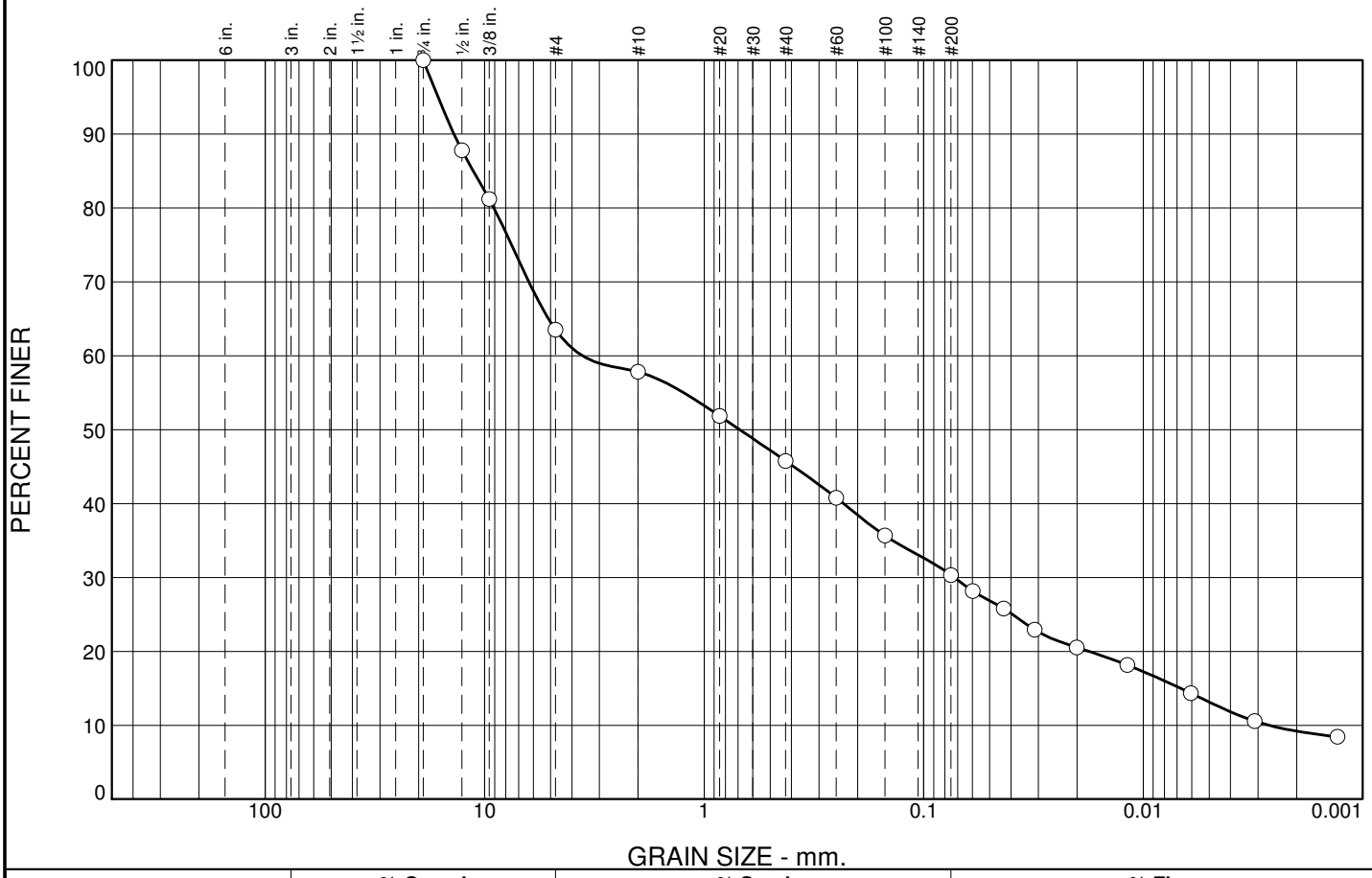
Location: GH11-247, Area E
Sample Number: SPT 4 **Depth:** 19-20.5' **Date:** 11/12/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	36.5	5.7	12.1	15.4	21.1	9.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	87.8		
0.375	81.2		
#4	63.5		
#10	57.8		
#20	51.8		
#40	45.7		
#60	40.8		
#100	35.7		
#200	30.3		
0.0598 mm.	28.2		
0.0431 mm.	25.8		
0.0312 mm.	22.9		
0.0201 mm.	20.5		
0.0118 mm.	18.2		
0.0061 mm.	14.3		
0.0031 mm.	10.6		
0.0013 mm.	8.4		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 13 LL= 25 PI= 12

Coefficients

D_{90}= 13.7928 D_{85}= 11.2715 D_{60}= 3.5939
D_{50}= 0.6884 D_{30}= 0.0725 D_{15}= 0.0068
D_{10}= 0.0027 C_u= 1344.66 C_c= 0.55

Classification

USCS= GC AASHTO= A-2-6(0)

Remarks

As received moisture - 9.5%

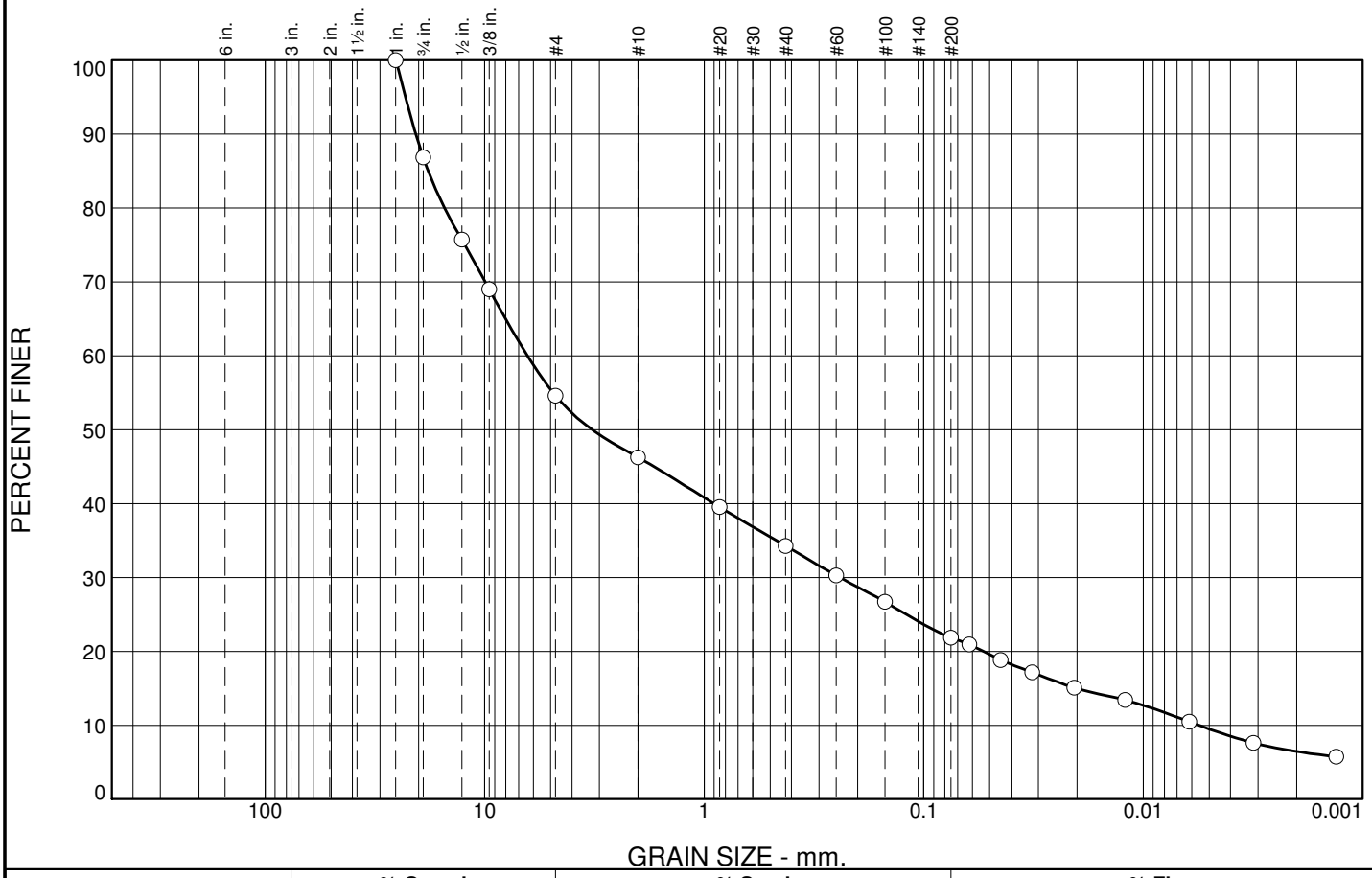
Location: GH11-247, Area E
Sample Number: SPT 7 **Depth:** 34-35.5' **Date:** 11/9/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.2	32.2	8.4	11.9	12.4	15.5	6.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	86.8		
.5	75.7		
0.375	69.0		
#4	54.6		
#10	46.2		
#20	39.5		
#40	34.3		
#60	30.3		
#100	26.7		
#200	21.9		
0.0619 mm.	20.9		
0.0446 mm.	18.8		
0.0320 mm.	17.2		
0.0206 mm.	15.1		
0.0121 mm.	13.4		
0.0062 mm.	10.5		
0.0031 mm.	7.6		
0.0013 mm.	5.7		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 14 LL= 24 PI= 10

Coefficients

D_{90}= 20.5812 D_{85}= 18.0974 D_{60}= 6.3885
D_{50}= 3.2430 D_{30}= 0.2407 D_{15}= 0.0202
D_{10}= 0.0056 C_u= 1145.57 C_c= 1.63

Classification

USCS= GC AASHTO= A-2-4(0)

Remarks

As received moisture content - 10.6%

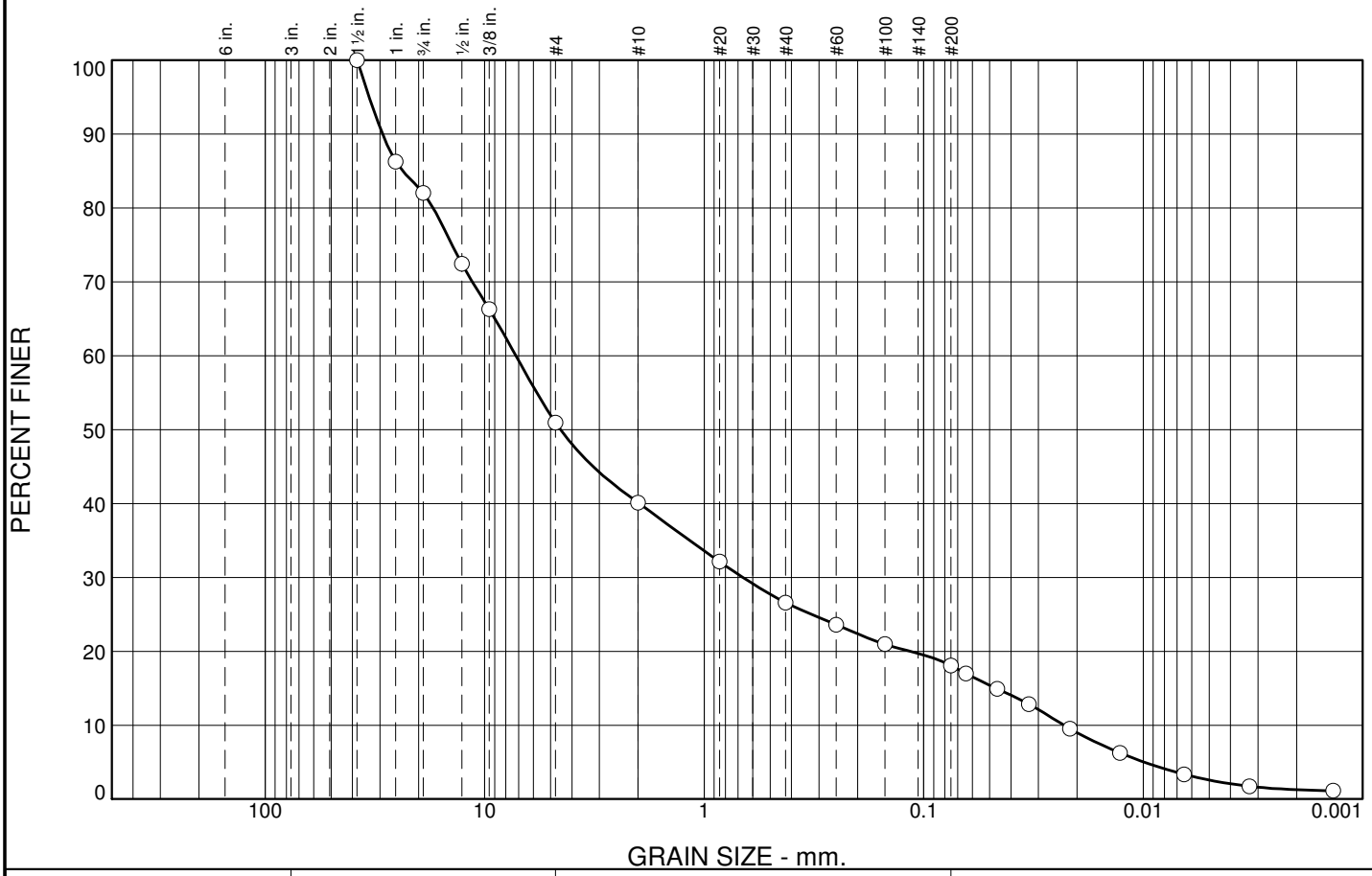
Location: GH11-247, Area E
Sample Number: SPT 11 **Depth:** 54-55.5' **Date:** 11/10/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	18.0	31.1	10.8	13.5	8.5	16.8	1.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	86.3		
.75	82.0		
.5	72.4		
0.375	66.3		
#4	50.9		
#10	40.1		
#20	32.1		
#40	26.6		
#60	23.6		
#100	21.0		
#200	18.1		
0.0641 mm.	17.0		
0.0461 mm.	14.9		
0.0332 mm.	12.8		
0.0215 mm.	9.5		
0.0127 mm.	6.2		
0.0065 mm.	3.3		
0.0033 mm.	1.7		
0.0014 mm.	1.1		

* (no specification provided)

Soil Description

silty gravel with sand

Atterberg Limits

PL= 22 LL= 24 PI= 2

Coefficients

D_{90}= 29.2175 D_{85}= 23.6738 D_{60}= 7.2108
D_{50}= 4.5131 D_{30}= 0.6665 D_{15}= 0.0468
D_{10}= 0.0229 C_u= 314.90 C_c= 2.69

Classification

USCS= GM AASHTO= A-1-b

Remarks

As received moisture content - 8.8%

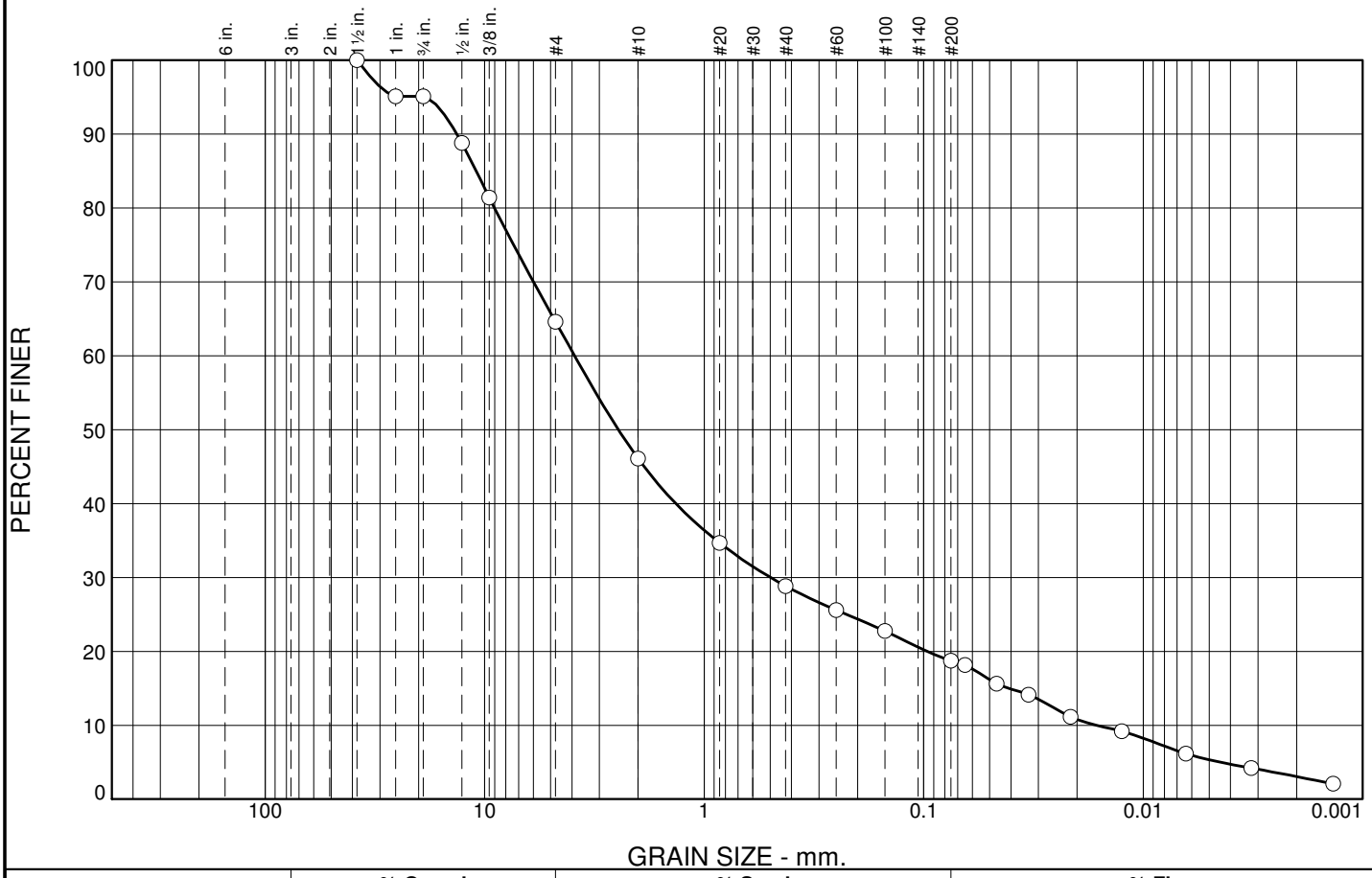
Location: GH11-247, Area E
Sample Number: SPT 13 **Depth:** 64-65.5' **Date:** 11/10/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.9	30.5	18.5	17.3	10.0	15.7	3.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	95.1		
.75	95.1		
.5	88.8		
0.375	81.4		
#4	64.6		
#10	46.1		
#20	34.7		
#40	28.8		
#60	25.6		
#100	22.7		
#200	18.8		
0.0647 mm.	18.1		
0.0465 mm.	15.6		
0.0332 mm.	14.1		
0.0214 mm.	11.2		
0.0125 mm.	9.2		
0.0064 mm.	6.2		
0.0032 mm.	4.2		
0.0014 mm.	2.1		

* (no specification provided)

Soil Description

silty sand with gravel

Atterberg Limits

PL= 24 LL= 30 PI= 6

Coefficients

D_{90}= 13.3888 D_{85}= 10.9271 D_{60}= 3.8970
D_{50}= 2.4584 D_{30}= 0.4986 D_{15}= 0.0409
D_{10}= 0.0164 C_u= 238.29 C_c= 3.90

Classification

USCS= SM AASHTO= A-1-b

Remarks

As received moisture content - 14.10%

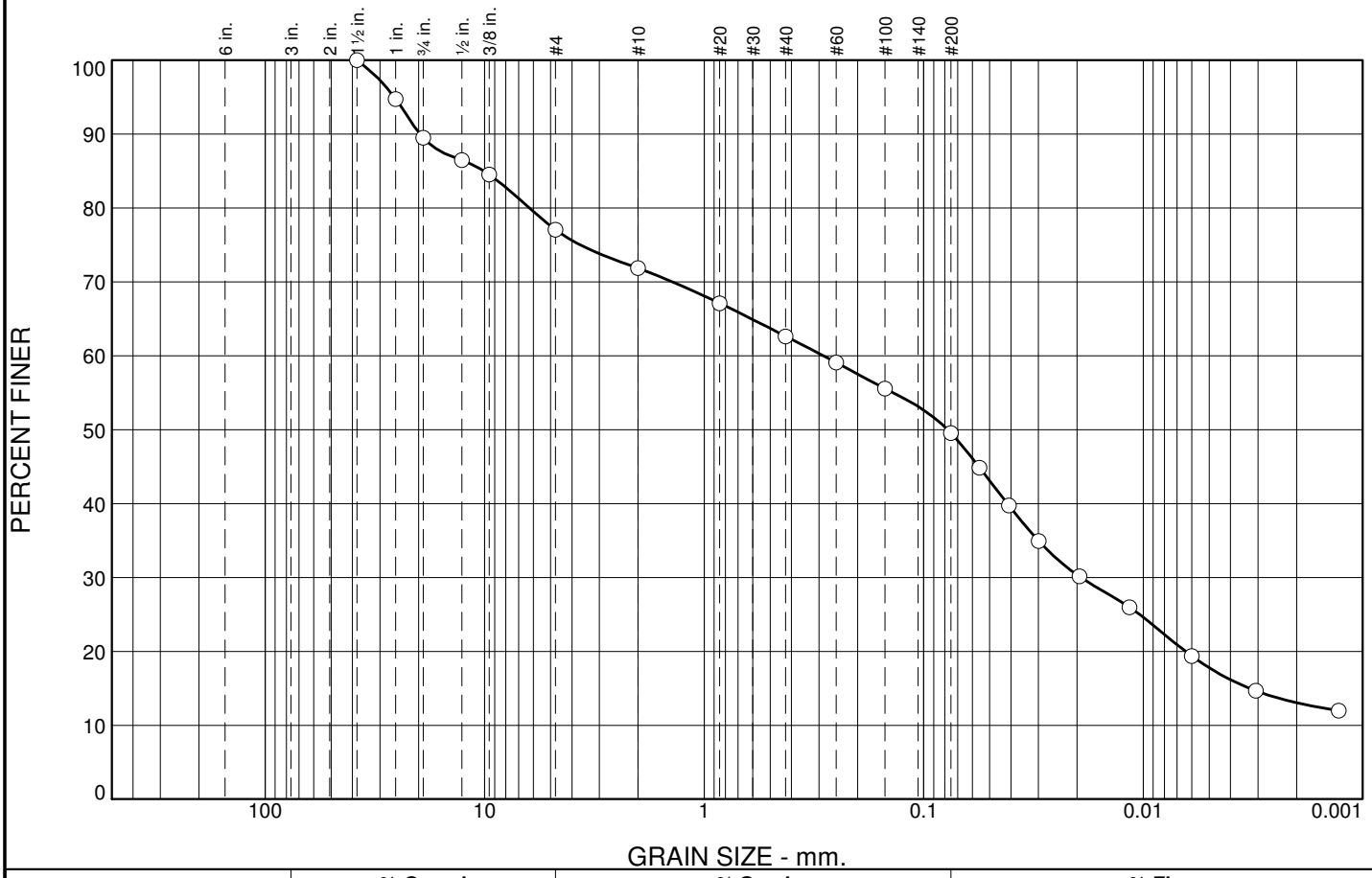
Location: GH11-266S
Sample Number: GH11-266S-1 **Depth:** 25.5-26' **Date:** 11/19/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.5	12.5	5.2	9.2	13.1	36.4	13.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	94.7		
.75	89.5		
.5	86.5		
0.375	84.5		
#4	77.0		
#10	71.8		
#20	67.1		
#40	62.6		
#60	59.1		
#100	55.6		
#200	49.5		
0.0556 mm.	44.8		
0.0409 mm.	39.7		
0.0299 mm.	34.9		
0.0195 mm.	30.1		
0.0115 mm.	26.0		
0.0060 mm.	19.4		
0.0031 mm.	14.7		
0.0013 mm.	12.0		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 16 LL= 39 PI= 23

Coefficients

D_{90}= 19.7100 D_{85}= 10.1132 D_{60}= 0.2869
D_{50}= 0.0778 D_{30}= 0.0192 D_{15}= 0.0033
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(7)

Remarks

As received moisture content - 15.1%

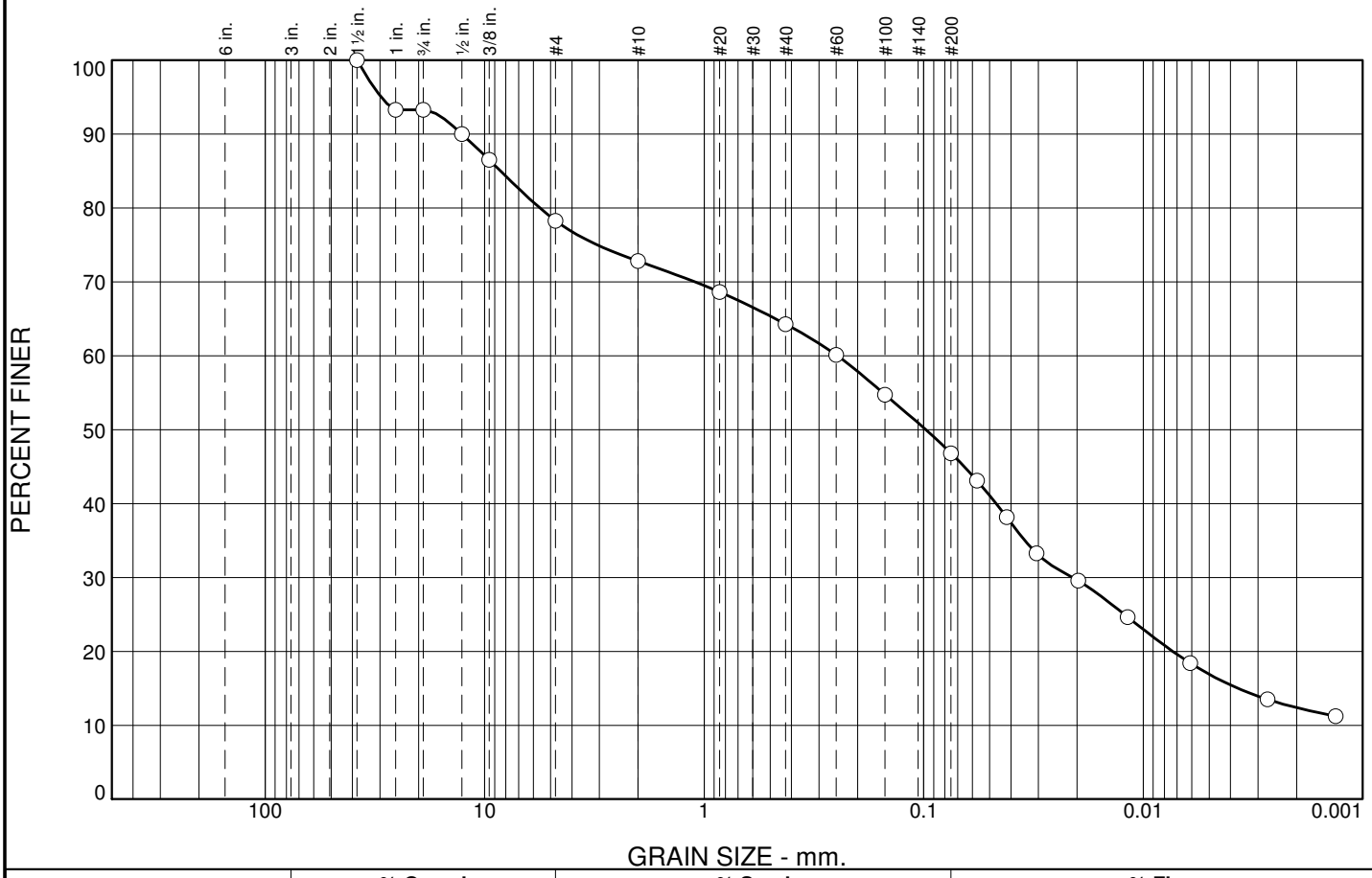
Location: GH11-266S
Sample Number: GH11-266S-2 **Depth:** 38.5-39' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.7	15.0	5.5	8.5	17.5	34.4	12.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	93.3		
.75	93.3		
.5	90.0		
0.375	86.5		
#4	78.3		
#10	72.8		
#20	68.6		
#40	64.3		
#60	60.1		
#100	54.7		
#200	46.8		
0.0571 mm.	43.1		
0.0418 mm.	38.2		
0.0306 mm.	33.3		
0.0198 mm.	29.6		
0.0118 mm.	24.6		
0.0061 mm.	18.4		
0.0027 mm.	13.5		
0.0013 mm.	11.2		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 18 LL= 28 PI= 10

Coefficients

D_{90}= 12.7105 D_{85}= 8.4631 D_{60}= 0.2474
D_{50}= 0.0978 D_{30}= 0.0210 D_{15}= 0.0037
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-4(2)

Remarks

As received moisture content - 22.1%

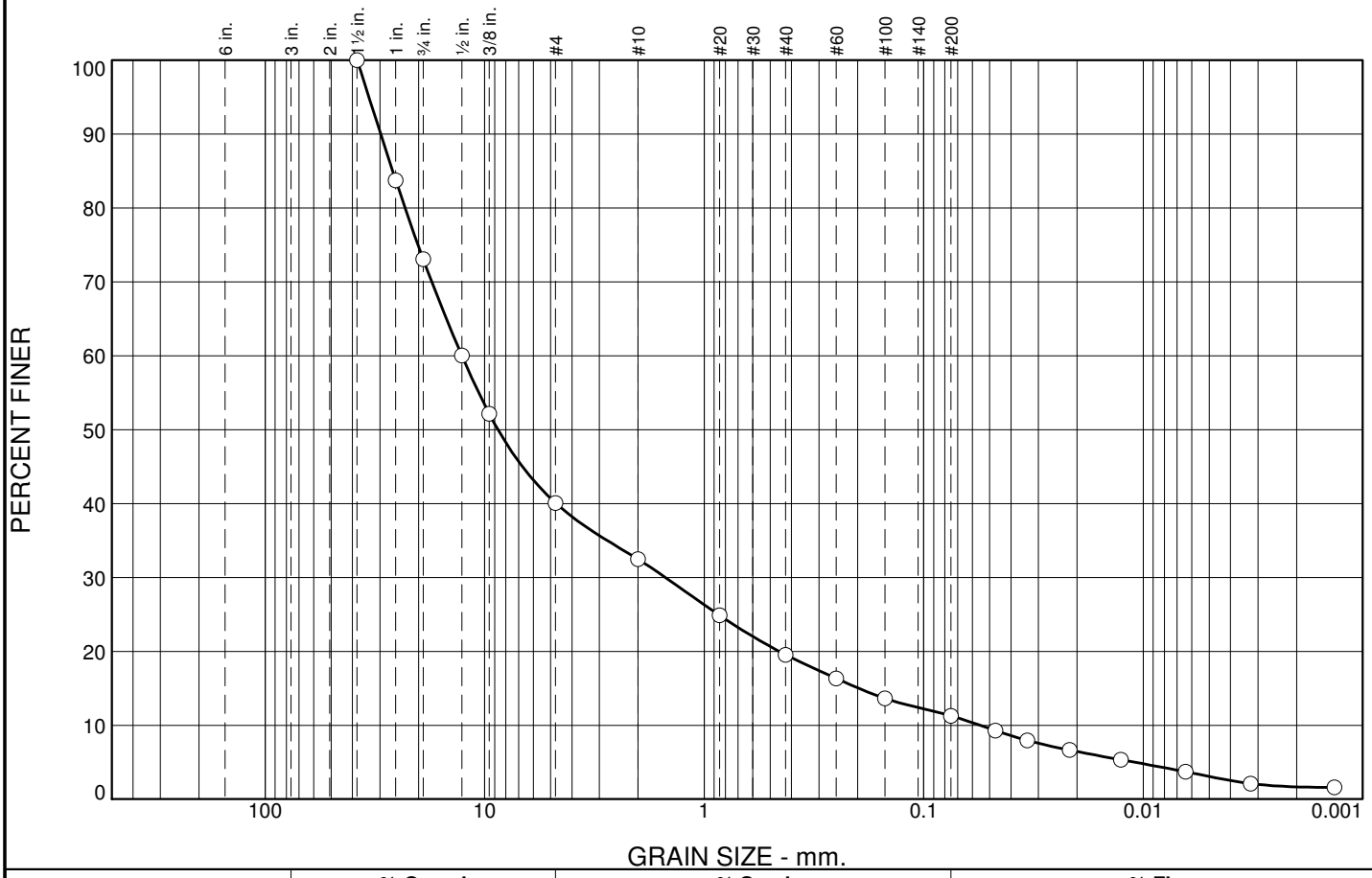
Location: GH11-266S
Sample Number: GH11-266S-3 **Depth:** 56.5-57' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.9	33.0	7.6	13.0	8.2	9.6	1.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	83.7		
.75	73.1		
.5	60.0		
0.375	52.1		
#4	40.1		
#10	32.5		
#20	24.9		
#40	19.5		
#60	16.3		
#100	13.6		
#200	11.3		
0.0471 mm.	9.3		
0.0337 mm.	8.0		
0.0216 mm.	6.6		
0.0126 mm.	5.3		
0.0064 mm.	3.7		
0.0032 mm.	2.1		
0.0013 mm.	1.6		

* (no specification provided)

Soil Description

poorly graded gravel with clay and sand

Atterberg Limits

PL= 18 LL= 28 PI= 10

Coefficients

D_{90}= 29.7753 D_{85}= 26.2441 D_{60}= 12.6808
D_{50}= 8.6923 D_{30}= 1.5029 D_{15}= 0.1979
D_{10}= 0.0555 C_u= 228.47 C_c= 3.21

Classification

USCS= GP-GC AASHTO= A-2-4(0)

Remarks

As received moisture content - 11.8%

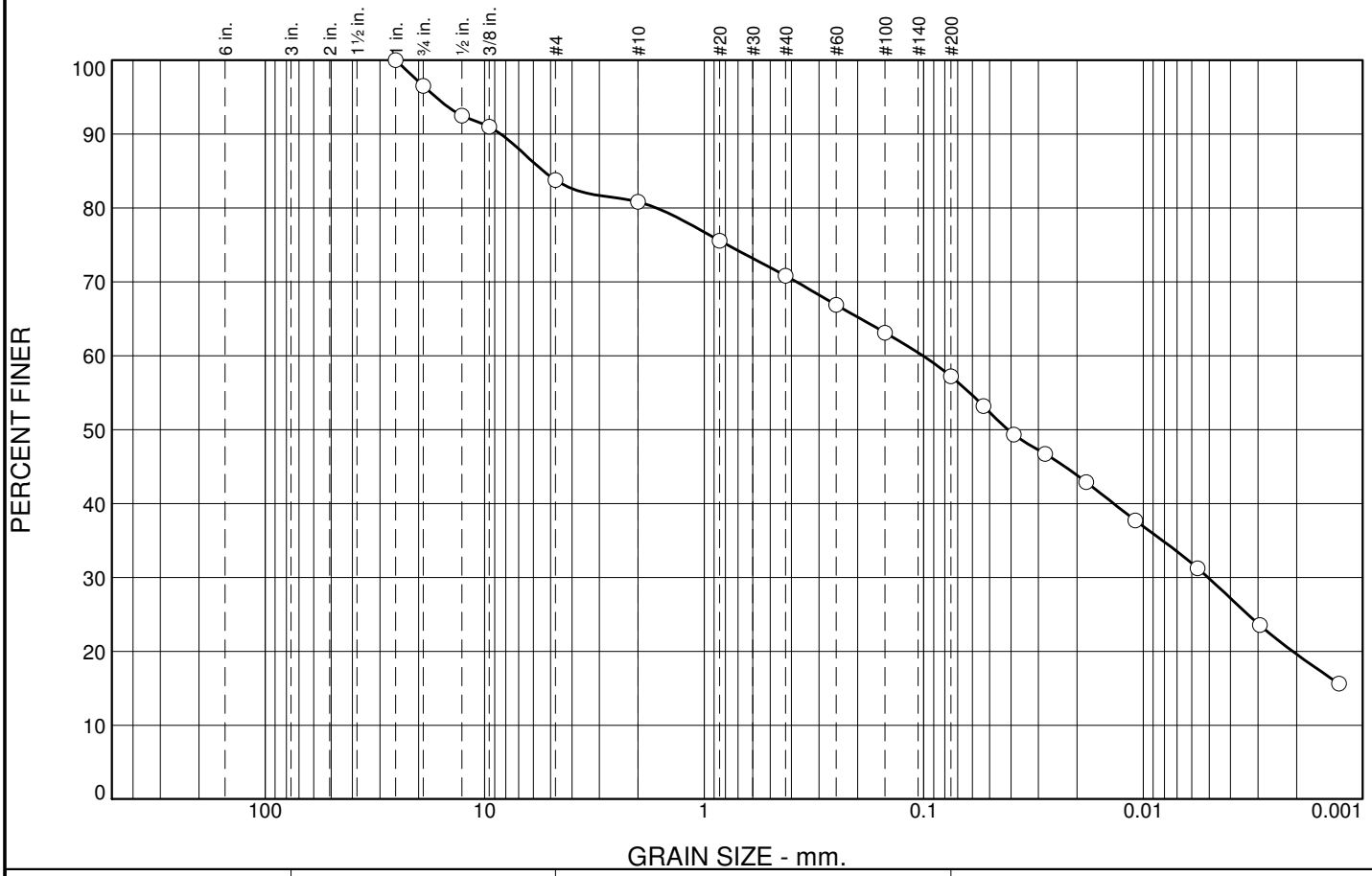
Location: GH11-267S
Sample Number: GH11-267S-1 **Depth:** 7.5-8.0' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.5	12.7	3.0	10.0	13.6	37.6	19.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.5		
.5	92.5		
0.375	91.0		
#4	83.8		
#10	80.8		
#20	75.6		
#40	70.8		
#60	66.9		
#100	63.1		
#200	57.2		
0.0534 mm.	53.2		
0.0388 mm.	49.3		
0.0280 mm.	46.7		
0.0182 mm.	42.9		
0.0108 mm.	37.7		
0.0056 mm.	31.2		
0.0029 mm.	23.5		
0.0013 mm.	15.6		

* (no specification provided)

Soil Description

sandy lean clay with gravel

Atterberg Limits

PL= 15 LL= 48 PI= 33

Coefficients

D_{90}= 8.4339 D_{85}= 5.4092 D_{60}= 0.1009
D_{50}= 0.0413 D_{30}= 0.0051 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(15)

Remarks

As received moisture content - 20.4%

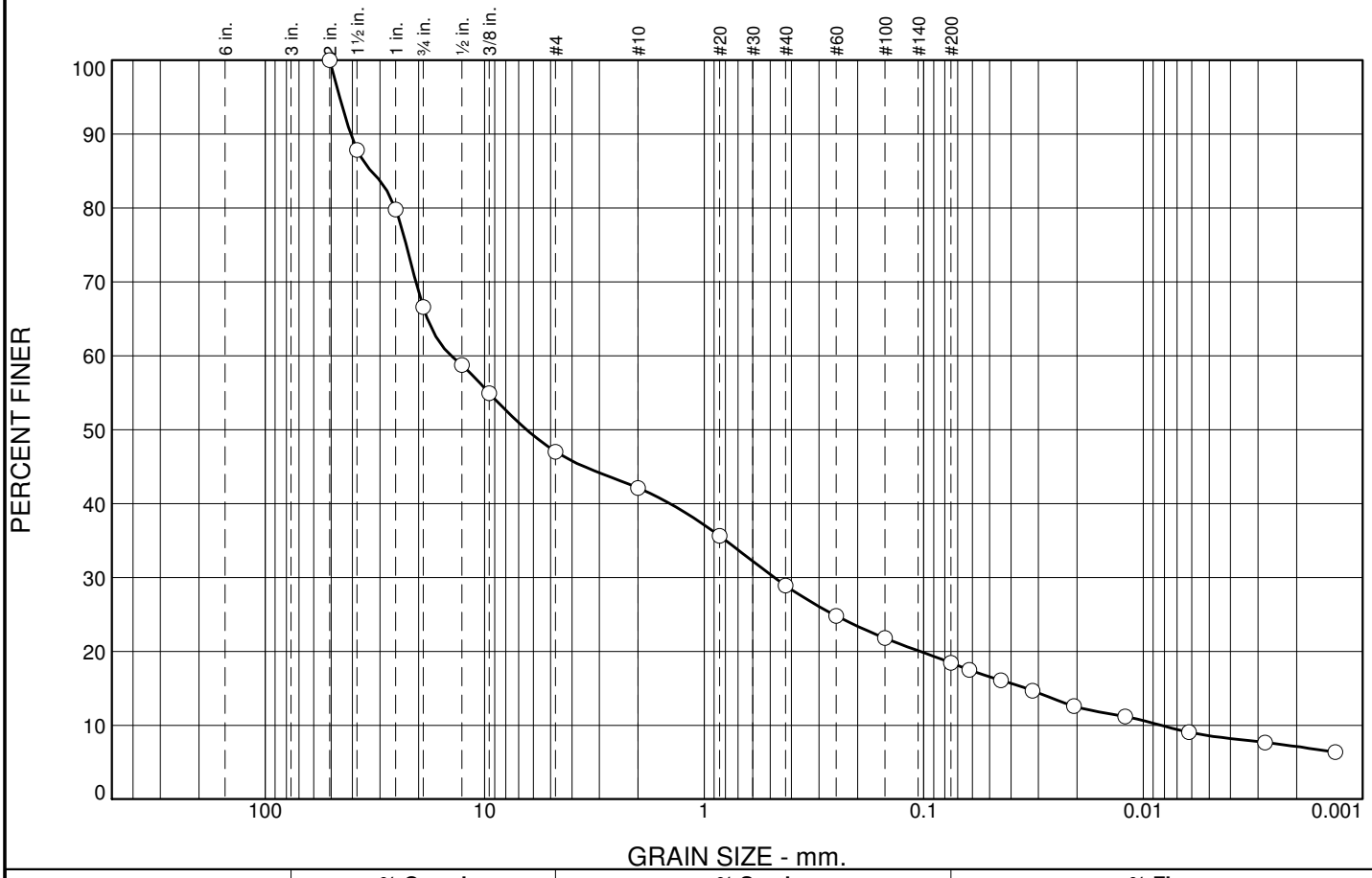
Location: GH11-267S
Sample Number: GH11-267S-2 **Depth:** 29.5-30' **Date:** 11/23/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	33.4	19.6	4.9	13.2	10.5	11.3	7.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	87.8		
1	79.8		
.75	66.6		
.5	58.8		
0.375	54.9		
#4	47.0		
#10	42.1		
#20	35.6		
#40	28.9		
#60	24.8		
#100	21.8		
#200	18.4		
0.0619 mm.	17.5		
0.0445 mm.	16.1		
0.0319 mm.	14.7		
0.0207 mm.	12.6		
0.0121 mm.	11.2		
0.0062 mm.	9.1		
0.0028 mm.	7.7		
0.0013 mm.	6.4		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 18 LL= 45 PI= 27

Coefficients

D_{90}= 40.7339 D_{85}= 32.9322 D_{60}= 14.2033
D_{50}= 6.4502 D_{30}= 0.4792 D_{15}= 0.0342
D_{10}= 0.0083 C_u= 1711.41 C_c= 1.95

Classification

USCS= GC AASHTO= A-2-7(1)

Remarks

As received moisture content - 14.2%

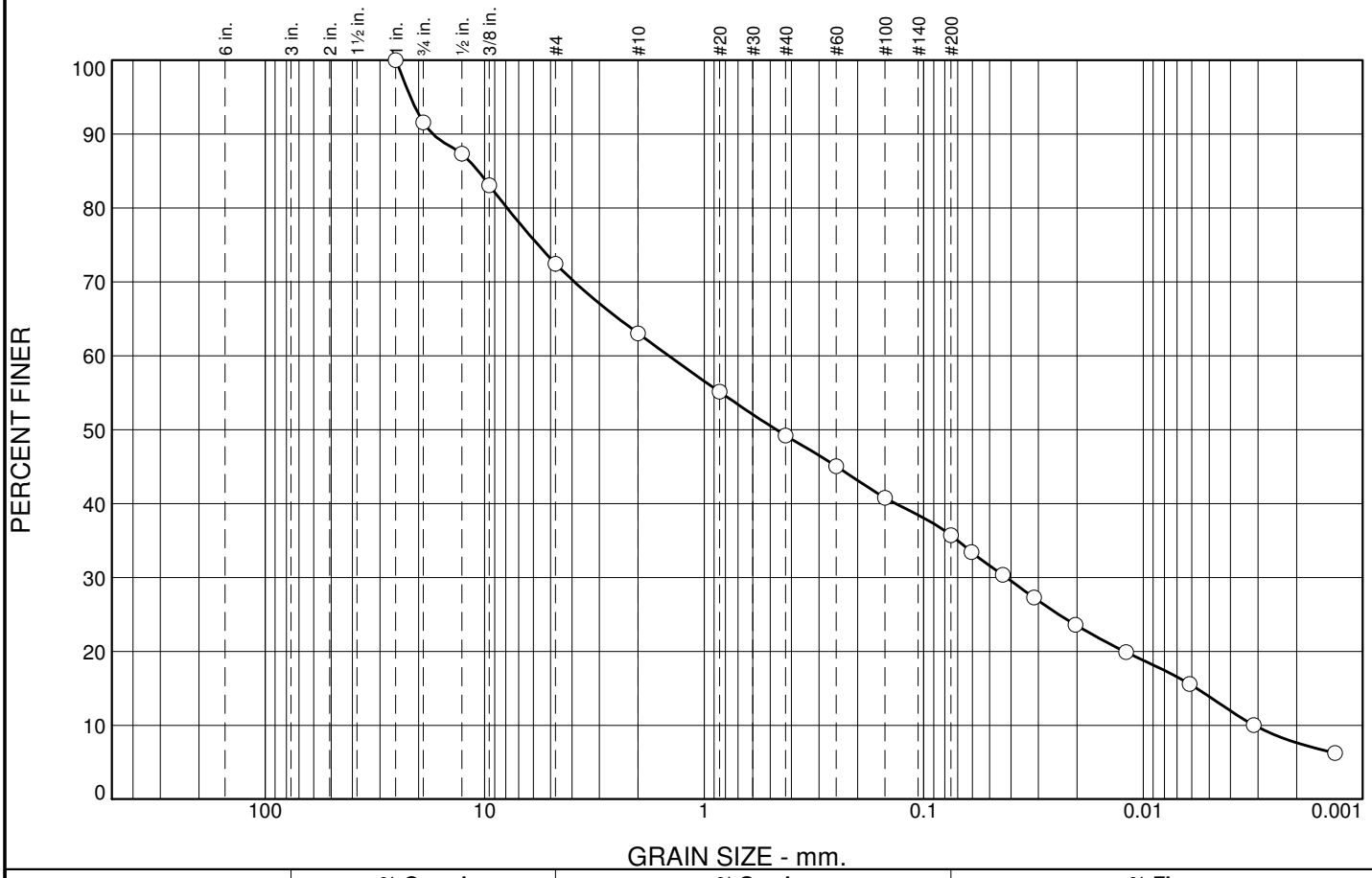
Location: GH11-267S
Sample Number: GH11-267S-3 **Depth:** 44.5-45' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.4	19.1	9.5	13.8	13.5	28.1	7.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	91.6		
.5	87.3		
0.375	83.1		
#4	72.5		
#10	63.0		
#20	55.1		
#40	49.2		
#60	45.1		
#100	40.8		
#200	35.7		
0.0605 mm.	33.4		
0.0436 mm.	30.4		
0.0314 mm.	27.3		
0.0203 mm.	23.6		
0.0120 mm.	19.9		
0.0061 mm.	15.6		
0.0031 mm.	10.0		
0.0013 mm.	6.2		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 20 LL= 41 PI= 21

Coefficients

D_{90}= 17.2581 D_{85}= 10.7052 D_{60}= 1.4504
D_{50}= 0.4699 D_{30}= 0.0420 D_{15}= 0.0057
D_{10}= 0.0031 C_u= 464.68 C_c= 0.39

Classification

USCS= SC AASHTO= A-7-6(3)

Remarks

As received moisture content - 23.1%

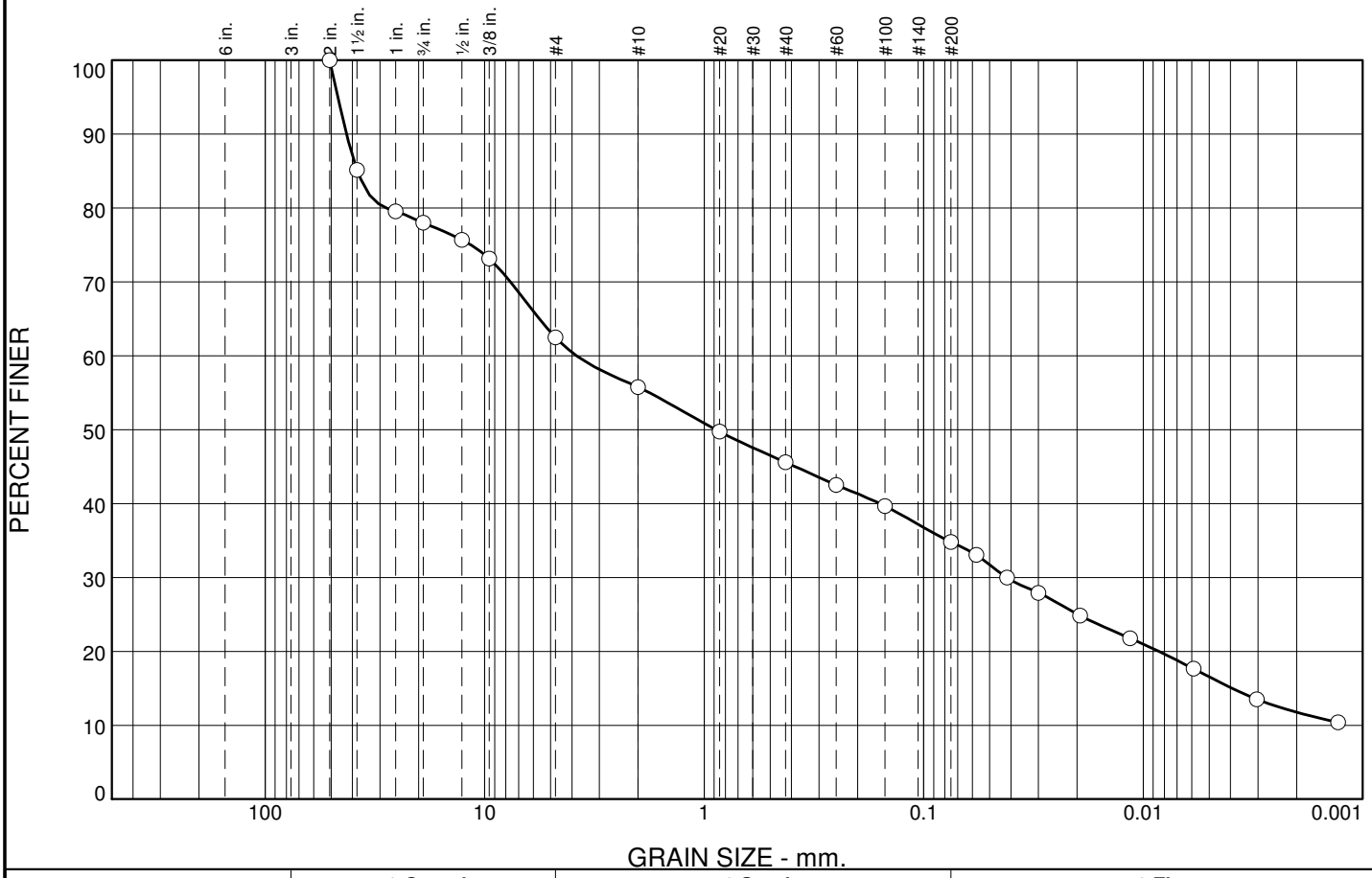
Location: GH11-274, Upper Talarik Creek Area
Sample Number: SPT 3 **Depth:** 14-15.5' **Date:** 11/15/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	22.0	15.5	6.8	10.1	10.8	23.0	11.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	85.1		
1	79.5		
.75	78.0		
.5	75.7		
0.375	73.1		
#4	62.5		
#10	55.7		
#20	49.7		
#40	45.6		
#60	42.5		
#100	39.6		
#200	34.8		
0.0575 mm.	33.0		
0.0417 mm.	30.0		
0.0300 mm.	27.9		
0.0194 mm.	24.8		
0.0115 mm.	21.8		
0.0059 mm.	17.7		
0.0030 mm.	13.5		
0.0013 mm.	10.4		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 15 LL= 48 PI= 33

Coefficients

D_{90}= 42.5904 D_{85}= 37.9611 D_{60}= 3.8104
D_{50}= 0.8853 D_{30}= 0.0419 D_{15}= 0.0039
D_{10}= C_u= C_c=

Classification

USCS= GC AASHTO= A-2-7(5)

Remarks

As received moisture content - 14.0%

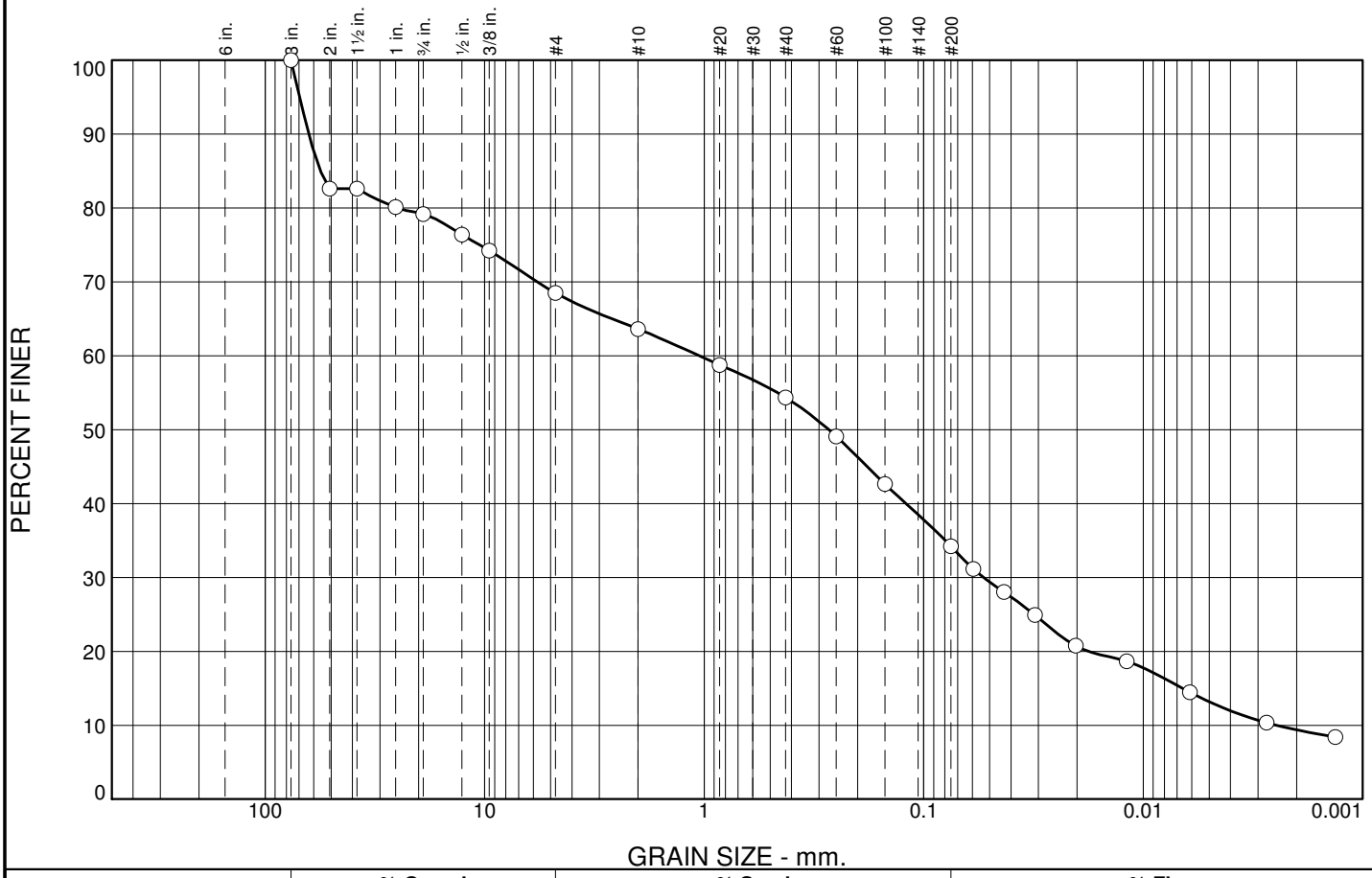
Location: GH11-278S
Sample Number: GH11-278S-3 **Depth:** 29.5-30' **Date:** 11/23/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.8	10.7	4.9	9.3	20.1	24.8	9.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	82.6		
1.5	82.6		
1	80.1		
.75	79.2		
.5	76.4		
0.375	74.2		
#4	68.5		
#10	63.6		
#20	58.8		
#40	54.3		
#60	49.1		
#100	42.6		
#200	34.2		
0.0594 mm.	31.1		
0.0430 mm.	28.0		
0.0311 mm.	24.9		
0.0203 mm.	20.8		
0.0119 mm.	18.7		
0.0061 mm.	14.5		
0.0027 mm.	10.3		
0.0013 mm.	8.4		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 16 LL= 34 PI= 18

Coefficients

D_{90}= 63.2451 D_{85}= 55.9798 D_{60}= 1.0538
D_{50}= 0.2707 D_{30}= 0.0534 D_{15}= 0.0066
D_{10}= 0.0025 C_u= 425.48 C_c= 1.09

Classification

USCS= SC AASHTO= A-2-6(2)

Remarks

As received moisture content - 16.2%

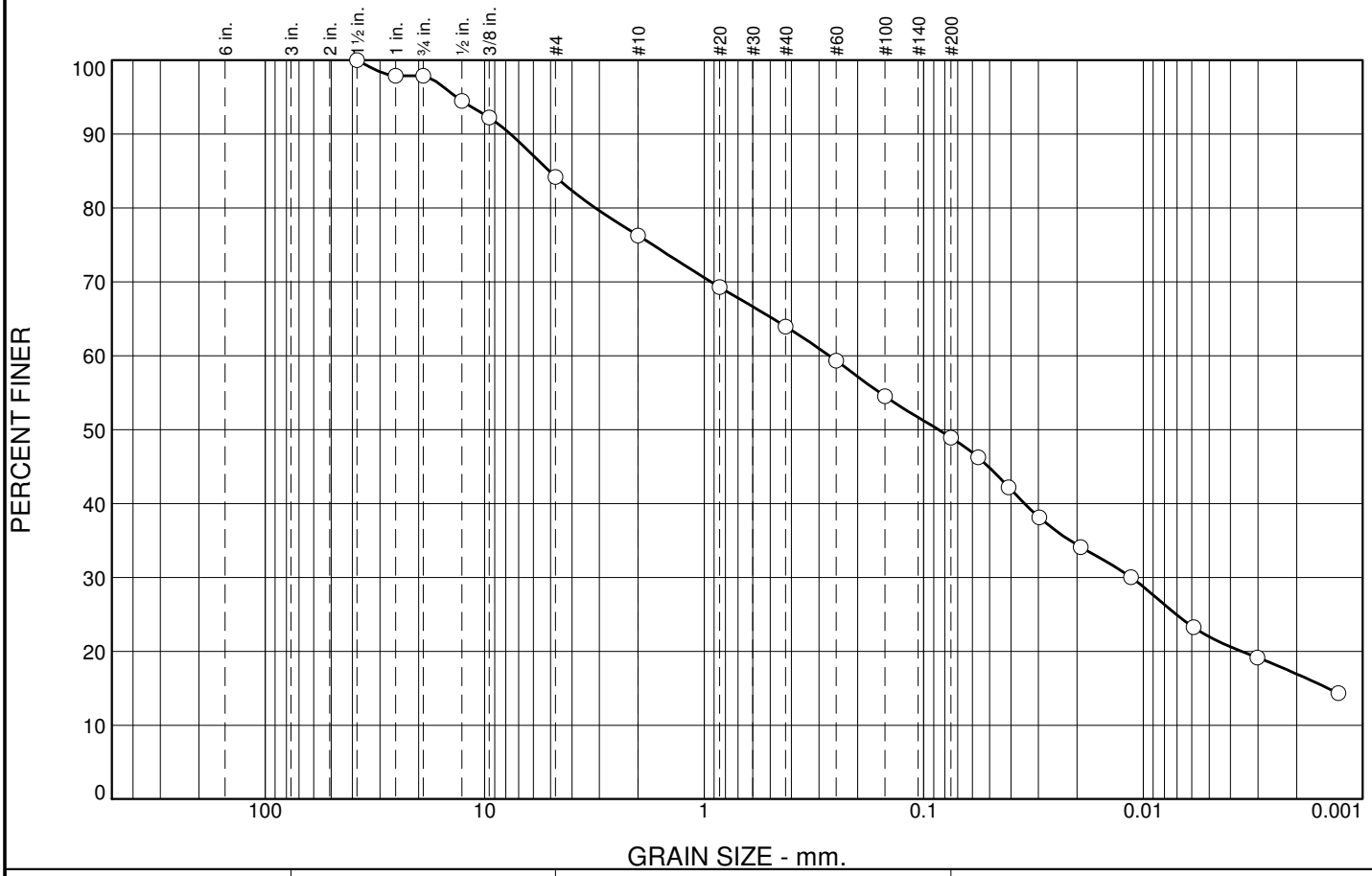
Location: GH11-278S
Sample Number: GH11-278S-1 **Depth:** 17-17.5' **Date:** 11/21/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.1	13.7	7.9	12.4	15.0	32.0	16.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	97.9		
.75	97.9		
.5	94.5		
0.375	92.2		
#4	84.2		
#10	76.3		
#20	69.3		
#40	63.9		
#60	59.3		
#100	54.5		
#200	48.9		
0.0565 mm.	46.3		
0.0410 mm.	42.2		
0.0297 mm.	38.1		
0.0192 mm.	34.1		
0.0114 mm.	30.0		
0.0059 mm.	23.2		
0.0030 mm.	19.2		
0.0013 mm.	14.4		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 46 PI= 31

Coefficients

D_{90}= 7.6300 D_{85}= 5.0833 D_{60}= 0.2691
D_{50}= 0.0858 D_{30}= 0.0113 D_{15}= 0.0014
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-7-6(10)

Remarks

As received moisture content - 14.4%

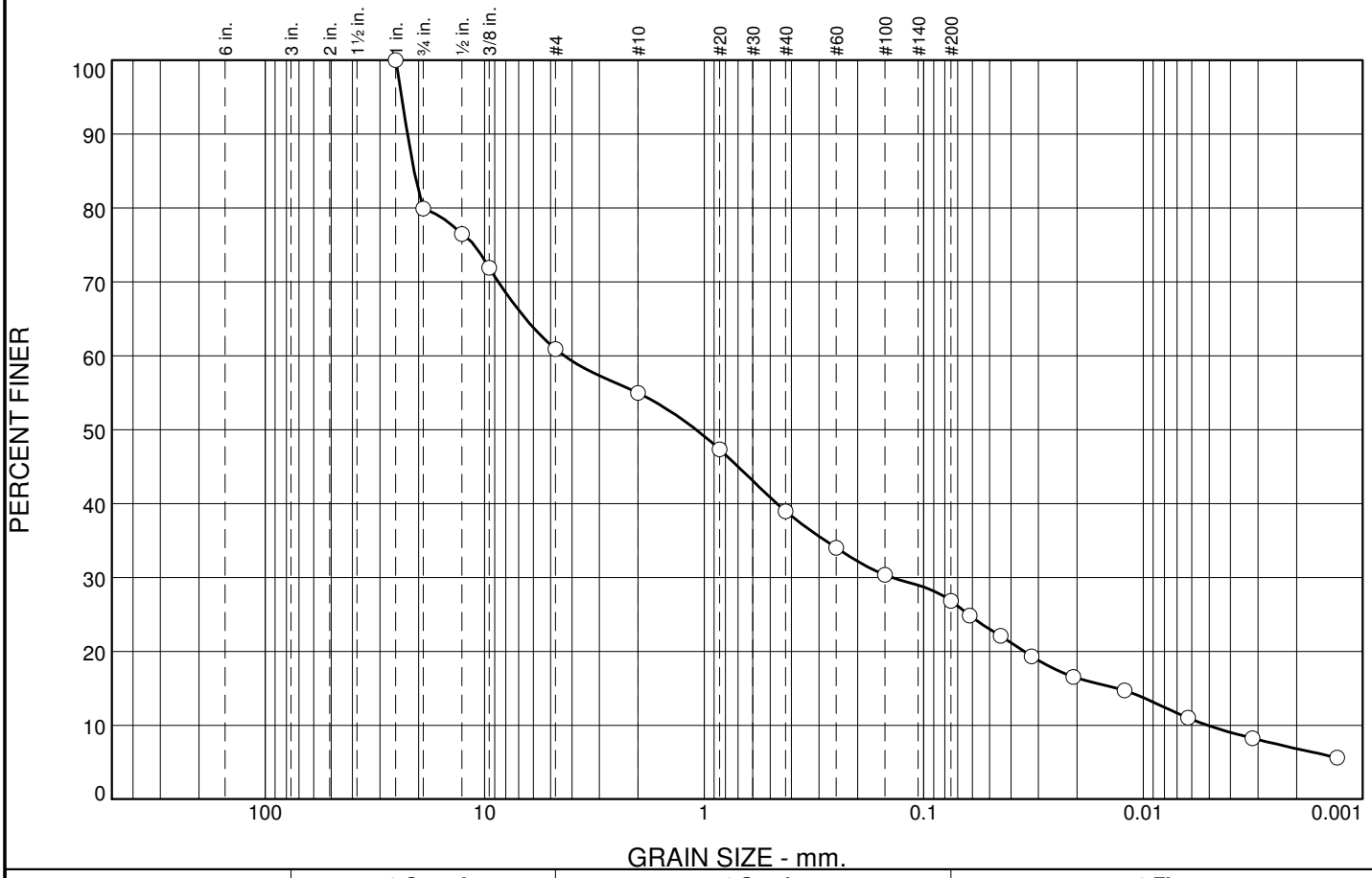
Location: GH11-278S
Sample Number: GH11-278S-2 **Depth:** 23.7-24' **Date:** 11/23/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.1	19.0	6.0	15.9	12.2	20.0	6.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	79.9		
.5	76.5		
0.375	71.9		
#4	60.9		
#10	54.9		
#20	47.3		
#40	39.0		
#60	34.0		
#100	30.3		
#200	26.8		
0.0617 mm.	24.8		
0.0446 mm.	22.1		
0.0322 mm.	19.3		
0.0208 mm.	16.6		
0.0122 mm.	14.7		
0.0062 mm.	11.0		
0.0032 mm.	8.2		
0.0013 mm.	5.6		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 17 LL= 30 PI= 13

Coefficients

D_{90}= 22.4733 D_{85}= 20.9466 D_{60}= 4.3393
D_{50}= 1.0892 D_{30}= 0.1396 D_{15}= 0.0131
D_{10}= 0.0051 C_u= 853.80 C_c= 0.88

Classification

USCS= GC AASHTO= A-2-6(0)

Remarks

As received moisture content - 11.6%

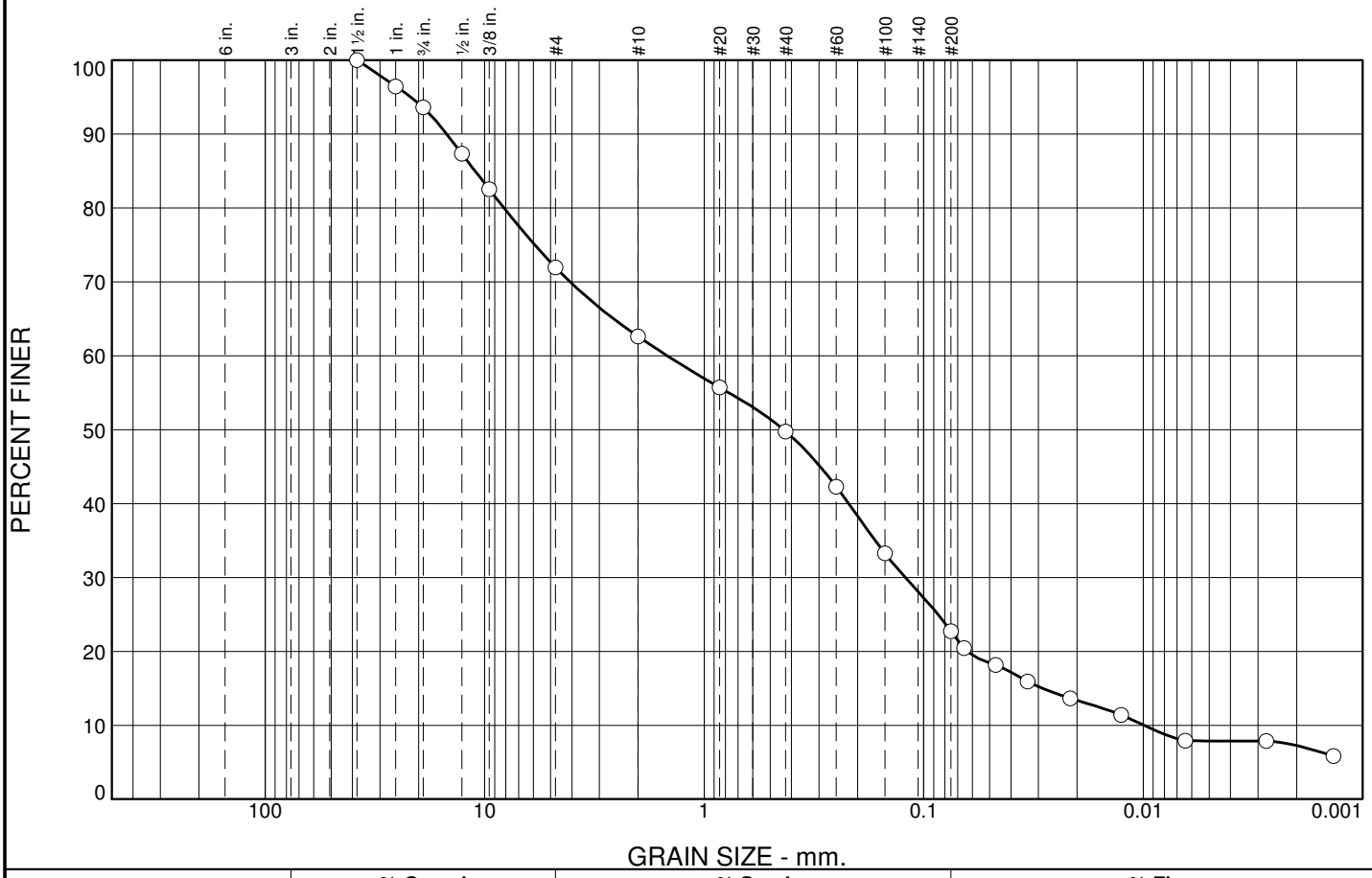
Location: GH11-279S
Sample Number: GH11-279S-1 **Depth:** 14-14.5' **Date:** 11/21/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.4	21.7	9.3	12.9	27.0	15.4	7.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	96.4		
.75	93.6		
.5	87.3		
0.375	82.5		
#4	71.9		
#10	62.6		
#20	55.7		
#40	49.7		
#60	42.3		
#100	33.2		
#200	22.7		
0.0654 mm.	20.4		
0.0469 mm.	18.2		
0.0336 mm.	15.9		
0.0215 mm.	13.6		
0.0126 mm.	11.4		
0.0064 mm.	7.9		
0.0027 mm.	7.9		
0.0014 mm.	5.8		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 19 LL= 27 PI= 8

Coefficients

D_{90}= 14.9002 D_{85}= 11.0575 D_{60}= 1.4735
D_{50}= 0.4348 D_{30}= 0.1212 D_{15}= 0.0288
D_{10}= 0.0099 C_u= 148.71 C_c= 1.01

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

As received moisture content - 15.6%

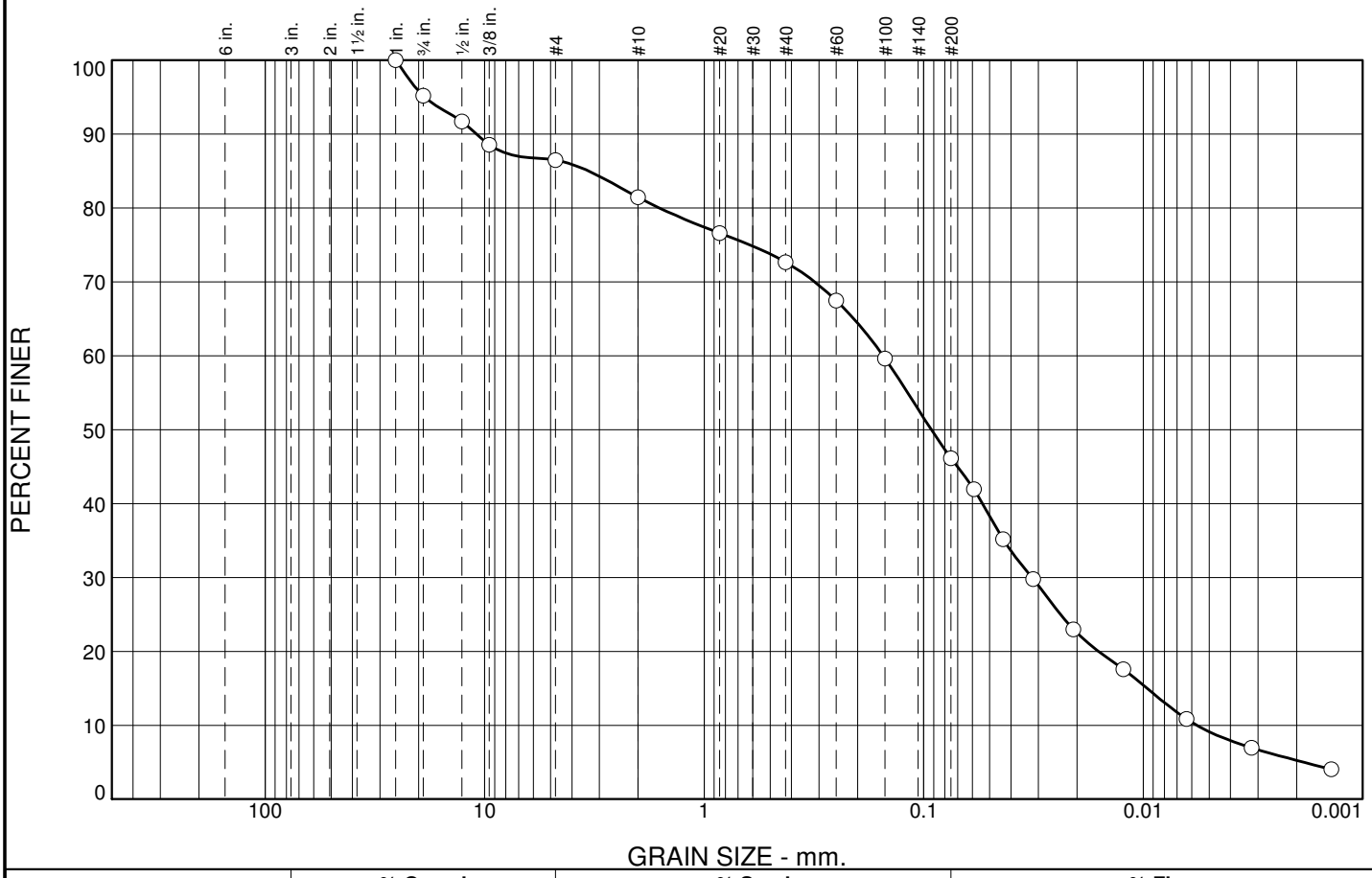
Location: GH11-279S
Sample Number: GH11-279S-2 **Depth:** 35-35.5' **Date:** 11/21/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.8	8.7	5.1	8.8	26.5	40.9	5.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.2		
.5	91.7		
0.375	88.5		
#4	86.5		
#10	81.4		
#20	76.6		
#40	72.6		
#60	67.5		
#100	59.6		
#200	46.1		
0.0590 mm.	41.9		
0.0435 mm.	35.2		
0.0317 mm.	29.8		
0.0208 mm.	23.0		
0.0123 mm.	17.6		
0.0063 mm.	10.9		
0.0032 mm.	7.0		
0.0014 mm.	4.1		

* (no specification provided)

Soil Description

silty sand

Atterberg Limits

PL= NP LL= 26 PI= NP

Coefficients

D_{90}= 10.8930 D_{85}= 3.3710 D_{60}= 0.1531
D_{50}= 0.0923 D_{30}= 0.0321 D_{15}= 0.0096
D_{10}= 0.0057 C_u= 26.90 C_c= 1.19

Classification

USCS= SM AASHTO= A-4(0)

Remarks

As received moisture content - 23.9%

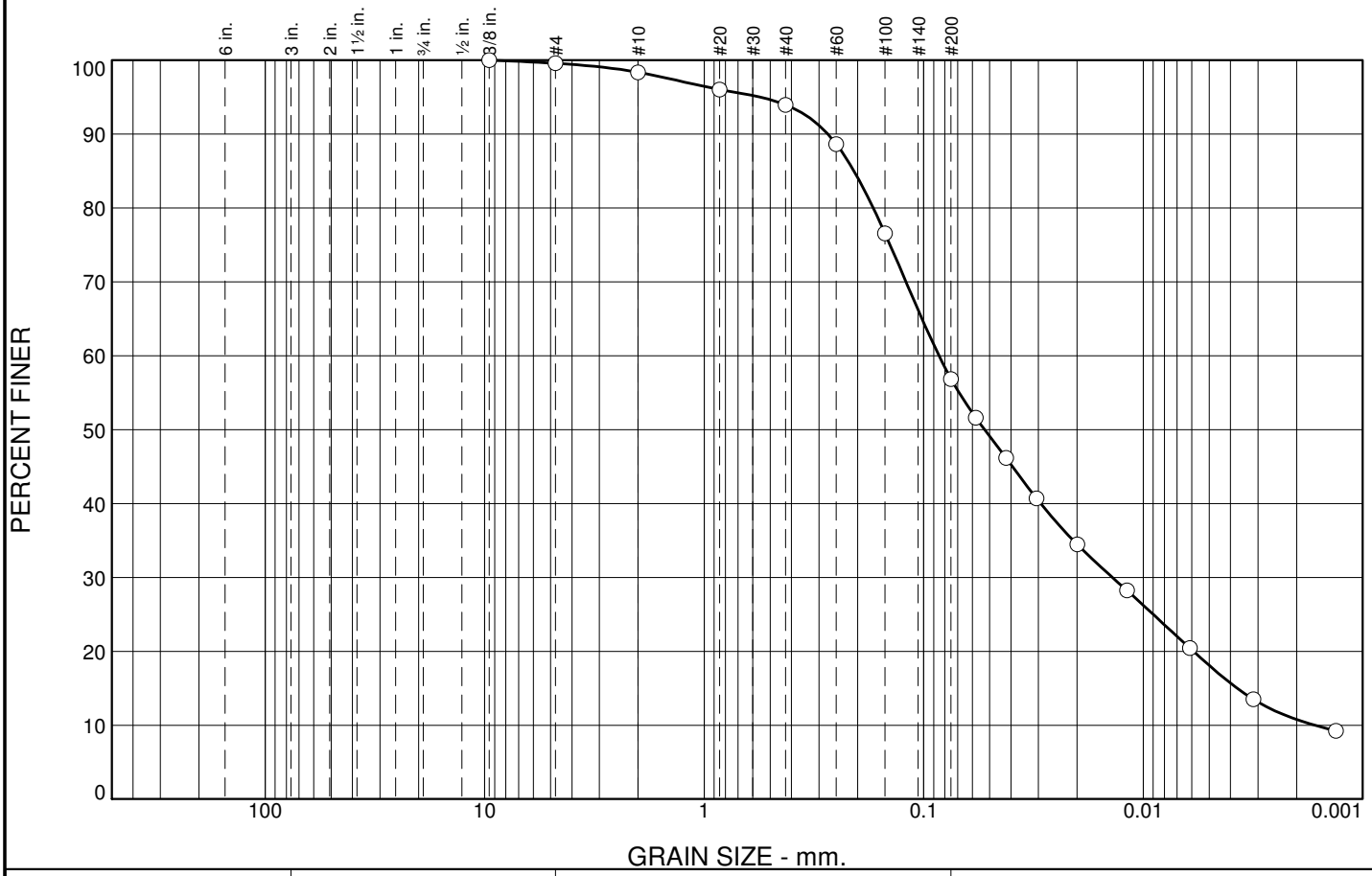
Location: GH11-287, Area E
Sample Number: SPT 1 **Depth:** 4-5.5' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	1.3	4.4	37.0	46.1	10.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	99.6		
#10	98.3		
#20	96.0		
#40	93.9		
#60	88.6		
#100	76.5		
#200	56.9		
0.0578 mm.	51.6		
0.0421 mm.	46.2		
0.0306 mm.	40.7		
0.0200 mm.	34.5		
0.0119 mm.	28.2		
0.0061 mm.	20.4		
0.0031 mm.	13.5		
0.0013 mm.	9.2		

* (no specification provided)

Soil Description

sandy silt

Atterberg Limits

PL= 24 LL= 30 PI= 6

Coefficients

D_{90}= 0.2731 D_{85}= 0.2079 D_{60}= 0.0851
D_{50}= 0.0527 D_{30}= 0.0138 D_{15}= 0.0037
D_{10}= 0.0016 C_u= 51.65 C_c= 1.36

Classification

USCS= ML AASHTO= A-4(2)

Remarks

As received moisture content - 24.1%

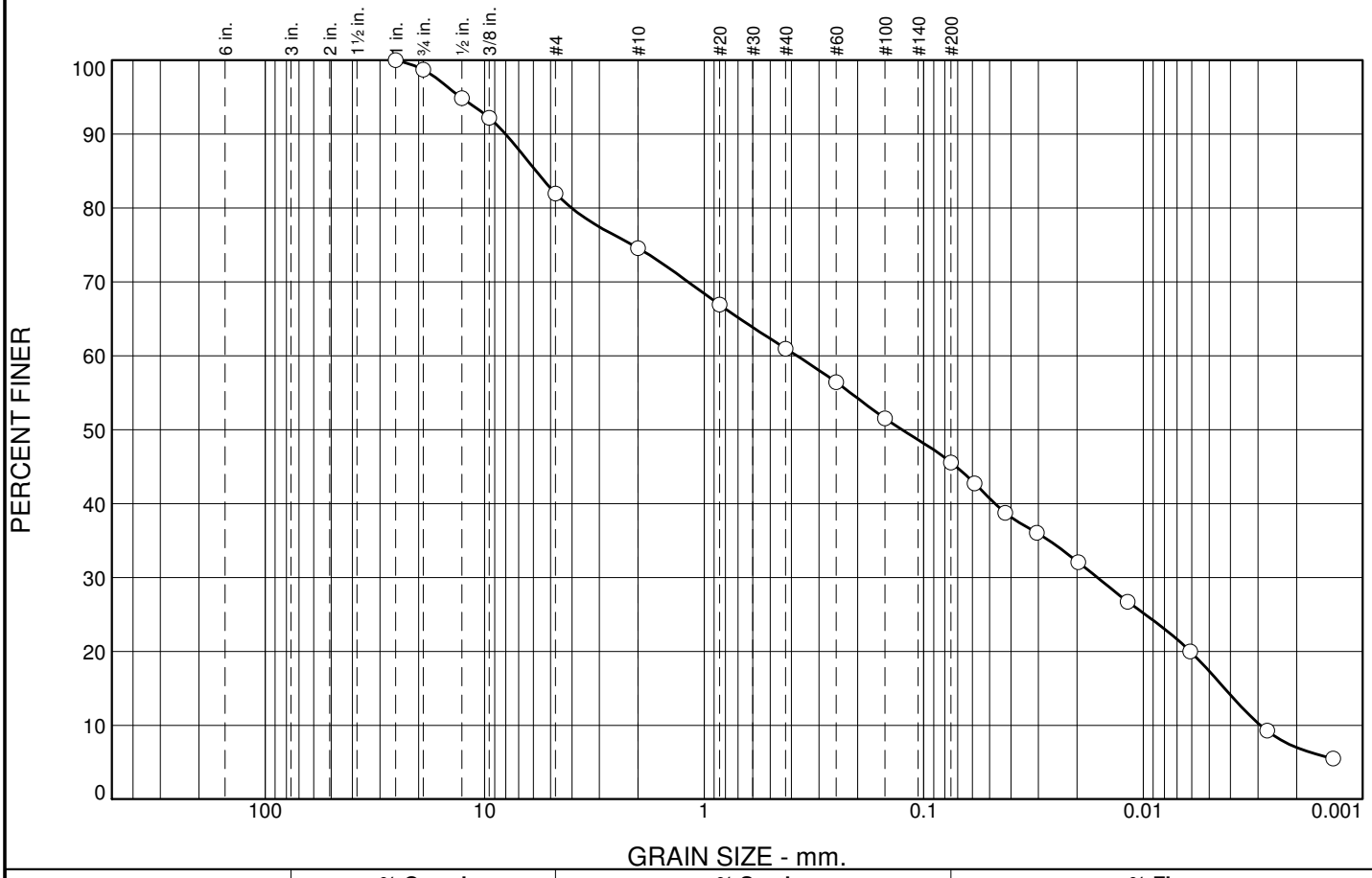
Location: GH11-287, Area E
Sample Number: SPT 2 **Depth:** 9-10.5' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.3	16.8	7.3	13.6	15.4	38.6	7.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.7		
.5	94.9		
0.375	92.2		
#4	81.9		
#10	74.6		
#20	66.9		
#40	61.0		
#60	56.4		
#100	51.5		
#200	45.6		
0.0586 mm.	42.7		
0.0425 mm.	38.7		
0.0305 mm.	36.1		
0.0198 mm.	32.1		
0.0117 mm.	26.7		
0.0061 mm.	20.0		
0.0027 mm.	9.3		
0.0014 mm.	5.5		

* (no specification provided)

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 16 LL= 35 PI= 19

Coefficients

D_{90}= 8.0344 D_{85}= 5.8416 D_{60}= 0.3784
D_{50}= 0.1255 D_{30}= 0.0162 D_{15}= 0.0043
D_{10}= 0.0029 C_u= 129.49 C_c= 0.24

Classification

USCS= SC AASHTO= A-6(5)

Remarks

As received moisture content - 12.4%

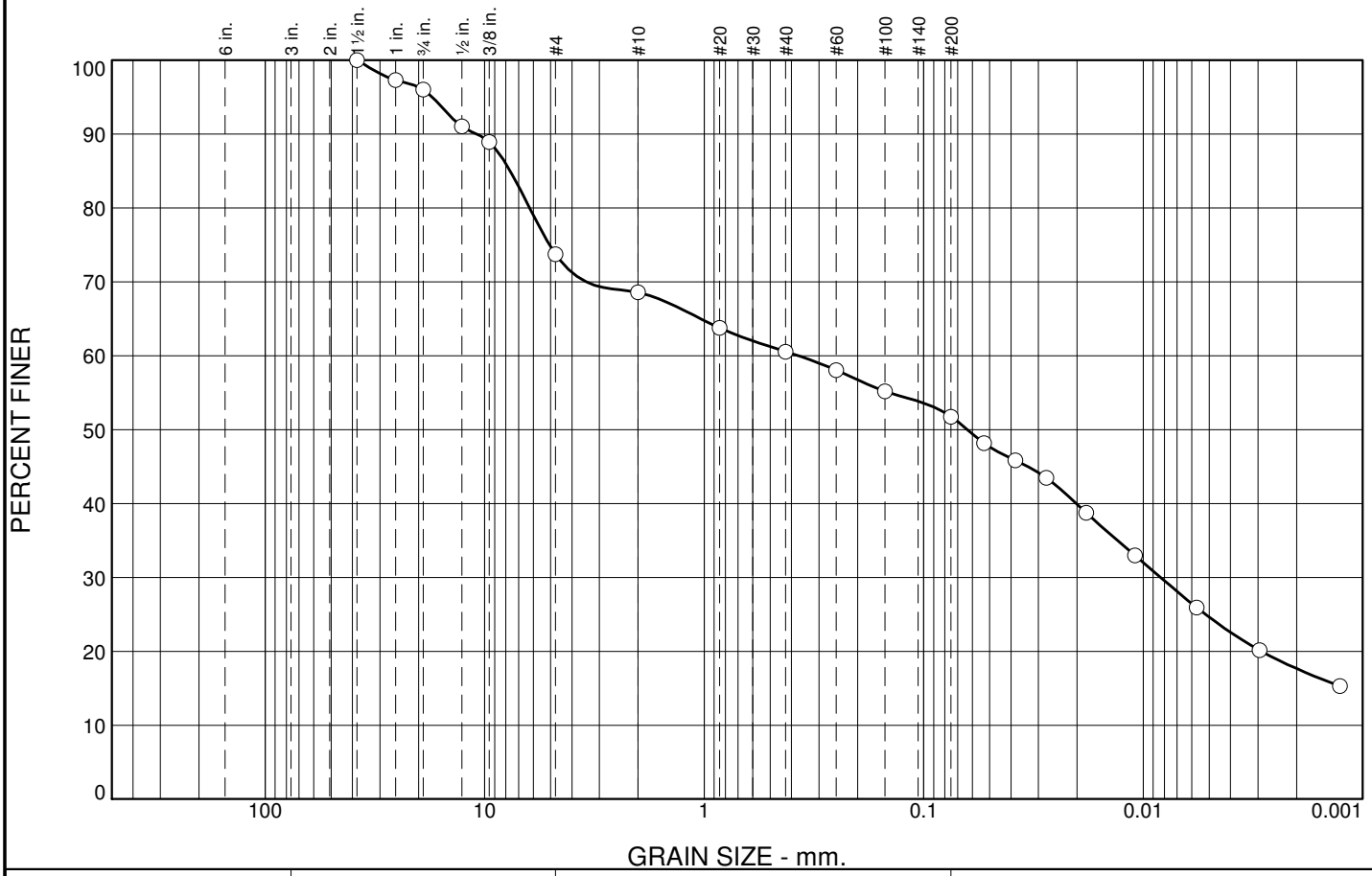
Location: GH11-289S
Sample Number: GH11-289S-1 **Depth:** 19.5-20' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.0	22.3	5.1	8.1	8.8	34.0	17.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	97.3		
.75	96.0		
.5	91.0		
0.375	88.9		
#4	73.7		
#10	68.6		
#20	63.8		
#40	60.5		
#60	58.0		
#100	55.2		
#200	51.7		
0.0530 mm.	48.2		
0.0383 mm.	45.8		
0.0276 mm.	43.5		
0.0182 mm.	38.7		
0.0109 mm.	33.0		
0.0057 mm.	25.9		
0.0029 mm.	20.1		
0.0013 mm.	15.3		

* (no specification provided)

Soil Description

gravelly lean clay with sand

Atterberg Limits

PL= 16 LL= 45 PI= 29

Coefficients

D_{90}= 10.8950 D_{85}= 7.6498 D_{60}= 0.3738
D_{50}= 0.0633 D_{30}= 0.0083 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(11)

Remarks

As received moisture content - 18.2%

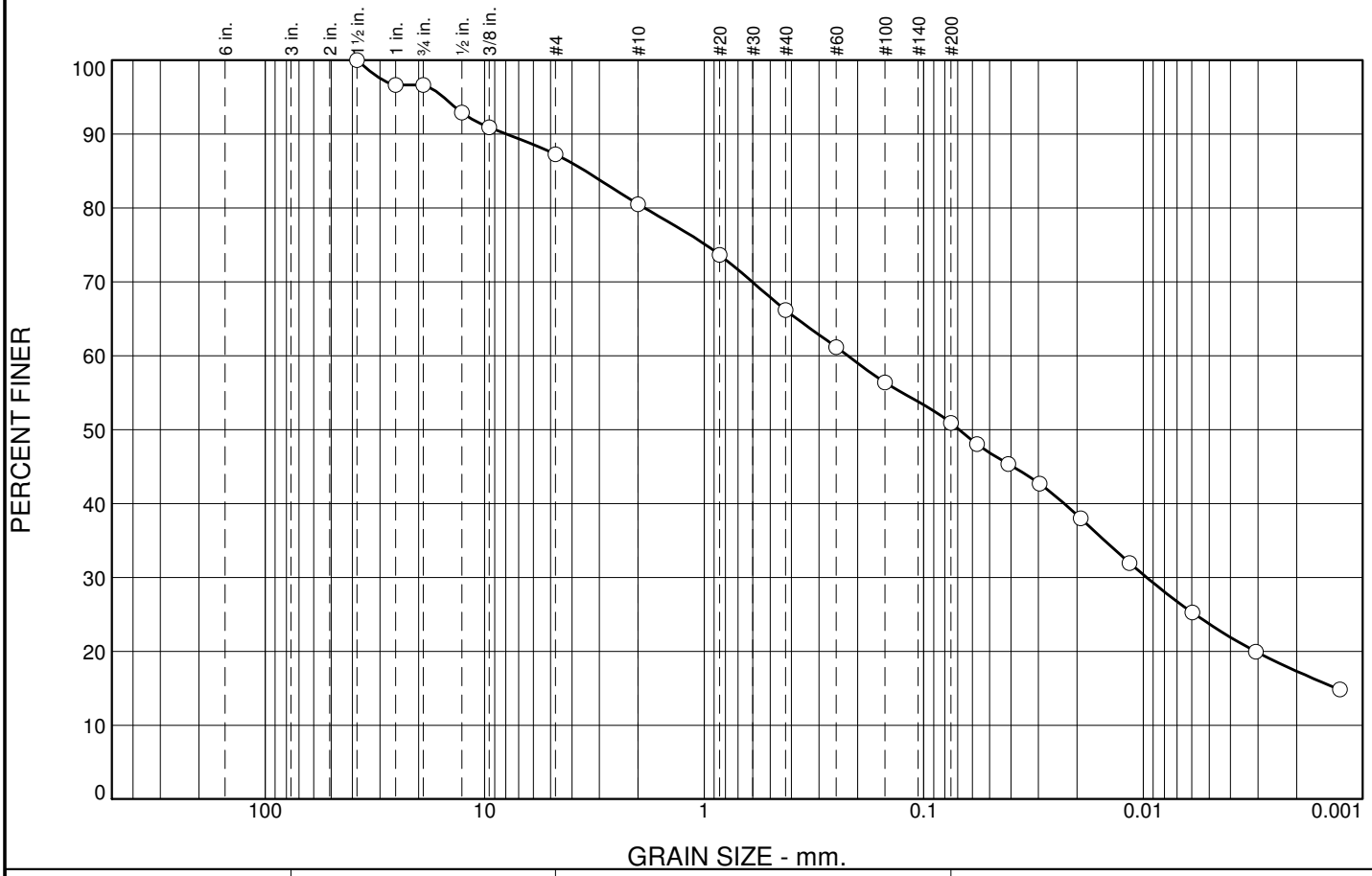
Location: GH11-289S
Sample Number: GH11-289S-2 **Depth:** 25.5-26' **Date:** 11/23/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.4	9.4	6.7	14.3	15.3	33.6	17.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	96.6		
.75	96.6		
.5	92.9		
0.375	90.9		
#4	87.2		
#10	80.5		
#20	73.6		
#40	66.2		
#60	61.2		
#100	56.4		
#200	50.9		
0.0571 mm.	48.0		
0.0411 mm.	45.3		
0.0296 mm.	42.7		
0.0193 mm.	38.0		
0.0115 mm.	31.9		
0.0060 mm.	25.3		
0.0031 mm.	20.0		
0.0013 mm.	14.8		

* (no specification provided)

Soil Description

sandy lean clay

Atterberg Limits

PL= 17 LL= 43 PI= 26

Coefficients

D_{90}= 7.9925 D_{85}= 3.4804 D_{60}= 0.2215
D_{50}= 0.0689 D_{30}= 0.0096 D_{15}= 0.0013
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(9)

Remarks

As received moisture content - 22.3%

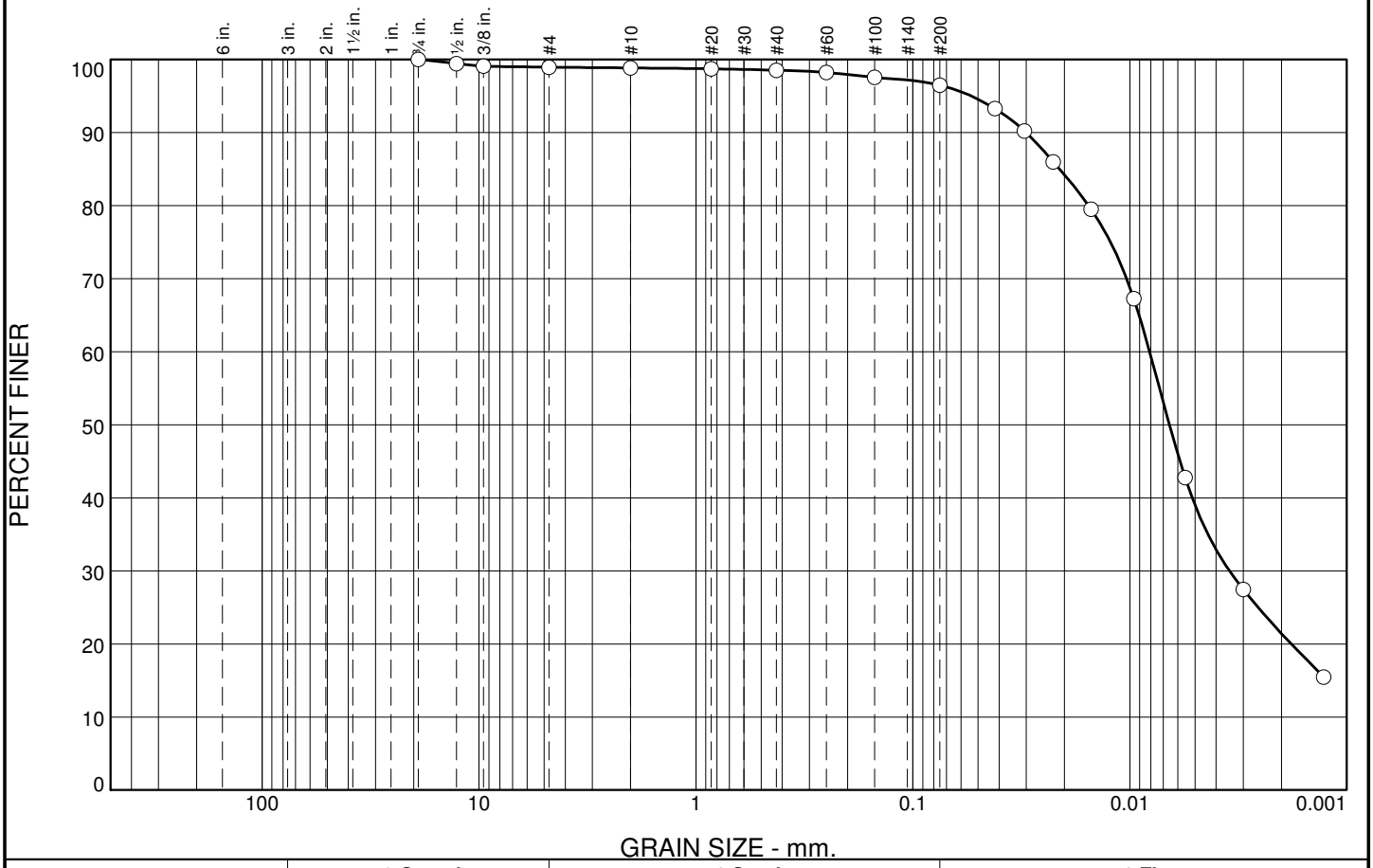
Location: GH11-289S
Sample Number: GH11-289S-3 **Depth:** 33-33.5' **Date:** 11/21/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	0.1	0.3	2.0	75.1	21.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	99.4		
0.375	99.1		
#4	98.9		
#10	98.8		
#20	98.7		
#40	98.5		
#60	98.2		
#100	97.5		
#200	96.5		
0.0418 mm.	93.3		
0.0306 mm.	90.2		
0.0225 mm.	86.0		
0.0151 mm.	79.5		
0.0096 mm.	67.3		
0.0056 mm.	42.8		
0.0030 mm.	27.5		
0.0013 mm.	15.5		

* (no specification provided)

Soil Description

silt

Atterberg Limits

PL= NP LL= 21 PI= NP

Coefficients

D_{90}= 0.0301 D_{85}= 0.0211 D_{60}= 0.0081
D_{50}= 0.0066 D_{30}= 0.0035 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

As received moisture content - 22.0%

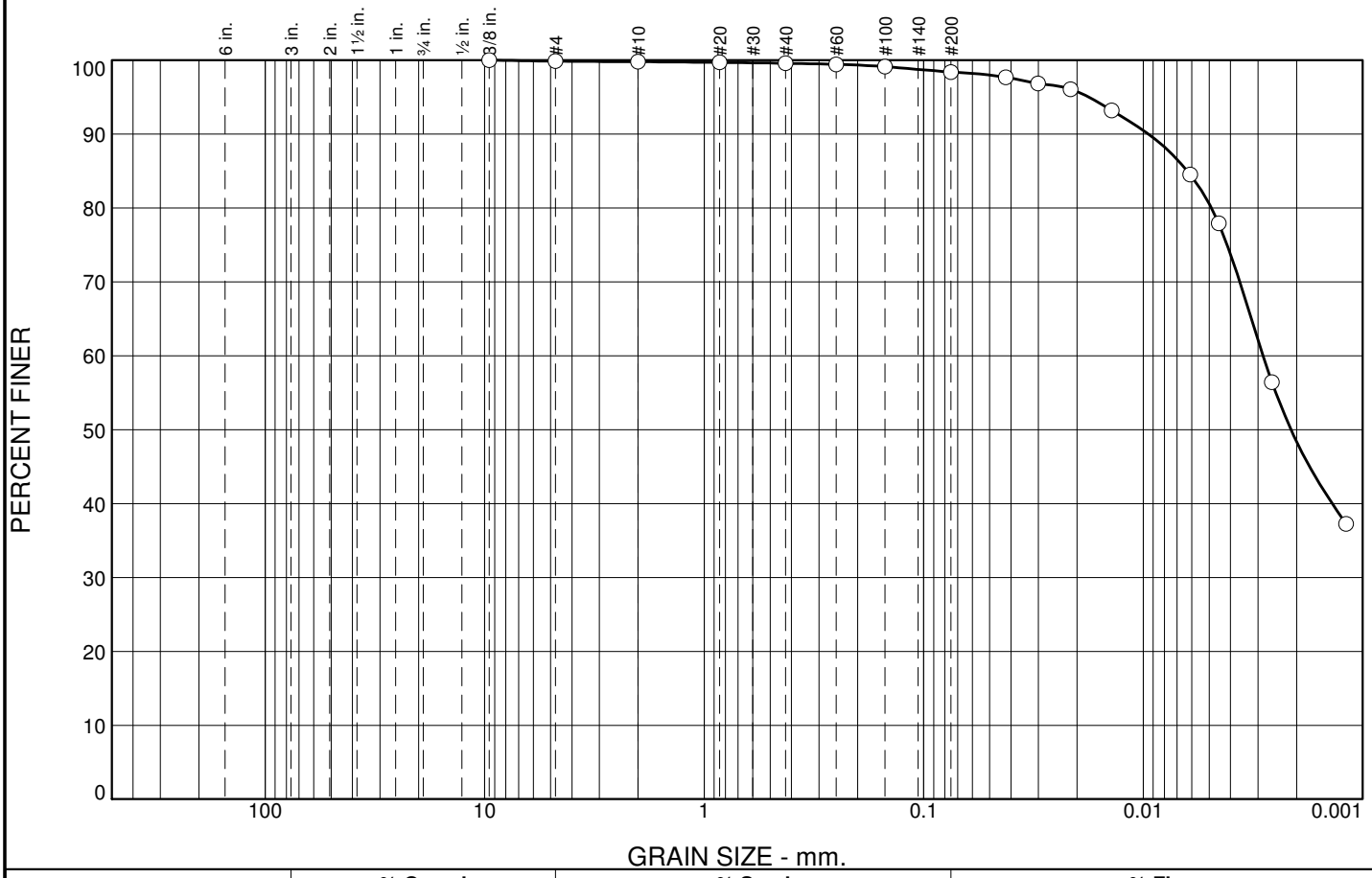
Location: GH11-290S
Sample Number: GH11-290s-3 **Depth:** 39.5-40' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.1	0.2	1.2	50.0	48.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	99.9		
#10	99.8		
#20	99.7		
#40	99.6		
#60	99.4		
#100	99.1		
#200	98.4		
0.0422 mm.	97.7		
0.0301 mm.	96.9		
0.0214 mm.	96.1		
0.0139 mm.	93.2		
0.0061 mm.	84.5		
0.0045 mm.	77.9		
0.0026 mm.	56.4		
0.0012 mm.	37.2		

* (no specification provided)

Soil Description

fat clay

Atterberg Limits

PL= 20 LL= 50 PI= 30

Coefficients

D_{90}= 0.0095 D_{85}= 0.0063 D_{60}= 0.0028
D_{50}= 0.0021 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(32)

Remarks

As received moisture content - 33.5%

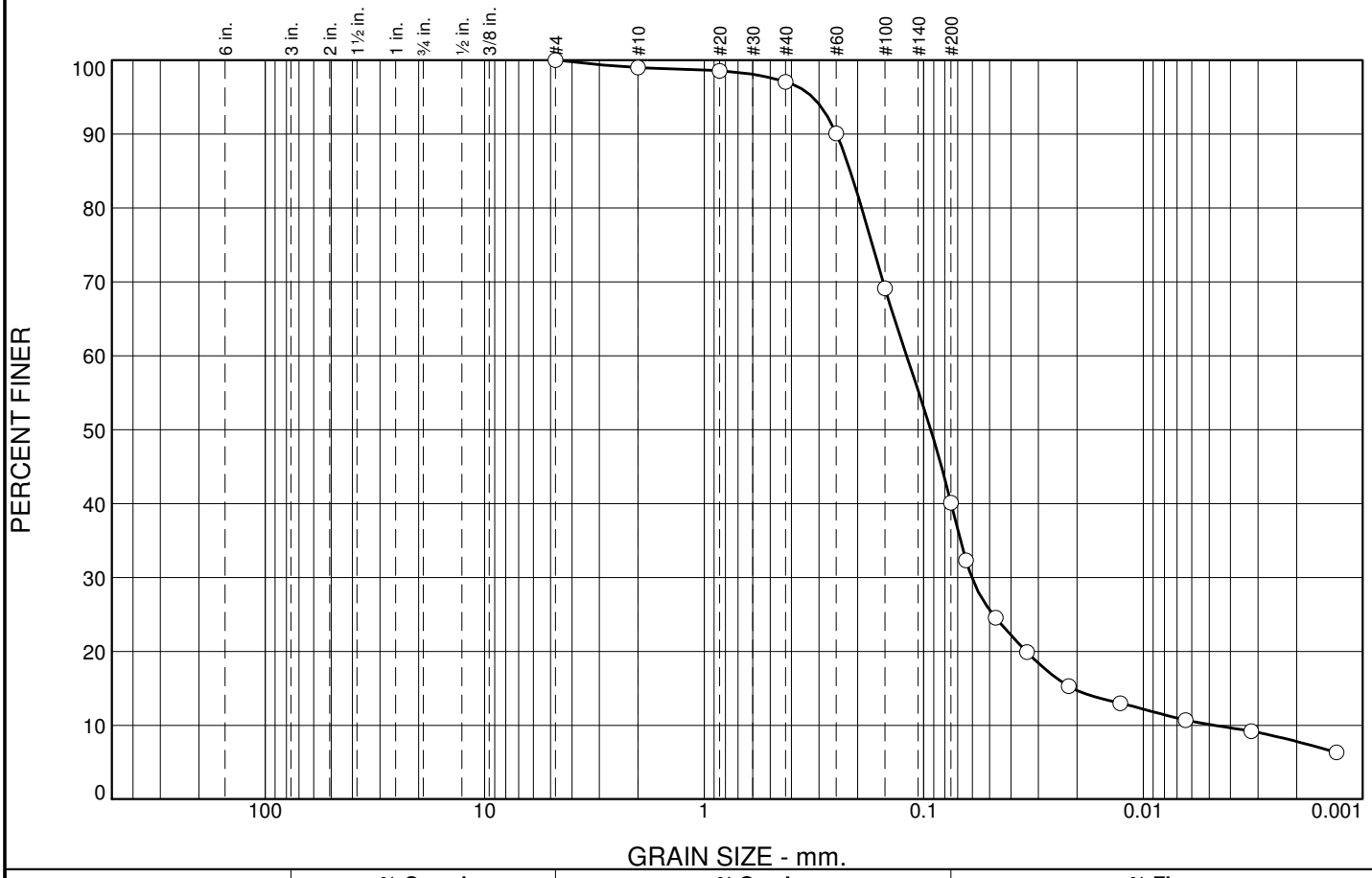
Location: GH11-290S
Sample Number: GH11-290S-1 **Depth:** 29.5-30' **Date:** 11/15/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.0	2.0	56.9	32.3	7.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.0		
#20	98.5		
#40	97.0		
#60	90.1		
#100	69.1		
#200	40.1		
0.0641 mm.	32.3		
0.0469 mm.	24.6		
0.0338 mm.	19.9		
0.0218 mm.	15.3		
0.0127 mm.	13.0		
0.0064 mm.	10.7		
0.0032 mm.	9.2		
0.0013 mm.	6.3		

* (no specification provided)

Soil Description

clayey sand

Atterberg Limits

PL= 19 LL= 31 PI= 12

Coefficients

D_{90}= 0.2495 D_{85}= 0.2160 D_{60}= 0.1196
D_{50}= 0.0930 D_{30}= 0.0603 D_{15}= 0.0210
D_{10}= 0.0047 C_u= 25.23 C_c= 6.41

Classification

USCS= SC AASHTO= A-6(1)

Remarks

As received moisture content - 28.8%

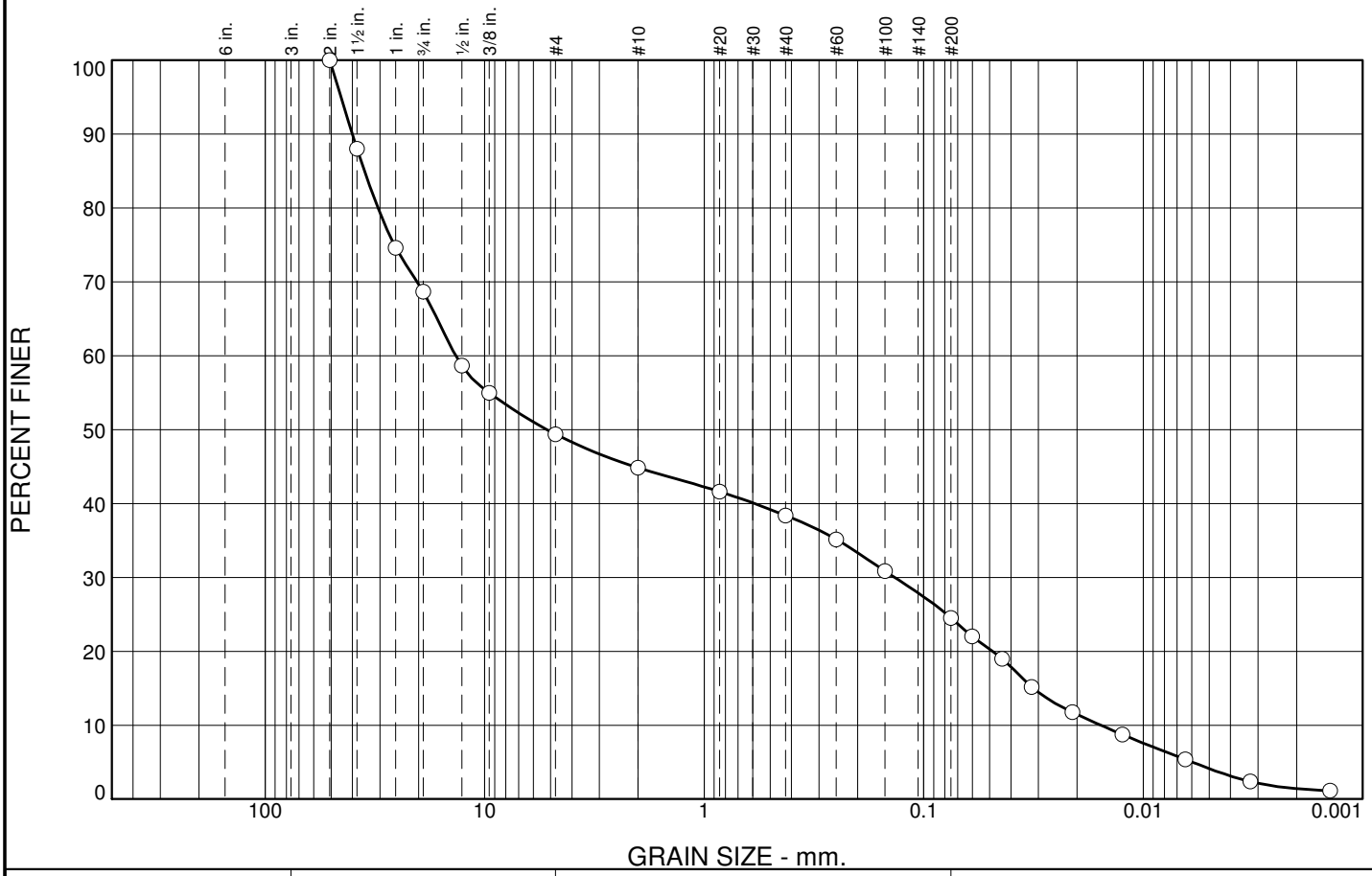
Location: GH11-290S
Sample Number: GH11-290S-2 **Depth:** 34-34.5' **Date:** 11/21/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	31.4	19.2	4.5	6.5	13.9	23.1	1.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	88.0		
1	74.6		
.75	68.6		
.5	58.7		
0.375	55.0		
#4	49.4		
#10	44.9		
#20	41.6		
#40	38.4		
#60	35.1		
#100	30.8		
#200	24.5		
0.0601 mm.	22.0		
0.0438 mm.	19.0		
0.0322 mm.	15.2		
0.0210 mm.	11.8		
0.0124 mm.	8.7		
0.0064 mm.	5.4		
0.0032 mm.	2.4		
0.0014 mm.	1.1		

* (no specification provided)

Soil Description

silty gravel with sand

Atterberg Limits

PL= 23 LL= 25 PI= 2

Coefficients

D_{90}= 40.0597 D_{85}= 35.2793 D_{60}= 13.5336
D_{50}= 5.2050 D_{30}= 0.1357 D_{15}= 0.0316
D_{10}= 0.0156 C_u= 867.88 C_c= 0.09

Classification

USCS= GM AASHTO= A-1-b

Remarks

As received moisture content - 12.2%

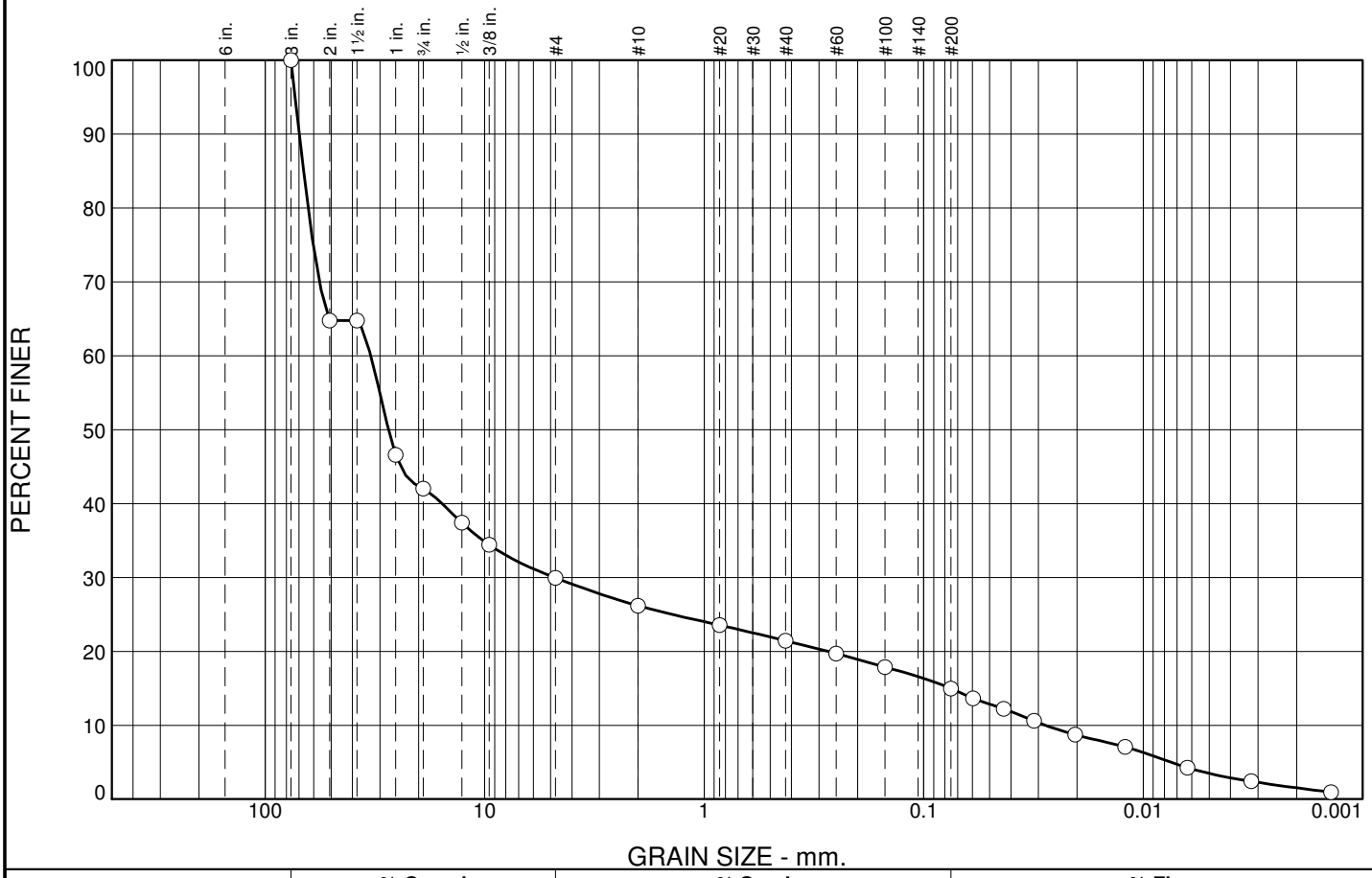
Location: GH11-293, Area E
Sample Number: GH11-293-1 **Depth:** 2-3' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	58.0	12.1	3.7	4.8	6.4	13.5	1.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	64.8		
1.5	64.8		
1	46.6		
.75	42.0		
.5	37.4		
0.375	34.4		
#4	29.9		
#10	26.2		
#20	23.5		
#40	21.4		
#60	19.7		
#100	17.9		
#200	15.0		
0.0597 mm.	13.7		
0.0432 mm.	12.2		
0.0314 mm.	10.6		
0.0204 mm.	8.7		
0.0121 mm.	7.1		
0.0063 mm.	4.3		
0.0032 mm.	2.4		
0.0014 mm.	0.9		

* (no specification provided)

Soil Description

silty gravel

Atterberg Limits

PL= NP LL= 21 PI= NP

Coefficients

D_{90}= 69.9043 D_{85}= 66.8163 D_{60}= 33.0113
D_{50}= 27.4295 D_{30}= 4.8062 D_{15}= 0.0756
D_{10}= 0.0278 C_u= 1186.20 C_c= 25.14

Classification

USCS= GM AASHTO= A-1-a

Remarks

As received moisture content - 8.3%

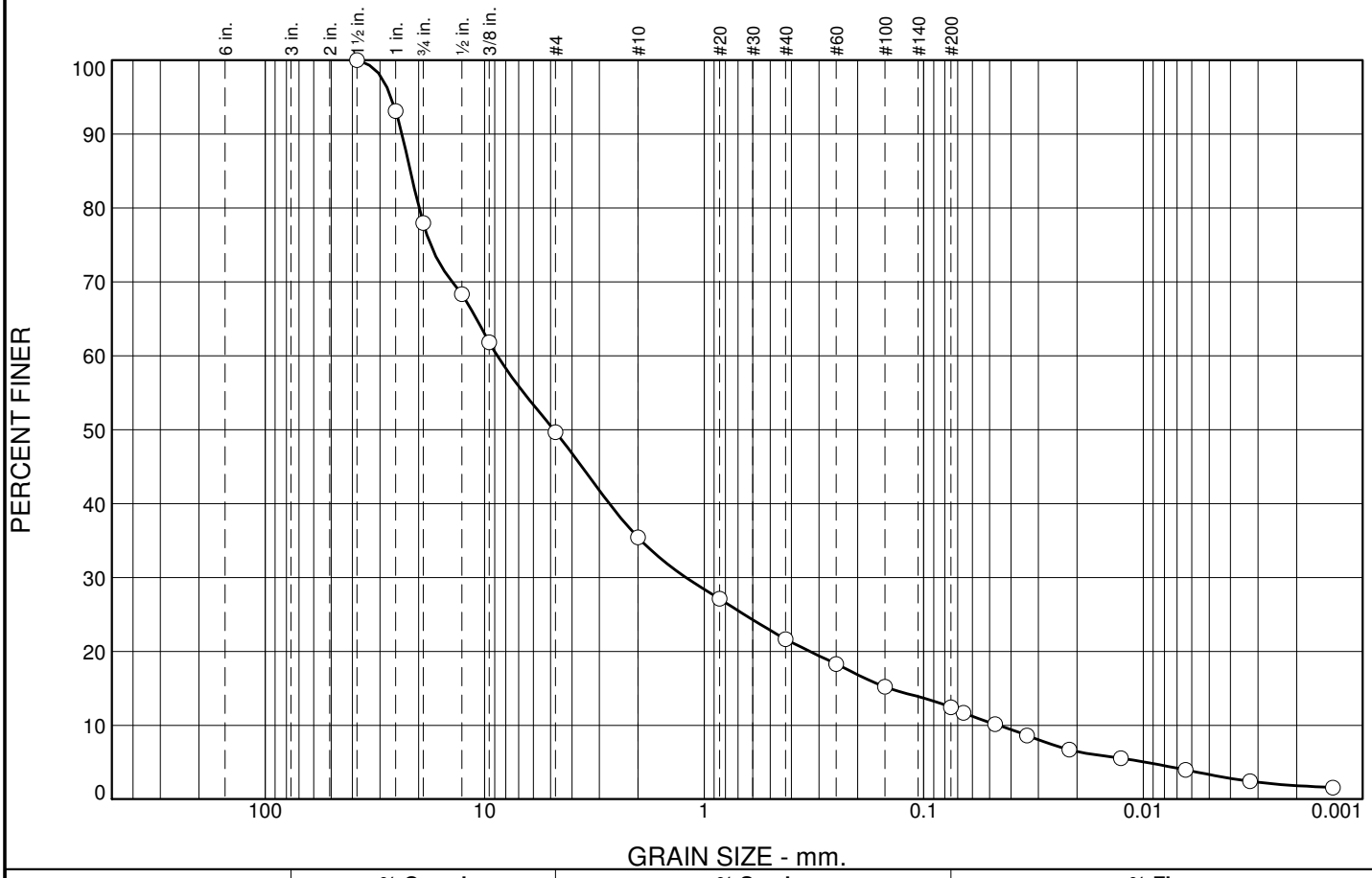
Location: GH11-294, Area E
Sample Number: GH11-294-1 **Depth:** 1-2' **Date:** 11/17/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	22.1	28.2	14.3	13.8	9.2	10.6	1.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	93.1		
.75	77.9		
.5	68.3		
0.375	61.8		
#4	49.7		
#10	35.4		
#20	27.1		
#40	21.6		
#60	18.3		
#100	15.2		
#200	12.4		
0.0659 mm.	11.7		
0.0472 mm.	10.1		
0.0338 mm.	8.6		
0.0217 mm.	6.7		
0.0126 mm.	5.5		
0.0064 mm.	4.0		
0.0033 mm.	2.4		
0.0014 mm.	1.6		

* (no specification provided)

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 19 LL= 27 PI= 8

Coefficients

D_{90}= 23.8174 D_{85}= 21.7753 D_{60}= 8.7492
D_{50}= 4.8480 D_{30}= 1.2089 D_{15}= 0.1432
D_{10}= 0.0456 C_u= 191.80 C_c= 3.66

Classification

USCS= GC AASHTO= A-2-4(0)

Remarks

As received moisture content - 13.1%

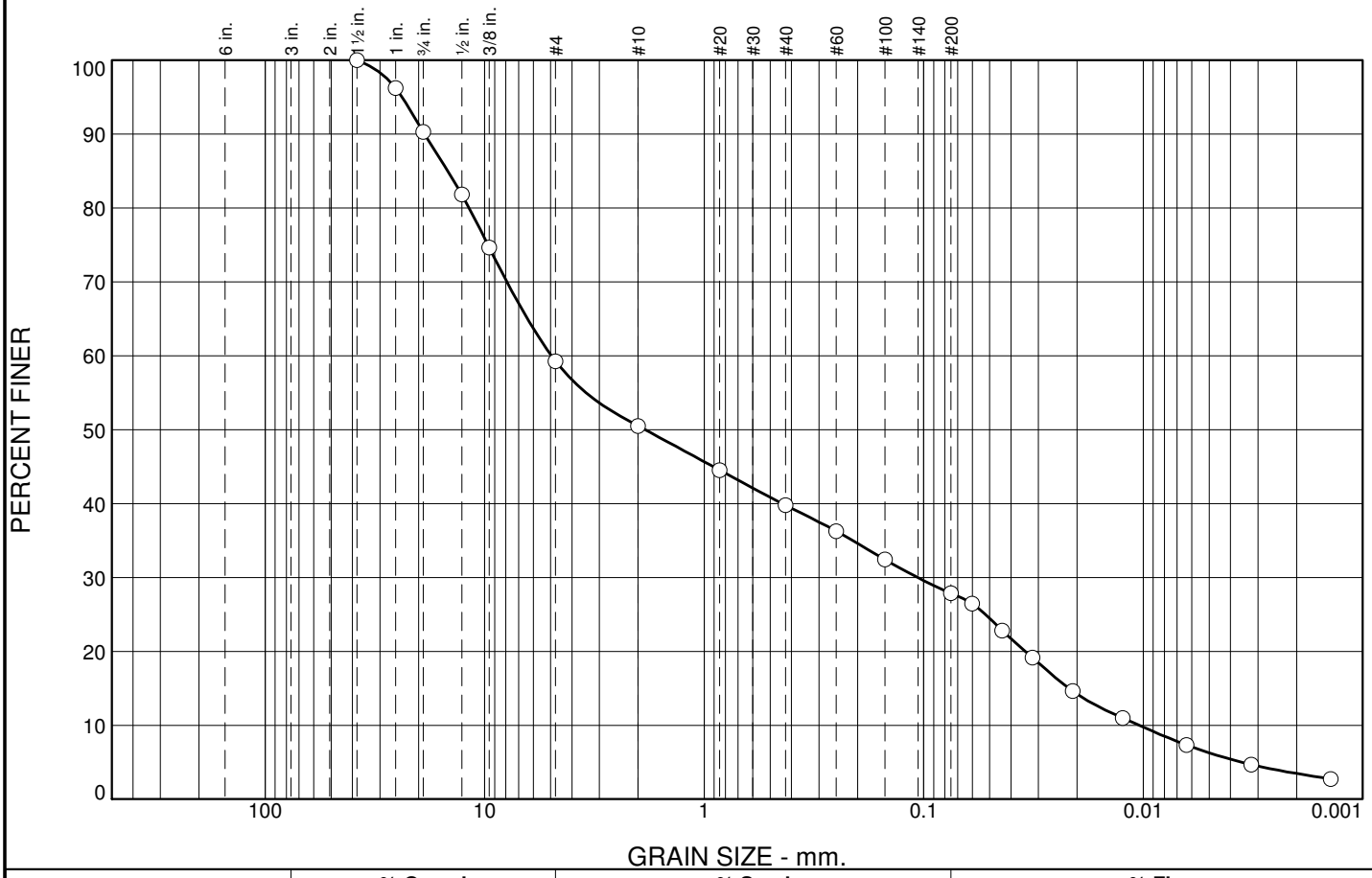
Location: GH11-296, Area E
Sample Number: SPT 1 **Depth:** 4-5.5 **Date:** 11/12/11

Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.7	31.0	8.8	10.7	11.9	24.4	3.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	96.2		
.75	90.3		
.5	81.8		
0.375	74.6		
#4	59.3		
#10	50.5		
#20	44.5		
#40	39.8		
#60	36.3		
#100	32.4		
#200	27.9		
0.0601 mm.	26.5		
0.0438 mm.	22.8		
0.0319 mm.	19.2		
0.0209 mm.	14.6		
0.0124 mm.	11.0		
0.0063 mm.	7.3		
0.0032 mm.	4.7		
0.0014 mm.	2.7		

* (no specification provided)

Soil Description

silty gravel with sand

Atterberg Limits

PL= 18 LL= 21 PI= 3

Coefficients

D_{90}= 18.8150 D_{85}= 14.7329 D_{60}= 4.9616
D_{50}= 1.8611 D_{30}= 0.1067 D_{15}= 0.0218
D_{10}= 0.0104 C_u= 475.22 C_c= 0.22

Classification

USCS= GM AASHTO= A-2-4(0)

Remarks

As received moisture content - 11.2%

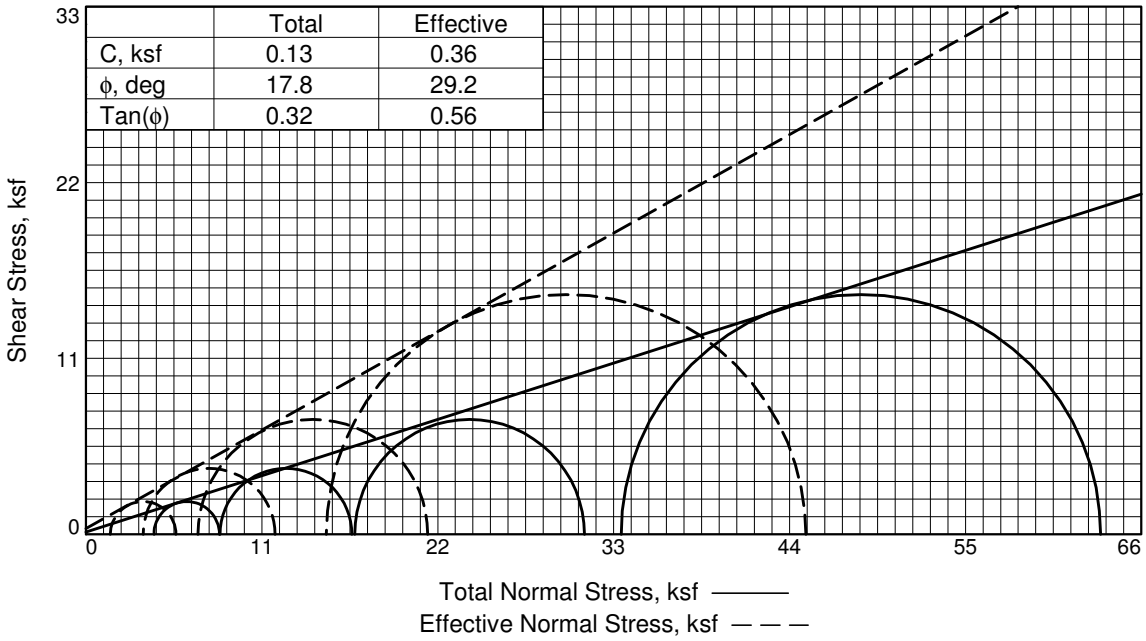
Location: GH11-296, Area E
Sample Number: SPT 2 **Depth:** 9-10.5' **Date:** 11/17/11

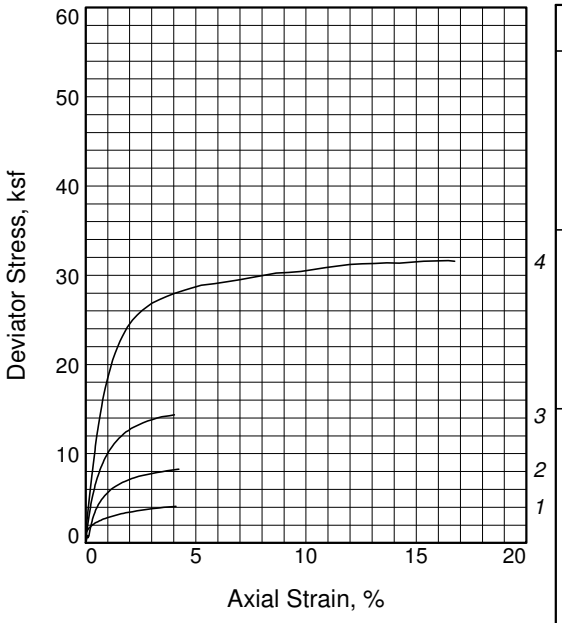
Knight Piésold CONSULTING

Client: Pebble Limited Partnership
Project: Pebble Project

Project No: 101-77/12 **Figure**

Cursory interpretations provided require review by a professional engineer. Knight Piesold accepts no responsibility in subsequent analyses.





Sample No.		1	2	3	4
Initial	Water Content, %	27.4	27.4	27.4	27.4
	Dry Density, pcf	96.9	96.9	96.9	96.9
	Saturation, %	99.0	99.0	99.0	99.0
	Void Ratio	0.7521	0.7521	0.7521	0.7521
	Diameter, in.	2.88	2.88	2.88	2.88
	Height, in.	5.80	5.80	5.80	5.80
At Test	Water Content, %	20.8	19.7	18.8	17.2
	Dry Density, pcf	103.4	105.2	106.9	109.8
	Saturation, %	87.8	87.3	86.7	85.7
	Void Ratio	0.6428	0.6144	0.5888	0.5462
	Diameter, in.	2.80	2.83	2.85	2.85
	Height, in.	5.72	5.53	5.36	5.20
Strain rate, %/min.		0.08	0.08	0.08	0.08
Eff. Cell Pressure, psi		29.51	58.23	116.72	232.42
Fail. Stress, ksf		4.1	8.2	14.4	30.0
Excess Pore Pr., ksf		2.7	4.8	9.8	18.4
Strain, %		4.1	4.2	4.0	8.1
Ult. Stress, ksf					
Excess Pore Pr., ksf					
Strain, %					
$\bar{\sigma}_1$ Failure, ksf		5.6	11.8	21.4	45.0
$\bar{\sigma}_3$ Failure, ksf		1.5	3.6	7.0	15.0

Type of Test:
CU with Pore Pressures

Sample Type: Shelby Tube

Description: lean clay

LL= 47 **PL=** 21 **PI=** 26

Specific Gravity= 2.72

Remarks: Failure tangents drawn through peak principal stress ratio. Multi staged specimen. Some consolidation of sample occured during extrusion from tube.

Figure _____

Client: Pebble Limited Partnership

Project: Pebble Project

Location: GH11-229, Upper Talarik Creek Area

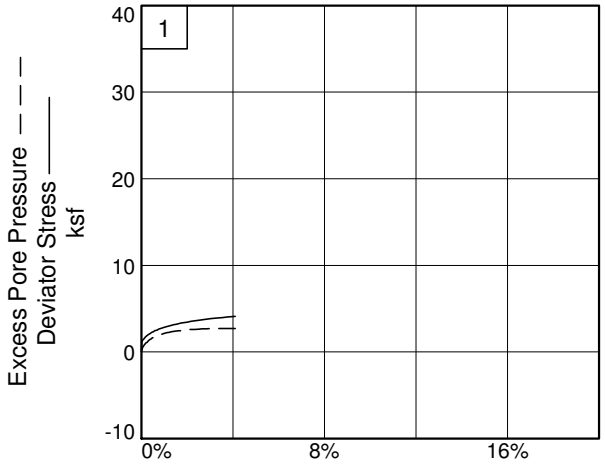
Sample Number: GH11-229-2 **Depth:** 4-6'

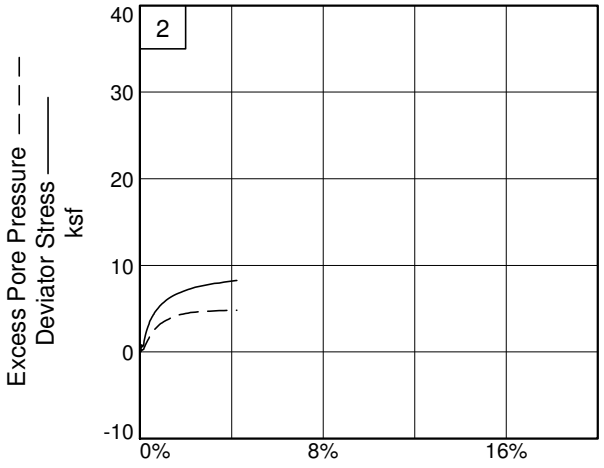
Proj. No.: 101-77/12 **Date Sampled:** 10/25/11

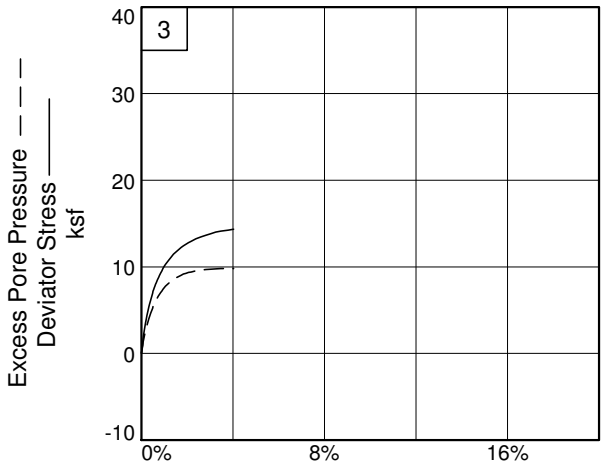
Knight Piésold CONSULTING

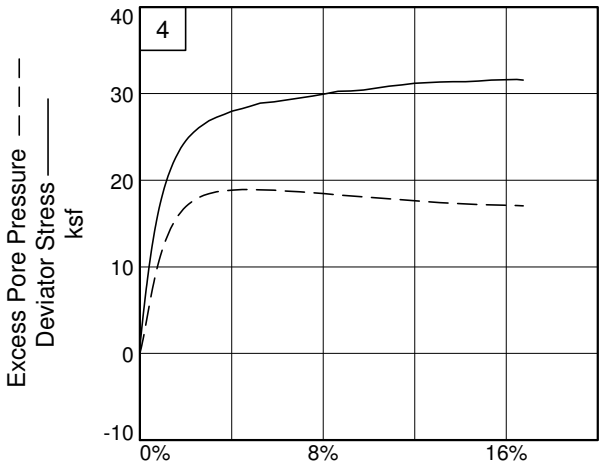
Tested By: rsh **Checked By:** spb

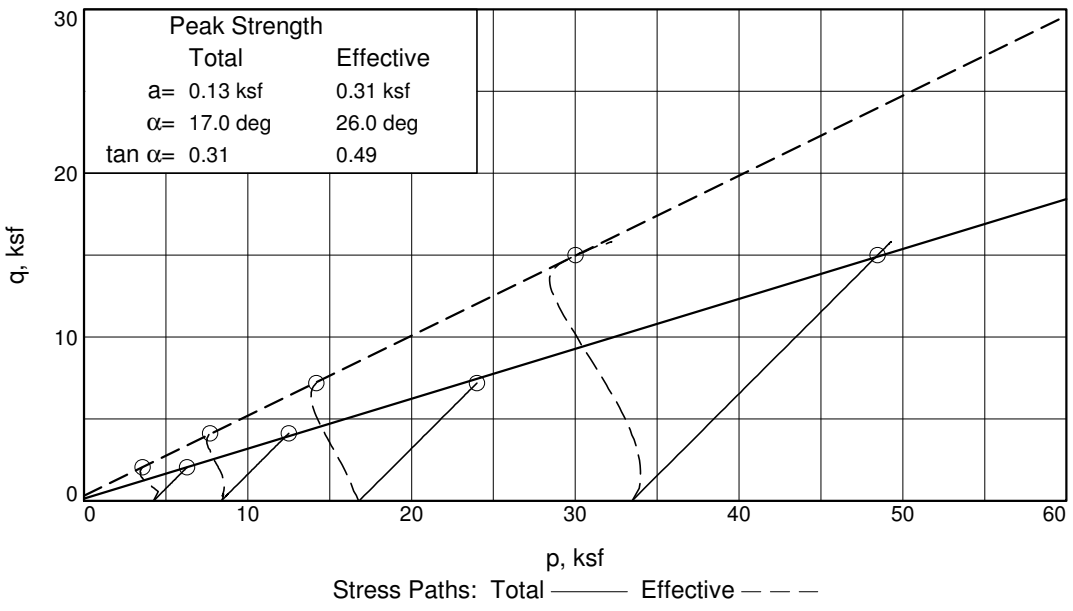
Cursory interpretations provided require review by a professional engineer. Knight Piesold accepts no responsibility in subsequent analyses.











Client: Pebble Limited Partnership
Project: Pebble Project
Location: GH11-229, Upper Talarik Creek Area **Depth:** 4-6' **Sample Number:** GH11-229-2
Project No.: 101-77/12 **Figure** _____

Knight Piesold Geotechnical Lab.

Tested By: rsh **Checked By:** spb

TRIAXIAL COMPRESSION TEST

1/9/2012
5:51 PM

CU with Pore Pressures

Date: 10/25/11
Client: Pebble Limited Partnership
Project: Pebble Project
Project No.: 101-77/12
Location: GH11-229, Upper Talarik Creek Area
Depth: 4-6' **Sample Number:** GH11-229-2
Description: lean clay
Remarks: Failure tangents drawn through peak principal stress ratio. Multi staged specimen. Some consolidation of sample occured during extrusion from tube.
Type of Sample: Shelby Tube
Specific Gravity=2.72 **LL=**47 **PL=**21 **PI=**26
Test Method: ASTM D 4767 Method A (staged method triaxial test)

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	391.700			475.600
Moisture content: Dry soil+tare, gms.	349.800			434.600
Moisture content: Tare, gms.	196.700			196.300
Moisture, %	27.4	24.8	20.8	17.2
Moist specimen weight, gms.	1220.0			
Diameter, in.	2.88	2.88	2.80	
Area, in.^{2}	6.49	6.49	6.17	
Height, in.	5.80	5.80	5.72	
Net decrease in height, in.		0.00	0.07	
Net decrease in water volume, cc.			38.50	
Wet density, pcf	123.4	120.9	124.8	
Dry density, pcf	96.9	96.9	103.4	
Void ratio	0.7521	0.7521	0.6428	
Saturation, %	99.0	89.6	87.8	

Test Readings for Specimen No. 1

Membrane modulus = 0.124105 kN/cm^2
Membrane thickness = 0.064 cm
Consolidation cell pressure = 69.51 psi (10.01 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 4.25 ksf
Strain rate, %/min. = 0.08
Fail. Stress = 4.10 ksf **at reading no.** 47

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.6449	3.252	0.0	0.0	0.00	4.24	4.24	1.00	40.06	4.24	0.00
1	-1.6434	51.063	47.8	0.0	1.12	3.96	5.08	1.28	41.99	4.52	0.56
2	-1.6420	58.398	55.1	0.1	1.29	3.79	5.07	1.34	43.22	4.43	0.64
3	-1.6405	63.311	60.1	0.1	1.40	3.65	5.05	1.38	44.17	4.35	0.70
4	-1.6391	67.488	64.2	0.1	1.50	3.54	5.04	1.42	44.95	4.29	0.75
5	-1.6376	70.789	67.5	0.1	1.58	3.45	5.02	1.46	45.58	4.23	0.79
6	-1.6362	74.237	71.0	0.2	1.66	3.36	5.01	1.49	46.18	4.19	0.83
7	-1.6347	76.985	73.7	0.2	1.72	3.29	5.01	1.52	46.67	4.15	0.86
8	-1.6332	79.731	76.5	0.2	1.78	3.22	5.01	1.55	47.12	4.11	0.89
9	-1.6318	82.471	79.2	0.2	1.85	3.16	5.01	1.58	47.55	4.08	0.92
10	-1.6303	84.781	81.5	0.3	1.90	3.12	5.02	1.61	47.82	4.07	0.95
11	-1.6289	87.180	83.9	0.3	1.95	3.01	4.96	1.65	48.63	3.98	0.98
12	-1.6260	91.123	87.9	0.3	2.05	2.89	4.94	1.71	49.41	3.92	1.02
13	-1.6231	94.861	91.6	0.4	2.13	2.80	4.93	1.76	50.10	3.86	1.07
14	-1.6216	97.143	93.9	0.4	2.18	2.75	4.93	1.79	50.41	3.84	1.09
15	-1.6202	99.046	95.8	0.4	2.23	2.71	4.94	1.82	50.70	3.82	1.11
16	-1.6173	101.972	98.7	0.5	2.29	2.63	4.92	1.87	51.25	3.78	1.15
17	-1.6144	104.659	101.4	0.5	2.36	2.56	4.91	1.92	51.74	3.74	1.18
18	-1.6115	107.969	104.7	0.6	2.43	2.50	4.93	1.97	52.16	3.71	1.22
19	-1.6086	110.133	106.9	0.6	2.48	2.44	4.92	2.02	52.59	3.68	1.24
20	-1.6057	112.603	109.4	0.7	2.54	2.38	4.92	2.06	52.97	3.65	1.27
21	-1.6028	115.261	112.0	0.7	2.60	2.33	4.93	2.11	53.34	3.63	1.30
22	-1.5999	117.850	114.6	0.8	2.66	2.28	4.93	2.16	53.68	3.61	1.33
23	-1.5970	119.781	116.5	0.8	2.70	2.24	4.94	2.21	53.97	3.59	1.35
24	-1.5941	122.021	118.8	0.9	2.75	2.20	4.95	2.25	54.24	3.57	1.37
25	-1.5897	124.379	121.1	1.0	2.80	2.14	4.94	2.31	54.65	3.54	1.40
26	-1.5868	126.458	123.2	1.0	2.85	2.10	4.95	2.35	54.91	3.53	1.42
27	-1.5810	129.507	126.3	1.1	2.92	2.03	4.95	2.43	55.38	3.49	1.46
28	-1.5752	132.841	129.6	1.2	2.99	1.98	4.97	2.51	55.78	3.47	1.49
29	-1.5694	136.343	133.1	1.3	3.07	1.93	4.99	2.59	56.13	3.46	1.53
30	-1.5636	139.406	136.2	1.4	3.13	1.88	5.01	2.67	56.45	3.45	1.57
31	-1.5578	142.263	139.0	1.5	3.20	1.84	5.04	2.74	56.73	3.44	1.60
32	-1.5520	145.265	142.0	1.6	3.26	1.81	5.08	2.80	56.92	3.44	1.63
33	-1.5462	147.991	144.7	1.7	3.32	1.80	5.12	2.85	57.04	3.46	1.66
34	-1.5404	150.146	146.9	1.8	3.37	1.79	5.16	2.88	57.08	3.47	1.68
35	-1.5288	154.416	151.2	2.0	3.46	1.70	5.16	3.04	57.71	3.43	1.73
36	-1.5230	156.510	153.3	2.1	3.50	1.67	5.17	3.09	57.90	3.42	1.75
37	-1.5114	160.381	157.1	2.3	3.58	1.64	5.22	3.19	58.14	3.43	1.79
38	-1.4998	163.863	160.6	2.5	3.66	1.61	5.26	3.27	58.34	3.44	1.83
39	-1.4940	165.752	162.5	2.6	3.69	1.60	5.29	3.32	58.43	3.44	1.85
40	-1.4882	168.082	164.8	2.7	3.74	1.58	5.33	3.36	58.52	3.45	1.87
41	-1.4824	170.318	167.1	2.8	3.79	1.57	5.36	3.41	58.61	3.47	1.90
42	-1.4708	173.814	170.6	3.0	3.86	1.55	5.41	3.49	58.73	3.48	1.93
43	-1.4534	176.648	173.4	3.3	3.91	1.56	5.47	3.51	58.69	3.52	1.96
44	-1.4418	179.960	176.7	3.5	3.98	1.53	5.51	3.60	58.87	3.52	1.99
45	-1.4301	182.300	179.0	3.8	4.02	1.53	5.55	3.63	58.89	3.54	2.01
46	-1.4185	184.620	181.4	4.0	4.07	1.52	5.59	3.67	58.92	3.56	2.03

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
47	-1.4105	186.118	182.9	4.1	4.10	1.53	5.62	3.68	58.90	3.58	2.05

Parameters for Specimen No. 2

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	391.700			475.600
Moisture content: Dry soil+tare, gms.	349.800			434.600
Moisture content: Tare, gms.	196.700			196.300
Moisture, %	27.4		19.7	17.2
Moist specimen weight, gms.	1220.0			
Diameter, in.	2.88		2.83	
Area, in.²	6.49		6.27	
Height, in.	5.80		5.53	
Net decrease in height, in.		0.31	-0.04	
Net decrease in water volume, cc.			10.00	
Wet density, pcf	123.4		125.9	
Dry density, pcf	96.9		105.2	
Void ratio	0.7521		0.6144	
Saturation, %	99.0		87.3	

Test Readings for Specimen No. 2

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 98.23 psi (14.15 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 8.39 ksf
Strain rate, %/min. = 0.08
Fail. Stress = 8.24 ksf **at reading no.** 53

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.5852	1.699	0.0	0.0	0.00	8.40	8.40	1.00	39.87	8.40	0.00
1	-1.5837	3.516	1.8	0.0	0.03	8.40	8.43	1.00	39.93	8.41	0.02
2	-1.5823	23.860	22.2	0.1	0.51	8.25	8.75	1.06	40.96	8.50	0.25
3	-1.5808	37.562	35.9	0.1	0.82	8.11	8.93	1.10	41.90	8.52	0.41
4	-1.5794	27.283	25.6	0.1	0.59	8.15	8.73	1.07	41.66	8.44	0.29
5	-1.5765	36.141	34.4	0.2	0.79	8.09	8.88	1.10	42.05	8.48	0.39
6	-1.5750	54.991	53.3	0.2	1.22	7.93	9.15	1.15	43.14	8.54	0.61
7	-1.5736	70.298	68.6	0.2	1.57	7.77	9.35	1.20	44.25	8.56	0.79
8	-1.5721	84.200	82.5	0.2	1.89	7.61	9.51	1.25	45.35	8.56	0.95
9	-1.5707	96.923	95.2	0.3	2.18	7.46	9.64	1.29	46.44	8.55	1.09
10	-1.5692	108.506	106.8	0.3	2.45	7.31	9.75	1.33	47.49	8.53	1.22
11	-1.5678	118.618	116.9	0.3	2.68	7.16	9.84	1.37	48.52	8.50	1.34
12	-1.5663	128.060	126.4	0.3	2.89	7.02	9.91	1.41	49.47	8.47	1.45
13	-1.5649	136.740	135.0	0.4	3.09	6.89	9.98	1.45	50.40	8.43	1.55
14	-1.5634	144.737	143.0	0.4	3.27	6.76	10.03	1.48	51.28	8.40	1.64
15	-1.5619	152.631	150.9	0.4	3.45	6.64	10.09	1.52	52.14	8.36	1.73
16	-1.5605	159.714	158.0	0.4	3.61	6.52	10.13	1.55	52.95	8.33	1.81
17	-1.5590	166.131	164.4	0.5	3.76	6.41	10.17	1.59	53.73	8.29	1.88
18	-1.5576	172.277	170.6	0.5	3.90	6.30	10.20	1.62	54.47	8.25	1.95

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
19	-1.5561	177.940	176.2	0.5	4.03	6.20	10.23	1.65	55.18	8.21	2.01
20	-1.5547	183.643	181.9	0.6	4.16	6.10	10.26	1.68	55.86	8.18	2.08
21	-1.5532	189.005	187.3	0.6	4.28	6.01	10.28	1.71	56.52	8.15	2.14
22	-1.5518	193.814	192.1	0.6	4.39	5.92	10.31	1.74	57.11	8.11	2.19
23	-1.5503	198.299	196.6	0.6	4.49	5.84	10.32	1.77	57.70	8.08	2.24
24	-1.5489	202.965	201.3	0.7	4.59	5.75	10.35	1.80	58.28	8.05	2.30
25	-1.5474	207.489	205.8	0.7	4.69	5.67	10.37	1.83	58.83	8.02	2.35
26	-1.5460	211.594	209.9	0.7	4.79	5.60	10.38	1.86	59.36	7.99	2.39
27	-1.5445	215.694	214.0	0.7	4.88	5.53	10.41	1.88	59.85	7.97	2.44
28	-1.5431	219.874	218.2	0.8	4.97	5.46	10.43	1.91	60.34	7.94	2.49
29	-1.5401	227.319	225.6	0.8	5.14	5.32	10.46	1.97	61.26	7.89	2.57
30	-1.5372	234.386	232.7	0.9	5.30	5.20	10.50	2.02	62.09	7.85	2.65
31	-1.5343	240.921	239.2	0.9	5.44	5.09	10.54	2.07	62.87	7.81	2.72
32	-1.5314	246.643	244.9	1.0	5.57	5.00	10.57	2.11	63.53	7.78	2.79
33	-1.5285	252.075	250.4	1.0	5.69	4.91	10.60	2.16	64.11	7.76	2.85
34	-1.5213	265.436	263.7	1.2	5.99	4.72	10.71	2.27	65.46	7.71	2.99
35	-1.5155	274.227	272.5	1.3	6.18	4.60	10.78	2.34	66.30	7.69	3.09
36	-1.5097	281.979	280.3	1.4	6.35	4.44	10.79	2.43	67.41	7.61	3.17
37	-1.5039	289.542	287.8	1.5	6.51	4.33	10.84	2.51	68.18	7.58	3.26
38	-1.4981	296.001	294.3	1.6	6.65	4.23	10.88	2.57	68.88	7.55	3.33
39	-1.4923	301.614	299.9	1.7	6.77	4.14	10.92	2.63	69.45	7.53	3.39
40	-1.4865	307.456	305.8	1.8	6.90	4.07	10.97	2.70	69.98	7.52	3.45
41	-1.4807	312.522	310.8	1.9	7.00	4.00	11.00	2.75	70.45	7.50	3.50
42	-1.4748	317.673	316.0	2.0	7.11	3.94	11.05	2.81	70.88	7.49	3.56
43	-1.4690	322.176	320.5	2.1	7.21	3.89	11.10	2.85	71.20	7.49	3.60
44	-1.4632	326.373	324.7	2.2	7.29	3.84	11.14	2.90	71.54	7.49	3.65
45	-1.4516	334.744	333.0	2.4	7.46	3.78	11.25	2.97	71.97	7.51	3.73
46	-1.4400	340.466	338.8	2.6	7.58	3.71	11.29	3.04	72.45	7.50	3.79
47	-1.4284	346.130	344.4	2.8	7.69	3.67	11.36	3.09	72.73	7.52	3.84
48	-1.4168	351.495	349.8	3.0	7.79	3.67	11.46	3.12	72.72	7.57	3.89
49	-1.4052	357.222	355.5	3.3	7.90	3.63	11.53	3.18	73.02	7.58	3.95
50	-1.3936	361.075	359.4	3.5	7.97	3.60	11.57	3.21	73.20	7.59	3.98
51	-1.3820	366.251	364.6	3.7	8.07	3.59	11.66	3.25	73.28	7.63	4.03
52	-1.3704	370.399	368.7	3.9	8.14	3.58	11.72	3.27	73.36	7.65	4.07
53	-1.3530	376.291	374.6	4.2	8.24	3.57	11.82	3.31	73.42	7.69	4.12
54	-1.3510	376.605	374.9	4.2	8.25	3.58	11.82	3.31	73.40	7.70	4.12

Parameters for Specimen No. 3

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	391.700			475.600
Moisture content: Dry soil+tare, gms.	349.800			434.600
Moisture content: Tare, gms.	196.700			196.300
Moisture, %	27.4		18.8	17.2
Moist specimen weight, gms.	1220.0			
Diameter, in.	2.88		2.85	
Area, in.²	6.49		6.37	
Height, in.	5.80		5.36	
Net decrease in height, in.		0.50	-0.06	
Net decrease in water volume, cc.			9.00	
Wet density, pcf	123.4		126.9	
Dry density, pcf	96.9		106.9	
Void ratio	0.7521		0.5888	
Saturation, %	99.0		86.7	

Test Readings for Specimen No. 3

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 156.72 psi (22.57 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 16.81 ksf
Strain rate, %/min. = 0.08
Fail. Stress = 14.37 ksf **at reading no.** 52

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.6344	26.752	0.0	0.0	0.00	16.77	16.77	1.00	40.24	16.77	0.00
1	-1.6330	54.687	27.9	0.0	0.63	16.30	16.93	1.04	43.51	16.62	0.32
2	-1.6315	77.974	51.2	0.1	1.16	15.89	17.05	1.07	46.36	16.47	0.58
3	-1.6301	102.481	75.7	0.1	1.71	15.51	17.22	1.11	49.00	16.37	0.86
4	-1.6286	125.544	98.8	0.1	2.23	15.15	17.38	1.15	51.50	16.27	1.12
5	-1.6272	146.968	120.2	0.1	2.71	14.80	17.51	1.18	53.94	16.16	1.36
6	-1.6257	166.418	139.7	0.2	3.15	14.47	17.63	1.22	56.20	16.05	1.58
7	-1.6243	185.771	159.0	0.2	3.59	14.16	17.75	1.25	58.37	15.96	1.79
8	-1.6228	203.117	176.4	0.2	3.98	13.87	17.85	1.29	60.41	15.86	1.99
9	-1.6214	220.431	193.7	0.2	4.37	13.58	17.95	1.32	62.42	15.76	2.18
10	-1.6199	235.690	208.9	0.3	4.71	13.31	18.02	1.35	64.27	15.67	2.36
11	-1.6185	250.408	223.7	0.3	5.04	13.06	18.10	1.39	66.04	15.58	2.52
12	-1.6170	264.335	237.6	0.3	5.35	12.81	18.17	1.42	67.74	15.49	2.68
13	-1.6156	277.438	250.7	0.4	5.65	12.58	18.23	1.45	69.34	15.41	2.82
14	-1.6141	290.058	263.3	0.4	5.93	12.36	18.29	1.48	70.87	15.33	2.97
15	-1.6127	302.096	275.3	0.4	6.20	12.15	18.35	1.51	72.34	15.25	3.10
16	-1.6112	313.602	286.9	0.4	6.46	11.95	18.41	1.54	73.75	15.18	3.23
17	-1.6098	324.441	297.7	0.5	6.70	11.76	18.46	1.57	75.07	15.11	3.35
18	-1.6083	335.511	308.8	0.5	6.95	11.57	18.52	1.60	76.35	15.05	3.47
19	-1.6069	345.561	318.8	0.5	7.17	11.40	18.57	1.63	77.56	14.98	3.59
20	-1.6054	355.006	328.3	0.5	7.38	11.23	18.61	1.66	78.72	14.92	3.69
21	-1.6040	364.635	337.9	0.6	7.60	11.07	18.67	1.69	79.83	14.87	3.80
22	-1.6025	373.205	346.5	0.6	7.79	10.92	18.70	1.71	80.90	14.81	3.89
23	-1.6011	381.995	355.2	0.6	7.98	10.77	18.75	1.74	81.94	14.76	3.99

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
24	-1.5996	389.730	363.0	0.6	8.15	10.63	18.78	1.77	82.92	14.70	4.08
25	-1.5982	398.295	371.5	0.7	8.34	10.49	18.83	1.80	83.86	14.66	4.17
26	-1.5967	405.988	379.2	0.7	8.51	10.35	18.87	1.82	84.81	14.61	4.26
27	-1.5953	413.003	386.3	0.7	8.67	10.23	18.90	1.85	85.68	14.56	4.33
28	-1.5938	420.004	393.3	0.8	8.82	10.11	18.93	1.87	86.51	14.52	4.41
29	-1.5923	427.030	400.3	0.8	8.98	9.99	18.97	1.90	87.33	14.48	4.49
30	-1.5894	440.615	413.9	0.8	9.28	9.78	19.05	1.95	88.83	14.42	4.64
31	-1.5865	452.914	426.2	0.9	9.55	9.58	19.13	2.00	90.21	14.35	4.77
32	-1.5836	464.616	437.9	0.9	9.81	9.39	19.20	2.04	91.50	14.29	4.90
33	-1.5807	475.994	449.2	1.0	10.05	9.21	19.27	2.09	92.73	14.24	5.03
34	-1.5778	486.419	459.7	1.1	10.28	9.05	19.33	2.14	93.87	14.19	5.14
35	-1.5706	508.979	482.2	1.2	10.77	8.70	19.47	2.24	96.32	14.08	5.39
36	-1.5648	525.626	498.9	1.3	11.13	8.46	19.59	2.32	97.96	14.03	5.57
37	-1.5590	541.000	514.2	1.4	11.46	8.24	19.71	2.39	99.47	13.98	5.73
38	-1.5532	553.696	526.9	1.5	11.73	8.07	19.80	2.45	100.71	13.93	5.87
39	-1.5474	565.630	538.9	1.6	11.98	7.91	19.89	2.52	101.79	13.90	5.99
40	-1.5416	577.145	550.4	1.7	12.23	7.77	20.00	2.57	102.77	13.88	6.11
41	-1.5357	587.367	560.6	1.8	12.44	7.65	20.09	2.63	103.59	13.87	6.22
42	-1.5300	595.562	568.8	1.9	12.61	7.55	20.16	2.67	104.29	13.85	6.30
43	-1.5241	604.803	578.1	2.1	12.80	7.47	20.27	2.71	104.88	13.87	6.40
44	-1.5183	612.048	585.3	2.2	12.95	7.39	20.34	2.75	105.37	13.87	6.47
45	-1.5067	625.985	599.2	2.4	13.22	7.26	20.49	2.82	106.28	13.88	6.61
46	-1.4951	637.662	610.9	2.6	13.45	7.18	20.63	2.87	106.88	13.90	6.73
47	-1.4835	648.335	621.6	2.8	13.66	7.11	20.77	2.92	107.34	13.94	6.83
48	-1.4719	657.615	630.9	3.0	13.83	7.06	20.89	2.96	107.67	13.98	6.92
49	-1.4603	667.275	640.5	3.2	14.01	7.03	21.04	2.99	107.91	14.03	7.01
50	-1.4487	674.520	647.8	3.5	14.14	7.01	21.15	3.02	108.03	14.08	7.07
51	-1.4313	682.097	655.3	3.8	14.25	7.00	21.25	3.04	108.13	14.12	7.13
52	-1.4183	688.850	662.1	4.0	14.37	7.00	21.37	3.05	108.08	14.19	7.18

Parameters for Specimen No. 4

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	391.700			475.600
Moisture content: Dry soil+tare, gms.	349.800			434.600
Moisture content: Tare, gms.	196.700			196.300
Moisture, %	27.4		17.2	17.2
Moist specimen weight, gms.	1220.0			
Diameter, in.	2.88		2.85	
Area, in.²	6.49		6.39	
Height, in.	5.80		5.20	
Net decrease in height, in.		0.66	-0.06	
Net decrease in water volume, cc.			15.00	
Wet density, pcf	123.4		128.7	
Dry density, pcf	96.9		109.8	
Void ratio	0.7521		0.5462	
Saturation, %	99.0		85.7	

Test Readings for Specimen No. 4

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 272.42 psi (39.23 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 33.47 ksf
Strain rate, %/min. = 0.08
Fail. Stress = 29.99 ksf **at reading no.** 57

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.9507	1.442	0.0	0.0	0.00	33.47	33.47	1.00	39.97	33.47	0.00
1	-1.9492	67.875	66.4	0.0	1.50	33.16	34.66	1.05	42.13	33.91	0.75
2	-1.9478	99.072	97.6	0.1	2.20	32.86	35.06	1.07	44.23	33.96	1.10
3	-1.9463	130.854	129.4	0.1	2.91	32.53	35.44	1.09	46.53	33.98	1.46
4	-1.9449	161.873	160.4	0.1	3.61	32.18	35.79	1.11	48.96	33.98	1.81
5	-1.9434	192.235	190.8	0.1	4.29	31.82	36.11	1.13	51.44	33.97	2.15
6	-1.9420	221.974	220.5	0.2	4.96	31.44	36.40	1.16	54.07	33.92	2.48
7	-1.9405	250.357	248.9	0.2	5.60	31.05	36.65	1.18	56.77	33.85	2.80
8	-1.9390	279.309	277.9	0.2	6.25	30.66	36.91	1.20	59.50	33.78	3.12
9	-1.9376	307.427	306.0	0.3	6.88	30.25	37.13	1.23	62.35	33.69	3.44
10	-1.9361	334.998	333.6	0.3	7.50	29.84	37.33	1.25	65.23	33.58	3.75
11	-1.9347	359.517	358.1	0.3	8.04	29.43	37.48	1.27	68.01	33.46	4.02
12	-1.9332	387.376	385.9	0.3	8.67	29.02	37.69	1.30	70.90	33.35	4.33
13	-1.9318	412.397	411.0	0.4	9.23	28.61	37.83	1.32	73.76	33.22	4.61
14	-1.9303	437.539	436.1	0.4	9.79	28.21	38.00	1.35	76.50	33.11	4.89
15	-1.9289	461.832	460.4	0.4	10.33	27.80	38.14	1.37	79.33	32.97	5.17
16	-1.9274	484.903	483.5	0.4	10.85	27.41	38.26	1.40	82.05	32.84	5.42
17	-1.9260	508.533	507.1	0.5	11.37	27.02	38.39	1.42	84.78	32.71	5.69
18	-1.9245	530.686	529.2	0.5	11.87	26.63	38.50	1.45	87.47	32.57	5.93
19	-1.9231	552.531	551.1	0.5	12.35	26.26	38.62	1.47	90.04	32.44	6.18
20	-1.9216	572.134	570.7	0.6	12.79	25.90	38.69	1.49	92.58	32.29	6.39
21	-1.9202	592.885	591.4	0.6	13.25	25.54	38.79	1.52	95.07	32.16	6.63
22	-1.9187	611.595	610.2	0.6	13.67	25.20	38.87	1.54	97.42	32.03	6.83
23	-1.9173	632.053	630.6	0.6	14.12	24.85	38.97	1.57	99.83	31.91	7.06

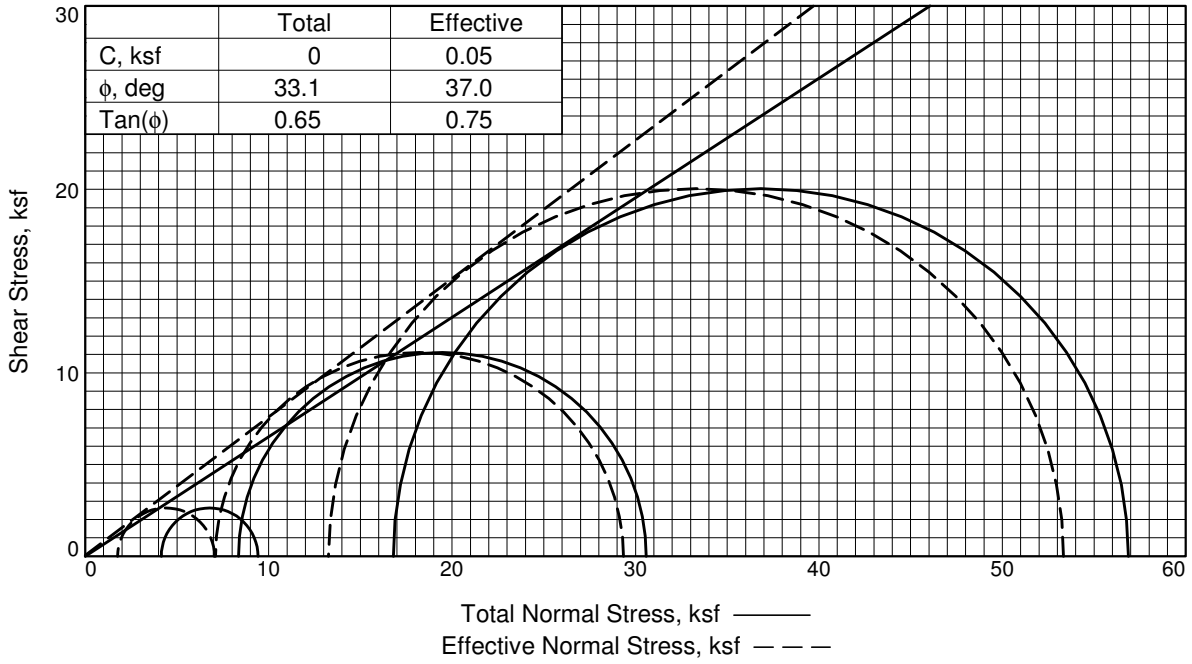
Test Readings for Specimen No. 4

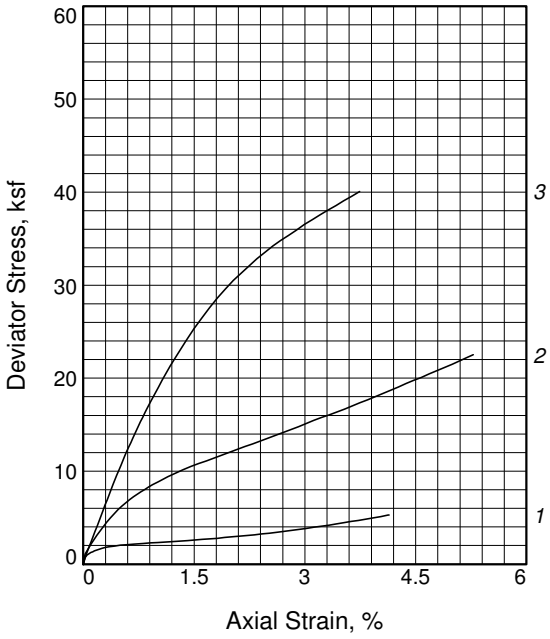
No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
24	-1.9158	650.360	648.9	0.7	14.53	24.52	39.05	1.59	102.11	31.79	7.26
25	-1.9144	668.103	666.7	0.7	14.92	24.21	39.13	1.62	104.31	31.67	7.46
26	-1.9129	686.012	684.6	0.7	15.32	23.89	39.21	1.64	106.49	31.55	7.66
27	-1.9100	719.208	717.8	0.8	16.05	23.30	39.35	1.69	110.60	31.33	8.02
28	-1.9071	750.442	749.0	0.8	16.74	22.75	39.49	1.74	114.44	31.12	8.37
29	-1.9042	779.469	778.0	0.9	17.38	22.22	39.59	1.78	118.14	30.90	8.69
30	-1.9013	805.971	804.5	0.9	17.96	21.73	39.69	1.83	121.53	30.71	8.98
31	-1.8984	831.598	830.2	1.0	18.52	21.27	39.79	1.87	124.69	30.53	9.26
32	-1.8955	856.601	855.2	1.1	19.07	20.84	39.91	1.91	127.70	30.37	9.53
33	-1.8926	879.493	878.1	1.1	19.57	20.44	40.00	1.96	130.50	30.22	9.78
34	-1.8868	921.197	919.8	1.2	20.47	19.73	40.21	2.04	135.39	29.97	10.24
35	-1.8810	957.895	956.5	1.3	21.27	19.06	40.33	2.12	140.06	29.69	10.63
36	-1.8752	991.926	990.5	1.5	22.00	18.49	40.49	2.19	144.02	29.49	11.00
37	-1.8694	1021.077	1019.6	1.6	22.62	17.98	40.60	2.26	147.55	29.29	11.31
38	-1.8636	1047.866	1046.4	1.7	23.19	17.55	40.73	2.32	150.57	29.14	11.59
39	-1.8578	1073.246	1071.8	1.8	23.72	17.14	40.87	2.38	153.36	29.01	11.86
40	-1.8520	1095.277	1093.8	1.9	24.18	16.80	40.98	2.44	155.74	28.89	12.09
41	-1.8462	1114.908	1113.5	2.0	24.59	16.50	41.09	2.49	157.86	28.79	12.29
42	-1.8404	1132.962	1131.5	2.1	24.96	16.24	41.20	2.54	159.66	28.72	12.48
43	-1.8288	1162.351	1160.9	2.3	25.55	15.79	41.34	2.62	162.74	28.57	12.77
44	-1.8172	1188.338	1186.9	2.6	26.06	15.46	41.52	2.69	165.04	28.49	13.03
45	-1.8056	1210.121	1208.7	2.8	26.48	15.20	41.68	2.74	166.86	28.44	13.24
46	-1.7940	1230.213	1228.8	3.0	26.86	15.00	41.86	2.79	168.23	28.43	13.43
47	-1.7766	1253.512	1252.1	3.3	27.27	14.80	42.08	2.84	169.61	28.44	13.64
48	-1.7591	1274.298	1272.9	3.7	27.63	14.67	42.30	2.88	170.52	28.49	13.81
49	-1.7417	1294.189	1292.7	4.0	27.96	14.59	42.56	2.92	171.07	28.58	13.98
50	-1.7185	1315.412	1314.0	4.5	28.29	14.54	42.83	2.95	171.42	28.69	14.15
51	-1.7011	1332.307	1330.9	4.8	28.55	14.54	43.10	2.96	171.42	28.82	14.28
52	-1.6779	1354.690	1353.2	5.2	28.90	14.56	43.46	2.98	171.30	29.01	14.45
53	-1.6460	1371.162	1369.7	5.9	29.06	14.63	43.69	2.99	170.84	29.16	14.53
54	-1.6170	1390.208	1388.8	6.4	29.29	14.71	44.00	2.99	170.26	29.36	14.64
55	-1.5880	1408.070	1406.6	7.0	29.49	14.81	44.30	2.99	169.58	29.55	14.74
56	-1.5590	1428.383	1426.9	7.5	29.74	14.92	44.66	2.99	168.80	29.79	14.87
57	-1.5300	1449.120	1447.7	8.1	29.99	15.03	45.01	3.00	168.06	30.02	14.99
58	-1.5010	1471.068	1469.6	8.6	30.26	15.15	45.41	3.00	167.19	30.28	15.13
59	-1.4720	1482.350	1480.9	9.2	30.30	15.27	45.58	2.98	166.35	30.43	15.15
60	-1.4430	1497.662	1496.2	9.8	30.43	15.39	45.82	2.98	165.54	30.60	15.21
61	-1.4140	1517.795	1516.4	10.3	30.65	15.51	46.15	2.98	164.74	30.83	15.32
62	-1.3849	1538.432	1537.0	10.9	30.87	15.62	46.49	2.98	163.92	31.06	15.44
63	-1.3559	1555.659	1554.2	11.4	31.02	15.74	46.76	2.97	163.13	31.25	15.51
64	-1.3269	1575.064	1573.6	12.0	31.21	15.84	47.05	2.97	162.43	31.44	15.61
65	-1.2979	1588.660	1587.2	12.6	31.28	15.95	47.23	2.96	161.68	31.59	15.64
66	-1.2689	1601.319	1599.9	13.1	31.33	16.04	47.37	2.95	161.01	31.71	15.66
67	-1.2399	1614.913	1613.5	13.7	31.39	16.13	47.52	2.95	160.40	31.83	15.70
68	-1.2109	1624.102	1622.7	14.2	31.37	16.20	47.57	2.94	159.90	31.89	15.68
69	-1.1819	1640.030	1638.6	14.8	31.47	16.27	47.74	2.93	159.46	32.00	15.73
70	-1.1529	1655.326	1653.9	15.3	31.55	16.32	47.88	2.93	159.07	32.10	15.78

Test Readings for Specimen No. 4

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
71	-1.12391	669.711	1668.3	15.9	31.62	16.37	47.99	2.93	158.76	32.18	15.81
72	-1.09491	682.502	1681.1	16.5	31.65	16.40	48.06	2.93	158.50	32.23	15.83
73	-1.08041	683.485	1682.0	16.7	31.56	16.42	47.98	2.92	158.41	32.20	15.78
74	-1.08021	683.080	1681.6	16.7	31.55	16.42	47.98	2.92	158.39	32.20	15.78

Cursory interpretations provided require review by a professional engineer. Knight Piesold accepts no responsibility in subsequent analyses.





Sample No.		1	2	3
Initial	Water Content, %	25.1	25.1	25.1
	Dry Density, pcf	100.8	100.8	100.8
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.6839	0.6839	0.6839
	Diameter, in.	2.88	2.88	2.88
	Height, in.	5.67	5.67	5.67
At Test	Water Content, %	21.9	21.5	21.1
	Dry Density, pcf	106.3	107.1	107.8
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.5971	0.5859	0.5753
	Diameter, in.	2.82	2.86	2.89
	Height, in.	5.57	5.39	5.25
Strain rate, %/min.		0.08	0.08	0.08
Eff. Cell Pressure, psi		28.79	58.03	116.61
Fail. Stress, ksf		5.3	22.2	40.1
Excess Pore Pr., ksf		2.4	1.3	3.5
Strain, %		4.1	5.2	3.7
Ult. Stress, ksf				
Excess Pore Pr., ksf				
Strain, %				
$\bar{\sigma}_1$ Failure, ksf		7.0	29.3	53.3
$\bar{\sigma}_3$ Failure, ksf		1.8	7.1	13.3

Type of Test:
CU with Pore Pressures

Sample Type: Shelby Tube

Description: silty clay

LL= 29 **PL=** 22 **PI=** 7

Specific Gravity= 2.72

Remarks: failure tangents drawn through peak principal stress ratio. Multi-staged specimen.

Figure _____

Client: Pebble Limited Partnership

Project: Pebble Project

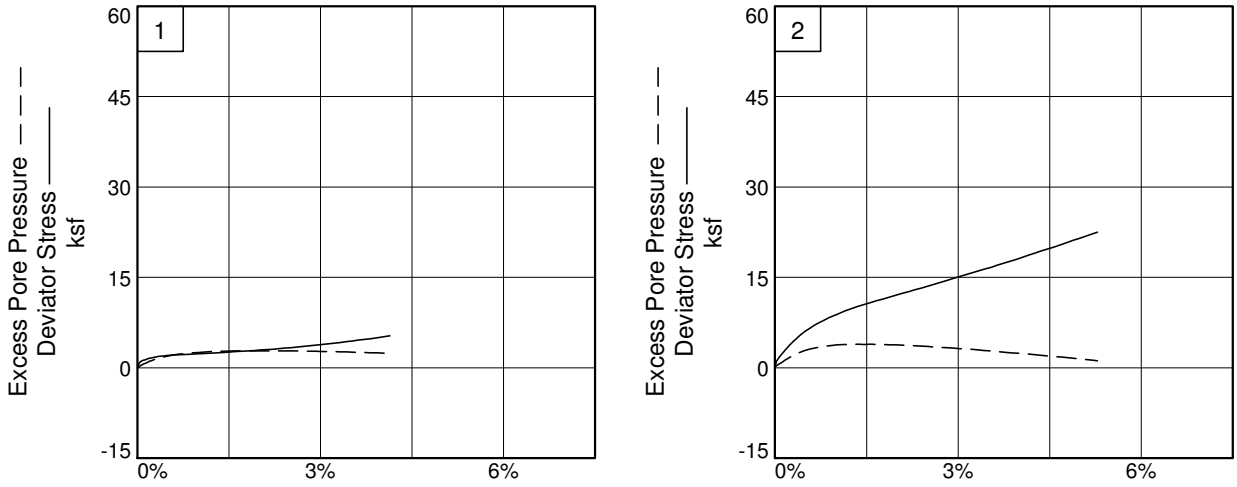
Location: GH11-232, Upper Talarik Creek Area

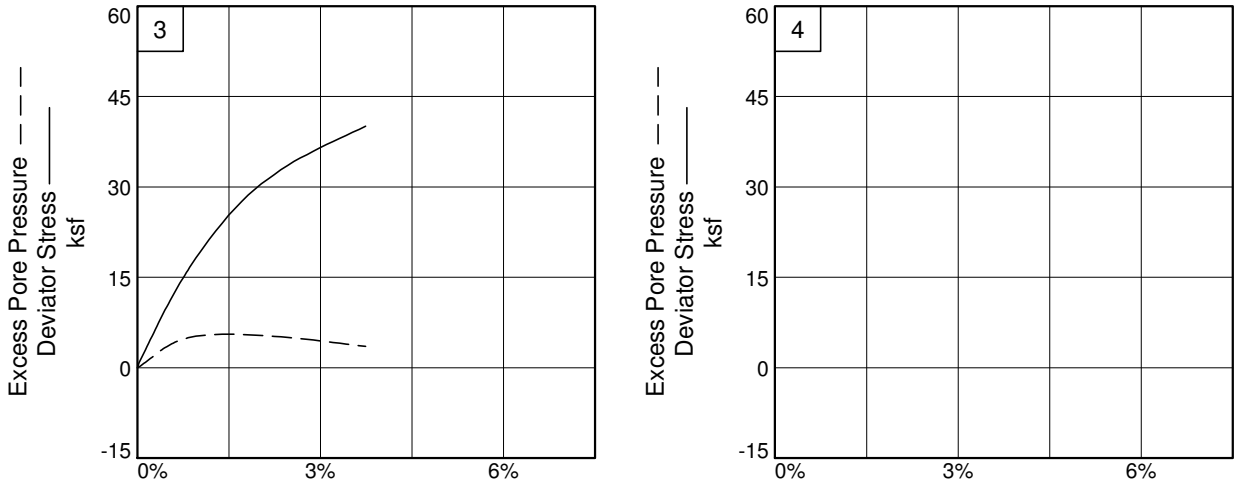
Sample Number: GH11-232-2 **Depth:** 4-6'

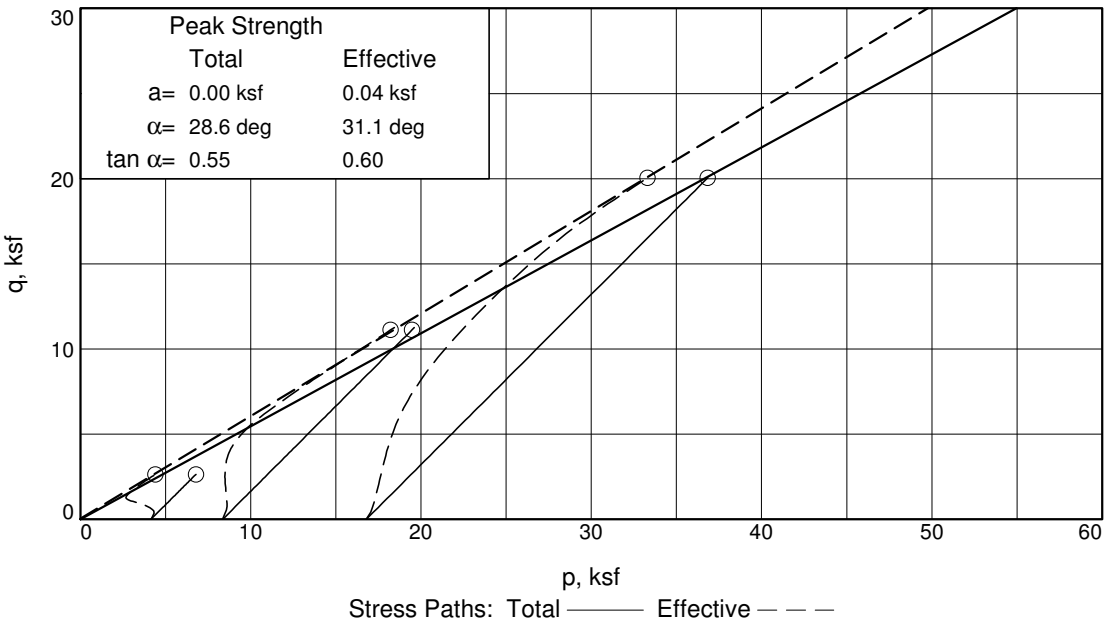
Proj. No.: 101-77/12 **Date Sampled:** 9/23/11

Knight Piésold CONSULTING

Cursory interpretations provided require review by a professional engineer. Knight Piesold accepts no responsibility in subsequent analyses.







Client: Pebble Limited Partnership
Project: Pebble Project
Location: GH11-232, Upper Talarik Creek Area **Depth:** 4-6' **Sample Number:** GH11-232-2
Project No.: 101-77/12 **Figure** _____

Knight Piesold Geotechnical Lab.

TRIAXIAL COMPRESSION TEST

CU with Pore Pressures

1/9/2012
5:52 PM

Date: 9/23/11
Client: Pebble Limited Partnership
Project: Pebble Project
Project No.: 101-77/12
Location: GH11-232, Upper Talarik Creek Area
Depth: 4-6' **Sample Number:** GH11-232-2
Description: silty clay
Remarks: failure tangents drawn through peak principal stress ratio. Multi-staged specimen. Some consolidation of sample occured during extrusion from tube.
Type of Sample: Shelby Tube
Specific Gravity=2.72 **LL=**29 **PL=**22 **PI=**7
Test Method: ASTM D 4767 Method A (staged method triaxial test)

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1054.700			517.300
Moisture content: Dry soil+tare, gms.	921.400			446.700
Moisture content: Tare, gms.	391.200			112.800
Moisture, %	25.1	25.1	21.9	21.1
Moist specimen weight, gms.	1219.3			
Diameter, in.	2.88	2.88	2.82	
Area, in.²	6.49	6.49	6.27	
Height, in.	5.67	5.67	5.57	
Net decrease in height, in.		0.00	0.10	
Net decrease in water volume, cc.			31.10	
Wet density, pcf	126.2	126.2	129.7	
Dry density, pcf	100.8	100.8	106.3	
Void ratio	0.6839	0.6839	0.5971	
Saturation, %	100.0	100.0	100.0	

Test Readings for Specimen No. 1

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 68.79 psi (9.91 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 4.15 ksf
Strain rate, %/min. = 0.08
Fail. Stress = 5.27 ksf **at reading no.** 46

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.6512	4.418	0.0	0.0	0.00	4.15	4.15	1.00	39.99	4.15	0.00
1	-1.6498	35.037	30.6	0.0	0.70	3.98	4.68	1.18	41.16	4.33	0.35
2	-1.6484	46.798	42.4	0.1	0.97	3.81	4.79	1.26	42.31	4.30	0.49
3	-1.6470	53.586	49.2	0.1	1.13	3.67	4.80	1.31	43.29	4.24	0.56
4	-1.6456	58.490	54.1	0.1	1.24	3.54	4.78	1.35	44.19	4.16	0.62
5	-1.6442	62.596	58.2	0.1	1.33	3.42	4.76	1.39	45.04	4.09	0.67
6	-1.6428	66.153	61.7	0.2	1.42	3.30	4.71	1.43	45.88	4.01	0.71
7	-1.6414	70.320	65.9	0.2	1.51	3.18	4.69	1.48	46.69	3.94	0.76
8	-1.6399	73.407	69.0	0.2	1.58	3.07	4.65	1.51	47.45	3.86	0.79
9	-1.6385	75.894	71.5	0.2	1.64	2.97	4.61	1.55	48.17	3.79	0.82
10	-1.6371	78.782	74.4	0.3	1.70	2.87	4.57	1.59	48.86	3.72	0.85
11	-1.6343	82.754	78.3	0.3	1.79	2.69	4.49	1.67	50.09	3.59	0.90
12	-1.6315	86.211	81.8	0.4	1.87	2.54	4.41	1.74	51.14	3.48	0.94
13	-1.6273	89.983	85.6	0.4	1.96	2.34	4.30	1.84	52.56	3.32	0.98
14	-1.6231	93.445	89.0	0.5	2.04	2.18	4.21	1.93	53.65	3.20	1.02
15	-1.6189	96.167	91.7	0.6	2.10	2.04	4.13	2.03	54.63	3.09	1.05
16	-1.6133	98.939	94.5	0.7	2.16	1.90	4.06	2.14	55.60	2.98	1.08
17	-1.6063	102.108	97.7	0.8	2.23	1.76	3.99	2.27	56.58	2.87	1.11
18	-1.6006	104.553	100.1	0.9	2.28	1.67	3.95	2.36	57.18	2.81	1.14
19	-1.5950	106.744	102.3	1.0	2.33	1.60	3.93	2.45	57.66	2.77	1.16
20	-1.5838	111.910	107.5	1.2	2.44	1.47	3.91	2.66	58.56	2.69	1.22
21	-1.5726	116.295	111.9	1.4	2.53	1.40	3.94	2.81	59.04	2.67	1.27
22	-1.5614	122.517	118.1	1.6	2.67	1.36	4.03	2.97	59.36	2.69	1.33
23	-1.5502	127.977	123.6	1.8	2.79	1.34	4.13	3.08	59.50	2.73	1.39
24	-1.5446	131.445	127.0	1.9	2.86	1.33	4.19	3.15	59.56	2.76	1.43
25	-1.5390	134.717	130.3	2.0	2.93	1.33	4.26	3.21	59.58	2.79	1.47
26	-1.5334	138.357	133.9	2.1	3.01	1.33	4.34	3.27	59.56	2.84	1.51
27	-1.5278	141.481	137.1	2.2	3.08	1.33	4.41	3.31	59.55	2.87	1.54
28	-1.5222	145.363	140.9	2.3	3.16	1.34	4.50	3.37	59.51	2.92	1.58
29	-1.5166	149.597	145.2	2.4	3.25	1.34	4.60	3.42	59.46	2.97	1.63
30	-1.5110	152.964	148.5	2.5	3.33	1.35	4.68	3.46	59.38	3.02	1.66
31	-1.5054	157.602	153.2	2.6	3.43	1.37	4.79	3.51	59.31	3.08	1.71
32	-1.4998	162.471	158.1	2.7	3.53	1.38	4.91	3.56	59.22	3.14	1.77
33	-1.4942	166.738	162.3	2.8	3.62	1.39	5.02	3.60	59.11	3.21	1.81
34	-1.4886	171.556	167.1	2.9	3.73	1.41	5.14	3.64	58.97	3.28	1.86
35	-1.4830	176.474	172.1	3.0	3.83	1.43	5.27	3.68	58.84	3.35	1.92
36	-1.4774	182.501	178.1	3.1	3.96	1.45	5.42	3.73	58.70	3.44	1.98
37	-1.4718	187.495	183.1	3.2	4.07	1.48	5.55	3.75	58.51	3.52	2.04
38	-1.4662	193.071	188.7	3.3	4.19	1.50	5.69	3.79	58.36	3.60	2.10
39	-1.4606	199.706	195.3	3.4	4.33	1.53	5.86	3.83	58.17	3.70	2.17
40	-1.4550	205.224	200.8	3.5	4.45	1.56	6.01	3.85	57.94	3.79	2.23
41	-1.4494	211.772	207.4	3.6	4.59	1.59	6.18	3.89	57.75	3.88	2.30
42	-1.4438	216.949	212.5	3.7	4.70	1.63	6.33	3.89	57.50	3.98	2.35
43	-1.4381	223.473	219.1	3.8	4.84	1.65	6.49	3.93	57.32	4.07	2.42
44	-1.4325	230.015	225.6	3.9	4.98	1.69	6.67	3.94	57.04	4.18	2.49
45	-1.4269	236.164	231.7	4.0	5.11	1.73	6.84	3.96	56.79	4.28	2.56
46	-1.4213	243.604	239.2	4.1	5.27	1.77	7.04	3.98	56.50	4.40	2.63

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
47	-1.4206	243.836	239.4	4.1	5.27	1.78	7.05	3.97	56.45	4.41	2.64

Parameters for Specimen No. 2

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1054.700			517.300
Moisture content: Dry soil+tare, gms.	921.400			446.700
Moisture content: Tare, gms.	391.200			112.800
Moisture, %	25.1		21.5	21.1
Moist specimen weight, gms.	1219.3			
Diameter, in.	2.88		2.86	
Area, in.²	6.49		6.44	
Height, in.	5.67		5.39	
Net decrease in height, in.		0.33	-0.05	
Net decrease in water volume, cc.			4.00	
Wet density, pcf	126.2		130.1	
Dry density, pcf	100.8		107.1	
Void ratio	0.6839		0.5859	
Saturation, %	100.0		100.0	

Test Readings for Specimen No. 2

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 98.03 psi (14.12 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 8.36 ksf
Strain rate, %/min. = 0.08
Fail. Stress = 22.23 ksf **at reading no.** 66

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.5196	3.348	0.0	0.0	0.00	8.34	8.34	1.00	40.09	8.34	0.00
1	-1.5182	52.123	48.8	0.0	1.09	8.02	9.11	1.14	42.32	8.57	0.55
2	-1.5168	69.650	66.3	0.1	1.48	7.86	9.35	1.19	43.41	8.61	0.74
3	-1.5154	85.726	82.4	0.1	1.84	7.69	9.53	1.24	44.62	8.61	0.92
4	-1.5140	100.453	97.1	0.1	2.17	7.52	9.69	1.29	45.84	8.60	1.08
5	-1.5125	114.314	111.0	0.1	2.48	7.34	9.82	1.34	47.05	8.58	1.24
6	-1.5111	128.306	125.0	0.2	2.79	7.17	9.96	1.39	48.21	8.57	1.40
7	-1.5097	142.376	139.0	0.2	3.10	7.01	10.11	1.44	49.36	8.56	1.55
8	-1.5083	155.015	151.7	0.2	3.39	6.85	10.23	1.49	50.48	8.54	1.69
9	-1.5069	168.295	164.9	0.2	3.68	6.69	10.37	1.55	51.56	8.53	1.84
10	-1.5055	180.447	177.1	0.3	3.95	6.54	10.49	1.60	52.60	8.52	1.98
11	-1.5041	192.330	189.0	0.3	4.22	6.40	10.61	1.66	53.62	8.50	2.11
12	-1.5027	204.462	201.1	0.3	4.48	6.26	10.74	1.72	54.57	8.50	2.24
13	-1.5013	215.421	212.1	0.3	4.73	6.13	10.85	1.77	55.49	8.49	2.36
14	-1.4999	226.500	223.2	0.4	4.97	6.00	10.97	1.83	56.36	8.49	2.49
15	-1.4971	247.167	243.8	0.4	5.43	5.78	11.21	1.94	57.91	8.49	2.72
16	-1.4943	266.236	262.9	0.5	5.85	5.57	11.43	2.05	59.33	8.50	2.93
17	-1.4915	283.296	279.9	0.5	6.23	5.40	11.63	2.15	60.53	8.51	3.11
18	-1.4887	299.584	296.2	0.6	6.59	5.25	11.84	2.25	61.56	8.55	3.29

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
19	-1.4859	314.565	311.2	0.6	6.92	5.12	12.04	2.35	62.49	8.58	3.46
20	-1.4831	329.215	325.9	0.7	7.24	5.00	12.24	2.45	63.29	8.62	3.62
21	-1.4803	342.267	338.9	0.7	7.53	4.90	12.43	2.53	63.98	8.67	3.76
22	-1.4775	354.677	351.3	0.8	7.80	4.82	12.62	2.62	64.56	8.72	3.90
23	-1.4746	366.325	363.0	0.8	8.05	4.75	12.80	2.70	65.08	8.77	4.03
24	-1.4718	377.599	374.3	0.9	8.30	4.68	12.98	2.77	65.50	8.83	4.15
25	-1.4690	388.749	385.4	0.9	8.54	4.63	13.17	2.84	65.85	8.90	4.27
26	-1.4648	403.930	400.6	1.0	8.87	4.57	13.44	2.94	66.30	9.00	4.43
27	-1.4578	428.912	425.6	1.1	9.41	4.51	13.92	3.09	66.72	9.21	4.71
28	-1.4522	446.844	443.5	1.3	9.80	4.48	14.27	3.19	66.94	9.38	4.90
29	-1.4466	464.466	461.1	1.4	10.18	4.47	14.65	3.28	66.99	9.56	5.09
30	-1.4410	479.944	476.6	1.5	10.51	4.47	14.98	3.35	66.97	9.73	5.25
31	-1.4354	494.265	490.9	1.6	10.81	4.45	15.26	3.43	67.11	9.86	5.41
32	-1.4298	508.364	505.0	1.7	11.11	4.47	15.58	3.48	66.97	10.03	5.55
33	-1.4242	522.786	519.4	1.8	11.41	4.50	15.91	3.54	66.79	10.21	5.71
34	-1.4186	536.612	533.3	1.9	11.71	4.53	16.24	3.58	66.57	10.38	5.85
35	-1.4130	552.128	548.8	2.0	12.03	4.57	16.60	3.63	66.30	10.59	6.02
36	-1.4074	567.106	563.8	2.1	12.35	4.62	16.97	3.67	65.97	10.79	6.17
37	-1.4018	581.057	577.7	2.2	12.64	4.66	17.31	3.71	65.64	10.99	6.32
38	-1.3962	594.575	591.2	2.3	12.92	4.72	17.64	3.74	65.27	11.18	6.46
39	-1.3906	608.944	605.6	2.4	13.22	4.78	18.00	3.77	64.86	11.39	6.61
40	-1.3850	624.175	620.8	2.5	13.54	4.83	18.37	3.80	64.48	11.60	6.77
41	-1.3794	638.731	635.4	2.6	13.84	4.90	18.74	3.83	64.02	11.82	6.92
42	-1.3738	653.898	650.5	2.7	14.16	4.96	19.12	3.85	63.56	12.04	7.08
43	-1.3682	668.505	665.2	2.8	14.46	5.03	19.49	3.88	63.12	12.26	7.23
44	-1.3626	684.479	681.1	2.9	14.79	5.10	19.89	3.90	62.62	12.50	7.40
45	-1.3570	700.784	697.4	3.0	15.13	5.17	20.30	3.93	62.13	12.74	7.57
46	-1.3514	716.617	713.3	3.1	15.46	5.25	20.71	3.95	61.59	12.98	7.73
47	-1.3458	732.081	728.7	3.2	15.78	5.32	21.09	3.97	61.10	13.21	7.89
48	-1.3402	746.012	742.7	3.3	16.06	5.40	21.46	3.97	60.53	13.43	8.03
49	-1.3346	761.466	758.1	3.4	16.38	5.48	21.86	3.99	59.96	13.67	8.19
50	-1.3290	776.236	772.9	3.5	16.68	5.56	22.24	4.00	59.39	13.90	8.34
51	-1.3234	793.121	789.8	3.6	17.02	5.66	22.68	4.01	58.73	14.17	8.51
52	-1.3178	809.936	806.6	3.7	17.37	5.76	23.12	4.02	58.05	14.44	8.68
53	-1.3122	825.250	821.9	3.9	17.68	5.85	23.53	4.02	57.39	14.69	8.84
54	-1.3066	841.386	838.0	4.0	18.01	5.94	23.95	4.03	56.75	14.95	9.00
55	-1.3010	858.441	855.1	4.1	18.35	6.01	24.36	4.05	56.29	15.19	9.18
56	-1.2954	876.126	872.8	4.2	18.71	6.11	24.82	4.06	55.60	15.47	9.36
57	-1.2898	892.987	889.6	4.3	19.05	6.20	25.25	4.07	55.00	15.72	9.53
58	-1.2842	910.802	907.5	4.4	19.41	6.30	25.71	4.08	54.30	16.00	9.71
59	-1.2786	928.077	924.7	4.5	19.76	6.40	26.16	4.09	53.59	16.28	9.88
60	-1.2730	943.598	940.2	4.6	20.07	6.49	26.56	4.09	52.96	16.53	10.04
61	-1.2674	962.053	958.7	4.7	20.44	6.59	27.03	4.10	52.25	16.81	10.22
62	-1.2618	980.032	976.7	4.8	20.80	6.70	27.50	4.11	51.53	17.10	10.40
63	-1.2562	997.331	994.0	4.9	21.15	6.79	27.94	4.11	50.86	17.37	10.57
64	-1.2506	1014.996	1011.6	5.0	21.50	6.89	28.40	4.12	50.15	17.65	10.75
65	-1.2450	1034.155	1030.8	5.1	21.88	7.00	28.89	4.13	49.40	17.94	10.94

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
66	-1.2394	1051.778	1048.4	5.2	22.23	7.10	29.34	4.13	48.70	18.22	11.12
67	-1.2352	1065.562	1062.2	5.3	22.51	7.19	29.69	4.13	48.13	18.44	11.25

Parameters for Specimen No. 3

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1054.700			517.300
Moisture content: Dry soil+tare, gms.	921.400			446.700
Moisture content: Tare, gms.	391.200			112.800
Moisture, %	25.1		21.1	21.1
Moist specimen weight, gms.	1219.3			
Diameter, in.	2.88		2.89	
Area, in.²	6.49		6.57	
Height, in.	5.67		5.25	
Net decrease in height, in.		0.57	-0.14	
Net decrease in water volume, cc.			3.80	
Wet density, pcf	126.2		130.6	
Dry density, pcf	100.8		107.8	
Void ratio	0.6839		0.5753	
Saturation, %	100.0		100.0	

Test Readings for Specimen No. 3

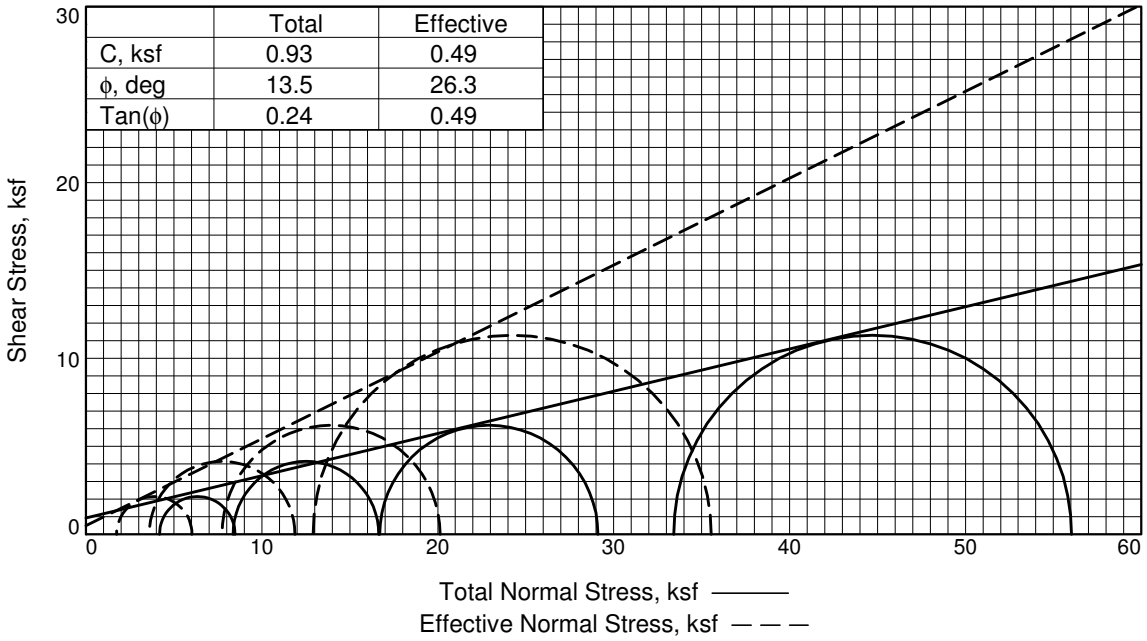
Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 156.61 psi (22.55 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 16.79 ksf
Strain rate, %/min. = 0.08
Fail. Stress = 40.08 ksf **at reading no.** 61

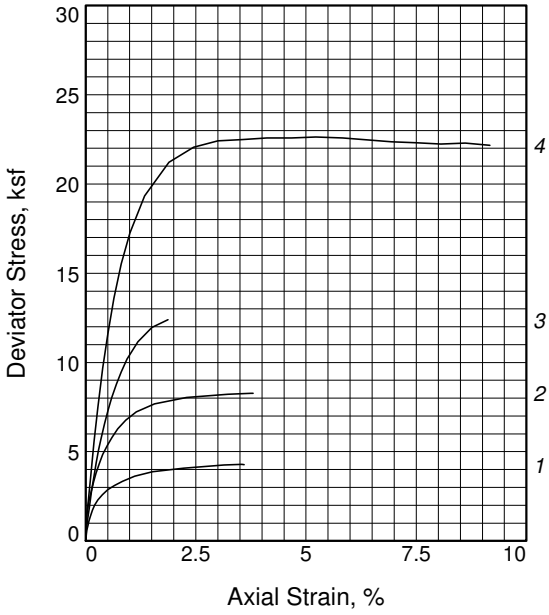
No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.6371	1.744	0.0	0.0	0.00	16.78	16.78	1.00	40.07	16.78	0.00
1	-1.6357	39.006	37.3	0.0	0.82	16.64	17.45	1.05	41.09	17.04	0.41
2	-1.6343	63.635	61.9	0.1	1.36	16.47	17.82	1.08	42.26	17.14	0.68
3	-1.6329	88.454	86.7	0.1	1.90	16.28	18.18	1.12	43.57	17.23	0.95
4	-1.6315	113.198	111.5	0.1	2.44	16.09	18.53	1.15	44.90	17.31	1.22
5	-1.6301	137.608	135.9	0.1	2.98	15.88	18.86	1.19	46.32	17.37	1.49
6	-1.6287	163.588	161.8	0.2	3.54	15.68	19.22	1.23	47.76	17.45	1.77
7	-1.6273	189.086	187.3	0.2	4.10	15.46	19.56	1.27	49.26	17.51	2.05
8	-1.6259	214.105	212.4	0.2	4.65	15.24	19.89	1.30	50.75	17.57	2.32
9	-1.6245	240.309	238.6	0.2	5.22	15.03	20.25	1.35	52.20	17.64	2.61
10	-1.6231	265.219	263.5	0.3	5.76	14.82	20.59	1.39	53.67	17.71	2.88
11	-1.6217	291.508	289.8	0.3	6.34	14.61	20.95	1.43	55.15	17.78	3.17
12	-1.6203	317.418	315.7	0.3	6.90	14.40	21.30	1.48	56.63	17.85	3.45
13	-1.6189	342.854	341.1	0.3	7.46	14.20	21.66	1.53	58.00	17.93	3.73
14	-1.6175	367.497	365.8	0.4	7.99	14.00	21.99	1.57	59.39	18.00	4.00
15	-1.6161	392.408	390.7	0.4	8.53	13.81	22.35	1.62	60.70	18.08	4.27
16	-1.6147	416.880	415.1	0.4	9.07	13.63	22.70	1.67	61.97	18.16	4.53
17	-1.6133	441.381	439.6	0.5	9.60	13.45	23.05	1.71	63.20	18.25	4.80

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
18	-1.6119	465.395	463.7	0.5	10.12	13.29	23.41	1.76	64.34	18.35	5.06
19	-1.6105	488.875	487.1	0.5	10.63	13.12	23.75	1.81	65.47	18.44	5.32
20	-1.6091	512.546	510.8	0.5	11.14	12.97	24.11	1.86	66.55	18.54	5.57
21	-1.6077	535.203	533.5	0.6	11.64	12.83	24.47	1.91	67.51	18.65	5.82
22	-1.6063	557.363	555.6	0.6	12.12	12.69	24.81	1.95	68.47	18.75	6.06
23	-1.6049	579.419	577.7	0.6	12.59	12.57	25.16	2.00	69.33	18.86	6.30
24	-1.6035	601.446	599.7	0.6	13.07	12.45	25.52	2.05	70.14	18.99	6.53
25	-1.6021	622.898	621.2	0.7	13.53	12.34	25.87	2.10	70.92	19.11	6.77
26	-1.6007	644.193	642.4	0.7	13.99	12.24	26.24	2.14	71.58	19.24	7.00
27	-1.5993	664.698	663.0	0.7	14.44	12.15	26.59	2.19	72.24	19.37	7.22
28	-1.5979	686.092	684.3	0.7	14.90	12.06	26.95	2.24	72.89	19.51	7.45
29	-1.5965	706.682	704.9	0.8	15.34	11.98	27.32	2.28	73.43	19.65	7.67
30	-1.5951	727.650	725.9	0.8	15.79	11.91	27.70	2.33	73.92	19.80	7.90
31	-1.5937	747.009	745.3	0.8	16.21	11.83	28.04	2.37	74.43	19.94	8.11
32	-1.5923	766.985	765.2	0.9	16.64	11.77	28.41	2.41	74.85	20.09	8.32
33	-1.5895	804.176	802.4	0.9	17.44	11.65	29.09	2.50	75.68	20.37	8.72
34	-1.5866	841.524	839.8	1.0	18.24	11.57	29.81	2.58	76.30	20.69	9.12
35	-1.5838	878.140	876.4	1.0	19.03	11.49	30.52	2.66	76.83	21.00	9.51
36	-1.5810	914.284	912.5	1.1	19.80	11.42	31.22	2.73	77.28	21.32	9.90
37	-1.5754	984.861	983.1	1.2	21.31	11.34	32.65	2.88	77.89	21.99	10.65
38	-1.5698	1049.788	1048.0	1.3	22.69	11.28	33.97	3.01	78.30	22.62	11.35
39	-1.5642	1111.949	1110.2	1.4	24.01	11.25	35.26	3.13	78.49	23.26	12.01
40	-1.5586	1173.509	1171.8	1.5	25.32	11.25	36.56	3.25	78.51	23.90	12.66
41	-1.5530	1228.926	1227.2	1.6	26.49	11.25	37.74	3.35	78.47	24.49	13.24
42	-1.5474	1281.738	1280.0	1.7	27.60	11.28	38.87	3.45	78.31	25.07	13.80
43	-1.5418	1332.184	1330.4	1.8	28.65	11.32	39.97	3.53	78.01	25.64	14.33
44	-1.5362	1378.642	1376.9	1.9	29.62	11.37	40.99	3.61	77.65	26.18	14.81
45	-1.5306	1422.164	1420.4	2.0	30.52	11.43	41.95	3.67	77.24	26.69	15.26
46	-1.5250	1459.634	1457.9	2.1	31.29	11.50	42.79	3.72	76.77	27.14	15.65
47	-1.5194	1498.144	1496.4	2.2	32.09	11.58	43.66	3.77	76.22	27.62	16.04
48	-1.5138	1535.434	1533.7	2.4	32.85	11.67	44.51	3.82	75.60	28.09	16.42
49	-1.5082	1569.647	1567.9	2.5	33.54	11.77	45.31	3.85	74.91	28.54	16.77
50	-1.5026	1603.025	1601.3	2.6	34.22	11.87	46.09	3.88	74.19	28.98	17.11
51	-1.4970	1632.895	1631.2	2.7	34.82	11.98	46.80	3.91	73.43	29.39	17.41
52	-1.4914	1659.093	1657.3	2.8	35.34	12.09	47.43	3.92	72.66	29.76	17.67
53	-1.4858	1687.855	1686.1	2.9	35.92	12.21	48.12	3.94	71.84	30.16	17.96
54	-1.4802	1717.884	1716.1	3.0	36.52	12.34	48.85	3.96	70.92	30.60	18.26
55	-1.4746	1744.402	1742.7	3.1	37.04	12.46	49.50	3.97	70.10	30.98	18.52
56	-1.4690	1770.629	1768.9	3.2	37.55	12.59	50.14	3.98	69.19	31.37	18.78
57	-1.4634	1797.911	1796.2	3.3	38.09	12.72	50.81	3.99	68.26	31.77	19.05
58	-1.4578	1822.336	1820.6	3.4	38.57	12.86	51.42	4.00	67.33	32.14	19.28
59	-1.4522	1848.597	1846.9	3.5	39.08	12.99	52.07	4.01	66.38	32.53	19.54
60	-1.4466	1873.364	1871.6	3.6	39.56	13.12	52.68	4.02	65.50	32.90	19.78
61	-1.4410	1900.020	1898.3	3.7	40.08	13.26	53.34	4.02	64.53	33.30	20.04
62	-1.4409	1899.629	1897.9	3.7	40.07	13.26	53.34	4.02	64.49	33.30	20.04

Cursory interpretations provided require review by a professional engineer. Knight Piesold accepts no responsibility in subsequent analyses.





Sample No.		1	2	3	4
Initial	Water Content, %	22.0	22.0	22.0	22.0
	Dry Density, pcf	104.9	104.9	104.9	104.9
	Saturation, %	99.9	99.9	99.9	99.9
	Void Ratio	0.5882	0.5882	0.5882	0.5882
	Diameter, in.	2.87	2.87	2.87	2.87
	Height, in.	5.82	5.82	5.82	5.82
At Test	Water Content, %	19.1	17.7	16.6	15.4
	Dry Density, pcf	110.3	113.2	115.4	118.2
	Saturation, %	100.0	100.0	100.0	100.0
	Void Ratio	0.5112	0.4726	0.4444	0.4107
	Diameter, in.	2.82	2.83	2.84	2.86
	Height, in.	5.73	5.58	5.41	5.22
Strain rate, %/min.		0.02	0.02	0.02	0.02
Eff. Cell Pressure, psi		29.06	58.09	116.00	232.00
Fail. Stress, ksf		4.3	8.3	12.4	22.6
Excess Pore Pr., ksf		2.4	4.8	9.0	20.5
Strain, %		3.5	3.7	1.9	5.2
Ult. Stress, ksf					
Excess Pore Pr., ksf					
Strain, %					
$\bar{\sigma}_1$ Failure, ksf		6.0	11.9	20.1	35.5
$\bar{\sigma}_3$ Failure, ksf		1.7	3.6	7.7	12.9

Type of Test:
CU with Pore Pressures

Sample Type: Shelby Tube

Description: sandy lean clay

LL= 49 **PL=** 15 **PI=** 34

Specific Gravity= 2.67

Remarks: Failure tangents drawn at approximately 1.5% strain. Multi-staged specimen. Some consolidation of sample occurred during extrusion from tube.

Figure _____

Client: Pebble Limited Partnership

Project: Pebble Project

Location: GH11-239, Area A

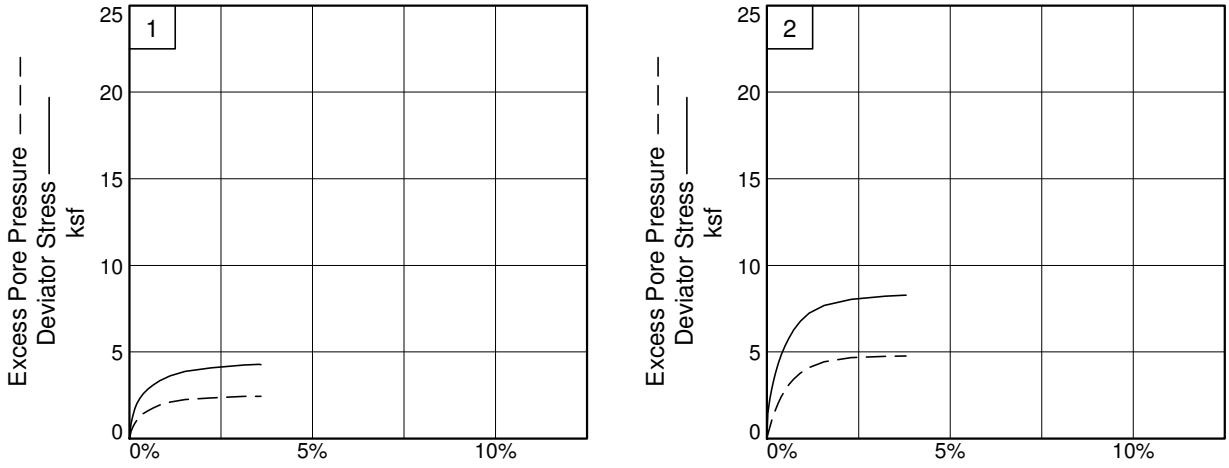
Sample Number: GH11-239-2 **Depth:** 14-15.5'

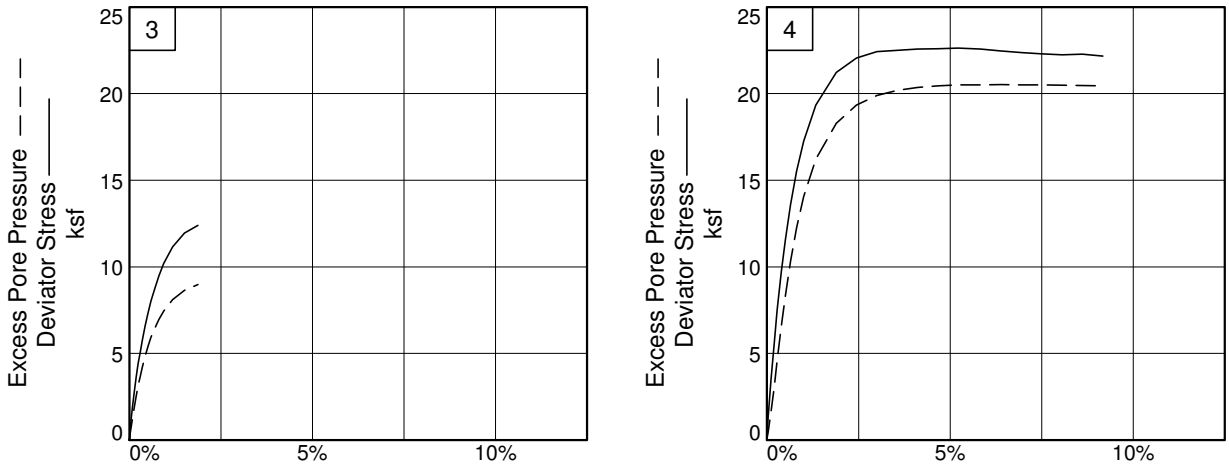
Proj. No.: 101-77/12 **Date Sampled:** 9/27/11

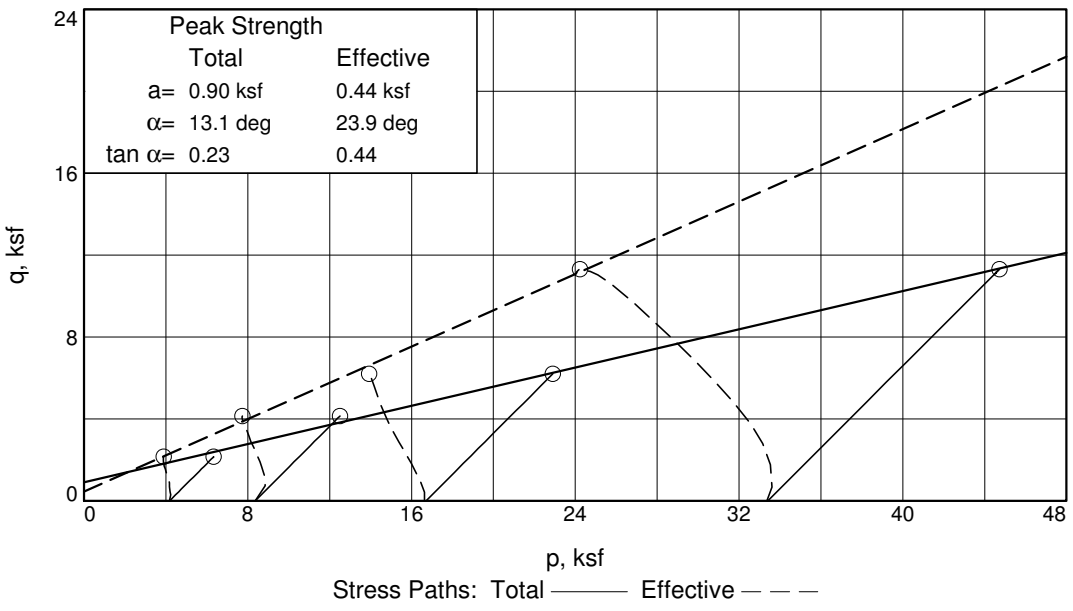
Knight Piésold CONSULTING

Tested By: rsh **Checked By:** spb

Cursory interpretations provided require review by a professional engineer. Knight Piesold accepts no responsibility in subsequent analyses.







Client: Pebble Limited Partnership
Project: Pebble Project
Location: GH11-239, Area A **Depth:** 14-15.5' **Sample Number:** GH11-239-2
Project No.: 101-77/12 **Figure** _____

Knight Piesold Geotechnical Lab.

Tested By: rsh **Checked By:** spb

TRIAXIAL COMPRESSION TEST

1/9/2012
6:28 PM

CU with Pore Pressures

Date: 9/27/11
Client: Pebble Limited Partnership
Project: Pebble Project
Project No.: 101-77/12
Location: GH11-239, Area A
Depth: 14-15.5' **Sample Number:** GH11-239-2
Description: sandy lean clay
Remarks: Failure tangents drawn at approximately 1.5% strain. Multi-staged specimen. Some consolidation of sample occurred during extrusion from tube.
Type of Sample: Shelby Tube
Specific Gravity=2.67 **LL=**49 **PL=**15 **PI=**34
Test Method: ASTM D 4767 Method A (staged method triaxial test)

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1268.100			696.100
Moisture content: Dry soil+tare, gms.	1039.400			618.100
Moisture content: Tare, gms.	0.000			110.800
Moisture, %	22.0	22.0	19.1	15.4
Moist specimen weight, gms.	1268.1			
Diameter, in.	2.87	2.87	2.82	
Area, in.²	6.48	6.48	6.26	
Height, in.	5.82	5.82	5.73	
Net decrease in height, in.		0.00	0.09	
Net decrease in water volume, cc.			30.00	
Wet density, pcf	128.0	128.1	131.4	
Dry density, pcf	104.9	104.9	110.3	
Void ratio	0.5882	0.5882	0.5112	
Saturation, %	99.9	100.0	100.0	

Test Readings for Specimen No. 1

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 69.06 psi (9.94 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 4.18 ksf
Strain rate, %/min. = 0.02
Fail. Stress = 4.29 ksf **at reading no.** 16

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.9553	2.118	0.0	0.0	0.00	4.17	4.17	1.00	40.13	4.17	0.00
1	-1.9539	27.243	25.1	0.0	0.58	3.94	4.52	1.15	41.70	4.23	0.29
2	-1.9524	39.780	37.7	0.1	0.87	3.77	4.64	1.23	42.88	4.20	0.43
3	-1.9510	50.432	48.3	0.1	1.11	3.63	4.74	1.31	43.88	4.18	0.56
4	-1.9495	60.836	58.7	0.1	1.35	3.50	4.85	1.39	44.73	4.18	0.67
5	-1.9466	77.505	75.4	0.2	1.73	3.30	5.03	1.52	46.15	4.16	0.87
6	-1.9437	90.144	88.0	0.2	2.02	3.13	5.15	1.64	47.31	4.14	1.01
7	-1.9394	102.620	100.5	0.3	2.31	2.94	5.25	1.78	48.62	4.10	1.15
8	-1.9336	115.318	113.2	0.4	2.59	2.75	5.34	1.94	49.96	4.05	1.30
9	-1.9263	127.362	125.2	0.5	2.87	2.57	5.44	2.11	51.19	4.01	1.43
10	-1.9176	137.877	135.8	0.7	3.10	2.42	5.52	2.28	52.28	3.97	1.55
11	-1.9074	148.533	146.4	0.8	3.34	2.26	5.59	2.48	53.40	3.93	1.67
12	-1.8915	161.434	159.3	1.1	3.62	2.08	5.71	2.74	54.59	3.90	1.81
13	-1.8683	173.386	171.3	1.5	3.88	1.94	5.82	3.00	55.59	3.88	1.94
14	-1.8276	183.621	181.5	2.2	4.08	1.83	5.92	3.23	56.32	3.87	2.04
15	-1.7754	192.738	190.6	3.1	4.25	1.75	6.00	3.42	56.90	3.87	2.12
16	-1.7522	195.393	193.3	3.5	4.29	1.74	6.03	3.47	56.98	3.88	2.14
17	-1.7494	194.842	192.7	3.6	4.27	1.74	6.01	3.46	56.97	3.88	2.14

Parameters for Specimen No. 2

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1268.100			696.100
Moisture content: Dry soil+tare, gms.	1039.400			618.100
Moisture content: Tare, gms.	0.000			110.800
Moisture, %	22.0		17.7	15.4
Moist specimen weight, gms.	1268.1			
Diameter, in.	2.87		2.83	
Area, in.²	6.48		6.28	
Height, in.	5.82		5.58	
Net decrease in height, in.		0.29	-0.05	
Net decrease in water volume, cc.			15.00	
Wet density, pcf	128.0		133.2	
Dry density, pcf	104.9		113.2	
Void ratio	0.5882		0.4726	
Saturation, %	99.9		100.0	

Test Readings for Specimen No. 2

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 98.09 psi (14.12 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 8.36 ksf
Strain rate, %/min. = 0.02
Fail. Stress = 8.28 ksf **at reading no.** 16

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.9541	2.793	0.0	0.0	0.00	8.36	8.36	1.00	40.05	8.36	0.00
1	-1.9527	66.527	63.7	0.0	1.46	8.12	9.58	1.18	41.71	8.85	0.73
2	-1.9498	100.902	98.1	0.1	2.25	7.71	9.96	1.29	44.51	8.84	1.12
3	-1.9469	126.714	123.9	0.1	2.84	7.34	10.18	1.39	47.12	8.76	1.42
4	-1.9439	148.686	145.9	0.2	3.34	7.00	10.34	1.48	49.48	8.67	1.67
5	-1.9410	168.145	165.4	0.2	3.79	6.70	10.48	1.57	51.58	8.59	1.89
6	-1.9367	193.273	190.5	0.3	4.36	6.30	10.66	1.69	54.35	8.48	2.18
7	-1.9323	214.816	212.0	0.4	4.85	5.96	10.80	1.81	56.74	8.38	2.42
8	-1.9265	237.625	234.8	0.5	5.36	5.57	10.93	1.96	59.42	8.25	2.68
9	-1.9207	256.731	253.9	0.6	5.79	5.25	11.05	2.10	61.61	8.15	2.90
10	-1.9135	278.483	275.7	0.7	6.28	4.93	11.21	2.27	63.86	8.07	3.14
11	-1.9033	300.649	297.9	0.9	6.77	4.58	11.36	2.48	66.26	7.97	3.39
12	-1.8902	321.654	318.9	1.1	7.23	4.27	11.50	2.70	68.46	7.88	3.62
13	-1.8670	342.534	339.7	1.6	7.67	3.94	11.61	2.95	70.73	7.78	3.84
14	-1.8264	361.441	358.6	2.3	8.04	3.70	11.74	3.17	72.41	7.72	4.02
15	-1.7742	372.596	369.8	3.2	8.21	3.62	11.83	3.27	72.98	7.72	4.11
16	-1.7452	377.641	374.8	3.7	8.28	3.60	11.88	3.30	73.09	7.74	4.14
17	-1.7422	377.456	374.7	3.8	8.27	3.60	11.87	3.30	73.06	7.74	4.14

Parameters for Specimen No. 3

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1268.100			696.100
Moisture content: Dry soil+tare, gms.	1039.400			618.100
Moisture content: Tare, gms.	0.000			110.800
Moisture, %	22.0		16.6	15.4
Moist specimen weight, gms.	1268.1			
Diameter, in.	2.87		2.84	
Area, in.²	6.48		6.35	
Height, in.	5.82		5.41	
Net decrease in height, in.		0.46	-0.04	
Net decrease in water volume, cc.			11.00	
Wet density, pcf	128.0		134.6	
Dry density, pcf	104.9		115.4	
Void ratio	0.5882		0.4444	
Saturation, %	99.9		100.0	

Test Readings for Specimen No. 3

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 156.00 psi (22.46 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 16.70 ksf
Strain rate, %/min. = 0.02
Fail. Stress = 12.40 ksf **at reading no.** 16

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.9014	3.128	0.0	0.0	0.00	16.64	16.64	1.00	40.46	16.64	0.00
1	-1.9000	40.253	37.1	0.0	0.84	16.22	17.06	1.05	43.37	16.64	0.42
2	-1.8971	84.406	81.3	0.1	1.84	15.52	17.36	1.12	48.24	16.44	0.92
3	-1.8942	125.820	122.7	0.1	2.78	14.83	17.61	1.19	53.03	16.22	1.39
4	-1.8913	163.851	160.7	0.2	3.64	14.16	17.80	1.26	57.63	15.98	1.82
5	-1.8884	198.001	194.9	0.2	4.41	13.57	17.98	1.33	61.79	15.77	2.20
6	-1.8855	228.870	225.7	0.3	5.11	13.01	18.12	1.39	65.63	15.57	2.55
7	-1.8826	257.497	254.4	0.3	5.75	12.51	18.26	1.46	69.12	15.39	2.87
8	-1.8782	294.739	291.6	0.4	6.59	11.86	18.44	1.56	73.67	15.15	3.29
9	-1.8738	327.968	324.8	0.5	7.33	11.28	18.61	1.65	77.64	14.95	3.67
10	-1.8695	358.896	355.8	0.6	8.02	10.78	18.80	1.74	81.14	14.79	4.01
11	-1.8637	393.745	390.6	0.7	8.80	10.22	19.01	1.86	85.06	14.62	4.40
12	-1.8579	424.022	420.9	0.8	9.47	9.75	19.22	1.97	88.32	14.48	4.74
13	-1.8506	456.742	453.6	0.9	10.19	9.25	19.44	2.10	91.76	14.35	5.10
14	-1.8375	501.271	498.1	1.2	11.17	8.59	19.76	2.30	96.35	14.17	5.58
15	-1.8201	538.385	535.3	1.5	11.96	8.06	20.02	2.48	100.05	14.04	5.98
16	-1.8004	560.278	557.1	1.9	12.40	7.73	20.14	2.60	102.30	13.93	6.20

Parameters for Specimen No. 4

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1268.100			696.100
Moisture content: Dry soil+tare, gms.	1039.400			618.100
Moisture content: Tare, gms.	0.000			110.800
Moisture, %	22.0		15.4	15.4
Moist specimen weight, gms.	1268.1			
Diameter, in.	2.87		2.86	
Area, in.²	6.48		6.42	
Height, in.	5.82		5.22	
Net decrease in height, in.		0.52	0.08	
Net decrease in water volume, cc.			13.10	
Wet density, pcf	128.0		136.3	
Dry density, pcf	104.9		118.2	
Void ratio	0.5882		0.4107	
Saturation, %	99.9		100.0	

Test Readings for Specimen No. 4

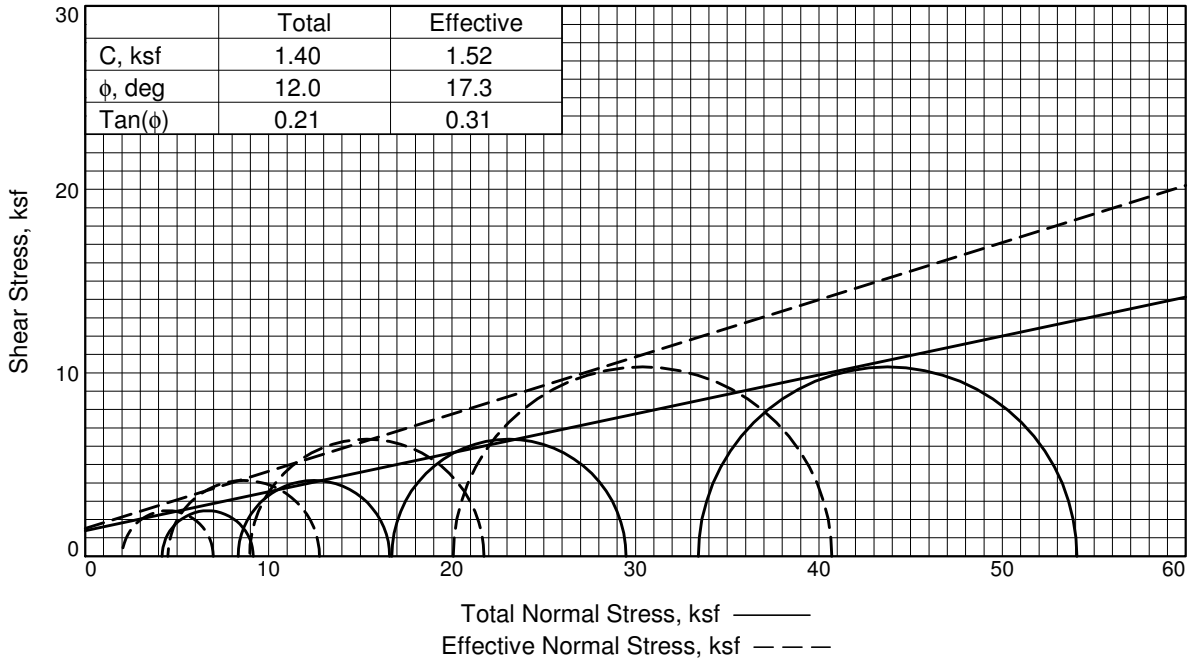
Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 272.00 psi (39.17 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 33.41 ksf
Strain rate, %/min. = 0.02
Fail. Stress = 22.63 ksf **at reading no.** 17

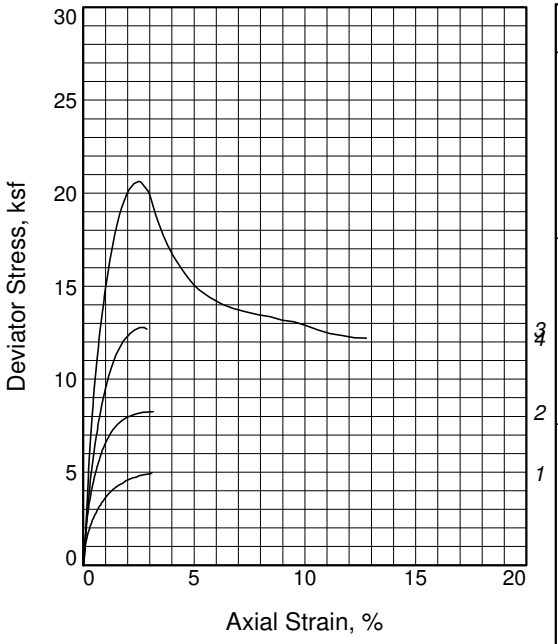
No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.9508	1.706	0.0	0.0	0.00	33.35	33.35	1.00	40.38	33.35	0.00
1	-1.9493	60.878	59.2	0.0	1.33	32.95	34.28	1.04	43.18	33.61	0.66
2	-1.9450	158.672	157.0	0.1	3.52	31.77	35.29	1.11	51.37	33.53	1.76
3	-1.9406	250.959	249.3	0.2	5.58	30.36	35.94	1.18	61.18	33.15	2.79
4	-1.9363	336.681	335.0	0.3	7.50	28.83	36.33	1.26	71.76	32.58	3.75
5	-1.9304	435.221	433.5	0.4	9.69	26.85	36.54	1.36	85.53	31.70	4.84
6	-1.9246	520.497	518.8	0.5	11.58	25.05	36.64	1.46	98.02	30.84	5.79
7	-1.9174	611.565	609.9	0.6	13.60	23.09	36.68	1.59	111.68	29.88	6.80
8	-1.9087	699.431	697.7	0.8	15.53	21.14	36.67	1.73	125.17	28.91	7.76
9	-1.8985	778.500	776.8	1.0	17.26	19.35	36.61	1.89	137.61	27.98	8.63
10	-1.8811	875.385	873.7	1.3	19.34	17.18	36.52	2.13	152.69	26.85	9.67
11	-1.8521	965.834	964.1	1.9	21.22	15.11	36.34	2.40	167.06	25.72	10.61
12	-1.82311009.416		1007.7	2.4	22.06	14.07	36.13	2.57	174.29	25.10	11.03
13	-1.79401031.738		1030.0	3.0	22.42	13.52	35.94	2.66	178.13	24.73	11.21
14	-1.76501041.178		1039.5	3.6	22.49	13.22	35.72	2.70	180.19	24.47	11.25
15	-1.73601050.803		1049.1	4.1	22.57	13.05	35.62	2.73	181.37	24.34	11.29
16	-1.70701057.566		1055.9	4.7	22.59	12.96	35.55	2.74	182.00	24.25	11.29
17	-1.67801065.743		1064.0	5.2	22.63	12.91	35.54	2.75	182.36	24.22	11.31
18	-1.64611070.261		1068.6	5.8	22.58	12.89	35.47	2.75	182.46	24.18	11.29
19	-1.61711071.513		1069.8	6.4	22.47	12.89	35.36	2.74	182.52	24.12	11.24
20	-1.58811072.817		1071.1	6.9	22.36	12.90	35.26	2.73	182.44	24.08	11.18
21	-1.55911076.300		1074.6	7.5	22.30	12.91	35.21	2.73	182.37	24.06	11.15
22	-1.53011079.973		1078.3	8.1	22.25	12.92	35.16	2.72	182.29	24.04	11.12
23	-1.50111088.605		1086.9	8.6	22.29	12.94	35.22	2.72	182.16	24.08	11.14

Test Readings for Specimen No. 4

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
24	-1.47211	088.984	1087.3	9.2	22.16	12.95	35.11	2.71	182.05	24.03	11.08

Cursory interpretations provided require review by a professional engineer. Knight Piesold accepts no responsibility in subsequent analyses.





Sample No.		1	2	3	4
Initial	Water Content, %	25.7	25.7	25.7	25.7
	Dry Density, pcf	95.5	95.5	95.5	95.5
	Saturation, %	89.8	89.8	89.8	89.8
	Void Ratio	0.7785	0.7785	0.7785	0.7785
	Diameter, in.	2.88	2.88	2.88	2.88
	Height, in.	5.77	5.77	5.77	5.77
At Test	Water Content, %	25.9	24.7	23.9	22.9
	Dry Density, pcf	99.7	101.6	102.8	104.7
	Saturation, %	100.0	100.0	100.0	100.0
	Void Ratio	0.7033	0.6715	0.6513	0.6224
	Diameter, in.	2.83	2.85	2.87	2.88
	Height, in.	5.72	5.52	5.37	5.24
Strain rate, %/min.		0.03	0.03	0.03	0.03
Eff. Cell Pressure, psi		29.13	57.89	116.04	232.13
Fail. Stress, ksf		5.0	8.3	12.8	20.6
Excess Pore Pr., ksf		2.2	3.8	7.7	13.4
Strain, %		3.1	3.2	2.8	2.5
Ult. Stress, ksf					
Excess Pore Pr., ksf					
Strain, %					
$\bar{\sigma}_1$ Failure, ksf		7.0	12.8	21.7	40.7
$\bar{\sigma}_3$ Failure, ksf		2.0	4.5	9.0	20.1

Type of Test:
CU with Pore Pressures

Sample Type: Shelby Tube

Description: lean clay

LL= 43 **PL=** 20 **PI=** 23

Specific Gravity= 2.72

Remarks: Failure tangents drawn at peak principal stress ratio. Multi- staged specimen. Shear plane developed with slickened surface. Some consolidation of specimen occurred

Figure _____

Client: Pebble Limited Partnership

Project: Pebble Project

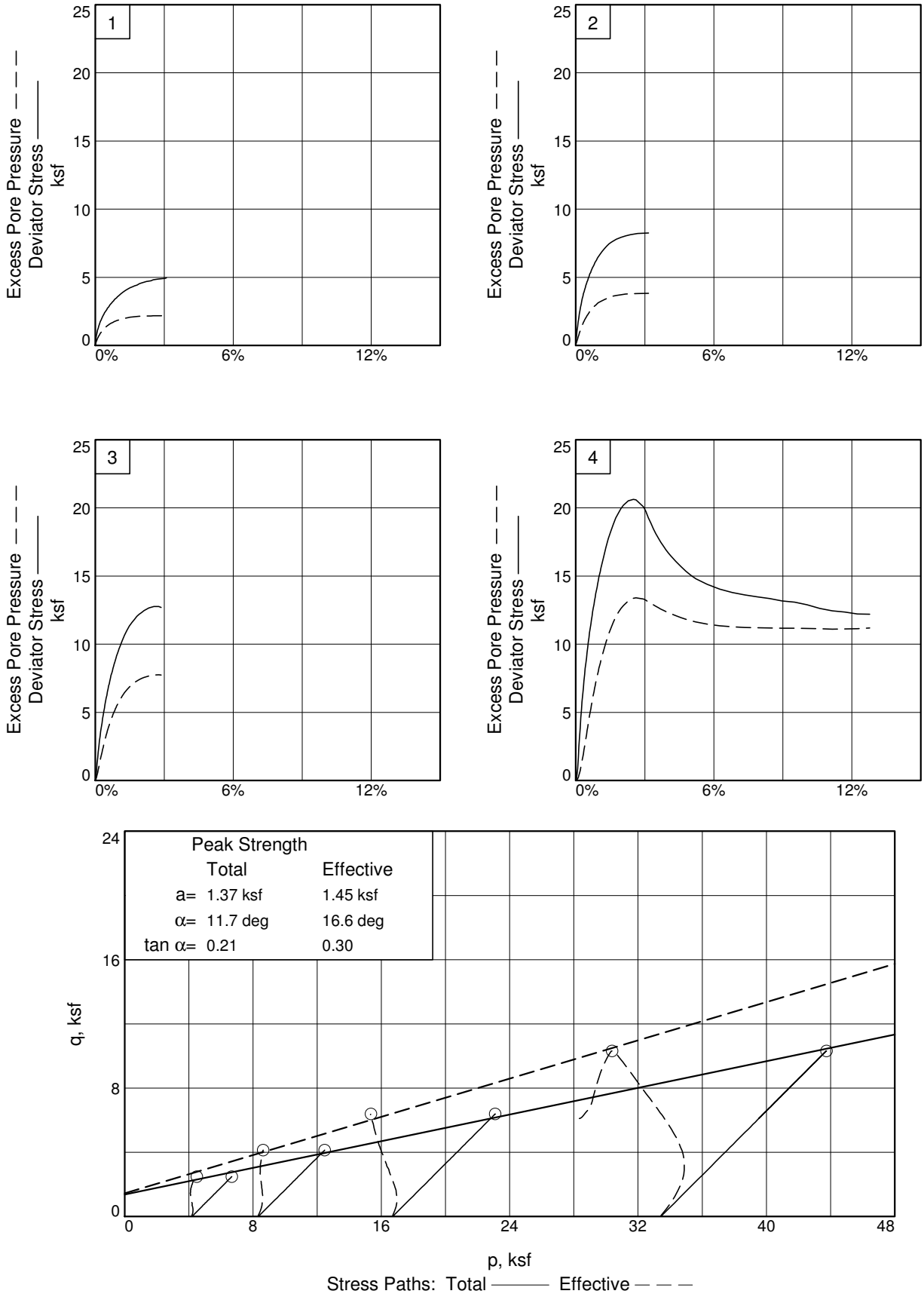
Location: GH11-243, Upper Talarik Creek Area

Sample Number: GH11-243-1 **Depth:** 4-5.5'

Proj. No.: 101-77/12 **Date Sampled:** 11/17/11

Knight Piésold CONSULTING

Cursory interpretations provided require review by a professional engineer. Knight Piesold accepts no responsibility in subsequent analyses.



Client: Pebble Limited Partnership
Project: Pebble Project
Location: GH11-243, Upper Talarik Creek Area **Depth:** 4-5.5' **Sample Number:** GH11-243-1
Project No.: 101-77/12 **Figure** _____

Knight Piesold Geotechnical Lab.

TRIAXIAL COMPRESSION TEST

1/9/2012
6:38 PM

CU with Pore Pressures

Date: 11/17/11
Client: Pebble Limited Partnership
Project: Pebble Project
Project No.: 101-77/12
Location: GH11-243, Upper Talarik Creek Area
Depth: 4-5.5' **Sample Number:** GH11-243-1
Description: lean clay
Remarks: Failure tangents drawn at peak principal stress ratio. Multi- staged specimen. Shear plane developed with slickened surface. Some consolidation of specimen occurred during extrusion from tube.
Type of Sample: Shelby Tube
Specific Gravity=2.72 **LL=**43 **PL=**20 **PI=**23
Test Method: ASTM D 4767 Method A (staged method triaxial test)

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	392.230			1430.500
Moisture content: Dry soil+tare, gms.	335.710			1220.600
Moisture content: Tare, gms.	115.810			303.000
Moisture, %	25.7	28.6	25.9	22.9
Moist specimen weight, gms.	1182.5			
Diameter, in.	2.88	2.88	2.83	
Area, in.²	6.51	6.51	6.28	
Height, in.	5.77	5.77	5.72	
Net decrease in height, in.		0.00	0.05	
Net decrease in water volume, cc.			26.00	
Wet density, pcf	120.0	122.8	125.5	
Dry density, pcf	95.5	95.5	99.7	
Void ratio	0.7785	0.7785	0.7033	
Saturation, %	89.8	100.0	100.0	

Test Readings for Specimen No. 1

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 69.13 psi (9.95 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 4.19 ksf
Strain rate, %/min. = 0.03
Fail. Stress = 4.96 ksf **at reading no.** 50

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.7383	2.655	0.0	0.0	0.00	4.17	4.17	1.00	40.14	4.17	0.00
1	-1.7369	20.963	18.3	0.0	0.42	4.03	4.44	1.10	41.18	4.23	0.21
2	-1.7354	33.128	30.5	0.1	0.70	3.91	4.60	1.18	42.01	4.25	0.35
3	-1.7340	43.152	40.5	0.1	0.93	3.79	4.72	1.24	42.82	4.25	0.46
4	-1.7325	51.373	48.7	0.1	1.12	3.68	4.80	1.30	43.54	4.24	0.56
5	-1.7311	57.700	55.0	0.1	1.26	3.60	4.86	1.35	44.16	4.23	0.63
6	-1.7297	63.718	61.1	0.2	1.40	3.51	4.90	1.40	44.79	4.20	0.70
7	-1.7282	70.649	68.0	0.2	1.56	3.43	4.98	1.45	45.33	4.20	0.78
8	-1.7268	75.575	72.9	0.2	1.67	3.36	5.03	1.50	45.79	4.19	0.83
9	-1.7253	79.894	77.2	0.2	1.77	3.29	5.06	1.54	46.26	4.18	0.88
10	-1.7239	84.088	81.4	0.3	1.86	3.23	5.09	1.58	46.67	4.16	0.93
11	-1.7224	87.589	84.9	0.3	1.94	3.17	5.11	1.61	47.13	4.14	0.97
12	-1.7210	93.063	90.4	0.3	2.07	3.11	5.18	1.66	47.52	4.15	1.03
13	-1.7196	96.580	93.9	0.3	2.14	3.07	5.21	1.70	47.83	4.14	1.07
14	-1.7181	100.041	97.4	0.4	2.22	3.02	5.25	1.74	48.14	4.13	1.11
15	-1.7167	103.289	100.6	0.4	2.30	2.97	5.27	1.77	48.49	4.12	1.15
16	-1.7152	107.128	104.5	0.4	2.38	2.93	5.31	1.81	48.81	4.12	1.19
17	-1.7138	110.553	107.9	0.4	2.46	2.89	5.35	1.85	49.08	4.12	1.23
18	-1.7123	113.115	110.5	0.5	2.52	2.85	5.37	1.88	49.33	4.11	1.26
19	-1.7094	118.654	116.0	0.5	2.64	2.78	5.42	1.95	49.84	4.10	1.32
20	-1.7080	122.103	119.4	0.5	2.72	2.75	5.47	1.99	50.05	4.11	1.36
21	-1.7051	126.517	123.9	0.6	2.82	2.69	5.51	2.05	50.46	4.10	1.41
22	-1.7037	128.994	126.3	0.6	2.88	2.65	5.53	2.09	50.73	4.09	1.44
23	-1.7022	132.232	129.6	0.6	2.95	2.62	5.57	2.13	50.93	4.10	1.48
24	-1.7008	134.979	132.3	0.7	3.01	2.60	5.61	2.16	51.09	4.10	1.51
25	-1.6979	139.176	136.5	0.7	3.11	2.55	5.65	2.22	51.44	4.10	1.55
26	-1.6964	142.174	139.5	0.7	3.17	2.52	5.70	2.26	51.61	4.11	1.59
27	-1.6935	145.119	142.5	0.8	3.24	2.48	5.72	2.30	51.87	4.10	1.62
28	-1.6921	147.873	145.2	0.8	3.30	2.46	5.76	2.34	52.06	4.11	1.65
29	-1.6907	150.421	147.8	0.8	3.36	2.44	5.80	2.38	52.20	4.12	1.68
30	-1.6878	153.687	151.0	0.9	3.43	2.41	5.84	2.42	52.41	4.12	1.71
31	-1.6849	157.505	154.8	0.9	3.51	2.37	5.89	2.48	52.66	4.13	1.76
32	-1.6834	159.887	157.2	1.0	3.57	2.35	5.92	2.52	52.80	4.14	1.78
33	-1.6806	163.124	160.5	1.0	3.64	2.33	5.97	2.56	52.97	4.15	1.82
34	-1.6748	169.839	167.2	1.1	3.79	2.28	6.07	2.66	53.32	4.17	1.89
35	-1.6690	175.214	172.6	1.2	3.91	2.23	6.13	2.75	53.66	4.18	1.95
36	-1.6632	181.194	178.5	1.3	4.04	2.19	6.22	2.85	53.95	4.20	2.02
37	-1.6574	186.154	183.5	1.4	4.14	2.16	6.30	2.92	54.16	4.23	2.07
38	-1.6517	190.089	187.4	1.5	4.23	2.13	6.36	2.99	54.37	4.24	2.11
39	-1.6459	193.952	191.3	1.6	4.31	2.10	6.42	3.05	54.51	4.26	2.16
40	-1.6401	196.666	194.0	1.7	4.37	2.09	6.46	3.09	54.60	4.28	2.18
41	-1.6344	199.722	197.1	1.8	4.43	2.08	6.51	3.13	54.71	4.29	2.22
42	-1.6286	204.139	201.5	1.9	4.53	2.06	6.59	3.20	54.84	4.32	2.26
43	-1.6228	207.288	204.6	2.0	4.59	2.04	6.64	3.25	54.94	4.34	2.30
44	-1.6170	209.718	207.1	2.1	4.64	2.04	6.69	3.27	54.94	4.37	2.32
45	-1.6113	212.070	209.4	2.2	4.69	2.03	6.72	3.31	55.04	4.38	2.35
46	-1.5997	214.954	212.3	2.4	4.75	2.03	6.78	3.34	55.03	4.40	2.37

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
47	-1.5940	218.065	215.4	2.5	4.81	2.02	6.83	3.38	55.09	4.43	2.41
48	-1.5824	220.800	218.1	2.7	4.86	2.02	6.88	3.41	55.11	4.45	2.43
49	-1.5651	223.945	221.3	3.0	4.92	2.02	6.94	3.43	55.07	4.48	2.46
50	-1.5614	225.947	223.3	3.1	4.96	2.02	6.98	3.46	55.11	4.50	2.48

Parameters for Specimen No. 2

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	392.230			1430.500
Moisture content: Dry soil+tare, gms.	335.710			1220.600
Moisture content: Tare, gms.	115.810			303.000
Moisture, %	25.7		24.7	22.9
Moist specimen weight, gms.	1182.5			
Diameter, in.	2.88		2.85	
Area, in.²	6.51		6.39	
Height, in.	5.77		5.52	
Net decrease in height, in.		0.23	0.02	
Net decrease in water volume, cc.			11.00	
Wet density, pcf	120.0		126.7	
Dry density, pcf	95.5		101.6	
Void ratio	0.7785		0.6715	
Saturation, %	89.8		100.0	

Test Readings for Specimen No. 2

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 97.89 psi (14.10 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 8.34 ksf
Strain rate, %/min. = 0.03
Fail. Stress = 8.26 ksf **at reading no.** 48

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.9330	1.693	0.0	0.0	0.00	8.30	8.30	1.00	40.25	8.30	0.00
1	-1.9315	27.995	26.3	0.0	0.59	8.15	8.74	1.07	41.32	8.44	0.30
2	-1.9301	47.068	45.4	0.1	1.02	8.01	9.03	1.13	42.28	8.52	0.51
3	-1.9287	63.291	61.6	0.1	1.39	7.86	9.25	1.18	43.29	8.56	0.69
4	-1.9273	77.950	76.3	0.1	1.72	7.72	9.43	1.22	44.30	8.58	0.86
5	-1.9258	92.352	90.7	0.1	2.04	7.57	9.61	1.27	45.33	8.59	1.02
6	-1.9244	105.062	103.4	0.2	2.33	7.43	9.75	1.31	46.31	8.59	1.16
7	-1.9230	117.172	115.5	0.2	2.60	7.30	9.89	1.36	47.23	8.59	1.30
8	-1.9216	126.785	125.1	0.2	2.81	7.17	9.99	1.39	48.07	8.58	1.41
9	-1.9201	137.226	135.5	0.2	3.05	7.05	10.10	1.43	48.91	8.58	1.52
10	-1.9187	146.412	144.7	0.3	3.25	6.94	10.20	1.47	49.69	8.57	1.63
11	-1.9173	154.514	152.8	0.3	3.44	6.84	10.27	1.50	50.42	8.55	1.72
12	-1.9159	162.385	160.7	0.3	3.61	6.73	10.35	1.54	51.12	8.54	1.81
13	-1.9144	170.817	169.1	0.3	3.80	6.64	10.44	1.57	51.81	8.54	1.90
14	-1.9130	177.894	176.2	0.4	3.96	6.54	10.50	1.60	52.45	8.52	1.98
15	-1.9116	184.145	182.5	0.4	4.10	6.46	10.56	1.63	53.04	8.51	2.05

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
16	-1.9101	191.372	189.7	0.4	4.26	6.38	10.64	1.67	53.60	8.51	2.13
17	-1.9087	198.236	196.5	0.4	4.41	6.29	10.71	1.70	54.18	8.50	2.21
18	-1.9073	204.373	202.7	0.5	4.55	6.22	10.77	1.73	54.70	8.49	2.27
19	-1.9059	210.139	208.4	0.5	4.68	6.15	10.82	1.76	55.20	8.49	2.34
20	-1.9044	215.068	213.4	0.5	4.79	6.08	10.87	1.79	55.66	8.47	2.39
21	-1.9030	221.598	219.9	0.5	4.93	6.01	10.94	1.82	56.14	8.48	2.47
22	-1.9016	227.069	225.4	0.6	5.05	5.95	11.00	1.85	56.58	8.47	2.53
23	-1.9002	232.212	230.5	0.6	5.17	5.88	11.05	1.88	57.04	8.47	2.58
24	-1.8987	236.878	235.2	0.6	5.27	5.82	11.09	1.91	57.47	8.46	2.63
25	-1.8973	240.758	239.1	0.6	5.35	5.76	11.12	1.93	57.86	8.44	2.68
26	-1.8959	246.388	244.7	0.7	5.48	5.71	11.19	1.96	58.22	8.45	2.74
27	-1.8944	251.377	249.7	0.7	5.59	5.66	11.25	1.99	58.58	8.46	2.79
28	-1.8930	255.781	254.1	0.7	5.69	5.61	11.30	2.01	58.92	8.46	2.84
29	-1.8902	263.273	261.6	0.8	5.85	5.52	11.37	2.06	59.56	8.44	2.93
30	-1.8887	268.108	266.4	0.8	5.96	5.47	11.43	2.09	59.88	8.45	2.98
31	-1.8873	272.654	271.0	0.8	6.06	5.43	11.49	2.12	60.19	8.46	3.03
32	-1.8859	276.724	275.0	0.9	6.15	5.39	11.54	2.14	60.46	8.46	3.07
33	-1.8830	283.041	281.3	0.9	6.29	5.31	11.60	2.18	60.99	8.46	3.14
34	-1.8816	287.136	285.4	0.9	6.38	5.28	11.65	2.21	61.25	8.46	3.19
35	-1.8802	291.179	289.5	1.0	6.46	5.23	11.69	2.24	61.59	8.46	3.23
36	-1.8759	299.559	297.9	1.0	6.65	5.15	11.80	2.29	62.09	8.48	3.32
37	-1.8702	310.449	308.8	1.1	6.88	5.05	11.94	2.36	62.79	8.49	3.44
38	-1.8645	320.659	319.0	1.2	7.10	4.96	12.07	2.43	63.42	8.51	3.55
39	-1.8588	329.097	327.4	1.3	7.28	4.89	12.17	2.49	63.92	8.53	3.64
40	-1.8531	336.944	335.3	1.4	7.45	4.80	12.25	2.55	64.54	8.53	3.72
41	-1.8474	343.142	341.4	1.5	7.58	4.75	12.33	2.60	64.92	8.54	3.79
42	-1.8417	348.097	346.4	1.7	7.68	4.70	12.38	2.63	65.25	8.54	3.84
43	-1.8360	353.451	351.8	1.8	7.79	4.66	12.45	2.67	65.52	8.56	3.90
44	-1.8246	360.723	359.0	2.0	7.94	4.61	12.54	2.72	65.89	8.58	3.97
45	-1.8131	366.454	364.8	2.2	8.05	4.56	12.61	2.76	66.21	8.58	4.02
46	-1.8017	371.146	369.5	2.4	8.13	4.54	12.67	2.79	66.37	8.60	4.07
47	-1.7846	376.091	374.4	2.7	8.21	4.52	12.74	2.82	66.47	8.63	4.11
48	-1.7584	379.942	378.2	3.2	8.26	4.51	12.77	2.83	66.58	8.64	4.13

Parameters for Specimen No. 3

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	392.230			1430.500
Moisture content: Dry soil+tare, gms.	335.710			1220.600
Moisture content: Tare, gms.	115.810			303.000
Moisture, %	25.7		23.9	22.9
Moist specimen weight, gms.	1182.5			
Diameter, in.	2.88		2.87	
Area, in.²	6.51		6.48	
Height, in.	5.77		5.37	
Net decrease in height, in.		0.42	-0.03	
Net decrease in water volume, cc.			7.00	
Wet density, pcf	120.0		127.4	
Dry density, pcf	95.5		102.8	
Void ratio	0.7785		0.6513	
Saturation, %	89.8		100.0	

Test Readings for Specimen No. 3

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 156.04 psi (22.47 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 16.71 ksf
Strain rate, %/min. = 0.03
Fail. Stress = 12.77 ksf **at reading no.** 52

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.8800	2.089	0.0	0.0	0.00	16.69	16.69	1.00	40.14	16.69	0.00
1	-1.8786	10.262	8.2	0.0	0.18	16.63	16.81	1.01	40.56	16.72	0.09
2	-1.8771	32.763	30.7	0.1	0.68	16.48	17.16	1.04	41.60	16.82	0.34
3	-1.8757	56.326	54.2	0.1	1.20	16.31	17.52	1.07	42.76	16.91	0.60
4	-1.8743	77.380	75.3	0.1	1.67	16.13	17.80	1.10	44.03	16.96	0.84
5	-1.8728	96.648	94.6	0.1	2.10	15.91	18.01	1.13	45.53	16.96	1.05
6	-1.8714	116.390	114.3	0.2	2.53	15.70	18.23	1.16	47.01	16.97	1.27
7	-1.8700	132.866	130.8	0.2	2.90	15.48	18.38	1.19	48.51	16.93	1.45
8	-1.8686	149.509	147.4	0.2	3.27	15.29	18.55	1.21	49.88	16.92	1.63
9	-1.8671	164.372	162.3	0.2	3.60	15.06	18.65	1.24	51.46	16.86	1.80
10	-1.8657	179.034	176.9	0.3	3.92	14.85	18.77	1.26	52.91	16.81	1.96
11	-1.8643	192.675	190.6	0.3	4.22	14.64	18.86	1.29	54.36	16.75	2.11
12	-1.8629	206.913	204.8	0.3	4.53	14.44	18.98	1.31	55.75	16.71	2.27
13	-1.8614	219.888	217.8	0.3	4.82	14.27	19.09	1.34	56.97	16.68	2.41
14	-1.8600	230.491	228.4	0.4	5.05	14.07	19.13	1.36	58.31	16.60	2.53
15	-1.8586	242.631	240.5	0.4	5.32	13.88	19.20	1.38	59.65	16.54	2.66
16	-1.8572	254.818	252.7	0.4	5.59	13.70	19.29	1.41	60.90	16.49	2.79
17	-1.8557	266.925	264.8	0.5	5.85	13.54	19.40	1.43	61.99	16.47	2.93
18	-1.8543	276.535	274.4	0.5	6.07	13.37	19.44	1.45	63.17	16.41	3.03
19	-1.8529	285.025	282.9	0.5	6.25	13.21	19.47	1.47	64.28	16.34	3.13
20	-1.8515	296.733	294.6	0.5	6.51	13.05	19.56	1.50	65.38	16.31	3.25
21	-1.8500	306.649	304.6	0.6	6.73	12.90	19.63	1.52	66.42	16.27	3.36
22	-1.8486	316.192	314.1	0.6	6.93	12.78	19.71	1.54	67.32	16.24	3.47
23	-1.8472	323.791	321.7	0.6	7.10	12.63	19.73	1.56	68.33	16.18	3.55

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
24	-1.8458	332.441	330.4	0.6	7.29	12.49	19.78	1.58	69.31	16.13	3.64
25	-1.8443	343.159	341.1	0.7	7.52	12.36	19.88	1.61	70.22	16.12	3.76
26	-1.8429	351.877	349.8	0.7	7.71	12.22	19.94	1.63	71.14	16.08	3.86
27	-1.8415	358.835	356.7	0.7	7.87	12.11	19.97	1.65	71.95	16.04	3.93
28	-1.8401	366.590	364.5	0.7	8.03	12.00	20.03	1.67	72.70	16.02	4.02
29	-1.8386	374.980	372.9	0.8	8.22	11.87	20.09	1.69	73.59	15.98	4.11
30	-1.8372	383.249	381.2	0.8	8.40	11.76	20.15	1.71	74.39	15.96	4.20
31	-1.8358	389.459	387.4	0.8	8.53	11.66	20.19	1.73	75.07	15.93	4.27
32	-1.8343	396.781	394.7	0.8	8.69	11.56	20.25	1.75	75.73	15.91	4.35
33	-1.8329	403.141	401.1	0.9	8.83	11.45	20.28	1.77	76.52	15.87	4.41
34	-1.8315	410.960	408.9	0.9	9.00	11.35	20.35	1.79	77.21	15.85	4.50
35	-1.8301	417.471	415.4	0.9	9.14	11.26	20.39	1.81	77.88	15.82	4.57
36	-1.8286	424.267	422.2	1.0	9.29	11.17	20.46	1.83	78.46	15.81	4.64
37	-1.8258	435.144	433.1	1.0	9.52	10.99	20.51	1.87	79.70	15.75	4.76
38	-1.8244	441.215	439.1	1.0	9.65	10.91	20.56	1.88	80.28	15.73	4.83
39	-1.8229	447.190	445.1	1.1	9.78	10.85	20.62	1.90	80.73	15.73	4.89
40	-1.8172	468.799	466.7	1.2	10.24	10.53	20.77	1.97	82.92	15.65	5.12
41	-1.8115	488.450	486.4	1.3	10.66	10.26	20.93	2.04	84.76	15.60	5.33
42	-1.8058	504.889	502.8	1.4	11.01	10.04	21.05	2.10	86.30	15.55	5.51
43	-1.8001	519.897	517.8	1.5	11.33	9.85	21.18	2.15	87.63	15.51	5.66
44	-1.7944	532.551	530.5	1.6	11.59	9.69	21.28	2.20	88.77	15.48	5.80
45	-1.7887	543.446	541.4	1.7	11.82	9.53	21.34	2.24	89.88	15.44	5.91
46	-1.7830	554.222	552.1	1.8	12.04	9.41	21.45	2.28	90.72	15.43	6.02
47	-1.7773	562.493	560.4	1.9	12.21	9.30	21.51	2.31	91.43	15.41	6.10
48	-1.7716	568.859	566.8	2.0	12.33	9.22	21.55	2.34	92.01	15.39	6.17
49	-1.7659	575.387	573.3	2.1	12.46	9.15	21.61	2.36	92.49	15.38	6.23
50	-1.7545	585.513	583.4	2.3	12.65	9.04	21.69	2.40	93.29	15.36	6.33
51	-1.7431	592.206	590.1	2.5	12.77	8.97	21.74	2.42	93.74	15.36	6.39
52	-1.7317	593.402	591.3	2.8	12.77	8.96	21.73	2.43	93.81	15.35	6.38
53	-1.7260	590.667	588.6	2.9	12.70	8.98	21.67	2.41	93.71	15.32	6.35

Parameters for Specimen No. 4

Specimen Parameter	Initial	Cum. for Test	Consolidated	Final
Moisture content: Moist soil+tare, gms.	392.230			1430.500
Moisture content: Dry soil+tare, gms.	335.710			1220.600
Moisture content: Tare, gms.	115.810			303.000
Moisture, %	25.7		22.9	22.9
Moist specimen weight, gms.	1182.5			
Diameter, in.	2.88		2.88	
Area, in.²	6.51		6.53	
Height, in.	5.77		5.24	
Net decrease in height, in.		0.55	-0.02	
Net decrease in water volume, cc.			10.00	
Wet density, pcf	120.0		128.6	
Dry density, pcf	95.5		104.7	
Void ratio	0.7785		0.6224	
Saturation, %	89.8		100.0	

Test Readings for Specimen No. 4

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 272.13 psi (39.19 ksf)
Consolidation back pressure = 40.00 psi (5.76 ksf)
Consolidation effective confining stress = 33.43 ksf
Strain rate, %/min. = 0.03
Fail. Stress = 20.63 ksf **at reading no.** 49

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	-1.7377	2.933	0.0	0.0	0.00	33.40	33.40	1.00	40.17	33.40	0.00
1	-1.7363	6.575	3.6	0.0	0.08	33.39	33.47	1.00	40.27	33.43	0.04
2	-1.7334	42.016	39.1	0.1	0.86	33.30	34.16	1.03	40.86	33.73	0.43
3	-1.7320	79.664	76.7	0.1	1.69	33.19	34.88	1.05	41.65	34.03	0.84
4	-1.7306	115.676	112.7	0.1	2.48	33.05	35.53	1.08	42.65	34.29	1.24
5	-1.7291	149.668	146.7	0.2	3.23	32.88	36.11	1.10	43.80	34.49	1.61
6	-1.7277	181.215	178.3	0.2	3.92	32.69	36.61	1.12	45.15	34.65	1.96
7	-1.7263	212.076	209.1	0.2	4.60	32.47	37.07	1.14	46.64	34.77	2.30
8	-1.7249	239.878	236.9	0.2	5.21	32.24	37.45	1.16	48.25	34.84	2.61
9	-1.7234	265.859	262.9	0.3	5.78	31.99	37.77	1.18	49.95	34.88	2.89
10	-1.7220	289.227	286.3	0.3	6.29	31.74	38.03	1.20	51.71	34.89	3.15
11	-1.7206	313.035	310.1	0.3	6.81	31.47	38.29	1.22	53.57	34.88	3.41
12	-1.7192	334.972	332.0	0.4	7.29	31.20	38.49	1.23	55.49	34.84	3.65
13	-1.7177	356.949	354.0	0.4	7.78	30.91	38.69	1.25	57.45	34.80	3.89
14	-1.7163	376.967	374.0	0.4	8.21	30.63	38.85	1.27	59.40	34.74	4.11
15	-1.7149	394.474	391.5	0.4	8.59	30.36	38.95	1.28	61.32	34.65	4.30
16	-1.7134	412.766	409.8	0.5	8.99	30.08	39.07	1.30	63.27	34.57	4.50
17	-1.7120	431.127	428.2	0.5	9.39	29.78	39.18	1.32	65.30	34.48	4.70
18	-1.7106	449.176	446.2	0.5	9.79	29.50	39.29	1.33	67.27	34.39	4.89
19	-1.7092	464.574	461.6	0.5	10.12	29.23	39.35	1.35	69.16	34.29	5.06
20	-1.7077	480.840	477.9	0.6	10.48	28.95	39.43	1.36	71.07	34.19	5.24
21	-1.7063	497.159	494.2	0.6	10.83	28.68	39.51	1.38	72.96	34.10	5.42
22	-1.7049	512.406	509.5	0.6	11.16	28.41	39.57	1.39	74.83	33.99	5.58
23	-1.7035	526.809	523.9	0.7	11.47	28.15	39.62	1.41	76.67	33.88	5.74

Test Readings for Specimen No. 4

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
24	-1.7020	540.149	537.2	0.7	11.76	27.90	39.66	1.42	78.40	33.78	5.88
25	-1.7006	554.794	551.9	0.7	12.08	27.64	39.72	1.44	80.16	33.68	6.04
26	-1.6992	568.816	565.9	0.7	12.38	27.39	39.78	1.45	81.92	33.58	6.19
27	-1.6978	582.034	579.1	0.8	12.67	27.14	39.82	1.47	83.62	33.48	6.34
28	-1.6963	594.067	591.1	0.8	12.93	26.91	39.84	1.48	85.25	33.38	6.47
29	-1.6949	606.155	603.2	0.8	13.19	26.69	39.88	1.49	86.81	33.28	6.60
30	-1.6935	618.836	615.9	0.8	13.46	26.46	39.92	1.51	88.41	33.19	6.73
31	-1.6921	630.526	627.6	0.9	13.72	26.23	39.95	1.52	89.95	33.09	6.86
32	-1.6906	641.632	638.7	0.9	13.96	26.02	39.98	1.54	91.42	33.00	6.98
33	-1.6892	653.165	650.2	0.9	14.20	25.81	40.02	1.55	92.86	32.92	7.10
34	-1.6878	664.141	661.2	1.0	14.44	25.61	40.05	1.56	94.29	32.83	7.22
35	-1.6864	676.233	673.3	1.0	14.70	25.40	40.10	1.58	95.75	32.75	7.35
36	-1.6849	686.693	683.8	1.0	14.92	25.20	40.12	1.59	97.14	32.66	7.46
37	-1.6821	706.037	703.1	1.1	15.34	24.82	40.16	1.62	99.74	32.49	7.67
38	-1.6806	715.871	712.9	1.1	15.55	24.64	40.19	1.63	101.04	32.41	7.77
39	-1.6749	753.556	750.6	1.2	16.35	23.94	40.29	1.68	105.88	32.12	8.18
40	-1.6692	787.848	784.9	1.3	17.08	23.31	40.39	1.73	110.23	31.85	8.54
41	-1.6635	818.822	815.9	1.4	17.73	22.75	40.49	1.78	114.13	31.62	8.87
42	-1.6578	846.351	843.4	1.5	18.31	22.25	40.56	1.82	117.60	31.41	9.16
43	-1.6521	870.379	867.4	1.6	18.81	21.81	40.62	1.86	120.68	31.21	9.41
44	-1.6464	891.911	889.0	1.7	19.26	21.42	40.68	1.90	123.37	31.05	9.63
45	-1.6407	909.754	906.8	1.9	19.62	21.09	40.71	1.93	125.68	30.90	9.81
46	-1.6350	925.100	922.2	2.0	19.93	20.81	40.74	1.96	127.61	30.78	9.97
47	-1.6293	938.594	935.7	2.1	20.20	20.58	40.79	1.98	129.19	30.69	10.10
48	-1.6179	955.519	952.6	2.3	20.52	20.25	40.77	2.01	131.49	30.51	10.26
49	-1.6065	962.877	959.9	2.5	20.63	20.06	40.70	2.03	132.79	30.38	10.32
50	-1.6008	961.794	958.9	2.6	20.59	20.03	40.62	2.03	133.04	30.32	10.29
51	-1.5837	941.392	938.5	2.9	20.08	20.11	40.19	2.00	132.47	30.15	10.04
52	-1.5780	926.535	923.6	3.0	19.74	20.19	39.94	1.98	131.90	30.06	9.87
53	-1.5723	905.806	902.9	3.2	19.28	20.31	39.59	1.95	131.06	29.95	9.64
54	-1.5666	887.780	884.8	3.3	18.87	20.43	39.30	1.92	130.26	29.87	9.44
55	-1.5609	869.522	866.6	3.4	18.46	20.54	39.00	1.90	129.52	29.77	9.23
56	-1.5552	853.733	850.8	3.5	18.10	20.64	38.75	1.88	128.78	29.69	9.05
57	-1.5495	839.127	836.2	3.6	17.77	20.75	38.52	1.86	128.06	29.63	8.89
58	-1.5438	826.105	823.2	3.7	17.48	20.85	38.33	1.84	127.34	29.59	8.74
59	-1.5381	813.548	810.6	3.8	17.19	20.94	38.13	1.82	126.70	29.54	8.60
60	-1.5324	802.234	799.3	3.9	16.93	21.03	37.96	1.81	126.09	29.50	8.47
61	-1.5267	792.331	789.4	4.0	16.70	21.11	37.81	1.79	125.53	29.46	8.35
62	-1.5210	781.981	779.0	4.1	16.47	21.19	37.66	1.78	124.96	29.43	8.23
63	-1.5096	765.018	762.1	4.4	16.07	21.34	37.41	1.75	123.96	29.37	8.04
64	-1.4982	749.407	746.5	4.6	15.71	21.47	37.18	1.73	123.04	29.32	7.85
65	-1.4868	734.617	731.7	4.8	15.36	21.59	36.95	1.71	122.19	29.27	7.68
66	-1.4753	721.292	718.4	5.0	15.05	21.70	36.75	1.69	121.40	29.23	7.52
67	-1.4639	711.597	708.7	5.2	14.81	21.79	36.60	1.68	120.82	29.19	7.40
68	-1.4383	695.407	692.5	5.7	14.40	21.95	36.34	1.66	119.72	29.15	7.20
69	-1.4098	682.048	679.1	6.3	14.04	22.07	36.10	1.64	118.88	29.09	7.02
70	-1.3813	674.458	671.5	6.8	13.80	22.15	35.94	1.62	118.34	29.04	6.90

Test Readings for Specimen No. 4

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
71	-1.3528	669.855	666.9	7.3	13.62	22.20	35.83	1.61	117.94	29.01	6.81
72	-1.3243	666.222	663.3	7.9	13.47	22.23	35.70	1.61	117.79	28.96	6.74
73	-1.2958	664.402	661.5	8.4	13.35	22.24	35.59	1.60	117.69	28.92	6.68
74	-1.2672	659.285	656.4	9.0	13.17	22.25	35.42	1.59	117.63	28.83	6.59
75	-1.2387	658.799	655.9	9.5	13.08	22.25	35.33	1.59	117.65	28.79	6.54
76	-1.2102	652.789	649.9	10.1	12.89	22.27	35.16	1.58	117.46	28.71	6.44
77	-1.1817	643.828	640.9	10.6	12.63	22.29	34.92	1.57	117.33	28.61	6.32
78	-1.1532	638.761	635.8	11.1	12.46	22.31	34.77	1.56	117.17	28.54	6.23
79	-1.1247	637.333	634.4	11.7	12.35	22.31	34.66	1.55	117.20	28.49	6.18
80	-1.0962	634.693	631.8	12.2	12.22	22.29	34.51	1.55	117.34	28.40	6.11
81	-1.0677	637.693	634.8	12.8	12.21	22.23	34.44	1.55	117.75	28.33	6.10

Knight Piésold
CONSULTING

APPENDIX A4

UNCONFINED COMPRESSIVE STRENGTH LABORATORY REPORT

- GH11-233
- GH11-281
- GH11-294

(Pages A4-1 to A4-10)

NORMAN B. KEEVIL
INSTITUTE OF MINING ENGINEERING

Knight Piésold Ltd.

Unconfined Compressive Strength & Young's Modulus

Laboratory Report

January 31, 2012

LABORATORY TESTING

Testing Date: January, 2012

Tested by: Sheila Ballantyne

Tested at: Norman B Keevil Institute of Mining Engineering, University of British Columbia

Equipment: MTS Electro-Hydraulic Testing

Method: ISRM-1979

Procedure: All samples identified as competent were wet cut and polished and tested per ISRM specifications.

Comments: Poissons ratio was not reported because the UBC circumferential strain gauges were not available at the time of the testing. The client approved reporting only the Young's Modulus, determined through the use of axial strain gauges.

Sample GH11-233-UCS2 was cut shorter than ISRM standards due to breakage during shipping and preparation along natural fractures.

The axial strain guage can be loaded up to 320 kN (112.5 MPa or 16312.5 psi) without damage to the equipment.

When a sample exceeds this load, the test is stopped and the gauges are removed. The testing is then re-started to loads higher than 320 kN without the axial strain gauge. In the data sheets attached, the stress-strain curve does not exceed 112.5 MPa. This method allows for both the Youngs modulus to be calculated and determination of the UCS of a high load sample.

Summary

Unconfined Compressive Strength Results

SAMPLE ID	DEPTH (feet)	DEPTH (m)	Diameter d (mm)	Height H	Ratio H/d	UCS (MPa)	UCS (psi)	Young Modulus E (GPa)
GH11-294-UCS1	73.00 - 73.50	22.25 - 22.40	60.16	145.71	2.4	241.1	34958	71.41
GH11-294-UCS2	104.00 - 105.00	31.70 - 32.00	60.22	146.01	2.4	206.3	29919	76.08
GH11-281-UCS1	40.00 - 40.70	12.19 - 12.41	60.31	146.43	2.4	208.0	30157	63.59
GH11-281-UCS2	72.00 - 73.00	21.95 - 22.25	60.48	146.02	2.4	90.7	13145	67.03
GH11-233-UCS2	87.50 - 90.25	26.67 - 27.51	60.42	117.03	1.9	85.3	12368	35.72

UNCONFINED COMPRESSIVE STRENGTH TESTS

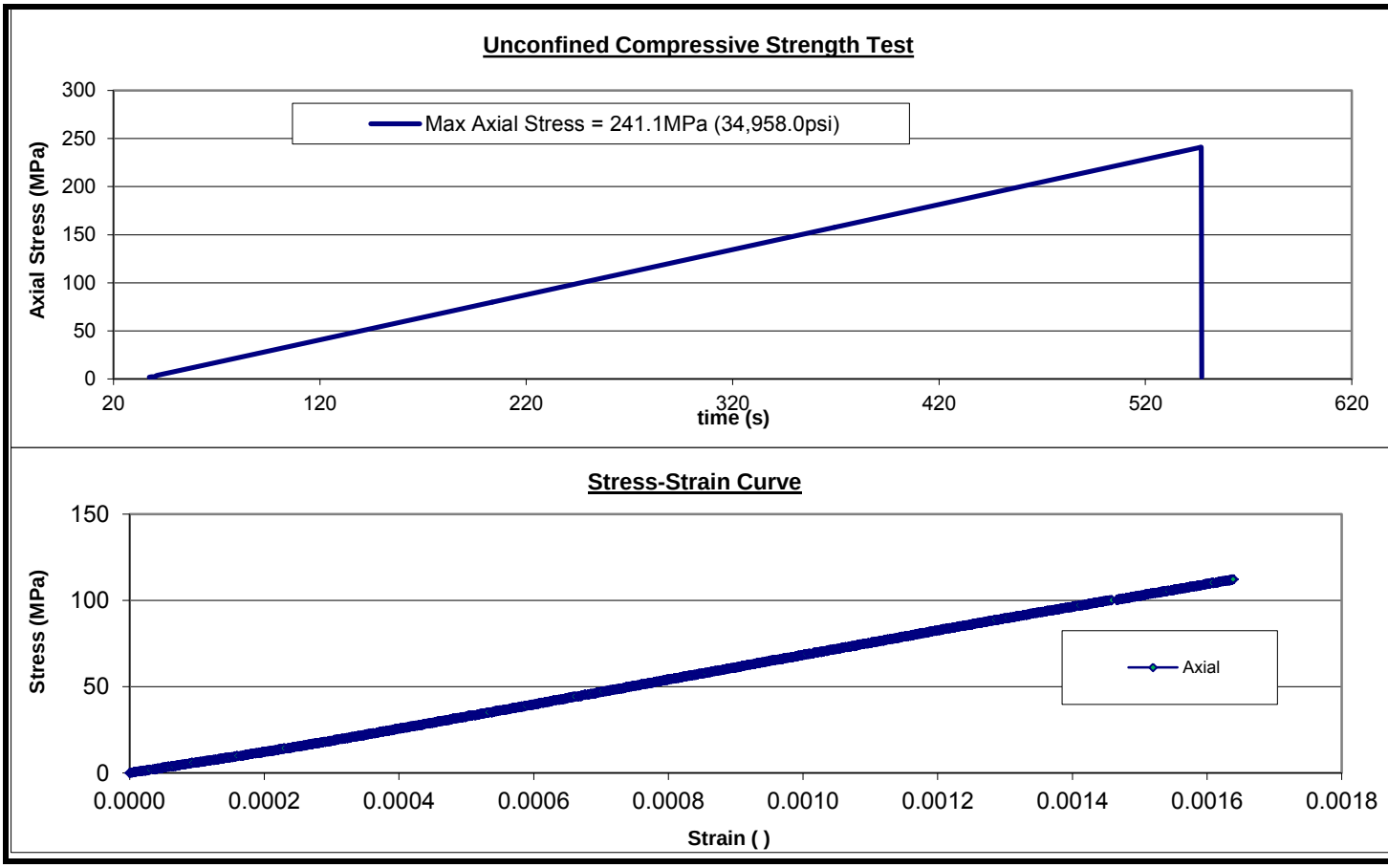
UNCONFINED COMPRESSIVE STRENGTH AND YOUNG'S MODULUS TEST
(ISRM-1979)

Sample ID:	GH11-294-UCS1
Depth (m):	22.25 - 22.40
Test Date:	January, 2012
Tested by:	S.Ballantyne
Young Modulus, E (GPa)	**71.41**
Failure Mode:	**Shear**

Before Test **After Test**



Diameter, (ϕ)	Area, (A)	Height, (h)	Ratio	Peak Load	σ_{UCS}	
(mm)	(mm^2)	(mm)	h/ϕ	(kN)	(MPa)	(psi)
60.16	2842.5	145.71	2.4	685.3	241.1	34,958



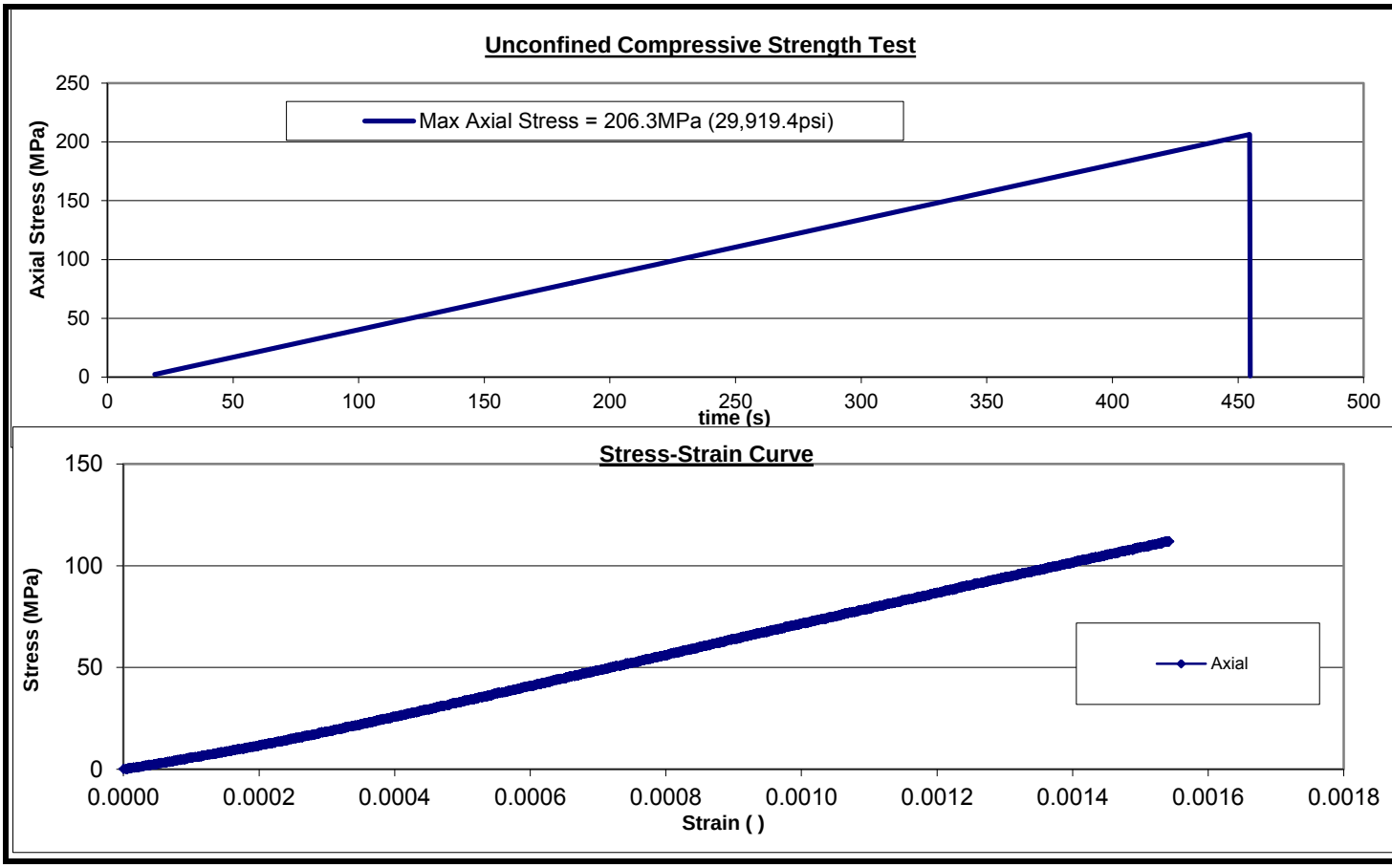
UNCONFINED COMPRESSIVE STRENGTH AND YOUNG'S MODULUS TEST
(ISRM-1979)

Sample ID:	GH11-294-UCS2
Depth (m):	31.70 - 32.00
Test Date:	January, 2012
Tested by:	S.Ballantyne
Young Modulus, E (GPa)	**76.08**
Failure Mode:	**Shear**

Before Test **After Test**



Diameter, (ϕ)	Area, (A)	Height, (h)	Ratio	Peak Load	σ_{UCS}	
(mm)	(mm^2)	(mm)	h/ϕ	(kN)	(MPa)	(psi)
60.22	2848.2	146.01	2.4	587.7	206.3	29,919



UNCONFINED COMPRESSIVE STRENGTH AND YOUNG'S MODULUS TEST
(ISRM-1979)

Sample ID:	GH11-281-UCS1
Depth (m):	12.19 - 12.41
Test Date:	January, 2012
	S.Ballantyne
Young Modulus, E (GPa)	**63.59**
Failure Mode:	**Shear**

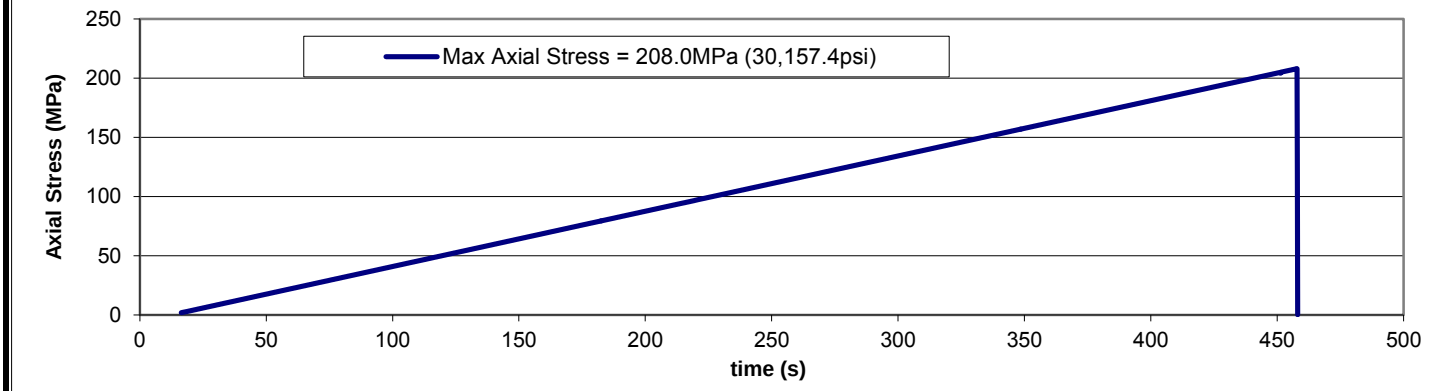
Before Test

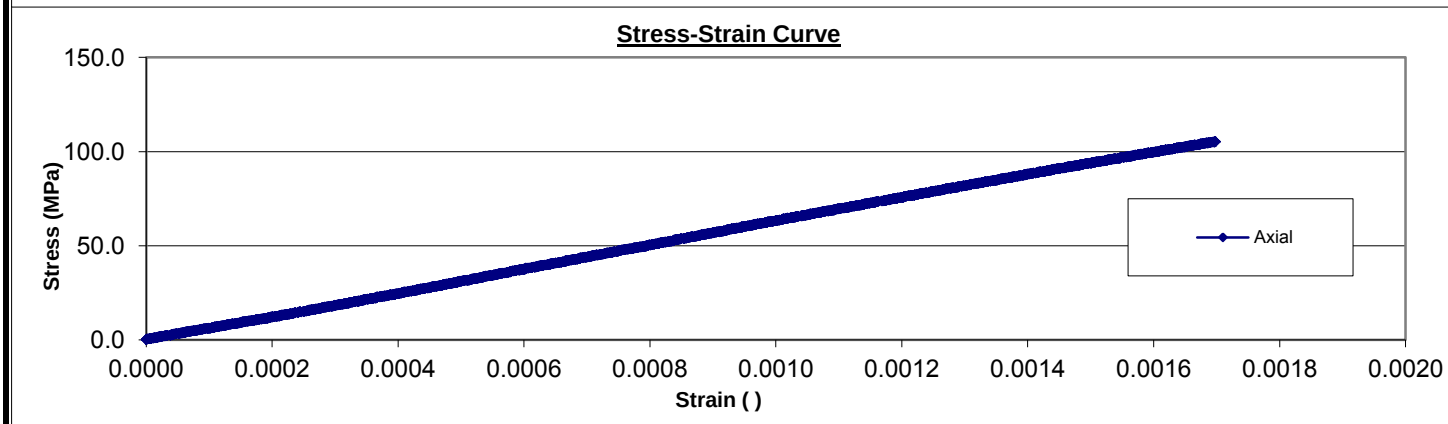


After Test



Diameter, (ϕ)	Area, (A)	Height, (h)	Ratio	Peak Load	σ_{UCS}	
(mm)	(mm^2)	(mm)	h/ϕ	(kN)	(MPa)	(psi)
60.31	2856.7	146.43	2.4	594.1	208.0	30,157





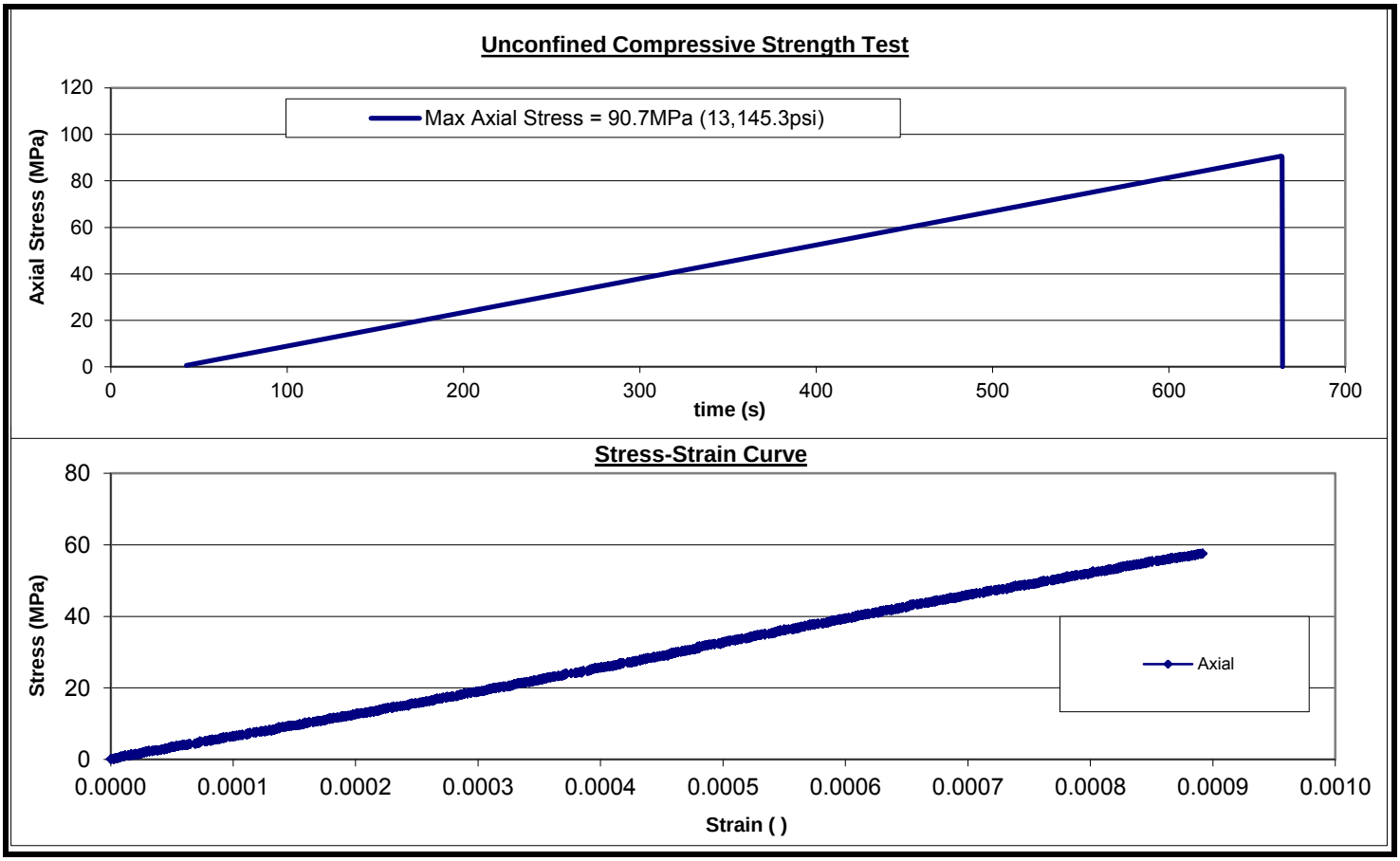
UNCONFINED COMPRESSIVE STRENGTH AND YOUNG'S MODULUS TEST
(ISRM-1979)

Sample ID:	GH11-281-UCS2
Depth (m):	21.95 - 22.25
Test Date:	January, 2012
	S.Ballantyne
Young Modulus, E (GPa)	**67.03**
Failure Mode:	**Pre-existing feature**

Before Test **After Test**



Diameter, (ϕ)	Area, (A)	Height, (h)	Ratio	Peak Load	σ_{UCS}	
(mm)	(mm^2)	(mm)	h/ϕ	(kN)	(MPa)	(psi)
60.48	2872.9	146.02	2.4	260.4	90.7	13,145



UNCONFINED COMPRESSIVE STRENGTH AND YOUNG'S MODULUS TEST
(ISRM-1979)

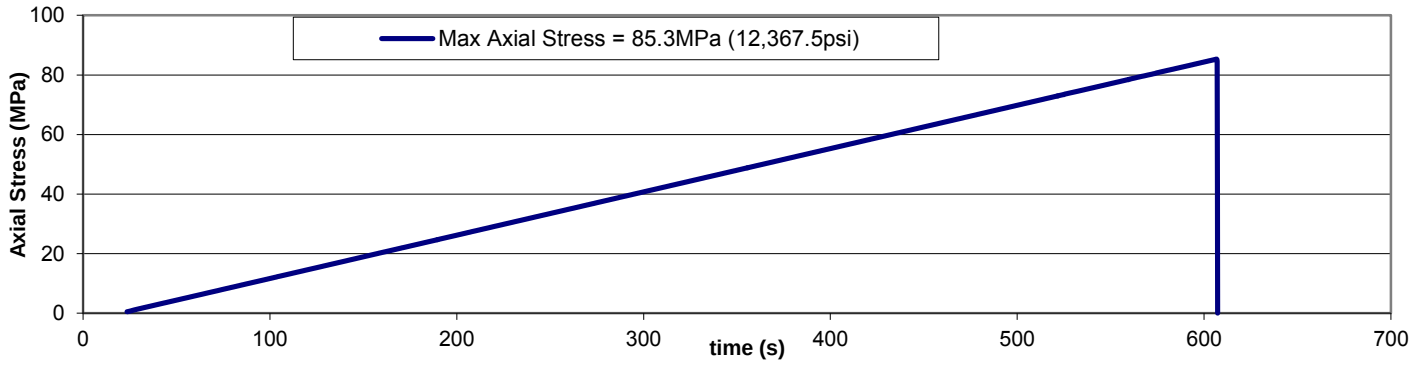
Sample ID:	GH11-233-UCS2
Depth (m):	26.67 - 27.51
Test Date:	January, 2012
	S.Ballantyne
Young Modulus, E (GPa)	**35.72**
Failure Mode:	**Pre-existing feature**

Before Test **After Test**

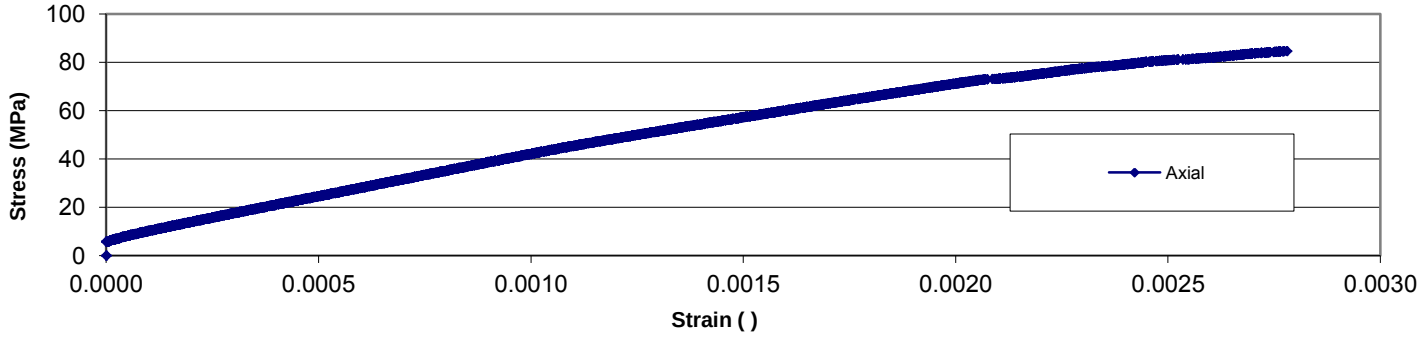


Diameter, (ϕ)	Area, (A)	Height, (h)	Ratio	Peak Load	σ_{UCS}	
(mm)	(mm^2)	(mm)	h/ϕ	(kN)	(MPa)	(psi)
60.42	2867.2	117.03	1.9	244.5	85.3	12,368

Unconfined Compressive Strength Test



Stress-Strain Curve



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APPENDIX A5

PREVIOUS GEOTECHNICAL
DRILLHOLE LOGS ON SECTIONS

- GH04-04, GH04-06, GH04-08, GH04-10 to GH04-11
- GH04-12A, GH04-14, GH04-18
- GH04-26 to GH04-33, GH04-35 to GH04-36
- GH04-39 to GH04-40A, GH04-42 to GH04-48
- GH05-51 to GH05-52, GH05-54
- GH05-56 to GH05-65
- GH06-65 to GH06-80
- GH07-81 to GH07-83, GH07-85 to GH07-94
- GH07-98 to GH07-100, GH07-104 to GH07-105
- GH08-107 to GH08-113, GH08-115 to GH08-116
- GH08-119 to GH08-123, GH08-125
- GH08-128 to GH08-129, GH08-131
- GH08-136 to GH08-138, GH08-140 to GH08-141
- GH08-143 to GH08-144, GH08-146, GH08-150
- GH08-154 to GH08-155, GH08-157 to GH08-159
- GH08-161, GH08-163 to GH08-164
- GH08-166 to GH08-173, GH08-176
- GH08-178 to GH08-179, GH08-183
- GH08-186 to GH08-189, GH08-198 to GH08-204
- GH08-206 to GH08-208, GH08-210
- GH10-211 to GH10-214
- GH10-216 to GH10-228

(Pages A5-1 to A5-447)

Project:	**Pebble Project**	Drill Hole No.	**GH04-04**	Page	**1** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**11 May 04**
Drilling Method:	**DDH**	Elevation:	**924 ft / 281.6m**	Date Completed:	**15 May 04**
Location:	**South Fork Koktuli River**	Total Depth:	**304 ft / 92.7m**	Logged by:	**CNH/NDE**
Coordinates:	**2,123,686 ft N , 1,383,250 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1		SAND and GRAVEL - trace silt, occasional cobbles, poorly graded, angular to subrounded particles, compact to dense, brown, damp to moist		72		GH04-04 #1	10/16/23	39	Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used. HW casing initially advanced to 5'.
10	3				61		GH04-04 #2	5/9/18	27	
15	5				53		GH04-04 #3	1/2/7	9	
30	9				67		GH04-04 #4	2/3/15	18	HW casing advanced to 29' with tri-cone.
35	10				67		GH04-04 #5	18/24/36	60	
	11				61		GH04-04 #6	3/15/23	38	
45	14				83		GH04-04 #7	11/22/27	49	
50	15									No SPT due to heaving.
55	17		SAND and GRAVEL - frequent cobbles, trace to some silt, well graded, angular to subrounded particles, dense, grey/brown, wet		92		GH04-04 #8	28/61/0	100+	
60	19									No SPT.
70	21		SAND and GRAVEL - trace to some silt, poorly graded, angular to subrounded particles, dense to very dense, brown, wet		72		GH04-04 #9	26/26/23	49	
75	23				39		GH04-04 #10	0/0/0	n/a	SPT - disturbed sample.
80	24				78		GH04-04 #11	23/31/31	62	

SPT TEST DATA
Uncorrected 'N' values vs. depth
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-04

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8		0

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GH04-04

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-04**	Page	**2** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**11 May 04**
Drilling Method:	**DDH**	Elevation:	**924 ft / 281.6m**	Date Completed:	**15 May 04**
Location:	**South Fork Koktuli River**	Total Depth:	**304 ft / 92.7m**	Logged by:	**CNH/NDE**
Coordinates:	**2,123,686 ft N , 1,383,250 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26				83	☒	GH04-04 #12	27/38/39	77			
90	27				78	☒	GH04-04 #13	19/25/20	45			
95	28				72	☒	GH04-04 #14	10/33/28	61			
100	29											
105	30				100	☒	GH04-04 #15	40/77/82	100+			
110	31											
115	32				61	☒	GH04-04 #16	34/35/25	60			
120	33		SAND and GRAVEL - trace fines, occasional cobbles, angular to subrounded particles, well graded, very dense, brown and grey, wet		67	☒	GH04-04 #17	19/52/60	100+			
125	34				50	☒	GH04-04 #18	29/50/44	94			
130	35				78	☒	GH04-04 #19	39/42/36	78			
135	36				89	☒	GH04-04 #20	18/38/40	78			
140	37				89	☒	GH04-04 #21	38/39/24	63			
145	38				86	☒	GH04-04 #22	28/40/34	74			
150	39				89	☒	GH04-04 #23	19/52/62	100+			
155	40				62	☒	GH04-04 #24	54/50/0	100+			
160	41				78	☒	GH04-04 #25	30/33/35	68			
	42											
	43											
	44											
	45											
	46											
	47											
	48											
	49											

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-04

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GH04-04

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-04**	Page	**3** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**11 May 04**
Drilling Method:	**DDH**	Elevation:	**924 ft / 281.6m**	Date Completed:	**15 May 04**
Location:	**South Fork Koktuli River**	Total Depth:	**304 ft / 92.7m**	Logged by:	**CNH/NDE**
Coordinates:	**2,123,686 ft N , 1,383,250 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51		gravelly SAND - some silt and clay, occasional cobbles, very dense, brown, wet		81	☒	GH04-04 #26	//			No SPT. Reduced to NQ2.	
170	52											
175	53											
180	54											
185	55											
190	56											
195	57											
200	58											
205	59											
210	60											
215	61		BEDROCK - Tertiary Siltstone - fine grained, grey, carbonates and chlorite on joint surfaces, joints suface highly oxidized near top of bedrock and decreases with depth, some core section highly fractured. RMR89 - 44.1, UCS - 24MPa, RQD - 37.3% (average/estimated values)								* See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)	
220	62											
225	63											
230	64											
235	65											
240	66											
245	67											
	68											
	69											
	70											
	71											
	72											
	73											
	74											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-04

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Project No.	Ref. No.	Rev.
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GH04-04

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-04**	Page	**4** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**11 May 04**
Drilling Method:	**DDH**	Elevation:	**924 ft / 281.6m**	Date Completed:	**15 May 04**
Location:	**South Fork Koktuli River**	Total Depth:	**304 ft / 92.7m**	Logged by:	**CNH/NDE**
Coordinates:	**2,123,686 ft N , 1,383,250 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
250	76											
	77											
255	78											
	79											
260	80											
	81											
265	82											
	83											
270	84											
	85											
275	86											
	87											
280	88											
	89											
285	90											
	91											
290	92											
	93		End of hole at 304' (92.6m)									
295	94											
	95											
300	96											
	97											
305	98											
	99											
310												
315												
320												
325												

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-04

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GH04-04

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-06**	Page	**1** of **3**		
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**18 May 04**		
Drilling Method:	**DDH**	Elevation:	**968 ft / 295.0m**	Date Completed:	**21 May 04**		
Location:	**Frying Pan Lake**	Total Depth:	**213 ft / 64.9m**	Logged by:	**GEM/NDE**		
Coordinates:	**2,146,959 ft N , 1,402,986 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**		

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
			PEAT - very soft, saturated, frozen 1 ft below surface							Triconed to 5'. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
5	1			0	61		GH04-06-1	1/2/2	4	5' - No recovery, peat washed out of core tube.
	2									
10	3									
	4				106		GH04-06-2	1/2/2	4	
15	5		GRAVEL and SAND - some fines and organics (peat), well graded, angular to subangular, compact, dark grey/brown, saturated.	0						14' - Very soft unconsolidated soil.
20	6			0	75		GH04-06-3	4/16/25	41	
	7									
25	8		SAND - very fine sand changing at depth to fine gravel and coarse sand, sub-angular to subround, loose to compact, brown, saturated.	32	67		GH04-06-4	11/17/18	35	
	9		GRAVEL - some sand, some silt, poorly graded, sub-rounded, loose to compact, brown, saturated	26	61		GH04-06-5	2/4/5	9	
30	10									
35	11			0	11		GH04-06-6	1/4/12	16	
40	12									
	13		silty/clayey SAND - fine grained, poorly graded, very soft to soft, brown, saturated.	0	111		GH04-06-7	2/4/8	12	
45	14		SILT and CLAY - some fine sand, some gravel, poorly graded, subrounded, brown to grey, saturated.	200 0	53		GH04-06-8	0.5/0.5/7	7.5	
50	15		SAND - medium grained, trace fines, poorly graded, loose, gray, saturated	20	139		GH04-06-9	4/4/7	11	
	16		CLAY - some silt, trace fine sand, poorly graded, grey, wet	139						
55	17		SAND - fine to medium grained, some to trace silt/clay with depth, trace to some gravel with depth, poorly graded, loose, grey/brown, wet.	0	161		GH04-06-10	3/4/6	10	
60	18			20						60' - Core barrel plugged by medium grained sand. Unplugged and drilled to 65'. SPT#11 sampled from core barrel. 65' - Hole caved to 65.5ft, SPT#12 sampled anyways.
	19			0						
65	20			0	67		GH04-06-11	10/10/10	20	
	21				44		GH04-06-12	9/7/7	14	
70	22			50						
75	23		GRAVEL and SAND - some silt, some clay, well graded, subround to angular, loose to compact, grey, moist to wet.	0	44		GH04-06-13	3/5/24	29	
	24									
80				30	28		GH04-06-14	10/13/17	30	

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-06

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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GH04-06

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-06**	Page	**2** of **3**		
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**18 May 04**		
Drilling Method:	**DDH**	Elevation:	**968 ft / 295.0m**	Date Completed:	**21 May 04**		
Location:	**Frying Pan Lake**	Total Depth:	**213 ft / 64.9m**	Logged by:	**GEM/NDE**		
Coordinates:	**2,146,959 ft N , 1,402,986 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**		

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
85	26			86	100		GH04-06-15	70/-/-	n/a	SPT - hit a rock.
90	27									
95	28			60	100		GH04-06-16	32/50/-	n/a	SPT - hit a rock.
	29									
100	30		Silt and Clay decreasing with depth.	40	88		GH04-06-17	21/51/70+	n/a	
	31			0	56		GH04-06-18	2/18/49	67	No recovery, tight ground, coarse sand in cuttings.
105	32		SAND and CLAY - some gravel, poorly graded, stiff to hard, moist to wet.	0	89		GH04-06-19	20/32/40	72	104' - Core barrel plugged with sand. Attempted to tri-cone, plugged with sand and gravel at 70ft.
110	33									
	34		sandy CLAY - some gravel, some silt, well graded, subround, very stiff to hard, wet.	11						
115	35			67	94		GH04-06-20	23/60+/-	n/a	SPT - refusal @3". Hole under artesian pressure with 4ft stickup on drill rods, 1 - 2 gal/min @ 120ft.
	36									
120	37		SAND and GRAVEL - trace silt, well graded, subround, dense, brown, wet.	57	71		GH04-06-21	6/30/20	50	SPT - shorter test interval due to rock.
125	38			70	96		GH04-06-22	39/58/-	n/a	SPT - hit cobble.
	39									
130	40			52	72		GH04-06-23	9/25/42	67	
			SAND - medium grained, some gravel, trace clay, well graded, dense, wet.	53	91		GH04-06-24	29/75+/-	n/a	SPT - cobbley substrate. Hole making significant water, 5 - 7 gpm @ surface.
135	41									
140	42		GRAVEL - fine grained, some sand, trace silt, well graded, dense, wet.	60	78		GH04-06-25	39/54/81	135	
	43									
145	44		SAND and GRAVEL - all grade sizes, trace silt, well graded, sub-angular to subround, dense, wet	40	133		GH04-06-26	70/-/-	n/a	SPT - rock stuck in tip.
	45		BEDROCK - Diorite - pyrite in joints, highly weathered, grey, calcite infilling, some red staining, joints mostly degraded near surface with no infill, less weathered with depth.	0	60		GH04-06-27	60+/-/-	n/a	
150	46									*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)
155	47		RMR89 - 46.0, RQD - 31.3%, UCS - 75MPa (average/estimated values)							
	48									
160	49									

SPT TEST DATA
Uncorrected 'N' values vs. depth
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-06

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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GH04-06

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-06**	Page	**3** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**18 May 04**
Drilling Method:	**DDH**	Elevation:	**968 ft / 295.0m**	Date Completed:	**21 May 04**
Location:	**Frying Pan Lake**	Total Depth:	**213 ft / 64.9m**	Logged by:	**GEM/NDE**
Coordinates:	**2,146,959 ft N , 1,402,986 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51											
170	52											
175	53											
180	54											
185	55											
190	56											
195	57											
200	58											
205	59											
210	60											
	61											
	62											
	63											
	64											
	65		End Of Hole @ 213 ft (64.9 m)									
215	66											
220	67											
225	68											
230	69											
235	70											
240	71											
245	72											
	73											
	74											

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-06

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Project No.	Ref. No.	Rev.
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GH04-06

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-08**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**22 May 04**
Drilling Method:	**DDH**	Elevation:	**1526 ft / 465.1m**	Date Completed:	**24 May 04**
Location:	**Saddle Area**	Total Depth:	**135 ft / 41.1m**	Logged by:	**GEM/NDE**
Coordinates:	**2,149,963 ft N , 1,373,556 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1		SAND - fine to medium, some gravel, some silt, well graded, sub-angular to subround, loose.	0	61		GH04-08-1	3/3/5	8	Drillhole advanced using HW casing with HQ2 core. HW Casing advanced as far as necessary to keep circulation and avoid hole collapse. HW casing initially advanced to 5'.
	2									
10	3		SAND - fine to medium grained, some gravel, some silt, well graded, sub-angular to subround, loose.	25	39		GH04-08-2	4/6/8	14	
	4		clayey SAND - fine to medium grained, some gravel, some silt, poorly graded, subangular to subrounded, soft, grey.	33	72		GH04-08-3	7/8/10	18	
15	5									
20	6		GRAVEL - coarse to medium grained, some clay, some sand, sub-angular to subround.	28	78		GH04-08-4	12/27/18	45	
25	7			59	8		GH04-08-5	7/10/11	21	
	8									
30	9		GRAVEL and SAND - well graded, subround to sub-angular, compact to dense, brown, wet.	0	50		GH04-08-6	3/5/7	12	
	10			37	156		GH04-08-7	-/-/-	n/a	SPT#7 done in core barrel. Blow count ignored.
35	11			0						
40	12									
	13			56	69		GH04-08-8	10/31/21	52	
45	14									
50	15			26	94		GH04-08-9	17/26/40	66	
	16									
55	17			50	67		GH04-08-10	18/22/23	45	
	18			58	67		GH04-08-11	2/7/16	23	
60	19									
65	20			42	61		GH04-08-12	11/18/28	46	
	21									
70	22			71	67		GH04-08-13	9/12/17	29	
75	23			45	156		GH04-08-14	8/3/10	13	No recovery, sand heaved into core barrel, core tube stuck. Pulled HQ rods to clean out. SPT#14 done inside core
80	24									

SPT TEST DATA
Uncorrected 'N' values vs. depth
(●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-08

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8		0

Rev. 0 - Issued for Report

GH04-08

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-08**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**22 May 04**
Drilling Method:	**DDH**	Elevation:	**1526 ft / 465.1m**	Date Completed:	**24 May 04**
Location:	**Saddle Area**	Total Depth:	**135 ft / 41.1m**	Logged by:	**GEM/NDE**
Coordinates:	**2,149,963 ft N , 1,373,556 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26			0							barrel. Advanced HW casing to 77ft.	
	27				100	☒	GH04-08-15	5/5/16	21			
90	28											
			BEDROCK - Layers of Sandstone, Siltstone and Siltstone Conglomerate/Breccia, some angular clasts, soft clay and carbonate infilling.	73							* See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)	
95	29											
	30		UCS - 30MPa, RQD - 0%, RMR-89 - 35.6 (average/estimated values)									
100	31											
105	32											
	33											
110	34											
115	35											
	36											
120	37											
125	38											
	39											
130	40											
135	41		End of Hole @ 135 feet (41.15m)									
	42											
140	43											
	44											
145	45											
150	46											
	47											
155	48											
160	49											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-08

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SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-10**	Page	**1 of 4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**26 May 04**
Drilling Method:	**DDH**	Elevation:	**908 ft / 276.8m**	Date Completed:	**28 May 04**
Location:	**South Fork Koktuli River**	Total Depth:	**330 ft / 100.6m**	Logged by:	**GEM/SM/NE**
Coordinates:	**2,123,101 ft N , 1,395,412 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
0	0		Surface tundra vegetation.							Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
5	1		SAND and GRAVEL - coarse sand, some cobbles, well graded, subrounded to round, compact.	0	67		GH04-10-1	14/24/18	42	
	2		SAND and GRAVEL - trace silt, occasional cobble, well graded, subrounded to angular, compact to dense at depth, grey, damp to moist.	30	72		GH04-10-2	13/18/18	36	
10	3			67	53		GH04-10-3	14/12/19	31	
15	4									
	5			20	11		GH04-10-4	12/25/33	58	
20	6									
	7			40	56		GH04-10-5	10/37/34	71	
25	8									
30	9			25	78		GH04-10-6	26/34/34	68	
	10									
35	11			57	58		GH04-10-7	1/7/20	27	
				72	47		GH04-10-8	4/9/10	19	
40	12									
	13			56						
45	14									
50	15			50	61		GH04-10-9	4/8/8	16	
	16									
55	17			40	81		GH04-10-10	12/33/30	66	
	18									
60			SAND - medium to fine grained, trace silt, dense to very dense, over consolidated, brown, wet.	0	79		GH04-10-11	12/20/	40	SPT - interval shortened due to refusal @12". Fluvial deposit, likely intra glacial deposit, grades to sandy silt, moderate dilatency. SPT - high 'N'value due to overconsolidated, fine grained substrate. Glacio-lacustrine.
	19			0						
65	20									
			CLAY and SILT - trace to some sand with depth, some gravel with depth, very dense, brown to grey to tan, damp to wet.	0	33		GH04-10-12	5/50+/50+	100+	
70	21									
	22			0	89		GH04-10-13	20/21/22	43	
75	23									
	24			0	44		GH04-10-14	9/13/16	29	
80	25									
				0						

SPT TEST DATA
Uncorrected 'N' values vs. depth
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-10

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8		0

Rev. 0 - Issued for Report

GH04-10

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-10**	Page	**2** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**26 May 04**
Drilling Method:	**DDH**	Elevation:	**908 ft / 276.8m**	Date Completed:	**28 May 04**
Location:	**South Fork Koktuli River**	Total Depth:	**330 ft / 100.6m**	Logged by:	**GEM/SM/NE**
Coordinates:	**2,123,101 ft N , 1,395,412 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
90	27	clayey, gravelly SAND - trace silt, poorly graded, hard, tan, wet.	13	0		GH04-10-15	16/22/27	49	
	28	SILT and CLAY - some gravel, trace cobble, stiff, brown, wet.	0						
95	29								
	30			0		GH04-10-16	40/50+/	n/a	SPT - pushing gravel.
100	31	SILT - trace fine sand, high dilatency.	0						
105	32								
	33	silty SAND - fine grained, trace clay, poorly graded, dense, stratified, gray-brown, damp to wet.	0	0		GH04-10-17	15/15/20	35	
110	34								
115	35								
	36		0	0		GH04-10-18	17/17/20	37	
120	37								
	38	SAND - medium grained, trace silt, trace gravel, poorly graded, compact to dense, grey, wet.	0						
125	39		0	100		GH04-10-19	3/7/7	14	Sanded rods and barrel together from heaved sand. Lost return at 87 ft, used G-STOP, dry hole. Triconed down to 135 ft--lost 3 ft. Cased with HQ to 140 ft.
130	40		0						
135	41			50		GH04-10-20	24/50/39	89	
	42								
140	43	GRAVEL - some silt, trace pockets of sand and gravel, well graded, sub-angular to rounded.	0						Reduced to NQ2 core barrel.
145	44								
	45								
150	46		15						
155	47								
	48								
160	49	SILT - some gravel, trace to some sand, trace clay, stiff, grey, moist.	1						
165	50								
	51								
170									

SPT TEST DATA
Uncorrected 'N' values vs. depth
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-10

Knight Piésold CONSULTING

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Date Revised: 8 Nov 04

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-10**	Page	**3** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**26 May 04**
Drilling Method:	**DDH**	Elevation:	**908 ft / 276.8m**	Date Completed:	**28 May 04**
Location:	**South Fork Koktuli River**	Total Depth:	**330 ft / 100.6m**	Logged by:	**GEM/SM/NE**
Coordinates:	**2,123,101 ft N , 1,395,412 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
175	53			20								
	54											
180	55			50								
	56											
185	57											
190	58		silty SAND - very fine grained, poorly graded, stiff to very stiff, grey to brown, moist to wet.	45								
	59											
195	60											
200	61		GRAVEL - some silt, trace, blue/green sedimentary.	35								
	62											
205	63											
210	64			1								
	65											
215	66											
220	67		silty SAND - some gravel, angular to rounded, compact to dense, brown.	0								
	68											
225	69											
230	70			4								
	71											
235	72											
240	73			10								
	74											
245	75											
250	76			25								
	77											
255												

Northern Dynasty Mines Inc.
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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-10**	Page	**4 of 4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**26 May 04**
Drilling Method:	**DDH**	Elevation:	**908 ft / 276.8m**	Date Completed:	**28 May 04**
Location:	**South Fork Koktuli River**	Total Depth:	**330 ft / 100.6m**	Logged by:	**GEM/SM/NE**
Coordinates:	**2,123,101 ft N , 1,395,412 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
260	79											
	80		SAND and GRAVEL - fine grading to coarse with depth, trace to some silt, isolated cobbles, sub-angular to sub-rounded, dense to compact, brown, moist to damp.	33								
265	81											
	82											
270	83			37							Lost return at 280 ft. Close to being sanded in.	
275	84											
	85											
280	86			38								
	87											
285	88											
	89			0								
290	90											
	91											
295	92											
	93			50							Fluvial deposit.	
300	94											
	95											
305	96			55							Fluvial deposit.	
	97											
310	98			38							S. Martin spoke with R. Moses and decided to shut down the hole.	
	99											
315	100										*Bedrock is undetermined.	
	101		End of hole @ 330 ft (100.6m)	10								
320	102											
	103											
325												
330												
335												
340												

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Overburden Log For GH04-10

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-11**	Page	**1 of 3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**28 May 04**
Drilling Method:	**DDH**	Elevation:	**977 ft / 297.8m**	Date Completed:	**31 May 04**
Location:	**South Fork Koktuli River**	Total Depth:	**170 ft / 51.8m**	Logged by:	**SM/NE**
Coordinates:	**2,128,321 ft N , 1,406,017 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1	SAND - mostly coarse, well graded, trace silt, trace to some gravel, dense, wet, brown, angular to sub-angular.						Triconed to 5'. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
10	2	SAND and SILT - some coarse sand, some gravel (increasing quantity with depth), well graded, subrounded to subangular, dense to compact with depth, brown, damp to wet.	0	106	GH04-11-1	24/26/28	54	
15	4	SAND, GRAVEL and CLAY - some silt, well graded, subrounded to subangular, compact, brown, damp to wet.	49	86	GH04-11-2	15/17/18	35	
20	6			72	GH04-11-3	12/12/13	25	
25	8	SAND and GRAVEL - some to trace silt with depth, isolated cobbles, well graded, subangular to subrounded, loose to very dense with depth, brown, wet to damp.	33	53	GH04-11-4	12/15/11	26	Potential for getting sanded in. PERMEABLE ZONE - lost return from surface to 30ft and @ 42 - 67ft. Used G-STOP at 54.5 - 60 ft interval.
30	9		50					
35	10		54	56	GH04-11-5	4/7/9	16	
40	12							Lost return @ 42 ft.
45	14		42	22	GH04-11-6	6/6/6	12	Lost return until 52 ft depth.
50	15							
55	17		37	53	GH04-11-7	14/20/19	39	Dry hole, used G_STOP.
60	18		65					
65	20			53	GH04-11-8	23/47/34	81	
70	21	BEDROCK - Tertiary Sediments - breccia, grey/green, clay, sand and gravel infilling on joints >10mm (soft), factured zones at each joint.	6					*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)
75	23	UCS - 43.5MPa, RQD - 48.1%, RMR89 - 41.9. (averge/estimated values)						
80	24							

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-11

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-11**	Page	**2** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**28 May 04**
Drilling Method:	**DDH**	Elevation:	**977 ft / 297.8m**	Date Completed:	**31 May 04**
Location:	**South Fork Koktuli River**	Total Depth:	**170 ft / 51.8m**	Logged by:	**SM/NE**
Coordinates:	**2,128,321 ft N , 1,406,017 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
100	31											
	32											
105	33											
	34											
110	35											
	36											
115	37											
	38											
120	39											
	40											
125	41											
	42											
130	43											
	44											
135	45											
	46											
140	47											
	48											
145	49											
150												
155												
160												

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-11

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Project:	**Pebble Project**	Drill Hole No.	**GH04-11**	Page	**3** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**28 May 04**
Drilling Method:	**DDH**	Elevation:	**977 ft / 297.8m**	Date Completed:	**31 May 04**
Location:	**South Fork Koktuli River**	Total Depth:	**170 ft / 51.8m**	Logged by:	**SM/NE**
Coordinates:	**2,128,321 ft N , 1,406,017 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51											
170	52		End of hole @ 170 ft (51.8 m)									
175	53											
	54											
180	55											
	56											
185	57											
	58											
190	59											
	60											
195	61											
200	62											
	63											
205	64											
	65											
210	66											
	67											
215	68											
220	69											
	70											
225	71											
	72											
230	73											
	74											
235												
240												
245												

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-12A**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**1 Jun 04**
Drilling Method:	**DDH**	Elevation:	**884 ft / 269.4m**	Date Completed:	**2 Jun 04**
Location:	**South Fork Koktuli River**	Total Depth:	**130 ft / 39.6m**	Logged by:	**CK/NDE**
Coordinates:	**2,122,286 ft N , 1,393,590 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1		SILT - some fine sand, poorly graded, compact, low plasticity, light to medium brown.							Tri-coned to 5 ft. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
10	2–3		silty SAND - some gravel, isolated cobbles, well graded, angular to subangular, compact to dense, low plasticity, light to medium brown.	0	67		GH04-12A-1	1/5/13	18	
15	4–5									
20	5–7		sandy GRAVEL - fine gravel, trace silt, well graded, subangular, very dense, dark brown.	45	50		GH04-12A-2	16/16/13	29	
25	7–8				33		GH04-12A-3	50+//	n/a	SPT - hit bedrock
30	8–9		BEDROCK - ANDESITE - dark grey, aphanitic, purplish in fracture zones, brecciated, friable rock, clayey/sandy infilling, thin carbonate veins.	55						*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)
35	10–11		UCS - 100MPa, RQD - 44.6%, RMR89 - 51.4. (average/estimated values)							
40	12									
45	13–14									
50	15–16									
55	17									
60	18–19									
65	20									
70	21–22									
75	23									
80	24									

SPT TEST DATA
Uncorrected 'N' values vs. depth
(●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-12A

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Project:	**Pebble Project**	Drill Hole No.	**GH04-12A**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**1 Jun 04**
Drilling Method:	**DDH**	Elevation:	**884 ft / 269.4m**	Date Completed:	**2 Jun 04**
Location:	**South Fork Koktuli River**	Total Depth:	**130 ft / 39.6m**	Logged by:	**CK/NDE**
Coordinates:	**2,122,286 ft N , 1,393,590 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
100	31											
	32											
105	33											
	34											
110	35											
	36											
115	37											
	38											
120	39											
	40		End of hole @ 130 ft (40 m)									
125	41											
	42											
130	43											
	44											
135	45											
	46											
140	47											
	48											
145	49											
150												
155												
160												

Northern Dynasty Mines Inc.
Pebble Project
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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-14**	Page	**1** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**4 Jun 04**
Drilling Method:	**DDH**	Elevation:	**929 ft / 283.2m**	Date Completed:	**6 Jun 04**
Location:	**South Fork Koktuli River**	Total Depth:	**199 ft / 60.7m**	Logged by:	**CK/NDE**
Coordinates:	**2,121,520 ft N , 1,382,419 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
	1	SAND - fine grained, poorly graded, low plasticity, light to medium brown, damp.						Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud addditive used.
5	2	silty SAND - fine grained, some gravel, trace cobbles, well graded, subangular, loose, coarsens with depth, light to medium brown, moist.	0	78	GH04-14-1	2/4/7	11	
10	3							
	4							
15	5	SAND and GRAVEL - trace silt, isolated cobbles, well graded, angular to subrounded, dense to very dense, low plasticity, brown, moist to wet.	26	67	GH04-14-2	19/23/24	47	
20	6							
	7							
25	8		87	39	GH04-14-3	12/38/35	73	
			47					
30	9							
	10							
35	11		0	56	GH04-14-4	7/35/50+	n/a	SPT stopped - bouncing on boulder for 25 blows at 10 inches.
40	12							
	13							
45	14	Fines increasing with depth.	26	39	GH04-14-5	7/16/15	31	Rods under high torque @ 50ft.
50	15							
	16							
55	17	SAND - some clay, trace gravel, trace silt, subangular to subrounded, medium brown, trace cobbles, well graded.	59	100	GH04-14-6	30/38/60	98	
	18		0					SPT stopped - bouncing on boulder. Extended HW casing 58ft. Triconed to next interval. Leak in rods due to sand abrasion.
60	19							
65	20		83	0	GH04-14-7	50+/50+/-	n/a	
	21							
70	22	▼						
75	23		50	81	GH04-14-8	16/38/53	91	
80	24							

SPT TEST DATA
Uncorrected 'N' values vs. depth
(●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-14

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8		0

Rev. 0 - Issued for Report

GH04-14

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-14**	Page	**2** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**4 Jun 04**
Drilling Method:	**DDH**	Elevation:	**929 ft / 283.2m**	Date Completed:	**6 Jun 04**
Location:	**South Fork Koktuli River**	Total Depth:	**199 ft / 60.7m**	Logged by:	**CK/NDE**
Coordinates:	**2,121,520 ft N , 1,382,419 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26		BEDROCK - ANDESITIC MUD/SILTSTONE - highly fractured, friable, light green gouge which reacts with HCl, chlorite alterations. UCS - 15MPa, RQD - 0%, RMR89 - 27.1. (average/estimated values)	26							*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)	
90	27											
95	28											
100	29											
105	30											
110	31											
115	32											
120	33											
125	34											
130	35											
135	36											
140	37											
145	38											
150	39											
155	40											
160	41											
	42											
	43											
	44											
	45											
	46											
	47											
	48											
	49											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-14

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SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-14**	Page	**3** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**4 Jun 04**
Drilling Method:	**DDH**	Elevation:	**929 ft / 283.2m**	Date Completed:	**6 Jun 04**
Location:	**South Fork Koktuli River**	Total Depth:	**199 ft / 60.7m**	Logged by:	**CK/NDE**
Coordinates:	**2,121,520 ft N , 1,382,419 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51											
170	52											
175	53											
180	54											
185	55											
	56		End of hole @ 185 ft (56.4 m)									
190	57											
195	58											
200	59											
205	60											
210	61											
215	62											
220	63											
225	64											
230	65											
235	66											
240	67											
245	68											
	69											
	70											
	71											
	72											
	73											
	74											

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-14

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-18**	Page	**1** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**16 Jun 04**
Drilling Method:	**DDH**	Elevation:	**833.3 ft / 254.0m**	Date Completed:	**18 Jun 04**
Location:	**South Fork Koktuli River**	Total Depth:	**177 ft / 53.9m**	Logged by:	**CK**
Coordinates:	**2,126,850 ft N , 1,382,120 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
0	0		silty SAND - trace clay, trace gravel, poorly graded, low plasticity, tan to rusty brown, moist to wet.							Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used. Geographic Location appears to be remnants of river channel. Note: Located 8m from existing creek. NO SPT - hit boulder @ 14ft.
5	1			0	83	☒	GH04-18-1	2/1/1	2	
	2									
10	3			0	94	☒	GH04-18-2	26/15/15	30	
	4									
15	5			50						
20	6		SAND and GRAVEL - trace silt, isolated boulders, well graded, subangular to subrounded, dense to very dense, light brown/ reddish, moist to wet. Some to trace silt with depth.	80	72	☒	GH04-18-3	7/28/31	59	
25	7			60						
	8			75	89	☒	GH04-18-4	7/19/18	37	
30	9									
	10			80	61	☒	GH04-18-5	19/26/14	40	
35	11									
40	12		SAND and GRAVEL - fine to medium grained sand, trace silt, trace clay, isolated cobbles and boulders, well graded, subangular to subrounded, compact to dense, light to medium brown, moist to wet.	25	33	☒	GH04-18-6	1/3/5	8	
	13			75						
45	14			100	0	☒	GH04-18-7	12/15/9	24	
50	15									
	16									
55	17			70	61	☒	GH04-18-8	11/20/24	44	
	18		BEDROCK - Andesitic Siltstone - grey, very tighly annealed veins, trace calcite, clay gouge and pyrite found in joints, joints dip 30 - 45 degrees. UCS - 30MPa, RQD - 14.9%, RMR89 - 40.9. (average/estimated values)	150						*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)
60	19									
65	20									
70	21									
	22									
75	23									
80	24									

SPT TEST DATA Uncorrected 'N' values vs. depth (●) — 20 40 60 80 — Drill Run Time (min) — 10 20 30 40

WELL DETAILS

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-18

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-18**	Page	**2** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**16 Jun 04**
Drilling Method:	**DDH**	Elevation:	**833.3 ft / 254.0m**	Date Completed:	**18 Jun 04**
Location:	**South Fork Koktuli River**	Total Depth:	**177 ft / 53.9m**	Logged by:	**CK**
Coordinates:	**2,126,850 ft N , 1,382,120 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
100	31											
	32											
105	33											
	34											
110	35											
	36											
115	37											
	38											
120	39											
	40											
125	41											
	42											
130	43											
	44											
135	45											
	46											
140	47											
	48											
145	49											
150												
155												
160												

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-18

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Project:	**Pebble Project**	Drill Hole No.	**GH04-18**	Page	**3** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT & Core**	Date Started:	**16 Jun 04**
Drilling Method:	**DDH**	Elevation:	**833.3 ft / 254.0m**	Date Completed:	**18 Jun 04**
Location:	**South Fork Koktuli River**	Total Depth:	**177 ft / 53.9m**	Logged by:	**CK**
Coordinates:	**2,126,850 ft N , 1,382,120 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51											
170	52											
175	53											
	54		End of hole at 177' (53.9m)									
180	55											
	56											
185	57											
190	58											
	59											
195	60											
200	61											
	62											
205	63											
210	64											
	65											
215	66											
220	67											
	68											
225	69											
230	70											
	71											
235	72											
240	73											
	74											
245												

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-18

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-26**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**2 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1558.4 ft / 475.0m**	Date Completed:	**3 Jul 04**
Location:	**Mill Site**	Total Depth:	**135 ft / 41.1m**	Logged by:	**CK**
Coordinates:	**2,158,941 ft N , 1,396,246 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
	1		silty SAND - some gravel, isolated cobbles, trace inclusions (roots), well graded, angular, low plasticity, damp.								Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used. HW casing initially advanced to 4.5'.	
5	2		BEDROCK - Siltstone - medium to dark brown-grey, with narrow bands of wacke, early pervasive potassic alterations, quartz, epidote and pyrite veins, hematite and limonite alterations, highly fractured.	0							*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)	
10	3											
	4		UCS - 115MPa, RQD - 27.9%, RMR89 - 48.8. (average/estimated values)									
15	5											
20	6											
	7											
25	8		▼									
30	9											
	10											
35	11											
40	12											
	13											
45	14											
50	15											
	16											
55	17											
60	18											
	19											
65	20											
70	21											
	22											
75	23											
80	24											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-26

Knight Piésold CONSULTING

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SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-26**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**2 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1558.4 ft / 475.0m**	Date Completed:	**3 Jul 04**
Location:	**Mill Site**	Total Depth:	**135 ft / 41.1m**	Logged by:	**CK**
Coordinates:	**2,158,941 ft N , 1,396,246 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
100	31											
	32											
105	33											
	34											
110	35											
	36											
115	37											
	38											
120	39											
	40											
125	41		End of hole at 135' (41.1m).									
130	42											
	43											
135	44											
	45											
140	46											
	47											
145	48											
	49											
150												
155												
160												

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-26

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SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-27**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**4 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1551.84 ft / 473.0m**	Date Completed:	**4 Jul 04**
Location:	**Mill Site**	Total Depth:	**125 ft / 38.1m**	Logged by:	**CK**
Coordinates:	**2,157,549 ft N , 1,395,818 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
	0		silty SAND - some gravels, trace cobbles, trace inclusions (roots), well graded, angular, low plasticity, damp.	0							Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used. *See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)	
5	1		BEDROCK - Siltstone - greenish-blue w/ Wacke layers, limonite alt on fracture surfaces, illite/chlorite alterations pervasive (green tint), quartz/ dolomite/ pyrite veining, heavily fractured, healed by silty sand infill.									
10	2											
	3		UCS - 61MPa, RQD - 27.9%, RMR89 - 46.7. (average/estimated values)									
15	4											
	5											
20	6											
	7											
25	8											
	9											
30	10											
	11											
35	12											
	13											
40	14											
	15											
45	16											
	17											
50	18											
	19											
55	20											
	21											
60	22											
	23											
65	24											
70												
75												
80												

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-27

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Project No.	Ref. No.	Rev.
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SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-27**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**
Drilling Method:	**DDH**	Elevation:	**1551.84 ft / 473.0m**
Location:	**Mill Site**	Total Depth:	**125 ft / 38.1m**
Coordinates:	**2,157,549 ft N , 1,395,818 ft E (NAD 83, Alaska State Planes - Zone 5)**		

Page **2** of **2**
Date Started: **4 Jul 04**
Date Completed: **4 Jul 04**
Logged by: **CK**
Reviewed by: **SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
100	31											
	32											
105	33											
	34											
110	35											
	36											
115	37											
120	38		End of hole at 125' (38.1m).									
125	39											
	40											
130	41											
	42											
135	43											
	44											
140	45											
	46											
145	47											
	48											
150	49											
155												
160												

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-27

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-28**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**5 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1158.14 ft / 353.0m**	Date Completed:	**6 Jul 04**
Location:	**Frying Pan Lake**	Total Depth:	**145 ft / 44.2m**	Logged by:	**CK**
Coordinates:	**2,137,379 ft N , 1,398,091 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1		SAND - some gravel, some silt, well graded, angular, compact to dense, medium brown, moist.	0	78	☒	GH04-28-1	10/10/12	22	Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used. HW casing initially advanced to 4'.
10	3			0	67	☒	GH04-28-2	9/12/9	21	
15	5		GRAVEL and SAND - trace silt, isolated cobble/boulders - surface heavily oxidized from 15-19ft, well graded, angular, medium brown, wet.	0	61	☒	GH04-28-3	3/9/17	26	Sanded in - extend HW casing to 22ft.
20	6			100						
25	8		BEDROCK - Monzodiorite - fine grained, green w/ light green patches(sericite alt), calcite and clay filled amygdules and joint infill, limonite/ epidote/ quartz/ magnetite alterations, quartz/ dolomite/ pyrite/ calcite veining. UCS - 152MPa, RQD - 62.7%, RMR89 - 62.8. (average/estimated values)	50						*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)
30	9									
35	10									
40	12									
45	13									
50	14									
55	15									
60	16									
65	17									
70	18									
75	19									
80	20									
	21									
	22									
	23									
	24									

SPT TEST DATA
Uncorrected 'N' values vs. depth
(●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-28

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GH04-28

Rev. 0 - Issued for Report

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-28**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**5 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1158.14 ft / 353.0m**	Date Completed:	**6 Jul 04**
Location:	**Frying Pan Lake**	Total Depth:	**145 ft / 44.2m**	Logged by:	**CK**
Coordinates:	**2,137,379 ft N , 1,398,091 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
100	31											
	32											
105	33											
	34											
110	35											
	36											
115	37											
	38											
120	39											
	40											
125	41											
	42											
130	43											
	44											
135	45											
	46											
140	47											
	48											
145	49		End of hole at 145' (44.2m).									
150												
155												
160												

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-28

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8		0

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-29**	Page	**1 of 1**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**9 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1072.83 ft / 327.0m**	Date Completed:	**10 Jul 04**
Location:	**Frying Pan Lake**	Total Depth:	**45 ft / 13.7m**	Logged by:	**CK/KA**
Coordinates:	**2,135,591 ft N , 1,399,085 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1–2		SAND - some gravel, some silt, isolated cobbles and boulders, well graded, rounded to subrounded, loose to compact, light to medium brown, moist.	0						Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
10	3			20						
15	4–5		GRAVEL and SAND - trace silt, isolated cobbles and boulders, well graded, rounded to subrounded, loose to compact, light to medium brown, moist.	40	50	☒	GH04-29-1	8/10/11	21	
20	6			20						
	7			50						
25	8			42	39	☒	GH04-29-1	3/3/6	9	
30	9–10			35						
35	11			60	44	☒	GH04-29-4	12/17/11	28	
40	12–13		gravelly SAND - occasional cobbles, isolated boulders, well graded, rounded to sub-rounded, loose to compact, medium brown, moist.	25						
45	14		HOLE ABANDONNED - REFER TO GH04-29A.	40	50	☒	GH04-29-5	9/9/8	17	Lost 5ft of HW casing in hole. Attempt to hook up but ended up splitting 4ft of casing. See Photo #1-GH04-29 folder.
50	15–16									
55	17									
60	18–19									
65	20									
70	21									
75	22–23									
80	24									

SPT TEST DATA
Uncorrected 'N' values vs. depth (●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-29

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SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 8 Nov 04

Project:	**Pebble Project**	Drill Hole No.	**GH04-29A**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**13 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1030.1 ft / 314.0m**	Date Completed:	**14 Jul 04**
Location:	**Frying Pan Lake**	Total Depth:	**159 ft / 48.5m**	Logged by:	**CK/KA**
Coordinates:	**2,135,590 ft N , 1,399,086 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
			Triconed down to 57' and advanced HW casing. Refer to GH04-29 Overburden Log for upper 55'.							Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
55	17		SAND and GRAVEL - increasing sand with depth, occasional cobbles and boulders, poorly graded, angular to sub-rounded, compact, moist.		6		GH04-29A - 1	6/5/4	9	
65	20			57	56		GH04-29A - 2	21/28/49	77	
70	21			40						
75	23			87	78		GH04-29A - 3	10/27/41	68	
80	24			30						

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-29A

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Date Revised: 20 Jan 05

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Project:	**Pebble Project**	Drill Hole No.	**GH04-29A**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**13 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1030.1 ft / 314.0m**	Date Completed:	**14 Jul 04**
Location:	**Frying Pan Lake**	Total Depth:	**159 ft / 48.5m**	Logged by:	**CK/KA**
Coordinates:	**2,135,590 ft N , 1,399,086 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
85	26			70	83	☒	GH04-29A - 4	20/31/22	53	
	27									
90			sandy GRAVEL - some cobbles, some boulders, rounded to subrounded, well graded, light to medium brown.	50						
	28									
95	29			70						No SPT
	30									
100				50						
	31									
105	32			85						SPT - hit boulder.
	33									
110				75						
	34									
115	35			30	75	☒	GH04-29A - 6	18/45/-	n/a	SPT-6 aborted after 12", blow count too high.
	36									
120				40						
	37			92						
125	38			12	1371	☒	GH04-29A - 7	24/50+/-	n/a	SPT-7 aborted after 7", blow count too high.
	39									
130				60						
	40									
135	41		GRAVEL and SAND - trace silt, isolated cobbles, well graded, rounded to subrounded, loose to compact, medium brown, moist.	0	6	☒	GH04-29A - 8	6/8/15	23	SPT8,9 --material fell out of the tube-stuck in core barrel -poor test.
	42			75						
140	43									
	44			40						
145				17	117	☒	GH04-29A - 9	21/-/-	n/a	
	45									
150	46			40						
			WEATHERED BEDROCK- mafic, silty infill and on surface, RMR~15, RQD=0, UCS~50.	41						*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)
155	47			80						
	48									
160			End of hole @159' (48.5m).							
	49									

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

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Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-29A

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-30**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**
Drilling Method:	**DDH**	Elevation:	**939.3 ft / 286.3m**
Location:	**Frying Pan Lake**	Total Depth:	**175 ft / 53.3m**
Coordinates:	**2,132,937 ft N , 1,394,724 ft E (NAD 83, Alaska State Planes - Zone 5)**		

Page **1** of **3**
Date Started: **31 Jul 04**
Date Completed: **3 Aug 04**
Logged by: **KA/RV**
Reviewed by: **SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
			GRAVEL and SAND - trace silt, occasional to frequent cobbles with depth, well graded, subangular to subrounded, medium brown, moist.		67		GH04-30-1	17/27/40	67	Triconed down to 5'. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
				60						
				0	50		GH04-30-2	50+//	n/a	SPTs are problematic due to cobbley substrate.
			sandy GRAVEL- trace silt, occasional cobbles, well graded, subangular to subrounded, compact to dense, light brown to light grey with depth, moist.	60	33		GH04-30-3	7/9/25	34	
			silty, gravelly SAND - trace clay, well graded, subangular to subrounded, compact to dense, light brown to light grey with depth, moist.	90	94		GH04-30-4	19/16/19	35	
				50						SPT - hit a boulder.
			GRAVEL and SAND - some silt, trace clay, occasional cobbles, well graded, subangular to subrounded, dense, light grey, moist.	80	92		GH04-30-5	20/50+/	n/a	Triconed - no recovery. SPT - hit a boulder.
					61		GH04-30-6	23/23/19	46	
				30						
				67	67		GH04-30-7	32/50+/	n/a	SPT - hit a boulder.
				30						
			sandy GRAVEL- trace silt, isolated cobbles, poorly graded, subangular to subrounded, dense, light grey, moist to wet.	50	58		GH04-30-8	23/50+/	n/a	SPT - hit a boulder.
				25						
				40	58		GH04-30-9	41/50+/	n/a	SPT - hit a boulder.
				13						

SPT TEST DATA
Uncorrected 'N' values vs. depth
(●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-30

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 20 Jan 05

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-30**	Page	**2** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**31 Jul 04**
Drilling Method:	**DDH**	Elevation:	**939.3 ft / 286.3m**	Date Completed:	**3 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**175 ft / 53.3m**	Logged by:	**KA/RV**
Coordinates:	**2,132,937 ft N , 1,394,724 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
85	26		GRAVEL - well graded, subangular to subrounded, moist to wet.	40	83		GH04-30-10	45/38+/	n/a	SPT - hammer broke.
	27			47						Drill time unknown.
90	28									
95	29			110						
	30									
100	31		Increasing cobbles and boulders.	60						No SPT.
105	32			80						Drill time unknown - lots of problems.
	33									
110	34			110						Drill time unkown - lots of problems.
115	35		SAND- some gravel, frequent cobbles, well graded, rounded to subrounded.	100						Assuming 4.75ft was sand as the core barrel sanded in twice on this run.
	36									
120	37			5						
125	38		SILT- some sand, some clay, trace gravel, isolated cobbles, poorly graded, rounded to subrounded, compact to very dense, medium brown, moist.	5	44		GH04-30-11	19/16/7	35	
	39									
130	40									
135	41			50	100		GH04-30-12	25/50+/	n/a	SPT - hit a boulder.
	42									
140	43		gravelly SAND- trace silt on cobbles, some gravel, well graded, rounded to subrounded.	15						
145	44			40	50		GH04-30-13	20/49/32	81	
	45									
150	46		sandy GRAVEL- trace silt, isolated cobbles, well graded, subrounded to rounded, light brown.	0						No SPT.
155	47			100						
	48									
160	49			70						No SPT.

SPT TEST DATA
Uncorrected 'N' values vs. depth (●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-30

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-30**	Page	**3** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**31 Jul 04**
Drilling Method:	**DDH**	Elevation:	**939.3 ft / 286.3m**	Date Completed:	**3 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**175 ft / 53.3m**	Logged by:	**KA/RV**
Coordinates:	**2,132,937 ft N , 1,394,724 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51			90							Due to a series of mislatches on the core barrel the actual recovery for this run is unknown.	
170	52											
175	53		END OF HOLE @ 175ft.	40							Bedrock was never reached. This hole was closed off due to the frequency at which the rods had to be pulled.	
180	54											
185	55											
190	56											
195	57											
200	58											
205	59											
210	60											
215	61											
220	62											
225	63											
230	64											
235	65											
240	66											
245	67											
	68											
	69											
	70											
	71											
	72											
	73											
	74											

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Overburden Log For GH04-30

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-31**	Page	**1** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**7 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1011.5 ft / 308.3m**	Date Completed:	**9 Jul 04**
Location:	**Frying Pan Lake**	Total Depth:	**195 ft / 59.4m**	Logged by:	**CK/KA**
Coordinates:	**2,133,911 ft N , 1,400,682 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1		gravelly SAND - trace cobbles, trace silt, well graded, rounded ot subrounded, light brown, moist to wet.	0	100		GH04-31-1	50+/-/-	n/a	Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used. HW casing initially advanced to 4'.
10	3				56		GH04-31-2	11/50+/-	n/a	
15	5		silty SAND and GRAVEL - trace clay, isolated cobble, well graded, rounded to subrounded, dense to very dense, medium to light brown, moist.	27	83		GH04-31-3	17/31/40	71	
20	6		silty SAND - some gravel, trace clay, isolated cobbles (increasing with depth), well graded, subrounded to subangular, dense to very dense, light brown, moist. Decreasing fines. Some cobbles.	0	83		GH04-31-4	8/22/30	52	
25	8			40			GH04-31-5	50+/-/-	n/a	
35	11			60	72		GH04-31-6	14/26/27	53	Tricone down to 45ft-extend HW casing.
40	12		SAND and GRAVEL - some silt, trace clay, poorly graded, subangular to subrounded, dense, light brown, moist.							
45	14			0	72		GH04-31-7	15/24/28	52	
50	15		gravelly SILT - trace sand, trace cobbles, well graded, subrounded, very dense, light brown, moist.	12						
55	17		sandy GRAVEL - some silt, trace clay, isolated cobbles, poorly graded, subrounded to rounded, dense, light brown, moist to damp.	40	56		GH04-31-8	11/18/26	44	
60	19			57						
65	20			8	78		GH04-31-9	23/48/43	91	
75	23			15	56		GH04-31-10	11/29/35	64	
80	24		BEDROCK- Latite - green, fine grained, flow banding, sericite infilling, quartz/dolomite/pyrite	18 11						*See GEOTECHNICAL BEDROCK DATA

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-31

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Project:	**Pebble Project**	Drill Hole No.	**GH04-31**	Page	**2** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**7 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1011.5 ft / 308.3m**	Date Completed:	**9 Jul 04**
Location:	**Frying Pan Lake**	Total Depth:	**195 ft / 59.4m**	Logged by:	**CK/KA**
Coordinates:	**2,133,911 ft N , 1,400,682 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26		veining mostly oxidized to limonite on fracture surfaces, irregular calcite stringers, moderately jointed.	70							LOGGING SHEET for additional information (RMR89)	
90	27		100 to 170' - coarse grained latite, same as GH04-32.									
95	28		Shear zone from 85' to 89' - partially healed.									
100	29		Shear zone from 130' to 135' - partially healed with calcite rich clay.									
105	30		UCS - 50MPa, RQD - 49.6%, RMR89 - 50.6. (average/estimated values)									
110	31											
115	32											
120	33											
125	34											
130	35											
135	36											
140	37											
145	38											
150	39											
155	40											
160	41											
	42											
	43											
	44											
	45											
	46											
	47											
	48											
	49											

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
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Project:	**Pebble Project**	Drill Hole No.	**GH04-31**	Page	**3** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**7 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1011.5 ft / 308.3m**	Date Completed:	**9 Jul 04**
Location:	**Frying Pan Lake**	Total Depth:	**195 ft / 59.4m**	Logged by:	**CK/KA**
Coordinates:	**2,133,911 ft N , 1,400,682 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51											
170	52											
175	53											
180	54											
185	55											
190	56											
195	57											
200	58											
205	59											
210	60											
215	61											
220	62											
225	63											
230	64											
235	65											
240	66											
245	67											
	68											
	69											
	70											
	71											
	72											
	73											
	74											
			End of hole at 195' (59.4m).									

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-32**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**6 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1214.6 ft / 370.2m**	Date Completed:	**7 Jul 04**
Location:	**Frying Pan Lake**	Total Depth:	**135 ft / 41.1m**	Logged by:	**CK/KA**
Coordinates:	**2,132,207 ft N , 1,401,402 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
5	1		sandy SILT - trace gravel, isolated boulders, well graded, subrounded to rounded, loose to compact, medium brown, moist.								Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used. HW casing initially advanced to 7'.	
	2			0								
10	3			17								
	4											
15	5		sandy GRAVEL - some silt, poorly graded, subangular to subrounded, sandy-silt layer above and below the 3" gravel layer, moist.	8	75		GH-04-32-1	5/15/50+	n/a			
20	6		SILT - some sand, trace gravel, trace cobbles, trace boulders, well graded, subrounded to subangular, loose to compact, medium brown, moist.	30								
	7											
25	8		BEDROCK - Latite - light green with plagioclase phenocrysts altering to illite, higly fractured with calcite and clay infilling.	33 80							*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)	
30	9		▼ Andesite - 32.5' to 42', 65' to 68', 85' to 90', olive green, with calcite and pyrite veins and vesicles which are mostly alterred to limonite.									
35	10		FAULT ZONE @44' - fault breccia in a fine grained calcite rich clay matrix.									
	11											
40	12		Fracture zone from 106' to 130'.									
	13											
45	14		UCS - 80MPa, RQD - 31.2%, RMR89 - 48.8. (average/estimated values)									
50	15											
	16											
55	17											
	18											
60	19											
	20											
65	21											
70	22											
	23											
75	24											
80												

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-32

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 20 Jan 05

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-32**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**6 Jul 04**
Drilling Method:	**DDH**	Elevation:	**1214.6 ft / 370.2m**	Date Completed:	**7 Jul 04**
Location:	**Frying Pan Lake**	Total Depth:	**135 ft / 41.1m**	Logged by:	**CK/KA**
Coordinates:	**2,132,207 ft N , 1,401,402 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
100	31											
	32											
105	33											
	34											
110	35											
	36											
115	37											
	38											
120	39											
	40											
125	41		End of hole at 135' (41.1m).									
130	42											
	43											
135	44											
	45											
140	46											
	47											
145	48											
	49											
150												
155												
160												

Northern Dynasty Mines Inc.
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Date Revised: 20 Jan 05

Project: Pebble Project | Drill Hole No. **GH04-33** | Page 1 of 5

Drilling Co: Quest America Drilling Inc. | In-Situ Sampler: SPT Split Spoon | Date Started: 10 Jul 04

Drilling Method: DDH | Elevation: 905.4 ft / 276.0m | Date Completed: 13 Jul 04

Location: South Fork Koktuli River | Total Depth: 335 ft / 102.1m | Logged by: CK/KA

Coordinates: 2,129,087 ft N , 1,399,309 ft E (NAD 83, Alaska State Planes - Zone 5) | Reviewed by: SM

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1		SAND and GRAVEL - trace silt, trace clay, frequent to isolated cobbles with depth, well graded, subangular to subrounded, compact to very dense with depth, medium brown, moist.	0	0		GH04-33-1	50+/-/-	n/a	Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used. HW casing initially advanced to 5'.
10	3			60	47		GH04-33-2	6/26/17	43	
15	5			40	33		GH04-33-3	50+/-/-	n/a	
20	6			50						
25	8			60	50		GH04-33-4	12/26/19	45	
30	9			40						
35	11		SILT - some sand, some clay, trace gravel, isolated cobbles, poorly graded, loose to compact, low plasticity, light brown, moist to wet.	40	56		GH04-33-5	4/7/8	15	Note: Drill rig has zero water head pressure at the drill bit.
40	12									
45	14			30	139		GH04-33-6	1/5/8	13	
50	15			7						
55	17		GRAVEL and SAND - some silt, isolated cobbles and boulders, well graded, rounded to subrounded, compact, light to medium brown, moist.	20	67		GH04-33-7	15/27/30	57	
60	18			60						
65	20			80	61		GH04-33-8	20/18/14	32	
70	21									
75	22		SAND and GRAVEL - some to trace silt with depth, trace clay, well graded, subrounded, dense to very dense, light to medium brown, moist.	60						
80	24			20	78		GH04-33-9	10/16/24	40	
				20						Tricone - extend HW

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
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Overburden Log For GH04-33

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SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-33**	Page	**2** of **5**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**10 Jul 04**
Drilling Method:	**DDH**	Elevation:	**905.4 ft / 276.0m**	Date Completed:	**13 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**335 ft / 102.1m**	Logged by:	**CK/KA**
Coordinates:	**2,129,087 ft N , 1,399,309 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
85	26			0	72		GH04-33-10	17/30/26	56	casing to 85ft.	
90	27										
95	28										
100	29			20	67		GH04-33-11	13/23/30	53		
105	30			80							
110	31			80	67		GH04-33-12	24/50+/-	n/a		
115	32			40							
120	33			50	72		GH04-33-13	30/50/38	88		
125	34			40							
130	35			40	39		GH04-33-14	14/42/44	86		
135	36										
140	37			40						Tricone - Extend HW casing to 145ft.	
145	38										
150	39										
155	40										
160	41										
	42										
	43										
	44		gravelly SAND - some silt, some cobbles and boulders, rounded to subrounded, medium brown, well graded, moist, very dense.	0	50		GH04-33-16	35/50+/-	n/a		
	45			87							
	46										
	47			70	0		GH04-33-17	50+/-/-	n/a		
	48			100							
	49										

SPT TEST DATA
Uncorrected 'N' values vs. depth
20 40 60 80
Drill Run Time (min)
10 20 30 40

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Project:	**Pebble Project**	Drill Hole No.	**GH04-33**	Page	**3** of **5**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**10 Jul 04**
Drilling Method:	**DDH**	Elevation:	**905.4 ft / 276.0m**	Date Completed:	**13 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**335 ft / 102.1m**	Logged by:	**CK/KA**
Coordinates:	**2,129,087 ft N , 1,399,309 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51			100								
170	52			47								
175	53			40								
180	54			0								
185	55			40								
190	56			0								
195	57		SAND - some silt, trace clay, trace gravel, well graded, subrounded, very dense, rusty brown, moist to wet.	80	94	☒	GH04-33-18	21/41/55	96			
200	58			80								
205	59			50	83	☒	GH04-33-19	18/42/50+	92+			
210	60			50								
215	61			45	50	☒	GH04-33-20	14/47/50+	97+			
220	62			80								
225	63			50								
	64			100								
	65			100								
	66											
	67											
	68											
	69		CLAY - some silt, trace sand, trace gravel, poorly graded, very dense, high plasticity.									
	70		BEDROCK - Monzonite - greyish green, plagioclase porphorytic, pyrite veins primarily oxidized to hematite, limonite and clay alterations pervasive, clacite veining, present, initally highly weathered and friable with red clay infilling.								*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)	
	71											
235	72											
240	73		UCS - 56MPa, RQD - 31.5%, RMR89 - 45.0. (average/estimated values)									
245	74											

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Project:	**Pebble Project**	Drill Hole No.	**GH04-33**	Page	**4** of **5**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**10 Jul 04**
Drilling Method:	**DDH**	Elevation:	**905.4 ft / 276.0m**	Date Completed:	**13 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**335 ft / 102.1m**	Logged by:	**CK/KA**
Coordinates:	**2,129,087 ft N , 1,399,309 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
250	76											
	77											
255	78											
	79											
260	80											
	81											
265	82											
	83											
270	84											
	85											
275	86											
	87											
280	88											
	89											
285	90											
	91											
290	92											
	93											
295	94											
	95											
300	96											
	97											
305	98											
	99											
310												
315												
320												
325												

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Project:	**Pebble Project**	Drill Hole No.	**GH04-33**	Page	**5** of **5**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**10 Jul 04**
Drilling Method:	**DDH**	Elevation:	**905.4 ft / 276.0m**	Date Completed:	**13 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**335 ft / 102.1m**	Logged by:	**CK/KA**
Coordinates:	**2,129,087 ft N , 1,399,309 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
330	101											
335	102		End of hole at 335' (102.1m).									
	103											
340	104											
	105											
345	106											
	107											
350	108											
	109											
355	110											
	111											
360	112											
	113											
365	114											
	115											
370	116											
	117											
375	118											
	119											
380	120											
	121											
385	122											
	123											
390	124											
395												
400												
405												

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-35**	Page	**1** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**28 Jul 04**
Drilling Method:	**DDH**	Elevation:	**890.4 ft / 271.4m**	Date Completed:	**30 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**190 ft / 57.9m**	Logged by:	**KA**
Coordinates:	**2,126,742 ft N , 1,397,715 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1		GRAVEL and SAND- some silt, poorly graded, subangular to subrounded, compact, medium brown, dry to moist.		100		GH04-35-1	25/-/-	n/a	Triconed through to 25'. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
10	3				94		GH04-35-2	28/46/31	77	
15	4				67		GH04-35-3	20/21/27	48	
20	6				56		GH04-35-4	7/16/16	32	
25	7				44		GH04-35-5	21/41/21	62	
30	9		SAND- some gravel, isolated cobbles, well graded, rounded to subrounded, loose, moist.							
35	10		SAND and GRAVEL - trace silt, isolated cobbles, poorly graded, rounded to subrounded, medium brown, moist.	60						
40	11			70	78		GH04-35-6	19/22/25	47	
45	13		▼	20	67		GH04-35-7	6/30/50+	80+	
50	15									
55	16		SAND- some silt, trace to some gravel with depth, poorly graded, subrounded to subangular, loose, medium brown, moist to wet.	15	100		GH04-35-8	5/10/10	20	
60	18			30						
65	19			0	161		GH04-35-9	2/4/3	7	May be slough or heave in bottom of hole (SPT'N'value of 7 and sample recovery of 161%).
70	21									
75	22			0	78		GH04-35-10	15/12/17	29	
80	24									

SPT TEST DATA
Uncorrected 'N' values vs. depth
(●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-35

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Project:	**Pebble Project**	Drill Hole No.	**GH04-35**	Page	**2** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**28 Jul 04**
Drilling Method:	**DDH**	Elevation:	**890.4 ft / 271.4m**	Date Completed:	**30 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**190 ft / 57.9m**	Logged by:	**KA**
Coordinates:	**2,126,742 ft N , 1,397,715 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
85	26			20	11	X	GH04-35-11	9/9/8	17	
90	27									
95	28									
	29		sandy GRAVEL- some silt, occasional cobbles, well graded, rounded to subrounded, compact, light brown, moist.	0	22	X	GH04-35-12	19/50+/-	50+	SPT - hit a boulder.
100	30									
	31		Large boulder sized chunks of brecciated rock held together with silty material with gravel. Cobbles of varying nature were also present.	60						
105	32		SAND- some silt some cobbles/boulders (comprised of breccia from last run) poorly graded, medium brown, dense.	80						
	33									
110	34		BEDROCK - Breccia - light grey to white matrix surrounding angular clasts of varied colour and size, cobble to pebble size predominant, soft and fractured throughout depth of core.	120						* See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89).
115	35									
	36		UCS - 60.9 MPa, RQD - 33.4%, RMR89 - 39.5. (average/approximate values)							
120	37									
125	38									
	39									
130	40									
135	41									
	42									
140	43									
145	44									
	45									
150	46									
155	47									
	48									
160	49									

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Project:	**Pebble Project**	Drill Hole No.	**GH04-35**	Page	**3** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**28 Jul 04**
Drilling Method:	**DDH**	Elevation:	**890.4 ft / 271.4m**	Date Completed:	**30 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**190 ft / 57.9m**	Logged by:	**KA**
Coordinates:	**2,126,742 ft N , 1,397,715 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51											
170	52											
175	53											
180	54											
185	55											
190	56											
195	57											
200	58		END OF HOLE @190ft.									
205	59											
210	60											
215	61											
220	62											
225	63											
230	64											
235	65											
240	66											
245	67											
	68											
	69											
	70											
	71											
	72											
	73											
	74											

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-36**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**24 Jul 04**
Drilling Method:	**DDH**	Elevation:	**952.8 ft / 290.4m**	Date Completed:	**25 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**155 ft / 47.2m**	Logged by:	**KA/RV**
Coordinates:	**2,119,650 ft N , 1,392,907 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
5	1		GRAVEL and SAND - fine grained sand, gravel content decreasing with depth, some silt, poorly graded, sub-angular to sub-rounded, compact, light brown, dry to moist.								Triconed to 10'. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.	
10	3				67	☒	GH04-36-2	20/21/25	45		* No well/piezometer installed at this location.	
15	5		sandy GRAVEL - some silt, trace clay, isolated boulders, well graded, very dense, light brown, moist.	40	67	☒	GH04-36-3	10/13/17	30			
20	6		BEDROCK - Dacite - Igneous - highly weathered and unrecognizable to 36' depth. Light greyish green becoming dark purple (87'), alternating fine to coarse grained, visible flow banding, pervasive illite and sericite alterations (thick clay seems throughout), calcite veining and iron oxide staining pervasive below 108'. UCS - 52.8 MPa, RQD - 36.7%, RMR89 - 41.3. (average/approximate values)	90							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
25	8											
30	9											
35	11											
40	12											
45	14											
50	15											
55	17											
60	18											
65	20											
70	21											
75	23											
80	24											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-36

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8		0

Rev. 0 - Issued for Report

GH04-36

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-36**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**24 Jul 04**
Drilling Method:	**DDH**	Elevation:	**952.8 ft / 290.4m**	Date Completed:	**25 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**155 ft / 47.2m**	Logged by:	**KA/RV**
Coordinates:	**2,119,650 ft N , 1,392,907 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
100	31											
	32											
105	33											
	34											
110	35											
	36											
115	37											
	38											
120	39											
	40											
125	41											
	42											
130	43											
	44											
135	45											
	46											
140	47											
	48											
145	49											
150												
155			END OF HOLE @155ft.									
160												

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-36

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-39**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**16 Jul 04**
Drilling Method:	**DDH**	Elevation:	**911.7 ft / 277.9m**	Date Completed:	**18 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**120 ft / 36.6m**	Logged by:	**CK/KA**
Coordinates:	**2,122,703 ft N , 1,389,233 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1		sandy GRAVEL - trace silt, isolated cobbles, well graded, subangular to subrounded, compact to dense, light brown, moist.	0	56		GH04-39-1	10/17/21	38	Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used. HW casing initially advanced to 4'.
	2									
10	3			0	28		GH04-39-2	12/12/12	24	Tricone to 10ft - extend HW casing--low torque on rods at 1000rpm.
	4			38						
15	5			50	11		GH04-39-3	6/5/10	15	
20	6									
	7									
25	8			35	50		GH04-39-4	5/6/6	12	
30	9		▼							
	10									
35	11		SAND and GRAVEL - trace silt, isolated cobbles, poorly graded, rounded to subrounded, compact to very dense with depth, light brown, moist.	40	22		GH04-39-5	8/8/14	22	
40	12									
	13									
45	14			30	67		GH04-39-6	12/16/18	34	
50	15									
	16									
55	17			35	56		GH04-39-7	18/17/15	32	Tricone and extend HW casing to 60ft.
60	18			0						
	19									
65	20			30	67		GH04-39-8	15/26/19	45	Very dense material stuck to core bit and cannot penetrate. Lost return at 67'. High permeability.
70	21									
	22									
75	23			0	56		GH04-39-9	17/21/40	61	
80	24									

SPT TEST DATA
Uncorrected 'N' values vs. depth
(●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-39

Knight Piésold CONSULTING

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Date Revised: 20 Jan 05

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-39**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**16 Jul 04**
Drilling Method:	**DDH**	Elevation:	**911.7 ft / 277.9m**	Date Completed:	**18 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**120 ft / 36.6m**	Logged by:	**CK/KA**
Coordinates:	**2,122,703 ft N , 1,389,233 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
85	26			50	50	☒	GH04-39-10	21/48/43	91	
90	27									
95	28									
	29		GRAVEL and SAND - trace silt, isolated cobbles, well graded, rounded to subrounded, compact, light brown, moist to wet.	40	56	☒	GH04-39-11	41/42/38	80	DELAY: Sanded in - pull 20' of HQ rods then ream back down.
100	30									
105	31									
	32		sandy SILT - some gravel, isolated cobbles, well graded, subrounded to rounded, medium brown, moist.	30	28	☒	GH04-39-12	20/12/10	22	LOST 100% OF RETURN AT BEDROCK CONTACT.
110	33									
115	34									
	35		BEDROCK - ANDESITE - dark purple, highly fractured, very brittle, magnetite and hematite alterations, limonite, chlorite and calcite scattered throughout. UCS - 50MPa, RQD - 10.8%, RMR89 - 39.7.	38						*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)
120	36			71						
125	37									
130	38									
135	39									
140	40									
145	41									
150	42									
155	43									
160	44									
	45									
	46									
	47									
	48									
	49									

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Overburden Log For GH04-39

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-40**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**14 Jul 04**
Drilling Method:	**DDH**	Elevation:	**928.8 ft / 283.1m**	Date Completed:	**16 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**105 ft / 32.0m**	Logged by:	**CK/KA**
Coordinates:	**2,123,808 ft N , 1,386,101 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
5	1		GRAVEL and SAND - some silt, isolated cobbles and boulders, poorly graded, subangular to rounded with depth, compact, light brown, moist.	0	89		GH04-40-1	16/27/40	67	Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.	
10	3			75							
15	5		Cobbles and boulders content increasing and becoming more rounded.	25	44		GH04-40-2	6/5/8	13		
20	6			60							
25	8			80	50		GH04-40-3	10/29/23	52		
30	9			70							
35	10			80						DRY HOLE. Pull HQ rods, tricone and extend casing to 46ft.	
40	12										
45	13										
	14		SAND and GRAVEL - trace silt, isolated cobbles, well graded, rounded to subrounded, dense to very dense, medium brown, moist.	0	61		GH04-40-4	9/24/33	57	DRY HOLE.	
50	15			30							
55	16										
	17			30	28		GH04-40-5	7/5/35	40		
60	18			25							
65	19										
	20			0	83		GH04-40-6	26/55/49	104	DRY HOLE - LOST 100% OF RETURN.	
70	21										
	22		sandy GRAVEL - trace silt, isolated cobbles, well graded, rounded to subrounded, dense to very dense, light brown, moist.	20							
75	23			80	61		GH04-40-7	33/34/32	66		
80	24			40							

SPT TEST DATA
Uncorrected 'N' values vs. depth
(●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-40

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Date Revised: 20 Jan 05

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-40**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**14 Jul 04**
Drilling Method:	**DDH**	Elevation:	**928.8 ft / 283.1m**	Date Completed:	**16 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**105 ft / 32.0m**	Logged by:	**CK/KA**
Coordinates:	**2,123,808 ft N , 1,386,101 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26			60	100	⊠	GH04-40-8	18/31/24	55		55	
90	27											
95	28											
100	29			40	100	⊠	GH04-40-9	29/24/25	49		Tricone and extend HW casing to 105ft.	
105	30										Lost 45ft HW casing in the hole.	
110	31											
115	32		HOLE ABANDONNED - REFER TO GH04-40A	0								
120	33											
125	34											
130	35											
135	36											
140	37											
145	38											
150	39											
155	40											
160	41											
	42											
	43											
	44											
	45											
	46											
	47											
	48											
	49											

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-40

Knight Piésold CONSULTING

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-40A**	Page	**1** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**18 Jul 04**
Drilling Method:	**DDH**	Elevation:	**927.4 ft / 282.7m**	Date Completed:	**20 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**255 ft / 77.7m**	Logged by:	**CK/KA**
Coordinates:	**2,123,858 ft N , 1,386,142 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
			Refer to GH04-40 Overburden Log for the upper 105' of GH04-40A Drill Hole.								Triconed down to 105'. Drillhole advanced using HW casing and HQ2 core. WDS-120 drilling mud additive used.	
5	1											
	2											
10	3											
	4											
15	5											
20	6											
	7											
25	8											
	9											
30	10											
35	11											
	12											
40	13											
45	14											
	15											
50	16											
55	17											
	18											
60	19											
65	20											
	21											
70	22											
75	23											
	24											
80												

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-40A

Knight Piésold CONSULTING

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-40A**	Page	**2** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**18 Jul 04**
Drilling Method:	**DDH**	Elevation:	**927.4 ft / 282.7m**	Date Completed:	**20 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**255 ft / 77.7m**	Logged by:	**CK/KA**
Coordinates:	**2,123,858 ft N , 1,386,142 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
	31											
100	32											
105	33		GRAVEL and SAND - trace silt, trace cobbles, well graded, subrounded to subangular, dense, light brown, moist.		56		GH04-40A-1	19/19/40	59			
	34			70							DELAY: Bit burnt out. Rods are pulled and reset.	
110	35			90								
115	36											
	37											
120	38			30	28		GH04-40A-2	43/15/12	27			
125	39											
	40											
130	41			20	72		GH04-40A-3	24/28/35	63		Sanded in - pull rods, replace core bit- tricone and extend HW casing to 136ft.	
135	42		silty SAND - trace clay, trace gravel, isolated cobbles, poorly graded, subrounded, dense to very dense, low plasticity, light brown, moist to wet.									
	43			25								
140	44		silty GRAVEL - some sand, trace cobbles, well graded, subrounded, very dense, light brown, moist to wet.									
145	45		BEDROCK - Tertiary Andesite - dark grey to forrest green, highly weathered, fine grained, heavily oxidized, abundant hematite on joint surfaces, calcite veins, silty sand infill.	30							*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)	
150	46											
	47		RMR89 - 44.6, RQD - 27.1%, UCS - 53MPa (average/estimated values)									
155	48											
160	49											

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Pebble Project
Overburden Log For GH04-40A

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-40A**	Page	**3** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**18 Jul 04**
Drilling Method:	**DDH**	Elevation:	**927.4 ft / 282.7m**	Date Completed:	**20 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**255 ft / 77.7m**	Logged by:	**CK/KA**
Coordinates:	**2,123,858 ft N , 1,386,142 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51											
170	52											
175	53											
180	54											
185	55											
190	56											
195	57											
200	58											
205	59											
210	60											
215	61											
220	62											
225	63											
230	64											
235	65											
240	66											
245	67											
	68											
	69											
	70											
	71											
	72											
	73											
	74											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-40A

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-40A**	Page	**4** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**18 Jul 04**
Drilling Method:	**DDH**	Elevation:	**927.4 ft / 282.7m**	Date Completed:	**20 Jul 04**
Location:	**South Fork Koktuli River**	Total Depth:	**255 ft / 77.7m**	Logged by:	**CK/KA**
Coordinates:	**2,123,858 ft N , 1,386,142 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
250	76											
	77											
255	78		End of hole @255' (77.7m).									
260	79											
	80											
265	81											
	82											
270	83											
	84											
275	85											
	86											
280	87											
	88											
285	89											
	90											
290	91											
	92											
295	93											
	94											
300	95											
	96											
305	97											
	98											
310	99											
315												
320												
325												

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-40A

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-42**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**5 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1066.5 ft / 325.1m**	Date Completed:	**6 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**150 ft / 45.7m**	Logged by:	**KA/RV**
Coordinates:	**2,135,111 ft N , 1,404,563 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1		sandy GRAVEL- some silt, frequent cobbles, well graded, compact to dense, med. brown, dry to moist.		83		GH04-42-1	19/33/40	73	Triconed to 5ft. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
10	2			100						
10	3									
15	4									
15	5		gravelly SAND- frequent cobbles, trace silt, well graded, subrounded to angular, medium brown.	38	6		GH04-42-2	6/5/6	11	
20	6		sandy GRAVEL- frequent cobbles, well graded, subangular to subrounded.	50	11		GH04-42-3	3/4/4	8	SPT - rock stuck in tube.
25	7									
25	8			90	53		GH04-42-4	11/20/30	50	SPT - rock stuck in tube.
30	9			70						
30	10									
35	11			70	20		GH04-42-5	40+//	n/a	SPT - rock stuck in tube.
40	12			33						Triconed from 38-45 in order to extend casing to this depth. No recovery for this interval.
40	13									
45	14				8		GHO4-42-6	45/50+/	n/a	SPT - encountered chunks of bedrock.
50	15		BEDROCK - Mudstone - green to blue-grey, with brown and black sequences, cancite and pyrite veins, very fractured, initially highly weathered.	17						* See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89).
55	16									
55	17		Fracture zone - 66' to 73'.							
60	18		Basalt Dyke - 113' to 115' - black, fine grained, calcite filled vesicles.							
60	19		UCS - 35.7 MPa, RQD - 17.1%, RMR89 - 42.3. (average/estimated values)							
65	20									
70	21									
70	22									
75	23									
80	24									

SPT TEST DATA
Uncorrected 'N' values vs. depth (●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-42

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8		0

GH04-42

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Date Revised: 20 Jan 05

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-42**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**5 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1066.5 ft / 325.1m**	Date Completed:	**6 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**150 ft / 45.7m**	Logged by:	**KA/RV**
Coordinates:	**2,135,111 ft N , 1,404,563 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
100	31											
	32											
105	33											
	34											
110	35											
	36											
115	37											
	38											
120	39											
	40											
125	41											
	42											
130	43											
	44											
135	45											
	46											
140	47											
	48											
145	49											
150			END OF HOLE @ 150ft.									
155												
160												

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-42

Knight Piésold CONSULTING

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-43**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**11 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1122.9 ft / 342.3m**	Date Completed:	**12 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**110 ft / 33.5m**	Logged by:	**KA/JEM**
Coordinates:	**2,137,825 ft N , 1,405,221 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
5	1		sandy GRAVEL - some silt, some organics, poorly graded, subangular to subrounded, reddish brown, moist to wet.		22		GH04-43-1	5/5/6	11		Triconed down 5ft. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.	
	2		BEDROCK - Dacite - light to medium grey with dark grey to black specks, fine grained becoming more coarse with depth, 2-5mm pockets of very fine powdery substance (no rxn with HCl), sandy-silt infill, magnetite staining on joint surfaces.	50	67		GH04-43-2	10/18/18	36		*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89)	
10	3											
15	4											
20	5		Highly fractured zone healed with clay from 45' to 63'.									
25	6											
30	7		Fracture zone healed with clay @104-105'.									
35	8											
40	9		Possible open fault @ 106' - 110'.									
45	10											
50	11		UCS - 28.8 MPa, RQD - 7.4%, RMR89 - 40.7. (average/estimated values)									
55	12											
60	13											
65	14											
70	15											
75	16											
80	17											
	18											
	19											
	20											
	21											
	22											
	23											
	24											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-43

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Date Revised: 20 Jan 05

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-43**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**11 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1122.9 ft / 342.3m**	Date Completed:	**12 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**110 ft / 33.5m**	Logged by:	**KA/JEM**
Coordinates:	**2,137,825 ft N , 1,405,221 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
100	31											
	32											
105	33											
110	34		END OF HOLE @ 110 ft.									
115	35											
	36											
120	37											
	38											
125	39											
130	40											
	41											
135	42											
	43											
140	44											
145	45											
	46											
150	47											
155	48											
160	49											

Northern Dynasty Mines Inc.
Pebble Project
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SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-44**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**
Drilling Method:	**DDH**	Elevation:	**1100.1 ft / 335.3m**
Location:	**Frying Pan Lake**	Total Depth:	**165 ft / 50.3m**
Coordinates:	**2,138,681 ft N , 1,402,137 ft E (NAD 83, Alaska State Planes - Zone 5)**		

Page **1** of **2**
Date Started: **7 Aug 04**
Date Completed: **9 Aug 04**
Logged by: **KA/RV**
Reviewed by: **SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
			sandy GRAVEL- some silt, occasional cobbles, well graded, subangular to subrounded, med. brown, dry to moist.		50		GH04-44-1	20/50+/-	n/a	Triconed to 5'->no core sample. Drilling with WDS-120 drilling additive.
5	1			75	83		GH04-44-2	14/24/20	44	SPT - hit boulder. SPT performed at 7' had no recovery.
10	2									
	3									
	4									
15	5			31	0		GH04-44-3	5/6/7	13	
20	6			40	61		GH04-44-4	7/5/4	9	
	7									
25	8		silty GRAVEL and SAND - some clay, isolated cobbles, well graded, subangular to subrounded, dense, dark brown, moist.	70	17		GH04-44-5	7/16/15	31	
30	9			0						
	10									
35	11			50	56		GH04-44-6	13/13/14	27	
40	12									
	13									
45	14		sandy GRAVEL- gravel content increasing with depth, sand content decreasing with depth, trace silt, isolated cobbles, well graded, rounded to subrounded, medium brown, moist.	55	72		GH04-44-7	15/17/37	32	
50	15			60						
	16									
55	17			20	61		GH04-44-8	14/23/24	47	
60	18			30						No recovery-> Triconed to 65'-> Sanded in at 60'.
	19									
65	20			0	44		GH04-44-9	38/37/39	77	
70	21			35						
	22									
75	23			60	17		GH04-44-10	32/38/30	70	No recovery.
80	24			0						
	25									
85	26			47	67		GH04-44-11	36/50+/-	n/a	SPT - hit boulder.

SPT TEST DATA
Uncorrected 'N' values vs. depth
(●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-44

Knight Piésold CONSULTING

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-44**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**7 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1100.1 ft / 335.3m**	Date Completed:	**9 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**165 ft / 50.3m**	Logged by:	**KA/RV**
Coordinates:	**2,138,681 ft N , 1,402,137 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
90	28		GRAVEL and SAND - trace silt, isolated cobbles, poorly graded, rounded to subrounded, medium brown, moist.	0						
95	29			45	67		GH04-44-12	42/49/63	112	
100	30			40						
105	32			30	72		GH04-44-13	12/37/40	77	
110	33			50						
115	35			40	44		GH04-44-14	9/40+/-	n/a	
120	36			13						
125	38			55	72		GHO4-44-15	46/29/37	66	Drill time undisclosed due to problems. Night shift pulled rods to extend casing to 125'. Dayshift had to pull rods and found bit burnt out. Replaced the bit and went down once again. Had to wait for HQ tap and then replace rod. Trouble with pump-> no pressure in rods.
130	40			50						
135	41			60	56		GH04-44-16	27/29/30	59	
140	43			70						
145	44									No SPT
150	46			70						No SPT done at 155' due to frequency of cobbles & large gravel.
155	47			80						
160	49			60						
165	50		END OF HOLE @ 165 ft. Hole called at 165' due to difficulties in drilling.	60	0		GH04-44-17	8/50+/-	n/a	
170	51									
175	52									
	53									

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Pebble Project
Overburden Log For GH04-44

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-45**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**
Drilling Method:	**DDH**	Elevation:	**1122.5 ft / 342.1m**
Location:	**Frying Pan Lake**	Total Depth:	**40 ft / 12.2m**
Coordinates:	**2,139,335 ft N , 1,399,997 ft E (NAD 83, Alaska State Planes - Zone 5)**		

Page **1** of **1**
Date Started: **10 Aug 04**
Date Completed: **11 Aug 04**
Logged by: **KA/RV**
Reviewed by: **SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
5	1		silty SAND- trace gravel, trace clay, poorly graded, subround to subangular, compact, medium to dark brown, moist.		78		GH04-45-1	6/6/10	16	Triconed to 5' and advanced HW casing with HQ2 core. WDS-120 drilling mud additive used.	
	2										
10	3		GRAVEL and SAND- some silt, frequent cobbles, well graded, subangular to subrounded, compact to dense, medium to dark brown, moist.	150	67		GH04-45-2	33/21/14	35	Casing fell into hole and needed to be fished out. Extended casing to 15ft.	
	4										
15	5		SAND- trace silt, some gravel, well graded, subangular to subround, compact, medium brown.	50	61		GH04-45-3	11/32/24	56	Cobbly substrate may effect SPT results.	
20	6										
	7		sandy GRAVEL- trace silt, frequent cobbles, well graded, subangular to subrounded, compact, medium brown, moist.	30	50		GH04-45-4	4/7/19	26	No SPT.	
25	8			80							
	9										
30	10			40							
35	11			40	22		GHO4-45-5	18/22/22	44		
40	12										
	13		END OF HOLE @ 40 ft. REFER TO GH04-45A. Lost part of core barrel and bit in hole. Attempted to tricone past to no avail. End of GH04-45. Will return and redrill GH04-45A.	40							
45	14										
	15										
50	16										
55	17										
	18										
60	19										
65	20										
	21										
70	22										
75	23										
80	24										

SPT TEST DATA
Uncorrected 'N' values vs. depth
(●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-45

Knight Piésold CONSULTING

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VA101-176/8		0

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GH04-45

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-45A**	Page	**1** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**12 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1123.5 ft / 342.4m**	Date Completed:	**14 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**225 ft / 68.6m**	Logged by:	**KA/JEM**
Coordinates:	**2,139,335 ft N , 1,399,997 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
			Refer to GH04-45 for first 40 feet of overburden.								Triconed to 45'. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.	
45	14		GRAVEL and SAND - trace silt, well graded, angular to subangular, light brown to light reddish brown, wet.	20	56		GH04-45A-1	35/51/36	87		No SPT	
65	20		gravelly-SAND- some silt, frequent cobbles, well graded, subangular to subrounded, loose to compact with depth, light reddish brown, wet.	80	0		GH04-45A-2	20+//	n/a		SPT - hit a boulder.	
75	23			50	72		GH04-45A-3	4/16/26	42			

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-45A

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-45A**	Page	**2** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**12 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1123.5 ft / 342.4m**	Date Completed:	**14 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**225 ft / 68.6m**	Logged by:	**KA/JEM**
Coordinates:	**2,139,335 ft N , 1,399,997 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
85	26		silty SAND- some gravel, round to subround, well graded, med. brown, moist compact to dense, frequent cobbles.	40	11		GH04-45A-4	15/17/22	39	Had to ream rods down last 40 feet.
90	27			92						Had to ream rods back down once again.
	28		sandy GRAVEL- some silt, frequent cobbles, well graded, moist, compact, silt is med. brown and sand is black.	38						
95	29			80	0		GH04-45A-5	20+//	n/a	SPT - hit a boulder.
	30									
100	31			60						
105	32		Encountered large chunks of weathered bedrock.	35						
	33									
110	34			120						
			BEDROCK - DIORITE - medium grey with green irregular splotches throughout, medium grained, magnetite, chalcopyrite, pyrite and calcite pervasive, soft clay-like infilling, limonite staining on joint surfaces.	133						*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89).
115	35									
	36									
120	37		UCS - 70.0 MPa, RQD - 58.7%, RMR89 - 56.3. (average/estimated values)							
125	38									
	39									
130	40									
135	41									
	42									
140	43									
	44									
145	45									
150	46									
	47									
155	48									
160	49									

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-45A

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-45A**	Page	**3** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**12 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1123.5 ft / 342.4m**	Date Completed:	**14 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**225 ft / 68.6m**	Logged by:	**KA/JEM**
Coordinates:	**2,139,335 ft N , 1,399,997 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51											
170	52											
175	53											
180	54											
185	55											
190	56											
195	57											
200	58											
205	59											
210	60											
215	61											
220	62											
225	63											
230	64											
235	65											
240	66											
245	67											
	68											
	69		END OF HOLE @ 225ft.									
	70											
	71											
	72											
	73											
	74											

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-45A

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-46**	Page	**1 of 2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**14 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1143.8 ft / 348.6m**	Date Completed:	**15 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**135 ft / 41.1m**	Logged by:	**KA/JEM**
Coordinates:	**2,145,777 ft N , 1,406,716 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
			silty SAND- trace gravel, subangular to angular, loose to compact with depth, med. brown to dark brown, moist.							Triconed to 5ft. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
5	1				33		GH04-46-1	5/7/3	10	
	2		sandy GRAVEL - some silt, subangular to angular, loose to compact with depth, med. brown to dark brown, moist. Frequent cobbles - increasing density with depth.	4	11		GH04-46-2	4/13/23	36	
10	3									
	4									
15	5			38						No SPT.
20	6									
	7		silty SAND and GRAVEL - frequent cobbles, well graded, subangular to subrounded, compact, medium brown, moist.	80						No SPT.
25	8		BEDROCK	50						* See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89).
	9		Dacite/Andesite (24' to 65') - medium to dark greenish grey, very fine grained rock, chlorite and calcite alterations, little to no veining.							
30	10		Andesitic Mudstone (65' to 86') - greenish grey to dark green, oxidation, carbonate pockets.							
35	11		Andesite (86' to end of hole) - medium to dark green with white flecks, carbonate veins, soft sandy silt infilling in some joints.							
40	12									
	13		Tertiary Basalt Dykes (100-106' and 127-135') - dark grey.							
45	14		UCS - 80.2 MPa, RQD - 57.4%, RMR89 - 57.2. (average/estimated values)							
50	15									
	16									
55	17									
	18									
60	19									
65	20									
	21									
70	22									
75	23									
80	24									

SPT TEST DATA
Uncorrected 'N' values vs. depth (●)
20 40 60 80
Drill Run Time (min)
10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-46

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8		0

GH04-46

Rev. 0 - Issued for Report

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Date Revised: 20 Jan 05

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-46**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**14 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1143.8 ft / 348.6m**	Date Completed:	**15 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**135 ft / 41.1m**	Logged by:	**KA/JEM**
Coordinates:	**2,145,777 ft N , 1,406,716 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
95	29											
	30											
100	31											
105	32											
	33											
110	34											
115	35											
	36											
120	37											
125	38											
	39											
130	40											
135	41		END OF HOLE @135ft.									
	42											
140	43											
145	44											
	45											
150	46											
155	47											
	48											
160	49											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-46

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8		0

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Date Revised: 20 Jan 05

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-47**	Page	**1** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**15 Aug 04**
Drilling Method:	**DDH**	Elevation:	**974.2 ft / 296.9m**	Date Completed:	**16 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**270 ft / 82.3m**	Logged by:	**KA/JEM**
Coordinates:	**2,147,359 ft N , 1,404,802 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
0	0		sandy GRAVEL - some silt, shells and organic mat'l, well graded, angular to subrounded, primarily grey in colour, moist.							Triconed to 25ft. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
5	1				56		GH04-47-1	4/8/10	18	
5	2									
10	3		silty, sandy GRAVEL - trace clay, shells and organic mat'l, some gravel, well graded, angular to subrounded, primarily grey in colour, wet.		33		GH04-47-2	1/1/1	2	
15	4									
15	5		SAND and GRAVEL - some silt, well graded, rounded to subrounded, loose, medium brown, moist.		78		GH04-47-3	8/15/9	24	
20	6									
20	7				111		GH04-47-4	1/2/2	4	
25	8		SAND- some gravel, trace silt, occasional cobbles, well graded, rounded to subrounded, loose, medium brown, moist.		89		GH04-47-5	4/7/13	20	
30	9									
30	10		gravelly SAND- trace silt, occasional cobbles and boulders, well graded, subangular to subround, loose, medium brown, moist.	40						
35	11		SILT and CLAY- trace sand, isolated cobbles, poorly graded, high plasticity, stiff to very stiff, visible layers in colouration, med. grey to light brown, moist to wet.	75	94		GH04-47-6	9/9/8	17	
40	12			30						
40	13									
45	14			0	150		GH04-47-7	2/5/4	9	
50	15									
50	16									
55	17		SILT- some clay, trace to some sand, poorly graded, stiff to very stiff, medium grey, moist.	0	144		GH04-47-8	3/5/7	12	
60	18			40						
60	19									
65	20		As above - becoming reddish brown with 1-5mm clay lenses.	65	156		GH04-47-9	2/6/8	14	
70	21									
70	22									
75	23		sandy, gravelly SILT - medium grained angular sand, some clay, frequent cobbles, poorly graded, angular to subrounded, hard, reddish-brown, moist.	55	67		GH04-47-10	18/46/50	96	
80	24									

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-47

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 20 Jan 05

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-47**	Page	**2** of **4**		
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**15 Aug 04**		
Drilling Method:	**DDH**	Elevation:	**974.2 ft / 296.9m**	Date Completed:	**16 Aug 04**		
Location:	**Frying Pan Lake**	Total Depth:	**270 ft / 82.3m**	Logged by:	**KA/JEM**		
Coordinates:	**2,147,359 ft N , 1,404,802 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**		

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26			81	0	☒	GH04-47-11	12/50+/-	n/a		No SPT	
				100								
90	27		SAND- medium grained, some silt, trace clay, trace gravel, occassional to frequent cobbles with depth, poorly graded, brown, moist.									
	28			79								
95	29			50							Drill time unknown, had to change bit.	
	30			150								
100	31		BEDROCK - Latite or Dacite Pyroclastic Flow - white to pinkish red, some flow banding, with ferric oxide and manganese oxide staining along fracture surfaces, soft CaCO3 clay-like infilling.								* See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89).	
105	32											
	33		UCS - 56.6 MPa, RQD - 44.1%, RMR89 - 48.3. (average/estimated values)									
110	34											
115	35											
	36											
120	37											
125	38											
	39											
130	40											
135	41											
	42											
140	43											
145	44											
	45											
150	46											
155	47											
	48											
160	49											

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-47

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-47**	Page	**3** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**15 Aug 04**
Drilling Method:	**DDH**	Elevation:	**974.2 ft / 296.9m**	Date Completed:	**16 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**270 ft / 82.3m**	Logged by:	**KA/JEM**
Coordinates:	**2,147,359 ft N , 1,404,802 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51											
170	52											
175	53											
180	54											
185	55											
190	56											
195	57											
200	58											
205	59											
210	60											
215	61											
220	62											
225	63											
230	64											
235	65											
240	66											
245	67											
	68											
	69											
	70											
	71											
	72											
	73											
	74											

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-47

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-47**	Page	**4** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**15 Aug 04**
Drilling Method:	**DDH**	Elevation:	**974.2 ft / 296.9m**	Date Completed:	**16 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**270 ft / 82.3m**	Logged by:	**KA/JEM**
Coordinates:	**2,147,359 ft N , 1,404,802 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
250	76											
	77											
255	78											
	79											
260	80											
	81											
265	82											
270	83		End of hole @ 270 ft.									
	84											
275	85											
	86											
280	87											
	88											
285	89											
	90											
290	91											
	92											
295	93											
	94											
300	95											
	96											
305	97											
	98											
310	99											
315												
320												
325												

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-47

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SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-48**	Page	**1** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**16 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1184.7 ft / 361.1m**	Date Completed:	**17 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**185 ft / 56.4m**	Logged by:	**JEM/DF**
Coordinates:	**2,147,095 ft N , 1,399,489 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
5	1		SAND and GRAVEL - some silt (increasing with depth), occassional to frequent cobbles, well graded, subangular to subrounded, loose to compact with depth, reddish brown, dry to damp with depth.		50		GH04-48-1	8/16/15	31	Triconed to 25'. Drillhole advanced using HW casing with HQ2 core. WDS-120 drilling mud additive used.
10	2									
10	3				78		GHO4-48-2	13/16/21	37	
15	4									
15	5				83		GH04-48-3	10/14/17	31	
20	6									
20	7				67		GH04-48-4	18/24/24	48	
25	8				50		GH04-48-5	16/22/20	42	
30	9		Increasing cobble.	80						No SPT.
30	10									
35	11		5-10mm siltly clay lenses.	100	83		GH04-48-6	18/27/41	68	
40	12			100						No SPT.
40	13									
45	14		gravelly, silty, SAND and CLAY - poorly graded, subangular, compact to very dense, reddish brown, damp.	90	83		GH04-48-7	11/50+/-	50+	SPT 7 - clay layer.
50	15		SAND and GRAVEL - some silt, some clay, frequent cobbles, well graded, subangular to subrounded, compact, reddish brown, damp.	171						
55	16									
55	17			80						No SPT.
60	18									
60	19			100						
65	20			80						
70	21		BEDROCK - Granodiorite - lots of pyrite and carbonate minerals, yellow staining (oxidation) on fracture surfaces, initially highly weathered. UCS - 77.1MPa, RQD - 30.7%, RMR89 - 44.5. (average/estimated values)	200						* See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information (RMR89).
75	22									
75	23									
80	24									

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 — Drill Run Time (min) 10 20 30 40

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-48

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 20 Jan 05

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-48**	Page	**2** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**16 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1184.7 ft / 361.1m**	Date Completed:	**17 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**185 ft / 56.4m**	Logged by:	**JEM/DF**
Coordinates:	**2,147,095 ft N , 1,399,489 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
85	26											
	27											
90	28											
	29											
95	30											
100	31											
	32											
105	33											
	34											
110	35											
	36											
115	37											
	38											
120	39											
	40											
125	41											
	42											
130	43											
	44											
135	45											
	46											
140	47											
	48											
145	49											
150												
155												
160												

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-48

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SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

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Date Revised: 20 Jan 05

Project:	**Pebble Project**	Drill Hole No.	**GH04-48**	Page	**3** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**16 Aug 04**
Drilling Method:	**DDH**	Elevation:	**1184.7 ft / 361.1m**	Date Completed:	**17 Aug 04**
Location:	**Frying Pan Lake**	Total Depth:	**185 ft / 56.4m**	Logged by:	**JEM/DF**
Coordinates:	**2,147,095 ft N , 1,399,489 ft E (NAD 83, Alaska State Planes - Zone 5)**			Reviewed by:	**SM**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80 / Drill Run Time (min) 10 20 30 40	NOTES	WELL DETAILS
165	51											
170	52											
175	53											
180	54											
185	55											
	56											
	57											
190	58											
	59											
195	60											
200	61											
	62											
205	63											
210	64											
	65											
215	66											
220	67											
	68											
225	69											
230	70											
	71											
235	72											
240	73											
	74											
245												

SOILS LOG WITH DRILL TIME NEWDRILL.GPJ DRILL.GDT 22 Mar 05

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH04-48

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Date Revised: 20 Jan 05

Project: Pebble Project | Drill Hole No. **GH05-51** | Page 1 of 5

Drilling Co: Quest America Drilling Inc. | In-Situ Sampler: SPT Split Spoon | Date Started: 20 Aug 05

Drilling Method: DDH | Elevation: 1001 ft / 305.1m | Date Completed: 26 Aug 05

Location: Southwest Embankment | Total Depth: 445 ft / 135.6m | Logged by: CK/BH

Coordinates: 6,635,165 N , 370,579 E | Azimuth,Inclination 0, -90 | Reviewed by: TT

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
	0		SAND and GRAVEL, subrounded to subangular, brown, moist								Drillhole advanced using a Tricone 5' to install casing. EZ MUD kwik gel used. Groundwater depth measured on Sept. 22/05, 55.5'	
5	1											
	2											
10	3			3								
	4		silty SAND, some gravel, well graded, subangular to subrounded, brown, moist.									
15	5				61		GH05-51-1	39/50/60	110		SPT#1 Recovered-11"/18" Photo 100-1090	
20	6											
	7											
25	8			5								
			SAND and GRAVEL, some silt, isolated cobbles, well graded, subagular to subrounded, brown, moist		56		GH05-51-2	30/52/36	88		SPT#2 Recovered 10"/18" Photo 100-1093	
30	9											
	10											
35	11											
40	12											
	13											
45	14				33		GH05-51-3	5/11/28	39		SPT#3 Recovered 6"/18" Photo 100-1095	
50	15											
	16											
55	17				78		GH05-51-4	32/40/46	86		SPT#4 Recovered 14"/18" Photo 100-1096	
60	18											
	19											
65	20											
	21											
70	22											
75	23											
	24		Increasing silt content (silty)									
80	25											
85	26		gravelly SAND, trace silt, isolated cobbles, well graded, subangular, brown, moist		67		GH05-51-5	11/36/50	86		SPT#5 recovered 14"/18" Photo 100-1098	
	27											
90	28											
95	29		Increasing sand, frequent boulders		61		GH05-51-6	4/29/39	68		SPT#6 recovered	

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH05-51

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SOILS LOG WITH WELL DETAILS GH05-51.GPJ DRILL.GDT 5 Jun 06

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Date Revised: 24 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-51**	Page	**2** of **5**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**20 Aug 05**
Drilling Method:	**DDH**	Elevation:	**1001 ft / 305.1m**	Date Completed:	**26 Aug 05**
Location:	**Southwest Embankment**	Total Depth:	**445 ft / 135.6m**	Logged by:	**CK/BH**
Coordinates:	**6,635,165 N , 370,579 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31										11"/18" Photo 100-1099	
105	32				33	☒	GH05-51-7	70/-/-	70+		SPT#7 recovered 6"/18" Photo 100-1100 (Incomplete test)	
110	33											
115	34				83	☒	GH05-51-8	25/52/73	125		SPT#8 recovered 15"/18" Photo 100-1101	
120	35											
125	36				83	☒	GH05-51-9	9/16/26	42		SPT #9 recovered 15"/18" Photo 100-1103	
130	37											
135	38				50	☒	GH05-51-10	7/35/68	103		SPT #10 recovered 9"/18" Photo 100-1104	
140	39											
145	40				56	☒	GH05-51-11	21/44/50	94		SPT #11 recovered 10"/18" Photo 100-1105	
150	41											
155	42				61	☒	GH05-51-12	31/32/62	94		SPT #12 recovered 11"/18" Photo 100-1106	
160	43											
165	44											
170	45											
175	46											
180	47											
185	48											
190	49											
195	50		Increasing gravel and decreasing silt content									
	51		SILT, some gravel, trace sand, isolated cobbles, poorly graded, grey, moist to wet.	2								
	52											
	53											
	54		Gravelly SAND, some silt, isolated cobbles, well graded, subangular, brown, moist.	40								
	55											
	56											
	57											
	58											
	59											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH05-51

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Knight Piésold CONSULTING

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GH05-51

SOILS LOG WITH WELL DETAILS GH05-51.GPJ DRILL.GDT 5 Jun 06

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Date Revised: 24 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-51**	Page	**3** of **5**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**20 Aug 05**
Drilling Method:	**DDH**	Elevation:	**1001 ft / 305.1m**	Date Completed:	**26 Aug 05**
Location:	**Southwest Embankment**	Total Depth:	**445 ft / 135.6m**	Logged by:	**CK/BH**
Coordinates:	**6,635,165 N , 370,579 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
200	61											
205	62											
210	63											
215	64											
220	65											
225	66											
230	67											
235	68											
240	69											
245	70											
250	71											
255	72											
260	73											
265	74											
270	75											
275	76											
280	77											
285	78											
290	79											
	80											
	81											
	82											
	83											
	84											
	85											
	86											
	87											
	88											
	89		BEDROCK, Tertiary Andesite, dark grey-green	38							*See GEOTECHNICAL	

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Date Revised: 24 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-51**	Page	**4** of **5**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**20 Aug 05**
Drilling Method:	**DDH**	Elevation:	**1001 ft / 305.1m**	Date Completed:	**26 Aug 05**
Location:	**Southwest Embankment**	Total Depth:	**445 ft / 135.6m**	Logged by:	**CK/BH**
Coordinates:	**6,635,165 N , 370,579 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
300	91		to red, fine to medium grained, plagioclase phenocrysts, abundant clay minerals, gypsum veining, chlorite on joint surfaces, highly fractured, weak rock. RMR89 - 41.2, UCS - 18MPa, RQD - 45.9%. (average/estimated values)								BEDROCK DATA LOGGING SHEET for additional information	
305	93											
310	95											
315	96											
320	98											
325	99											
330	101											
335	102											
340	104											
345	105											
350	107											
355	108											
360	110											
365	111											
370	113											
375	114											
380	116											
385	117											
390	118											
	119											

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Date Revised: 24 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-51**	Page	**5** of **5**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**20 Aug 05**
Drilling Method:	**DDH**	Elevation:	**1001 ft / 305.1m**	Date Completed:	**26 Aug 05**
Location:	**Southwest Embankment**	Total Depth:	**445 ft / 135.6m**	Logged by:	**CK/BH**
Coordinates:	**6,635,165 N , 370,579 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
395	121											
400	122											
	123											
405	124											
410	125											
	126											
415	127											
420	128											
	129											
425	130											
430	131											
	132											
435	133											
440	134											
	135											
445	136		End of Hole at 445'									
450	137											
	138											
455	139											
460	140											
	141											
465	142											
470	143											
	144											
475	145											
480	146											
	147											
485	148											
490	149											

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Date Revised: 24 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-52**	Page	**1** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**26 Aug 05**
Drilling Method:	**DDH**	Elevation:	**1023 ft / 311.8m**	Date Completed:	**30 Aug 05**
Location:	**Southwest Embankment**	Total Depth:	**307 ft / 93.6m**	Logged by:	**CK/BH**
Coordinates:	**6,635,999 N , 370,766 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
			SAND and GRAVEL, some silt, well graded, subangular, dense, brown, moist								Groundwater depth measured on Sept 22, 2006, 105'	
5	1											
	2											
10	3			87								
	4											
15	5		Decreasing fines content (trace silt)	87	72	☒	GH05-52-1	27/18/17	35		SPT#1 Recovered-13"/18" Photo 100-1107	
20	6			0								
	7											
25	8			73	78	☒	GH05-52-2	26/23/15	48		SPT#2 Recovered-14"/18" Photo 100-1108	
30	9			40								
	10											
35	11			63	50	☒	GH05-52-3	20/33/30	63		SPT#3 Recovered-9"/14" Photo 100-1113, Hit Cobble	
40	12		Decreasing fines content (some silt)									
	13											
45	14			45	56	☒	GH05-52-4	25/36/24	60		SPT#4 Recovered-10"/18" Photo 100-1114	
50	15											
	16											
55	17			50	28	☒	GH05-52-5	15/14/14	28		SPT#5 Recovered-5"/18" Photo 100-1115	
60	18			40								
	19											
65	20			40	61	☒	GH05-52-6	36/34/27	61		SPT#6 Recovered-11"/18" Photo 100-1117	
70	21		Decreasing fines content (trace silt)	40								
	22											
75	23			40	72	☒	GH05-52-7	13/20/26	46		SPT#7 Recovered-13"/18" Photo 100-1118	
80	24			40								
	25											
85	26			80	61	☒	GH05-52-8	6/17/17	34		No recovery SPT#8 Recovered-11"/18" Photo 100-1119	
90	27		Decreasing gravel and increasing fine (some silt)									
	28											
95	29		Decreasing fines content (trace silt)	40	72	☒	GH05-52-9	37/48/36	84		SPT#9 Recovered-	

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Project:	**Pebble Project**	Drill Hole No.	**GH05-52**	Page	**2** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**26 Aug 05**
Drilling Method:	**DDH**	Elevation:	**1023 ft / 311.8m**	Date Completed:	**30 Aug 05**
Location:	**Southwest Embankment**	Total Depth:	**307 ft / 93.6m**	Logged by:	**CK/BH**
Coordinates:	**6,635,999 N , 370,766 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31										13"/18" Photo 100-1120	
105	32			30	100		GH05-52-10	38/56/60	116		SPT#10 Recovered- 14"/18" Photo 100-1121	
110	33											
115	34			50	83		GH05-52-11	35/61/-	61+		SPT#11 Recovered- 10"/12" Photo 100-1122, Hit Boulder	
120	36											
125	37			25	67		GH05-52-12	12/32/62	94		SPT#12 Recovered- 12"/18" Photo 100-1123	
130	39											
135	40			50	72		GH05-52-13	28/24/23	47		SPT#13 Recovered- 13"/18" Photo 100-1124	
140	42											
145	43			25								
150	45											
155	46											
	47		Silty SAND and GRAVEL, isolated cobbles, well graded, subangular, rusty brown, moist	25	33		GH05-52-14	29/44/43	87		SPT#14 Recovered- 6"/18" Photo 100-1125, Hit Cobble	
160	48											
165	49				28		GH05-52-15	60/-/-	60+		SPT#15 Recovered- 5"/16" No Photo *See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information	
170	51		BEDROCK Y type rock, weathered, dark grey, fine grained, trace pyrite, limonite stains on joints, (UCS~5-150 Mpa), (RMR~25-70)	42								
175	52											
180	53											
185	54											
190	56											
195	57											
	58											
	59											

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Project:	**Pebble Project**	Drill Hole No.	**GH05-52**	Page	**3** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**26 Aug 05**
Drilling Method:	**DDH**	Elevation:	**1023 ft / 311.8m**	Date Completed:	**30 Aug 05**
Location:	**Southwest Embankment**	Total Depth:	**307 ft / 93.6m**	Logged by:	**CK/BH**
Coordinates:	**6,635,999 N , 370,766 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
200	61											
205	62											
210	63											
215	64											
220	65											
225	66											
230	67											
235	68											
240	69											
245	70											
250	71											
255	72											
260	73											
265	74											
270	75											
275	76											
280	77											
285	78											
290	79											
	80											
	81											
	82											
	83											
	84											
	85											
	86											
	87											
	88											
	89											

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Project:	**Pebble Project**	Drill Hole No.	**GH05-52**	Page	**4** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**26 Aug 05**
Drilling Method:	**DDH**	Elevation:	**1023 ft / 311.8m**	Date Completed:	**30 Aug 05**
Location:	**Southwest Embankment**	Total Depth:	**307 ft / 93.6m**	Logged by:	**CK/BH**
Coordinates:	**6,635,999 N , 370,766 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
300	91											
	92											
305	93											
	94		End of Hole at 308'									
310	95											
	96											
315	97											
	98											
320	99											
	100											
325	101											
	102											
330	103											
	104											
335	105											
	106											
340	107											
	108											
345	109											
	110											
350	111											
	112											
355	113											
	114											
360	115											
	116											
365	117											
	118											
370	119											
375												
380												
385												
390												

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Project:	**Pebble Project**	Drill Hole No.	**GH05-54**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**31 Aug 05**
Drilling Method:	**DDH**	Elevation:	**2000 ft / 609.6m**	Date Completed:	**31 Aug 05**
Location:	**North Saddle**	Total Depth:	**125 ft / 38.1m**	Logged by:	**CK/BH**
Coordinates:	**6,639,209 N , 374,843 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
5	1		Tricone and casing to Bedrock.								Groundwater depth measured on Sept 22, 2005, Dry Well'	
10	3		BEDROCK Y type rock, dark grey, fine grained, clay infill, weathered joints, trace calcite nodules, (UCS~ 50-100 Mpa), (RMR~ 25-65)								*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information	
15	4											
	5											
20	6											
	7											
25	8											
	9											
30	10											
35	11											
	12											
40	13											
45	14											
	15											
50	16											
55	17											
	18											
60	19											
65	20											
	21											
70	22											
75	23											
	24											
80	25											
85	26											
	27											
90	28											
95	29											

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Project: Pebble Project | Drill Hole No. **GH05-54** | Page **2** of **2**

Drilling Co: **Quest America Drilling Inc.** | In-Situ Sampler: **SPT Split Spoon** | Date Started: **31 Aug 05**

Drilling Method: **DDH** | Elevation: **2000 ft / 609.6m** | Date Completed: **31 Aug 05**

Location: **North Saddle** | Total Depth: **125 ft / 38.1m** | Logged by: **CK/BH**

Coordinates: **6,639,209 N , 374,843 E** | Azimuth,Inclination **0, -90** | Reviewed by: **TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31											
105	32											
110	33											
115	34											
120	35											
125	36											
	37											
	38		End of Hole at 125'									
130	39											
135	40											
140	41											
145	42											
150	43											
155	44											
160	45											
165	46											
170	47											
175	48											
180	49											
185	50											
190	51											
195	52											
	53											
	54											
	55											
	56											
	57											
	58											
	59											

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Project:	**Pebble Project**	Drill Hole No.	**GH05-56**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**2 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1358 ft / 413.9m**	Date Completed:	**2 Sep 05**
Location:	**North Embankment**	Total Depth:	**145 ft / 44.2m**	Logged by:	**CK/BH**
Coordinates:	**6,639,448 N , 370,566 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
5	1		Silty SAND, some gravel, some clay, isolated cobbles, well graded, subangular, brown, moist		0	☒	GH05-56-1	7/6/4	10		Groundwater depth measured on Sept 22, 2005, Dry Well SPT#1 Recovered- 0"/18" No Photo, Loose, back end of split tube blocked with gravel	
10	3											
15	5			35	44	☒	GH05-56-2	8/12/9	21			
20	6		gravelly SAND, some clay, isolated cobbles, well graded, subangular, brown, moist	12							SPT#2 Recovered- 8"/18" Photo 100-1143	
25	8		BEDROCK Diorite/Granodiorite, light grey, quartz phenocrysts, weathered joints, limonite, clay infill, (UCS~25-100 Mpa), (RMR~ 25-65)								*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information	
30	9											
35	11											
40	12											
45	14											
50	15											
55	17											
60	18											
65	20											
70	21											
75	23											
80	24											
85	25											
90	27											
95	28											
	29											

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Project:	**Pebble Project**	Drill Hole No.	**GH05-56**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**2 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1358 ft / 413.9m**	Date Completed:	**2 Sep 05**
Location:	**North Embankment**	Total Depth:	**145 ft / 44.2m**	Logged by:	**CK/BH**
Coordinates:	**6,639,448 N , 370,566 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31											
105	32											
110	33											
115	34											
120	35											
125	36											
130	37											
135	38											
140	39											
145	40											
150	41											
155	42											
160	43											
165	44											
170	45		End of Hole at 145'									
175	46											
180	47											
185	48											
190	49											
195	50											
	51											
	52											
	53											
	54											
	55											
	56											
	57											
	58											
	59											

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Project:	**Pebble Project**	Drill Hole No.	**GH05-57**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**3 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1408 ft / 429.2m**	Date Completed:	**4 Sep 05**
Location:	**Mill Site**	Total Depth:	**125 ft / 38.1m**	Logged by:	**CK/BH**
Coordinates:	**6,643,241 N , 369,743 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
5	1		Silty SAND and GRAVEL, Tricone and casing to 10'								Groundwater depth measured on Sept 22, 2005, 10.5'	
10	3		BEDROCK Granodiorite, (UCS~ 25-100 Mpa), (RMR~ 25-60)								*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information	
15	4											
20	5											
25	6											
30	8											
35	9											
40	10											
45	11											
50	12											
55	13											
60	14											
65	15											
70	16											
75	17											
80	18											
85	19											
90	20											
95	21											
	22											
	23											
	24											
	25											
	26											
	27											
	28											
	29											

SOILS LOG WITH WELL DETAILS GH05-51.GPJ DRILL.GDT 5 Jun 06

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH05-57

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	6	0

Rev. 0 - Issued for Report

GH05-57

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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-57**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**3 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1408 ft / 429.2m**	Date Completed:	**4 Sep 05**
Location:	**Mill Site**	Total Depth:	**125 ft / 38.1m**	Logged by:	**CK/BH**
Coordinates:	**6,643,241 N , 369,743 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31											
105	32											
110	33											
115	34											
120	35											
125	36											
130	37											
135	38		End of Hole at 125'									
140	39											
145	40											
150	41											
155	42											
160	43											
165	44											
170	45											
175	46											
180	47											
185	48											
190	49											
195	50											
	51											
	52											
	53											
	54											
	55											
	56											
	57											
	58											
	59											

SOILS LOG WITH WELL DETAILS GH05-51.GPJ DRILL.GDT 5 Jun 06

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH05-57

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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-58**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**4 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1505 ft / 458.7m**	Date Completed:	**5 Sep 05**
Location:	**Mill Site**	Total Depth:	**155 ft / 47.2m**	Logged by:	**CK/BH**
Coordinates:	**6,642,044 N , 369,541 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
5	1		Silty SAND and GRAVEL, well graded, subrounded to subangular, rusty brown, moist								Groundwater depth measured on Sept 22, 2005, 17.5'	
			Tricone and case top 20'									
10	3										Esker just west of site	
15	4											
20	6		silty SAND and GRAVEL, trace clay, well graded, subrounded to subangular, rusty brown, moist	0							Clay seam at 20-30', extremely weathered bedrock	
25	7				67	☒	GH05-58-1	16/34/38	72	●	SPT#1 Recovered- 12"/18" Photo 100-1152	
30	9											
35	10											
40	11											
45	12		BEDROCK Y/G type rock, light grey, fine grained, competent bedrock at 38ft, (UCS~ 5-100 Mpa), (RMR~ 25-50)								*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information	
50	14											
55	15											
60	16											
65	17											
70	19											
75	20											
80	21											
85	23											
90	25											
95	26											
	27											
	28											
	29											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH05-58

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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-58**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**4 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1505 ft / 458.7m**	Date Completed:	**5 Sep 05**
Location:	**Mill Site**	Total Depth:	**155 ft / 47.2m**	Logged by:	**CK/BH**
Coordinates:	**6,642,044 N , 369,541 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31											
105	32											
110	33											
115	34											
120	35											
125	36											
130	37											
135	38											
140	39											
145	40											
150	41											
155	42											
160	43											
165	44											
170	45											
175	46											
180	47		End of Hole at 155'									
185	48											
190	49											
195	50											
	51											
	52											
	53											
	54											
	55											
	56											
	57											
	58											
	59											

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Pebble Project
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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-59**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**5 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1184 ft / 360.9m**	Date Completed:	**6 Sep 05**
Location:	**Crusher Site**	Total Depth:	**175 ft / 53.3m**	Logged by:	**CK/BH**
Coordinates:	**6,640,688 N , 370,671 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Silty SAND and GRAVEL, some clay, isolated cobbles, well graded, subangular, rusty brown, moist.								Groundwater depth measured on Sept 22, 2005, 72'	
					17	☒	GH05-50-1	7/4/5	9		SPT#1 Recovered- 3"/18" Photo 100-1157	
15	5		Decreasing fines	21	50	☒	GH05-50-2	6/7/11	18		SPT#2 Recovered- 9"/18" Photo 100-1158	
25	8			10	39	☒	GH05-50-3	6/16/13	29		SPT#3 Recovered- 7"/18" Photo 100-1159	
35	11		Decreasing gravel	25	61	☒	GH05-50-4	4/12/12	24		SPT#4 Recovered- 11"/18" Photo 100-1160	
45	14			45	0	☒	GH05-50-5	6/10/11	21		SPT#5 Recovered- 0"/18" No Photo	
55	17		Decreasing sand		61	☒	GH05-50-6	3/7/8	15		SPT#6 Recovered- 11"/18" Photo 100-1161	
70	21		BEDROCK Granodiorite, light grey, stained discolouration in quartz veins, heavy deposit of clay 76'-78', (UCS~ 25-100 Mpa), (RMR~ 25-50)	0 3							SPT#7 Recovered- ?"/18" No Photo, Hit Cobble or Boulder *See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information	
95	29											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH05-59

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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-59**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**5 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1184 ft / 360.9m**	Date Completed:	**6 Sep 05**
Location:	**Crusher Site**	Total Depth:	**175 ft / 53.3m**	Logged by:	**CK/BH**
Coordinates:	**6,640,688 N , 370,671 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31											
105	32											
110	33											
115	34											
120	35											
125	36											
130	37											
135	38											
140	39											
145	40											
150	41											
155	42											
160	43											
165	44											
170	45											
175	46											
180	47											
185	48											
190	49											
195	50											
	51											
	52											
	53											
	54		End of Hole at 175'									
	55											
	56											
	57											
	58											
	59											

SOILS LOG WITH WELL DETAILS GH05-51.GPJ DRILL.GDT 5 Jun 06

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH05-59

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Date Revised: 26 Oct 05

Project: Pebble Project | Drill Hole No. **GH05-60** | Page 1 of 3

Drilling Co: Quest America Drilling Inc. | In-Situ Sampler: SPT Split Spoon | Date Started: 6 Sep 05

Drilling Method: DDH | Elevation: 1107 ft / 337.4m | Date Completed: 8 Sep 05

Location: Crusher Site | Total Depth: 245 ft / 74.7m | Logged by: CK/BH

Coordinates: 6,640,182 N , 371,125 E | Azimuth,Inclination 0, -90 | Reviewed by: TT

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
0	0		TOPSOIL, silty SAND and GRAVEL, trace inclusions (roots), well graded, subangular, rusty brown, moist							Groundwater at surface on Sept 22, 2005
5	1		SAND and GRAVEL, some silt, trace clay, trace inclusions (roots), well graded, subangular, brown, moist	20	0		GH05-60-1	1/4/3	7	SPT#1 Recovered- 0"/18" No Photo, Sample fell out of tube
10	3			15	0		GH05-60-2	2/4/4	8	SPT#2 Recovered- 0"/18" No Photo, Sample fell out of tube
25	8			30	33		GH05-60-3	4/9/8	17	SPT#3 Recovered- 6"/18" Photo 100-1166
35	11			25	44		GH05-60-4	6/13/20	33	SPT#4 Recovered- 8"/18" Photo 100-1167, Hit Cobble
45	14			38	61		GH05-60-5	16/20/21	41	SPT#5 Recovered- 11"/18" Photo 100-1168, Hit Cobble
55	17				61		GH05-60-6	18/26/27	53	SPT#6 Recovered- 11"/18" Photo 100-1169
60	18		Tricone and case to 75'		44		GH05-60-7	30/35/30	65	SPT#7 Recovered- 8"/14" Photo 100-1170, Hit Cobble/Boulder
75	23				61		GH05-60-8	6/7/7	14	SPT#8 Recovered- 11"/18" Photo 100-1171
85	26		silty gravelly SAND, trace clay, subangular, brown, moist	42	78		GH05-60-9	12/18/23	41	SPT#9 Recovered- 14"/18" Photo 100-1172
90	27		BEDROCK Granodiorite, weathered, rusty brown/orange, (UCS~ 5-100 Mpa),(RMR~ 25-50)							*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80

WELL DETAILS

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH05-60

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-60**	Page	**2** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**6 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1107 ft / 337.4m**	Date Completed:	**8 Sep 05**
Location:	**Crusher Site**	Total Depth:	**245 ft / 74.7m**	Logged by:	**CK/BH**
Coordinates:	**6,640,182 N , 371,125 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31											
105	32											
110	33											
115	34											
120	35											
125	36											
130	37											
135	38											
140	39											
145	40											
150	41											
155	42											
160	43											
165	44											
170	45											
175	46											
180	47											
185	48											
190	49											
195	50											
	51											
	52											
	53											
	54											
	55											
	56											
	57											
	58											
	59											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH05-60

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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-60**	Page	**3** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**6 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1107 ft / 337.4m**	Date Completed:	**8 Sep 05**
Location:	**Crusher Site**	Total Depth:	**245 ft / 74.7m**	Logged by:	**CK/BH**
Coordinates:	**6,640,182 N , 371,125 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
200	61											
	62											
205	63											
210	64											
	65											
215	66											
220	67											
	68											
225	69											
230	70											
	71											
235	72											
240	73											
	74											
245	75		End of Hole at 245'									
250	76											
	77											
255	78											
260	79											
	80											
265	81											
270	82											
	83											
275	84											
280	85											
	86											
285	87											
290	88											
	89											

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Pebble Project
Overburden Log For GH05-60

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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-61**	Page	**1 of 4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**8 Sep 05**
Drilling Method:	**DDH**	Elevation:	**976 ft / 297.5m**	Date Completed:	**10 Sep 05**
Location:	**North Embankment**	Total Depth:	**305 ft / 93.0m**	Logged by:	**CK/BH**
Coordinates:	**6,639,653 N , 371,651 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Silty SAND (Topsoil), trace inclusions (roots), poorly graded, loose, dark brown, moist								Groundwater depth measured on Sept 22, 2005, 1.5'	
5	1		SILT and SAND, trace gravel, trace clay, poorly graded, dark grey, wet		39		GH05-61-1	1/2/2	4		No recovery SPT#1 Recovered- 7"/18" Photo 100-1177	
10	3											
15	5		Trace gravel and isolated cobbles	0	22		GH05-61-2	4/4/5	9		SPT#2 Recovered- 4"/18" Photo 100-1178	
20	6											
25	8				111		GH05-61-3	3/5/5	10		SPT#3 Recovered- 20"/18" Photo 100-1180	
30	9											
35	11		Decreasing fines (silty), isolated cobbles, trace gravel	25	144		GH05-61-4	6/8/11	19		SPT#4 Recovered- 26"/18" Photo 100-1182	
40	12											
45	14				117		GH05-61-5	41/33/50	83		No SPT due to cave in.	
50	15											
55	17		SAND, trace gravel, trace silt, trace clay, occasional boulder, poorly graded, dense, light brown, moist	20							SPT#5 Recovered- 21"/18" Photo 100-1183	
60	18											
65	20				94		GH05-61-6	11/23/19	42		SPT#6 Recovered- 17"/18" Photo 100-1184	
70	21											
75	23		Silty SAND and GRAVEL, trace clay, frequent cobbles, well graded, subangular, light brown, moist		0		GH05-61-7	60/-/-	60+		SPT#7 Recovered- 0"/6" No Photo, Hit Boulder	
80	24											
85	26			100	100		GH05-61-8	60/-/-	60+		SPT#8 Recovered- 6"/6" Photo 100-1185	
90	27											
95	29			60	33		GH05-61-9	37/60/-	60+		SPT#9 Recovered-	

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Pebble Project
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Date Revised: 26 Oct 05

Project: Pebble Project | Drill Hole No. **GH05-61** | Page 2 of 4

Drilling Co: Quest America Drilling Inc. | In-Situ Sampler: SPT Split Spoon | Date Started: 8 Sep 05

Drilling Method: DDH | Elevation: 976 ft / 297.5m | Date Completed: 10 Sep 05

Location: North Embankment | Total Depth: 305 ft / 93.0m | Logged by: CK/BH

Coordinates: 6,639,653 N , 371,651 E | Azimuth,Inclination 0, -90 | Reviewed by: TT

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31										4"/12" Photo 100-1186, Hit Boulder	
105	32			60							No recovery	
	33				0		GH05-61-10	60/-/-	60+		SPT#10 Recovered- 0"/6" No Photo, Hit Boulder	
110	34			0							No recovery	
115	35											
120	36											
	37											
125	38				0		GH05-61-11	60/-/-	60+		SPT#11 Recovered- 0"/6" No Photo, Hit Boulder	
130	39											
	40											
135	41		SAND, trace silt, poorly graded	8	133		GH05-61-12	10/18/20	38		SPT#12 Recovered- 24"/18" Photo 100-1187, 2' of cave in	
140	42											
	43											
145	44			45	0		GH05-61-13	58/50/	50+		SPT#13 Recovered- 0"/6" No Photo, Hit Boulder	
150	45											
	46											
155	47			40	67		GH05-61-14	60/-/-	60+		SPT#14 Recovered- 4"/6" Photo 100-1188, Hit Boulder	
160	48											
	49											
165	50			60								
	51											
170	52											
175	53		Silty SAND, isolated cobbles, trace gravel, poorly graded, subangular to subrounded, loose, dark grey, moist	45	83		GH05-61-15	60/-/-	60+		SPT#15 Recovered- 5"/6" Photo 100-1189, Hit Boulder	
	54											
180	55											
	56											
185	57		BEDROCK Granodiorite, clay filled joints, (UCS~5-35 Mpa), (RMR~ 40-55)	50	83		GH05-61-16	60/-/-	60+		*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information SPT#16 Recovered- 5"/6" No Photo, Hit Boulder	
190	58											
195	59											

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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-61**	Page	**3** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**8 Sep 05**
Drilling Method:	**DDH**	Elevation:	**976 ft / 297.5m**	Date Completed:	**10 Sep 05**
Location:	**North Embankment**	Total Depth:	**305 ft / 93.0m**	Logged by:	**CK/BH**
Coordinates:	**6,639,653 N , 371,651 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
200	61											
	62											
205	63											
210	64											
	65											
215	66											
220	67											
	68											
225	69											
230	70											
	71											
235	72											
240	73											
	74											
245	75											
250	76											
	77											
255	78											
260	79											
	80											
265	81											
270	82											
	83											
275	84											
280	85											
	86											
285	87											
290	88											
	89											

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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-61**	Page	**4** of **4**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**8 Sep 05**
Drilling Method:	**DDH**	Elevation:	**976 ft / 297.5m**	Date Completed:	**10 Sep 05**
Location:	**North Embankment**	Total Depth:	**305 ft / 93.0m**	Logged by:	**CK/BH**
Coordinates:	**6,639,653 N , 371,651 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
300	91											
	92											
305	93		End of Hole at 305'									
	94											
310	95											
	96											
315	97											
	98											
320	99											
	100											
325	101											
	102											
330	103											
	104											
335	105											
	106											
340	107											
	108											
345	109											
	110											
350	111											
	112											
355	113											
	114											
360	115											
	116											
365	117											
	118											
370	119											
375												
380												
385												
390												

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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-62**	Page	**1** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**11 Sep 05**
Drilling Method:	**DDH**	Elevation:	**972 ft / 296.3m**	Date Completed:	**13 Sep 05**
Location:	**North Embankment**	Total Depth:	**245 ft / 74.7m**	Logged by:	**CK/BH**
Coordinates:	**6,639,566 N , 372,470 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
5	1		SAND, some silt, trace gravel, poorly graded, subangular, brown, moist.								Well was lost due to bridging to rods	
10	2											
15	3											
	4											
	5				39	☒	GH05-62-1	7/6/34	40		SPT#1 Recovered- 7"/18" Photo 100-1194	
20	6											
	7											
25	8		gravelly SILT and SAND, well graded	15	67	☒	GH05-62-2	8/9/13	22		SPT#2 Recovered- 12"/18" Photo 100-1195	
30	9											
	10											
35	11			20	100	☒	GH05-62-3	8/14/19	33		SPT#3 Recovered- 18"/18" Photo 100-1196	
40	12											
	13											
45	14		sandy SILT, trace gravel, trace clay, , subangular, poorly graded, moist	27	0	☒	GH05-62-4	9/11/22	33		No SPT, Boulder	
50	15											
	16											
55	17			50							SPT#4 Recovered- 18"/18" Photo 100-1197	
60	18											
	19											
65	20			50	83	▬	GH05-62-5	40/60/-	60+		SPT#5 Recovered- 5"/6" Photo 100-1198, Hit Boulder	
70	21		SAND and GRAVEL, trace silt, occasional cobbles, well graded, subangular, chocolate brown, moist	33								
	22											
75	23				39	☒	GH05-62-6	9/37/36	73		SPT#6 Recovered- 7"/18" Photo 100-1199, Likely hit cobble	
80	24											
	25											
85	26		Silty SAND and GRAVEL, occasional cobble, well graded, subangular, light brown, moist		0	☒	GH05-62-7	30/60/	60+		SPT#7 Recovered- 0"/6" No Photo, Hit Boulder	
90	27											
	28											
95	29				0	☒	GH05-62-8	40/60/-	60+		SPT#8 Recovered-	

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Date Revised: 26 Oct 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-62**	Page	**2** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**11 Sep 05**
Drilling Method:	**DDH**	Elevation:	**972 ft / 296.3m**	Date Completed:	**13 Sep 05**
Location:	**North Embankment**	Total Depth:	**245 ft / 74.7m**	Logged by:	**CK/BH**
Coordinates:	**6,639,566 N , 372,470 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31										0"/18" No Photo, Hit Boulder	
105	32		sandy, gravelly SILT, some clay, well graded, subangular, pinkish white, well graded, moist (Completely decomposed bedrock)	39								
110	33											
115	34											
120	35				83	☒	GH05-62-9	21/60/-	60+	●	SPT#9 Recovered- 10"/12" Photo 100-1200, Hit Boulder	
125	36											
130	37											
135	38		BEDROCK Y unit, Pinkish white, completely decomposed bedrock, soft, silty, (UCS~5-50 Mpa), (RMR~25-60)								*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information	
140	39											
145	40											
150	41											
155	42											
160	43											
165	44											
170	45											
175	46											
180	47											
185	48											
190	49											
195	50											
	51											
	52											
	53											
	54											
	55											
	56											
	57											
	58											
	59											

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Project:	**Pebble Project**	Drill Hole No.	**GH05-62**	Page	**3** of **3**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**11 Sep 05**
Drilling Method:	**DDH**	Elevation:	**972 ft / 296.3m**	Date Completed:	**13 Sep 05**
Location:	**North Embankment**	Total Depth:	**245 ft / 74.7m**	Logged by:	**CK/BH**
Coordinates:	**6,639,566 N , 372,470 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
200	61											
	62											
205	63											
210	64											
	65											
215	66											
220	67											
	68											
225	69											
230	70											
	71											
235	72											
240	73											
	74											
245	75		End of Hole at 245'									
250	76											
	77											
255	78											
260	79											
	80											
265	81											
270	82											
	83											
275	84											
280	85											
	86											
285	87											
290	88											
	89											

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Project:	**Pebble Project**	Drill Hole No.	**GH05-63**	Page	**1** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**13 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1041 ft / 317.3m**	Date Completed:	**14 Sep 05**
Location:	**North Embankment**	Total Depth:	**135 ft / 41.1m**	Logged by:	**LS/BH**
Coordinates:	**6,639,564 N , 373,025 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
			SILT, some sand, trace gravel, trace organics, poorly graded, dark brown, moist								Groundwater was at surface on Sept 22, 2005	
5	1											
	2		Clayey SAND, some gravel, well graded, subangular, brown, moist.	10								
10	3											
	4											
15	5				33	☒	GH05-63-1	21/70/-	70+	●	SPT#1 Recovered- 6"/6" Photo 100-1205, Hit Boulder	
	6		BEDROCK									
20	7		Diorite, dark grey, quartz veins, rusty brown discolouration, (UCS~5-100 Mpa), (RMR~25-60)								*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information	
25	8											
	9											
30	10											
35	11											
	12											
40	13											
45	14											
	15											
50	16											
55	17											
	18											
60	19											
65	20											
	21											
70	22											
75	23											
	24											
80	25											
85	26											
	27											
90	28											
95	29											

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Project:	**Pebble Project**	Drill Hole No.	**GH05-63**	Page	**2** of **2**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**13 Sep 05**
Drilling Method:	**DDH**	Elevation:	**1041 ft / 317.3m**	Date Completed:	**14 Sep 05**
Location:	**North Embankment**	Total Depth:	**135 ft / 41.1m**	Logged by:	**LS/BH**
Coordinates:	**6,639,564 N , 373,025 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31											
105	32											
110	33											
115	34											
120	35											
125	36											
130	37											
135	38											
140	39											
145	40											
150	41		End of Hole at 135'									
155	42											
160	43											
165	44											
170	45											
175	46											
180	47											
185	48											
190	49											
195	50											
	51											
	52											
	53											
	54											
	55											
	56											
	57											
	58											
	59											

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Project: Pebble Project | Drill Hole No. GH05-64 | Page 1 of 2

Drilling Co: Quest America Drilling Inc. | In-Situ Sampler: SPT Split Spoon | Date Started: 14 Sep 05

Drilling Method: DDH | Elevation: 1020 ft / 310.9m | Date Completed: 15 Sep 05

Location: Topsoil Stockpile | Total Depth: 185 ft / 56.4m | Logged by: LS/BH

Coordinates: 6,640,869 N , 374,012 E | Azimuth,Inclination 0, -90 | Reviewed by: TT

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (20 40 60 80)	NOTES	WELL DETAILS
0	0		Silty SAND, trace organics, well graded, subangular fragments, brown, moist.									
5	1				28		GH05-64-1	8/5/7	12		SPT#1 Recovered- 5"/18" Photo 100-1210	
10	3											
15	5				61		GH05-64-2	16/26/21	47		SPT#2 Recovered- 11"/18" Photo 100-1211, Pebble stuck in end	
20	6											
25	8		SAND and GRAVEL, fine grained, well graded, brown, moist.	20	61		GH05-64-3	7/16/25	41		SPT#3 Recovered- 11"/18" Photo 100-1212	
30	9											
35	11		CLAY and SILT, trace sand, poorly graded, brown, moist.	10	67		GH05-64-4	14/11/17	18		SPT#4 Recovered- 12"/18" Photo 100-1213, advanced 3" on last hit of 2nd 6"	
40	12											
45	14		Silty SAND, trace gravel, well graded, subangular, brown, moist.	8	133		GH05-64-5	7/10/14	24		SPT#5 Recovered- 24"/18" Photo 100-1214	
50	15											
55	17											
60	18											
65	19											
70	21		BEDROCK Y rock type, fairly weathered, soft, rusty brown discolouration in joints, quartz veins, (UCS~5-100 Mpa), (RMR~25-65)	17							*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information	
75	22											
80	24											
85	25											
90	27											
95	28											
	29											

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Project: Pebble Project | Drill Hole No. GH05-64 | Page 2 of 2

Drilling Co: Quest America Drilling Inc. | In-Situ Sampler: SPT Split Spoon | Date Started: 14 Sep 05

Drilling Method: DDH | Elevation: 1020 ft / 310.9m | Date Completed: 15 Sep 05

Location: Topsoil Stockpile | Total Depth: 185 ft / 56.4m | Logged by: LS/BH

Coordinates: 6,640,869 N , 374,012 E | Azimuth,Inclination 0, -90 | Reviewed by: TT

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31											
105	32											
	33											
110	34											
115	35											
	36											
120	37											
125	38											
	39											
130	40											
135	41											
	42											
140	43											
145	44											
	45											
150	46											
155	47											
	48											
160	49											
165	50											
	51											
170	52											
175	53											
	54											
180	55											
	56											
185	57		End of Hole at 185'									
190	58											
	59											
195												

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Project:	**Pebble Project**	Drill Hole No.	**GH05-65**	Page	**1** of **6**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**16 Sep 05**
Drilling Method:	**DDH**	Elevation:	**835 ft / 254.5m**	Date Completed:	**20 Sep 05**
Location:	**UT1.190**	Total Depth:	**495 ft / 150.9m**	Logged by:	**LS/BH**
Coordinates:	**6,631,402 N , 370,590 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
5	1	sandy, gravelly SILT, trace clay, subrounded, clasts up to cobble size, well graded, light brown, moist							Well was lost due to sand cavern	
	2			78	☒	GH05-65-1	7/7/14	21	SPT#1 Recovered- 14"/18" Photo GH05-65 SPT#1	
10	3									
	4									
15	5	Gravelly sandy SILT, some cobbles, subangular to subrounded clasts, gap-graded, light brown, moist.		3	☒	GH05-65-2	11/8/11	19	SPT#2 Recovered- 0"/18" Photo GH05-65 SPT#2, Few Pebbles	
20	6									
	7									
25	8	Increasing sand and gravel content		61	☒	GH05-65-3	4/16/27	43	SPT#3 Recovered- 11"/18" Photo GH05-65 SPT#3	
30	9									
	10									
35	11	Increasing silt content		50	☒	GH05-65-4	22/27/73	100	SPT#4 Recovered- 9"/18" Photo GH05-65 SPT#4	
40	12									
	13									
45	14	SILT and fine SAND, trace gravel, trace clay, poorly graded		89	☒	GH05-65-5	19/32/36	68	SPT#5 Recovered- 16"/18" Photo GH05-65 SPT#5	
50	15									
	16									
55	17	Some clay, very fine, absence of pebbles		89	☒	GH05-65-6	9/18/25	43	SPT#6 Recovered- 16"/18" Photo GH05-65 SPT#6	
60	18									
	19									
65	20	SILT, trace sand, trace clay, poorly graded		139	☒	GH05-65-7	5/8/16	24	Tricone to 105', Cased to 60' SPT#7 Recovered- 25"/18" Photo GH05-65 SPT#7 & 7(2)	
70	21									
	22									
75	23									
80	24									
	25									
85	26									
	27									
90	28									
95	29									

SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80

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Date Revised: 3 Nov 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-65**	Page	**2** of **6**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**16 Sep 05**
Drilling Method:	**DDH**	Elevation:	**835 ft / 254.5m**	Date Completed:	**20 Sep 05**
Location:	**UT1.190**	Total Depth:	**495 ft / 150.9m**	Logged by:	**LS/BH**
Coordinates:	**6,631,402 N , 370,590 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
100	31											
105	32		SAND, trace silt, trace gravel, poorly graded, subrounded clasts up to cobble size, light brown, moist.	0	100	⊠	GH05-65-8	14/28/25	53		SPT#8 Recovered-18"/18" Photo 100-1217	
110	33											
115	34											
	35		SAND and GRAVEL, trace silt, well graded, subrounded to subangular, light brown, moist		61	⊠	GH05-65-9	45/30/13	43		SPT#9 Recovered-11"/18" Photo 100-1218	
120	36											
125	37											
	38		Some clay		33	⊠	GH05-65-10	47/25/15	40		SPT#10 Recovered-6"/18" Photo 100-1219, Hit Cobble	
130	39											
135	40											
	41		SILT, some clay, trace sand, trace gravel, subrounded to cobble size, poorly graded		111	⊠	GH05-65-11	27/54/60	114		SPT#11 Recovered-20"/18" Photo 100-1220	
140	42											
145	43											
	44		SILT and SAND, trace clay, poorly graded, light brown, moist.		100	⊠	GH05-65-12	14/30/34	64		SPT#12 Recovered-18"/18" Photo 100-1221	
150	45											
155	46											
	47		Increasing fines (clayey SILT)		133	⊠	GH05-65-13	16/20/26	46		SPT#13 Recovered-24"/18" Photo 100-1222	
160	48											
165	49											
	50		gravelly SILT, some sand, trace clay, well graded, subangular to subrounded, light brown, moist.		78	⊠	GH05-65-14	27/60/	60+		SPT#14 Recovered-14"/18" Photo 100-1223	
170	51											
175	52											
	53		SILT, some clay, trace sand, poorly graded		56	⊠	GH05-65-15	36/65/	65+		SPT#15 Recovered-10"/18" Photo 100-1224	
180	54											
185	55											
	56				67	⊠	GH05-65-16	42/60/	60+		SPT#16 Recovered-12"/10" Photo 100-1225, Hit Cobble	
190	57											
195	58											
	59											

SOILS LOG WITH WELL DETAILS GH05-51.GPJ DRILL.GDT 5 Jun 06

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH05-65

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	6	0

GH05-65

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Date Revised: 3 Nov 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-65**	Page	**3** of **6**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**16 Sep 05**
Drilling Method:	**DDH**	Elevation:	**835 ft / 254.5m**	Date Completed:	**20 Sep 05**
Location:	**UT1.190**	Total Depth:	**495 ft / 150.9m**	Logged by:	**LS/BH**
Coordinates:	**6,631,402 N , 370,590 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
200	61		SAND, trace gravel, some silt, poorly graded, subangular, brown, moist									
205	62		Increasing fines									
210	63											
215	64											
220	65											
225	66										Tricone to 237', due to tight hole, sand heaved up 20' in rods, core tube sanded in core barrel, reaming shell replaced	
230	67											
235	68											
240	69											
245	70											
250	71											
255	72			0								
260	73											
265	74											
270	75											
275	76											
280	77											
285	78											
290	79											
	80											
	81										Sand taken from cuttings and added to core box	
	82											
	83											
	84										Tricone to 340' after tube was sanded in twice more and rods pulled to free it each time.	
	85											
	86											
	87											
	88											
	89											

Northern Dynasty Mines Inc.
Pebble Project
Overburden Log For GH05-65

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Date Revised: 3 Nov 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-65**	Page	**4** of **6**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**16 Sep 05**
Drilling Method:	**DDH**	Elevation:	**835 ft / 254.5m**	Date Completed:	**20 Sep 05**
Location:	**UT1.190**	Total Depth:	**495 ft / 150.9m**	Logged by:	**LS/BH**
Coordinates:	**6,631,402 N , 370,590 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
300	91											
	92											
305	93											
	94											
310	95											
	96											
315	97											
	98											
320	99											
	100											
325	101											
330	102											
	103											
335	104		Increasing fines	0							Triconed to 395', Bedrock at 392'	
	105											
340	106											
	107											
345	108											
	109											
350	110											
	111											
355	112											
	113											
360	114											
	115											
365	116											
	117											
370	118											
	119											
375												
380												
385												
390				0								

SOILS LOG WITH WELL DETAILS GH05-51.GPJ DRILL.GDT 5 Jun 06

Northern Dynasty Mines Inc.
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Overburden Log For GH05-65

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Date Revised: 3 Nov 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-65**	Page	**5** of **6**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**16 Sep 05**
Drilling Method:	**DDH**	Elevation:	**835 ft / 254.5m**	Date Completed:	**20 Sep 05**
Location:	**UT1.190**	Total Depth:	**495 ft / 150.9m**	Logged by:	**LS/BH**
Coordinates:	**6,631,402 N , 370,590 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
395	121		BEDROCK G type rock, quartz veins, competent rock, none weathered, (UCS~100 Mpa), (RMR~25-70)								*See GEOTECHNICAL BEDROCK DATA LOGGING SHEET for additional information	
400	122											
	123											
405	124											
410	125											
	126											
415	127											
420	128											
	129											
425	130											
430	131											
	132											
435	133											
440	134											
	135											
445	136											
450	137											
	138											
455	139											
460	140											
	141											
465	142											
470	143											
	144											
475	145											
480	146											
	147											
485	148											
490	149											

SOILS LOG WITH WELL DETAILS GH05-51.GPJ DRILL.GDT 5 Jun 06

Northern Dynasty Mines Inc.
Pebble Project
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Date Revised: 3 Nov 05

Project:	**Pebble Project**	Drill Hole No.	**GH05-65**	Page	**6** of **6**
Drilling Co:	**Quest America Drilling Inc.**	In-Situ Sampler:	**SPT Split Spoon**	Date Started:	**16 Sep 05**
Drilling Method:	**DDH**	Elevation:	**835 ft / 254.5m**	Date Completed:	**20 Sep 05**
Location:	**UT1.190**	Total Depth:	**495 ft / 150.9m**	Logged by:	**LS/BH**
Coordinates:	**6,631,402 N , 370,590 E**	Azimuth,Inclination	**0, -90**	Reviewed by:	**TT**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) 20 40 60 80	NOTES	WELL DETAILS
495	151		End of Hole at 495'									
500	152											
	153											
505	154											
	155											
510	156											
	157											
515	158											
	159											
520	160											
	161											
525	162											
	163											
530	164											
	165											
535	166											
	167											
540	168											
	169											
545	170											
	171											
550	172											
	173											
555	174											
	175											
560	176											
	177											
565	178											
	179											
570												
575												
580												
585												
590												

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Pebble Project
Overburden Log For GH05-65

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Date Revised: 3 Nov 05

Project:	**Pebble Project**	Drill Hole No.	**GH06-65**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 28, 06**
Drilling Method:	**DDH**	Elevation:	**1649 ft**	Date Completed:	**Aug 30, 06**
Location:	**Area G**	Total Depth:	**100 ft**	Logged by:	**DAY/MW**
Coordinates:	**2,149,020 N , 1,372,647 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			Triconed								Triconed to 5'	
5	1		SAND, fine to coarse grained, some silt, some fine gravel, dense, angular, well graded, dry to moist, brown	0	75	☒	GH06-65-1	21/50/-	50+	■	Water level measured at 85' below ground surface Aug 31/06	
	2			100								
			WEATHERED BEDROCK, Highly weathered Sandstone?, dark green, coarse grained, silty sand infill, friable									
10	3			94							***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
	4											
15			BEDROCK, Rhyolite, slightly weathered, clastic, pinkish, coarse to fine grain, moderate to strong, some quartz, calcite veins	80								
	5											
20	6			100							*See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	7			100								
25	8											
				77								
30	9			66								
	10											
35				37								
	11			100								
				96								
40	12			100								
				94								
	13											
45				13								
	14											
				100								
50	15			100								

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-65

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-65**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 28, 06**
Drilling Method:	**DDH**	Elevation:	**1649 ft**	Date Completed:	**Aug 30, 06**
Location:	**Area G**	Total Depth:	**100 ft**	Logged by:	**DAY/MW**
Coordinates:	**2,149,020 N , 1,372,647 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
55	16			94							
	17			98							
				82							
60	18										
				100							
	19			98							
65				98							
	20										
	21			98							
70											
	22			98							
75											
	23			98							
	24										
80				100							
	25										
				98							
85	26			98							
	27			98							
90											
	28			98							
				99							
95	29			100							
	30										
100			END OF HOLE @100FT	100							
	31										

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-65

Knight Piésold CONSULTING

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-66**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 25, 06**
Drilling Method:	**DDH**	Elevation:	**1565 ft**	Date Completed:	**Aug 26, 06**
Location:	**Area G**	Total Depth:	**88 ft**	Logged by:	**DAY/BH**
Coordinates:	**2,163,510 N , 1,376,039 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE (SPT TEST DATA Uncorrected 'N' values vs. depth (■), RQD (%) (●), 20 40 60 80)	NOTES	WELL DETAILS
			Silty SAND mixed with roots of tundra vegetation 0 - 3', brown, wet.							Casing installed to 6' No SPT's performed as bedrock was encountered at shallow depth.	
5	2		WEATHERED/FRACTURED BEDROCK, Gabbro/Tertiary Basalt?, hematite on fractures, fine to coarse grained, dark grey, broken	25							
				98							
				98						Water level measured at 1' above ground surface Oct 16/06	
10	3			98							
				99							
15	4			100						***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
	5										
20	6			98							
	7										
25				99							
	8										
				98							
30	9		BEDROCK, Gabbro/Tertiary Basalt?, slightly weathered, fine to coarse grained, dark grey, competent	98						* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	10			98							
35											
	11			98							
40	12										
				98							
	13			82							
45	14										
				98							
50	15										

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-66

Knight Piésold CONSULTING

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-66**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 25, 06**
Drilling Method:	**DDH**	Elevation:	**1565 ft**	Date Completed:	**Aug 26, 06**
Location:	**Area G**	Total Depth:	**88 ft**	Logged by:	**DAY/BH**
Coordinates:	**2,163,510 N , 1,376,039 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	16			98								
	17											
60	18			98								
	19											
65	20			98								
	21											
70	22			98								
	23											
75	24			98								
80	25											
	26			98								
85	27		END OF HOLE @88FT	98								
90	28											
95	29											
	30											
100	31											

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-67**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 22, 06**
Drilling Method:	**DDH**	Elevation:	**1482 ft**	Date Completed:	**Aug 24, 06**
Location:	**Area G**	Total Depth:	**123 ft**	Logged by:	**DAY/BH**
Coordinates:	**2,163,945 N , 1,379,185 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			Tundra Vegetation, organics								Drillhole advanced with HQ3 core, HW casing until 35 ft	
			gravelly SAND									
5	1		SAND and GRAVEL, isolated cobbles	0							Water level measured at 11' below ground surface Aug 31/06	
	2											
				25								
10	3		Silty SAND, some gravel, poorly graded, subangular, brown, moist	98	70	☒	GH06-67-1	36/44/46	50+		***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
	4			50								
				17								
15	5			98	98	☒	GH06-67-2	50/-/-	50+			
				25								
20	6		WEATHERED BEDROCK, Tertiary basalt, highly weathered, soil like, very broken, iron oxides, gouge	82								
	7											
25				60							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	8		BEDROCK, moderately weathered Tertiary basalt, fine grained, broken, iron oxides, brown									
				67								
30	9											
				50								
35	10											
	11			83								
				100								
40	12											
				100								
	13											
				75								
45	14											
				10								
				100								
50	15											

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-67

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-67**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 22, 06**
Drilling Method:	**DDH**	Elevation:	**1482 ft**	Date Completed:	**Aug 24, 06**
Location:	**Area G**	Total Depth:	**123 ft**	Logged by:	**DAY/BH**
Coordinates:	**2,163,945 N , 1,379,185 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
55	16			80							
				80							
	17										
				38							
				0							
60	18										
	19			100							
65	20			100							
	21			100							
70	22			100							
75	23										
	24			100							
80	25			100							
85	26			100							
	27			100							
90	28			100							
95	29										
	30			100							
100	31			98							

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

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VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-67**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 22, 06**
Drilling Method:	**DDH**	Elevation:	**1482 ft**	Date Completed:	**Aug 24, 06**
Location:	**Area G**	Total Depth:	**123 ft**	Logged by:	**DAY/BH**
Coordinates:	**2,163,945 N , 1,379,185 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
105	32			100							
				100							
	33										
110				100							
	34										
				100							
115	35										
				100							
	36										
120				100							
	37										
			END OF HOLE @123FT	100							
	38										
125											
	39										
130	40										
	41										
135											
	42										
140	43										
	44										
145											
	45										
150	46										

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-67

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-7

Rev. 0 - Issued for Report

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-68**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 20, 06**
Drilling Method:	**DDH**	Elevation:	**1214 ft**	Date Completed:	**Aug 22, 06**
Location:	**Area G**	Total Depth:	**119 ft**	Logged by:	**DAY/BH**
Coordinates:	**2,162,370 N , 1,380,641 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		PEAT, silty clay, very soft, contains roots, brown.								Water level measured at 0.25' below ground surface Oct 16/06	
5	1											
	2											
			Gravelly SAND, some silt, subangular, loose to compact, poorly graded, grey, wet								***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
10	3			20	33	☒	GH06-68-1	4/9/15	24	■		
	4											
15			WEATHERED BEDROCK, Gabbro, fine grained, grey-green, broken, weathered, clay seam at 16-16.5'	60								
	5			98								
20	6		BEDROCK, Gabbro, grey, fine-grained, highly fractured, weathered, clay seams, becomes less weathered at 38', calcite veins, becomes more competent with depth	100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	7											
25				80								
	8											
				100								
				100								
30	9			98								
	10											
				100								
35				98								
	11											
				100								
40	12											
				100								
	13											
45				75								
	14											
50	15			24								

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-68

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-8

Rev. 0 - Issued for Report

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-68**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 20, 06**
Drilling Method:	**DDH**	Elevation:	**1214 ft**	Date Completed:	**Aug 22, 06**
Location:	**Area G**	Total Depth:	**119 ft**	Logged by:	**DAY/BH**
Coordinates:	**2,162,370 N , 1,380,641 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	16			100								
	17											
60	18			100								
	19											
65	20			100								
	21			90								
70	22											
75	23			100								
	24											
80	25			100								
85	26											
	27			100								
90	28											
95	29			100								
	30											
100	31			100								

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-68

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-9

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-68**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 20, 06**
Drilling Method:	**DDH**	Elevation:	**1214 ft**	Date Completed:	**Aug 22, 06**
Location:	**Area G**	Total Depth:	**119 ft**	Logged by:	**DAY/BH**
Coordinates:	**2,162,370 N , 1,380,641 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			100								
110	33			100								
115	34			100								
120	35											
125	36		END OF HOLE @119FT	100								
130	37											
135	38											
140	39											
145	40											
150	41											
	42											
	43											
	44											
	45											
	46											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-68

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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-69**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 26, 06**
Drilling Method:	**DDH**	Elevation:	**1497 ft**	Date Completed:	**Aug 27, 06**
Location:	**Area G**	Total Depth:	**159.5 ft**	Logged by:	**DAY/MW**
Coordinates:	**2,160,944 N , 1,384,085 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			Silty SAND, fine grained, subrounded, contains roots, brown, saturated								Casing set to 4'	
	1		SAND, trace gravel, saturated, poorly graded								Water level measured at 1.5' above ground surface Aug 31/06	
5			SAND and GRAVEL	40								
	2			28								
10	3		Silty SAND, trace gravel, medium grained, subrounded, compact, grey, wet to damp	49	83		GH06-69-1	15/14/14	28		***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
	4		SAND and SILT/CLAY, varying amounts of clay, trace gravel, subrounded, dense to compact, damp, grey-yellow	71								
15	5				100		GH06-69-2	8/16/17	33			
20	6			75	72		GH06-69-3	12/13/18	31			
	7											
25	8			18	100		GH06-69-4	2/6/8	14			
				39								
	9			61								
30			WEATHERED BEDROCK, highly to completely weathered, coarse grained Gabbro, grey yellow, damp to wet, iron oxide staining.	100								
	10			76								
35				94								
	11											
40	12			0								
	13			78								
45				100								
	14			98								
				98								
				100								
	15											
50			BEDROCK, moderately weathered, coarse	100							* See GEOTECHNICAL	

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-69

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-69**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 26, 06**
Drilling Method:	**DDH**	Elevation:	**1497 ft**	Date Completed:	**Aug 27, 06**
Location:	**Area G**	Total Depth:	**159.5 ft**	Logged by:	**DAY/MW**
Coordinates:	**2,160,944 N , 1,384,085 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
55	16		grained Gabbro, highly fractured, iron oxide staining, grey to brown	100						BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
60	17			100							
65	18			99							
70	19			99							
75	20			50							
80	21			28							
85	22			100							
90	23			100							
95	24			100							
100	25			100							
	26			100							
	27			100							
	28			100							
	29			100							
	30			100							
	31			100							

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-69

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Knight Piésold CONSULTING

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VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-69**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 26, 06**
Drilling Method:	**DDH**	Elevation:	**1497 ft**	Date Completed:	**Aug 27, 06**
Location:	**Area G**	Total Depth:	**159.5 ft**	Logged by:	**DAY/MW**
Coordinates:	**2,160,944 N , 1,384,085 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			100								
110	33			100								
115	34			100								
120	35			100								
125	36			100								
130	37			100								
135	38			100								
140	39			100								
145	40			100								
150	41			100								
	42											
	43											
	44											
	45											
	46											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-69

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-69**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 26, 06**
Drilling Method:	**DDH**	Elevation:	**1497 ft**	Date Completed:	**Aug 27, 06**
Location:	**Area G**	Total Depth:	**159.5 ft**	Logged by:	**DAY/MW**
Coordinates:	**2,160,944 N , 1,384,085 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
155	47			100								
	48											
160			END OF HOLE @159.5FT	100								
	49											
165	50											
	51											
170	52											
	53											
175	54											
180	55											
	56											
185	57											
190	58											
	59											
195	60											
200	61											
	62											

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-69

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-14

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-70**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 31, 06**
Drilling Method:	**DDH**	Elevation:	**1109 ft**	Date Completed:	**Sep 2, 06**
Location:	**Area A Northeast Abutment**	Total Depth:	**139.8 ft**	Logged by:	**DAY/LS/MW**
Coordinates:	**2,147,906 N , 1,400,211 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			Silty SAND and GRAVEL, subangular to subrounded, up to cobble size, well graded, light brown, dense, moist								NOTE: **Flowing Conditions.	
5	1			10	56		GH06-70-1	2/13/26	39		Water levels measured at 2.25' above ground surface and flowing Sep 28/06	
	2			33								
10	3		Gravelly SILT, clasts up to boulder size, subrounded, light brown, compact, moist, gap graded	9	0		GH06-70-2	2/4/10	14		***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
	4		Silty SAND and GRAVEL, fine to coarse grained, subangular to subrounded, well graded, moist, brown, compact to very dense, some layers of increasing and decreasing silt content	33								
15	5			41	33		GH06-70-3	10/12/23	35			
20	6			70	42		GH06-70-4	13/25/28	50+			
	7											
25	8			27	22		GH06-70-5	25/29/20	49			
				50								
30	9			20	58		GH06-70-6	14/21/14	35			
	10			17								
35	11			25	44		GH06-70-7	15/14/16	30			
				40								
				100								
40	12			25	28		GH06-70-8	19/16/41	50+			
	13			25								
				22								
45	14			91	83		GH06-70-9	6/10/11	21			
50	15			30	89		GH06-70-10	10/15/25	40			

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-70

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-70**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 31, 06**
Drilling Method:	**DDH**	Elevation:	**1109 ft**	Date Completed:	**Sep 2, 06**
Location:	**Area A Northeast Abutment**	Total Depth:	**139.8 ft**	Logged by:	**DAY/LS/MW**
Coordinates:	**2,147,906 N , 1,400,211 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	17			100								
				57								
60	18			99	94		GH06-70-11	18/35/61	50+			
	19			33								
65	20			70								
			No recovery	23								
70	21			0	100		GH06-70-12	15/21/31	50+			
	22		Silty SAND and GRAVEL, fine to coarse grained, subangular to subrounded, well graded, moist, brown, very dense, some layers of increasing and decreasing silt content									
75	23		GRAVEL, fine to coarse grained, subrounded to subangular	5								
	24		WEATHERED BEDROCK, completely to highly weathered angular fragments of Granodiorite, clay infilling fractures, some hematite and limonite staining, some pyrite.	17								
80				100								
	25											
				9								
85	26			100								
	27			17								
				60								
90				66								
			BEDROCK, highly to moderately weathered Granodiorite, fine grained grey rock, pyrite, chlorite, hematite, and clay gouges throughout	0							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	28			12								
95	29			18								
				62								
	30											
100				100								
	31			53								
				93								

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-70

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-70**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Aug 31, 06**
Drilling Method:	**DDH**	Elevation:	**1109 ft**	Date Completed:	**Sep 2, 06**
Location:	**Area A Northeast Abutment**	Total Depth:	**139.8 ft**	Logged by:	**DAY/LS/MW**
Coordinates:	**2,147,906 N , 1,400,211 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
105	32			100						
				100						
	33			100						
110				22						
	34			82						
115	35									
	36			11						
120				59						
	37			86						
				100						
				33						
125	38			41						
				80						
	39			33						
130				96						
	40									
				3						
	41			100						
135				66						
	42			100						
				100						
140			END OF HOLE @139.8FT	96						Too difficult to continue drilling without grouting
	43									
	44									
145										
	45									
150	46									

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

WELL DETAILS

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-70

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-71**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 5, 06**
Drilling Method:	**DDH**	Elevation:	**1011 ft**	Date Completed:	**Sep 6, 06**
Location:	**Area A North Embankment**	Total Depth:	**90 ft**	Logged by:	**LS/MW**
Coordinates:	**2,147,080 N , 1,401,484 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			PEAT, boulders, fines washed away, subangular to subrounded								NOTE: **Flowing Conditions, ~20gpm.	
5	1		Silty SAND and GRAVEL, subrounded, clasts up to pebble size, light brown, compact to dense, moist, well graded	25	78	☒	GH06-71-1	14/17/23	40		No piezometer installed.	
				33								
10	3			13	61	☒	GH06-71-2	8/7/15	22		***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
15	5			9	33	☒	GH06-71-3	5/9/8	17			
				16								
20	6		SAND and GRAVEL, fine to coarse grained, well graded, subangular to subrounded, moist, brown, compact to very dense	14	72	☒	GH06-71-4	24/43/-	50+			
25	8			33	50	☒	GH06-71-5	27/50/36	50+			
				47								
30	9			37	22	☒	GH06-71-6	23/50/-	50+			
35	11		Sandy SILT, trace fine to coarse gravel, poorly graded, subrounded to subangular, moist to wet, brown, compact	22	11	☒	GH06-71-7	6/6/16	22			
				20								
				24								
40	12			50	67	☒	GH06-71-8	6/5/6	11			
45	14			30	50	☒	GH06-71-9	6/6/10	16			
				20								
50	15			55								

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-71

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Rev. 0 - Issued for Report

M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\WMF2006 REVISED.GPJ

Date Revised: Nov 26, 07

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Project:	**Pebble Project**	Drill Hole No.	**GH06-71**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 5, 06**
Drilling Method:	**DDH**	Elevation:	**1011 ft**	Date Completed:	**Sep 6, 06**
Location:	**Area A North Embankment**	Total Depth:	**90 ft**	Logged by:	**LS/MW**
Coordinates:	**2,147,080 N , 1,401,484 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	17			10	39		GH06-71-10	5/8/12	20			
60	18			5	0		GH06-71-11	7/8/9	17			
65	20		Silty, clayey GRAVEL, clasts up to pebble size, subrounded, light grey, dense to very dense, moist	3	0		GH06-71-12	5/8/24	32			
	21			7								
70	22			33 98	39		GH06-71-13	50/-/-	50+			
75	23			27								
80	24			93	39		GH06-71-14	11/50/-	50+			
85	26			55 62 36								
	27		Sand seam present at 89'	43							Flowing conditions encountered (20 gpm), casing was advanced and hole was capped, no monitoring well was installed.	
90	28		END OF HOLE @90FT	49								
95	29											
	30											
100	31											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-71

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-71A**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 7, 06**
Drilling Method:	**DDH**	Elevation:	**1011 ft**	Date Completed:	**Sep 10, 06**
Location:	**Area A North Embankment**	Total Depth:	**206 ft**	Logged by:	**MW/LS**
Coordinates:	**2,147,087 N , 1,401,454 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			Triconed to below depth of GH06-71 No Recovery								Cemented in casing until 50'. Hit flowing conditions at 90', similar to GH06-71.	
5	1											
10	2											
15	3											
20	4											
25	5											
30	6											
35	7											
40	8											
45	9											
50	10											
	11											
	12											
	13											
	14											
	15											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-71A

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Rev. 0 - Issued for Report

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-71A**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 7, 06**
Drilling Method:	**DDH**	Elevation:	**1011 ft**	Date Completed:	**Sep 10, 06**
Location:	**Area A North Embankment**	Total Depth:	**206 ft**	Logged by:	**MW/LS**
Coordinates:	**2,147,087 N , 1,401,454 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	17											
60	18											
65	20											
70	21											
75	22											
80	24											
85	25											
90	27		Silty, clayey GRAVEL, clasts up to pebble size, subrounded, light grey, moist, no recovery, based on drill cuttings and observations of flowing conditions and GH06-71.	0							Water level measured at 1.4' above ground surface, flowing Sep 5/06 ***Drillhole logs represent an interpretation of field logs combined with laboratory test results.*** * See GEOTECHNICAL	
95	29											
100	30											
	31		BEDROCK, Granodiorite, highly weathered,									

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-71A

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Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-71A**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 7, 06**
Drilling Method:	**DDH**	Elevation:	**1011 ft**	Date Completed:	**Sep 10, 06**
Location:	**Area A North Embankment**	Total Depth:	**206 ft**	Logged by:	**MW/LS**
Coordinates:	**2,147,087 N , 1,401,454 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
105	32		fractured from 100.5' to 105.5' with hematite and limonite alteration. More competent starting at 105.5', light grey, clay in fractures, some pyrite.	50						BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
110	33			100							
115	34			95							
120	35			100							
125	36			100							
130	37			100							
135	38			63							
140	39			98							
145	40			22							
150	41			47							
	42			90							
	43										
	44										
	45										
	46										

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-71A

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-71A**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 7, 06**
Drilling Method:	**DDH**	Elevation:	**1011 ft**	Date Completed:	**Sep 10, 06**
Location:	**Area A North Embankment**	Total Depth:	**206 ft**	Logged by:	**MW/LS**
Coordinates:	**2,147,087 N , 1,401,454 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
155	47			64							
	48			100							
160	49			63							
				105							
165	50			43							
	51										
170	52			100							
				68							
	53			100							
175	54										
				100							
180	55			92							
	56			58							
185				0							
	57			10							
190	58			80							
	59										
195				73							
	60										
200	61			89							
	62										

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-71A

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Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-71A**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 7, 06**
Drilling Method:	**DDH**	Elevation:	**1011 ft**	Date Completed:	**Sep 10, 06**
Location:	**Area A North Embankment**	Total Depth:	**206 ft**	Logged by:	**MW/LS**
Coordinates:	**2,147,087 N , 1,401,454 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
205	63		END OF HOLE @206FT	100								
210	64											
	65											
215	66											
	67											
220	68											
	69											
225	70											
	71											
230	72											
	73											
235	74											
	75											
240	76											
	77											
245												
250												

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-71A

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-72**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 11, 06**
Drilling Method:	**DDH**	Elevation:	**967 ft**	Date Completed:	**Sep 16, 06**
Location:	**Area A North Embankment**	Total Depth:	**215 ft**	Logged by:	**MW/LS**
Coordinates:	**2,147,129 N , 1,403,789 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
			PEAT, organic material							NOTE: **Flowing Conditions, ~3gpm
5	1				100		GH06-72-1	1/-/-	0	
	2									
10	3		Silty SAND, some clay, very fine sand, light brown to dark brown, poorly graded, loose, moist	5	72		GH06-72-2	5/2/2	4	Triconed from 5' to 10', description based on SPT sample.
	4									
15	5		Silty GRAVEL, some clay, subrounded clasts up to cobble size, isolated boulders, well graded, light brown, dense, moist to wet	18	100		SHELBY-1	//		Water level measured at 1.7' above ground surface and flowing Sep 28/06
20	6			15	61		GH06-72-3	7/21/26	47	***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***
	7			22						
25	8		Silty SAND, poorly graded, no clasts, compact, light brown, moist, small subrounded gravel clasts with depth	99	122		GH06-72-4	3/4/8	12	
30	9									
	10		SILT and SAND, some clay, trace gravel, gap graded, light grey, moist, up to gravel size clasts, loose to compact, subrounded	66	94		GH06-72-5	2/4/5	9	
				16						
35	11			13 100	89		GH06-72-6	7/14/17	31	
			SILT and SAND, trace clay, poorly graded to gap graded, some gravel, small number of clasts, up to boulder size, light brown, compact to very dense, moist							
40	12			85	117		GH06-72-7	3/5/9	14	
	13									
45	14			54	28		GH06-72-8	8/14/19	33	
	15									
50				30	28		GH06-72-9	32/50+/-	50+	

SPT TEST DATA: Uncorrected 'N' values vs. depth (■) RQD (%) (●) — 20 40 60 80

WELL DETAILS

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-72

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-25

Rev. 0 - Issued for Report

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-72**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 11, 06**
Drilling Method:	**DDH**	Elevation:	**967 ft**	Date Completed:	**Sep 16, 06**
Location:	**Area A North Embankment**	Total Depth:	**215 ft**	Logged by:	**MW/LS**
Coordinates:	**2,147,129 N , 1,403,789 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	16			58								
	17											
60	18		SAND and GRAVEL, some silt/clay, fine to coarse grained, well graded, occasional cobbles, greyish brown, dense to very dense	25	56		GH06-72-10	19/18/17	35		Between 65 - 75', driller noted flow confined by silts and clays, low flow	
	19											
65	20			25								
	21			61								
70	22			46	53		GH06-72-11	21/20/29	49			
				42								
75	23			64	61		GH06-72-12	9/16/50+	50+			
	24			24								
80			Silty GRAVEL, some clay, some sand, well graded, clasts up to cobble size, subrounded	15 25								
	25											
85	26		SILT and CLAY, some sand, poorly graded, light brown, moist, no clasts, very stiff	87	111		GH06-72-13	9/23/38	50+			
	27											
90			SAND and GRAVEL, well graded, some silt/clay, clasts up to boulder size, subrounded, light brown, moist, very dense	52								
	28											
95	29			20	39		GH06-72-14	31/25/47	50+			
	30											
100	31			37								

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-72

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Rev. 0 - Issued for Report

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Date Revised: Nov 26, 07

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Project:	**Pebble Project**	Drill Hole No.	**GH06-72**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 11, 06**
Drilling Method:	**DDH**	Elevation:	**967 ft**	Date Completed:	**Sep 16, 06**
Location:	**Area A North Embankment**	Total Depth:	**215 ft**	Logged by:	**MW/LS**
Coordinates:	**2,147,129 N , 1,403,789 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
105	32			39							
				54							
	33		WEATHERED BEDROCK, yellow-brown, silt/clay, some gravel, poorly graded, clasts up to cobble size, subangular	20							
110				63							
	34			41							
			BEDROCK, Rhyolite, highly weathered, highly fractured, cream to white, dendritic pyrolusite, hematite	64						* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
115	35			89							
	36										
120				85							
	37										
	38			100							
125											
	39										
130				100							
	40										
	41			84							
135											
	42			93							
140											
	43			92							
145	44										
	45			72							
150				93							
	46										

SPT TEST DATA Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-72

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Rev. 0 - Issued for Report

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Date Revised: Nov 26, 07

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Project:	**Pebble Project**	Drill Hole No.	**GH06-72**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 11, 06**
Drilling Method:	**DDH**	Elevation:	**967 ft**	Date Completed:	**Sep 16, 06**
Location:	**Area A North Embankment**	Total Depth:	**215 ft**	Logged by:	**MW/LS**
Coordinates:	**2,147,129 N , 1,403,789 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
155	47			73							
	48			62							
160	49			100							
	50			60							
165	51			66							
170	52			56							
	53			90							
175	54			79							
180	55			92							
	56			95							
185	57			98							
190	58			100							
	59										
195	60										
200	61										
	62										

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-72

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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-72**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 11, 06**
Drilling Method:	**DDH**	Elevation:	**967 ft**	Date Completed:	**Sep 16, 06**
Location:	**Area A North Embankment**	Total Depth:	**215 ft**	Logged by:	**MW/LS**
Coordinates:	**2,147,129 N , 1,403,789 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
205	63			92								
210	64			100								
	65											
215	66		END OF HOLE @215FT	96								
220	67											
	68											
225	69											
230	70											
	71											
235	72											
	73											
240	74											
245	75											
	76											
250	77											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-72

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-29

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-73**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 16, 06**
Drilling Method:	**DDH**	Elevation:	**1007 ft**	Date Completed:	**Sep 19, 06**
Location:	**Area A North Embankment**	Total Depth:	**158.5 ft**	Logged by:	**MW/LS**
Coordinates:	**2,146,876 N , 1,406,063 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			Tundra vegetation, roots, organic soils, dark brown, silty sandy GRAVEL, clasts up to boulder size, subrounded								Triconed to 5'	
5	1		Sandy GRAVEL, trace silt, trace clay, well graded, clasts up to boulder size, subrounded, light brown, dense to very dense, moist	0	61	☒	GH06-73-1	11/21/38	50+		NOTE: **Artesian Conditions encountered at 115' with flow increasing to 65 gpm at 130', not possible to drill any further, had to cap hole, no piezometer was installed	
10	2			24	33	☒	GH06-73-2	12/18/34	50+			
15	3			15	44	☒	GH06-73-3	6/14/23	37		***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
20	4			34								
	5		SAND and GRAVEL, trace silt, trace clay, fine to coarse grained, subangular to subrounded, moist to wet, light brown, compact to very dense	38	89	☒	GH06-73-4	8/36/21	50+			
25	6			24	56	☒	GH06-73-5	16/7/14	21			
30	7			25	72	☒	GH06-73-6	16/24/27	50+			
35	8			34								
	9			66								
	10			33	56	☒	GH06-73-7	9/32/50	50+			
40	11			22								
	12			26	78	☒	GH06-73-8	34/43/18	50+			
45	13			6								
	14			33	83	☒	GH06-73-9	41/50/-	50+			
			Silty, gravelly SAND, some clay, subangular to subrounded, poorly graded, very dense, moist, brown to purplish grey	23								
50	15			52								
				22	81	☒	GH06-73-10	20/34/33	50+			

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-73

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-30

Rev. 0 - Issued for Report

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\WMF2006 REVISED.GPJ

Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-73**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 16, 06**
Drilling Method:	**DDH**	Elevation:	**1007 ft**	Date Completed:	**Sep 19, 06**
Location:	**Area A North Embankment**	Total Depth:	**158.5 ft**	Logged by:	**MW/LS**
Coordinates:	**2,146,876 N , 1,406,063 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	16			20								
	17			30								
				69								
	18			30								
60				34	0		GH06-73-11	9/37/50	50+			
	19											
65	20		GRAVEL, some sand, trace silt/clay, gap graded, light brown, moist, clasts up to large cobbles, subrounded	17								
	21											
70				17	17		GH06-73-12	50/-/-	50+			
	22											
75	23		BEDROCK, Tertiary Dacite, fine grained, light coloured, hematite, limonite	66							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	24											
80				84								
	25											
85	26			91								
	27											
90				66								
	28											
				100								
95	29			100								
	30											
100				95								
	31											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-73

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-31

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-73**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 16, 06**
Drilling Method:	**DDH**	Elevation:	**1007 ft**	Date Completed:	**Sep 19, 06**
Location:	**Area A North Embankment**	Total Depth:	**158.5 ft**	Logged by:	**MW/LS**
Coordinates:	**2,146,876 N , 1,406,063 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			100								
110	33			100								
	34			36								
115	35			94								
	36											
120	37			95								
	38			69								
125	39											
130	40			100								
	41			97								
135	42											
140	43			94								
	44											
145	45			94								
	46			93								
150												

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-73

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-32

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-73**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 16, 06**
Drilling Method:	**DDH**	Elevation:	**1007 ft**	Date Completed:	**Sep 19, 06**
Location:	**Area A North Embankment**	Total Depth:	**158.5 ft**	Logged by:	**MW/LS**
Coordinates:	**2,146,876 N , 1,406,063 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
155	47			100								
	48		END OF HOLE @158.5FT	100								
160	49											
	50											
165	51											
	52											
170	53											
	54											
175	55											
	56											
180	57											
	58											
185	59											
	60											
190	61											
	62											
195												
200												

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-73

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Rev. 0 - Issued for Report

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Date Revised: Nov 26, 07

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Project:	**Pebble Project**	Drill Hole No.	**GH06-74**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 19, 06**
Drilling Method:	**DDH**	Elevation:	**1197 ft**	Date Completed:	**Sep 20, 06**
Location:	**Area A Northwest Abutment**	Total Depth:	**140 ft**	Logged by:	**LS/AG**
Coordinates:	**2,147,514 N , 1,407,904 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			Sandy GRAVEL, trace clay, well graded, subangular, dense, light brown (based on SPT sample).								Triconed, casing down to 9 ft	
5	1				58		GH06-74-1	13/19/11	30			
	2											
			SAND and GRAVEL, trace to some clay and silt, subangular to subrounded, some fines washed away, up to boulder size clasts, well graded, light brown, compact to very dense, moist to wet	0								
10	3			33	50		GH06-74-2	14/20/21	41		Water level measured at 30' below ground surface Oct 16/06	
	4											
15				18	0		GH06-74-3	13/25/19	44			
	5			0							***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
20	6		Gravelly SAND, trace silt/clay, well graded, subangular to subrounded, clasts up to gravel size, light brown, compact, moist to wet	22	50		GH06-74-4	14/15/13	28			
	7			45								
25	8											
30	9			90	11		GH06-74-5	50+/-/-	50+			
	10			8								
35	11											
40	12			20	11		GH06-74-6	50+/-/-	50+			
			BEDROCK, Tertiary Basalt, fine grained, dark green rock, chlorite and calcite veins, hematite on fractures	16							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	13											
45	14			95							RMR89-56, UCS-73MPa (average/estimated values for rock mass)	
50	15			100 46								

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-74

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-34

Rev. 0 - Issued for Report

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-74**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 19, 06**
Drilling Method:	**DDH**	Elevation:	**1197 ft**	Date Completed:	**Sep 20, 06**
Location:	**Area A Northwest Abutment**	Total Depth:	**140 ft**	Logged by:	**LS/AG**
Coordinates:	**2,147,514 N , 1,407,904 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	16											
	17			92								
	18			91								
60	19											
				100								
65	20			100								
	21											
70	22			100								
75	23			100								
	24											
80	25			99								
85	26			100								
	27											
90	28			100								
95	29			100								
	30											
100	31			100								

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-74

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-35

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-74**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 19, 06**
Drilling Method:	**DDH**	Elevation:	**1197 ft**	Date Completed:	**Sep 20, 06**
Location:	**Area A Northwest Abutment**	Total Depth:	**140 ft**	Logged by:	**LS/AG**
Coordinates:	**2,147,514 N , 1,407,904 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			100								
110	33			100								
115	34			100								
120	35			100								
125	36			99								
130	37			98								
135	38			100								
140	39			99								
145	40			100								
150	41											
	42											
	43		END OF HOLE @140FT									
	44											
	45											
	46											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-74

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-75**	Page	**1** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 21, 06**
Drilling Method:	**DDH**	Elevation:	**1026 ft**	Date Completed:	**Sep 27, 06**
Location:	**Area A**	Total Depth:	**414.5 ft**	Logged by:	**LS/AG/TT/KW**
Coordinates:	**2,136,598 N , 1,400,526 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			SAND and GRAVEL, trace to some silt and clay, well graded, clasts up to cobble size, subrounded to angular, compact to very dense, light brown, moist to wet (first 9' based on SPT sample).								Triconed and set casing to 9 ft	
5	1				39		GH06-75-1	21/33/30	50+			
	2			0								
10	3			22	94		GH06-75-2	18/26/34	50+		Water level measured at 140' below ground surface Sep 28/06	
	4											
15	5		Silt and Sand w/ some gravel, trace to some clay, poorly to gap graded, clasts up to cobble size, light brown, moist	17	61		GH06-75-3	11/14/15	29		***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
20	6		GRAVEL and SAND, trace silt/clay, light brown, subrounded to subangluar, clasts up to boulder size, well graded, compact to very dense	4	17		GH06-75-4	7/12/8	20		Fines washed away	
	7			22								
25	8			22	50		GH06-75-5	26/25/28	50+		Lost circulation at 24', regained after a foot	
	9			25 79								
30				22 98	33		GH06-75-6	50+/-/-	50+			
	10			57 98								
35	11			16	56		GH06-75-7	12/14/13	27			
40	12			17	61		GH06-75-8	42/25/24	49			
	13			9								
45	14			11 66	50		GH06-75-9	14/17/13	30		Lost circulation just before 45', all fines washed away, poor recovery	
50	15		Sandy GRAVEL, trace silt/clay, fine to coarse	23	28		GH06-75-10	3/6/25	31		Lost circulation at 50',	

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-75

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-37

Rev. 0 - Issued for Report

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-75**	Page	**2** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 21, 06**
Drilling Method:	**DDH**	Elevation:	**1026 ft**	Date Completed:	**Sep 27, 06**
Location:	**Area A**	Total Depth:	**414.5 ft**	Logged by:	**LS/AG/TT/KW**
Coordinates:	**2,136,598 N , 1,400,526 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			gravel, well graded, most fines washed away, clasts up to cobble size, isolated boulders, subangular to subrounded clasts, dense to very dense	10							water lost into formation. Note: Drill run recovery was low and multiple drill runs from 45' to 75' due to blocking and lost water circulation.	
55	16			73								
	17			28								
				49								
				47								
	18			41								
				61								
				28								
60				61								
				62	11		GH06-75-11	50+/-/-	50+			
	19			55								
				41								
				47								
				66								
65				66								
	20			8							Lost circulation at approximately 69.5'	
	21											
70				7	50		GH06-75-12	14/23/25	48		Lost circulation at 75'	
	22											
75				7								
	23											
	24											
80												
			SAND and GRAVEL, trace silt/clay, well graded, subrounded, clasts up to boulder size, but mostly gravel to cobble size, compact to very dense, light brown (based on SPT samples as most fine material being washed away during drilling).	20	33		GH06-75-13	15/16/13	29		Driller had to tricone and set casing to 85.5'; all drilling water was being lost into formation	
	25											
85				3								
	26			82								
				13								
	27											
90				18	100		GH06-75-14	31/47/49	50+			
	28											
				14								
				49								
				82								
95	29			51								
				31								
				33								
	30			33								
				33								
100				44	78		GH06-75-15	44/50/50+	50+			
	31											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-75

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Rev. 0 - Issued for Report

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-75**	Page	**3** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 21, 06**
Drilling Method:	**DDH**	Elevation:	**1026 ft**	Date Completed:	**Sep 27, 06**
Location:	**Area A**	Total Depth:	**414.5 ft**	Logged by:	**LS/AG/TT/KW**
Coordinates:	**2,136,598 N , 1,400,526 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			25								
				61								
	33			30								
				33								
110	34			29	39		GH06-75-16	48/50+/-	50+			
115	35			16							Lost circulation @115'	
	36			21								
120	37			33	33		GH06-75-17	27/50+/-	50+			
125	38			16								
	39											
130	40			13	33		GH06-75-18	38/50+/-	50+			
135	41			9								
	42											
140	43			16	33		GH06-75-19	17/50+/-	50+			
				25								
145	44			8								
	45			22								
150	46			34	33		GH06-75-20	45/38/50+	50+			

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-75

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-39

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-75**	Page	**4** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 21, 06**
Drilling Method:	**DDH**	Elevation:	**1026 ft**	Date Completed:	**Sep 27, 06**
Location:	**Area A**	Total Depth:	**414.5 ft**	Logged by:	**LS/AG/TT/KW**
Coordinates:	**2,136,598 N , 1,400,526 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
155	47			34								
				7								
	48			49								
				82								
				51								
				73								
160				55								
	49			16	0		GH06-75-21	50+/-/-	50+			
				66								
				19								
	50			16								
165				66								
	51			25								
				52								
				98	72		GH06-75-22	26/32/37	50+			
170	52			15								
	53											
175				4								
	54			82								
				14	17		GH06-75-23	50+/-/-	50+			
180	55			25								
	56			10								
185												
	57											
190												
	58			13	44		GH06-75-24	24/23/23	46			
			Well graded SAND and GRAVEL, trace silt/clay, angular to subounded clasts up to boulder size, mostly gravel size, light brown, moist, (based on observations of cuttings and prior materials encountered)								Triconed from 192' to 315'.	
	59											
195												
	60											
200												
	61											
	62											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-75

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-75**	Page	**5** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 21, 06**
Drilling Method:	**DDH**	Elevation:	**1026 ft**	Date Completed:	**Sep 27, 06**
Location:	**Area A**	Total Depth:	**414.5 ft**	Logged by:	**LS/AG/TT/KW**
Coordinates:	**2,136,598 N , 1,400,526 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
205	63										Triconed. Lost circulation at 204 ft.	
210	64										Triconed. Lost circulation at 209 ft.	
	65											
215	66										Triconed. Lost circulation at 214 ft.	
220	67											
	68											
225	69											
230	70		Increase in cobbles (based on cuttings)									
	71											
235	72											
240	73											
	74											
245	75											
250	76											
	77											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
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Overburden Log For GH06-75

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-75**	Page	**6** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 21, 06**
Drilling Method:	**DDH**	Elevation:	**1026 ft**	Date Completed:	**Sep 27, 06**
Location:	**Area A**	Total Depth:	**414.5 ft**	Logged by:	**LS/AG/TT/KW**
Coordinates:	**2,136,598 N , 1,400,526 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
260	78										Triconed from 192' to 315'.	
	79											
265	80											
	81											
270	82											
	83											
275	84											
	85											
280	86											
	87											
285	88											
	89											
290	90											
	91											
295	92											
300	93										Triconed. Lost circulation at 299 ft.	
305												

Northern Dynasty Minerals Inc.
Pebble Project
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Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-75**	Page	**7** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 21, 06**
Drilling Method:	**DDH**	Elevation:	**1026 ft**	Date Completed:	**Sep 27, 06**
Location:	**Area A**	Total Depth:	**414.5 ft**	Logged by:	**LS/AG/TT/KW**
Coordinates:	**2,136,598 N , 1,400,526 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
310	94										Triconed from 192' to 315'.	
	95											
315	96		BEDROCK, Tertiary Basalt grey green, chloritized, pyrite present along veins, intercalations of Tertiary Mudstone/Siltstone starting at 327'	0							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	97			89								
320	98			99								
325	99			99								
	100											
330	101			92								
335	102			100								
	103		BEDROCK, Tertiary Mudstone/siltstone and Tertiary andesite dykes, fine grained, calcite/quartz veins, dark grey green to black, pyrite									
340	104			100								
345	105			92								
	106											
350	107			100								
355	108			100								

Northern Dynasty Minerals Inc.
Pebble Project
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Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-75**	Page	**8** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 21, 06**
Drilling Method:	**DDH**	Elevation:	**1026 ft**	Date Completed:	**Sep 27, 06**
Location:	**Area A**	Total Depth:	**414.5 ft**	Logged by:	**LS/AG/TT/KW**
Coordinates:	**2,136,598 N , 1,400,526 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
360	109			99								
	110											
	111			100								
365				75								
	112											
370				100								
	113											
	114											
375				100								
	115											
380				100								
	116											
	117											
385				100								
	118											
390				99								
	119											
	120											
395				99								
	121											
400				99								
	122			100								
	123											
405				77								
	124											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-75

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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-75**	Page	**9** of **9**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 21, 06**
Drilling Method:	**DDH**	Elevation:	**1026 ft**	Date Completed:	**Sep 27, 06**
Location:	**Area A**	Total Depth:	**414.5 ft**	Logged by:	**LS/AG/TT/KW**
Coordinates:	**2,136,598 N , 1,400,526 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
410	125			98								
	126											
415			END OF HOLE @414.5FT	98								
	127											
420	128											
	129											
425	130											
430	131											
	132											
435	133											
440	134											
	135											
445	136											
450	137											
	138											
455	139											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-75

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-76**	Page	**1** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 4, 06**
Drilling Method:	**DDH**	Elevation:	**989 ft**	Date Completed:	**Oct 9, 06**
Location:	**Area A**	Total Depth:	**274.5 ft**	Logged by:	**JV/TT/AG**
Coordinates:	**2,135,578 N , 1,401,319 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
			SAND and GRAVEL, fine sand, trace silt, subrounded to subangular, compact, saturated, light brown (interpretation based on SPT sample).	0	44		GH06-76-1	4/7/12	19	Triconed down to 6'.
5	1			0	67		GH06-76-2	9/18/30	48	Water level measured at 111' below ground surface Oct 16/06
	2		silty/clayey SAND and GRAVEL, clasts up to cobble size, subrounded to subangular, well graded, compact to very dense	60	89		GH06-76-3	23/20/28	48	
10	3			26 52						***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***
	4			44	44		GH06-76-4	16/36/50	50+	
15	5			44 85 98 98						
	6			92 98	39		GH06-76-5	16/16/15	31	
20	7		Sandy GRAVEL, trace silt/clay, clasts up to cobble size, mostly gravel size, subrounded to subangular, well graded, compact to dense, (based on SPT samples)	20						Triconed from 46.5' to 127'. Cobbles damaging drill bits
25	8			59 39 75	17		GH06-76-6	22/36/50	50+	
30	9			12	61		GH06-76-7	26/28/32	50+	
	10			21 33						
35	11			30 44	50		GH06-76-8	16/18/21	39	
40	12			22	39		GH06-76-9	13/13/21	34	
	13			44						
45	14			17 25 66	72		GH06-76-10	16/36/34	50+	
50	15									

SPT TEST DATA: Uncorrected 'N' values vs. depth (■) / RQD (%) (●) — 20 40 60 80

WELL DETAILS

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-76

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-76**	Page	**2** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 4, 06**
Drilling Method:	**DDH**	Elevation:	**989 ft**	Date Completed:	**Oct 9, 06**
Location:	**Area A**	Total Depth:	**274.5 ft**	Logged by:	**JV/TT/AG**
Coordinates:	**2,135,578 N , 1,401,319 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	16			0	67		GH06-76-11	28/28/42	50+		Lost circulation from 62 - 65'.	
60	17											
65	18											
70	19											
75	20											
80	21											
85	22											
90	23											
95	24											
100	25											
	26											
	27											
	28											
	29											
	30			0	67		GH06-76-12	50+/-/-	50+			
	31											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
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Overburden Log For GH06-76

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Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-76**	Page	**3** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 4, 06**
Drilling Method:	**DDH**	Elevation:	**989 ft**	Date Completed:	**Oct 9, 06**
Location:	**Area A**	Total Depth:	**274.5 ft**	Logged by:	**JV/TT/AG**
Coordinates:	**2,135,578 N , 1,401,319 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32											
	33											
110	34											
115	35											
	36											
120	37										Lost circulation at 119'.	
	38											
125	39		GRAVEL, some sand, some silt, trace clay, coarse, well graded, subangular to subrounded.	0								
				55								
130	40		SAND, trace clay and silt, grey (based on cuttings), potentially weathered bedrock	98	67		GH06-76-13	50+/-/-	50+		Triconed from 129' to 176'.	
135	41											
	42										Lost circulation at 137.5-139'. Poor circulation from 139'-157.	
140	43											
	44											
145	45											
150	46											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
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Overburden Log For GH06-76

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Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-76**	Page	**4** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 4, 06**
Drilling Method:	**DDH**	Elevation:	**989 ft**	Date Completed:	**Oct 9, 06**
Location:	**Area A**	Total Depth:	**274.5 ft**	Logged by:	**JV/TT/AG**
Coordinates:	**2,135,578 N , 1,401,319 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
155	47										
	48										
160	49										
	50										
165	51										
	52										
170	53										
175	54		BEDROCK, Granodiorite, weak, becoming more competent with depth, light grey, fractured, calcite veins, fine to medium grained, pyrite infilling, zones of Tertiary Andesite	0 77 98 95 66 87 98 44 93 98 87 92						* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	55										
180	56										
	57										
185	58										
	59										
190	60										
	61										
195	62										
200											

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

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Pebble Project
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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-76**	Page	**5** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 4, 06**
Drilling Method:	**DDH**	Elevation:	**989 ft**	Date Completed:	**Oct 9, 06**
Location:	**Area A**	Total Depth:	**274.5 ft**	Logged by:	**JV/TT/AG**
Coordinates:	**2,135,578 N , 1,401,319 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
205	63			98							
210	64			100							
				69							
	65			98							
215	66			96							
220	67			98							
	68										
225	69			98							
230	70			95							
	71										
235	72			100							
				94							
240	73			98							
	74			95							
245	75										
				100							
250	76										
	77			99							

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

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Northern Dynasty Minerals Inc.
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Overburden Log For GH06-76

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Project No.	Ref. No.	Rev.
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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-76**	Page	**6** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 4, 06**
Drilling Method:	**DDH**	Elevation:	**989 ft**	Date Completed:	**Oct 9, 06**
Location:	**Area A**	Total Depth:	**274.5 ft**	Logged by:	**JV/TT/AG**
Coordinates:	**2,135,578 N , 1,401,319 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
260	78			96								
	79			98								
265	80											
	81			100								
270	82											
	83			100								
275	84		END OF HOLE @274.5FT	100								
	85											
280	86											
	87											
285	88											
	89											
290	90											
	91											
295	92											
	93											
300												
305												

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-76

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-51

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-77**	Page	**1** of **10**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 28, 06**
Drilling Method:	**DDH**	Elevation:	**1027 ft**	Date Completed:	**Oct 3, 06**
Location:	**Area A**	Total Depth:	**482 ft**	Logged by:	**TT/AG**
Coordinates:	**2,135,459 N , 1,400,130 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Sandy GRAVEL, subrounded to subangular, trace clay, well graded, clasts up to boulder size, mostly up to cobble size, compact to very dense								Water level measured at 135' below ground surface Oct 13/06	
5	1											
	2			5								
10	3			16	22		GH06-77-1	15/18/16	34		***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
	4											
15	5			5	33		GH06-77-2	13/19/18	37			
				43								
				33								
20	6			35	33		GH06-77-3	10/15/19	34			
	7											
25	8			5	0		GH06-77-4	26/26/29	50+			
				7								
30	9			35	22		GH06-77-5	22/23/18	41			
	10			24								
35				21	33		GH06-77-6	15/14/13	27			
	11											
	12			29								
40			No recovery from SPT sampler	89	0		GH06-77-7	15/17/17	34		Triconed from 40' to 44', no recovery	
	13											
45			SAND and GRAVEL, some silt and clay, fine to coarse gravel clasts, rounded to subangular, dense to very dense	0	61		GH06-77-8	30/17/24	41			
	14											
	15											
50				28	50		GH06-77-9	38/50+/-	50+			

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Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-77

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-77**	Page	**2** of **10**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 28, 06**
Drilling Method:	**DDH**	Elevation:	**1027 ft**	Date Completed:	**Oct 3, 06**
Location:	**Area A**	Total Depth:	**482 ft**	Logged by:	**TT/AG**
Coordinates:	**2,135,459 N , 1,400,130 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	16			13								
	17											
60	18			20	50		GH06-77-10	28/25/16	41			
	19			37								
			SAND and GRAVEL (based on cuttings)	23							Triconed from 62.5' to 326'. Lost circulation at 63'.	
65	20											
	21											
70	22											
75	23											
	24											
80	25										Lost circulation at 80'.	
85	26											
	27											
90	28											
95	29											
	30											
100	31											

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-77

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-77**	Page	**3** of **10**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 28, 06**
Drilling Method:	**DDH**	Elevation:	**1027 ft**	Date Completed:	**Oct 3, 06**
Location:	**Area A**	Total Depth:	**482 ft**	Logged by:	**TT/AG**
Coordinates:	**2,135,459 N , 1,400,130 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32										Dry Well.	
110	33											
115	34											
	35											
			SAND and GRAVEL, medium sand, very dense, subangular to angular, dark brown sand and grey gravel (based on SPT sample)	0	56	☒	GH06-77-11	25/50+/-	50+			
120	36											
	37											
125	38											
	39											
130	40										Lost ciculation from 130' to 132'.	
	41											
135	42											
	43											
140	44											
	45											
145	46											
150												

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
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Overburden Log For GH06-77

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Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-77**	Page	**4** of **10**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 28, 06**
Drilling Method:	**DDH**	Elevation:	**1027 ft**	Date Completed:	**Oct 3, 06**
Location:	**Area A**	Total Depth:	**482 ft**	Logged by:	**TT/AG**
Coordinates:	**2,135,459 N , 1,400,130 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
155	47											
	48											
160	49											
	50											
165	51											
170	52											
	53											
175	54											
180	55											
	56											
185	57										Lost circulation at 185'.	
190	58											
	59											
195	60										Lost circulation at 197'.	
200	61											
	62											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-77

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-77**	Page	**5** of **10**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 28, 06**
Drilling Method:	**DDH**	Elevation:	**1027 ft**	Date Completed:	**Oct 3, 06**
Location:	**Area A**	Total Depth:	**482 ft**	Logged by:	**TT/AG**
Coordinates:	**2,135,459 N , 1,400,130 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
205	63											
210	64											
	65											
215	66										Lost circulation at 214'.	
	67											
220	68										Lost circulation at 220'.	
	69										Lost circulation at 226'.	
225	70											
230	71											
	72											
235	73										Lost circulation at 238'.	
240	74											
	75											
245	76										Lost circulation at 248'.	
250	77											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-77**	Page	**6** of **10**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 28, 06**
Drilling Method:	**DDH**	Elevation:	**1027 ft**	Date Completed:	**Oct 3, 06**
Location:	**Area A**	Total Depth:	**482 ft**	Logged by:	**TT/AG**
Coordinates:	**2,135,459 N , 1,400,130 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
260	78											
	79											
	80											
265	81											
	82											
270	83											
	84											
275	85											
	86											
280	87											
	88											
285	89											
	90											
290	91											
	92											
295	93											
300												
305												

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Overburden Log For GH06-77

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-77**	Page	**7** of **10**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 28, 06**
Drilling Method:	**DDH**	Elevation:	**1027 ft**	Date Completed:	**Oct 3, 06**
Location:	**Area A**	Total Depth:	**482 ft**	Logged by:	**TT/AG**
Coordinates:	**2,135,459 N , 1,400,130 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
310	94											
	95											
315	96											
	97											
320	98											
325	99		GRAVEL, some sand, fine to coarse gravel clasts, rounded to subangular	0							Reduced to NQ.	
	100		Silty SAND, trace clay, poorly graded, fine, very dense, dark to medium grey	33								
330	101											
				39								
335	102											
				82								
	103											
340				98								
	104											
345	105		GRAVEL, poorly graded, rounded to subrounded	36							Fines washed away	
				41								
	106			39								
350			Silty SAND, trace clay, poorly graded, fine, dark to medium grey	44								
	107											
	108											
355				39								

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Overburden Log For GH06-77

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-77**	Page	**8** of **10**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 28, 06**
Drilling Method:	**DDH**	Elevation:	**1027 ft**	Date Completed:	**Oct 3, 06**
Location:	**Area A**	Total Depth:	**482 ft**	Logged by:	**TT/AG**
Coordinates:	**2,135,459 N , 1,400,130 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
360	109			97								
	110											
365	111			89								
	112											
370	113			100								
	114			95								
375	115											
	116			100								
380	117		GRAVEL, fine to coarse clasts, gap graded, subangular	100							Fines washed away	
385	118			49								
390	119		BEDROCK, Tertiary Mudstone, fine grained, dark grey, pyrite present, white calcite veins, fractured.	22							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	120			100								
395	121			94								
				93								
400	122											
	123		BEDROCK, Tertiary amygdaloidal Andesite/Basalt, zones of Porphyritic Monzodiorite, fine grained, grey to green-grey, pyrite present, white calcite veins, fractured.	100								
405	124			97								

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Overburden Log For GH06-77

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-77**	Page	**9** of **10**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 28, 06**
Drilling Method:	**DDH**	Elevation:	**1027 ft**	Date Completed:	**Oct 3, 06**
Location:	**Area A**	Total Depth:	**482 ft**	Logged by:	**TT/AG**
Coordinates:	**2,135,459 N , 1,400,130 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
410	125			100								
	126			100								
415	127											
				100								
420	128											
	129											
425				100								
	130											
	131			100								
430												
	132											
435				98								
	133											
				100								
440	134											
	135											
445				98								
	136											
				100								
450	137											
	138											
				100								
455	139											

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-77

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Project:	**Pebble Project**	Drill Hole No.	**GH06-77**	Page	**10** of **10**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Sep 28, 06**
Drilling Method:	**DDH**	Elevation:	**1027 ft**	Date Completed:	**Oct 3, 06**
Location:	**Area A**	Total Depth:	**482 ft**	Logged by:	**TT/AG**
Coordinates:	**2,135,459 N , 1,400,130 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
460	140			100							
	141										
465	142			99							
	143										
470	144			99							
	145			100							
475	146			86							
480	147		END OF HOLE @482FT	87 79 71							
485	148										
	149										
490	150										
	151										
495	152										
	153										
500	154										
505	155										

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

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Pebble Project
Overburden Log For GH06-77

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Project No.	Ref. No.	Rev.
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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-78**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 10, 06**
Drilling Method:	**DDH**	Elevation:	**915 ft**	Date Completed:	**Oct 12, 06**
Location:	**East Deposit Area**	Total Depth:	**149 ft**	Logged by:	**TT/JV**
Coordinates:	**2,155,947 N , 1,409,794 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			Peaty, organic TOPSOIL, saturated.								Piezometer installed but permanently sealed with grout due to artesian conditions of >65 gpm.	
			Sandy SILT, some gravel, some clay (glacial till), fine to coarse gravel subangular, well graded, trace cobbles, trace boulders, stiff to very stiff, brown.	0								
5	1											
	2			0	56	☒	GH06-78-1	2/5/7	12		Pushed four Shelby tubes (#1 to #4), but they were heavily disturbed with bentonite from the collar seal deteriorating, samples not useable	
10	3			0	0	☒	GH06-78-2	4/5/8	13			
	4											
15				15							***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
	5			49								
20	6			48								
			Sandy, gravelly SILT/CLAY, clasts up to cobble size, mostly gravel, brown, moist, stiff to very stiff	66	44	☒	GH06-78-3	17/21/40	50+			
	7			30								
25				80	83	☒	GH06-78-4	15/20/45	50+			
	8			44								
				87								
30	9			90	78	☒	GH06-78-5	21/22/33	55			
				33								
	10			82								
				87								
35			Gravelly Sand, some silt, trace to some clay, subangular clasts, up to boulder size, mostly gravel size, brown, moist	59	50	☒	GH06-78-6	12/34/34	50+		Flowing condition encountered.	
	11			66								
				82								
				98								
	12			98								
40				66	0	☒	GH06-78-7	13/50+/-	50+			
				55								
	13			75								
45				13	50	☒	GH06-78-8	36/24/27	51		Dramatic increase in flow to more than 65gpm at bedrock contact	
	14											
	15											
50			BEDROCK, Volcaniclastic Tertiary	72							* See GEOTECHNICAL	

Northern Dynasty Minerals Inc.
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Project:	**Pebble Project**	Drill Hole No.	**GH06-78**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 10, 06**
Drilling Method:	**DDH**	Elevation:	**915 ft**	Date Completed:	**Oct 12, 06**
Location:	**East Deposit Area**	Total Depth:	**149 ft**	Logged by:	**TT/JV**
Coordinates:	**2,155,947 N , 1,409,794 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	16		fragmental rock, heterolithic matrix supported, fine angular clasts, white grey, brittle with up to 1cm infilling of clay. Fragments are predominantly 0.1 cm to 0.8 cm in size.								BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	17			64								
60	18											
				100								
	19											
65	20											
				100								
	21											
70				89								
	22											
75				100								
	23											
	24											
80				100								
	25											
85	26			100								
	27											
90				97								
	28											
95	29			100								
	30											
100	31			100								

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-78

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-63

Rev. 0 - Issued for Report

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-78**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 10, 06**
Drilling Method:	**DDH**	Elevation:	**915 ft**	Date Completed:	**Oct 12, 06**
Location:	**East Deposit Area**	Total Depth:	**149 ft**	Logged by:	**TT/JV**
Coordinates:	**2,155,947 N , 1,409,794 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
105	32			92						Increased fractures.	
110	33			100							
115	34			100							
120	35			100							
125	36			96							
130	37			100							
135	38			100							
140	39			100							
145	40			100							
150	41			98							
	42										
	43										
	44										
	45		BEDROCK, Bottom 1 foot is dark purple, iron stained TX unit, highly fractured, clast supported								
	46		END OF HOLE @149FT								

SPT TEST DATA: Uncorrected 'N' values vs. depth (■); RQD (%) (●); 20 40 60 80

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Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-78

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-64

Rev. 0 - Issued for Report

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-79**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 13, 06**
Drilling Method:	**DDH**	Elevation:	**957 ft**	Date Completed:	**Oct 16, 06**
Location:	**East Deposit Area**	Total Depth:	**120 ft**	Logged by:	**TT/JV**
Coordinates:	**2,155,394 N , 1,410,562 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			organic TOPSOIL, peat, root layer.								Artesian flow exceeds 300 gpm, hole plugged due to artesian flow	
			Silty SAND, trace clay, some organics, wet, soft, brown	0	94		GH06-79-1	1/1/3	4			
	1			94								
5					67		GH06-79-2	2/4/5	9		No piezometer installed.	
	2			66								
			SAND, trace to some silt, clay and gravel, subangular to subrounded, fine grained sand, moist, loose to compact		67		GH06-79-3	3/10/14	24			
10	3			66								
	4				94		GH06-79-4	2/4/7	11			
15											***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
	5			35	89		GH06-79-5	1/8/9	17			
20	6			90								
				98								
	7											
25				69	89		GH06-79-6	11/12/8	20			
	8											
			SAND and GRAVEL, trace to some silt/clay, subangular to subrounded, well graded, some cobbles, very dense	33								
				98								
	9			66								
30				43	72		GH06-79-7	36/39/50	50+			
				39								
	10			66								
				59								
				79								
35				44	0		GH06-79-8	50+/-/-	50+			
	11			82								
				92								
	12			72								
40				98								
	13			98								
				49								
45			Silty, gravelly SAND, trace clay, some coarse gravel, subangular, trace cobbles, very dense	98	78		GH06-79-9	32/49/50+	50+			
	14			44								
				66								
				66								
	15			66								
50				98	67		GH06-79-10	37/50+/-	50+			

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Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-79

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-65

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-79**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 13, 06**
Drilling Method:	**DDH**	Elevation:	**957 ft**	Date Completed:	**Oct 16, 06**
Location:	**East Deposit Area**	Total Depth:	**120 ft**	Logged by:	**TT/JV**
Coordinates:	**2,155,394 N , 1,410,562 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	16			44								
				98								
	17			98								
				98								
				98								
	18											
60			SILT, some sand, trace to some gravel and cobbles, some clay, subangular to subrounded, compact to very dense, moist	98	100		GH06-79-11	18/26/43	50+			
	19											
65				85								
	20		SAND and GRAVEL, well graded, subrounded to subangular clasts, compact to very dense, brown, moist	33								
	21											
70				14	72		GH06-79-12	50+/-/-	50+			
	22			33								
75				22								
	23											
	24											
80				52	89		GH06-79-13	11/13/15	28			
	25											
85	26			13								
				39								
	27			66							Fines washed away	
90				87	67		GH06-79-14	47/50+/-	50+			
	28			98								
95	29			15								
				26								
	30											
100				33	44		GH06-79-15	43/50+/-	50+			
	31											

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-79

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-79**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 13, 06**
Drilling Method:	**DDH**	Elevation:	**957 ft**	Date Completed:	**Oct 16, 06**
Location:	**East Deposit Area**	Total Depth:	**120 ft**	Logged by:	**TT/JV**
Coordinates:	**2,155,394 N , 1,410,562 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			25							Significant increase in flow, conditions now artesian	
				27								
				33								
				66								
	33			66								
110			Silty SAND, trace clay, poorly graded, dense, moist.	98	100		GH06-79-16	15/17/28	45			
	34		SAND and GRAVEL, trace silt/clay, dense, well graded, subangular clasts.									
115	35			75								
	36											
120				69	67		GH06-79-17	20/22/14	36			
	37		END OF HOLE @121.5FT, PLUGGED @120FT DUE TO ARTESIAN FLOW OF 300gpm	68								
125	38											
	39											
130	40											
	41											
135	42											
140	43											
	44											
145	45											
150	46											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-79

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Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-80**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 17, 06**
Drilling Method:	**DDH**	Elevation:	**1017 ft**	Date Completed:	**Oct 20, 06**
Location:	**Open Pit Area**	Total Depth:	**217 ft**	Logged by:	**TT/JV**
Coordinates:	**2,154,864 N , 1,406,799 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, clay with organics, root mat.									
			Sandy SILT, trace to some gravel, trace clay, angular clasts, moist, dense, medium plasticity, brown.	0	33		GH06-80-1	2/3/3	6		Water level measured at 37' below ground surface Oct 20/06	
5	1			33								
					0		GH06-80-2	2/3/5	8			
	2			0							Spoon blocked by gravel clast.	
					6		GH06-80-3	6/12/9	21			
10	3			7								
	4											
15				15	89		GH06-80-4	4/5/6	11		***Drillhole logs represent an interpretation of field logs combined with laboratory test results.***	
	5											
20	6			20	94		GH06-80-5	6/9/15	24			
	7											
25				20	0		GH06-80-6	11/14/21	35			
	8											
30	9			60	78		GH06-80-7	8/17/17	34			
	10		Gravelly SAND, fine to coarse gravel, trace to some silt/clay, well graded, subangular to subrounded sediment, moist, brown, compact to dense									
35				49	67		GH06-80-8	9/10/11	21		Lost circulation at 36 ft.	
	11			27								
40	12			33	50		GH06-80-9	8/8/8	16			
	13			41								
45				66	67		GH06-80-10	16/17/17	34		Tricone to advance 4" casing due to heaving in loose gravelly sand zone.	
	14											
50	15			13								

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-80

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-80**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 17, 06**
Drilling Method:	**DDH**	Elevation:	**1017 ft**	Date Completed:	**Oct 20, 06**
Location:	**Open Pit Area**	Total Depth:	**217 ft**	Logged by:	**TT/JV**
Coordinates:	**2,154,864 N , 1,406,799 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) / RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
55	16			0								
	17			66	56		GH06-80-11	9/15/18	33			
60	18			13	33		GH06-80-12	12/14/13	27			
	19			13								
65	20			26								
	21			33	28		GH06-80-13	14/15/18	33			
70	22											
75	23		Sandy SILT, some gravel, trace cobbles, some clay, angular clasts, moist, very dense, grey brown.	13							Loss Circulation at 75 ft.	
	24			58	117		GH06-80-14	4/11/13	24			
80	25											
85	26			57								
	27											
90	28		SAND and GRAVEL, some silt, trace clay, subangular clasts, very dense, moist, brown	59	83		GH06-80-15	23/31/50+	50+			
95	29		BEDROCK, completely to highly weathered, hematitic basalt. Some brecciated, flow-banded and amygdaloidal basalt, stained red by hematite alteration. 4% calcite overall as amygdules and fracture infill. Moderate to strong fracturing.	37							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	30			100								
100	31			69								

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-80

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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-80**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 17, 06**
Drilling Method:	**DDH**	Elevation:	**1017 ft**	Date Completed:	**Oct 20, 06**
Location:	**Open Pit Area**	Total Depth:	**217 ft**	Logged by:	**TT/JV**
Coordinates:	**2,154,864 N , 1,406,799 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
105	32			89							
				44							
	33										
110				70							
	34										
115	35			100							
	36										
120				100							
	37										
	38		BEDROCK, fragmental Tertiary conglomerate from 124' to 129'. Poorly consolidated. Very soft.	98							
125											
	39										
130			BEDROCK, completely to highly weathered, hematitic basalt. Some brecciated, flow-banded and amygdaloidal basalt, stained red by hematite alteration. 4% calcite overall as amygdules and fracture infill. Moderate to strong fracturing.	98							
	40			66							
	41			93							
135											
	42										
140				101							
	43										
				102							
	44			90							
145				82							
	45										
150				100						Change to NQ	
	46										

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-80

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-80**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 17, 06**
Drilling Method:	**DDH**	Elevation:	**1017 ft**	Date Completed:	**Oct 20, 06**
Location:	**Open Pit Area**	Total Depth:	**217 ft**	Logged by:	**TT/JV**
Coordinates:	**2,154,864 N , 1,406,799 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
155	47			98							
				80						Changed bit to enhance recovery	
	48										
				33							
160	49										
				95							
	50			33							
165											
	51										
				71							
170	52										
				75							
	53										
175											
	54										
				100							
180	55										
				92							
	56										
				98							
185											
	57										
				100							
190	58										
				97							
	59										
195											
	60										
				98							
200	61										
	62		BEDROCK, dark grey rock with quartz veins,	100							

SPT TEST DATA
Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-80

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH06-80**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 17, 06**
Drilling Method:	**DDH**	Elevation:	**1017 ft**	Date Completed:	**Oct 20, 06**
Location:	**Open Pit Area**	Total Depth:	**217 ft**	Logged by:	**TT/JV**
Coordinates:	**2,154,864 N , 1,406,799 E**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
205	63		clay infilling and reddish spots. Less mottled than above.	100								
210	64											
	65			100								
215	66		END OF HOLE @217FT	90								
220	67											
	68											
225	69											
	70											
230	71											
	72											
235	73											
240	74											
	75											
245	76											
250	77											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\08\A\DATA\2006 WMF SI\GINT\LIBRARY1.GLB Printed: Mar 5, 08

Northern Dynasty Minerals Inc.
Pebble Project
Overburden Log For GH06-80

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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/8	**9**	**0**

A1-72

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Date Revised: Nov 26, 07

Project:	**Pebble Project**	Drill Hole No.	**GH07-81**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 18, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1383 ft**	Date Completed:	**Aug 21, 07**
Location:	**Area G, NE Alignment**	Total Depth:	**164.5 ft**	Logged by:	**LS/EC/AM**
Coordinates:	**2,161,333 N , 1,382,565 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, numerous roots, dark brown, wet.	0							Casing advanced 0 - 14 ft, no core recovery.	
5	1		Gravelly SAND, well graded, trace cobbles, subangular, light brown, moist.									
	2			0							Flowing conditions encountered from 9 to 14 feet below ground. Flow measured at ~3.5 gpm.	
10	3											
	4											
15	5		BEDROCK, Monzonite, light grey, fine to medium grained, hematite, chlorite, pyrite and clay on fracture surfaces, Shear zone 117-121 ft, Possibly Tertiary Basalt below 121 ft.	98					0		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	6			91					21			
20	7			100					65			
25	8										***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
	9			100					82			
30	10			100					81			
35	11			100					100			
				95					30			
40	12											
	13			100					69			
45	14											
				100					88			
50	15											
	16			99					16			
55	17											
				99					62			
60	18											
				97					0			
65	19			100					63			
	20											
70				98					43			
	21											
	22			100					43			
75	23											
				100					93			
80	24											
	25			99					64			
				98					45			
85	26											
				100					50			
90	27											
	28			100					92			
95	29											
				98					83			
	30											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-81

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Rev. 0 - Issued for Report VA101-00176/20-4

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Date Revised: Sep 15, 08

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINTLIBRARY1.GLB Printed: Sep 21, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-81**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 18, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1383 ft**	Date Completed:	**Aug 21, 07**
Location:	**Area G, NE Alignment**	Total Depth:	**164.5 ft**	Logged by:	**LS/EC/AM**
Coordinates:	**2,161,333 N , 1,382,565 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			95					77			
	33			100					43			
110	34			100					40			
115	35			100					7			
	36			94					0			
120	37			100					24			
125	38			92					54			
	39			89					10			
130	40			100					49			
135	41			91					59			
	42			100					81			
140	43			100					61			
145	44			100					58			
	45			96					50			
150	46			100					60			
155	47											
	48											
160	49											
165	50		END OF HOLE @ 164.5 FT									
	51											
170	52											
175	53											
	54											
180	55											
185	56											
	57											
190	58											
	59											
195	60											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-81

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Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-82**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 22, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1407 ft**	Date Completed:	**Aug 25, 07**
Location:	**Area G, NE Alignment**	Total Depth:	**215 ft**	Logged by:	**LS/EC/AM**
Coordinates:	**2,162,943 N , 1,379,583 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, organics, dark brown moss, roots.	0							Casing advanced 0 - 30 ft, no core recovery.	
5	1		SILT/CLAY, some sand, some subangular to subrounded gravel, trace cobbles, gap graded, light brown, moist.	0								
	2			53	53		GH07-82-1	12/30/16	46		Water levels in 82S and 82D measured at 5.5 ft and 6.8 ft below ground surface, respectively on Sept 2/07.	
10	3		Sandy GRAVEL, some silt, trace to some clay, varying amounts of sand, well graded, trace subrounded to subangular cobbles and boulders; light brown, moist.	0								
	4			53	53		GH07-82-2	28/27/27	54			
15	5			0								
				0								
				47	47		GH07-82-3	24/29/50+	79+			
20	6			0								
	7		Gravelly SAND, some silt, trace clay, few subangular cobbles, well graded, light brown, moist.	93	93		GH07-82-4	50+/+/+	50+++		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
25	8			0								
				93	93		GH07-82-5	50+/+/+	50+++			
30	9			0								
	10			10								
35	11		BEDROCK, Tertiary Basalt, weathered to grey, calcite/chlorite on fracture surfaces, hematite only on shallow fractures, calcite veins.	100	100		GH07-82-6	50+/+/+	50+++		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
				31					0			
40	12											
	13			28					0			
45	14			39					0			
				66					0			
50	15											
	16			90					30			
55	17			92					0			
				39					0			
60	18			39					0			
	19			100					11			
65	20			91					7			
	21											
70	22			100					0			
	23			100					7			
75	24											
				98					33			
80	25											
	26			99					38			
85	27			39					0			
				49					0			
90	28			80					14			
	29			83					8			
95	30											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-82

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Date Revised: Sep 15, 08

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINTLIBRARY1.GLB Printed: Sep 21, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-82**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 22, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1407 ft**	Date Completed:	**Aug 25, 07**
Location:	**Area G, NE Alignment**	Total Depth:	**215 ft**	Logged by:	**LS/EC/AM**
Coordinates:	**2,162,943 N , 1,379,583 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	NOTES	WELL DETAILS
	31			59					0		
105	32			100					0		
	33			66					25		
110	34			94					25		
	35			62					0		
115	36			98					49		
	37			63					0		
120	38			87					21		
	39			56					16		
125	40			100					40		
130	41			100					59		
	42			93					34		
135	43			99					23		
	44			96					0		
140	45			98					25		
	46			100					21		
145	47			87					7		
150	48			100					49		
	49			100					28		
155	50			100					7		
	51			98					0		
160	52			100					36		
	53			97					41		
165	54			100					20		
	55			96					0		
170	56			100					13		
	57										
175	58										
	59										
180	60										

SPT TEST DATA Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

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Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-82

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-82**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 22, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1407 ft**	Date Completed:	**Aug 25, 07**
Location:	**Area G, NE Alignment**	Total Depth:	**215 ft**	Logged by:	**LS/EC/AM**
Coordinates:	**2,162,943 N , 1,379,583 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
205	62			100					31			
	63											
210	64			100					49			
	65											
215	66			93					27			
			END OF HOLE @ 215FT									
220	67											
	68											
225	69											
	70											
230	71											
235	72											
	73											
240	74											
	75											
245	76											
250	77											
	78											
255	79											
	80											
260	81											
265	82											
	83											
270	84											
	85											
275	86											
280	87											
	88											
285	89											
	90											
290	91											
295												

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINTLIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-82

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-83**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 26, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1605 ft**	Date Completed:	**Aug 27, 07**
Location:	**Area G, NW Alignment**	Total Depth:	**164.5 ft**	Logged by:	**EC/AM**
Coordinates:	**2,163,510 N , 1,374,824 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, organic, sandy, gravelly SILT, trace clay, angular to subangular gravel, some angular to subangular cobbles and boulders. numerous roots (Tundra vegetation).	0							Casing advanced 0 - 8.5 ft, no core recovery.	
5	1			0								
	2			47	47		GH07-83-1	9/9/9	18	■		
				0								
10	3		Silty, gravelly SAND, trace clay, some angular to subrounded gravel and cobbles, gravel content decreasing with depth, well graded, brown, moist.	49					0		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	4			89					0			
15	5		WEATHERED BEDROCK, Monzonite, fine to medium-grained, grey-green, hematite, chlorite, and clay alteration on fracture surfaces, minor disseminated pyrite.	77					0			
20	6			100					31			
	7			87					23			
25	8		BEDROCK, Monzonite, fine to medium-grained, grey-green, hematite, chlorite, pyrite and clay alteration on fracture surfaces.	77					43		Water levels in 83S and 83D measured at 0.3 ft and 0.7 ft above ground surface, respectively on Oct 4/07.	
30	9			95					43			
	10			88					76			
35	11			100					16			
	12			100					10			
40	13			100					22		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
45	14			100					75			
50	15			25					0			
	16			99					39			
55	17			98					0			
	18			100					33			
60	19			98					63			
65	20			98					26			
	21			100					86			
70	22			98					27			
75	23			100					26			
	24			99					37			
80	25		BEDROCK, Siltstone and minor sandstone, dark grey-brown-green, minor alteration.	100					83			
85	26											
	27											
90	28											
95	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-83

Knight Piésold CONSULTING

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-83**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 26, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1605 ft**	Date Completed:	**Aug 27, 07**
Location:	**Area G, NW Alignment**	Total Depth:	**164.5 ft**	Logged by:	**EC/AM**
Coordinates:	**2,163,510 N , 1,374,824 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			100					66			
	33											
110	34			100					74			
	35											
115	36			100					68			
	37											
120	38			100					80			
	39											
125				100					35			
130	40		BEDROCK, Granodiorite, light grey to white, fine-medium grained, calcite, chlorite, hematite, pyrite, minor chalcopyrite.	100					83			
	41											
135	42			100					93			
	43											
140	44			100					68			
	45											
145	46			100					89			
	47											
150	48			100					95			
	49											
155	50			100					85			
160	51			100					76			
	52											
165	53		END OF HOLE @ 164.5FT	96					70			
	54											
170	55											
	56											
175	57											
	58											
180	59											
	60											
185												
190												
195												

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-83

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-85**	Page	**1** of **2**		
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 30, 07**		
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1628 ft**	Date Completed:	**Sep 2, 07**		
Location:	**Area G, NE Alignment**	Total Depth:	**154.5 ft**	Logged by:	**LS/EC**		
Coordinates:	**2,163,904 N , 1,377,732 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**		

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Sandy, silty GRAVEL, trace clay, poorly graded, clasts subangular up to boulder size, brown, moist, tundra vegetation veneer.	0	57		GH07-85-1	3/4/45	49		Casing advanced 0 - 21.5 ft, no core recovery.	
5	1			6							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	2		BEDROCK, Siltstone/Wacke, Fine-grained grey rock, propylitically altered, possibly sediments or basalt?, epidote, hematite, calcite and chlorite on fracture surfaces throughout. Many steeply dipping fractures. Occasional pyrite and chalcopyrite inclusions, Fault Zone, 48 to 65'.	70					0			
10	3			98					21			
	4			98					43			
15	5			98					98			
				100					55			
20	6										Water level measured at 7.3' below ground surface, Oct 4/07	
	7			100					54			
25	8								78			
				98								
30	9										***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
	10			98					39			
35	11			66					0			
				78					0			
				46					0			
40	12			98					0			
	13			86					33			
45	14			85					68			
				89					0			
50	15											
	16			68					0			
				16					0			
55	17			31					0			
				0					0			
60	18			59					0			
	19			20					0			
65	20											
	21			92					45			
70	22			99					79			
75	23			99					62			
	24			95					43			
80	25			100					88			
85	26			100					91			
	27											
90	28			99					91			
				92					92			
95	29			96					58			
	30											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-85

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-85**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 30, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1628 ft**	Date Completed:	**Sep 2, 07**
Location:	**Area G, NE Alignment**	Total Depth:	**154.5 ft**	Logged by:	**LS/EC**
Coordinates:	**2,163,904 N , 1,377,732 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			98					87			
110	34			98					98			
115	35			100					58			
120	37			100					77			
125	38			92					18			
130	40			100					61			
135	41			100					41			
140	43			100					72			
145	44			98					62			
150	46			99					34			
155	47			100					21			
155	47		END OF HOLE @ 154.5 FT									
160	48											
165	50											
170	51											
175	53											
180	54											
185	55											
190	57											
195	58											
	59											
	60											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Project No.	Ref. No.	Rev.
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Date Revised: Sep 15, 08

Project: Pebble Project | Drill Hole No. **GH07-86** | Page 1 of 2

Drilling Co: Foundex | In-Situ Sampler: SPT | Date Started: Sep 2, 07

Drilling Method: HT-700 Mud Rotary Diamond Drill | Elevation: 1690 ft | Date Completed: Sep 4, 07

Location: Area G, NW Alignment | Total Depth: 165 ft | Logged by: LS/EC

Coordinates: 2,161,121 N , 1,372,867 E, NAD83 AK State Plane (ft) | Azimuth, Inclination: 0 degs, -90 degs | Reviewed by: LJG

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	NOTES
0	0		Tundra vegetation, peat, numerous roots.	0	0		GH07-86-1	1/27/6	33	Casing advanced 0 - 13 ft, no core recovery.
5	1		Silty/clayey SAND, some gravel, occasional cobbles, gap graded, clasts subrounded, boulder from 11 to 13', light brown, moist.		0		GH07-86-2	7/6/5	11	
	2				3		GH07-86-3	22/21/18	39	Sandy light brown drill return, 5 - 10 ft.
10	3			0						
					80		GH07-86-4	14/16/50+	66+	
15	4		BEDROCK, light grey, relatively unaltered, medium grained Monzonite, calcite and hematite/limonite on fracture surfaces, Fault Zone at 127 to 142 ft, ~25 degrees tca.	77					24	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).
	5			100					63	
20	6			98					98	
	7			100					92	
25	8			100					100	Water level measured at 1.8' above ground surface, Sept 4/07.
30	9			98					82	
	10			100					94	
35	11			100					91	
40	12									
	13			100					95	
45	14			100					100	***Drillhole logs represent an interpretation of field logs combined with laboratory test results***
50	15									
	16			94					94	
55	17			74					74	
	18			98					66	
60	19			100					30	
65	20			100					43	
	21			100					70	
70	22									
75	23			100					41	
	24									
80	25			100					57	
	26									
85	27			34					0	
90	28			88					58	
95	29									
	30			100					69	

SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80

WELL DETAILS

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINTLIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-86

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	4	0

A1-12

Rev. 0 - Issued for Report VA101-00176/20-4

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-86**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 2, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1690 ft**	Date Completed:	**Sep 4, 07**
Location:	**Area G, NW Alignment**	Total Depth:	**165 ft**	Logged by:	**LS/EC**
Coordinates:	**2,161,121 N , 1,372,867 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE / RQD (%)	NOTES	WELL DETAILS
105	32			100					75		
	33										
110	34			100					85		
	35										
115	36			100					53		
	37										
120	38			98					86		
	39										
125	40			100					86		
	41										
130	42			70					10		
	43			100					0		
135	44			66					0		
	45			96					11		
140	46			72					0		
	47			100					0		
145	48			92					22		
	49										
150	50			100					25		
	51										
155	52			97					50		
	53										
160	54			92					0		
	55			93					0		
165	56			89					29		
	57			97					14		
170	58		END OF HOLE @ 165 FT								
	59										
175	60										
	61										
180	62										
	63										
185	64										
	65										
190	66										
	67										
195	68										

SPT TEST DATA: Uncorrected 'N' values vs. depth (■); RQD (%) (●); 20 40 60 80

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-86

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Rev. 0 - Issued for Report VA101-00176/20-4

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-87**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 4, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1855 ft**	Date Completed:	**Sep 7, 07**
Location:	**Area G, NW Alignment**	Total Depth:	**260 ft**	Logged by:	**EC/LS**
Coordinates:	**2,159,296 N , 1,372,353 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, Organic silt and clay, numerous roots, dark brown.	0							Casing advanced 0 - 15 ft, no core recovery. Drill return light brown, sand-rich 3 - 8 ft.	
5	1		Silty clayey SAND, trace gravel, up to cobble size, occasional boulders, well graded, clasts subangular, light brown, moist.	0	77		GH08-87-1	6/8/2	10			
10	2				61		GH08-87-2	18/24/26	50			
15	3		WEATHERED BEDROCK, granodiorite, highly weathered to coarse-grained sand, some hematite staining, poorly graded sand, light brown, moist.		66		GH08-87-3	15/18/31	49			
20	4			0								
25	5		BEDROCK. Light grey, relatively unaltered, medium to coarse-grained Granodiorite, calcite and hematite on fracture surfaces, Major Fault Zone 176 to 232 ft, Minor Fault Zones at 118.5 to 125.5 ft, 134.75 to 136.5, 168.5 to 172.5 ft.	93					0		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
30	6											
35	7			79					0			
40	8										Water levels in 87S and 87D measured at 5.8 ft and 8.7 ft below ground surface, respectively on Oct 4/07.	
45	9			0					0			
50	10			0	98		GH08-87-4	23/50+/+	50++			
55	11			45					0			
60	12			30					0			
65	13			18					0			
70	14			69					0		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
75	15			85					0			
80	16			85					0			
85	17			56					0			
90	18			83					26			
95	19			92					10			
100	20			71					18			
105	21			95					0			
110	22			94					52			
115	23			95					18			
120	24			59					0			
125	25			100					0			
130	26			100					42			
135	27			98					18			
140	28			100					50			
145	29											
150	30											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-87

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-87**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 4, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1855 ft**	Date Completed:	**Sep 7, 07**
Location:	**Area G, NW Alignment**	Total Depth:	**260 ft**	Logged by:	**EC/LS**
Coordinates:	**2,159,296 N , 1,372,353 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			100					51			
	33			100					14			
110	34			90					12			
115	35			87					0			
	36			60					7			
120	37			55					0			
125	38			86					0			
	39			94					19			
130	40			100					29			
135	41			100					58			
	42			100					26			
140	43			100					70			
145	44			100					63			
	45			100					59			
150	46			95					50			
155	47			98					47			
	48			84					0			
160	49			98					33			
165	50			82					0			
	51			100					0			
170	52			69					16			
175	53			98					0			
	54			67					0			
180	55			82					0			
185	56			93					33			
	57											
190	58											
	59											
195	60											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-87

Rev. 0 - Issued for Report VA101-00176/20-4

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-87**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 4, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1855 ft**	Date Completed:	**Sep 7, 07**
Location:	**Area G, NW Alignment**	Total Depth:	**260 ft**	Logged by:	**EC/LS**
Coordinates:	**2,159,296 N , 1,372,353 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	NOTES	WELL DETAILS
205	62			98					0		
	63			94					0		
210	64			98					0		
	65			78					0		
215	66			98					0		
220	67			98					0		
	68			100					0		
225	69			100					0		
230	70			100					0		
	71			91					13		
235	72			100					79		
240	73			100					100		
	74			100					75		
245	75			97					43		
250	76			100					80		
	77										
255	78										
260	79		END OF HOLE @ 260 FT								
	80										
265	81										
270	82										
	83										
275	84										
280	85										
	86										
285	87										
290	88										
	89										
295	90										
	91										

SPT TEST DATA Uncorrected 'N' values vs. depth (■)
RQD (%) (●)
20 40 60 80

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-87

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Rev. 0 - Issued for Report VA101-00176/20-4

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-88**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 7, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1626 ft**	Date Completed:	**Sep 9, 07**
Location:	**Area G, NW Alignment**	Total Depth:	**155 ft**	Logged by:	**JN/TB/LS/EC**
Coordinates:	**2,162,438 N , 1,372,730 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, organic silt and clay, numerous roots, brown.	0							Casing advanced, no core sample 0 - 5 ft.	
5	1		Silty SAND, trace gravel, frequent cobbles and boulders, (frost heaved bedrock), Well graded, clasts subangular, brown, moist to wet.	0	22		GH07-88-1	43/50+/+	50++		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	3		BEDROCK, Gabbro, dark grey to green, coarse-grained, calcite, hematite and clay on fracture surfaces, pyrite veins, chalcopyrite increases downhole.	90					35			
15	4			98					89		Water level measured at 1.4' below ground surface, Oct 4/07.	
20	6			100					91			
25	7			99					96			
30	9			92					0		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
35	10			100					58			
40	12			94					68			
45	13			99					84			
50	15			100					91			
55	16			100					42			
60	18			99					85			
65	19			100					42			
70	21			97					40			
75	22			97					90			
80	24			97					84			
85	25			89					58			
90	27			100					75			
95	28			94					54			
	30			96					86			
				100					90			
				96					96			

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-88

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINTLIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-88**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 7, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1626 ft**	Date Completed:	**Sep 9, 07**
Location:	**Area G, NW Alignment**	Total Depth:	**155 ft**	Logged by:	**JN/TB/LS/EC**
Coordinates:	**2,162,438 N , 1,372,730 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			100					88			
	33											
110	34			100					92			
	35											
115	36			100					94			
	37											
120	38			100					100			
	39											
125	40			98					94			
	41											
130	42			91					89			
	43											
135	44			100					100			
	45											
140	46			97					88			
	47											
145	48			100					100			
	49											
150	50			100					90			
	51											
155	52			100					92			
	53		END OF HOLE @ 155 FT									
160	54											
	55											
165	56											
	57											
170	58											
	59											
175	60											
180												
185												
190												
195												

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-88

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-18

Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-89**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 10, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1890 ft**	Date Completed:	**Sep 11, 07**
Location:	**Area G, SW Alignment**	Total Depth:	**154.1 ft**	Logged by:	**TB/JN/EC**
Coordinates:	**2,153,620 N , 1,367,910 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
5	1		Tundra Vegetation, organics silt and clay, numerous roots, brown.	0							Casing advanced, no core sample 2 - 7.5 ft. Drill return orange-tan brown, changes to tan-brown to grey at 7.5 ft. * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
			Silty SAND, some gravel, frequent boulders, well graded, clasts subangular to subrounded of variable composition, boulder 5 - 5.5 ft, moist, brown.	0	14		GH07-89-1	3/6/2	8			
10	2			98	75		GH07-89-2	50/+/+	50+++			
	3		WEATHERED BEDROCK, Granodiorite/Monzonite, weathered to sand size material.	0					0			
15	4			0					28			
	5		BEDROCK, Granodiorite/Monzonite, grey to greenish-grey, coarse grained. Hematite and calcite on fracture surfaces.	100					14			
20	6			94					31			
25	7			98					43			
	8			100					35			
30	9			98					53		Water levels in 89S and 89D measured at 7.5 ft and 6.4 ft below ground surface on Sept 1/08 and Oct 4/07, respectively.	
	10			96					0			
35	11			100					23			
40	12			100					0			
	13			100					0			
45	14			69					0			
	15			99					28			
50	16			100					0			
55	17			94					0			
	18			86					0			
60	19			96					0			
65	20			98					47		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
	21			97					0			
70	22			94					0			
	23			97					55			
75	24			100					24			
80	25			100					21			
	26			100					78			
85	27			100					100			
90	28			93					0			
	29			98					0			
95	30			69					0			

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-89

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-19

Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-89**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 10, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1890 ft**	Date Completed:	**Sep 11, 07**
Location:	**Area G, SW Alignment**	Total Depth:	**154.1 ft**	Logged by:	**TB/JN/EC**
Coordinates:	**2,153,620 N , 1,367,910 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE / RQD (%)	NOTES	WELL DETAILS
105	32			98					56		
	33			100					0		
110	34			98					26		
115	35										
	36			100					12		
120	37			99					70		
125	38										
	39			100					95		
130	40			96					77		
135	41										
	42			100					66		
140	43			94					25		
				96					66		
145	44			98					69		
	45			100					62		
150	46			100					77		
				100					73		
155	47		END OF HOLE @ 154.1 FT	100					78		
	48										
160	49										
	50										
165	51										
170	52										
	53										
175	54										
180	55										
	56										
185	57										
190	58										
	59										
195	60										

SPT TEST DATA: Uncorrected 'N' values vs. depth (■) / RQD (%) (●); 20 40 60 80

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-89

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-90**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 12, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1963 ft**	Date Completed:	**Sep 13, 07**
Location:	**Area G, SW Alignment**	Total Depth:	**170 ft**	Logged by:	**TB/JN**
Coordinates:	**2,151,062 N , 1,367,772 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, thin veneer, dark brown, moist, organic odor. numerous roots and organic debris.	0							Casing advanced 0 - 10 ft, no core recovery. Drill return tan brown, sand-rich 4.5 - 10 ft. * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	1			0	17		GH07-90-1	3/7/8	15			
	2		WEATHERED BEDROCK, Monzonite, frost heaved, medium to coarse grained, boulders, subangular, some sand, some silt.	0	33		GH07-90-2	12/23/22	45			
10	3			0					0			
	4		BEDROCK, Monzonite, light grey and pink, medium-grained. Some calcite veinlets, calcite and hematite on fracture surfaces, clay fracture infilling.	26					0			
15	5			83					0			
	6			89					26			
20	7			98					67			
25	8			98					66		Water levels in 90S and 90D measured at 1.6 ft and 2.7 ft below ground surface, respectively on Oct 4/07.	
30	9			99					60			
	10			100					39			
35	11			83					37		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
40	12			100					62			
	13			95					51			
45	14			91					0			
50	15			91					41			
55	16			98					59			
	17			100					26			
60	18			96					59			
65	19			100					68			
	20			100					32			
70	21			100					54			
75	22			100					83			
	23											
80	24											
	25											
85	26											
90	27											
	28											
95	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-90

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-21

Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINTLIBRARY1.GLB Printed: Sep 21, 08

M:\1\01\00176\20\A\DATA\2007 WMF SI\GINT\WMF2007.GPJ

Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-90**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 12, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1963 ft**	Date Completed:	**Sep 13, 07**
Location:	**Area G, SW Alignment**	Total Depth:	**170 ft**	Logged by:	**TB/JN**
Coordinates:	**2,151,062 N , 1,367,772 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			100					79			
	33			97					79			
110	34			100					65			
115	35											
	36			100					79			
120	37			97					85			
125	38											
	39			100					72			
130	40											
	41			100					15			
135	42			100					7			
140	43											
	44			98					89			
145	45			100					54			
150	46											
	47			100					62			
155	48											
	49			98					28			
160	50			100					92			
165	51											
	52			98					98			
170	53		END OF HOLE @ 170 FT									
175	54											
180	55											
	56											
185	57											
190	58											
	59											
195	60											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-90

Rev. 0 - Issued for Report VA101-00176/20-4

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-22

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-91**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 14, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1889 ft**	Date Completed:	**Sep 15, 07**
Location:	**Area G, S Alignment**	Total Depth:	**155 ft**	Logged by:	**TB/JN**
Coordinates:	**2,149,768 N , 1,368,765 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra vegetation, silty sand matrix and frequent roots and organic debris. Trace grey-blue organic clay near surface, poorly graded, clasts angular to subangular up to boulder size, damp.	0	66		GH07-91-1	3/8/13	21		Casing advanced 0 - 5.5 ft, no core recovery. Drill return tan brown, sand-rich.	
5	1			0					0		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	2			0					0			
			WEATHERED BEDROCK, Silty SAND, some gravel, poorly graded, clasts subangular to angular, light brown.	20					43			
10	3											
	4		BEDROCK, Monzonite, light grey and pink, medium-grained, hematite, calcite and chlorite on fracture surfaces, some calcite veinlets, basalt intercalations from 87 to 108'.	95					24			
15	5										Water level measured at 0.5' above ground surface, Oct 4/07.	
				90					49			
20	6											
	7			95					49			
25	8											
				95					100			
30	9										***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
	10			100					68			
35	11											
	12			100					52			
40	13											
				95					60			
45	14											
				96					53			
50	15											
	16			100					43			
55	17											
				100					65			
60	18											
	19			98					52			
65	20											
				100					37			
70	21											
	22			100					38			
75	23											
				100					49			
80	24											
	25			100					50			
85	26											
				97					25			
90	27											
	28			100					27			
95	29											
	30			100					10			

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-91

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-23

Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-91**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 14, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1889 ft**	Date Completed:	**Sep 15, 07**
Location:	**Area G, S Alignment**	Total Depth:	**155 ft**	Logged by:	**TB/JN**
Coordinates:	**2,149,768 N , 1,368,765 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			92					20			
	33											
110	34			100					30			
	35											
115	36			100					62			
	37											
120	38			98					77			
	39											
125	40			100					85			
	41											
130	42			100					52			
	43											
135	44			97					80			
	45											
140	46			100					89			
	47											
145	48			94					94			
	49											
150	50			100					85			
	51											
155	52			100					91			
	53		END OF HOLE @ 155 FT									
160	54											
	55											
165	56											
	57											
170	58											
	59											
175	60											
	61											
180	62											
	63											
185	64											
	65											
190	66											
	67											
195	68											
	69											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-91

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-24

Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-92**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 15, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1699 ft**	Date Completed:	**Sep 18, 07**
Location:	**Area G, S Alignment**	Total Depth:	**160 ft**	Logged by:	**TB/JN**
Coordinates:	**2,149,448 N , 1,370,764 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, SAND, some silt, some gravel, frequent roots and organic debris, well graded, clasts subrounded up to cobble size, light brown, moist.	0	56		GH07-92-1	2/4/11	15		Casing advanced, no core recovery 0 - 6 ft.	
5	1								0			
	2			0					0		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	3		WEATHERED BEDROCK, Monzonite, brecciated, weathered to sand size particles with angular more competent fragments, light brown, poorly sorted, light brown.	0	83		GH07-92-2	14/48/49	97			
	4			23					0			
15	5		BEDROCK, Monzonite, brecciated, angular monzonite clasts ranging from gravel to boulder size, matrix consists of a ploymictic wacke to gravel conglomerate, fractures contain mainly hard infilling, strong weathering of matrix.	62					7		Water levels in 92S and 92D measured at 0.7 ft above ground surface and 11.7 ft below ground surface, respectively on Oct 4/07.	
20	6											
	7			98					26			
25	8											
	9			92					7			
30	10			100					26		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
35	11											
	12			100					36			
40	13			100					38			
45	14											
	15			91					0			
50	16			100					69			
55	17											
	18			98					49			
60	19			100					13			
65	20											
	21			100					7			
70	22			100					49			
75	23											
	24			100					43			
80	25			100					69			
85	26											
	27			100					59			
90	28			98					81			
95	29											
	30			100					62			

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-92

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-25

Rev. 0 - Issued for Report VA101-00176/20-4

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Date Revised: Sep 15, 08

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINTLIBRARY1.GLB Printed: Sep 21, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-92**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 15, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1699 ft**	Date Completed:	**Sep 18, 07**
Location:	**Area G, S Alignment**	Total Depth:	**160 ft**	Logged by:	**TB/JN**
Coordinates:	**2,149,448 N , 1,370,764 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			100					33			
110	33			100					75			
115	34			100					66			
120	35			100					47			
125	36			100					95			
130	37			100					55			
135	38			98					70			
140	39			100					57			
145	40			100					68			
150	41			100					24			
155	42			100					39			
160	43			100					66			
165	44											
170	45											
175	46											
180	47											
185	48											
190	49		END OF HOLE @ 160 FT									
195	50											
	51											
	52											
	53											
	54											
	55											
	56											
	57											
	58											
	59											
	60											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-92

Rev. 0 - Issued for Report VA101-00176/20-4

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-26

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-93**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 18, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1517 ft**	Date Completed:	**Sep 21, 07**
Location:	**Area G, S Alignment**	Total Depth:	**205 ft**	Logged by:	**TB/JN**
Coordinates:	**2,149,129 N , 1,373,640 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES
0	0		Tundra Vegetation, SILT and SAND, trace gravel, isolated cobbles, well graded, clasts angular to subrounded, brown, moist, numerous roots and organic debris.	0							Casing advanced 0 - 16.5 ft, no core recovery.
5	1				61		GH07-93-1	11/11/12	23		
10	3		Sandy GRAVEL, some silt, trace clay, isolated cobbles, well graded, clasts angular to subrounded, light brown, moist, sand and silt content increasing with depth.	0	72		GH07-93-2	20/31/37	68		Water level measured at 3.1' below ground surface, Oct 4/07.
15	5				33		GH07-93-3	27/11/6	17		
20	6		WEATHERED BEDROCK, Tertiary Andesite, dark grey, white phenocrysts, hematite on fracture surfaces, soft infill material washed away.	74					0		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).
25	8			50					0		
30	9			98					0		
				56					26		
			BEDROCK, Tertiary clast-supported breccia, mix of subrounded and angular basaltic clasts ranging from gravel to cobble size, matrix ranging from mudstone to sandstone, hematite, limonite and calcite on fracture surfaces.		67		GH07-93-4	9/13/12	25		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***
35	10			75					20		
40	12			100					28		
45	13			100					36		
50	14			98					0		
55	16			100					40		
60	17			100					63		
65	19			97					52		
70	20			100					30		
75	22			100					32		
80	23			100					7		
85	25			100					56		
90	26			100					29		Loss of circulation between 82 to 85 ft.
95	28			100					48		
	29			100					69		
	30			100					65		

WELL DETAILS

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-93

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-27

Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-93**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 18, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1517 ft**	Date Completed:	**Sep 21, 07**
Location:	**Area G, S Alignment**	Total Depth:	**205 ft**	Logged by:	**TB/JN**
Coordinates:	**2,149,129 N , 1,373,640 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			100					31			
	33											
110	34			100					39			
	35											
115	36			98					10			
	37											
120	38			100					31			
125	39		BEDROCK, Tertiary Dacite, grey-green, flow banding, vesicular portions, weathered to pale brown in portions.	100					47			
	40											
130	41			100					82			
	42											
135	43			98					70			
	44											
140	45			100					0			
	46											
145	47			100					60			
	48											
150	49			99					92			
	50											
155	51			100					52			
	52											
160	53			98					51			
	54											
165	55			100					64		Total loss of circulation at 160 ft.	
	56											
170	57			98					75			
	58											
175	59			100					82			
	60											
180				100					66			
185				100					74			
190				100					54			
195				94					84			
				100					69			
				100					72			

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-93

Rev. 0 - Issued for Report VA101-00176/20-4

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-28

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-93**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 18, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1517 ft**	Date Completed:	**Sep 21, 07**
Location:	**Area G, S Alignment**	Total Depth:	**205 ft**	Logged by:	**TB/JN**
Coordinates:	**2,149,129 N , 1,373,640 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
205	62			100					82			
			END OF HOLE @ 205 FT									
210	64											
215	66											
220	67											
225	69											
230	70											
235	72											
240	73											
245	75											
250	76											
255	78											
260	79											
265	81											
270	82											
275	83											
280	84											
285	86											
290	87											
295	89											
	90											
	91											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-93

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-29

Rev. 0 - Issued for Report VA101-00176/20-4

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-94**	Page	**1** of **2**		
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 21, 07**		
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1676 ft**	Date Completed:	**Sep 22, 07**		
Location:	**Area G, S Alignment**	Total Depth:	**139 ft**	Logged by:	**TB/JN**		
Coordinates:	**2,148,734 N , 1,374,743 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**		

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, Silty sand, trace gravel, isolated cobbles, numerous roots and organic debris, well graded, clasts angular to subangular, dark brown, moist.	0							Casing advanced 0 - 5.5 ft, no core recovery. Drill return tan brown, sand-rich 1 - 5.5 ft. * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	1			0								
	2			0	100		GH07-94-1	50+/+/+	50/++			
10	3		Silty SAND, some gravel, occasional cobbles, well graded, clasts angular to subangular, orangey-brown, moist.	91					21			
	4			85					12			
15	5		BEDROCK. Porphyritic with a fine-grained matrix and white sand to gravel sized phenocrysts. Hematite and clay on fracture surfaces.	70					0			
	6			51					13			
20	7			92					21		Water level measured at 1' above ground surface, Oct 4/07.	
25	8			95					0			
30	9											
	10			84					18		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
35	11			100					29			
40	12			100					45			
	13			100					16			
45	14			100					39			
50	15			100					79			
	16											
55	17			100					83			
60	18											
	19			100					97			
65	20			100					73			
70	21											
	22			100					99			
75	23			100					100			
80	24											
	25			100					59			
85	26			99					67			
90	27											
	28			100					90			
95	29											
	30			100					96			

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINTLIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-94

Rev. 0 - Issued for Report VA101-00176/20-4

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-30

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-94**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 21, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1676 ft**	Date Completed:	**Sep 22, 07**
Location:	**Area G, S Alignment**	Total Depth:	**139 ft**	Logged by:	**TB/JN**
Coordinates:	**2,148,734 N , 1,374,743 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			100					77			
	33											
110	34			100					62			
	35											
115	36			100					76			
	37											
120	38			100					85			
	39											
125	40			100					66			
	41											
130	42			99					60			
	43		END OF HOLE @ 139 FT									
135	44			100					47			
	45											
140	46			100					66		Loss of circulation at 137 ft	
	47											
145	48											
	49											
150	50											
	51											
155	52											
	53											
160	54											
	55											
165	56											
	57											
170	58											
	59											
175	60											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-94

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Rev. 0 - Issued for Report VA101-00176/20-4

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-98**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 28, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1746 ft**	Date Completed:	**Sep 30, 07**
Location:	**Area G, E Alignment**	Total Depth:	**229.5 ft**	Logged by:	**TB/JN**
Coordinates:	**2,152,902 N , 1,384,912 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, fine sand and gravel (colluvium), some cobbles, numerous roots and organic debris, gap graded, clasts angular to subangular, dark brown, damp.	0	8		GH07-98-1	4/4/4	8		Casing advanced 0 - 49.5 ft, no core recovery. Drill return changed from dark reddish-brown to greyish brown at 5 ft, gravel encountered.	
5	1				50		GH07-98-2	22/23/30	53			
10	3		Sandy GRAVEL, trace to some silt/clay, fines increasing with depth, occasional cobbles, well graded, clasts subangular to subrounded, tan brown, moist to damp.		100		GH07-98-3	3/2/5	7			
15	4			0	89		GH07-98-4	7/8/13	21			
20	5				81		GH07-98-5	9/13/12	25			
25	7				100		GH07-98-6	10/14/14	28			
25	8		COMPLETELY WEATHERED BEDROCK, Silty, gravelly SAND, trace clay, silt content decreasing with depth, gravel content increasing with depth, well graded, clasts subangular, greyish brown, moist.		94		GH07-98-7	23/34/46	80		Water levels in 98S and 98D measured at 12.9 ft and 12.3 ft below ground surface, respectively on Oct 13/07.	
30	9				89		GH07-98-8	10/12/34	46			
35	10			0	78		GH07-98-9	14/13/16	29			
40	12				100		GH07-98-10	15/18/16	34			
45	13											
50	15				100		GH07-98-11	19/44/49	93			
55	16		WEATHERED BEDROCK, Tertiary matrix supported breccia/conglomerate, silty, gravelly SAND, occasional cobbles, well graded, clasts subangular, mottled orange, brown, and grey, moist, hematite and limonite alteration, more competent.	85					0		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
60	17			85					0			
65	19			95					45		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
70	20			89					28			
75	22			72					16			
80	23			93					48			
80	24		BEDROCK, Monzonite, light grey and pink, medium-grained, calcite, hematite/limonite on fracture surfaces, vugs, weak to moderately fractured.	98					16			
85	25			79					20			
90	26			96					0			
95	28			100					25			
	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-98

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-98**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 28, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1746 ft**	Date Completed:	**Sep 30, 07**
Location:	**Area G, E Alignment**	Total Depth:	**229.5 ft**	Logged by:	**TB/JN**
Coordinates:	**2,152,902 N , 1,384,912 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			98					0			
110	34			100					41			
115	35			100					0			
120	37			98					23			
125	38			98					64			
130	40			100					75			
135	41			100					36			
140	43			100					45			
145	44			100					89			
150	45			100					56			
155	47			100					46			
160	48			100					79			
165	49			100					51			
170	51			100					85			
175	52			95					66			
180	53			100					92			
185	55			100					85			
190	56			100					58			
195	57			100					74			

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-98

Rev. 0 - Issued for Report VA101-00176/20-4

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-98**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 28, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1746 ft**	Date Completed:	**Sep 30, 07**
Location:	**Area G, E Alignment**	Total Depth:	**229.5 ft**	Logged by:	**TB/JN**
Coordinates:	**2,152,902 N , 1,384,912 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
205	62			100					92			
	63											
210	64			100					66			
	65											
215	66			100					79			
	67											
220	68			98					66			
	69											
225	70			100					82			
	71											
230	72			97					64			
	73		END OF HOLE @ 229.5 FT									
235	74											
	75											
240	76											
	77											
245	78											
	79											
250	80											
	81											
255	82											
	83											
260	84											
	85											
265	86											
	87											
270	88											
	89											
275	90											
	91											
280												
285												
290												
295												

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-98

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-99**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 30, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1900 ft**	Date Completed:	**Oct 3, 07**
Location:	**Area G, E Alignment**	Total Depth:	**160 ft**	Logged by:	**TB/JN**
Coordinates:	**2,154,211 N , 1,385,450 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, frost heaved bedrock at surface, silty SAND, some gravel, well graded, dark reddish-brown, moist to wet.	0	28		GH07-99-1	3/4/4	8		Casing advanced 0 - 10 ft, no core recovery.	
5	2		WEATHERED BEDROCK, Monzonite, weathered to SAND, some silt, trace clay, trace gravel, poorly graded, subangular coarse sand, light brown, moist.	0	67		GH07-99-2	26/13/17	30		Drill return greyish brown between 7 - 10 ft.	
10	3		Frequent boulders 7 - 10 ft.	100	100		GH07-99-3	14/20/41	61		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
15	4		BEDROCK, Monzonite, light grey and pink, medium-grained, biotite-hornblende-quartz, calcite veinlets, weak to moderate fracturing, hematite and calcite on fracture surfaces throughout, some pyrite and chlorite staining.	100					23			
20	5			100					58			
25	6			35					60			
30	7			98					87		Water level measured at 3.7' below ground surface, Oct 13/07.	
35	8			99					66			
40	9			100					87			
45	10			100					100		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
50	11			100					94			
55	12			100					80			
60	13			100					89			
65	14			97					87			
70	15			100					79			
75	16			100					79			
80	17			98					70			
85	18			100					82			
90	19			100					79			
95	20			100					83			
	21			100					92			
	22			97					85			
	23											
	24											
	25											
	26											
	27											
	28											
	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-99

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-99**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 30, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1900 ft**	Date Completed:	**Oct 3, 07**
Location:	**Area G, E Alignment**	Total Depth:	**160 ft**	Logged by:	**TB/JN**
Coordinates:	**2,154,211 N , 1,385,450 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	31			100					89			
	32											
	33			100					85			
110	34											
	35			100					82			
115	36			95					82			
120	37											
	38			100					84			
125	39			100					82		Lost circulation between 125 to 130 ft. (15gpm)	
130	40											
	41			100					62			
135	42			100					97			
140	43											
	44			100					100			
145	45			96					94			
150	46											
	47			100					95			
155	48			100					83			
160	49		END OF HOLE @ 160 FT									
165	50											
	51											
170	52											
	53											
175	54											
180	55											
	56											
185	57											
190	58											
	59											
195	60											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-99

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-100**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 3, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1916 ft**	Date Completed:	**Oct 5, 07**
Location:	**Area G, E Alignment**	Total Depth:	**180 ft**	Logged by:	**TB/JN/LS/TG**
Coordinates:	**2,151,719 N , 1,384,518 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation veneer, frost heaved bedrock, organic silt and clay, frequent roots, dark brown, poorly sorted, moist.	0	56		GH07-100-1	3/4/7	11		Casing advanced 0 - 5 ft, no core recovery.	
5	1			0								
	2		Sandy GRAVEL, angular to subangular clasts, isolated cobbles and boulders, well graded, moist, likely weathered bedrock.		100		GH07-100-2	50+/+/+	50+++		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	3			0					0			
	4		BEDROCK, Tertiary breccia/conglomerate, mainly clast supported, clasts are volcanic and angular to subrounded, matrix consists of wacke, chlorite and hematite on fracture surfaces, occasional dacitic intrusions.	33					0		Lost circulation 15-20 ft.	
15	5			98					29			
20	6											
	7			100					73			
25	8											
	9			100					53			
30	10		▼	100					67		Water level measured at 34.1' below ground surface, Oct 13/07.	
35	11			98					46			
	12											
40	13			100					30		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
45	14			100					90			
	15											
50	16			100					68			
55	17											
	18			94					71			
60	19											
	20			100					71			
65	21											
	22			100					67			
70	23											
	24			100					58			
75	25											
	26			100					88			
80	27											
	28			100					68			
85	29											
	30			100					40			
90												
				100					79			
95												
				100					91			

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-100

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

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Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINTLIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-100**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 3, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1916 ft**	Date Completed:	**Oct 5, 07**
Location:	**Area G, E Alignment**	Total Depth:	**180 ft**	Logged by:	**TB/JN/LS/TG**
Coordinates:	**2,151,719 N , 1,384,518 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
105	32			96					56			
110	34			93					60			
115	35			93					60			
120	37			100					100			
125	38			100					64			
130	40			100					95			
135	41			100					75			
140	43			100					100			
145	44			98					87			
150	46			100					44			
155	47			82					66			
160	49			100					100			
165	50			100					62			
170	52			100					49			
175	53			98					16			
180	55		END OF HOLE @ 179.5 FT									
185	56											
190	57											
195	59											
	60											

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-100

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VA101-176/20	**4**	**0**

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-104**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 15, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1003 ft**	Date Completed:	**Oct 20, 07**
Location:	**East Deposit Area**	Total Depth:	**195 ft**	Logged by:	**TG/LS**
Coordinates:	**2,153,137 N , 1,408,702 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			Tundra vegetation, Gravelly SAND, some silt and clay, numerous organic roots, well graded, clasts subrounded to subangular, brown, moist.	20							Casing advanced to 17.5 ft. No core recovery from 7.5-17.5 ft. Finer materials mostly washed away 0 - 9 ft.	
5	1		GRAVEL and SAND, trace silt, trace clay, well graded, clasts subrounded to angular, light brown, moist.	60	56		GH07-104-1	18/15/29	44			
				40	44		GH07-104-2	18/22/21	43			
10	2				50		GH07-104-3	14/16/24	40			
	3				50		GH07-104-4	15/17/17	34			
	4			0	64		GH07-104-5	9/9/15	24			
15	5				61		GH07-104-6	15/20/40	60		Circulation lost @15'	
											Boulder 17' to 19.5'	
20	6		SILT, some sand, some clay, trace gravel, poorly graded, grey, moist.	92	100		GH07-104-7	4/7/12	19			
	7		Silty, gravelly SAND, trace clay, well graded, clasts rounded to subangular, light brown, moist to wet.	62	50		GH07-104-8	10/13/13	26		Finer materials mostly washed away in core recoveries 24 - 30 ft.	
25	8			20	44		GH07-104-9	5/5/9	14			
				40	36		GH07-104-10	6/7/12	19		Water level measured at 2.1' above ground surface, Oct 20/07.	
30	9			40	100		GH07-104-11	3/3/3	6			
	10		SILT, some sand, some clay, areas where sand and clay content is higher, trace gravel, poorly graded, clasts rounded to subangular, grey, moist to wet.	13	100		GH07-104-12	2/4/6	10			
35	11			25	33		GH07-104-13	6/9/15	24			
				23	47		GH07-104-14	6/8/11	19			
40	12			28	64		GH07-104-15	3/6/8	14			
	13			67	83		GH07-104-16	8/10/12	22			
45	14			40	94		GH07-104-17	5/8/10	18			
				23	114		GH07-104-18	4/5/5	10		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
50	15			25	119		GH07-104-19	3/5/6	11			
	16			71	94		GH07-104-20	3/7/12	19			
55	17			25								
60	18				78		GH07-104-21	5/6/9	15			
	19			72								
65	20				117		GH07-104-22	7/9/16	25			
				75								
70	21				33		GH07-104-23	4/6/7	13			
	22			67								

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-104

Rev. 0 - Issued for Report VA101-00176/20-4

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-51

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

M:\1\01\00176\20\A\DATA\2007 WMF SI\GINT\WMF2007.GPJ

Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-104**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 15, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1003 ft**	Date Completed:	**Oct 20, 07**
Location:	**East Deposit Area**	Total Depth:	**195 ft**	Logged by:	**TG/LS**
Coordinates:	**2,153,137 N , 1,408,702 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
80	23		SAND and GRAVEL, some silt/clay, poorly to well graded due to varying amounts of gravel, subrounded clasts up to cobble size, light brown to light grey, moist.	42	100		GH07-104-24	9/26/36	61		Some heaving sand during drilling at 75 ft, sand in drill return from 77 to 105 ft.	
	24			22								
80	25			7	67		GH07-104-25	26/24/18	42		Trace hematite on cobbles, Trace iron oxide in soil 80 - 81.5 ft.	
85	26			0								
90	27			10								
	28											
95	29			20	83		GH07-104-26	10/19/22	41			
	30											
100	31			10	22		GH07-104-27	19/32/47	79			
105	32				22		GH07-104-28	21/47/50+	97+		Gravel does not appear in SPT samples for this material - only observed in core recovery.	
	33		Clayey SILT, trace sand, trace gravel, poorly graded, clasts subrounded to subangular, up to gravel size, light grey, moist.	86								
110	34				100		GH07-104-29	8/13/29	42			
	35			85								
115	36				97		GH07-104-30	5/7/11	18			
120	37			55	106		GH07-104-31	22/30/35	65		Heaving sands at 125 to 134 ft. 1 ft boulder at 139 ft.	
	38		Sandy SILT, some clay, trace gravel, subrounded clasts, poorly graded, grey, moist.	43			GH07-104-32	50+/+/+	50+++			
125	39											
130	40			30								
	41											
135	42			50	22		GH07-104-33	17/50+/+	50++			
	43			18								
140	44				100		GH07-104-34	17/22/40	62			
	45			65								
145					106		GH07-104-35	15/30/50+	83+			
				82								

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-104

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-52

Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-104**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 15, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**1003 ft**	Date Completed:	**Oct 20, 07**
Location:	**East Deposit Area**	Total Depth:	**195 ft**	Logged by:	**TG/LS**
Coordinates:	**2,153,137 N , 1,408,702 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
155	47		SAND and GRAVEL, some silt/clay, frequent cobbles and boulders, well graded, clasts rounded to subrounded, light brown, moist to wet.	17	6		GH07-104-36	30/42/50+	92+		Heaving sand at 165 ft associated with flowing conditions, very low, casing set to 175 ft.	
				95	33		GH07-104-37	12/38/50+	88+			
160	49			67	89		GH07-104-38	34/49/50+	99+			
165	50			100								
	51			33								
170	52			75	22		GH07-104-39	24/35/50+	85+			
	53			27								
175	54			0	60		GH07-104-40	16/46/50+	96+			
180	55		BEDROCK, Weathered Tertiary Rhyolite, cream white-green, heavily weathered, clay, chlorite and calcite fracture infilling.	0	40		GH07-104-41	11/35/50+	85+		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	56			100					0			
185	57			100					27			
190	58			92					53			
	59			62					18			
195	60		END OF HOLE @ 195 FT						0			
200	61											
	62											
205	63											
210	64											
	65											
215	66											
	67											
220	68											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-104

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-53

Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-105**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 20, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**996 ft**	Date Completed:	**Oct 25, 07**
Location:	**East Deposit Area**	Total Depth:	**170 ft**	Logged by:	**TG/LS**
Coordinates:	**2,152,553 N , 1,406,897 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
			Tundra vegetation., silty SAND, some gravel, round to subrounded clastsup to coarse gravel size, dry, numerous roots up to 1 ft depth.	0								
5	1		GRAVEL and SAND, trace silt, trace clay, well graded, clasts subangular to rounded, occasional cobbles and boulders, light brown, dry to moist, gravel content varying with depth.		50		GH07-105-1	17/24/30	54		Tricone drilled 0 - 20 ft to install 6" casing, no core recovery to 22.5 ft. Light brown drill return with brown/black sand content 0 - 21 ft. 1 ft boulder at 5.5 ft	
					53		GH07-105-2	22/27/29	56			
10	2				56		GH07-105-3	16/25/24	49			
	3				39		GH07-105-4	14/19/32	51		Water level measured at 0.7' below ground surface, Oct 26/07.	
				0								
	4				56		GH07-105-5	21/20/23	43			
15					56		GH07-105-6	22/19/23	42			
	5				58		GH07-105-7	11/9/9	18			
20	6				69		GH07-105-8	9/15/19	34		Finer materials mostly washed away from core recoveries 20 - 37 ft.	
	7				50		GH07-105-9	12/18/12	30			
25				10								
	8				50		GH07-105-10	4/10/8	18		Circulation lost occasionally between 25 and 35 ft.	
				5								
30	9				56		GH07-105-11	4/6/7	13			
				0								
	10				67		GH07-105-12	7/7/6	13			
35				5								
	11		SAND, some silt/clay, trace gravel, silt content increases with depth, poorly graded, sand size clasts, subrounded, light brown, moist.		64		GH07-105-13	9/7/7	14			
				5								
					58		GH07-105-14	7/5/9	14		Finer materials washed away.	
				20								
40	12				78		GH07-105-15	5/7/8	15			
				40								
					106		GH07-105-16	4/5/8	13		Orangey brown, sandy drill return 37 - 75 ft.	
	13			43	97		GH07-105-17	4/7/8	15			
45				63								
	14		SILT, some sand, some clay, trace to some gravel, gravel content increasing with depth, subrounded clasts up to gravel size, poorly graded to gap graded, light brown, moist		111		GH07-105-18	4/7/8	15			
				80								
					117		GH07-105-19	4/8/17	25		***Drillhole logs represent an interpretation of field logs combined with laboratory test results***	
50	15			20								
					67		GH07-105-20	11/11/14	25			
	16			7								
55												
	17		SAND, some silt/clay, trace to some gravel, poorly graded to gap graded, subangular clasts, grey-brown, moist.		22		GH07-105-21	6/11/9	20		Heaving sand at 60 to 75 ft.	
60	18											
	19			30								
65					56		GH07-105-22	10/12/11	23			
	20			79								
	21											
70					17		GH07-105-23	7/7/8	15			
	22			0								
				62								

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-105

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-54

Rev. 0 - Issued for Report VA101-00176/20-4

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-105**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 20, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**996 ft**	Date Completed:	**Oct 25, 07**
Location:	**East Deposit Area**	Total Depth:	**170 ft**	Logged by:	**TG/LS**
Coordinates:	**2,152,553 N , 1,406,897 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	NOTES
	23				100		GH07-105-24	50+/+/+	50+++	
	24			22						
80	25				89		GH07-105-25	8/13/22	35	
	25			9						
85	26				139		GH07-105-26	8/12/19	31	
	27			58						
90	28				133		GH07-105-27	2/11/15	26	
	28			77						
95	29		Sandy, clayey SILT, some gravel, gap graded, clasts subrounded up to cobble size, light grey-brown, moist.	23						
	30			33						
100	31				14		GH07-105-28	15/14/17	31	
	32			13						
105	33									No core recovery 105 - 110 ft
	33			0						
110	34				125		GH07-105-29	6/9/11	20	
	35			60						
115	36		SAND and GRAVEL, some silt/clay, frequent cobbles and boulders, well graded, clasts subrounded to subangular, light brown-grey, moist.	50	39		GH07-105-30	15/50+/+	50++	Boulder 120 to 123 ft
	36			100						
120	37				58		GH07-105-31	50+/+/+	50+++	
	37			97						
125	38		Gravelly SILT, some sand, trace clay, gap graded, clasts subrounded up to medium gravel size, light brown, moist.		0		GH07-105-32	22/28/50+	78+	
	39			43						
130	40		GRAVEL and SAND, trace silt/clay, numerous cobbles, well graded, clasts rounded to subrounded, light brown, moist.	100	43		GH07-105-33	20/50+/+	50++	Boulder 128.5 - 130 ft
	40			65						
135	41				33		GH07-105-34	50+/+/+	50+++	
	42			90						
140	43				50		GH07-105-35	50+/+/+	50+++	
	43			43						
145	44				58		GH07-105-36	50+/+/+	50+++	Finer materials washed away in core recoveries 145 - 159 ft.
	45			27						
				50						

SPT TEST DATA: Uncorrected 'N' values vs. depth (■); RQD (%) (●); 20 40 60 80

WELL DETAILS

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINTLIBRARY1.GLB Printed: Sep 21, 08

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-105

Rev. 0 - Issued for Report VA101-00176/20-4

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-55

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH07-105**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 20, 07**
Drilling Method:	**HT-700 Mud Rotary Diamond Drill**	Elevation:	**996 ft**	Date Completed:	**Oct 25, 07**
Location:	**East Deposit Area**	Total Depth:	**170 ft**	Logged by:	**TG/LS**
Coordinates:	**2,152,553 N , 1,406,897 E, NAD83 AK State Plane (ft)**	Azimuth, Inclination:	**0 degs, -90 degs**	Reviewed by:	**LJG**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE RQD (%)	SPT TEST DATA Uncorrected 'N' values vs. depth (■) RQD (%) (●) 20 40 60 80	NOTES	WELL DETAILS
	46				56		GH07-105-37	42/50+/+	50++			
				40								
155	47											
				43	67		GH07-105-38	50+/+/+	50+++			
	48			0								
				53								
160	49		BEDROCK. Rhyolite, coarse grained, mainly cream pink with banded texture, calcite and hematite on fracture surfaces, clay infilling, trace pyrite, moderately to heavily weathered, very fractured.	100					0		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
				84					11			
165	50			98					0			
	51			94					0			
170	52		END OF HOLE @ 190 FT									
	53											
175	54											
180	55											
	56											
185	57											
190	58											
	59											
195	60											
200	61											
	62											
205	63											
210	64											
	65											
215	66											
220	67											
	68											

Pebble Limited Partnership
Pebble Project
Overburden Geotechnical Log For GH07-105

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/20	**4**	**0**

A1-56

Rev. 0 - Issued for Report VA101-00176/20-4

Log Type: SOILS LOG WITH ROCK DATA Library Filepath: M:\1\01\00176\23\A\DATA\2008 WMF SI\2008 GINT\LIBRARY1.GLB Printed: Sep 21, 08

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Date Revised: Sep 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-107**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 12, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1029.3 ft**	Date Completed:	**Apr 21, 08**
Location:	**Open Pit Area**	Total Depth:	**355 ft**	Logged by:	**LS/EC/SR**
Coordinates:	**2,154,630 N , 1,407,556 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
0	0	Tundra Vegetation, dark brown, root inclusions, moist. (Topsoil)	77					HQ3 to 355' PW casing to 15.3' PQ3 to 59' HWT to 205', 61' stuck in hole.
5	1	Gravelly silty SAND, some clay, trace cobbles, subangular to subrounded, up to cobble size (2"), well graded, low plasticity, loose to compact, light brown, moist. (Glacial Drift)	81	89	GH08-107-1	13/50+/+	50++	
10	3		20	65	GH08-107-2	5/5/5	10	
15	5	Gravelly SAND, some silt, some clay, subrounded, up to cobble size, up to 2", well graded, low plasticity, loose, light brown, moist. (Glacial Drift)	20					
20	6		46	67	GH08-107-3	6/11/10	21	
25	8		55	56	GH08-107-4	11/15/14	29	
30	9	Gravelly, silty SAND, some clay, subangular to subrounded, trace cobbles up to 10" diameter, well graded, medium to high plasticity, dense to very dense, brown, moist. (Glacial Drift)	79					
	10		87	42	GH08-107-5	9/37/34	71	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***
35	11		88	100	GH08-107-6	36/50+/+	50++	
40	12		100	94	GH08-107-7	10/17/47	64	
45	14		93	83	GH08-107-8	40/34/29	63	
50	15	SAND and GRAVEL, some silt, some clay, subrounded to subangular, trace cobbles up to 2" diameter, poorly graded, low plasticity, very dense, brown, moist. (Glaciofluvial)	68	67	GH08-107-9	10/32/45	77	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).
55	17		98					
60	18	BEDROCK, Tertiary Basalt, fine grained, grey, moderately weathered, calcite, hematite, chlorite, some clay infilling of discontinuities, intervals of brecciated basalt, competent.	99					
65	19		100					
70	21		100					
75	22		100					
80	24		79					
85	25		100					
90	27		96					
95	28		89					
	29		96					

SPT TEST DATA Uncorrected 'N' values vs. depth (●)
RQD DATA (%) (■)
20 40 60 80

WELL DETAILS

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-107

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-107

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: May 2, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-107**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 12, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1029.3 ft**	Date Completed:	**Apr 21, 08**
Location:	**Open Pit Area**	Total Depth:	**355 ft**	Logged by:	**LS/EC/SR**
Coordinates:	**2,154,630 N , 1,407,556 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31			63								
	32										Core pump was left on for 15 mins after the run, possible shear zone 103-105ft, material suspected to be washed away.	
	33			96								
110	34			100								
115	35											
	36			96								
120	37			99								
125	38			100							Lost circulation, 124.7 to 127'	
	39			100								
130	40			98							Increased circulation to ~12gpm	
				62								
	41			100								
135				94								
	42			96								
140	43			100								
145	44											
	45			91								
150	46			98								
155	47											
	48			85								
160	49			98								
165	50											
	51			98								
170	52			92								
175	53											
	54			100								
180	55			100								
	56											
185	57			64								
190	58			92								
	59			97								
195	60		BEDROCK, Tertiary volcaniclastic breccia/conglomerate, brown to grey, ranges	78								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-107

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-107

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Date Revised: May 2, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-107**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 12, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1029.3 ft**	Date Completed:	**Apr 21, 08**
Location:	**Open Pit Area**	Total Depth:	**355 ft**	Logged by:	**LS/EC/SR**
Coordinates:	**2,154,630 N , 1,407,556 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62		from clast to matrix supported, angular to subrounded poorly sorted, polymicitic breccia-fragmental rock. Clasts range from sand to boulder sized (1 cm to 60 cm) with most clasts between 1-5 cm.	100								
	63			100								
210	64			100								
	65											
215	66			99								
220	67			93								
	68											
225	69			100								
230	70			100								
	71											
235	72			100								
240	73			98								
	74											
245	75			97								
250	76		BEDROCK, Tertiary Basalt, dark green to black, some reddish, fine grained, moderately weathered, carbonate and calcite veins, minor chlorite and hematite.	100								
	77											
255	78			100								
260	79			100								
	80											
265	81			100								
270	82			100								
	83											
275	84			94								
280	85			100								
	86											
285	87			100								
290	88			94								
	89											
295	90			96								
	91											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-107

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Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: May 2, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-107**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 12, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1029.3 ft**	Date Completed:	**Apr 21, 08**
Location:	**Open Pit Area**	Total Depth:	**355 ft**	Logged by:	**LS/EC/SR**
Coordinates:	**2,154,630 N , 1,407,556 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
305	92			100								
	93											
	94			100								
310	95											
	96			98								
315	97											
	98			94								
320	99											
	100			100								
325	101											
	102			88								
330	103											
	104			100								
335	105											
	106			98								
340	107											
	108			100								
345	109											
	110			100								
350	111											
	112			100								
355	113		END OF HOLE @ 355 FT									
	114											
360	115											
	116											
365	117											
	118											
370	119											
	120											
375	121											
380												
385												
390												
395												

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Pebble Limited Partnership
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Date Revised: May 2, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-108**	Page	**1** of **1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 21, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**863.42 ft**	Date Completed:	**Apr 23, 08**
Location:	**East Deposit Area**	Total Depth:	**75 ft**	Logged by:	**CG/LS/MS**
Coordinates:	**2,157,070 N , 1,410,500 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		PEAT, very soft, dark brown, organic. Top 4 inches frozen, some greyish-brown sand, trace silt/clay, trace subangular gravel, poorly graded, high plasticity, very loose, moist to wet. (Topsoil)	20							Permanent 6" casing installed to 20' PQ3 to 37' HQ3 to 75'	
5	1				50	☒	GH08-108-1	1/1/3	4	●		
	2			24								
10	3		Silty, gravelly SAND, some clay, trace cobbles/boulders, subangular to subrounded, well graded, medium to high plasticity, light greyish-brown, very dense, moist. (Glacial Drift)	47	74	☒	GH08-108-2	4/6/9	15	●		
	4			67								
15	5			87	100	═	GH08-108-3	50+/+/+	50+++	●		
20	6		BEDROCK, Tertiary Basalt, fine grained, porphyritic, with thin white calcite and dark red hematite veins, some disseminated pyrite, dark black to grey-brown, some clay infilling of discontinuities.	50	17	☒	GH08-108-4	9/17/20	37	●	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89). Artesian/Flowing conditions of approximately 5 gpm at 25 ft depth,	
25	8			79						■		
30	9			87						■		
35	11			65						■		
40	12			90						■	No Piezometer installed because the casing became stuck at 37 ft depth and an HQ Van Ruth plug had already been installed at 45 ft. The hole was grouted in.	
45	14			85						■		
50	15			100						■		
55	17			94						■		
60	18			100						■		
65	20			97						■	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
70	21			100						■		
75	23		END OF HOLE @ 75 FT									
80	24											
85	26											
90	27											
95	28											
	29											
	30											

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Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-108

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-108

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Date Revised: May 2, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-109**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 21, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**993.44 ft**	Date Completed:	**Apr 25, 08**
Location:	**East Deposit Area**	Total Depth:	**139.5 ft**	Logged by:	**SR/EC**
Coordinates:	**2,154,404 N , 1,408,606 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Tundra Vegetation, dark brown, organics, root inclusions, moist. (Topsoil)	95							PW to 10' PQ to 139.5'	
5	1		Sandy SILT, some clay, trace gravel, trace cobbles, subrounded to subangular, poorly graded, medium to high plasticity, brown, compact, moist. (Glaciolacustrine)	52	28		GH08-109-1	4/4/7	11	●		
10	3			10	42		GH08-109-2	6/5/7	12	●		
15	4		Gravelly, Sandy SILT, some clay, trace cobbles, trace boulders up to 30 cm diameter, subrounded to subangular, gap graded, medium to high plasticity, brown, dense, moist. (Glaciolacustrine)	30	22		GH08-109-3	19/19/10	29	●		
20	6			98								
25	8			59	67		GH08-109-5	16/50+/+	50++			
30	9		SILT, some clay, some sand, trace gravel, trace cobbles, subrounded to subangular, poorly graded, medium to high plasticity, grey, compact, moist. (Glaciolacustrine)	20	0		GH08-109-6	7/7/11	18	●	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
35	11			23	33		GH08-109-7	5/10/15	25	●		
40	12			77	78		GH08-109-8	5/8/9	17	●		
45	14		Silty SAND, trace gravel, trace clay, subangular to subrounded, clasts less than 4 cm diameter, large amount of fines washed away, poorly graded, low plasticity, brown, compact, moist to wet. (Glaciolacustrine)	13								
50	15			13	72		GH08-109-9	13/11/16	27	●		
55	17		SAND and GRAVEL, trace silt/clay, subrounded to subangular, clasts up to cobble size, most fines washed away, well graded, low to no plasticity, brown, dense, moist. (Glaciofluvial)	46	50		GH08-109-10	17/20/26	46	●		
60	18			55								
	19		Clayey SILT, some sand, trace gravel, trace cobbles, subangular to subrounded, poorly graded, low to medium plasticity, grey/brown, compact to dense, moist. (Glaciolacustrine)	99								
65	20			100	94		GH08-109-11	6/10/15	25	●		
70	21			98								
75	22			100	100		GH08-109-12	12/19/19	38	●		
80	24			97								
85	25			100	83		GH08-109-13	14/25/37	62	●		
90	27		Gravelly SAND, some silt, trace clay, trace cobbles, some fines washed away in sections with less fines, more fines from 92 to 94.5 ft depth, subangular to subrounded, well graded, low to medium plasticity, brown, firm to dense, moist.	53								
95	28			10	61		GH08-109-14	2/50+/+	50++			
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-109

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: May 5, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-109**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 21, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**993.44 ft**	Date Completed:	**Apr 25, 08**
Location:	**East Deposit Area**	Total Depth:	**139.5 ft**	Logged by:	**SR/EC**
Coordinates:	**2,154,404 N , 1,408,606 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		(Glaciofluvial)	11								
105	32				59		GH08-109-15	43/50+/+	50++			
	33			18								
110	34			34								
	35			98								
115	36		WEATHERED BEDROCK, Tertiary volcaniclastic breccia, highly oxidized, weak, gravelly SAND, some silt, trace clay, trace cobbles, subangular to subrounded clasts, poorly graded, medium plasticity, reddish-brown, dense, moist.	56	64		GH08-109-16	36/31/50+	50+		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
120	37			57								
	38		BEDROCK, Tertiary volcaniclastic breccia with fine grained matrix and subangular multicoloured clasts, mostly gravel size, trace cobbles, oxidized, poorly sorted, heterolithic clasts largely of basalt, up to 10cm diameter, reddish-purple.	100								
125	39			96								
130	40			100								
	41											
135	42			97								
140	43		END OF HOLE @ 139.5 FT									
145	44											
	45											
150	46											
	47											
155	48											
	49											
160	50											
	51											
165	52											
	53											
170	54											
	55											
175	56											
	57											
180	58											
	59											
185	60											
190												
195												

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-109

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: May 5, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-110**	Page	**1** of **1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 24, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**898.01 ft**	Date Completed:	**Apr 26, 08**
Location:	**East Deposit Area**	Total Depth:	**75 ft**	Logged by:	**CG/LS/MS**
Coordinates:	**2,157,260 N , 1,409,305 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
0	0	PEAT, tundra vegetation, dark brown, frozen, organics, spongy, fibrous, no recovery. (Topsoil)	0	56	GH08-110-1	2/1/1	2	PQ3 to 75'
5	1	Gravelly Silty SAND, trace to some clay, some cobbles and boulders (increased cobbles from 10 to 15 ft depth), increased sand from 25 to 27 ft depth, subangular to subrounded, well graded, medium to high plasticity, grey, dense, moist. (Glacial Drift)	33	44	GH08-110-2	1/1/2	3	
10	3		25	50	GH08-110-3	4/7/10	17	Driller noticed reddish return at 12' which turned back to grey.
15	5		100	86	GH08-110-4	11/14/20	34	
20	6		64	97	GH08-110-5	11/14/31	45	
25	8	Silty SAND, some gravel, some clay, trace cobbles, subangular to subrounded, clasts up to boulder size, gap graded, medium plasticity, brown, very dense, moist. (Glacial Drift)	89	97	GH08-110-6	15/24/30	54	
30	9	Gravelly Silty SAND, trace cobbles and boulders, subangular to subrounded, clasts up to boulder size, well graded, medium plasticity, brown, dense, moist. (Glacial Drift)	72	86	GH08-110-7	21/42/50+	50+	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***
35	11		100	67	GH08-110-8	30/41/38	79	
40	12		89	33	GH08-110-9	18/34/50	84	Artesian/ flowing conditions at 40', measured at ~0.5gpm.
45	14	Sandy SILT, some clay, trace gravel, increased silt from 45 to 50 ft depth, subangular to subrounded, clasts up to cobble size, poorly graded, medium to high plasticity, light brown to brown, moist. (Glaciolacustrine)	60	100	GH08-110-10	17/34/50+	50+	
50	15		62	100	GH08-110-11	15/50+/+	50++	
55	17	Silty SAND, some clay, trace gravel, trace cobbles, subangular to subrounded, clasts up to cobble size, well graded, medium to high plasticity, brown, moist, silt and clay content increases with depth. (Glaciolacustrine)	95					
60	18		100	100	GH08-110-12	25/50+/+	50++	
65	20	WEATHERED BEDROCK, Tertiary volcaniclastic breccia/conglomerate, weathered, very soft material in fractures, matrix supported, polymictic, angular to subrounded clasts, up to 5cm, moderately to well sorted, hematite/limonite on fractures.	52					* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).
70	21	BEDROCK, Tertiary volcaniclastic breccia/conglomerate, highly weathered, highly fractured, light grey, matrix supported breccia, with clay infilling, some vertical fractures, limonite/hematite on fractures, some quartz.	93					
75	23	END OF HOLE @ 75 FT	98					
80	25							
85	26							
	27							

SPT TEST DATA Uncorrected 'N' values vs. depth (●)
RQD DATA (%) (■)
20 40 60 80

WELL DETAILS

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-110

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Date Revised: Apr 24, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-111**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 25, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**989.55 ft**	Date Completed:	**Apr 29, 08**
Location:	**East Deposit Area**	Total Depth:	**119.5 ft**	Logged by:	**EC/SR/CK(SLR)/SD**
Coordinates:	**2,153,775 N , 1,407,626 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra vegetation, SAND, trace silt, gravelly, brown, frozen. (Topsoil)	94							PW casing to 9.5' PQ3 to 119.5' Driller comments that this zone is very rocky.	
5	1			98								
	2		Silty SAND, some clay, trace gravel, trace cobbles, trace boulders, subangular to subrounded, well graded, low to medium plasticity, light brown, compact, damp to moist, clay content increases from 5.7 to 9.25 ft depth, fines washed away between 9.25 to 14.5 ft. (Glaciolacustrine)	68	67		GH08-111-1	21/19/9	28		
10	3			55								
	4			16	100		GH08-111-2	9/4/9	13			
15	5			82	78		GH08-111-3	4/5/6	11			
20	6		Clayey SILT, some sand, no gravel, subrounded, up to coarse sand, sand seems to be in isolated seams, poorly graded, low to medium plasticity, brown, firm to dense, moist. (Glaciolacustrine)	89	72		GH08-111-4	4/10/9	19			
25	8			85	78		GH08-111-5	11/12/13	25			
30	9		Sandy SILT, fine-grained, sand decreasing with depth, trace to some clay, trace gravel, subangular, clasts up to gravel size, poorly graded, low plasticity, grey-brown, density increases with depth, moist. (Glaciolacustrine)	19	92		GH08-111-6	10/11/15	26		***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
35	11			100	92		GH08-111-7	7/12/14	26			
40	12		SILT, some sand to sandy, some clay to clayey, some to no gravel, trace cobbles from 35.5 to 54.5 ft depth, subangular to subrounded, clasts up to cobble size, poorly graded, low to medium plasticity, grey-brown, firm to dense, damp to moist. (Glaciolacustrine)	46	94		GH08-111-8	11/24/10	34			
45	14			100	100		GH08-111-9	4/6/10	16			
50	15			33	92		GH08-111-10	3/6/9	15			
55	17			43								
60	18			92	100		GH08-111-11	4/4/7	11			
	19		Silty SAND, fine to medium grained, trace to some clay, trace gravel, subrounded, clasts up to gravel size, poorly graded, low to medium plasticity, ranging to high plasticity with increased clay content from 74.5 to 79.5 ft depth, light brown, firm to dense, moist to damp. (Glaciolacustrine)	100								
65	20			89								
70	21			66	83		GH08-111-12	4/8/10	18			
75	23			100								
80	24		Silty SAND and GRAVEL, with lenses of high plasticity clay, trace boulders of conglomerate composition, subangular to subrounded, poorly graded, low to medium plasticity, light brown, dense, moist. (Glacial Drift)	100							No SPT, run ended on boulder.	
85	26			100								
90	27		Sandy SILT, some clay, trace gravel, trace cobbles, increased sand from 102.5 to 105 ft depth, decreased sand with depth, gravel lense at 89.5 to 90 ft depth, subangular, poorly graded, medium to high plasticity light brown to grey, stiff, damp.	100								
95	29			28	0		GH08-111-13	5/10/15	25		Low recovery due to cored boulder jammed into lifter.	
100	30											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-111

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: May 5, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-111**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 25, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**989.55 ft**	Date Completed:	**Apr 29, 08**
Location:	**East Deposit Area**	Total Depth:	**119.5 ft**	Logged by:	**EC/SR/CK(SLR)/SD**
Coordinates:	**2,153,775 N , 1,407,626 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		(Glaciolacustrine)	100								
105	32			98	100		GH08-111-14	50+/+/+	50+++			
	33		BEDROCK, Tertiary Basalt, brecciated, angular fragments/clasts up to 15cm, clast supported, fine grained brown matrix, soft infilling in joints, oxidized, competent, pink-brown.	75							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
110	34			100								
115	35											
	36			88								
120	37		END OF HOLE @ 119.5 FT									
125	38											
	39											
130	40											
	41											
135	42											
	43											
140	44											
	45											
150	46											
	47											
155	48											
160	49											
	50											
165	51											
170	52											
	53											
175	54											
180	55											
	56											
185	57											
190	58											
	59											
195	60											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
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Date Revised: May 5, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-112**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 26, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1007.33 ft**	Date Completed:	**May 3, 08**
Location:	**Open Pit Area**	Total Depth:	**380 ft**	Logged by:	**CG/MS**
Coordinates:	**2,155,883 N , 1,408,340 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	1		Tundra Vegetation, peat, organics, roots, spongy, bown. (Topsoil)	0							PQ3 to 103.5' HQ3 to 380'	
5	2		Gravelly SAND, some silt/clay, trace cobbles, subangular to subrounded, well graded, low plasticity silt/clay, brown, compact, moist. (Glacial Drift)	7	19		GH08-112-1	1/2/2	4	●		
					50		GH08-112-2	5/5/8	13	●		
10	3			50	44		GH08-112-3	10/4/7	11	●		
15	4											
	5			27	44		GH08-112-4	7/8/10	18	●		
20	6			14	50		GH08-112-5	5/10/12	22	●		
25	7											
	8			17	80		GH08-112-6	24/15/50+	50+	●		
30	9			7	72		GH08-112-7	14/19/22	41	●	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
	10											
35	11		SAND, some silt/clay, trace gravel, trace cobbles, subangular to subrounded, poorly graded, low to no plasticity, brown, compact to dense, moist, fines washed out with the drill water circulation, minimal recovery, no recovery from 40 to 45 ft depth. (Glacial Drift)	33	78		GH08-112-8	21/35/49	84	●		
40	12											
	13			0	117		GH08-112-9	13/15/15	30	●	No recovery	
45	14			13	67		GH08-112-10	9/10/16	26	●		
50	15		▼									▼
	16			50	100		GH08-112-11	18/21/20	41	●		
55	17		Gravelly SAND, coarse grained, some silt/clay, subrounded to subangular, clasts up to cobble size, increased to silt/clay from 65 to 70 ft depth, gap graded, medium plasticity, brown, moist. (Glacial Drift)	17								
60	18											
	19			30	100		GH08-112-12	23/31/50+	50+	●		
65	20			42								
	21											
70	22		Silty SAND, becoming coarser with depth, trace cobbles and boulders, subrounded to subangular, poorly graded, medium plasticity, grey, becoming brown with depth, dense, moist. (Glacial Drift)	28	111		GH08-112-13	11/19/22	41	●		
75	23			95						■		
80	24		WEATHERED BEDROCK, highly to completely weathered to SAND and GRAVEL, some silt, trace clay, trace cobbles and boulders, subrounded to subangular, well graded, medium plasticity, brown, dense, moist.	90	100		GH08-112-14	25/50+/+	50++	●	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	25											
85	26			50						■		
	27											
90	28		BEDROCK, Tertiary Volcaniclastic Breccia Felsite Conglomerate, heterolithic clast supported breccia, clasts range from 0.1 to 4cm diameter, subangular to subrounded, mottled, hard, fractures at fragment/clast boundaries, calcite, rare hematized pyrite.	84	78		GH08-112-15	50+/+/+	50+++	●		
95	29											
	30			92								

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Date Revised: Apr 27, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-112**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 26, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1007.33 ft**	Date Completed:	**May 3, 08**
Location:	**Open Pit Area**	Total Depth:	**380 ft**	Logged by:	**CG/MS**
Coordinates:	**2,155,883 N , 1,408,340 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			84								
105	32			100								
	33			94								
110	34			90								
115	35		BEDROCK, Tertiary Basalt, dark grey-green, minor xenoliths of volcaniclastic breccia, weak to moderately brecciated zones, moderately hard and competent except weak to moderately oxidized and fractured zone from 133 to 138, some larger zones of volcaniclastic breccia from 159.5 to 184, mainly calcite infilling in joints as well as veins throughout, rare fine disseminated pyrite.	91								
	36											
120	37			91								
125	38											
	39			100								
130	40			100								
135	41											
	42			100								
140	43			100								
	44			100								
145	45											
150	46			100								
	47											
155	48			100								
160	49			88								
	50											
165	51			89								
170	52			100								
	53											
175	54			98								
180	55			94								
	56											
185	57			98								
190	58		BEDROCK, Tertiary Volcaniclastic Breccia, medium to coarse grained, clast supported, various shades of green and cream, clasts tend to be smaller than 1 cm, but up to 3cm, angular to subangular, generally highly weathered, moderately hard, not competent, minor fracturing, localized bedding at 30°tca,	100								
	59											
195	60			97								

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Date Revised: Apr 27, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-112**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 26, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1007.33 ft**	Date Completed:	**May 3, 08**
Location:	**Open Pit Area**	Total Depth:	**380 ft**	Logged by:	**CG/MS**
Coordinates:	**2,155,883 N , 1,408,340 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			weak rubbly zones with some clay gouge from 210 to 220' and 236 to 254'.									
205	62			96								
	63			100								
210	64											
	65			98								
215	66			89								
220	67											
	68			94								
225	69			100								
230	70											
	71			100								
235	72			92								
240	73											
	74			92								
245	75			100								
250	76											
	77			92								
255	78		BEDROCK, Tertiary Basalt, dark grey with some maroon zones, weak to moderately brecciated zones, moderately hard, competent, minor fracturing, calcite veins and infilling, some clay infilling, rare to trace pyrite blebs, carbonate.	100								
260	79											
	80			95								
265	81			98								
270	82											
	83			95								
275	84			89								
280	85											
	86			97								
285	87			100								
290	88											
	89			100								
295	90			91								
	91											

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Project:	**Pebble Project**	Drill Hole No.	**GH08-112**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 26, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1007.33 ft**	Date Completed:	**May 3, 08**
Location:	**Open Pit Area**	Total Depth:	**380 ft**	Logged by:	**CG/MS**
Coordinates:	**2,155,883 N , 1,408,340 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
305	92			97								
	93			93								
310	94											
	95			98								
315	96											
	97			100								
320	98											
				100								
325	99											
	100			100								
330	101											
				98								
335	102											
	103			95								
340	104											
				97								
345	105											
	106			95								
350	107											
				97								
355	108											
	109			100								
360	110											
				100								
365	111											
	112			100								
370	113											
				100								
375	114											
	115			98								
380	116		END OF HOLE @ 380 FT									
385	117											
	118											
390	119											
	120											
395	121											

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Date Revised: Apr 27, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-113**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 29, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1001.54 ft**	Date Completed:	**May 2, 08**
Location:	**East Deposit Area**	Total Depth:	**105 ft**	Logged by:	**SR/CK(SLR)/SD/AS**
Coordinates:	**2,151,709 N , 1,408,277 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra vegetation, SILT, some sand, angular, clasts up to cobble size, poorly graded, no to low plasticity, organics, dark brown, damp to moist. (Topsoil)	79							Permanent 6" casing installed to 20' PQ3 to 105'	
5	1				82	☒	GH08-113-1	16/20/26	46			
	2			59								
10	3		SAND and GRAVEL, some cobbles and boulders, some silt, trace clay, varying amounts of sand and gravel, subrounded to subangular, clasts up to boulder size, poorly graded, non plastic, brown, moist, low recovery, fines washed out. (Glaciofluvial)		94	☒	GH08-113-2	33/50+/+	50++			
	4			65								
15	5			60	78	☒	GH08-113-3	36/32/48	80			
				41								
20	6		Gravelly Sandy SILT, some clay, some cobbles, subangular, clasts up to cobble size, poorly graded, low plasticity, brown, damp to moist. (Glacial Drift)	49	83	☒	GH08-113-4	22/10/14	24			
25	7											
	8			30	72	☒	GH08-113-5	16/26/27	53			
30	9		Gravelly SAND, some silt/clay, decreases in gravel content from 30 to 37.5 ft depth, trace cobbles from 29 to 30 ft depth, subrounded to subangular, clasts up to cobble size, well graded, non plastic, brown, moist, some fines washed away. (Glacial Drift)	20	58	☒	GH08-113-6	18/22/25	47			
	10											
35	11			72	100	☒	GH08-113-7	15/24/32	56			
40	12				97	☒	GH08-113-8	16/34/43	77		***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
	13		Silty SAND, trace gravel, trace clay, clay content increases at 52,5', few cobbles increasing towards the bottom, subangular to subrounded, clasts up to cobble size, poorly graded, non plastic, very dense from 55 to 60 ft depth, grey-brown, moist. (Glacial Drift)	95								
45	14			13	50	☒	GH08-113-9	12/22/39	61			
50	15				89	☒	GH08-113-10	11/23/36	59			
	16			76								
55				88								
	17			98								
60	18		Silty SAND, trace gravel, trace cobbles, trace clay, subangular to subrounded, clasts up to cobble size, poorly graded, non plastic, grey/brown, moist. (Glacial Drift)	86							Most of the sand and fines are assumed to have washed away.	
				25	100	☒	GH08-113-11	20/19/21	40			
	19			33								
65	20			84								
				56								
	21		Sandy SILT, some gravel, some clay, trace cobbles, trace boulders, subrounded to subangular, clasts up to boulder size, gap graded, low plasticity, brown, moist. (Glacial Drift)	31								
70					88	☒	GH08-113-12	15/24/50+	50+			
	22			91								
75	23			64								
80	24		WEATHERED BEDROCK, Rhyolite, light pink, grey-green, weathered to sandy GRAVEL, clasts are fragments of rhyolite, angular to subangular up to 4cm diameter.									
	25			34								
85	26		BEDROCK, Rhyolite, banded pale green and pink, fine-medium grained matric with moderate biotite content, highly to completely weathered, thin clay infilling in joints.								* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
90	27											
	28			100								
95	29											
	30			95								

Pebble Limited Partnership
Pebble Project
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Date Revised: May 5, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-113**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Apr 29, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1001.54 ft**	Date Completed:	**May 2, 08**
Location:	**East Deposit Area**	Total Depth:	**105 ft**	Logged by:	**SR/CK(SLR)/SD/AS**
Coordinates:	**2,151,709 N , 1,408,277 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32		END OF HOLE @ 105 FT									
110	33											
	34											
115	35											
	36											
120	37											
	38											
125	39											
	40											
130	41											
	42											
135	43											
	44											
140	45											
	46											
145	47											
	48											
150	49											
	50											
155	51											
	52											
160	53											
	54											
165	55											
	56											
170	57											
	58											
175	59											
	60											
180												
185												
190												
195												

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Date Revised: May 5, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-115**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 3, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1016.53 ft**	Date Completed:	**May 8, 08**
Location:	**East Deposit Area**	Total Depth:	**200 ft**	Logged by:	**SR/SD**
Coordinates:	**2,154,432 N , 1,409,718 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Tundra vegetation at surface, Silty SAND, some gravel, subrounded, clasts up to gravel size, poorly graded, non plastic, brown, damp. (Topsoil)	100							Permanent 6" casing to 20' PQ3 to 115' HWT casing to 140' HQ3 to 200'	
5	1											
			Sandy GRAVEL, trace silt, trace clay, trace cobbles, subangular to subrounded, clasts up to cobble size, poorly graded, non plastic, brown, moist. (Glacial Drift)	85	71		GH08-115-1	17/21/40	61			
	2			98								
				92								
10	3		SAND and GRAVEL, trace silt/clay, trace cobbles/boulders, subangular to subrounded, clasts up to boulder size, poorly graded, non plastic, brown/grey, damp. (Glacial Drift)	76	56		GH08-115-2	9/13/13	26			
	4											
15				88	0		GH08-115-3	13/10/12	22			
	5			81								
20	6			98	47		GH08-115-4	12/7/6	13			
			Silty SAND, trace gravel, trace clay, subangular to subrounded, clasts up to gravel size, poorly graded, non plastic, light brown, moist. (Glacial Drift)	98								
	7			68								
				75								
				35							Fines are assumed to have washed away.	
25				69	53		GH08-115-5	13/17/14	31			
	8		GRAVEL and SAND, some silt, trace clay, subangular to subrounded, clasts up to cobble size, poorly graded, low plasticity, brown and grey, moist. (Glacial Drift)	11								
30	9				72		GH08-115-6	8/12/9	21			
			Silty SAND, some gravel, some clay, some gravel, trace cobbles, subangular to subrounded, clasts up to cobble size, poorly graded, low plasticity, brown, moist, fines washed away. (Glacial Drift)	20								
35	10											
	11			20	61		GH08-115-7	7/11/15	26			
40	12		SAND and GRAVEL, some silt, trace clay, trace cobbles, subrounded to subangular, clasts up to cobble size, poorly graded, non plastic, brown, moist. (Glacial Drift)	56	58		GH08-115-8	8/14/27	41			
	13											
45				23	56		GH08-115-9	10/17/23	40			
	14											
	15											
50				28	56		GH08-115-10	9/11/11	22		***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
	16											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-115

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-115

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jun 1, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-115**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 3, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1016.53 ft**	Date Completed:	**May 8, 08**
Location:	**East Deposit Area**	Total Depth:	**200 ft**	Logged by:	**SR/SD**
Coordinates:	**2,154,432 N , 1,409,718 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	17			46								
	18											
60			SILT, some clay, some sand, trace gravel, only gravel recovered from 65 to 65.5 ft depth (fines washed out), subangular to subrounded, clasts up to gravel size, poorly graded, low plasticity, brown, moist. (Glaciolacustrine)		83		GH08-115-11	11/22/38	60			
	19			46								
65	20			82								
	21											
70			GRAVEL and SAND, trace clay, trace silt, silt content increasing with depth, trace cobbles, subangular to subrounded, clasts up to cobble size, poorly graded, non plastic, brown and grey, moist, fines washed out. (Glacial Drift)		53		GH08-115-12	9/23/25	48			
	22			33								
75	23			57								
	24			98								
80			Sandy SILT, some clay, some gravel, subangular to subrounded, clasts up to cobble size, poorly graded, low plasticity, brown, moist. (Glacial Drift)	49								
	25											
85	26				83		GH08-115-13	17/34/50+	50+			
				52								
	27											
90				13								
	28											
95	29				82		GH08-115-14	27/50+/+	50++			
				43								
	30											
100				79								
	31											
105	32				79		GH08-115-15	12/33/50+	50+			
	33		SILT and CLAY, trace sand, trace gravel, trace cobbles, trace boulders, subangular to subrounded, clasts up to boulder size, poorly graded, medium plasticity, plasticity	85								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-115

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-115

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Date Revised: Jun 1, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-115**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 3, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1016.53 ft**	Date Completed:	**May 8, 08**
Location:	**East Deposit Area**	Total Depth:	**200 ft**	Logged by:	**SR/SD**
Coordinates:	**2,154,432 N , 1,409,718 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	34		decreases with depth, brown grey, dense to very dense, moist. (Glaciolacustrine)	100								
115	35				100		GH08-115-16	10/35/40	75	●		
				95								
	36											
120	37			100								
125	38				11		GH08-115-17	9/19/39	58	●		
	39			56								
130	40			19								
	41			94								
135	42			100								
140	43		Gravelly, silty SAND, trace to some clay, trace cobbles, trace boulders, subrounded to subangular, clasts up to boulder size, poorly graded, non plastic, firm, brown grey, moist. (Glacial Drift)		94		GH08-115-18	22/50+/+	50++			
	44			100								
145	45			100								
150	46				95		GH08-115-19	19/50+/+	50++			
	47			57								
155	48			100								
160	49				50		GH08-115-20	27/50+/+	50++			
	50			91								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-115

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jun 1, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-115**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 3, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1016.53 ft**	Date Completed:	**May 8, 08**
Location:	**East Deposit Area**	Total Depth:	**200 ft**	Logged by:	**SR/SD**
Coordinates:	**2,154,432 N , 1,409,718 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
170	51			100								
	52			79	100	☒	GH08-115-21	20/50+/+	50++			
175	53			93								
	54											
180	55			98								
				68								
	56			97								
185	57		BEDROCK, Tertiary Volcaniclastic Rhyolite Breccia, fine to medium grained, highly weathered, highly fractured, fine grained light pink grey, clast supported, fragments from 0.2 to 2 cm with rare clasts up to 10cm diameter, soft, weak.	100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
190	58			100								
	59											
195	60			94								
200	61		END OF HOLE @ 200 FT									
	62											
205	63											
210	64											
	65											
215	66											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-115

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jun 1, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-116**	Page	**1** of **1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 4, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**890.45 ft**	Date Completed:	**May 5, 08**
Location:	**East Deposit Area**	Total Depth:	**30 ft**	Logged by:	**CG/AM(SLR)/MS**
Coordinates:	**2,158,613 N , 1,409,244 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		PEAT, fibrous, spongy, dark brown, organic, frozen. (Topsoil)	52							PW to 6.5' HWT to 17.5' PQ3 to 15' HQ3 to 30'	
5	1		Silty SAND and GRAVEL, some clay, trace cobbles and boulders, subangular to subrounded, clasts up to boulder size, gap graded, low plasticity, brown, moist to wet. (Glacial Drift)	88	19	☒	GH-08-116-1	34/13/25	38	●		
10	3				83	☒	GH-08-116-2	3/42/50+	50+	●		
15	4		BEDROCK, Tertiary Volcaniclastic Breccia, clast supported, heterolithic clasts, most are felsic, less than 0.1 to 5cm diameter, angular to subrounded fragments, moderately soft, competent, rare carbonate.	100						■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
20	5			84						■		
25	7			100						■		
30	8			97						■		
	9		END OF HOLE @ 30 FT								***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
35	10											
40	11											
45	12											
50	13											
	14											
	15											
	16											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-116

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: May 4, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-119**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 7, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**846.51 ft**	Date Completed:	**May 8, 08**
Location:	**East Deposit Area**	Total Depth:	**105 ft**	Logged by:	**CG/AM(SLR)/MS**
Coordinates:	**2,157,799 N , 1,411,549 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES
	1		PEAT, Silty, spongy, fibrous, dark brown, organic, moist. (Topsoil)	0							PQ3 to 28.5' HQ3 to 105' No recovery from 0-5'
5	2				72	☒	GH08-119-1	5/4/9	13	●	
			Silty SAND, some gravel, some clay, some cobbles and boulders, subangular to subrounded, clasts up to boulder size, well graded, low plasticity, brown, moist, some fines washed out. (Glacial Drift)	29							
10	3				61	☒	GH08-119-2	5/5/7	12	●	
	4			46							
15			BEDROCK, Tertiary Basalt, dark green to black, fracture infillings of quartz and calcite, some clay infilling, competent.		0	☒	GH08-119-3	25/28/13	41	■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).
	5			63						■	
20	6										
	7			98						■	
25	8			96						■	
	9			98						■	
30				98						■	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***
	10			84						■	
35	11			100						■	
40	12										
	13			100						■	
45	14			100						■	
50	15										
	16			100						■	
55	17			100						■	
60	18										
	19			100						■	
65	20			100						■	
70	21										
	22			95						■	
75	23			100						■	
	24										

WELL DETAILS

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-119

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-119

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Date Revised: May 8, 08

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-119**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 7, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**846.51 ft**	Date Completed:	**May 8, 08**
Location:	**East Deposit Area**	Total Depth:	**105 ft**	Logged by:	**CG/AM(SLR)/MS**
Coordinates:	**2,157,799 N , 1,411,549 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
85	25			97								
	26											
90	27			98								
	28			97								
95	29											
	30			100								
100	31			100								
105	32		END OF HOLE @ 105 FT									
110	33											
	34											
115	35											
	36											
120	37											
	38											
125	39											
	40											
130	41											
	42											
135	43											
	44											
140	45											
	46											
145	47											
	48											
150												
155												

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-119

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: May 8, 08

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-120**	Page	**1** of **1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 8, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**851.05 ft**	Date Completed:	**May 9, 08**
Location:	**East Deposit Area**	Total Depth:	**50 ft**	Logged by:	**CG/MS**
Coordinates:	**2,158,439 N , 1,410,536 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation and PEAT for top 0.2 m, material then washed away, possibly more peat or sandy material, bottom 0.1 m is SILT/CLAY material with medium to high plasticity, poorly graded, grey, wet. (Topsoil)	10							PW casing to 20' PQ3 to 50'	
10	3		SILT and CLAY, trace sand, no clasts, poorly graded, high plasticity, grey, moist. (Glaciolacustrine)	40	67	☒	GH08-120-1	0/1/2	3	●		
15	5		Sandy, gravelly SILT and CLAY, trace cobbles and boulders, subangular to subrounded, clasts up to boulder size, gap graded, low to medium plasticity, grey brown, moist. (Glacial Drift)	75	78	☒	GH08-120-2	0/1/2	3	●		
20	6			55	61	☒	GH08-120-3	9/22/28	50	●	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
25	8			66								
30	9			49								
30	10		BEDROCK, Tertiary Rhyolite Breccia, green-grey, weak banding, some felsic subangular fragments, some clay infilling, highly weathered, possible lower contact with basalt at 49.5', rare calcite.	98						■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
35	11			92						■		
40	12			95						■		
45	14			89						■		
50	15		END OF HOLE @ 50 FT									

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Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-120

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Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-120

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Date Revised: Jun 1, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-121**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 9, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1041.78 ft**	Date Completed:	**May 12, 08**
Location:	**East Deposit Area**	Total Depth:	**135 ft**	Logged by:	**SR/SD**
Coordinates:	**2,154,709 N , 1,411,364 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Silty SAND, trace gravel, subangular, clasts up to gravel size, poorly graded, non plastic, brown, organics, moist, very soft. (Topsoil)	69							PW casing installed to 16.5' PQ3 to 90' HQ3 to 135' Fines washed away.	
5	2				100		GH08-121-1	31/50+/+	50++			
10	3		Silty SAND, trace gravel increasing in content with depth, subangular, poorly graded, non plastic, soft, brown, moist. (Glacial Drift)	0								
15	4											
15	5		GRAVEL and SAND, trace silt/clay, subangular to subrounded, clasts up to gravel size, well graded, non plastic, brown, moist. (Glacial Drift)	84							Installed PW after coring to 5', so no recovery and no SPTs due to triconing to 16.5'.	
20	6		No recovery									
20	7		Gravelly SAND, trace cobbles and boulders present, generally well graded, varying silt/clay content that increased with depth, subrounded to subangular, well graded, non plastic, dark grey to brown, moist. (Glacial Drift)	73							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
25	8			20								
30	9				54		GH08-121-2	13/29/17	46			
30	10			60								
35	11		GRAVEL and SAND, trace cobbles, trace boulders, trace silt, subangular to subrounded, poorly graded, non plastic, brown to dark grey, moist. Fewer cobbles with depth, and decreasing average size of gravel. Significant sand content between 50 to 55 ft depth. (Glacial Drift)	75			GH08-121-3	17/50/26	76		Fines washed away.	
40	12			59								
40	13				67		GH08-121-4	14/22/23	45			
45	14			63								
45					44		GH08-121-5	12/13/14	27			
50	15			26								
50	16				40		GH08-121-6	14/8/13	21			
55	17			36								
60	18			52							Lost circulation at 55', causes PW casing to be spun.	
60	19				0		GH08-121-7	9/30/17	47			
65	20			25								
70	21			20								
70	22			22								
75	23		Silty Gravelly SAND, trace cobbles and clay, sand coarsening with depth, silt content increases from 108 to 110', subangular to subrounded, clasts up to cobble size, well graded, no to low plasticity, brown, moist. (Glacial Drift)	68								
80	24				67		GH08-121-9	15/14/18	32			
80	25			37								
85	26			30								
90	27				96		GH08-121-10	22/18/38	56			
90	28			64								
95	29			51								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-121

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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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GH08-121

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: May 28, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-121**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 9, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1041.78 ft**	Date Completed:	**May 12, 08**
Location:	**East Deposit Area**	Total Depth:	**135 ft**	Logged by:	**SR/SD**
Coordinates:	**2,154,709 N , 1,411,364 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			69	67		GH08-121-11	30/42/42	84			
105	32											
	33			93								
110	34			50	67		GH08-121-12	50+/+/+	50+++			
115	35		WEATHERED BEDROCK, highly weathered Tertiary Basalt, green brown, with angular fragments of bedrock.	100								
	36			98								
120	37		BEDROCK, Tertiary Basalt, brecciated, dark grey to black, fine grained, calcite veins.	100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
125	38											
	39			100								
130	40			100								
135	41		END OF HOLE @ 135 FT									
140	42											
	43											
145	44											
	45											
150	46											
	47											
155	48											
	49											
160	50											
	51											
165	52											
	53											
170	54											
	55											
175	56											
	57											
180	58											
	59											
185	60											
190												
195												

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-121

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-121

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: May 28, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-122**	Page	**1 of 2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 9, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**869.86 ft**	Date Completed:	**May 13, 08**
Location:	**East Deposit Area**	Total Depth:	**115 ft**	Logged by:	**CG/AM(SLR)/MS**
Coordinates:	**2,156,617 N , 1,411,477 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			No recovery	0							Permanent 6" casing to 20' PQ3 to 115' Artesian conditions would not allow drilling to bedrock.	
5	1											
	2		Silty, gravelly SAND, some clay, subangular to subrounded, clasts up to cobble size, gap graded, low plasticity, brown, moist. (Glacial Drift)	38								
10	3			20	17		GH08-122-1	19/37/36	73			
	4			89								
15	5			92	92		GH08-122-2	15/27/50+	50+		No SPT taken for 20-21.5ft, as boulder present.	
20	6			86								
25	7				97		GH08-122-3	19/32/50+	50+			
	8			96								
30	9				56		GH08-122-4	5/18/28	51			
	10			92								
35	11				56		GH08-122-5	3/18/40	58		Sample collected in 2 runs- pulled up rods at 37.5 ft.	
	12		Clayey SILT, some sand, trace gravel, subrounded, clasts up to gravel size, poorly graded, low plasticity, dark brown to light grey, moist. (Glaciolacustrine)	93								
40	13			86	114		GH08-122-6	9/16/21	37			
45	14				78		GH08-122-7	9/19/31	50		First noticed Artesian flow (<0.5 gpm).	
	15			39								
50	16				83		GH08-122-8	9/14/16	30			
				49								
55	17		Sandy SILT, some clay, some gravel, trace cobbles, sand content decreasing with depth, subangular to subrounded, clast up to cobble size, poorly graded, low plasticity, brown, moist, more clay present between 70 to 73 ft and 84 to 85 ft depth. (Glacial Drift)	10								
	18			11	124		GH08-122-9	36/50+/+	50++			
60	19			16								
65	20			13							63' switched from polymer to bentonite.	
	21				89		GH08-122-10	19/50+/+	50++			
70	22			57								
				49								
75	23			91								
	24				31		GH08-122-11	10/18/44	62		Artesian flow increased significantly, to ~6 gpm.	
80	25			86								
85	26		Sandy SILT, some clay, some gravel, trace cobbles, subangular to subrounded, clast up to cobble size, poorly graded, low plasticity, brown, moist, fines washed away. (Glacial Drift)	13								
	27				67		GH08-122-12	10/23/50	73			
90	28			18								
95	29											
				44								
	30		Sandy Clayey SILT, trace gravel, some seams									

Pebble Limited Partnership
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Date Revised: Jun 1, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-122**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 9, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**869.86 ft**	Date Completed:	**May 13, 08**
Location:	**East Deposit Area**	Total Depth:	**115 ft**	Logged by:	**CG/AM(SLR)/MS**
Coordinates:	**2,156,617 N , 1,411,477 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		with increased clay content, subangular, clasts up to gravel size, poorly graded, low plasticity, grey to brown, moist. (Glaciolacustrine)	49	0		GH08-122-13	12/21/38	59			
105	32			46								
	33			91								
110	34		SAND, some gravel, some silt, trace clay, subrounded, clasts up to gravel size, poorly graded, non plastic, light brown, moist, heaving sands, core barrel is sanded in several times. (Glacial Drift)	5	103		GH08-122-14	10/31/19	50		Artesian flow increased to 10 gpm.	
115	35											
	36			20								
120	37		END OF HOLE @ 120 FT									
125	38											
	39											
130	40											
	41											
135	42											
	43											
140	44											
	45											
150	46											
	47											
155	48											
160	49											
	50											
165	51											
170	52											
	53											
175	54											
180	55											
	56											
185	57											
190	58											
	59											
195	60											

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Pebble Limited Partnership
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Knight Piésold CONSULTING

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VA101-176/23	**4**	**0**

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Date Revised: Jun 1, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-123**	Page	**1** of **1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 12, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**972.94 ft**	Date Completed:	**May 13, 08**
Location:	**East Deposit Area**	Total Depth:	**42.75 ft**	Logged by:	**LB/SD/AM(SLR)**
Coordinates:	**2,151,513 N , 1,404,831 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			PEAT, dark brown, organic, moist. (Topsoil)	52							PQ3 to 42.7' First 25" frozen.	
5	1				0		GH08-123-1	//	1			
	2			22								
10	3				0		GH08-123-2	5/4/3	7			
	4			25								
15	5		SAND and GRAVEL, trace silt, trace clay, subangular to subrounded, well graded, low plasticity, grey, moist. (Glaciofluvial)	56	53		GH08-123-3	3/6/5	11			
				100								
20	6				33		GH08-123-4	7/4/5	9			
	7			61								
25	8		Silty SAND, some gravel, trace cobbles, some clay, subrounded, clasts up to cobble size, poorly graded, no to low plasticity, gravel content increases with depth, grey, moist. (Glaciolacustrine)	23	56		GH08-123-5	3/7/10	17			
30	9				50		GH08-123-6	11/19/17	36			
	10			25								
35	11				72		GH08-123-7	11/16/30	46			
				28								
40	12		SAND and GRAVEL, some cobble, trace silt, subangular to subrounded, clasts up to cobble size, well graded, no to low plasticity, changing brown to dark grey toward bottom, moist. (Glacial Drift)	69	50		GH08-123-8	11/28/23	51		Hole abandoned due to rising meltwater, Bedrock not reached.	
45	13		END OF HOLE @ 42.67 FT									
	14											
50	15											
	16											
55	17											
	18											
60	19											
65	20											
	21											
70	22											
75	23											
	24											
80	25											
	26											
85	27											
90	28											
	29											
95	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-123

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jun 1, 08

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Project:	**Pebble Project**	Drill Hole No.	**GH08-125**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 14, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**980.56 ft**	Date Completed:	**May 17, 08**
Location:	**Open Pit Area**	Total Depth:	**150 ft**	Logged by:	**LB/AM(SLR)/SD**
Coordinates:	**2,154,975 N , 1,405,927 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		PEAT Top 10 cm, organics and sand, some silt, fibrous, frozen, brown. (Topsoil)	83							PQ3 to 100' HQ3 to 150'	
5	1		SAND, trace gravel, trace cobbles, subrounded, clasts up to cobble size, poorly graded, no plasticity, brown, moist. (Glaciofluvial)	64	67	☒	GH08-125-1	10/13/14	27	●		
10	3			64	64	☒	GH08-125-2	16/8/6	14	●		
15	4		SAND and GRAVEL, some silt, trace clay, trace cobbles, subangular to subrounded, clasts up to cobble size, well graded, non plastic, brown, moist. (Glaciofluvial)	37								
	5			20	69	☒	GH08-125-3	12/18/17	35	●		
20	6		GRAVEL and SAND, varying amounts of sand and gravel, trace silt/clay, trace cobbles, subrounded to subangular, clasts up to cobble size, poorly graded, non plastic, light brown to dark grey, moist. (Glaciofluvial)	54	67	☒	GH08-125-4	8/14/13	27	●		
	7			74								
25	8			90	53	☒	GH08-125-5	4/1/5	6	●		
				73								
30	9			89	58	☒	GH08-125-6	8/12/11	23	●		
	10		SAND and SILT, trace clay, trace gravel, trace cobbles and boulders, subrounded, clasts up to boulder size, poorly graded, non plastic, brown, moist. (Glaciolacustrine)	24								
35	11			94	53	☒	GH08-125-7	13/16/17	33	●		
40	12											
	13			68								
45	14		Gravelly, silty SAND, some cobbles, trace boulders up to 30cm, subrounded, clasts up to boulder size, clasts various colour and composition, well graded, medium to low plasticity, brown, moist. (Glacial Drift)	37								
50	15											
	16			91							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
55	17			100								
60	18				0	☒	GH08-125-8	26/50+/+	50++			
	19			94								
65	20											
	21		WEATHERED BEDROCK, highly weathered to Silty SAND, some gravel, trace clay, subangular, clasts up to gravel size, gravel content increases with depth, poorly graded, low plasticity, dark grey to dark brown, moist.	65								
70	22			89	92	☒	GH08-125-9	39/50+/+	50++			
75	23		BEDROCK, Tertiary Siltstone, fine grained, no visible laminae or bedding, black to dark grey-green, moderately to highly fractured, highly weathered from 90' onward, iron staining from 109 to 117.	96							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	24			98								
80	25			100								
85	26											
	27			91								
90	28			100								
95	29											
	30			16								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-125

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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GH08-125

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Date Revised: Jun 1, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-125**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 14, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**980.56 ft**	Date Completed:	**May 17, 08**
Location:	**Open Pit Area**	Total Depth:	**150 ft**	Logged by:	**LB/AM(SLR)/SD**
Coordinates:	**2,154,975 N , 1,405,927 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	32			100								
	33			100								
110	34			95								
115	35											
	36			100								
120	37		BEDROCK, Tertiary Basalt, some breccia zones, hematite staining on fractures, calcite veins and white phenocrysts, red to brown, less fractured than siltstone.	98								
				96								
				97								
125	38											
	39			97								
130	40			99								
	41											
135	42			100								
140	43			100								
	44											
145	45			98								
150	46		End of Hole at 150 ft									
	47											
155	48											
160	49											
	50											
165	51											
170	52											
	53											
175	54											
180	55											
	56											
185	57											
190	58											
	59											
195	60											

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Pebble Limited Partnership
Pebble Project
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Knight Piésold CONSULTING

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Date Revised: Jun 1, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-128**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 17, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1462.7 ft**	Date Completed:	**May 23, 08**
Location:	**Area E**	Total Depth:	**285 ft**	Logged by:	**LB/SD**
Coordinates:	**2,154,863 N , 1,395,164 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
0	0	Tundra Vegetation, organic, some gravel, dark brown. (Topsoil)	96					PQ3 to 120' HQ3 to 285'
5	1							
	2	Sandy SILT, some clay, trace gravel, poorly graded, low to medium plasticity, brown, moist. (Glacial Drift)	61	78	GH08-128-1	1/9/9	18	
10	3							
	4	Gravelly SAND, some silt/clay, trace cobbles, sub-angular, well graded, brown, moist. (Glacial Drift)	64					
15	5		51	33	GH08-128-2	7/7/8	15	
20	6	Sandy GRAVEL, some silt/clay, trace cobbles, sub-angular to sub-rounded, brown, dense, moist. (Glacial Drift)	44	33	GH08-128-3	5/8/10	18	
	7							
25	8		100	67	GH08-128-4	12/40/25	65	
30	9	Sandy GRAVEL, some silt, trace clay, trace cobbles, sub-angular to sub-rounded, well graded, medium plasticity, light brown, compact, moist. (Glacial Drift)	72	56	GH08-128-5	12/19/16	35	
35	11		33	28	GH08-128-6	8/12/27	39	
40	12			0	GH08-128-7	14/24/22	46	
	13		17					
45	14		25	0	GH08-128-8	10/13/13	26	
50	15			14	GH08-128-9	8/9/11	20	
	16		21					
55	17		36					
60	18	SILT, trace clay, trace sand, poorly graded, medium plasticity, brown, moist. (Glacial Drift)	90	0	GH08-128-10	5/7/9	16	
65	20	Sandy, silty GRAVEL, trace cobbles, sub-rounded to sub-angular, well graded, brown, moist. (Glacial Drift)	98					
70	21			0	GH08-128-11	8/6/11	17	
	22	SILT, trace sand, trace clay, poorly graded, medium plasticity, brown, moist. 30 cm sand lens at 69 ft depth, 5 cm sand lens at 72 ft depth, 20 cm sand and gravel lens at 73.5 ft depth, and 5 cm sand and gravel lens at 74.5 ft depth. (Glacial Drift)	100					
75	23		83					
80	24		60	100	GH08-128-12	12/39/27	66	
	25		0					
85	26	Gravelly SAND, some silt, trace clay, subangular to subrounded, well graded, brown, dense, moist. (Glacial Drift)	49					
90	27			75	GH08-128-13	8/15/19	34	
	28	SILT, some sand, trace gravel, very soft, poorly graded, light brown, moist. (Glacial Drift)	72					
95	29	CLAY, high plasticity, light brown, stiff. (Glacial Drift)	80					
	30		77					

SPT TEST DATA Uncorrected 'N' values vs. depth (●)
RQD DATA (%) (■)
20 40 60 80

WELL DETAILS

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Date Revised: May 28, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-128**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 17, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1462.7 ft**	Date Completed:	**May 23, 08**
Location:	**Area E**	Total Depth:	**285 ft**	Logged by:	**LB/SD**
Coordinates:	**2,154,863 N , 1,395,164 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31		SAND and SILT, some clay, trace gravel, trace cobbles from 95 to 111 ft depth, poorly graded, brown, dense, moist. (Glacial Drift)	79	41		GH08-128-14	32/54/50+	50++			
	32			94								
110	33											
	34		BEDROCK, Tertiary Breccia, reddish brown to grey, highly fractured, very soft, often sandy or silty surfaces on fractures.	75	100		GH08-128-15	50+/+/+	50+++		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89). ***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
115	35			93								
	36			81								
120	37			70								
				79								
125	38			93								
	39			83								
130	40			100								
	41			98								
135	42			100								
140	43			100								
145	44											
	45			100								
150	46			100								
155	47											
	48			94								
160	49			98								
165	50											
	51			100								
170	52			100								
175	53											
	54			99								
180	55			98								
185	56											
	57			99								
190	58		BEDROCK, Granodiorite, pale green to grey, medium grained, veins of pyrite and calcite, competent.	97								
195	59											
	60			96								

Pebble Limited Partnership
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Project:	**Pebble Project**	Drill Hole No.	**GH08-128**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 17, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1462.7 ft**	Date Completed:	**May 23, 08**
Location:	**Area E**	Total Depth:	**285 ft**	Logged by:	**LB/SD**
Coordinates:	**2,154,863 N , 1,395,164 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100								
	63			100								
210	64			100								
	65			98								
215	66			100								
220	67			97								
	68											
225	69			99								
230	70			100								
	71											
235	72			100								
240	73			98								
	74											
245	75			99								
250	76			100								
	77											
255	78			100								
260	79											
	80			100								
265	81			100								
270	82											
	83			100								
275	84			100								
280	85											
	86			100								
285	87		END OF HOLE @ 285 FT									
290	88											
	89											
295	90											
	91											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-128

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-128

Rev. 0 - Issued for Report VA101-176/23-4

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: May 28, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-129**	Page	**1** of **1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 19, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1548.8 ft**	Date Completed:	**May 20, 08**
Location:	**Area E**	Total Depth:	**70 ft**	Logged by:	**MS/CG**
Coordinates:	**2,160,024 N , 1,399,033 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Sandy, silty GRAVEL, trace clay, trace cobbles, subangular to subrounded, clasts up to cobbles, well graded, low plasticity, grey brown, moist. (Glacial Drift)	28							PQ3 to 15' HQ3 to 70'	
5	1			66								
10	2			100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
15	3		BEDROCK, Basalt, propylitic altered, dark green to black, epidote and pyrite in fractures.	90								
20	4			92								
25	5			100								
30	6			100								
35	7			100							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
40	8			100								
45	9			100								
50	10			100								
55	11			100								
60	12			100								
65	13			100								
70	14			100								
75	15			100								
80	16			100								
85	17			100								
90	18			100								
95	19			100								
	20			100								
	21		END OF HOLE @ 70 FT									
	22											
	23											
	24											
	25											
	26											
	27											
	28											
	29											
	30											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-129

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-129

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: May 27, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-131**	Page	**1** of **1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 21, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1060.1 ft**	Date Completed:	**Jun 1, 08**
Location:	**Upper Talarik Creek Area**	Total Depth:	**79.5 ft**	Logged by:	**JR(SLR)/DM/LS**
Coordinates:	**2,162,693 N , 1,405,027 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES
5	1		SAND and GRAVEL, trace silt, trace clay, trace cobbles, angular to subrounded, clasts up to cobble size, well graded, no to low plasticity, brown, moist, silt/clay seam between 40 and 45 ft depth approximately 1.5 ft thick. (Glacial Drift)	23							HWT casing to 14.5' HQ3 to 79.5'
					56		GH08-131-1	8/21/36	57		
10	2			10							
	3				44		GH08-131-2	3/6/8	14		
15	4			13							
	5				33		GH08-131-3	10/11/15	26		
20	6			14							
	7				33		GH08-131-4	12/10/12	22		
25	8			33							
					47		GH08-131-5	19/29/31	60		
30	9			16							
	10				44		GH08-131-6	16/42/29	71		***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***
35	11			30							
					39		GH08-131-7	34/32/31	63		
40	12			26							
	13				53		GH08-131-8	14/22/20	42		
45	14			26							
					31		GH08-131-9	5/18/25	43		
50	15			23							
					75		GH08-131-10	14/32/29	61		
55	16			11							
	17			70							
60	18		BEDROCK, Tertiary Basalt, fine-grained, calcite and chlorite in fractures, dark green-grey, competent.	98							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).
65	19										
	20			97							
70	21										
	22		BEDROCK, Tertiary Volcaniclastic Breccia, poorly sorted, matrix supported, very angular clasts, matrix is fine wacke, calcite.	94							
75	23			100							
80	24		END OF HOLE @ 79.5 FT								
85	25										
	26										
90	27										
	28										
95	29										
	30										

WELL DETAILS

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-131

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-131

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jul 3, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-136**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 27, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1614 ft**	Date Completed:	**May 29, 08**
Location:	**Area G**	Total Depth:	**120 ft**	Logged by:	**MS/CG/JB/LS**
Coordinates:	**2,163,750 N , 1,376,848 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Sandy SILT, some gravel, trace fractured boulders, angular to subangular, gap graded, non plastic, , brown, trace organics, moist. (Topsoil/Felsenmeer)	81							HWT to 12.5' PQ3 to 12' HQ3 to 120' * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	1											
10	2		BEDROCK, Cretaceous Basalt, dark green and purple aphanitic chlorite, calcite and chlorite infilling in fractures, some calcite veins, trace pyrite and chalcopyrite, competent, hard, slightly fractured.	85								
15	3			97								
20	4			98								
25	5			100								
30	6			99								
35	7			100								
40	8			100							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
45	9			100								
50	10			91								
55	11			100								
60	12			100								
65	13			100								
70	14			100								
75	15			100								
80	16			100								
85	17			98								
90	18			100								
95	19			100								
	20			100								
	21			100								
	22			100								
	23			100								
	24			100								
	25			100								
	26			100								
	27			100								
	28			100								
	29			100								
	30			100								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-136

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-136

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Date Revised: Jul 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-136**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 27, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1614 ft**	Date Completed:	**May 29, 08**
Location:	**Area G**	Total Depth:	**120 ft**	Logged by:	**MS/CG/JB/LS**
Coordinates:	**2,163,750 N , 1,376,848 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31–32			95						■		
	32–33			100						●		
110	33–34											
	34–35			96						■		
115	35–36			100						■		
120	36–37		END OF HOLE @ 120 FT									
125	38											
130	39–40											
135	41											
140	42–43											
145	44											
150	45–46											
155	47											
160	48–49											
165	50											
170	51–52											
175	53											
180	54–55											
185	56											
190	57–58											
195	59–60											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-136

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-136

Rev. 0 - Issued for Report VA101-176/23-4

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jul 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-137**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 28, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1041.9 ft**	Date Completed:	**Jun 1, 08**
Location:	**Area A**	Total Depth:	**250 ft**	Logged by:	**LB/JC**
Coordinates:	**2,137,818 N , 1,404,282 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, some sand, some gravel, subangular, clasts up to gravel size, poorly graded, non plastic, brown, organics, moist. (Topsoil)	73							PW casing to 17' PQ3 to 92.5' HWT casing to 98' HQ3 to 250'	
5	1				61	☒	GH08-137-1	7/11/11	22	●		
	2		SAND and GRAVEL, trace to some silt, trace clay, trace cobbles, sand and gravel content varies throughout interval, subangular to subrounded, clasts up to cobble size, poorly graded, no to low plasticity, brown, moist, most fines washed away. (Glacial Drift)	56								
10	3				36	☒	GH08-137-2	8/13/20	33	●		
	4			63								
15	5				22	☒	GH08-137-3	11/17/13	30	●		
				54								
20	6				47	☒	GH08-137-4	14/10/10	20	●		
	7			63								
25	8				56	☒	GH08-137-5	12/16/17	33	●		
				72								
30	9				39	☒	GH08-137-6	11/9/10	19	●		
	10			37								
35	11			49	50	☒	GH08-137-7	11/11/13	24	●		
				79								
40	12			49								
	13			21	56	☒	GH08-137-8	11/12/13	25	●		
45				72								
	14			55	31	☒	GH08-137-9	9/11/14	25	●		
50				59								
	15			52								
				66	0	☒	GH08-137-10	9/13/12	25	●		
55	16			52								
				30								
	17			56								
				59								
	18			49								
60			Gravelly, silty SAND, some clay, trace cobbles, subangular to subrounded, clasts up to cobble size, poorly graded, low plasticity, brown, moist, better recovery. (Glacial Drift)	98	0	☒	GH08-137-11	7/8/11	19	●	Lost circulation at 60', regained from 82' to 86'.	
	19			30								
65				66								
	20			92								
				49								
	21			44								
70				33	56	☒	GH08-137-12	13/27/47	74	●		
	22			57								
				100								
75	23			50								
	24											
80			BEDROCK, Tertiary Basalt, dark to medium green and purple, moderately magnetic, pidote and minor chlorite alteration in fractures, calcite infilling in joints.	89	94	☒	GH08-137-13	35/40+/+	50++	■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	25											
85				88						■		
	26											
				84						■		
90	27											
	28											
95				100						■	Lost circulation at 98', regained from 110 to 115'.	
	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-137

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-137

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jul 1, 09

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-137**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 28, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1041.9 ft**	Date Completed:	**Jun 1, 08**
Location:	**Area A**	Total Depth:	**250 ft**	Logged by:	**LB/JC**
Coordinates:	**2,137,818 N , 1,404,282 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			98								
105	32			100								
	33											
110	34			100								
115	35											
	36			100								
120	37			90								
125	38											
	39			96								
130	40			99								
135	41											
	42			100								
140	43			100								
145	44											
	45			98								
150	46			100								
155	47											
	48			99								
160	49			100								
165	50											
	51			100								
170	52			100								
175	53											
	54			100								
180	55			100								
	56											
185	57			99							Lost circulation at 188'	
190	58			100								
	59											
195	60			100								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-137

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jul 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-137**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 28, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1041.9 ft**	Date Completed:	**Jun 1, 08**
Location:	**Area A**	Total Depth:	**250 ft**	Logged by:	**LB/JC**
Coordinates:	**2,137,818 N , 1,404,282 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100								
	63			100								
210	64											
	65			97								
215	66			100								
220	67											
	68			100								
225	69			100								
230	70		BEDROCK, brecciated Tertiary Basalt, pale pinky-green in colour, jigsaw breccia apperance, calcite infilling in joints.								***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
	71			96								
235	72			99								
240	73											
	74			100								
245	75			100								
250	76		END OF HOLE @ 250 FT									
	77											
255	78											
	79											
260	80											
	81											
265	82											
270	83											
	84											
275	85											
280	86											
	87											
285	88											
290	89											
	90											
295	91											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-137

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jul 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-138**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 29, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1581 ft**	Date Completed:	**Jun 3, 08**
Location:	**Area G**	Total Depth:	**275 ft**	Logged by:	**LB/CG/JB/DM**
Coordinates:	**2,163,442 N , 1,375,431 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
5	1		Silty, gravelly SAND, subangular, clasts up to gravel size, poorly graded, non plastic, brown, moist. (Topsoil)	0	33		GH08-138-1	1/1/1	2		HWT/PQ3 to 10' HQ3 to 275'	
	2				56		GH08-138-2	15/32/20	52			
10	3		BEDROCK, Basalt, plagioclase, pyroxene phyric (pyroxenite?), black, some brecciated zones, white phenocrysts, calcite, hematite, possible dyke.	74							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
15	4			83								
	5			100								
20	6										***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
	7			100								
25	8			100								
30	9											
	10			94								
35	11		BEDROCK, Basalt, light greenish-grey, pyroxene phyric (pyroxenite?), rubble zones, 33.5 to 61' strongly fractured and rubbled with several 10 cm gouge zones, weakly to moderately fractured outside this interval, calcite and chlorite infilling, calcite veins, rubbly zones.	40								
40	12											
	13			59								
45	14			68								
50	15			79								
	16			25								
55	17			98								
	18			62								
60				49								
	19			98								
65	20			100								
	21			98								
70	22			100								
75	23			98								
80	24											
	25			100								
85	26			100								
90	27											
	28			98								
95	29			99								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-138

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jul 16, 08

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-138**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 29, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1581 ft**	Date Completed:	**Jun 3, 08**
Location:	**Area G**	Total Depth:	**275 ft**	Logged by:	**LB/CG/JB/DM**
Coordinates:	**2,163,442 N , 1,375,431 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			35								
105	32			95								
	33											
110	34			87								
115	35											
	36			45								
120	37			54								
125	38											
	39			25								
130	40			98								
				30								
135	41											
	42			38								
140	43			66								
				100								
145	44			76								
	45			26								
150	46			51								
155	47											
	48			22								
160	49		BEDROCK, Granodiorite, dark green/grey to light grey, hornblende and feldspar phenocrysts, 166 to 264' is heavily fractured with zones of gouge making up to 5% of interval, calcite and chlorite infilling, some brecciated zones from 266 to 275'.	81								
	50											
165	51			98								
170	52			100								
175	53											
	54			100								
180	55			98								
185	56											
	57			100								
190	58			98								
	59											
195	60			100								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-138

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Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Project:	**Pebble Project**	Drill Hole No.	**GH08-138**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**May 29, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1581 ft**	Date Completed:	**Jun 3, 08**
Location:	**Area G**	Total Depth:	**275 ft**	Logged by:	**LB/CG/JB/DM**
Coordinates:	**2,163,442 N , 1,375,431 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			97								
	63			100								
210	64											
	65			83								
215	66											
	67			39								
220	68											
	69			95								
225	70											
	71			95								
230	72											
	73			100								
235	74											
	75			100								
240	76											
	77			100								
245	78											
	79			100								
250	80											
	81			92								
255	82											
	83			100								
260	84		END OF HOLE @ 275 FT									
	85			87								
265	86											
	87			87								
270	88											
	89			96								
275	90											
	91											
280												
285												
290												
295												

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Date Revised: Jul 16, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-140**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 2, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1029 ft**	Date Completed:	**Jun 4, 08**
Location:	**Area L**	Total Depth:	**135 ft**	Logged by:	**JC/LB**
Coordinates:	**2,139,747 N , 1,376,604 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, brown, organics, moist. (Topsoil)	92							PW casing to 10'	
5	1		Silty, gravelly SAND, trace clay, trace cobble, silt content increases with depth, gravel and sand contents vary throughout interval, subangular to subrounded, clasts up to cobble size, rare boulder size, poorly graded, brown, moist. (Glacial Drift)	85	78		GH08-140-1	45/50+/+	50++		PQ3 to 35' HWT casing to 38' HQ3 to 135'	
10	3			93	183		GH08-140-2	7+/+/+	50+++			
15	5			100	83		GH08-140-3	40/50+/+	50++			
20	6			99	89		GH08-140-4	32/40/52	50+			
25	8			89	97		GH08-140-5	9/33/41	74		Possibly extremely weathered bedrock.	
30	9		BEDROCK, Tertiary Volcaniclastic Breccia, heterolithic, clast supported, clasts are 85% volcanic in orgin and 15% sedimentary in origin, angular to subrounded, 1cm to 20cm diameter, generally less than 2cm, some blebs and cubic pyrite, some fine grained soft infilling in joints, grey to reddish brown.	89	100		GH08-140-6	50+/+/+	50+++		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
35	11			94							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
40	12			79								
45	14			97								
50	15			100								
55	17			95								
60	19			100								
65	20			100								
70	22			100								
75	23			98								
80	25			100								
85	26			98								
90	27		BEDROCK, Tertiary Basalt, black, porphyritic, 2 ft chilled margins at contacts, oxidized, brecciated basalt layer from 96 to 100 ft, weak flow banding.	100								
95	29			100								

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Date Revised: Jul 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-140**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 2, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1029 ft**	Date Completed:	**Jun 4, 08**
Location:	**Area L**	Total Depth:	**135 ft**	Logged by:	**JC/LB**
Coordinates:	**2,139,747 N , 1,376,604 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31–32			100						■		
	33			100						■		
110	34		BEDROCK, Tertiary Volcaniclastic Breccia, heterolithic, clast supported, clasts are 85% volcanic in orgin and 15% sedimentary in origin, angular to subrounded, 1cm to 20cm diameter, generally less than 2cm, some blebs and cubic pyrite, some fine grained soft infilling in joints, grey to reddish brown.	100						■		
115	35											
	36			100						■		
120	37			98						■		
125	38											
	39			100						■		
130	40		BEDROCK, Tertiary Basalt?, pinky green amgydule rich, amygules infilled by chlorite.	100						■		
135	41		END OF HOLE @ 135 FT									
140	42–43											
145	44–45											
150	46–47											
155	48–49											
160	50–51											
165	52–53											
170	54–55											
175	56–57											
180	58–59											
185	60											
190												
195												

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Date Revised: Jul 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-141**	Page	**1 of 1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 3, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1728.8 ft**	Date Completed:	**Jun 5, 08**
Location:	**Area G**	Total Depth:	**87 ft**	Logged by:	**JB/RS**
Coordinates:	**2,163,204 N , 1,374,035 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Gravelly, Silty SAND, trace clay, subangular, clasts up to boulder size, well graded, non plastic, brown, moist. (Topsoil, Felsenmeer)	62							HWT to 11.5', 5' stuck in the ground. PQ3 to 11' HQ3 to 87' * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	2		BEDROCK, Granodiorite, dark fragments of magnetite make up less than 1% of interval, quartz rich from 17-18', chlorite, epidote, calcite, pyrite and minor molybdenum, competent, few fractures.	94								
10	3			100								
15	4			100								
20	5			100								
25	6			100								
30	8			98								
35	9			99							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
40	11			100								
45	12			100								
50	13			96								
55	15			99								
60	16			100								
65	18			98								
70	19			92								
75	20			98								
80	21			100								
85	22			100								
90	23			90								
95	24			100								
	25			92								
	26			100								
	27		END OF HOLE @ 87 FT									
	28											
	29											
	30											

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Date Revised: Jul 17, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-143**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 5, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1064.5 ft**	Date Completed:	**Jun 9, 08**
Location:	**Area L**	Total Depth:	**335 ft**	Logged by:	**JC/LB**
Coordinates:	**2,140,607 N , 1,375,861 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Tundra Vegetation, dark brown, organics, moist. (Topsoil)	80							PW to 10' PQ3 to 45' HQ3 to 197' NQ3 to 335'	
5	1		Silty, Sandy GRAVEL, trace cobbles, subangular to subrounded, clasts up to cobble size, gap graded, low plasticity, brown, moist. (Glacial Drift)	65	64	☒	GH08-143-1	10/21/41	62			
10	2											
	3			41								
15	4											
	5		Silty SAND, trace to some gravel, trace clay, subrounded to subangular, clasts up to gravel size, poorly graded, no to low plasticity, brown, moist. (Glacial Drift)	100	69	☒	GH08-143-2	6/7/12	19	●		
20	6			100	89	☒	GH08-143-3	9/14/20	34	●		
	7											
25	8		Gravelly, Silty SAND, trace clay, trace cobbles, subrounded to subangular, clasts up to cobble size, gap graded, low plasticity, brown, moist. (Glacial Drift)	96	78	☒	GH08-143-4	20/37/45	82	●		
30	9			98	90	☒	GH08-143-5	30/50+/+	50++			
	10			92						■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89). ***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
35	11		WEATHERED BEDROCK, Tertiary Volcaniclastic Breccia, highly weathered, soft clay infill keeping rock fragments together, reddish brown.	95						■		
40	12		BEDROCK, Tertiary Volcaniclastic Breccia, monomictic, clast supported, clasts 2mm to 3cm, most ~1cm diameter, varies in colour from grey to red-brown to greenish-grey, gypsum infill between clasts and coating fracture surfaces, hematite staining common.	99						■		
45	13											
	14			100						■		
50	15											
	16			91						■		
55	17			100						■		
	18											
60	19			99						■		
65	20			100						■		
	21											
70	22			100						■		
75	23			98						■		
80	24		BEDROCK, Tertiary Volcaniclastic Breccia, polymictic, clast supported, darker coloured, vesicular andesite and basalt clasts.	88						■		
85	25											
	26			89						■		
90	27											
	28			98						■		
95	29											
	30			100						■		

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Project:	**Pebble Project**	Drill Hole No.	**GH08-143**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 5, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1064.5 ft**	Date Completed:	**Jun 9, 08**
Location:	**Area L**	Total Depth:	**335 ft**	Logged by:	**JC/LB**
Coordinates:	**2,140,607 N , 1,375,861 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES
	31			100							
105	32										
	33			99							
110	34			100							
115	35										
	36		BEDROCK, Tertiary Basalt, brecciated, dark green, aphanitic groundmass with 2% plagioclase phenocrysts over the interval, soft infilling.	100							
120	37			100							
125	38										
	39			100							
130	40		BEDROCK, Tertiary Volcaniclastic Breccia, felsic to mafic volcanic clasts as well as porphyritic intrusive granodiorite with chloritized hornblende phenocrysts, alternates between red-brown and grey in colour, some calcite veins, clast supported, hematite staining common.	100							
135	41										
	42			94							
140	43			100							
145	44										
	45			100							
150	46			98							
155	47										
	48			100							
160	49			100							
165	50										
	51			100							
170	52			99							Poor circulation at 170'.
175	53										
	54			96							
180	55			100							
185	56										
	57			100							Lost circulation 186 to192'.
190	58			100							
195	59										
	60			79							Lost circulation 195 to 200', regained at 200'.

WELL DETAILS

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Project:	**Pebble Project**	Drill Hole No.	**GH08-143**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 5, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1064.5 ft**	Date Completed:	**Jun 9, 08**
Location:	**Area L**	Total Depth:	**335 ft**	Logged by:	**JC/LB**
Coordinates:	**2,140,607 N , 1,375,861 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			98								
	63			95								
210	64											
	65			99								
215	66			99								
220	67		BEDROCK, Tertiary Basalt to Andesite, pinkish brown colour, contains 10% euhedral plagioclase phenocrysts, gypsum coating on fractures.									
	68			98								
225	69			100								
230	70											
	71			100								
235	72		BEDROCK, Tertiary Basalt Breccia, reddish brown to grey, small sections of polymictic volcaniclastic breccia.	100								
240	73											
	74			100								
245	75			98								
250	76											
	77			100								
255	78			100								
260	79											
	80			99								
265	81			98								
270	82											
	83			100								
275	84			100								
280	85											
	86			99								
285	87			100								
290	88											
	89			100								
295	90			98							Lost circulation due to bit clogging at 295'.	
	91											

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Project:	**Pebble Project**	Drill Hole No.	**GH08-143**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 5, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1064.5 ft**	Date Completed:	**Jun 9, 08**
Location:	**Area L**	Total Depth:	**335 ft**	Logged by:	**JC/LB**
Coordinates:	**2,140,607 N , 1,375,861 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
305	92			100								
	93											
	94			99								
310	95											
	96			100								
315	97										No circulation from 315 to 335'.	
				100								
320	98											
	99			99								
325	100											
				98								
330	101											
				100								
335	102		END OF HOLE @ 335 FT									
	103											
340	104											
	105											
345	106											
	107											
350	108											
	109											
355	110											
	111											
360	112											
	113											
365	114											
	115											
370	116											
	117											
375	118											
	119											
380	120											
	121											
385												
390												
395												

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Project:	**Pebble Project**	Drill Hole No.	**GH08-144**	Page	**1** of **1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 5, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1700.7 ft**	Date Completed:	**Jun 6, 08**
Location:	**Area G**	Total Depth:	**95 ft**	Logged by:	**JB/RS**
Coordinates:	**2,162,615 N , 1,373,646 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		FROST HEAVED BEDROCK, Granodiorite, fines washed away in cuttings. (Topsoil/Felsenmeer)								PQ3 to 7' HQ3 to 95' * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	1			100								
	2		BEDROCK, Granodiorite, grey, relatively unaltered, hornblende, quartz, plagioclase, k-feldspar, iron oxides in fractures, thin chlorite veinlets, minor epidote and pyrite, competent, few fractures.	100								
10	3			100								
	4			100								
15	5			100								
20	6			100							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
25	7			100								
30	8			100								
	9			100								
35	10			100								
40	11			100								
	12			100								
45	13			100								
50	14			100								
	15			100								
55	16			100								
60	17			100								
	18			100								
65	19			99								
70	20			100								
	21			100								
75	22			56								
80	23			100								
	24			100								
85	25											
90	26											
	27											
95	28											
	29		END OF HOLE @ 95 FT									
	30											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-144

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	4	0

GH08-144

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jul 18, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-146**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 6, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1659 ft**	Date Completed:	**Jun 7, 08**
Location:	**Area G**	Total Depth:	**105 ft**	Logged by:	**JB/RS**
Coordinates:	**2,161,935 N , 1,373,192 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
5	1		Tundra Vegetation, oganic soils, peat, roots, dark black. (Topsoil)	33							HWT to 15.3' PQ3 to 15' HQ3 to 105' ***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs*** * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	2		SAND and GRAVEL, some silt, trace clay, some cobbles, some boulders, subangular to subrounded, clasts up to boulder size, gap graded, non plastic, light brown, moist, frost heaved bedrock. (Felsenmeer)	20	44	☒	GH08-146-1	6/11/7	18	●		
10	3			94						■		
15	4											
15	5		BEDROCK, Granodiorite, medium grained, relatively fresh, plagioclase, k-felspar, quartz, hornblende, biotite, weak chloritization, minor pyrite, trace molybdenum, trace copper minerals in last 20 ft, 37.5 to 39' is a basalt/andesite dyke with a 35° tca contact.	100						■		
20	6											
25	7			100						■		
25	8			100						■		
30	9											
30	10			100						■		
35	11			100						■		
40	12											
40	13			100						■		
45	14			98						■		
50	15											
50	16			92						■		
55	17			100						■		
60	18											
60	19			100						■		
65	20			100						■		
70	21			100						■		
70	22			100						■		
75	23											
75	24			100						■		
80	25			100						■		
85	26			100						■		
90	27											
90	28			100						■		
95	29			100						■		
95	30			97						■		

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-146

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jul 18, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-146**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 6, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1659 ft**	Date Completed:	**Jun 7, 08**
Location:	**Area G**	Total Depth:	**105 ft**	Logged by:	**JB/RS**
Coordinates:	**2,161,935 N , 1,373,192 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100						■		
105	32		END OF HOLE @ 105 FT									
110	33											
	34											
115	35											
	36											
120	37											
	38											
125	39											
	40											
130	41											
	42											
135	43											
	44											
140	45											
	46											
145	47											
	48											
150	49											
	50											
155	51											
	52											
160	53											
	54											
165	55											
	56											
170	57											
	58											
175	59											
	60											
180												
185												
190												
195												

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-146

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-146

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Date Revised: Jul 18, 08

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-150**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 10, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1081.5 ft**	Date Completed:	**Jun 15, 08**
Location:	**Area L**	Total Depth:	**320 ft**	Logged by:	**JC/LB**
Coordinates:	**2,140,642 N , 1,377,288 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
5	1		Tundra Vegetation, dark brown, organics, moist. (Topsoil)	64							PW to 10' PQ3 to 25.5' HQ3 to 100' NQ3 to 320'	
	2		Sandy GRAVEL with some silt, trace clay, trace cobbles, trace boulders, subangular to subrounded, well graded, low plasticity, brown, moist. (Glacial Drift)		31		GH08-150-1	5/10/15	25			
10	3				94		GH08-150-2	19/38/50+	50+			
	4			72								
15	5		WEATHERED BEDROCK, Tertiary Volcaniclastic Breccia, highly weathered to Sandy GRAVEL, some cobbles, some silt and clay towards bottom of interval, subangular, clasts up to cobble size, poorly graded, low plasticity, brown, moist.	72	100		GH08-150-3	50+/+/+	50+++			
20	6			81							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
25	7			98								
	8		BEDROCK, Tertiary Volcaniclastic Breccia, heterolithic, dark purple, strongly magnetic, fairly competent with sporadic zones of highly fractured rock, mostly granodiorite clasts, chlorite, oxidized volcanic clasts, homolithic from 91 to 104'.	78								
30	9											
35	10			100							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
	11			100								
40	12											
	13			100								
45	14			99								
50	15											
	16			100								
55	17			98								
60	18											
	19			89								
65	20			100								
	21											
70	22			100								
75	23			100								
	24											
80	25			100								
	26			90								
85	27											
90	28			100								
95	29			100								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-150

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-150

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Date Revised: Jul 2, 09

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-150**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 10, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1081.5 ft**	Date Completed:	**Jun 15, 08**
Location:	**Area L**	Total Depth:	**320 ft**	Logged by:	**JC/LB**
Coordinates:	**2,140,642 N , 1,377,288 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31			96								
	32											
	33			70								
110	34			97								
115	35			93								
	36											
120	37			94								
125	38											
	39		BEDROCK, Tertiary Volcaniclastic Breccia, dark brownish-grey to deep purple, mottled, volcanic crackle breccia, abundant calcite filling in fractures.	99								
130	40			98								
135	41											
	42			99								
140	43			83								
145	44											
	45			100								
150	46			100								
155	47											
	48			100								
160	49											
	50		BEDROCK, Tertiary Volcaniclastic Breccia, heterolithic, dark grey, strongly magnetic, competent, mostly granodiorite clasts, chlorite, basalt clasts, calcite veinlets.	100								
165	51			100								
170	52			100								
175	53											
	54			100								
180	55			100								
	56											
185	57			100								
190	58			100								
	59											
195	60			98								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-150

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-150**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 10, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1081.5 ft**	Date Completed:	**Jun 15, 08**
Location:	**Area L**	Total Depth:	**320 ft**	Logged by:	**JC/LB**
Coordinates:	**2,140,642 N , 1,377,288 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			97								
	63			100								
210	64			100								
	65											
215	66			100								
220	67			100								
	68											
225	69			99								
230	70			99								
	71											
235	72			100								
240	73			96								
	74											
245	75			100								
250	76			95								
	77											
255	78			100								
260	79			100								
	80											
265	81			99								
270	82			100								
	83											
275	84			100								
280	85			100								
	86											
285	87			100								
290	88			100								
	89											
295	90			100								
	91											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-150

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-150**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 10, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1081.5 ft**	Date Completed:	**Jun 15, 08**
Location:	**Area L**	Total Depth:	**320 ft**	Logged by:	**JC/LB**
Coordinates:	**2,140,642 N , 1,377,288 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	92			100								
305	93		BEDROCK, Tertiary Basalt dyke, dark green, strongly magnetic plagioclase-phyric, large calcite veins.									
	94			98								
310	95											
				100								
315	96											
	97			100								
320	98		END OF HOLE @ 320 FT									
325	99											
	100											
330	101											
	102											
335	103											
	104											
340	105											
	106											
345	107											
	108											
350	109											
	110											
355	111											
	112											
360	113											
	114											
365	115											
	116											
370	117											
	118											
375	119											
	120											
380	121											
385												
390												
395												

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-150

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-154**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 14, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1491.8 ft**	Date Completed:	**Jun 16, 08**
Location:	**Area J**	Total Depth:	**165 ft**	Logged by:	**AM(SLR)/DM**
Coordinates:	**2,149,452 N , 1,391,260 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		FROST HEAVED BEDROCK, weathered granodiorite, sand and clay infill.	36							HWT to 18.5' HQ3 to 165'	
5	1		BEDROCK, Granodiorite, hornblende, quartz, plagioclase, moderately fractured, fractures increasing downhole, calcite and oxides on fractures, sulphides.	56							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	2			98								
10	3			54								
15	4			100								
20	5			100								
25	6			100								
30	7			83							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
35	8			100								
40	9			100								
40	10			100								
45	11			93								
50	12			87								
55	13			98								
60	14			96								
65	15			100								
70	16			100								
70	17			100								
75	18			52								
80	19			100								
80	20			100								
85	21			100								
90	22			100								
90	23			74								
95	24			100								
95	25			100								
100	26			100								
100	27			100								
105	28			100								
105	29			100								
110	30			100								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-154

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jul 14, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-154**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 14, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1491.8 ft**	Date Completed:	**Jun 16, 08**
Location:	**Area J**	Total Depth:	**165 ft**	Logged by:	**AM(SLR)/DM**
Coordinates:	**2,149,452 N , 1,391,260 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31–32			100								
	32–33			100								
110	33–34			99								
115	34–35			100								
	35–36			87								
120	36–37			53								
125	37–38			100								
	38–39			100								
130	39–40			98							Slight artesian conditions noted.	
135	40–41			100								
	41–42			100								
140	42–43			98								
145	43–44			73								
	44–45			100								
150	45–46			100								
	46–47											
155	47–48											
	48–49											
160	49–50											
165	50–51		END OF HOLE @ 165 FT									
170	51–52											
	52–53											
175	53–54											
	54–55											
180	55–56											
	56–57											
185	57–58											
190	58–59											
	59–60											
195												

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Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-154

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jul 14, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-155**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 15, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1311.4 ft**	Date Completed:	**Jun 20, 08**
Location:	**Area L**	Total Depth:	**240 ft**	Logged by:	**SD/JC/RS**
Coordinates:	**2,140,571 N , 1,379,360 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
5	1		BEDROCK, Tertiary Volcaniclastic Breccia, polymictic, clast supported, clasts from pebble to cobble size and are angular to highly angular, matrix is usually a coarse wacke but is poorly sorted and consists of grains from silt to pebbles, colour varies throughout interval, completely weathered from 0 to 9 ft, oxidized to 21', brecciated from 21 to 29', basalt from 25 to 29', highly fractured from 117-134', calcite in matrix.	65							HWT to 8' HQ3 to 55' NQ3 to 240' * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	2			90								
10	3			100								
	4			100								
15	5			100							Lose circulation at 16'	
20	6											
	7			96								
25	8			98								
30	9											
	10			99							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
35	11			100								
40	12											
	13			100							Lose circulation several times after 40'.	
45	14			100								
50	15											
	16			100								
55	17			97								
60	18											
	19			100								
65	20			98								
70	21											
	22			100								
75	23			98								
80	24											
	25			96								
85	26			100								
90	27											
	28			100								
95	29											
	30			100								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-155

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-155

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-155**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 15, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1311.4 ft**	Date Completed:	**Jun 20, 08**
Location:	**Area L**	Total Depth:	**240 ft**	Logged by:	**SD/JC/RS**
Coordinates:	**2,140,571 N , 1,379,360 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100								
	33											
110	34			100								
115	35											
	36			100								
120	37			100								
125	38											
	39			99								
130	40			100								
135	41											
	42			100								
140	43			98								
145	44											
	45			98								
150	46			99							No drill return from 150 to 180.25'.	
155	47											
	48			96								
160	49			100								
165	50											
	51			100								
170	52			91								
175	53		BEDROCK, Tertiary Volcaniclastic Breccia, monomictic, clast supported, heavily brecciated, matrix is made up mostly of clast material but 25% is calcite cement, some clay infilling, moderately fractured, heavily fractured from 210 to 217', pyrite in the matrix from 228-240'.									
	54			100								
180	55											
	56			90								
185	57			100							Very poor circulation from 180 to 210'	
190	58											
	59			100								
195	60			100								

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Pebble Limited Partnership
Pebble Project
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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-155**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 15, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1311.4 ft**	Date Completed:	**Jun 20, 08**
Location:	**Area L**	Total Depth:	**240 ft**	Logged by:	**SD/JC/RS**
Coordinates:	**2,140,571 N , 1,379,360 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			97								
	63			100								
210	64			93							Generally poor circulation from 210 to EOH.	
215	65											
	66			100								
220	67											
	68			100								
225	69			100								
230	70											
	71			95								
235	72			93								
240	73		END OF HOLE @ 240 FT									
245	74											
	75											
250	76											
	77											
255	78											
	79											
260	80											
	81											
265	82											
270	83											
	84											
275	85											
280	86											
	87											
285	88											
	89											
290	90											
295	91											

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Knight Piésold CONSULTING

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VA101-176/23	**4**	**0**

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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-157**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 17, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1548.6 ft**	Date Completed:	**Jun 20, 08**
Location:	**Area J**	Total Depth:	**298.75 ft**	Logged by:	**CK(SLR)/DM**
Coordinates:	**2,148,413 N , 1,391,522 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
5	1		Gravelly SAND, some silt, subrounded to subangular, clasts up to gravel size, poorly graded, non plastic, light brown, damp, weathered bedrock. (Felsenmeer)	16							HWT to 12' HQ3 to 79.5' NQ3 to 298.75' * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	2			67								
15	3		BEDROCK, Diorite, fine-grained, grey, thin dykelets of massive dark grey basalt?, calcite, moderate propylitic alteration, MnO and FeO staining on fracture surfaces to 24', veining, abundant pyrite with lesser chalcopyrite, rare molybdenite, finer-grained below 125', highly fractured, possibly from drilling.	100								
	4			100								
				98								
20	5			100								
25	6			100								
30	7			100								
35	8			100								
40	9			96								
45	10			100								
50	11			100								
55	12			85								
60	13			100								
65	14			82								
70	15			91								
75	16			99								
80	17			79								
85	18			88								
90	19			66								
95	20			100								
	21			98								
	22			98								
	23											
	24											
	25											
	26											
	27											
	28											
	29											
	30											

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Pebble Limited Partnership
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Overburden Log For GH08-157

Knight Piésold CONSULTING

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Date Revised: Jul 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-157**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 17, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1548.6 ft**	Date Completed:	**Jun 20, 08**
Location:	**Area J**	Total Depth:	**298.75 ft**	Logged by:	**CK(SLR)/DM**
Coordinates:	**2,148,413 N , 1,391,522 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	32			98								
110	34			98								
115	35			98								
120	37			66								
125	38			43								
130	40			100								
135	41			94								
	42			82								
140	43			66								
145	44			96								
	45			98								
150	46			100								
155	48			100								
160	49			87								
	50			100								
165	51			100								
170	52			100								
175	53			100								
	54		BEDROCK, Granodiorite, weakly mineralized, grey-green pink, hornblende, strong propylitic alteration, some small faults with gouge, minor chalcopyrite, pyrite disseminated throughout, contact with diorite very sharp.								***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
180	55			95								
185	57			100								
190	58			79								
195	59			93								
	60											

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Date Revised: Jul 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-157**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 17, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1548.6 ft**	Date Completed:	**Jun 20, 08**
Location:	**Area J**	Total Depth:	**298.75 ft**	Logged by:	**CK(SLR)/DM**
Coordinates:	**2,148,413 N , 1,391,522 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			98								
	63			79								
210	64			91								
	65											
215	66			100								
220	67			100								
	68											
225	69			100								
230	70			100								
	71											
235	72			96								
240	73			100								
	74											
245	75			100								
250	76			87								
	77											
255	78			93								
260	79			100								
	80											
265	81			94								
270	82			98								
	83											
275	84			71								
280	85			100								
	86			100								
285	87			100								
290	88			98								
	89											
295	90			89								
	91											

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Date Revised: Jul 15, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-157**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 17, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1548.6 ft**	Date Completed:	**Jun 20, 08**
Location:	**Area J**	Total Depth:	**298.75 ft**	Logged by:	**CK(SLR)/DM**
Coordinates:	**2,148,413 N , 1,391,522 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	92		END OF HOLE @ 298.75 FT									
305	93											
	94											
310	95											
	96											
315	97											
	98											
320	99											
	100											
325	101											
	102											
330	103											
	104											
335	105											
	106											
340	107											
	108											
345	109											
	110											
350	111											
	112											
355	113											
	114											
360	115											
	116											
365	117											
	118											
370	119											
	120											
375	121											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-157

Knight Piésold CONSULTING

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SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-158**	Page	**1** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**None**	Date Started:	**Jun 18, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1755.1 ft**	Date Completed:	**Jun 27, 08**
Location:	**Area G**	Total Depth:	**500 ft**	Logged by:	**GD/JB/RS/LB**
Coordinates:	**2,160,506 N , 1,372,125 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**250, -70**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
5	1		Tundra vegetation, some sand and silt, dark brown, organics, moist. (Topsoil)	22							Drillhole inclined at 70 degrees. Depths are not corrected for 70 degree angle. PQ3 to 19' HQ3 to 347' NQ3 to 500' NO SPT's performed due to incline of hole.	
			Silty SAND, some gravel, angular, clasts up to gravel size, poorly graded, no to low plasticity, dark brown, moist, fines washed away. (Colluvium)	11								
10	3			9								
	4		GRAVEL and COBBLES, some sand and silt, subangular, poorly graded, light brown, moist. (Colluvium)	94								
15	5			100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
			SAND and GRAVEL, some cobbles, medium course, poorly graded, angular to sub rounded, loose, moist. (Colluvium)	98								
20	6			97								
25	8		BEDROCK, Granodiorite, sulfide, hematite, epidote, calcite, chlorite bearing hornblende granodiorite porphyry. Greenish-grey to pinkish-grey, calcite and chlorite infilling in joints.	97								
30	9											
	10			79								
35	11			100								
40	12											
	13			99							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
45	14			100								
50	15											
	16			100								
55	17			96								
60	18											
	19			98								
65	20			100								
				98								
70	21											
75	22			100								
	23			98								
80	24											
	25			85								
85	26			100								
				100								
90	27			98								
	28			94								
95	29			100								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-158

Knight Piésold CONSULTING

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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-158**	Page	**2** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**None**	Date Started:	**Jun 18, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1755.1 ft**	Date Completed:	**Jun 27, 08**
Location:	**Area G**	Total Depth:	**500 ft**	Logged by:	**GD/JB/RS/LB**
Coordinates:	**2,160,506 N , 1,372,125 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**250, -70**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	32			96								
	33			98								
110	34			98								
115	35			100								
	36											
120	37			100								
125	38			98								
	39											
130	40			100								
135	41			92								
	42			98								
140	43			100								
145	44			100								
	45											
150	46			100							Lost circulation at 153'	
155	47			100								
	48											
160	49			98								
	50			98								
165	51			100								
170	52			100								
	53											
175	54			100								
180	55			97								
	56											
185	57			96								
190	58			100								
	59			100								
195	60			96								
				91								

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Project:	**Pebble Project**	Drill Hole No.	**GH08-158**	Page	**3** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**None**	Date Started:	**Jun 18, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1755.1 ft**	Date Completed:	**Jun 27, 08**
Location:	**Area G**	Total Depth:	**500 ft**	Logged by:	**GD/JB/RS/LB**
Coordinates:	**2,160,506 N , 1,372,125 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**250, -70**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			98								
	63			100								
210	64			100								
	65			100								
215	66			100								
220	67			100								
	68			100								
225	69			100								
230	70			96								
	71			95								
235	72			100								
	73			96								
240	74			96								
	75			98								
245	76			98								
	77			100								
250	78			100								
	79			98								
255	80			100								
	81			98								
260	82			100								
	83			97								
265	84			100								
	85			98								
270	86			100								
	87			100								
275	88			98								
	89			100								
280	90			100								
	91			98								

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Project:	**Pebble Project**	Drill Hole No.	**GH08-158**	Page	**4** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**None**	Date Started:	**Jun 18, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1755.1 ft**	Date Completed:	**Jun 27, 08**
Location:	**Area G**	Total Depth:	**500 ft**	Logged by:	**GD/JB/RS/LB**
Coordinates:	**2,160,506 N , 1,372,125 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**250, -70**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	92			100								
305	93			100								
	94											
310	95			100								
315	96											
	97			100								
320	98			99								
325	99											
	100			98								
330	101			100								
335	102											
	103			100								
340	104			98								
345	105			100								
	106			82								
350	107			98								
355	108											
	109			99								
360	110			100								
365	111											
	112			100								
370	113			98								
375	114											
	115			100								
380	116			100								
385	117											
	118			100								
390	119			100								
	120											
395	121			92								
				100								

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Project:	**Pebble Project**	Drill Hole No.	**GH08-158**	Page	**5** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**None**	Date Started:	**Jun 18, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1755.1 ft**	Date Completed:	**Jun 27, 08**
Location:	**Area G**	Total Depth:	**500 ft**	Logged by:	**GD/JB/RS/LB**
Coordinates:	**2,160,506 N , 1,372,125 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**250, -70**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
405	123			100								
	124			100								
410	125			100								
	126											
415	127			100								
420	128			100								
	129											
425	130			100								
430	131											
	132			100								
435	133			100								
440	134											
	135			100								
445	136			99								
450	137											
	138			100								
455	139			100								
460	140											
	141			96								
465	142			100								
470	143											
	144			100								
475	145			100								
480	146											
	147			100								
485	148			100								
490	149											
	150			100								
495	151			100								
	152											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-158

Rev. 0 - Issued for Report VA101-176/23-4

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-158

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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-158**	Page	**6** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**None**	Date Started:	**Jun 18, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1755.1 ft**	Date Completed:	**Jun 27, 08**
Location:	**Area G**	Total Depth:	**500 ft**	Logged by:	**GD/JB/RS/LB**
Coordinates:	**2,160,506 N , 1,372,125 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**250, -70**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	153		END OF HOLE @ 500 FT									
505	154											
	155											
510	156											
	157											
515	158											
	159											
520	160											
	161											
525	162											
	163											
530	164											
	165											
535	166											
	167											
540	168											
	169											
545	170											
	171											
550	172											
	173											
555	174											
	175											
560	176											
	177											
565	178											
	179											
570	180											
	181											
575	182											
580												
585												
590												
595												

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-158

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-158

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-159**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 20, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1400.7 ft**	Date Completed:	**Jun 23, 08**
Location:	**Area L**	Total Depth:	**235 ft**	Logged by:	**SD/RS/KB**
Coordinates:	**2,140,694 N , 1,383,070 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		SAND and GRAVEL, some silt/clay, trace cobbles, subangular, clasts up to cobble size, gap graded, non plastic, brown, moist. (Felsenmeer)	41							PQ3 to 20' HQ3 to 235'	
5	1			100								
10	2			100								
10	3			100								
15	4		BEDROCK, Tertiary Volcaniclastic Breccia, clast supported, polymictic, clasts up to cobble size, dark grey.	100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
20	5			100								
20	6			98								
25	7											
25	8		BEDROCK, Tertiary Basalt, calcite filled amygdules, fine grained, dark blue.	100							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
30	9			100								
30	10			100								
35	11		BEDROCK, Granodiorite, light grey, oxidation or chlorite alteration, chlorite and calcite infilling, some clay infilling and iron staining on joints towards top of interval, contact with above basalt is 43°tca.	94								
40	12			98								
40	13			100								
45	14			98								
50	15			96								
50	16			100								
55	17			100								
60	18			100								
65	19			100								
70	20			100								
75	21			100								
80	22			100								
85	23			100								
90	24			100								
95	25			100								
	26			100								
	27			100								
	28			100								
	29			100								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-159

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-159

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-159**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 20, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1400.7 ft**	Date Completed:	**Jun 23, 08**
Location:	**Area L**	Total Depth:	**235 ft**	Logged by:	**SD/RS/KB**
Coordinates:	**2,140,694 N , 1,383,070 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			98								
105	32			98								
	33											
110	34			100								
115	35											
	36			100								
120	37			100								
125	38											
	39			100								
130	40			100								
135	41											
	42			100								
140	43			100								
145	44											
	45			100								
150	46		BEDROCK, Basalt dyke, dark green brecciated, chloritized, calcite filling in joints and phenocrysts.	99								
155	47		BEDROCK, Granodiorite, light grey, oxidation or chlorite alteration, chlorite and calcite infilling.	100								
	48											
160	49			100								
165	50											
	51			100								
170	52			95								
175	53											
	54			98								
180	55											
	56			100								
185	57			100								
190	58											
	59			100								
195	60			98								

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Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-159

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-159**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 20, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1400.7 ft**	Date Completed:	**Jun 23, 08**
Location:	**Area L**	Total Depth:	**235 ft**	Logged by:	**SD/RS/KB**
Coordinates:	**2,140,694 N , 1,383,070 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100								
	63											
210	64			100								
	65		BEDROCK, dark green Basalt dyke, calcite filled phenocrysts and chlorite filled vesicles.									
215	66		BEDROCK, Granodiorite, light grey, oxidation or chlorite alteration, chlorite and calcite infilling.	100								
220	67											
	68			100								
225	69		BEDROCK, dark green Basalt dyke, small calcite filled phenocrysts.	100								
230	70		BEDROCK, Granodiorite, light grey, oxidation or chlorite alteration, chlorite and calcite infilling.									
	71			97								
235	72		END OF HOLE @ 235 FT									
240	73											
	74											
245	75											
250	76											
	77											
255	78											
	79											
260	80											
265	81											
	82											
270	83											
	84											
275	85											
280	86											
	87											
285	88											
	89											
290	90											
295	91											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Knight Piésold CONSULTING

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Date Revised: Jul 2, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-161**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 23, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1764.2 ft**	Date Completed:	**Jun 24, 08**
Location:	**Area L**	Total Depth:	**101 ft**	Logged by:	**SD/KB/RS**
Coordinates:	**2,141,487 N , 1,384,942 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, silt and sand, dark brown, moist. (Topsoil)	43							PQ3 to 15' HQ3 to 100'	
5	1		FELSENMEER, Moderately weathered/fractured Granodiorite. trace amounts of sand and fines as infilling.	98							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	2		BEDROCK, Granodiorite, light grey to green in colour, composed primarily of quartz, plagioclase, k-feldspar with moderate amounts of chlorite, weakly to moderately fractured, quartz veins with moderate pyrite, disseminated pyrite.	99								
15	3			90								
20	4			100								
25	5			100								
30	6			100								
35	7			100							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
40	8			100								
45	9			95								
50	10			100								
55	11			100								
60	12			100								
65	13			97								
70	14			87								
75	15			98								
80	16			98								
85	17			100								
90	18			92								
95	19			92								
	20			89								
	21			100								
	22			92								
	23			100								
	24											
	25											
	26											
	27											
	28											
	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-161

Knight Piésold CONSULTING

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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-161**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 23, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1764.2 ft**	Date Completed:	**Jun 24, 08**
Location:	**Area L**	Total Depth:	**101 ft**	Logged by:	**SD/KB/RS**
Coordinates:	**2,141,487 N , 1,384,942 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		END OF HOLE @ 100FT									
105	32											
	33											
110	34											
	35											
115	36											
	37											
120	38											
	39											
125	40											
	41											
130	42											
	43											
135	44											
	45											
140	46											
	47											
145	48											
	49											
150	50											
	51											
155	52											
	53											
160	54											
	55											
165	56											
	57											
170	58											
	59											
175	60											
180												
185												
190												
195												

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-163**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 26, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1268.3 ft**	Date Completed:	**Jun 28, 08**
Location:	**Area G**	Total Depth:	**215 ft**	Logged by:	**KB/RS**
Coordinates:	**2,160,010 N , 1,380,080 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		PEAT, fibrous, dark brown, partially frozen, moist. (Topsoil)	31							HWT to 17', Stuck in hole to 15' PQ3 to 12.5' HQ3 to 215'	
5	1		Silty GRAVEL, some sand, trace clay, trace cobbles, subangular to subrounded, clasts up to cobble size, gap graded, non plastic, brown to dark brown, moist. (Glacial Drift)	38	44	☒	GH08-163-1	9/17/6	32	●		
10	2			100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
15	3			87						■		
20	4			100								
25	5		BEDROCK, Basalt, dark green to black, massive, fine grained, iron oxide staining on fracture surfaces, minor chlorite and epidote to 150', then increasing downhole, highly fractured from 100 to 150'.	100								
30	6			97								
35	7			100								
40	8			97							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
45	9			100								
50	10			98								
55	11			100								
60	12			100								
65	13			98								
70	14			86								
75	15			100								
80	16			97								
85	17			100								
90	18			100								
95	19			100								
	20			100								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-163

Knight Piésold CONSULTING

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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-163**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 26, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1268.3 ft**	Date Completed:	**Jun 28, 08**
Location:	**Area G**	Total Depth:	**215 ft**	Logged by:	**KB/RS**
Coordinates:	**2,160,010 N , 1,380,080 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE / RQD DATA (%) (20 40 60 80)	NOTES	WELL DETAILS
	31			100							
105	32										
	33			96							
110	34			100							
115	35										
	36			96							
120	37			100							
125	38										
	39			100							
130	40			99							
135	41										
	42			100							
140	43			96							
145	44										
	45			100							
150	46			100							
155	47										
	48			72							
160	49			100							
165	50										
	51			100							
170	52			100							
175	53										
	54			100							
180	55			100							
185	56										
	57			100							
190	58			97							
195	59										
	60			100							

SPT TEST DATA Uncorrected 'N' values vs. depth (●)

RQD DATA (%) (■)

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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-163**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 26, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1268.3 ft**	Date Completed:	**Jun 28, 08**
Location:	**Area G**	Total Depth:	**215 ft**	Logged by:	**KB/RS**
Coordinates:	**2,160,010 N , 1,380,080 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			85						■		
	63			100								
210	64									■		
	65			95								
215	66		END OF HOLE @ 215 FT							■		
220	67											
	68											
225	69											
	70											
230	71											
	72											
235	73											
	74											
240	75											
	76											
245	77											
	78											
250	79											
	80											
255	81											
	82											
260	83											
	84											
265	85											
	86											
270	87											
	88											
275	89											
	90											
280	91											
285												
290												
295												

Pebble Limited Partnership
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Project:	**Pebble Project**	Drill Hole No.	**GH08-164**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 28, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**2026.7 ft**	Date Completed:	**Jun 30, 08**
Location:	**Area G**	Total Depth:	**106 ft**	Logged by:	**LB/GD**
Coordinates:	**2,155,408 N , 1,385,809 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
5	1		FROST HEAVED BEDROCK, some silt and sand infilling. (Felsenmeer)	52							PQ3 to 10' HQ3 to 106'	
	2		BEDROCK, Granodiorite, dark grey to green, equigranular of the Kaskanak Batholith, some chlorite alteration, quartz.	69							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	3			98								
	4			98								
15	5			100								
20	6			100								
25	7			97								
30	8			100							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
35	9			100								
40	10			100								
	11			100							Lost circulation from 42 to 71 ft.	
45	12			99								
50	13			100								
55	14			93								
	15			92								
60	16			100								
65	17			100								
70	18			100								
	19			100								
75	20			99								
80	21			100								
85	22			100								
90	23			100								
95	24			100								
	25			100								
	26			100								
	27			100								
	28			100								
	29			100								
	30			100								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-164

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-164

Rev. 0 - Issued for Report VA101-176/23-4

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jul 10, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-164**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 28, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**2026.7 ft**	Date Completed:	**Jun 30, 08**
Location:	**Area G**	Total Depth:	**106 ft**	Logged by:	**LB/GD**
Coordinates:	**2,155,408 N , 1,385,809 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32		END OF HOLE @ 106 FT									
110	33											
	34											
115	35											
	36											
120	37											
	38											
125	39											
	40											
130	41											
	42											
135	43											
	44											
140	45											
	46											
145	47											
	48											
150	49											
	50											
155	51											
	52											
160	53											
	54											
165	55											
	56											
170	57											
	58											
175	59											
	60											
180												
185												
190												
195												

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-164

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-164

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Date Revised: Jul 10, 08

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-166**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 29, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1402.7 ft**	Date Completed:	**Jul 2, 08**
Location:	**Area G**	Total Depth:	**235 ft**	Logged by:	**KB/RS**
Coordinates:	**2,159,924 N , 1,381,741 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES
0	0	Tundra Vegetation, organics, dark brown, moist. (Topsoil)	26					HWT to 65, stuck at 60' PQ3 to 65' HQ3 to 235'
5	1.5	SILT, some sand, trace gravel, trace clay, subrounded to subangular, clasts up to cobble size, poorly graded, low plasticity, brown, moist. (Glacial Drift)	34					
10	3		47					
15	4.5		35	89	GH08-163-1	2/4/7	11	
20	6		35					
25	7.5	Gravelly SAND, some silt, trace clay, subangular, clasts up to gravel size, well graded, low plasticity, orangy brown, moist to wet. (Glacial Drift)	100	44	GH08-163-2	8/24/18	42	Heaving Sands, 25 to 40'
30	9		100	100	GH08-163-3	16/26/28	54	
35	10.5		100	100	GH08-163-4	31/50+/+	50++	
40	12	Sandy SILT, some clay, trace gravel, subangular to subrounded, clasts up to gravel size, poorly graded, low plasticity, brown, moist to wet. (Glacial Drift)	26	100	GH08-163-5	13/19/36	55	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***
45	13.5		65					
50	15	BEDROCK, Basalt, dark green to black/brown, moderately weathered, upper 100 ft is weathered and highly fractured, calcite, iron staining on fractures, calcite filled vesicles.	66					* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).
55	16.5		72					
60	18		74					
65	19.5		91					
70	21		85					
75	22.5		95					
80	24		91					
85	25.5		91					
90	27		100					
95	28.5		94					

SPT TEST DATA Uncorrected 'N' values vs. depth (●)
RQD DATA (%) (■)
20 40 60 80

WELL DETAILS

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-166

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-166

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Date Revised: Jul 11, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-166**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 29, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1402.7 ft**	Date Completed:	**Jul 2, 08**
Location:	**Area G**	Total Depth:	**235 ft**	Logged by:	**KB/RS**
Coordinates:	**2,159,924 N , 1,381,741 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			93								
105	32			100								
	33											
110	34			100								
115	35											
	36			99								
120	37											
				98								
125	38											
	39			99								
130	40											
				100								
135	41											
	42			99								
140	43											
				99								
145	44											
	45			100								
150	46											
				100								
155	47											
	48			99								
160	49											
				100								
165	50											
	51			99								
170	52											
	53			99								
175	54											
				98								
180	55											
	56			100								
185	57											
				99								
190	58											
	59			100								
195	60											
				100								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Overburden Log For GH08-166

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Date Revised: Jul 11, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-166**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jun 29, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1402.7 ft**	Date Completed:	**Jul 2, 08**
Location:	**Area G**	Total Depth:	**235 ft**	Logged by:	**KB/RS**
Coordinates:	**2,159,924 N , 1,381,741 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100								
	63			97								
210	64											
	65			100								
215	66			100								
220	67											
	68			100								
225	69			100								
230	70											
	71			100								
235	72		END OF HOLE @ 235 FT									
240	73											
	74											
245	75											
250	76											
	77											
255	78											
	79											
260	80											
265	81											
	82											
270	83											
275	84											
	85											
280	86											
285	87											
	88											
290	89											
295	90											
	91											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-166

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jul 11, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-167**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 1, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1987.2 ft**	Date Completed:	**Jul 2, 08**
Location:	**Area G**	Total Depth:	**106 ft**	Logged by:	**LB/GD**
Coordinates:	**2,157,140 N , 1,386,522 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		SILT, some clay, trace sand, trace boulders, subangular, clasts up to boulder size, poorly graded, low plasticity, brown, moist. (Felsenmeer)	100							PQ3 to 9.7' HQ3 to 106' * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	1			72								
	2		BEDROCK, Granodiorite, fine to medium-grained, black and white specked, weak chlorite alteration, calcite and hematite on fracture surfaces, competent.	96								
10	3			100								
	4			100								
15	5			98								
20	6			98								
25	7			100								
	8			96							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
30	9			96								
35	10			100								
	11			100								
40	12			95								
45	13			100								
50	14			98								
55	15			100								
	16			100								
60	17			96								
65	18			100								
70	19			97								
75	20			100								
80	21			100								
85	22			90								
90	23			100								
95	24			97								
	25											
	26											
	27											
	28											
	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-167

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jul 10, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-167**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 1, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1987.2 ft**	Date Completed:	**Jul 2, 08**
Location:	**Area G**	Total Depth:	**106 ft**	Logged by:	**LB/GD**
Coordinates:	**2,157,140 N , 1,386,522 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31–32			100								
			END OF HOLE @ 106 FT									
110	33–34											
115	35–36											
120	37–38											
125	39–40											
130	41–42											
135	43–44											
140	45–46											
145	47–48											
150	49–50											
155	51–52											
160	53–54											
165	55–56											
170	57–58											
175	59–60											
180												
185												
190												
195												

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-167

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Project No.	Ref. No.	Rev.
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Date Revised: Jul 10, 08

Project:	**Pebble Project**	Drill Hole No.	**GH08-168**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 3, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1868.2 ft**	Date Completed:	**Jul 6, 08**
Location:	**Area G**	Total Depth:	**335 ft**	Logged by:	**LB/KB/DM/GD**
Coordinates:	**2,158,898 N , 1,372,501 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**070, -70**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, organics, dark brown, moist.								HWT casing installed to 283'. 5' and casing shoe left in hole. PQ3 to 34' HQ3 to 282.9' NQ3 to 335' Drillhole inclined at 70 degrees. Depths are not corrected for angle. * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	1		(Topsoil)	52								
10	2		EXTREMELY WEATHERED BEDROCK, SAND and SILT, some clay, trace gravel, subangular, clasts up to gravel size, poorly graded, no to low plasticity, grey-brown to red-brown, moist.	100								
15	3			100								
20	4		WEATHERED BEDROCK, Granodiorite with red-brown sand infill, very weathered with plagioclase, hornblende and quartz.	95								
25	5		BEDROCK, Granodiorite, heavily fractured, fracture density ranges between 2 and 20 fractures/ft, fracture surfaces oxidized and contain chlorite.	54								
30	6			81								
35	7			93								
40	8			98								
45	9			97								
50	10			78								
55	11			98								
60	12		BEDROCK, Basalt dyke, dark green to black, fine grained.	91								
65	13			46								
70	14			100								
75	15		BEDROCK, Granodiorite, light grey in color, calcite chlorite and quartz veins throughout.	98								
80	16			100								
85	17			100								
90	18			100								
95	19			97								
	20			100								
	21			100								
	22			100								
	23			97								
	24			100								
	25			100								
	26			100								
	27			100								
	28			100								
	29			100								
	30											

Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-168

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-168**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 3, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1868.2 ft**	Date Completed:	**Jul 6, 08**
Location:	**Area G**	Total Depth:	**335 ft**	Logged by:	**LB/KB/DM/GD**
Coordinates:	**2,158,898 N , 1,372,501 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**070, -70**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			98								
105	32											
	33			83								
110	34											
	35			97								
115	36			100								
120	37											
	38			89								
125	39			100								
130	40											
	41			96								
135	42			100								
	43			114								
140	44											
	45		BEDROCK, Basalt dyke, dark blue in colour, calcite veins present.	92								
145	46		BEDROCK, Granodiorite, grey to green in colour, highly fractured, chlorite and calcite throughout, fracture density ranges between 2 and 20 fractures per ft.	100								
150	47											
	48			98								
155	49			99								
160	50											
	51			98								
165	52			100								
170	53											
	54			99								
175	55			87								
180	56			100								
	57			100								
185	58											
	59			93								
190	60			98								
195				97								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-168**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 3, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1868.2 ft**	Date Completed:	**Jul 6, 08**
Location:	**Area G**	Total Depth:	**335 ft**	Logged by:	**LB/KB/DM/GD**
Coordinates:	**2,158,898 N , 1,372,501 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**070, -70**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100								
	63			91								
210	64			78								
	65											
215	66			93								
220	67			100								
	68											
225	69			100								
230	70											
	71			100								
235	72			99								
	73											
240	74			79								
245	75			100								
	76											
250	77			100								
255	78			100								
	79											
260	80			100								
265	81		BEDROCK, Basalt dyke, black in colour, calcite amygdules.	96								
	82											
270	83			100								
275	84		BEDROCK, Granodiorite, grey to green in color, less fractured, fracture density ranges between 2 and 20 fractures per ft.	98								
	85											
280	86			95								
				100								
285	87			97								
290	88											
	89			100								
295	90											
	91			100								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-168**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 3, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1868.2 ft**	Date Completed:	**Jul 6, 08**
Location:	**Area G**	Total Depth:	**335 ft**	Logged by:	**LB/KB/DM/GD**
Coordinates:	**2,158,898 N , 1,372,501 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**070, -70**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
305	92			99								
	93											
	94			98								
310	95											
				100								
315	96											
	97			100								
320	98											
				99								
325	99											
	100			100								
330	101											
				98								
335	102		END OF HOLE @ 335 FT									
	103											
340	104											
	105											
345	106											
350	107											
	108											
355	109											
360	110											
	111											
365	112											
370	113											
	114											
375	115											
380	116											
	117											
385	118											
390	119											
	120											
395	121											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-168

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-168

Rev. 0 - Issued for Report VA101-176/23-4

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-169**	Page	**1** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 7, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1940.13 ft**	Date Completed:	**Jul 12, 08**
Location:	**Area G**	Total Depth:	**499.5 ft**	Logged by:	**LB/KB/DM/LS**
Coordinates:	**2,153,064 N , 1,369,359 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Granodiorite BOULDERS and COBBLES, some sand and gravel, frost shattered rocks on surface. (Felsenmeer)	49							HWT to 67.5' PQ3 to 65' HQ3 to 245' NQ3 to 499.5'	
5	1											
	2			66								
10	3										Virbrating Wire Piezometer installed @291.25'.	
	4			39								
15	5			16								
20	6		WEATHERED BEDROCK, highly to completely weathered, possibly granodiorite or Tertiary volcaniclastic breccia, some basaltic fragments, highly oxidized, reddish brown, clay, soft, not competent, broken.	86								
25	7											
	8			94								
30	9											
	10			88								
35	11			100								
40	12											
	13			91							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
45	14			100								
50	15											
	16			83								
55	17			100								
60	18											
	19			98								
65	20			85								
70	21											
	22		BEDROCK, Granodiorite, light grey in colour, medium grained, moderately to heavily weathered, calcite and chlorite infilling, moderately oxidized.	100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
75	23			100								
80	24											
	25		BEDROCK, Tertiary Basalt intrusion, dark brown to dark green, white phenocrysts, fine grained, moderately fractured.	98								
85	26			99								
90	27											
	28			98								
95	29			100								
	30		BEDROCK, Granodiorite, light grey in colour, calcite and chlorite infilling, slightly weathered and fractured, competent, becoming	100								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-169

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-169

Rev. 0 - Issued for Report VA101-176/23-4

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-169**	Page	**2** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 7, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1940.13 ft**	Date Completed:	**Jul 12, 08**
Location:	**Area G**	Total Depth:	**499.5 ft**	Logged by:	**LB/KB/DM/LS**
Coordinates:	**2,153,064 N , 1,369,359 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		gradually less fractured with depth, hard.	100								
105	32			100								
	33											
110	34			95								
115	35			100								
	36											
120	37			100								
125	38			96								
	39											
130	40			95								
135	41			100								
	42											
140	43			100								
145	44			100								
	45											
150	46			100								
155	47			100								
	48			98								
160	49			100								
165	50			87								
	51											
170	52			100								
175	53			92								
	54											
180	55			100								
185	56			100								
	57											
190	58			100								
195	59			100								
	60			99								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-169

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-169

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-169**	Page	**3** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 7, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1940.13 ft**	Date Completed:	**Jul 12, 08**
Location:	**Area G**	Total Depth:	**499.5 ft**	Logged by:	**LB/KB/DM/LS**
Coordinates:	**2,153,064 N , 1,369,359 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			90								
	63			100								
210	64											
	65			100								
215	66			100								
220	67											
	68			100								
225	69			100								
230	70											
	71			100								
235	72			100								
240	73											
	74			100								
245	75			99								
250	76											
	77			100								
255	78			98								
260	79											
	80			100								
265	81			100								
270	82											
	83			100								
275	84			100								
280	85											
	86			100								
285	87			88								
290	88											
	89			98								
295	90			100								
	91											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
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Overburden Log For GH08-169

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-169**	Page	**4** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 7, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1940.13 ft**	Date Completed:	**Jul 12, 08**
Location:	**Area G**	Total Depth:	**499.5 ft**	Logged by:	**LB/KB/DM/LS**
Coordinates:	**2,153,064 N , 1,369,359 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	92			100								
305	93			100								
	94											
310	95			100								
	96											
315	97			100								
	98			100								
320												
	99			100								
325	100											
	101			100								
330												
	102			98								
335	103											
	104			100								
340												
	105			100								
345	106											
	107			100								
350												
	108			100								
355	109											
	110			100								
360												
	111			100								
365	112											
	113			100								
370												
	114			100								
375	115											
	116			100								
380												
	117			100								
385	118											
	119			99							Little to no drill return, 388 to 450', 399 to 450', water noted coming out of the casing, artesian conditions seem inconsistent with no drill	
390	120											
395	121			100								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-169

Knight Piésold CONSULTING

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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-169**	Page	**5** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 7, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1940.13 ft**	Date Completed:	**Jul 12, 08**
Location:	**Area G**	Total Depth:	**499.5 ft**	Logged by:	**LB/KB/DM/LS**
Coordinates:	**2,153,064 N , 1,369,359 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
405	123			100							return.	
	124			96								
410	125			100								
	126											
415	127			97								
420	128			100								
	129											
425	130			100								
430	131			100								
	132											
435	133			100								
440	134			100								
	135											
445	136			98								
450	137			97								
	138											
455	139			100								
460	140			100								
	141											
465	142			100								
470	143			100								
	144											
475	145			100								
480	146			100								
	147											
485	148			100								
490	149			100								
	150											
495	151			97								
	152											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-169

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-169**	Page	**6** of **6**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 7, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1940.13 ft**	Date Completed:	**Jul 12, 08**
Location:	**Area G**	Total Depth:	**499.5 ft**	Logged by:	**LB/KB/DM/LS**
Coordinates:	**2,153,064 N , 1,369,359 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	153		END OF HOLE @ 499.5 FT									
505	154											
	155											
510	156											
	157											
515	158											
	159											
520	160											
	161											
525	162											
	163											
530	164											
	165											
535	166											
	167											
540	168											
	169											
545	170											
	171											
550	172											
	173											
555	174											
	175											
560	176											
	177											
565	178											
	179											
570	180											
	181											
575	182											
580												
585												
590												
595												

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-169

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jul 3, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-170**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 14, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1949 ft**	Date Completed:	**Jul 18, 08**
Location:	**Area L**	Total Depth:	**500 ft**	Logged by:	**LB/DM**
Coordinates:	**2,147,896 N , 1,367,111 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		TOPSOIL, organics, dark brown, moist. (Topsoil)	26							PQ3 to 30' HQ3 to 135' NQ3 to 500', HWT rods stuck in hole.	
5	1		SAND, some silt, some gravel, trace to some clay, subangular to subrounded, clasts up to gravel size, poorly graded, non plastic, brown, moist. (Colluvium)	32								
10	3		WEATHERED BEDROCK, Silty SAND, some gravel, trace to some clay, subangular to subrounded clasts/fragments of granodiorite, clast up to gravel size, mostly coarse sand size, poorly graded, low plasticity, soft, grey brown, moist.	98							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
15	5			51								
20	6			100								
25	8		BEDROCK, Granodiorite, medium grained, light grey, moderately weathered, iron oxides on fracture surfaces, heavily to moderately fractured to 45', the becomes more competent with depth, epidote vein at between 88 and 89', ~0.3 inches wide.	87								
30	9			83								
35	11			59								
40	12			100								
45	14			98								
50	15			100								
55	17			93								
60	18			100								
65	20			97								
70	21			100								
75	23			98								
80	24			100								
85	26			100								
90	27			100								
95	28			100							Virbrating Wire Piezometer installed at 488' depth.	
100	30			99								
	31			100								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-170

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jun 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-170**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 14, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1949 ft**	Date Completed:	**Jul 18, 08**
Location:	**Area L**	Total Depth:	**500 ft**	Logged by:	**LB/DM**
Coordinates:	**2,147,896 N , 1,367,111 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
110	33			100								
	34			100								
115	35											
	36			100								
120	37			100								
125	38											
	39			100								
130	40			98								
135	41			85								
	42			94								
140	43			98								
145	44											
	45			99								
150	46			100								
155	47											
	48			87								
160	49			100								
165	50											
	51			100								
170	52			100								
175	53											
	54			100								
180	55			98								
185	56											
	57			100								
190	58			97								
195	59											
	60			100								
200	61			100								
	62											
205	63			100								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-170

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jun 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-170**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 14, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1949 ft**	Date Completed:	**Jul 18, 08**
Location:	**Area L**	Total Depth:	**500 ft**	Logged by:	**LB/DM**
Coordinates:	**2,147,896 N , 1,367,111 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
215	65			100								
	66			100								
220	67											
	68			98								
225	69			100								
230	70											
	71			100								
235	72			100								
240	73											
	74			100								
245	75			96								
				100								
250	76											
	77			100								
255	78			100								
260	79											
	80			100								
265	81			100								
270	82											
	83			98								
275	84			100								
280	85											
	86			100								
285	87			100								
	88											
290	89		▼Water level needs further verification by more data from the VW Piezometer.	100								▼
295	90			100								
	91											
300	92			99							Lost circulation at 302.5, little to no drill return to 500'.	
305	93			100								
	94											
310	95			100								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-170

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jun 1, 09

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-170**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 14, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1949 ft**	Date Completed:	**Jul 18, 08**
Location:	**Area L**	Total Depth:	**500 ft**	Logged by:	**LB/DM**
Coordinates:	**2,147,896 N , 1,367,111 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
320	97			100								
	98			100								
325	99			100								
330	100			100								
	101			98								
335	102			100								
340	103			100								
	104			100								
345	105			98								
	106			99								
350	107			100								
	108			100								
355	109			98								
	110			100								
360	111			100								
	112			100								
365	113			98								
	114			100								
370	115			100								
	116			100								
375	117			100								
	118			100								
380	119			98								
	120			100								
385	121			100								
	122			100								
390	123			100								
	124			98								
395	125			98								
	126			97								
400	127											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-170

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-170

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jun 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-170**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 14, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1949 ft**	Date Completed:	**Jul 18, 08**
Location:	**Area L**	Total Depth:	**500 ft**	Logged by:	**LB/DM**
Coordinates:	**2,147,896 N , 1,367,111 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
425	129			100								
	130			100								
430	131											
	132			100								
435	133			100							Slight artesian conditions at 435' observed after run, however flow stopped soon after, difficult to get seal on some packer tests.	
440	134											
	135			98								
445	136			100								
450	137											
	138			100								
455	139			98								
	140											
460	141			100								
465	142			100								
	143											
470	144			100								
475	145			100								
	146											
480	147			100								
485	148			100								
	149											
490	150			100								
495	151			100								
	152											
500	153		END OF HOLE @ 500 FT									
505	154											
	155											
510	156											
515	157											
	158											
520	159											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-170

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jun 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-171**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 19, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1589.41 ft**	Date Completed:	**Jul 21, 08**
Location:	**Area L**	Total Depth:	**150 ft**	Logged by:	**LB/RS/DM**
Coordinates:	**2,147,241 N , 1,370,411 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES
0	0		Tundra Vegetation, organics, dark brown, moist. (Topsoil)	52							PQ3 to 43' HQ3 to 150'
5	1				50		GH08-171-1	7/4/6	10		
10	2		WEATHERED BEDROCK, Tertiary Volcaniclastic Breccia, highly weathered, silty SAND matrix, fragments sand to boulder size of various igneous composition, felsic to mafic, highly fractured, weak, limonitic clay alteration prevalent, hematite on some fracture surfaces, friable.	58							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).
15	3				61		GH08-171-2	6/17/35	52		
20	4			85							
25	5			93							
30	6			98							
35	7			100							
40	8			93							
45	9			85							
50	10			25							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***
55	11			87							
60	12			81							
65	13			92							
70	14			100							Sands heaved to 59' after rods pulled at the end of the drillhole.
75	15			88							
80	16			93							
85	17		BEDROCK, Tertiary Volcaniclastic Breccia, as above, only less weathered and more competent, less fractured, matrix supported, calcite in fractures, some limonite and hematite alteration, dark grey to black with multi-coloured fragments.	100							
90	18			98							
95	19			77							
100	20			88							
105	21			100							
110	22			100							
115	23			98							
120	24			100							
125	25			100							
130	26			100							
135	27			100							
140	28			100							
145	29			100							
150	30										

WELL DETAILS

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-171

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-171

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jun 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-171**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 19, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1589.41 ft**	Date Completed:	**Jul 21, 08**
Location:	**Area L**	Total Depth:	**150 ft**	Logged by:	**LB/RS/DM**
Coordinates:	**2,147,241 N , 1,370,411 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100								
	33											
110	34			100								
115	35											
	36			100								
120	37			100								
125	38											
	39			100								
130	40											
	41			88								
135	42			100								
140	43			100							Water bubbling out of casing, 140 to 145'.	
145	44											
	45			100								
150	46		END OF HOLE @ 150 FT									
155	47											
	48											
160	49											
165	50											
	51											
170	52											
175	53											
	54											
180	55											
185	56											
	57											
190	58											
	59											
195	60											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
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Overburden Log For GH08-171

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jun 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-172**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 21, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1457.75 ft**	Date Completed:	**Jul 23, 08**
Location:	**Area L**	Total Depth:	**235 ft**	Logged by:	**RS/DM**
Coordinates:	**2,147,901 N , 1,371,504 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, organics, dark brown, moist. (Topsoil)	17							PQ3 to 20' HQ3 to 150' NQ3 to 235' * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	1				67		GH08-172-1	12/27/28	55			
10	2		WEATHERED BEDROCK, Tertiary Volcaniclastic Breccia, matrix highly weathered to a silty SAND, soft, light brown in colour, clast supported, monomictic, clasts are coarse grained granodiorite, iron oxides, chlorite, becomes more competent with depth, moderately to highly fractured.	68								
	3			82	83		GH08-172-2	12/23/50+	50+			
15	4			98								
20	5			93								
	6										***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
25	7			83								
30	8			51								
	9										Lost circulation from 30 to 40'.	
35	10			94								
40	11			100								
	12			100								
45	13											
	14		BEDROCK, Teriary Volcaniclastic Breccia, slightly orange to brown in colour with frequent purple patches, polymictic, gravel to boulder sized clasts of granodiorite and felsic to mafic volcanic rocks, clasts are subangular to angular, wacke size matrix, basaltic clasts become more abundant with depth, minor carbonate, becomes more competent at 60', highly weathered from 145 to 148ft.	100								
50	15			96								
	16			98								
55	17			100								
60	18											
	19			100							Lost circulation from 62 to 90' with limited return at times.	
65	20			100								
70	21											
	22			98								
75	23			100								
80	24											
	25			96							Hole suspected to have sanded in to 80' after pulling the rods when finished drilling.	
85	26			100								
90	27											
	28			100								
95	29			100								
	30											

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Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-172

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jun 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-172**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 21, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1457.75 ft**	Date Completed:	**Jul 23, 08**
Location:	**Area L**	Total Depth:	**235 ft**	Logged by:	**RS/DM**
Coordinates:	**2,147,901 N , 1,371,504 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100							Lost circulation 105 to 150' with periodic recovery	
	33											
110	34			100								
115	35											
	36			100								
120	37			100								
125	38											
	39			100								
130	40			100								
135	41											
	42			100								
140	43			100								
145	44											
	45			96							Likely heaving sand or slough, uniform loose sand from 145-147.5'	
150	46		BEDROCK, Tertiary Volcaniclastic Breccia, clast supported, monomictic, basaltic clasts, rare felsic clasts, calcite, dark purple to black, bright red patches near upper and lower contacts, competent.	97								
	47			100								
155	48			75								
160	49											
	50			94								
165	51			91								
				98								
170	52			100								
175	53											
	54			95								
180	55		BEDROCK, Tertiary Volcaniclastic Breccia, grey, matrix supported to fine clast supported, polymictic, angular clasts mostly granodiorite with some clasts of intermediate to mafic volcanic rocks, chlorite, competent.	100							Lost and regained circulation from 180 to 235'	
	56											
185	57			100								
190	58			100								
	59											
195	60			100								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-172

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jun 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-172**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 21, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1457.75 ft**	Date Completed:	**Jul 23, 08**
Location:	**Area L**	Total Depth:	**235 ft**	Logged by:	**RS/DM**
Coordinates:	**2,147,901 N , 1,371,504 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100								
	63			100								
210	64											
	65			100								
215	66		BEDROCK, Tertiary Basalt, brecciated, black to red in colour, calcite veins, competent.	100								
220	67											
	68			100								
225	69			100								
230	70											
	71			100								
235	72		END OF HOLE @ 235 FT									
240	73											
	74											
245	75											
250	76											
	77											
255	78											
	79											
260	80											
	81											
265	82											
270	83											
	84											
275	85											
280	86											
	87											
285	88											
	89											
290	90											
295	91											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-172

Knight Piésold CONSULTING

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Date Revised: Jun 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-173**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 24, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1342.22 ft**	Date Completed:	**Jul 27, 08**
Location:	**Area L**	Total Depth:	**220 ft**	Logged by:	**RS/DM**
Coordinates:	**2,146,475 N , 1,372,111 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Tundra Vegetation, organics, dark red brown, moist. (Topsoil)	80							PW to 38', HWT casing to 117', PQ3 to 118', HQ3 to 220', HWT casing stuck in drillhole, had to be cut, drill steel remains in the ground from 86 to 117'	
5	1		Sandy, silty GRAVEL, trace cobbles, trace clay, subangular to subrounded, clasts up to cobble size, well graded, low plasticity, brown, moist. (Colluvium)	26	0	☒	GH08-173-1	4/3/4	7	●		
10	3			40	53	☒	GH08-173-2	15/23/23	46	●		
15	4											
	5		Gravelly silty SAND, trace clay, trace cobbles, silt content decreases with depth, subangular to subrounded, clasts up to cobble size, poorly to well graded, non plastic, hematite on some subangular clasts, light brown, moist. (Colluvium)	5	72	☒	GH08-173-3	16/25/29	54	●	Most fines washed away in drill return.	
20	6			33	56	☒	GH08-173-4	12/10/4	14	●		
25	8			0	72	☒	GH08-173-5	2/12/15	27	●	Lost circulation from 25-35', partial recovery from 30 to 35'. SPTs not performed past 25 ft depth due to broken cathead.	
30	9			49								
35	10			62								
40	12											
	13		Gravelly SAND, some silt, trace clay, some cobbles and boulders, subangular, clasts up to boulder size, poorly graded, no to low plasticity, brown with some orange zones of iron staining, moist. (Colluvium)	60								
45	14			69								
50	15			87							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
55	17			53								
60	18			74								
65	19			61								
70	20			82								
75	22											
	23		Gravelly SAND, some silt, trace cobbles and boulders, hematite on some clast surfaces, zones with higher silt content with better recovery, subrounded to subangular, clasts up to boulder size, non plastic, brown, moist. (Colluvium)	74							Fines washed away in drill return.	
80	24			67								
85	25			82								
90	26			66								
95	28			63							Heaving Sand.	
	29											
	30											

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Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-173

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Project:	**Pebble Project**	Drill Hole No.	**GH08-173**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 24, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1342.22 ft**	Date Completed:	**Jul 27, 08**
Location:	**Area L**	Total Depth:	**220 ft**	Logged by:	**RS/DM**
Coordinates:	**2,146,475 N , 1,372,111 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			43								
105	32		BEDROCK or possible boulder, Granodiorite, medium grained, light grey in colour, brecciated with a matrix of fine grained feldspar and epidote, thought to be a boulder as this unit overlies a younger Tertiary unit, could also possibly be a thrust fault or overturning, competent.	52							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
110	33											
	34			89								
115	35											
	36			100								
120	37			100							Lost circulation at 122'.	
125	38											
	39			100								
130	40			100								
135	41											
	42		BEDROCK, Tertiary volcaniclastic breccia, contains fragments/clasts of granodiorite similar to the unit above as well as fragments of basalt and sedimentary rocks, some calcite and chlorite veins, competent, some vertical fracturing, moderately fractured.	100								
140	43			100								
	44											
145	45			100								
150	46			100								
	47											
155	48			100								
160	49			100								
	50											
165	51			100								
170	52			100								
	53											
175	54			92								
180	55			100								
	56											
185	57			100								
190	58			100								
	59											
195	60			100								

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Date Revised: Jun 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-173**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 24, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1342.22 ft**	Date Completed:	**Jul 27, 08**
Location:	**Area L**	Total Depth:	**220 ft**	Logged by:	**RS/DM**
Coordinates:	**2,146,475 N , 1,372,111 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100						■		
	63			100						●		
210	64											
	65			96						●■		
215	66											
				97						■		
220	67		END OF HOLE @ 220 FT									
225	68											
	69											
230	70											
	71											
235	72											
	73											
240	74											
	75											
245	76											
	77											
250	78											
	79											
255	80											
	81											
260	82											
	83											
265	84											
	85											
270	86											
	87											
275	88											
	89											
280	90											
	91											
285												
290												
295												

Pebble Limited Partnership
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SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jun 1, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-176**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 31, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1575.55 ft**	Date Completed:	**Aug 3, 08**
Location:	**Area L**	Total Depth:	**145 ft**	Logged by:	**RS/DM**
Coordinates:	**2,140,251 N , 1,371,615 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0–25	0–8		Sandy GRAVEL, some silt/clay, trace cobbles, subangular, clasts up to cobble size, gap graded, low plasticity, light brown, moist. (Felsenmeer)	20 / 82 / 23 / 20 / 23							PQ3 to 40' HWT to 42' HQ3 to 145' 300 lb boulder had to be moved at the surface to start drilling, felsenmeer on surface.	
25–145	8–30		BEDROCK, Tertiary Volcaniclastic Breccia, reddish-brown to grey in colour, clasts are angular to subrounded ranging in size from 5mm to > 0.5 m, clasts are mostly granodiorite from 25.5 to 70 ft, 70 to 145 ft is polymictic with some basaltic material present as both clasts and matrix.	100 / 49 / 91 / 98 / 100 / 100 / 100 / 95 / 100 / 100 / 94 / 96 / 100 / 100 / 100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89). ***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-176

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jul 4, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-176**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Jul 31, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1575.55 ft**	Date Completed:	**Aug 3, 08**
Location:	**Area L**	Total Depth:	**145 ft**	Logged by:	**RS/DM**
Coordinates:	**2,140,251 N , 1,371,615 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31–32			100							Lost circulation from 125 to 130'.	
	32–33			100								
110	33–34			100							Clay seam 132.5 to 135'.	
115	34–35			100								
120	35–36			100								
	36–37			100								
125	37–38			100								
130	38–39			100								
	39–40			100								
135	40–41			100								
140	41–42			100								
145	42–43			100								
	43–44											
	44–45		END OF HOLE @ 145 FT									
150	45–46											
	46–47											
155	47–48											
160	48–49											
	49–50											
165	50–51											
170	51–52											
	52–53											
175	53–54											
180	54–55											
	55–56											
185	56–57											
190	57–58											
	58–59											
195	59–60											

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Pebble Limited Partnership
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Date Revised: Jul 4, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-178**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 9, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1346.2 ft**	Date Completed:	**Aug 12, 08**
Location:	**Area E**	Total Depth:	**260 ft**	Logged by:	**RS/DM**
Coordinates:	**2,161,569 N , 1,392,234 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, dark brown, organics, moist. (Topsoil)	30							PQ3 to 95' HQ3 to 110' NQ3 to 260'	
5	1		Silty GRAVEL, some sand, some clay, trace cobbles, subangular to rounded, clasts up to cobble size, gap graded, low plasticity, brown, moist. (Glacial Drift)	24								
10	3			43								
15	4			18	56		GH08-178-1	12/15/16	31			
20	6			23	64		GH08-178-2	7/15/26	41			
25	7											
30	8		Sandy GRAVEL, trace silt, trace cobbles, subangular, clasts up to cobble size, poorly graded, no to low plasticity, grey/brown, moist, fines washed away. (Glacial Drift)	41	64		GH08-178-3	13/35/40	75			
30	9			39	56		GH08-178-4	13/28/39	67			
35	10			28	39		GH08-178-5	8/14/29	43			
40	12			24	38		GH08-178-6	11/50+/+	50++		***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
45	13			77	72		GH08-178-7	12/25/50+	50+			
50	15			76			GH08-178-8	50+/+/+	50+++			
55	16			38								
60	17			45								
65	19			48	133		GH08-178-9	50+/+/+	50+++			
70	20			35								
75	21			41	69		GH08-178-10	26/50/50+	50+			
80	23			30								
85	24			24	42		GH08-178-11	15/50+/+	50++			
90	26			98								
95	27		BEDROCK, Basalt, dark blue-green in colour, highly fractured, calcite and pyrite veins, chlorite, epidote.	75							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	28			33								
	29			93								
	30			77								
				66								

Pebble Limited Partnership
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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jul 4, 09

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-178**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 9, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1346.2 ft**	Date Completed:	**Aug 12, 08**
Location:	**Area E**	Total Depth:	**260 ft**	Logged by:	**RS/DM**
Coordinates:	**2,161,569 N , 1,392,234 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		BEDROCK, Basalt, dark blue-green in colour, moderately fractured, calcite and pyrite veins, chlorite, epidote.	96								
105	32											
	33			100								
110	34											
				91								
115	35											
	36			100								
120	37											
				96								
125	38											
	39			92								
130	40											
				87								
135	41											
	42			94								
140	43											
				98								
145	44											
	45			93								
150	46											
				96								
155	47											
	48		BEDROCK, Basalt, dark blue-green in colour, heavily fractured, possible fault zone, calcite and pyrite veins, chlorite, epidote.	72								
160	49											
				94								
165	50											
	51			60								
170	52											
				87								
175	53			94								
	54			57								
180	55			87								
				89								
	56			69								
185				24								
	57			82								
				59								
190	58			31								
				73								
	59			31								
195	60			31								

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Project:	**Pebble Project**	Drill Hole No.	**GH08-178**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 9, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1346.2 ft**	Date Completed:	**Aug 12, 08**
Location:	**Area E**	Total Depth:	**260 ft**	Logged by:	**RS/DM**
Coordinates:	**2,161,569 N , 1,392,234 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			20								
	63			37								
210	64											
	65			72								
215	66			80								
220	67		BEDROCK, Basalt, dark blue-green in colour, moderately fractured, calcite and pyrite veins, chlorite, epidote.	86								
	68											
225	69			100								
230	70											
	71			93								
235	72			100								
240	73											
	74			93								
245	75			100								
	76											
250	77			100								
255	78			100								
	79											
260	80		END OF HOLE @ 260 FT									
265	81											
	82											
270	83											
275	84											
	85											
280	86											
285	87											
	88											
290	89											
295	90											
	91											

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Date Revised: Jul 4, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-179**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 13, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1309.4 ft**	Date Completed:	**Aug 16, 08**
Location:	**Area E**	Total Depth:	**215 ft**	Logged by:	**LB/DM/DG**
Coordinates:	**2,162,015 N , 1,391,461 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
5	1		Gravelly SAND, trace to some silt, trace to some clay, trace cobbles, varying amounts of SAND and GRAVEL, subangular, clasts up to cobble size, well graded, low plasticity, brown, moist. (Glacial Drift)	19							PW to 28.5' PQ3 to 85' HQ3 to 100' NQ3 to 215'	
				22								
	2			9	61	☒	GH08-179-1	9/7/8	15	●		
10	3				36	☒	GH08-179-2	6/13/16	29	●		
	4			14								
15	5				69	☒	GH08-179-3	8/11/16	27	●	Heaving Sands, rods sanded in.	
				12								
20	6			36	100	☒	GH08-179-4	50+/+/+	50+++	●		
	7			19								
25	8				11	☒	GH08-179-5	11/14/15	29	●		
				12								
30	9				67	☒	GH08-179-6	13/19/25	44	●		
	10			33								
35	11		SAND and SILT, some gravel, trace clay, trace cobbles, subangular, clasts up to cobble size, well graded, low plasticity, light brown, moist. (Glacial Drift)		39	☒	GH08-179-7	15/34/39	73	●		
				41								
40	12				47	☒	GH08-179-8	6/11/8	19	●		
	13			13								
45	14		SAND and GRAVEL, trace silt, trace cobbles, varying amounts of gravel content throughout interval but generally gravel content slightly increases with depth, subangular to subrounded, clasts up to boulder size, poorly graded, grey, moist. (Glacial Drift)	39	58	☒	GH08-179-9	17/39/?	50+	●		
				28								
50	15				44	☒	GH08-179-10	19/39/36	75	●		
	16			20								
55	17			35								
60	18				0		GH08-179-11	50+/+/+	50+++			
	19			49								
65	20			18								
	21			10								
70	22				56	☒	GH08-179-12	29/25/31	56	●		
				26								
75	23			19								
80	24											
	25			42								
			BEDROCK, Basalt, fine grained, moderately fractured, some oxidation at shallow depths coating fracture surfaces 83 to 91 ft, calcite veins, pyrite veins, epidote, quartz, rock becomes more competent with depth.	74						■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
85	26			95						■		
				100								
90	27			96						●		
	28			100						●		
95	29											
				100						●		
	30											

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Project No.	Ref. No.	Rev.
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Date Revised: Jul 4, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-179**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 13, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1309.4 ft**	Date Completed:	**Aug 16, 08**
Location:	**Area E**	Total Depth:	**215 ft**	Logged by:	**LB/DM/DG**
Coordinates:	**2,162,015 N , 1,391,461 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			65							Possible Void?	
105	32			68								
	33			94								
110	34			100								
115	35											
	36			100								
120	37			100								
125	38											
	39			100								
130	40			100								
135	41											
	42			100								
140	43			100								
145	44											
	45			99								
150	46			100								
155	47											
	48			100								
160	49			99								
165	50											
	51			100								
170	52			100								
175	53											
	54			100								
180	55			100								
185	56											
	57			100								
190	58			100								
195	59											
	60			100								

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Date Revised: Jul 4, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-179**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 13, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1309.4 ft**	Date Completed:	**Aug 16, 08**
Location:	**Area E**	Total Depth:	**215 ft**	Logged by:	**LB/DM/DG**
Coordinates:	**2,162,015 N , 1,391,461 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100						■		
	63			100						●		
210	64											
	65			100						■		
215	66		END OF HOLE @ 215 FT								***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
220	67											
	68											
225	69											
	70											
230	71											
	72											
235	73											
	74											
240	75											
	76											
245	77											
	78											
250	79											
	80											
255	81											
	82											
260	83											
	84											
265	85											
	86											
270	87											
	88											
275	89											
	90											
280	91											
285												
290												
295												

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jul 4, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-183**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 24, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1309.5 ft**	Date Completed:	**Aug 27, 08**
Location:	**Area E**	Total Depth:	**270 ft**	Logged by:	**DG/DB**
Coordinates:	**2,159,867 N , 1,391,073 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
5	1		Tundra vegetation, dark brown, roots, organics, moist. (Topsoil)	40							PQ3 to 50' HQ3 to 180' NQ3 to 270' HWT to 180', casing stuck from 25 to 40'	
			SILT and SAND, some clay, trace gravel, subrounded to subangular, clasts up to gravel size, poorly graded, low plasticity, light brown, moist. (Colluvium)	52	56	☒	GH08-183-1	2/7/14	23	●		
10	3			59	94	☒	GH08-183-2	3/6/9	18	●		
	4			33								
15	5		Gravelly SAND, some silt, trace clay, trace cobble, subrounded to subangular, clasts up to cobble size, well graded, non plastic, grey, moist. (Glacial Drift)	38	100	☒	GH08-183-3	9/20/50+	50+	●		
20	6			37	100	☒	GH08-183-4	15/14/15	44	●	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
25	8		Silty SAND, some gravel, trace clay, trace cobble, subrounded to subangular, clasts up to cobble size, poorly graded, non plastic, brown, moist. (Glacial Drift)	30	72	☒	GH08-183-5	4/4/6	14	●		
30	9			60	72	☒	GH08-183-6	7/9/13	29	●		
	10		SAND, some gravel, some silt, subrounded to subangular, clasts up to gravel size, poorly graded, non plastic, light brown, moist. (Glacial Drift)	94							Heaving sands at 35'	
35	11			66	100	☒	GH08-183-7	//50+	50+	●		
40	12		EXTREMELY WEATHERED BEDROCK, SAND and GRAVEL, some silt, medium to fine grained sand, subrounded to subangula, clasts up to gravel size, well graded, non plastic, light brown, moist.	40	67	☒	GH08-183-8	19/44/50+	50+	●		
45	14			87						■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
50	15		WEATHERED BEDROCK, Granodiorite, medium to coarse grained, hornblende, quartz, feldspars, heavily fractured and oxidized.	93						■		
55	17			89						■		
60	18			83						■		
	19			93						■		
65	20			87						■		
70	21			79						■		
75	23			79						■		
80	24			92						■		
85	26			79						■		
90	27			87						■		
95	29			45						■		

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-183

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-183

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jul 4, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-183**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 24, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1309.5 ft**	Date Completed:	**Aug 27, 08**
Location:	**Area E**	Total Depth:	**270 ft**	Logged by:	**DG/DB**
Coordinates:	**2,159,867 N , 1,391,073 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	NOTES	WELL DETAILS
	31			67							
105	32			81							
	33										
110	34			66							
115	35			62							
	36										
120	37			30							
125	38			52							
	39										
130	40			89							
135	41			85							
	42										
140	43			26							
145	44										
	45			100							
150	46			92							
	47			66							
155	48			93							
160	49		BEDROCK, Granodiorite, medium to coarse grained, hornblende, quartz, feldspars, heavily fractured, chlorite, epidote, hematite alteration.	88							
	50										
165	51			100							
170	52			99							
	53										
175	54			88							
180	55			100							
				67							
	56		BEDROCK, Basalt, fine grained, black, calcite veins, more competent.	98							
185	57			87							
190	58		BEDROCK, Granodiorite, medium to coarse grained, hornblende, quartz, feldspars, heavily fractured, chlorite, epidote, hematite alteration.	87							
	59										
195	60		BEDROCK, Basalt, fine grained, black, calcite veins, more competent.	100							

SPT TEST DATA Uncorrected 'N' values vs. depth (●)

RQD DATA (%) (■) 20 40 60 80

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-183

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	4	0

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Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Jul 4, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-183**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 24, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1309.5 ft**	Date Completed:	**Aug 27, 08**
Location:	**Area E**	Total Depth:	**270 ft**	Logged by:	**DG/DB**
Coordinates:	**2,159,867 N , 1,391,073 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62		BEDROCK, Granodiorite, medium to coarse grained, hornblende, quartz, feldspars, heavily fractured, chlorite, epidote, hematite alteration.	35								
210	63			54								
215	64			44								
220	65			52								
225	66			100								
230	67		BEDROCK, Granodiorite, medium to coarse grained, hornblende, quartz, feldspars, moderately fractured, chlorite, epidote, hematite alteration .	66								
235	68			100								
240	69			100								
245	70			75								
250	71			83								
255	72			75								
260	73			85								
265	74			100								
270	75			100							Core improperly labelled in photographs, hole continues to 270'.	
275	76			100								
280	77			100								
285	78											
290	79											
295	80											
	81											
	82		END OF HOLE @ 270 FT									
	83											
	84											
	85											
	86											
	87											
	88											
	89											
	90											
	91											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-183

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jul 4, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-186**	Page	**1** of **1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 29, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1316.4 ft**	Date Completed:	**Aug 29, 08**
Location:	**Area G**	Total Depth:	**24.5 ft**	Logged by:	**DB/WX**
Coordinates:	**2,160,728 N , 1,379,386 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation with organics, very dark brown, wet. (Topsoil)	87							PQ3 to 15' HQ3 to 24.5'	
5	1		Clayey SILT, some gravel, subangular, clasts up to gravel size, gap graded, low plasticity, light grey brown, moist. (Colluvium)	45							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	3		WEATHERED BEDROCK, Fragments of dark grey Gabbro, oxidation on some fragments, fine material washed away.	72							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
15	5			51								
20	6		BEDROCK, Gabbro, dark grey, plagioclase, pyroxene, competent, moderately fractured, oxidation on fractures.	100								
25	8		END OF HOLE @ 24.5 FT									
30	9											
35	10											
40	12											
45	13											
50	14											
55	15											
60	17											
65	18											
70	19											
75	21											
80	22											
85	23											
90	25											
95	26											
	27											
	28											
	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-186

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jul 5, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-187**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 29, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1497.7 ft**	Date Completed:	**Aug 31, 08**
Location:	**Area G**	Total Depth:	**145 ft**	Logged by:	**DG/AW/DB/WX**
Coordinates:	**2,159,911 N , 1,383,083 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE (SPT TEST DATA Uncorrected 'N' values vs. depth (●); RQD DATA (%) (■); 20 40 60 80)	NOTES	WELL DETAILS
0	0		Tundra Vegetation, dark brown, organics, moist. (Topsoil)	47						PQ3 to 40' HQ3 to 145'	
5	1		WEATHERED BEDROCK, Basalt, moderately to highly fractured basalt with highly to completely weathered zones, infillings of clay and silt, oxidation on fracture surfaces.	97							
10	2			100							
15	3			72							
20	4			92						***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
25	5			90							
30	6			98							
35	7			100							
40	8		BEDROCK, Basalt, dark green/black vesicular fine grained basalt, moderately fractured, oxidized zones.	78						* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
45	9			100							
50	10			22							
55	11			3							
60	12			98							
65	13			100							
70	14			85							
75	15			87							
80	16		BEDROCK, Granodiorite, competent, weakly altered, oxidation on fractures.	89							
85	17			100							
90	18			100							
95	19		BEDROCK, Basalt, transitioning from granodiorite, dark green/black vesicular fine grained basalt, less fractured, oxidized zones, calcite on fractures and in veins.	100							
100	20			100							

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-187

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jul 5, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-187**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 29, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond Drill**	Elevation:	**1497.7 ft**	Date Completed:	**Aug 31, 08**
Location:	**Area G**	Total Depth:	**145 ft**	Logged by:	**DG/AW/DB/WX**
Coordinates:	**2,159,911 N , 1,383,083 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100								
	33											
110	34			100								
115	35											
	36			100								
120	37			100								
125	38		BEDROCK, Granodiorite, competent, slightly altered, oxidation on fractures.	100								
	39											
130	40			100								
135	41											
	42			100								
140	43		BEDROCK, Basalt, transitioning from granodiorite, dark green/black vesicular fine grained basalt, competent.	100								
145	44		END OF HOLE @ 145 FT									
	45											
150	46											
	47											
155	48											
160	49											
	50											
165	51											
170	52											
	53											
175	54											
180	55											
	56											
185	57											
190	58											
	59											
195	60											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-187

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Jul 5, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-188**	Page	**1** of **1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Aug 31, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1764.6 ft**	Date Completed:	**Sep 1, 08**
Location:	**Area G**	Total Depth:	**90 ft**	Logged by:	**DG/AW/DB/WX**
Coordinates:	**2,159,683 N , 1,384,804 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			No recovery, washed away in drill return.	0							PQ3 to 10' HQ3 to 90'	
5	1		WEATHERED BEDROCK, SILT/CLAY, some sand, bedrock fragments up to cobble size, angular to subangular, gap graded, low plasticity, grey brown, moist.	100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	3		BEDROCK, Basalt, dark green, porphyritic, minor vesicles filled with pyrite, quartz, calcite, and ankerite, iron staining on joints.	87								
15	4			96								
20	5			99								
25	6			100								
30	7			100								
35	8			26							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
40	9			73								
45	10			100								
50	11			100								
55	12			100								
60	13			100								
65	14			100								
70	15			100								
75	16			100								
80	17			100								
85	18			100								
90	19			100								
95	20			100								
	21			100								
	22			100								
	23			100								
	24			100								
	25			100								
	26			100								
	27											
	28		END OF HOLE @ 90 FT									
	29											
	30											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-188

Knight Piésold CONSULTING

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VA101-176/23	**4**	**0**

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Date Revised: May 27, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-189**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 1, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1375 ft**	Date Completed:	**Sep 7, 08**
Location:	**Area E**	Total Depth:	**350 ft**	Logged by:	**DG/DB**
Coordinates:	**2,160,625 N , 1,392,769 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, some fine grained gravel, brown, primarily organics, moist to wet. (Topsoil)	28							PQ3 to 85' HQ3 to 185' NQ3 to 350'	
5	1		SAND and SILT, trace gravel, trace clay, trace cobbles, subangular to subrounded, poorly graded, non plastic, brown, moist. (Glacial Drift)	27	67		GH08-189-1	8/14/31	45			
10	3		SAND and GRAVEL, varying amounts of sand and gravel throughout interval, trace to some silt, trace cobble, trace clay, subangular to subrounded, clasts up to cobble size, poorly graded, no to low plasticity, light brown to grey, moist. (Glacial Drift)	38	72		GH08-189-2	19/27/32	59		.	
15	5			28	67		GH08-189-3	31/50+/+	50++			
20	6			54	88		GH08-189-4	30/50+/+	50++			
25	8			43	67		GH08-189-5	50/50/45	95		***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
30	9			33	28		GH08-189-6	4/7/50+	50+			
35	11			7	39		GH08-189-7	3/25/50+	50+			
40	12			46	64		GH08-189-8	20/50+/+	50++			
45	14			22	63		GH08-189-9	6/50/50+	50+			
50	15			30								
55	17			17	111		GH08-189-10	40/50+/+	50++			
60	18			16	0		GH08-189-11	50+/+/+	50+++			
65	20			33								
70	21		Sandy, silty GRAVEL, trace clay, trace cobbles, subangular, clasts up to cobble size, well graded, medium to low plasticity, very oxidized, rust brown, moist, possible weathered bedrock, difficult to discern. (Glacial Drift)	72	88		GH08-189-12	36/50+/+	50++			
75	22			89								
80	23			98								
	24			100								
	25		EXTREMELY WEATHERED BEDROCK, weathered to Sandy, silty GRAVEL, trace clay, subangular to subrounded, clasts up to boulder size, well graded, low to medium plasticity, orange-brown, moist, seems to be oxidized, weathered Tertiary Volcaniclastic Breccia?.	69	100		GH08-189-13	50+/+/+	50+++			
85	26			90								
90	27			46								
	28		BEDROCK, Granodiorite, mafic rich, groundmass consists of quartz and feldspar, limonite along fractures, major fault below 105 ft extending into the lower basalt unit to 140 ft,	54							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
95	29			59								
	30											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-189

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Date Revised: Jul 5, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-189**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 1, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1375 ft**	Date Completed:	**Sep 7, 08**
Location:	**Area E**	Total Depth:	**350 ft**	Logged by:	**DG/DB**
Coordinates:	**2,160,625 N , 1,392,769 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE / RQD DATA (%) (20 40 60 80)	NOTES	WELL DETAILS
	31		very gougey and clay filled.	52							
105	32			52							
	33										
110	34		BEDROCK, Basalt, Cretaceous?, chloritic, blackish grey to green, clasts of granodiorite entrained, calcite veins and infilling, chlorite to serpentine alteration, very broken to 140' with numerous gougey/clayey zones, contact with lower basalt unit is a healed breccia.	54							
115	35			54							
	36										
120	37			47							
125	38			72							
	39										
130	40			24							
135	41			100							
	42										
140	43			100							
	44										
145	45			100							
150	46			54							
	47			94							
155	48			100							
160	49			91							
	50										
165	51			62							
170	52			100							
	53										
175	54			100							
180	55			99							
	56			96							
185	57			78							
				100							
190	58			68							
	59										
195	60			87							

SPT TEST DATA Uncorrected 'N' values vs. depth (●)

RQD DATA (%) (■)

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-189

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jul 5, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-189**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 1, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1375 ft**	Date Completed:	**Sep 7, 08**
Location:	**Area E**	Total Depth:	**350 ft**	Logged by:	**DG/DB**
Coordinates:	**2,160,625 N , 1,392,769 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE (SPT TEST DATA Uncorrected 'N' values vs. depth (●); RQD DATA (%) (■); 20 40 60 80)	NOTES	WELL DETAILS
205	62			73							
	63			54							
210	64			66							
	65										
215	66			49							
220	67			87							
	68										
225	69			97							
230	70										
	71			100							
235	72			89							
	73			92							
240	74			48							
245	75			100							
250	76										
	77			85							
255	78			66							
260	79										
	80			100							
265	81			75							
270	82										
	83			47							
275	84		BEDROCK, Basalt, Cretaceous?, chloritic, blackish grey to green, calcite veins and infilling.	100							
				98							
	85			59							
280				92							
	86			100							
285	87			100							
290	88										
	89			100							
295	90			100							
	91										

Pebble Limited Partnership
Pebble Project
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Project No.	Ref. No.	Rev.
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GH08-189

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Date Revised: Jul 5, 09

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-189**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 1, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1375 ft**	Date Completed:	**Sep 7, 08**
Location:	**Area E**	Total Depth:	**350 ft**	Logged by:	**DG/DB**
Coordinates:	**2,160,625 N , 1,392,769 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
305	92–93			100								
	93–94			87								
310	94–95											
	95–96			100								
315	96–97			66								
320	97–98			50								
	98–99											
325	99–100			34								
330	100–101			81								
	101–102											
335	102–103			19								
340	103–104											
	104–105											
345	105–106			68								
350	106–107		END OF HOLE @ 350 FT									
	107–108											
355	108–109											
	109–110											
360	110–111											
	111–112											
365	112–113											
370	113–114											
	114–115											
375	115–116											
380	116–117											
	117–118											
385	118–119											
390	119–120											
	120–121											
395	121											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-189

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Project No.	Ref. No.	Rev.
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Date Revised: Jul 5, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-198**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 16, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1416.7 ft**	Date Completed:	**Sep 17, 08**
Location:	**Area E**	Total Depth:	**200 ft**	Logged by:	**EC/DG**
Coordinates:	**2,162,343 N , 1,395,936 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, dark brown, dominated by organics, bottom portion is sandy, moist. (Topsoil)	30							PQ3 to 35' HQ3 to 200'	
5	1		Sandy GRAVEL, some silt, trace clay, trace cobble, silt content decreases to trace towards bottom of interval, subangular, clasts up to cobble size, clasts are mostly granodiorite with iron staining, well graded transitioning to poorly graded with depth, low to no plasticity, brown, moist. (Glacial Drift)	66	67		GH08-198-1	7/24/29	53			
10	2											
	3			60	44		GH08-198-2	18/23/41	64			
	4			47								
15				46								
	5				53		GH08-198-3	18/29/37	66			
20	6			81								
	7		WEATHERED BEDROCK, highly to completely weathered Granodiorite, becoming less weathered with depth, gravel to cobble size fragments of granodiorite in a sandy material.	31							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
25	8			25								
30	9			49								
	10			46								
35	11		BEDROCK, Granodiorite, light to medium grey, medium grained, quartz dominated matrix, moderately weathered and more fractured and rubbly from 35 to 55, moderately hard, competent, minor fracturing, trace narrow quartz-pyrite veinlets, disseminated pyrite, chalcopyrite blebs, rare molybdenite, some calcite, epidote, sericite and chlorite infilling.	81							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
40	12			91								
45	13											
	14			92								
50	15			96								
	16			98								
55	17			100								
	18											
60	19			100								
65	20			100								
	21											
70	22			100								
75	23			100								
	24											
80	25			100								
85	26			100								
	27											
90	28			100								
95	29			97								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-198

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SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-198**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 16, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1416.7 ft**	Date Completed:	**Sep 17, 08**
Location:	**Area E**	Total Depth:	**200 ft**	Logged by:	**EC/DG**
Coordinates:	**2,162,343 N , 1,395,936 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			98								
105	32			97								
	33											
110	34			100								
115	35			98								
	36											
120	37			100								
125	38			100								
	39											
130	40			100								
135	41			94								
	42											
140	43			100								
145	44			98								
	45											
150	46			100								
155	47			95								
	48											
160	49			98								
165	50			100								
	51											
170	52			99								
175	53			100								
	54											
180	55			100								
185	56			99								
	57											
190	58			100								
195	59			100								
	60											

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Project:	**Pebble Project**	Drill Hole No.	**GH08-198**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 16, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1416.7 ft**	Date Completed:	**Sep 17, 08**
Location:	**Area E**	Total Depth:	**200 ft**	Logged by:	**EC/DG**
Coordinates:	**2,162,343 N , 1,395,936 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	62		END OF HOLE @ 200 FT									
205	63											
210	64											
	65											
215	66											
220	67											
	68											
225	69											
230	70											
	71											
235	72											
240	73											
	74											
245	75											
250	76											
	77											
255	78											
260	79											
	80											
265	81											
270	82											
	83											
275	84											
280	85											
	86											
285	87											
290	88											
	89											
295	90											
	91											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Project:	**Pebble Project**	Drill Hole No.	**GH08-199**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 17, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1331 ft**	Date Completed:	**Sep 20, 08**
Location:	**Area L**	Total Depth:	**245 ft**	Logged by:	**CD/CG**
Coordinates:	**2,139,428 N , 1,380,179 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, dark brown to black, vegetation roots, moist. (Topsoil)	100							PQ3 to 15' HQ3 to 90' NQ3 to 245'	
5	1			66								
	2		Gravelly SAND, some silt, trace clay, trace cobbles, subangular, clasts up to cobble size, well graded, low to medium plasticity, dark to light brown, moist. (Glacial Drift)	100	78	☒	GH08-199-1	7/13/24	37	●		
10	3			100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	4			92						■		
15	5		BEDROCK, Tertiary Volcaniclastic Breccia, light brown to grey, polymictic, subangular to rounded, <1cm to >4cm diameter clasts, poorly sorted, quite oxidized, calcite veins in matrix.	67						■		
20	6											
	7			93						■		
25	8			95						■		
30	9											
	10		BEDROCK, Tertiary Basalt Breccia, dark grey to red, brecciated, some amygdules, moderate to strong iron oxidation on fracture surfaces, some calcite veins.	100						■		
35	11			100						■		
40	12											
	13			100						■	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
45	14			96						■		
50	15											
	16			96						■		
55	17			95						■		
60	18											
	19			98						■		
65	20			99						■		
70	21											
	22			99						■		
75	23		BEDROCK, Tertiary Conglomerate, light to dark grey, polymictic, poorly sorted, matrix supported fragmental rock, subangular to rounded, >6cm to <2cm diameter fragments, heavily weathered and oxidized in sections, minor pyrite in granodiorite clasts, calcite.	100						■		
80	24											
	25			100						■	Shear zone 82 to 83.5', circulation lost from 85 to 90', regained after NWT casing is installed to 90'.	
85	26			100						■		
90	27											
	28			72						■		
95	29			100						■		
	30			100						■		

Pebble Limited Partnership
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Project:	**Pebble Project**	Drill Hole No.	**GH08-199**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 17, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1331 ft**	Date Completed:	**Sep 20, 08**
Location:	**Area L**	Total Depth:	**245 ft**	Logged by:	**CD/CG**
Coordinates:	**2,139,428 N , 1,380,179 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			94								
	33			97								
110	34			95								
	35			99								
115				98								
				28								
	36		BEDROCK, Tertiary Basalt Breccia, dark grey to red, brecciated, some amygdules, moderate to strong iron oxidation on fracture surfaces, some calcite veins.	84							No circulation 117 to 120'	
120				100								
	37			100							Minimal circulation from 120 to 130'.	
125	38											
	39			100								
130	40			94							Circulation Lost at 130', did not return.	
	41											
135	42			100								
	43			95								
140	44											
145	45			100								
	46			100								
150	47											
155	48			100								
	49			99								
160	50											
165	51			100								
	52			97								
170	53											
175	54			99								
	55			99								
180	56											
185	57			96								
	58			100								
190	59											
195	60			100								

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Project:	**Pebble Project**	Drill Hole No.	**GH08-199**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 17, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1331 ft**	Date Completed:	**Sep 20, 08**
Location:	**Area L**	Total Depth:	**245 ft**	Logged by:	**CD/CG**
Coordinates:	**2,139,428 N , 1,380,179 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62		BEDROCK, Tertiary Conglomerate, light to dark grey, polymictic, poorly sorted, matrix supported fragmental rock, subangular to rounded, >6cm to <2cm diameter clasts, calcite and chlorite infilling in joints, minor pyrite in granodiorite clasts..	100								
210	63			100								
215	64			100								
220	65			100								
225	66			100								
230	67			100								
235	68			93								
240	69			93								
245	70			100								
	71		END OF HOLE @ 245 FT									
250	72											
255	73											
260	74											
265	75											
270	76											
275	77											
280	78											
285	79											
290	80											
295	81											
	82											
	83											
	84											
	85											
	86											
	87											
	88											
	89											
	90											
	91											

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Pebble Limited Partnership
Pebble Project
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Project:	**Pebble Project**	Drill Hole No.	**GH08-200**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 18, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1442.7 ft**	Date Completed:	**Sep 20, 08**
Location:	**Upper Talarik Creek Area**	Total Depth:	**150 ft**	Logged by:	**EC/DG**
Coordinates:	**2,164,708 N , 1,399,869 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, dark brown, organics, moist. (Topsoil)	24							PQ3 to 50' HQ3 to 150'	
5	1		Gravelly, sandy SILT, some clay, trace cobbles, subangular, clasts up to cobble size, gap graded, medium plasticity, brown, moist. (Glacial Drift)	13	31	☒	GH08-200-1	7/7/7	14	●		
10	3			13	69	☒	GH08-200-2	7/4/6	10	●		
15	5			37	75	☒	GH08-200-3	5/8/14	22	●		
20	6		Clayey SILT, some sand, trace gravel, subangular, clasts up to gravel size, poorly graded, medium plasticity, light brown, moist. (Glacial Drift)	49	97	☒	GH08-200-4	9/20/35	55	●		
25	8		SAND and GRAVEL, some silt/clay, trace cobble, subangular, clasts up to cobble size, well graded, non plastic, brown, moist, fines washed away. (Glacial Drift)	35	65	☒	GH08-200-5	12/37/50+	50+	●	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
30	9			30			GH08-200-6	50+/+/+	50+++			
35	11			15	75	☒	GH08-200-7	13/24/27	51	●		
40	12		BEDROCK, Basalt, light grey to light brown, highly siliceous, wacke interbeds, moderately altered, high amounts of pyrite with minor chalcopyrite, relatively brecciated in upper 80 ft, granodiorite? between 103 and 105 ft depth and between 140 and 144.5 ft depth, calcite, chlorite and iron staining in joints, highly fractured 41 to 95 ft, more competent from 95 to 150 ft.	89	100	▬	GH08-200-8	50+/+/+	50+++	●	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
45	14			90								
50	15			89								
55	17			86								
60	18			100								
65	19			78								
70	20			100								
75	22			99								
80	23			100								
85	24			98								
90	26			100								
95	27			99								
	28			100								
	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-200

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Project:	**Pebble Project**	Drill Hole No.	**GH08-200**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 18, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1442.7 ft**	Date Completed:	**Sep 20, 08**
Location:	**Upper Talarik Creek Area**	Total Depth:	**150 ft**	Logged by:	**EC/DG**
Coordinates:	**2,164,708 N , 1,399,869 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31–32			100								
	32–33			100								
110	33–34			100								
115	34–35			100								
120	35–36			95								
125	36–37			100								
130	38–39			97								
135	40–41			100								
140	42–43			98								
145	44–45			100								
150	46		END OF HOLE @ 150 FT									
155	47–48											
160	49–50											
165	51–52											
170	53–54											
175	54–55											
180	56–57											
185	57–58											
190	59–60											
195												

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Project:	**Pebble Project**	Drill Hole No.	**GH08-201**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 20, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1296 ft**	Date Completed:	**Sep 24, 08**
Location:	**Upper Talarik Creek Area**	Total Depth:	**238 ft**	Logged by:	**EC/DG/SC**
Coordinates:	**2,164,347 N , 1,401,337 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
5	1		Gravelly SAND, some silt, some clay, trace cobble, subangular to subrounded, well graded, medium plasticity, brown, moist, silt content increases at approximately 30 ft depth. (Glacial Drift)	16							NQ3 to 153.8', HQ3 to165.5' NQ3 to 238' PW to 21.5' PQ3 to 74' HWT to 83' HQ3 to 135'	
	2			11	17	☒	GH08-201-1	2/2/2	4	●		
10	3			5	33	☒	GH08-201-2	4/4/3	7	●		
15	4			20	39	☒	GH08-201-3	6/4/6	10	●		
	5											
20	6			45	42	☒	GH08-201-4	20/15/18	33	●		
25	7			21	94	☒	GH08-201-5	10/50+/+	50++			
	8											
30	9			25	56	☒	GH08-201-6	11/15/25	40	●	***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
35	10			15	53	☒	GH08-201-7	9/19/25	44	●		
	11											
40	12			24			GH08-201-8	50+/+/+	50+++			
45	13											
	14		GRAVEL and SAND, some silt, trace clay, trace cobble, subangular to subrounded, clasts up to cobble size, poorly graded, no to low plasticity, light brown, moist, silt content decreases from 60 to 70 ft depth. (Glacial Drift)	15	39	☒	GH08-201-9	5/8/11	19	●	Flowing conditons at 47.5', ~5gpm.	
50	15			25	67	☒	GH08-201-10	26/27/27	54	●		
55	17			17							Piezometer was pressure grouted to stop artesian flow, 2.5gpm.	
60	18			18	50	☒	GH08-201-11	18/17/12	29	●		
	19											
65	20			42								
70	21				86	☒	GH08-201-12	10/16/15	31	●		
	22			16								
75	23			66								
				10								
80	24			51	85	☒	GH08-201-13	20/50+/+	50++			
	25		BEDROCK, Basalt, dark green-grey, fine to medium grained, fairly hard and moderately fractured, fractures along veins, minor zones of shattered rock, calcite stringers and veins, epidote, weak to moderate propylitic alteration, trace to minor chlorite, limonite on fractures, moderate disseminated and vein pyrite mineralization, rare disseminated chalcopyrite, weathered to 96.5'.	19							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
85	26			31								
90	27											
	28			90	0	☒	GH08-201-14	50+/+/+	50+++			
95	29			100								
	30			95								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-201

Rev. 0 - Issued for Report VA101-176/23-4

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Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-201

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Date Revised: Jun 30, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-201**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 20, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1296 ft**	Date Completed:	**Sep 24, 08**
Location:	**Upper Talarik Creek Area**	Total Depth:	**238 ft**	Logged by:	**EC/DG/SC**
Coordinates:	**2,164,347 N , 1,401,337 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	32			100								
	33											
110	34			96								
115	35											
	36			100								
120	37			96								
125	38											
	39			96								
130	40			97								
135	41											
	42			100								
140	43			100								
145	44											
	45			94								
150	46			26								
155	47			100								
	48			100								
160	49			100								
165	50											
	51			58								
170	52			93								
175	53											
	54			65								
180	55			95								
185	56											
	57			81								
190	58			66								
195	59			100								
	60			100								

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Jun 30, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-201**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 20, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1296 ft**	Date Completed:	**Sep 24, 08**
Location:	**Upper Talarik Creek Area**	Total Depth:	**238 ft**	Logged by:	**EC/DG/SC**
Coordinates:	**2,164,347 N , 1,401,337 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			100								
	63			100								
210	64			99								
	65											
215	66			100								
				49								
220	67											
	68			99								
225			BEDROCK, Fault Zone?, Basalt, light to	89								
	69		medium grey, fine to medium grained, clay	41								
			gouge, likely a fault but holes ends in material	54								
230	70		so extent is unknown.									
	71			97								
235												
	72			79								
240	73		END OF HOLE @ 238 FT									
	74											
245	75											
	76											
250	77											
	78											
255	79											
	80											
260	81											
	82											
265	83											
	84											
270	85											
	86											
275	87											
	88											
280	89											
	90											
285	91											
290												
295												

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Date Revised: Jun 30, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-202**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 25, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1073.1 ft**	Date Completed:	**Sep 26, 08**
Location:	**Upper Talarik Creek Area**	Total Depth:	**125 ft**	Logged by:	**EC/SC**
Coordinates:	**2,163,894 N , 1,404,030 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, dark brown, organics, moist. (Topsoil)	49							PW casing to 21'	
5	1			4							PQ3 to 40'	
	2		Silty SAND, some gravel, trace clay, trace cobble, subangular, clasts up to cobble size, poorly graded, low plasticity, brown, moist. (Glacial Drift)	13	64		GH08-202-1	2/4/4	8		HWT casing to 41'	
10	3				53		GH08-202-2	11/9/19	28		HQ3 to 125'	
	4		GRAVEL and SAND, some silt, trace cobble, subangular, clasts up to cobble size, poorly graded, brown to grey, moist, varying gravel content. (Glacial Drift)	25								
15	5			22	100		GH08-202-3	12/34/48	82			
20	6				81		GH08-202-4	20/49/46	95			
	7			28								
25	8				69		GH08-202-5	28/27/41	68		***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
				28								
30	9				64		GH08-202-6	12/17/17	34			
	10			36								
35	11		BEDROCK, Cretaceous Andesitic Bedded Siltstone, dark brown with patches of light grey, fine grained, minor wacke beds, highly mineralized with pyrite, some chalcopyrite, mineralization is disseminated and in veins, calcite veins and infilling, bedding 70°tca.	100	81		GH08-202-7	49/50+/+	50++		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
40	12			79								
	13			97								
45	14			100								
50	15											
	16			97								
55	17			98								
	18			97								
60	19			94								
65	20			98								
70	21											
	22			100								
75	23			100								
80	24											
	25			100								
85	26			100								
90	27											
	28			99								
95	29			95								
	30											

Pebble Limited Partnership
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SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-202**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 25, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1073.1 ft**	Date Completed:	**Sep 26, 08**
Location:	**Upper Talarik Creek Area**	Total Depth:	**125 ft**	Logged by:	**EC/SC**
Coordinates:	**2,163,894 N , 1,404,030 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	32			100								
	33		BEDROCK, Granodiorite, altered, fine-grained, light brown with patches of dark brown, pyrite veins and disseminations, some chalcopyrite.	100								
110	34			100								
115	35		BEDROCK, Cretaceous Andesitic Bedded Siltstone, dark brown with patches of light grey, fine grained, minor wacke beds, highly mineralized with pyrite, some chalcopyrite, mineralization is disseminated and in veins, calcite veins and infilling, bedding 70°tca.	100								
120	36			100								
125	37			100								
	38		END OF HOLE @ 125 FT									
130	39											
	40											
135	41											
	42											
140	43											
	44											
145	45											
150	46											
	47											
155	48											
160	49											
	50											
165	51											
170	52											
	53											
175	54											
180	55											
	56											
185	57											
190	58											
	59											
195	60											

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Date Revised: Jun 30, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-203**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 25, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1302.6 ft**	Date Completed:	**Sep 27, 08**
Location:	**Area L**	Total Depth:	**230 ft**	Logged by:	**CD/CG**
Coordinates:	**2,140,309 N , 1,373,795 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, dark brown black, organics, roots, moist. (Topsoil)	60							PQ3 to 20' HQ3 to 140' NQ3 to 230' ***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs*** * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	1											
	2		Gravelly, silty SAND, trace clay, trace cobble, subangular, clasts up to cobble size, well graded, low plasticity, brown, moist. (Glacial Drift)	75	67	☒	GH08-203-1	9/33/50+	50+			
10	3			82								
	4		BEDROCK, Tertiary Volcaniclastic Breccia, light to dark brown, polymictic, poorly sorted, clasts are 2mm to 5cm, angular to subrounded, 20% of granodiorite composition, some soft infilling.	85								
15	5			86								
20	6			96								
25	7											
	8			97								
30	9											
	10			96								
35	11			100								
40	12											
	13			100								
45	14			97								
50	15		BEDROCK, Tertiary Basalt, dark grey-black, fine grained.									
	16			99								
55	17		BEDROCK, Tertiary Volcaniclastic Breccia, light to dark brown, polymictic, poorly sorted, clasts are 2mm to 5cm, angular to subrounded, 20% of granodiorite composition, some soft infilling.	100								
	18											
60	19			100								
65	20			100								
	21		BEDROCK, Tertiary Basalt Breccia, dark greyish-green to reddish-brown, calcite and hematite veining, small massive sections.									
70	22			98								
75	23			92								
	24											
80	25			100								
85	26			100								
	27											
90	28			100								
95	29		BEDROCK, subangular to subrounded fragments of Granodiorite with chlorite and hematite filling the spaces between fragments, possible healed fault zone.	100								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-203

Knight Piésold CONSULTING

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Project:	**Pebble Project**	Drill Hole No.	**GH08-203**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 25, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1302.6 ft**	Date Completed:	**Sep 27, 08**
Location:	**Area L**	Total Depth:	**230 ft**	Logged by:	**CD/CG**
Coordinates:	**2,140,309 N , 1,373,795 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100								
	33											
110	34			98								
115	35											
	36			100								
120	37			100								
125	38											
	39			85								
130	40			100								
135	41											
	42			100								
140	43			86								
145	44											
	45			100								
150	46			100								
155	47											
	48			100								
160	49			98								
165	50											
	51			100								
170	52			98								
175	53											
	54			100								
180	55		BEDROCK, Granodiorite, light grey to pink, competent, soft gougey sections between 218 and 218.5 ft and between 224.5 and 225.5 ft, chlorite and calcite infilling in joints.	100								
185	56											
	57			100								
190	58											
	59			100								
195	60			100								

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Pebble Limited Partnership
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Project:	**Pebble Project**	Drill Hole No.	**GH08-203**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 25, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1302.6 ft**	Date Completed:	**Sep 27, 08**
Location:	**Area L**	Total Depth:	**230 ft**	Logged by:	**CD/CG**
Coordinates:	**2,140,309 N , 1,373,795 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			98								
	63			100								
210	64			99								
	65			100								
215	66		BEDROCK, subangular to subrounded fragments of Granodiorite with chlorite and hematite filling the spaces between fragments, possible healed fault zone.	97								
220	67			97								
	68			100								
225	69			100								
230	70		END OF HOLE @ 230 FT									
235	71											
	72											
240	73											
	74											
245	75											
	76											
250	77											
255	78											
	79											
260	80											
	81											
265	82											
270	83											
	84											
275	85											
	86											
280	87											
	88											
285	89											
290	90											
	91											
295												

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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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Date Revised: Jun 30, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-204**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 27, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1209 ft**	Date Completed:	**Oct 1, 08**
Location:	**Area A**	Total Depth:	**240 ft**	Logged by:	**EC/SC**
Coordinates:	**2,146,402 N , 1,408,822 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		TOPSOIL, organics, dark brown, moist. (Topsoil)	20							PQ3 to 65' HQ3 to 240' HWT Casing installed to 130'. Poor Recovery, Fines washed away in Drill Return.	
5	1		Sandy, silty GRAVEL, trace to some clay, trace cobble, subangular to subrounded, well graded, low to medium plasticity, dark brown to brown, stiff, moist. (Glacial Drift)	22	44		GH08-204-1	7/6/4	10			
	2			6								
10	3			25	28		GH08-204-2	5/5/5	10			
15	4			13	28		GH08-204-3	6/6/5	11			
	5											
20	6			7	0		GH08-204-4	1/7/6	13			
25	7											
	8		Sandy, clayey SILT, some gravel, trace cobble, subangular, poorly graded, medium plasticity, stiff, moist. (Glacial Drift)	24	56		GH08-204-5	9/14/13	27			
30	9			24	42		GH08-204-6	13/15/18	33			
	10		SAND and GRAVEL, medium to coarse-grained, some silt/clay, trace cobble, subangular to subrounded, well graded, low plasticity, brown, moist, fines washed away in drill return. (Glacial Drift)									
35	11			46	44		GH08-204-7	20/25/23	48			
40	12			49	79		GH08-204-8	27/50+/+	50++			
45	13			67	32		GH08-204-9	25/50+/+	50++			
	14											
50	15											
	16			39	100		GH08-204-10	50+/+/+	50+++		Lost circulation at 54', regained at 57'.	
55	17			79								
60	18			26	25		GH08-204-11	15/16/19	35			
	19											
65	20		Gravelly, Silty SAND, trace clay, trace cobbles and boulders, subangular to subrounded, gap graded to well graded, low plasticity, brown, stiff, moist, some lenses of mainly silt/clay. (Glacial Drift)	64								
70	21			43	72		GH08-204-12	13/18/23	41			
	22			63								
75	23			60								
80	24			72	100		GH08-204-13	50+/+/+	50+++			
	25			78								
85	26			74								
	27			71								
90	28			35	0		GH08-204-14	50/41/27	68			
95	29			50								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-204

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	4	0

GH08-204

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Date Revised: Apr 15, 09

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-204**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 27, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1209 ft**	Date Completed:	**Oct 1, 08**
Location:	**Area A**	Total Depth:	**240 ft**	Logged by:	**EC/SC**
Coordinates:	**2,146,402 N , 1,408,822 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES
	31		Sandy GRAVEL, trace silt, trace clay, trace cobbles and boulders, subangular to subrounded, well graded, low plasticity, brown, stiff, moist, fines washed away in drill return. (Glacial Drift)	51	47		GH08-204-15	27/21/22	43		
105	32			34							
	33										
110	34			57	22		GH08-204-16	28/34/25	59		
115	35			66							
	36										
120	37			52	0		GH08-204-17	10/10/24	34		Lost circulation at 120', decision is made to Tricone, no core recovered from 121 to 129'.
125	38			0							
	39										
130	40		BEDROCK, Granodiorite, grey, speckled black, fine to medium-grained, moderately competent with localized iron oxide weathered zones, minor to moderate fracturing, clay, weathered granodiorite sand and calcite in fractures, some rubble zones.	26	90		GH08-204-18	50+/+/+	50+++		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).
	41			85							
135	42			88							
140	43			90							
	44										
145	45			59							
150	46			91							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***
	47										
155	48			95							
160	49			95							
	50										
165	51			89							
170	52			90							
	53										
175	54			96							Coring Pump at maximum flow rate to maintain circulation. No Fluid Return from 179 to 190', rods chattering occasionally.
180	55			95							
	56			100							
185	57			100							
190	58			91							
	59										
195	60			99							

WELL DETAILS

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-204

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

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Date Revised: Apr 15, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-204**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 27, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1209 ft**	Date Completed:	**Oct 1, 08**
Location:	**Area A**	Total Depth:	**240 ft**	Logged by:	**EC/SC**
Coordinates:	**2,146,402 N , 1,408,822 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			92								
	63			100								
210	64			100								
	65			100								
215	66			100								
220	67			100							Move water supply pump to deeper portion of the water source at 220'.	
	68			91								
225	69			100							Still have not regained full circulation at 235'.	
230	70			90								
	71											
235	72											
240	73		END OF HOLE @ 239.75 FT									
	74											
245	75											
250	76											
	77											
255	78											
	79											
260	80											
	81											
265	82											
270	83											
	84											
275	85											
	86											
280	87											
	88											
285	89											
	90											
290	91											
295												

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-204

Knight Piésold CONSULTING

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Date Revised: Apr 15, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-206**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 30, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1203.4 ft**	Date Completed:	**Oct 3, 08**
Location:	**Area J**	Total Depth:	**270 ft**	Logged by:	**CD/MG**
Coordinates:	**2,149,489 N , 1,392,479 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, light brown, some root vegetation, moist. (Topsoil)	60							PQ3 to 15' HQ3 to 155' NQ3 to 270'	
5	1		SAND and coarse GRAVEL, some cobbles, subangular to angular, clasts up to cobble size, poorly graded, nonplastic, light brown, moist. (Felsenmeer)	79								
10	2			98								
15	3			98								
20	4			100								
25	5		BEDROCK, Tertiary Basalt, fine grained, highly fractured at top of interval become more competent with depth, calcite, chlorite, and pyrite infilling and veins, as well as some clay infilling, calcite veins.	66								
30	6			98								
35	7			94								
40	8			98								
45	9			52								
50	10			98								
55	11			98								
60	12			100							Rods get stuck at 35' in highly fractured rock.	
65	13			97								
70	14			94								
75	15			99								
80	16			99								
85	17			100								
90	18			100								
95	19			100								
100	20			95								
105	21			100								
110	22			98								
115	23			100								
120	24			94								
125	25			98								
130	26			100								
135	27			99								
140	28			100								
145	29			100								
150	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-206

Knight Piésold CONSULTING

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Date Revised: Jun 30, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-206**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 30, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1203.4 ft**	Date Completed:	**Oct 3, 08**
Location:	**Area J**	Total Depth:	**270 ft**	Logged by:	**CD/MG**
Coordinates:	**2,149,489 N , 1,392,479 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	32			100								
110	34			100								
115	35			100								
120	37			100								
125	38			100								
130	40			100								
135	41			97								
140	43			96								
145	44			100								
150	46			97								
155	47			94								
160	49			72								
165	50			85								
170	52			98								
175	53			78							Rock gets better at 175'.	
180	55			100								
185	56			100								
190	58			97								
195	59			83								
	60			100								

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Pebble Project
Overburden Log For GH08-206

Knight Piésold CONSULTING

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Project:	**Pebble Project**	Drill Hole No.	**GH08-206**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 30, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1203.4 ft**	Date Completed:	**Oct 3, 08**
Location:	**Area J**	Total Depth:	**270 ft**	Logged by:	**CD/MG**
Coordinates:	**2,149,489 N , 1,392,479 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			98								
	63			100								
210	64											
	65			100								
215	66			100								
220	67											
	68			100								
225	69			100								
230	70											
	71			99								
235	72			100								
240	73											
	74			100								
245	75			100								
250	76											
	77			99								
255	78			99								
260	79			98								
	80			100								
265	81			100								
270	82		END OF HOLE @ 270 FT									
275	83											
	84											
280	85											
	86											
285	87											
	88											
290	89											
295	90											
	91											

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Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-206

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Date Revised: Jun 30, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-207**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 2, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1482.6 ft**	Date Completed:	**Oct 3, 08**
Location:	**Area A**	Total Depth:	**115 ft**	Logged by:	**EC/SC**
Coordinates:	**2,147,466 N , 1,410,638 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, organics, dark brown, moist. (Topsoil)	20							PQ3 to 25' HQ3 to 115', HWT casing to 26'	
5	1		Gravelly, silty SAND, some clay, trace cobble, subangular, well graded, low plasticity, brown, firm, moist. (Colluvium)	42	56	☒	GH08-207-1	3/8/15	23	●		
	2			16								
10	3			73		☒	GH08-207-2	22/50+/+	50++			
	4		GRAVEL and SAND, trace silt/clay, subangular, poorly graded, fine to coarse gravel, grey, loose, moist. (Glacial Drift)	28								
15	5			74	83	☒	GH08-207-3	35/50+/+	50++		* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
20	6		BEDROCK, Monzonite, quartz, fine to coarse grained, some soft clay and sand infilling, some calcite infilling, trace pyrite.	85								
	7			98								
25	8			98								
30	9			96								
	10											
35	11			98							Start to lose circulation at 33', complete loss of circulation at 35', did not regain.	
40	12											
	13			96								
45	14			100								
50	15											
	16			100								
55	17			100								
60	18											
	19			100								
65	20			100								
70	21											
	22			100							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
75	23			100								
80	24											
	25			100								
85	26			100								
90	27											
	28			100								
95	29			100								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-207

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Knight Piésold CONSULTING

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Project:	**Pebble Project**	Drill Hole No.	**GH08-207**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 2, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1482.6 ft**	Date Completed:	**Oct 3, 08**
Location:	**Area A**	Total Depth:	**115 ft**	Logged by:	**EC/SC**
Coordinates:	**2,147,466 N , 1,410,638 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31			100								
	32											
	33			100								
110	34											
				100								
115	35		END OF HOLE @ 115 FT									
120	36											
	37											
125	38											
	39											
130	40											
	41											
135	42											
	43											
140	44											
	45											
145	46											
	47											
150	48											
	49											
155	50											
	51											
160	52											
	53											
165	54											
	55											
170	56											
	57											
175	58											
	59											
180	60											
185												
190												
195												

Pebble Limited Partnership
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Project:	**Pebble Project**	Drill Hole No.	**GH08-208**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 3, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1519 ft**	Date Completed:	**Oct 5, 08**
Location:	**Area J**	Total Depth:	**200 ft**	Logged by:	**CD/MG**
Coordinates:	**2,150,663 N , 1,392,562 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Tundra Vegetation, black, vegetation roots, moist. (Topsoil)	66							PQ3 to 25' HQ3 to 200'	
5	1		Gravelly SAND, trace cobbles, trace silt/clay, subangular, clasts up to cobble size, poorly graded, low plasticity, brown, moist. (Colluvium, possible Felsenmeer)	49								
10	2			98								
15	3		WEATHERED BEDROCK, GRAVEL, some silt, some cobbles, some sand, subangular, clasts up to cobble size, poorly graded, low plasticity, light brown, moist. (Felsenmeer)	49								
20	4			98								
25	5			79							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
30	6		BEDROCK, Granodiorite, medium grained, moderately fractured and moderately competent until end of interval, calcite and chlorite veins, calcite, epidote, chlorite and clay infilling, minor disseminated pyrite, trace chalcopyrite.	100								
35	7			33								
40	8			100								
45	9			100								
50	10			93								
55	11			85							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
60	12			100								
65	13			93								
70	14			96								
75	15			100								
80	16			100								
85	17			98								
90	18			100								
95	19			100								
	20			98								
	21			100								
	22			100								
	23			100								
	24			98								
	25			100								
	26			100								
	27			100								
	28			100								
	29			100								
	30											

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Pebble Limited Partnership
Pebble Project
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Knight Piésold CONSULTING

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Project:	**Pebble Project**	Drill Hole No.	**GH08-208**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 3, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1519 ft**	Date Completed:	**Oct 5, 08**
Location:	**Area J**	Total Depth:	**200 ft**	Logged by:	**CD/MG**
Coordinates:	**2,150,663 N , 1,392,562 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			96								
105	32			100								
	33											
110	34			99								
115	35											
	36			100								
120	37			100								
125	38											
	39			100								
130	40			99								
135	41											
	42			99								
140	43			100								
145	44											
	45			100								
150	46			98								
155	47											
	48			100								
160	49			98								
165	50											
	51			100								
170	52			98								
175	53											
	54			100								
180	55			100								
185	56											
	57			100								
190	58			100								
195	59											
	60			100							Rods get stuck at 198, later freed.	
				100								

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Project:	**Pebble Project**	Drill Hole No.	**GH08-208**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 3, 08**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1519 ft**	Date Completed:	**Oct 5, 08**
Location:	**Area J**	Total Depth:	**200 ft**	Logged by:	**CD/MG**
Coordinates:	**2,150,663 N , 1,392,562 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	62		END OF HOLE @ 200 FT									
205	63											
210	64											
	65											
215	66											
220	67											
	68											
225	69											
230	70											
	71											
235	72											
240	73											
	74											
245	75											
250	76											
	77											
255	78											
260	79											
	80											
265	81											
270	82											
	83											
275	84											
280	85											
	86											
285	87											
290	88											
	89											
295	90											
	91											

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-208

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

Rev. 0 - Issued for Report VA101-176/23-4

GH08-208

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Date Revised: Jun 30, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-210**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 6, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1096.3 ft**	Date Completed:	**Oct 9, 08**
Location:	**Area A**	Total Depth:	**145 ft**	Logged by:	**MG/SC**
Coordinates:	**2,146,875 N , 1,407,171 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			TOPSOIL, root vegetation, moist. (Topsoil)	30							PQ3 to 55' HQ3 to 145'	
5	1		Sandy GRAVEL, trace silt/clay, trace cobbles and boulders, subrounded to subangular, poorly graded, low plasticity, brown, moist. (Glacial Drift)		67		GH08-210-1	14/32/34	66			
	2			27								
10	3				56		GH08-210-2	11/21/25	46			
	4			35								
15				52								
	5		Gravelly SAND, medium to coarse grained, trace silt/clay, trace cobbles, subangular, poorly graded, brown, moist. (Glacial Drift)	31								
20	6				50		GH08-210-3	14/36/27	63			
	7			44								
25	8				44		GH08-210-4	19/31/46	77			
				30								
30	9				50		GH08-210-5	16/20/50+	50+			
	10		Gravelly, Silty SAND, some clay, trace cobbles and boulders, clasts up to boulder size increasing in frequency with depth, subangular, well graded, low to medium plasticity, greyish-brown, moist. (Glacial Drift)	40							***Drillhole logs represent an interpretation of field logs combined with PLP Lithology Logs***	
35	11				55		GH08-210-6	26/50+/+	50++			
				35								
40	12				0		GH08-210-7	50+/+/+	50+++			
	13			67								
45	14				0		GH08-210-8	50+/+/+	50+++			
				81								
50	15											
	16		BEDROCK, Tertiary Basalt, black to dark grey green, fine-grained, porphyritic, weak to moderate brecciation throughout, chlorite, epidote, and calcite matrix and fracture filling, some clay infilling.	67							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
55	17			82								
	18			90								
60	19			100								
65	20			100								
	21			77								
70	22			96								
				92								
75	23			100								
80	24											
	25			100								
85	26			89								
90	27		BEDROCK, Tertiary Volcaniclastic Breccia, dark green to light grey, polymictic, coarse grained, angular fragments, fine-grained matrix, moderately fractured throughout, strongly fractured from 90-100', hematite, calcite, chlorite and clay infilling.	92								
95	28											
	29			98								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-210

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-210

Rev. 0 - Issued for Report VA101-176/23-4

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

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Date Revised: Apr 14, 09

Project:	**Pebble Project**	Drill Hole No.	**GH08-210**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 6, 08**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1096.3 ft**	Date Completed:	**Oct 9, 08**
Location:	**Area A**	Total Depth:	**145 ft**	Logged by:	**MG/SC**
Coordinates:	**2,146,875 N , 1,407,171 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	32			95								
	33			98								
110	34		BEDROCK, Tertiary Basalt, dark coloured, medium grained, weak to moderate brecciation, chlorite, epidote and calcite matrix and fracture filling.	100								
115	35											
	36			100								
120	37			99								
125	38			84								
	39		BEDROCK, Tertiary Siltstone/Mudstone, fine grained, black and grey, finely bedded, calcite and chlorite infilling.	98								
130	40		BEDROCK, Tertiary Volcaniclastic Breccia, grey to brown, very fractured, weathered, calcite, chlorite and thick clay infillings.	97								
	41			100								
135	42			100								
140	43		BEDROCK, Tertiary Wacke, fine to medium grained, light grey with purple/pink, black flecks, calcite and chlorite infilling.	100								
145	44		END OF HOLE @ 145 FT									
150	45											
	46											
155	47											
	48											
160	49											
	50											
165	51											
170	52											
	53											
175	54											
	55											
180	56											
	57											
185	58											
190	59											
	60											
195												

SOILS LOG WITH WELL DETAILS WMF2008_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Sep 25, 09

Pebble Limited Partnership
Pebble Project
Overburden Log For GH08-210

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/23	**4**	**0**

GH08-210

Rev. 0 - Issued for Report VA101-176/23-4

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Date Revised: Apr 14, 09

Project:	**Pebble Project**	Drill Hole No.	**GH10-211**	Page	**1 of 1**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**Sep 6, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1463 ft**	Date Completed:	**Sep 8, 10**
Location:	**Area E**	Total Depth:	**50 ft**	Logged by:	**CG/JPN/AA**
Coordinates:	**2,161,758 N , 1,397,211 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Sandy SILT, some gravel, trace clay, subangular to subrounded, some boulders up to 17" diameter, poorly graded, low plasticity, light brown, root vegetation, moist. (Glacial Drift)	49							Core Size: PQ3 to 26' HQ3 to 50' HWT casing stuck in hole from 21-26'.	
5	1											
5	2		WEATHERED BEDROCK, Granodiorite, fine to medium grained, grey to dark grey with moderate to highly weathered, highly fractured, iron oxide on fracture surfaces, weak.	76							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
10	3			73						■		
10	4											
15	5		BEDROCK, Granodiorite, fine to medium grained, grey to dark grey, weak propylitic alteration, weak to moderately silicified, hematite on fracture surfaces from 15 - 26', rubble zones at 43 - 44' and 49 - 50', weakly to moderately fractured, pyrite, quartz, calcite, chalcopyrite, disseminated and in veinlets, possible trace molybdenite.	66					●	■	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
20	6			100						■		
20	7										UCS Sample taken at 28.5 - 29.5'	
25	8			84						■		
30	9											
30	10			99						■		
35	11			100						■		
40	12										UCS Sample taken at 40.5 - 41.5'	
40	13			96						■		
45	14			90						■		
50	15			95						●	Rods sheared off at pin at 49', hole was terminated.	
50	15		END OF HOLE @ 50 FT									
	16											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-211

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-212**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 8, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1429 ft**	Date Completed:	**Sep 12, 10**
Location:	**Area E**	Total Depth:	**115 ft**	Logged by:	**BSH/BO**
Coordinates:	**2,160,442 N , 1,397,588 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Silty SAND, some gravel to gravelly, trace to some cobbles, some clay, subrounded to subangular, well graded, low plasticity, bown, moist, occasional root inclusions up to 4' depth. (Glacial Drift)	60							HWT Casing to 60'. Core Size: PQ3 to 58.5', HQ3 to 115'.	
5	1			0								
10	3			25	50	☒	GH10-212 SPT #1	14/9/12	21	●		
15	5			20								
20	6		SAND AND GRAVEL, some silt, some clay, some cobbles, some zones with less gravel, subrounded to subangular, poorly graded, no to low plasticity, light brown with some reddish brown zones, moist, zone with higher fines content from 50 - 51.5', poor recovery, fines mostly washed away, iron oxide staining on clasts throughout interval. (Glacial Drift)	20	33	☒	GH10-212 SPT #2	29/50+/-	50+	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
25	7			20	89	☒	GH10-212 SPT #3	30/43/38	81	●		
30	9			30	3	☒	GH10-212 SPT #4	12/22/32	54	●		
35	10			20	56	☒	GH10-212 SPT #5	21/30/27	57	●		
40	12			40	89	☒	GH10-212 SPT #6	23/49/50	99	●		
45	13			5	0	☒	GH10-212 SPT #7	50/50+/-	50+	●		
	14											
	15											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-212

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

GH10-212

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-212**	Page	**2 of 3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 8, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1429 ft**	Date Completed:	**Sep 12, 10**
Location:	**Area E**	Total Depth:	**115 ft**	Logged by:	**BSH/BO**
Coordinates:	**2,160,442 N , 1,397,588 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
				33								
	16			12								
55	17			16								
	18		BEDROCK, Cretaceous Wacke to Siltstone/Mudstone, dark grey, fine to medium grained, laminated, quartz veins, competent, hard, siliceous, trace vein and disseminated sulphide mineralization, iron oxides on fracture surfaces from 58.5 to 70'.	95							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
60	19			100								
				98							UCS Sample taken at 64.5 - 65.5'.	
65	20			100								
	21											
70	22			100								
75	23			100								
	24											
80	25			100								
85	26			100							UCS Sample taken at 86 - 86.7'.	
	27											
90	28			39								
95	29			100								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-212

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

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SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-212**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 8, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1429 ft**	Date Completed:	**Sep 12, 10**
Location:	**Area E**	Total Depth:	**115 ft**	Logged by:	**BSH/BO**
Coordinates:	**2,160,442 N , 1,397,588 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	31			98								
	32										UCS Sample taken at 107'.	
				98								
110	33											
	34			97								
				92								
115	35		END OF HOLE @ 115 FT									
	36											
120	37											
	38											
125	39											
	40											
130	41											
	42											
135	43											
	44											
140	45											
145												

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-212

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

GH10-212

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-213**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 9, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1613 ft**	Date Completed:	**Sep 12, 10**
Location:	**Area E**	Total Depth:	**165 ft**	Logged by:	**JPN/AA**
Coordinates:	**2,161,546 N , 1,399,036 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Silty, gravelly SAND, some cobbles, trace clay, subangular to subrounded, poorly graded, low plasticity, light brown to grey brown, moist. (Glacial Drift)	10	33		GH10-213 SPT #1	11/18/17	35		Core Size: PQ3 to 29.5', HQ3 to 165'.	
5	1											
	2		GRAVEL, some silt, some sand, trace clay, subangular, well graded, low to no plasticity, light brown, loose, moist. (Glacial Drift)	12								
10	3		GRAVEL and SAND, trace silt/clay, subangular, well graded, fine to coarse gravel clasts and sand, non plastic, light brown, moist. (Glacial Drift)	13								
	4				22		GH10-213 SPT #2	16/26/13	39			
15	5			9								
20	6			39	39		GH10-213 SPT #3	16/30/50+	50+			
	7		BEDROCK, Granodiorite, dark grey, medium grained, slightly weathered, iron oxide alteration lessening with depth, moderately to highly fractured, weak to medium strong.	52							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
25	8			80								
	9			0							***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
30	10			100								
35	11											
	12			89								
40	13			100								
45	14											
	15			95								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-213

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

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VA101-176/35	**1**	**0**

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-213**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 9, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1613 ft**	Date Completed:	**Sep 12, 10**
Location:	**Area E**	Total Depth:	**165 ft**	Logged by:	**JPN/AA**
Coordinates:	**2,161,546 N , 1,399,036 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			72								
	17			33								
60	18											
	19			62								
65	20											
	21			85								
70	22		BEDROCK FAULT ZONE, upper contact 15°tca, deformed and brecciated, sheared intrusion, fault gouge matrix, very soft, approximately 20% gouge, locally competent, moderately fractured, highly fractured from 80 - 90', weak.	91								
75	23			100								
	24											
80	25			90								
85	26											
	27			77								
90	28		BEDROCK, Siltstone, dark brown, hornfelsed, fine grained, locally very fractured from drilling process and fault breccia below, calcite/chlorite veins, disseminated pyrite, trace chalcopyrite, core redrill from 92 - 95.2'.	0								
				90								
95	29											
	30		BEDROCK, Unknown lithology, bleached and silicified, milky white to grey, fine grained, possible interval of siltstone or intrusive rock,	100								

Pebble Limited Partnership
Pebble Project
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Project No.	Ref. No.	Rev.
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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-213**	Page	**3** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 9, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1613 ft**	Date Completed:	**Sep 12, 10**
Location:	**Area E**	Total Depth:	**165 ft**	Logged by:	**JPN/AA**
Coordinates:	**2,161,546 N , 1,399,036 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		calcite veins 60°tca, pyrite, trace chalcopyrite, moderately fractured.	59								
105	32		BEDROCK, Cretaceous Siltstone, dark brown to tan, hornfelsed, fine grained, moderately fractured at ~5°tca to 110', more competent from 110 - 118.9', biotite/chlorite veins, thin pyrite veinlets with trace chalcopyrite, weakly silicified.	69								
	33											
110	34			77								
	35											
115	36			100								
120	37		BEDROCK, Diorite, dark to light green to grey brown, fine grained, moderate propylitic alteration, thin pyrite veins, minor quartz veins, calcite veins 60°tca.	100								
	38											
125	39			100								
130	40			100								
135	41											
	42			94								
140	43			100								
	44											
145	45			88								

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Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-213

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-213**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 9, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1613 ft**	Date Completed:	**Sep 12, 10**
Location:	**Area E**	Total Depth:	**165 ft**	Logged by:	**JPN/AA**
Coordinates:	**2,161,546 N , 1,399,036 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
155	46			97								
	47											
	48			100							UCS Sample taken at 155.5 - 156.5'.	
160	49											
	50			100								
165			END OF HOLE @ 165 FT									
	51											
170	52											
	53											
175	54											
	55											
180	56											
	57											
185	58											
	59											
190	60											
195												

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-213

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

GH10-213

Rev. 0 - Issued for Report

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-214**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 13, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1368 ft**	Date Completed:	**Sep 16, 10**
Location:	**Area E**	Total Depth:	**135 ft**	Logged by:	**BSH/BO**
Coordinates:	**2,159,461 N , 1,398,287 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		GRAVEL and SAND, fine to coarse sand, some silt/clay, trace cobbles and boulders, subangular to subrounded, well graded, no to low plasticity, brown, trace organics, moist, some zones with higher fines content and better recovery. (Glacial Drift)	26							Core Size: PQ3 to 57', HQ3 to 135'.	
5	1				56		GH10-214 SPT #1	32/20/28	48	●		
	2			87								
10	3				44		GH10-214 SPT #2	14/11/10	21	●		
	4			20								
15	5				44		GH10-214 SPT #3	4/10/11	21	●		
				46								
20	6		Sandy GRAVEL, some silt/clay, coarse gravel, trace cobbles and boulders, subrounded, poorly graded, low plasticity, brown, moist, iron oxide alteration increasing with depth. (Glacial Drift)		33		GH10-214 SPT #4	15/20/26	46	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	7			16								
25	8				61		GH10-214 SPT #5	19/50/50+	100+	●		
				33								
30	9		HIGHLY WEATHERED BEDROCK, Cretaceous Wacke, medium grained, yellow brown, very weak, highly altered to Silty, gravelly SAND, trace clay, subrounded to subangular, poorly graded, low plasticity, moist, iron oxide staining.		56		GH10-214 SPT #6	9/14/19	33	●	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	10			35						■		
35	11				72		GH10-214 SPT #7	8/11/18	29	●		
				60						■		
40	12											
	13			68						■		
45	14											
				62						■		
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-214

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

GH10-214

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-214**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 13, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1368 ft**	Date Completed:	**Sep 16, 10**
Location:	**Area E**	Total Depth:	**135 ft**	Logged by:	**BSH/BO**
Coordinates:	**2,159,461 N , 1,398,287 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16		BEDROCK, Cretaceous Wacke, fine grained, grey brown to dark grey, rare medium grained wacke interbeds, rusty yellow or reddish orange iron oxidized fracture surfaces, iron oxide alteration decreases at 70' depth, quartz veins, disseminated pyrite and chalcopyrite, trace sulphide mineralization, bedding is ~55°tca where present, highly fractured, overall not strong.	26								
	17			98								
	18			33								
60												
	19			98								
65												
	20			79								
	21											
70												
	22			92								
75												
	23			51								
	24											
80												
	25			98								
85												
	26			66								
	27											
90			BEDROCK, Cretaceous Siltstone/Mudstone to Wacke, dark brown to grey, very fine grained, laminated siltstone with ~10% interbedded light to dark brown fine grained wacke, bedding is ~50°tca where present, no oxidation, core is rubbly in fractured zones from 90 - 101.5', rare calcite and pyrite veinlets, trace sulphide mineralization.									
	28			98								
95	29											
				98								
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-214

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

GH10-214

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-214**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 13, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1368 ft**	Date Completed:	**Sep 16, 10**
Location:	**Area E**	Total Depth:	**135 ft**	Logged by:	**BSH/BO**
Coordinates:	**2,159,461 N , 1,398,287 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		FAULT ZONE, consists of ~50% clay gouge, white to light grey, weak.	96								
105	32		BEDROCK, Cretaceous Siltstone/Mudstone to Wacke, dark brown to grey, very fine grained, laminated siltstone with ~10% interbedded light to dark brown fine grained wacke, bedding is ~50°tca where present, no oxidation, core is rubbly in fractured zones from 105 - 135', rare calcite and pyrite veinlets, trace sulphide mineralization.								UCS Sample taken at 107 - 108'.	
	33			98								
110	34			100							UCS Sample taken at 112 - 113'.	
115	35											
	36			100								
120	37			100								
125	38			100								
	39			98								
130	40			100							UCS Sample taken at 131'.	
135	41		END OF HOLE @ 135 FT									
	42											
140	43											
	44											
145	45											

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Pebble Limited Partnership
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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-216**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 16, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1545 ft**	Date Completed:	**Sep 23, 10**
Location:	**Area G**	Total Depth:	**130 ft**	Logged by:	**JPN/AA**
Coordinates:	**2,150,793 N , 1,373,405 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Silty SAND, some fine to coarse gravel, trace clay, some cobbles, subrounded, well graded, low plasticity, light brown, moist. (Glacial Drift)								6" Casing installed to 21' but later pulled. Core Size: PQ3 to 75', HQ3 to 130'.	
5	1		No recovery due to tricone bit being used for 6" permanent casing, some large boulders encountered.									
10	2			0								
15	3											
20	4											
25	5		▼SAND, some gravel and cobbles, some silt, trace clay, subangular and subrounded gravel, clasts are of various lithology, poorly graded, no plasticity, light brown, loose, moist to wet, very poor recovery, most fine material washed away. (Glacial Drift)	19							Lots of heaving sand from 25 - 60', Difficult drilling, poor recovery.	▼
30	6				6		GH10-216 SPT#1	10/10/3	13			
35	7			3								
40	8				50		GH10-216 SPT#2	21/16/12	28		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
45	9			13								
	10				67		GH10-216 SPT#3	2/2/7	9			
	11			39								
	12											
	13			7								
	14											
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-216

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
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SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-216**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 16, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1545 ft**	Date Completed:	**Sep 23, 10**
Location:	**Area G**	Total Depth:	**130 ft**	Logged by:	**JPN/AA**
Coordinates:	**2,150,793 N , 1,373,405 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			26								
	17			82								
60	18		HIGHLY WEATHERED BEDROCK, Tertiary Siltstone/Mudstone weathered to Silty SAND, some clay, trace gravel, gap graded, low plasticity, grey brown, moist, mudstone boulders and cobbles found throughout, rock is greyish brown, weak, weathered, soft, fractured, zone with very poor recovery from 75 - 78'.	60							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	19											
65	20			96	44		GH10-216 SPT#4	20/50+/-	50+			
	21											
70	22			76								
75	23			41								
	24											
80	25		BEDROCK, Tertiary Volcaniclastic Conglomerate, dark grey to rusty brown orange, fresh to slightly weathered, competent, fragmental, clast supported, clasts of various lithology, weakly fractured.	100								
85	26			100							Lost circulation at 85'.	
	27											
90	28			100							Lost circulation from 87.5 - 92'.	
95	29			100								
	30											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

Pebble Limited Partnership
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Overburden Log For GH10-216

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-216**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 16, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1545 ft**	Date Completed:	**Sep 23, 10**
Location:	**Area G**	Total Depth:	**130 ft**	Logged by:	**JPN/AA**
Coordinates:	**2,150,793 N , 1,373,405 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31		BEDROCK, Tertiary Wacke/Siltstone/Mudstone, brown, laminated, competent.	96							Lost circulation from 104 - 107'.	
105	32											
	33		BEDROCK, Tertiary Volcaniclastic Conglomerate, dark grey to rusty brown orange, fresh to slightly weathered, competent, fragmental, clast supported, clasts of various lithology, weakly fractured.	100								
110	34			100							Lost circulation from 110 - 117'.	
115	35											
	36			96								
120	37			97							Lost circulation from 120 - 122'.	
125	38											
	39			100								
130	40		END OF HOLE @ 130 FT									
135	41											
	42											
140	43											
	44											
145	45											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

Pebble Limited Partnership
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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-217**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 17, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1285 ft**	Date Completed:	**Sep 19, 10**
Location:	**Open Pit Area**	Total Depth:	**144 ft**	Logged by:	**BSH/BO**
Coordinates:	**2,158,419 N , 1,400,918 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Silty SAND, some gravel, some cobbles, some clay, subangular, well graded, low plasticity, brown, moist. (Glacial Drift)	43							PQ Casing to 57', HQ Casing to 80'. Core Size: PQ3 to 57', HQ3 to 77', NQ3 to 144'.	
5	1				0		GH10-217 SPT #1	5/5/11	16	●		
	2			27								
10	3				100		GH10-217 SPT #2	7/8/9	17	●		
	4			10								
15	5				39		GH10-217 SPT #3	8/8/16	24	●		
				10								
20	6		Gravelly SAND, some silt, trace clay, subangular gravel clasts, well graded, low plasticity, light brown/yellow, moist. (Glacial Drift)		39		GH10-217 SPT #4	1/6/6	12	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	7			67								
25				100	89		GH10-217 SPT #5	22/40/60	100	●		
	8		HIGHLY WEATHERED BEDROCK, Diorite, grey to light yellow to orange, bedrock fragments, heavily oxidized, friable, very weak.	87						■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
30	9			79						■		
	10											
35	11			43						■		
40	12			20						■		
	13											
45	14			93						■		
	15											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-217

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-217**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 17, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1285 ft**	Date Completed:	**Sep 19, 10**
Location:	**Open Pit Area**	Total Depth:	**144 ft**	Logged by:	**BSH/BO**
Coordinates:	**2,158,419 N , 1,400,918 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	16			96								
55				59								
	17		BEDROCK, Diorite, light grey to white with iron oxide staining and alteration throughout, brecciated and fractured, poor competency, friable, weak.	66								
	18											
60				7								
	19											
65	20			100								
	21											
70				85								
	22											
				98								
75	23		Drilled through void 75 - 77'.	0							Lost circulation in void.	
				33								
	24											
80				33								
	25			11								
85	26			75								
	27											
90				100								
	28											
95	29			57								
	30											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-217

Knight Piésold CONSULTING

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-217**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 17, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1285 ft**	Date Completed:	**Sep 19, 10**
Location:	**Open Pit Area**	Total Depth:	**144 ft**	Logged by:	**BSH/BO**
Coordinates:	**2,158,419 N , 1,400,918 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			83								
105	32			66								
	33											
110	34			68								
	35											
115				36								
	36											
120	37			37								
	38											
125				81								
	39											
130	40			100								
	41											
135				65								
	42											
140	43			66								
	44		END OF HOLE @ 144 FT									
145												
	45											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

Pebble Limited Partnership
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Overburden Log For GH10-217

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-218**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 19, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1166 ft**	Date Completed:	**Sep 21, 10**
Location:	**Open Pit Area**	Total Depth:	**144 ft**	Logged by:	**BSH/BH/BO**
Coordinates:	**2,156,964 N , 1,400,731 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Silty, gravelly SAND, trace to some clay, some to trace cobbles and boulders, subangular to subrounded, clasts up to boulder size, mostly gravel size, well graded, low to no plasticity, light brown, loose, moist, zone from 11 - 21' with lower fines content. (Glacial Drift)	11							PQ Casing to 94'. Core Size: PQ3 to 64.5', HQ3 to 144.	
5	1				56	☒	GH10-218 SPT #1	11/24/14	38	●		
	2			20								
10	3				33	☒	GH10-218 SPT #2	14/23/20	43	●		
	4			33								
15	5				39	☒	GH10-218 SPT #3	8/20/17	37	●		
				43								
20	6				33	☒	GH10-218 SPT #4	15/49/20	69	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	7			20								
25	8		▼		50	☒	GH10-218 SPT #5	8/12/20	32	●		▼
				25								
30	9				33	☒	GH10-218 SPT #6	17/18/22	40	●		
	10			12								
35	11				22	☒	GH10-218 SPT #7	12/50/50+	100+	●		
				22								
40	12											
	13			20								
45	14				28	☒	GH10-218 SPT #8	6/50/50+	100+	●		
				5								
50	15				44	☒	GH10-218 SPT #9	14/30/50+	80+	●		
				59								

Pebble Limited Partnership
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Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-218**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 19, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1166 ft**	Date Completed:	**Sep 21, 10**
Location:	**Open Pit Area**	Total Depth:	**144 ft**	Logged by:	**BSH/BH/BO**
Coordinates:	**2,156,964 N , 1,400,731 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16		HIGHLY WEATHERED BEDROCK, Diorite, dark grey to black with white weathered sections and yellow to reddish orange iron oxide staining, strongly oxidized, fine to medium grained, heavily fractured, not competent, mostly rubble, some solid pieces of core, breccia, quartz veins, trace sulphide mineralization.	66							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89). Lost circulation from 53 - 54'.	
	17			76								
60	18											
	19			89								
65				66								
	20			60								
70	21											
	22			62								
75	23											
				47								
80	24											
	25			65								
85	26											
				46								
90	27											
	28			70								
95	29											
				23								
100	30											
	31			2								

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Project:	**Pebble Project**	Drill Hole No.	**GH10-218**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 19, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1166 ft**	Date Completed:	**Sep 21, 10**
Location:	**Open Pit Area**	Total Depth:	**144 ft**	Logged by:	**BSH/BH/BO**
Coordinates:	**2,156,964 N , 1,400,731 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	32											
				39								
	33		BEDROCK, Diorite, dark grey to black, fine to medium grained, some iron oxide weathering, more competent, brecciated zones, quartz veins, trace sulphide mineralization.									
110	34			55								
115	35			20								
	36											
120	37			100								
125	38		BEDROCK, Monzodiorite, grey brown, medium grained, iron oxide alteration on most fracture surfaces, rock is intensely altered/weathered from 124 - 130, and 139 - 144', rock is light yellow orange gouge in these zones, not competent, quartz veins, trace sulphide mineralization.	87								
	39											
130	40			100								
135	41			84								
	42											
140	43			82								
145	44		END OF HOLE @ 144 FT									
	45											
150	46											

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-219**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 21, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1012 ft**	Date Completed:	**Sep 24, 10**
Location:	**Upper Talarik Creek Area**	Total Depth:	**158 ft**	Logged by:	**BH/BO**
Coordinates:	**2,160,637 N , 1,405,153 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Silty, gravelly SAND, some clay, subrounded to subangular, clasts up to large cobble size, mostly gravel size, well graded, low to no plasticity, dark brown, loose, root inclusions, moist to damp. (Glacial Drift)	12							Core Size: PQ3 to 53', HQ3 to 158'.	
5	1				39	☒	GH10-219 SPT #1	2/1/2	3	●		
	2			60								
10	3		▼		28	☒	GH10-219 SPT #2	9/9/10	19	●		▼
	4			33								
15	5				17	☒	GH10-219 SPT #3	7/6/10	16	●		
				40								
20	6		SAND and SILT, some clay, trace gravel, subrounded, poorly graded, low plasticity, light brown, moist. (Glaciolacustrine)		50	☒	GH10-219 SPT #4	4/6/10	16	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	7			4								
25	8				67	☒	GH10-219 SPT #5	5/5/9	14	●		
				0								
30	9		Clayey SILT, some sand, trace gravel, trace cobbles, poorly graded, low to medium plasticity, grey brown, stiff, moist. (Glaciolacustrine)		61	☒	GH10-219 SPT #6	3/5/4	9	●		
	10			37								
35	11		Silty, gravelly SAND, some clay, trace cobbles and boulders, fine to coarse gravel, subrounded, gap graded, low to medium plasticity, grey brown, moist. (Glacial Drift)		0	☒	GH10-219 SPT #7	4/5/8	13	●		
				33								
40	12				33	☒	GH10-219 SPT #8	7/7/9	16	●		
	13			35								
45	14				67	☒	GH10-219 SPT #9	8/22/50+	72+	●		
				67								
50	15		BEDROCK, Tertiary Volcaniclastic Conglomerate, matrix supported, dark green matrix, clasts are subangular to subrounded and vary from 0.75 to 2.5" in diameter, clasts are all of the same volcanic lithology.	90						■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
55	16											
	17			64						■		
	18										UCS Sample taken at 58 - 59'.	

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Project:	**Pebble Project**	Drill Hole No.	**GH10-219**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 21, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1012 ft**	Date Completed:	**Sep 24, 10**
Location:	**Upper Talarik Creek Area**	Total Depth:	**158 ft**	Logged by:	**BH/BO**
Coordinates:	**2,160,637 N , 1,405,153 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	19			100								
65	20		BEDROCK, Tertiary Volcaniclastic Conglomerate, matrix supported, polylithic, medium grained, beige to tan matrix, angular to subangular clasts, clasts are all volcanic in origin, competent, slightly weathered to fresh.	100								
70	21			100								
	22											
75	23			100								
	24		BEDROCK, Fault Breccia, light grey and white, breccia fragments are subrounded, calcite - dolomite cement in matrix, upper contact is rubbly, lower contact is sharp and almost perpendicular to core axis.								UCS Sample taken at 77 - 78'.	
80	25		BEDROCK, Tertiary Volcaniclastic Conglomerate, beige to tan, matrix supported, polylithic, medium grained matrix, clasts are angular to subangular, competent, fresh to slightly weathered.	100								
85	26			100								
	27											
90	28			100								
95	29			100								
	30											
100	31		BEDROCK, Tertiary Volcaniclastic Conglomerate, purplish maroon to dark rust red fragmental basalt conglomerate, calcite cement, upper and lower contacts are rubbly, competent.	95							UCS Sample taken at 103 - 104'.	
105	32		BEDROCK, Tertiary Conglomerate, clast supported conglomerate in beige, medium grained wacke matrix, subrounded to rounded clasts are polylithic and range from 0.4 to 9" diameter, coarse grained wacke beds found throughout, some calcite, fresh to slightly weathered, competent, rubble zone at top of interval.	95								
	33											
110	34			66								
115	35			89								
	36											

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-219**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 21, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1012 ft**	Date Completed:	**Sep 24, 10**
Location:	**Upper Talarik Creek Area**	Total Depth:	**158 ft**	Logged by:	**BH/BO**
Coordinates:	**2,160,637 N , 1,405,153 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
125	38			97								
130	40			75							UCS Sample taken at 131 - 132'.	
135	41			100								
140	43			33								
145	44			89								
150	46			100								
155	47			100								
160	48		END OF HOLE @ 158 FT									
165	50											
170	51											
175	53											
	54											

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-220**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**Sep 23, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1986 ft**	Date Completed:	**Oct 6, 10**
Location:	**Area L**	Total Depth:	**600 ft**	Logged by:	**JPN/AA/DDF**
Coordinates:	**2,148,401 N , 1,366,690 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	1		BOULDERS and COBBLES, Granodiorite, Gravelly SAND, coarse grained, some silt, trace clay, subangular, frost shattered rock on surface, gap graded, light grey to dark grey rock fragments with dark brown soil, some iron oxide staining, slightly weathered, organics present in top 6". (Felsenmeer)	46							Core Size: PQ3 to 13' HQ3 to 600'.	
5	2			45							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
				57								
10	3			100								
	4											
15	5		BEDROCK, Granodiorite, light to medium grey, some intervals brown green due to alteration, weak to moderate alteration, some smaller zones are highly altered, porphyritic, minor veins of calcite, chlorite, hematite, clay, weak chloritization, weakly to moderately fractured.	100								
20	6			100								
	7											
25	8			100								
30	9			89							Hole was drilled with Pure-Vis from 29 - 35'.	
	10			93								
35	11			100								
40	12			100								
	13											
45	14			100							Hole was drilled with Pure-Vis from 45 - 60'.	
50	15			100								
	16											
55	17			100								
	18											
60	19			100								
65	20			100								
	21											
70	22			100								
75	23			100								
	24											
80	25			100								
85	26			100								
	27											
90	28			100							Hole was drilled with Pure-Vis from 90 - 225'.	
95	29			100							Lost circulation 97-100'	
	30											
100	31			100								
105	32			100								
	33											
110	34			100							***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
115	35			100								
	36											
120	37			100								

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Project:	**Pebble Project**	Drill Hole No.	**GH10-220**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**Sep 23, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1986 ft**	Date Completed:	**Oct 6, 10**
Location:	**Area L**	Total Depth:	**600 ft**	Logged by:	**JPN/AA/DDF**
Coordinates:	**2,148,401 N , 1,366,690 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
130	39			100								
	40			100								
135	41											
	42			100								
140	43											
	44			100								
145	45			100								
150	46			100								
	47											
155	48			100								
160	49											
	50			100								
165	51			100								
				100						>>		
170	52			100								
	53											
175	54			100								
180	55											
	56			100								
185	57			100								
190	58											
	59			100							Lost circulation from 186 - 187'.	
195	60		195 - 197' Clay in fractures.	95								
200	61											
	62			92							Hole was flushed prior to WestBay installation and airlifted from 200' upward.	
205	63			100								
210	64											
	65			92								
215	66		217 - 220' very altered, very soft.	100								
220	67											
	68			100								
225	69			100								
230	70											
	71			100								
235	72		235 - 237' very weathered zone, possible small fault or cave.	100							Hole was drilled with Pure-Vis from 235 - 385'.	
240	73											
	74			100								
245	75											
	76			100								

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Project:	**Pebble Project**	Drill Hole No.	**GH10-220**	Page	**3** of **5**		
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**Sep 23, 10**		
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1986 ft**	Date Completed:	**Oct 6, 10**		
Location:	**Area L**	Total Depth:	**600 ft**	Logged by:	**JPN/AA/DDF**		
Coordinates:	**2,148,401 N , 1,366,690 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**		

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
255	77			96								
	78			81								
260	79											
	80			100								
265	81			100								
	82											
270	83			100								
	84			100								
275	85											
	86			100								
280	87			100							Pure-Vis added due to high torque from 285 - 290'	
	88											
285	89			100								
	90			96								
290	91											
	92			100								
295	93			100								
	94											
300	95			100								
	96			100								
305	97											
	98			100								
310	99			100								
	100											
315	101			100								
	102			100								
320	103											
	104			100								
325	105			98								
	106											
330	107			98								
	108											
335	109			100								
	110											
340	111			100								
	112			100								
345	113											
350	114			100								

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Project:	**Pebble Project**	Drill Hole No.	**GH10-220**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**Sep 23, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1986 ft**	Date Completed:	**Oct 6, 10**
Location:	**Area L**	Total Depth:	**600 ft**	Logged by:	**JPN/AA/DDF**
Coordinates:	**2,148,401 N , 1,366,690 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
380	115			97								
	116			100								
385	117											
	118			98								
390	119											
	120			100								
395	121			100								
400	122											
	123			97								
405	124			98								
410	125											
	126			100								
415	127			100								
420	128											
	129			98							Hole was drilled with Pure-Vis from 420-460'.	
425	130			100								
430	131											
	132			100								
435	133			100								
440	134											
	135			100								
445	136			100								
450	137											
	138			100								
455	139			99								
460	140											
	141			100								
465	142			100								
470	143											
	144			95								
475	145			100								
480	146											
	147			100								
485	148			100								
490	149											
	150			100								
495	151			100								
	152											

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Project:	**Pebble Project**	Drill Hole No.	**GH10-220**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**Sep 23, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1986 ft**	Date Completed:	**Oct 6, 10**
Location:	**Area L**	Total Depth:	**600 ft**	Logged by:	**JPN/AA/DDF**
Coordinates:	**2,148,401 N , 1,366,690 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
505	153–154			96								
	154–155			100								
510	155–156			100								
515	156–157			100								
	157–158			100								
520	158–159			100							Hole was drilled with Pure-Vis from 520 - 560'.	
525	159–160			100								
	160–161			100								
530	161–162			100								
535	162–163			98								
	163–164			100								
540	164–165			100								
545	165–166			100								
	166–167			100								
550	167–168			96								
555	168–169			100								
	169–170			94								
560	170–171			100								
565	171–172			98								
	172–173			100								
570	173–174			100								
575	174–175			98								
	175–176			100								
580	176–177			100								
585	177–178			98								
	178–179			98								
590	179–180											
595	180–181											
	181–182											
600	182–183		END OF HOLE @ 600 FT									
	183–184											
605	184–185											
610	185–186											
	186–187											
615	187–188											
620	188–189											
	189–190											

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Overburden Log For GH10-220

Rev. 0 - Issued for Report

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

GH10-220

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-221**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 24, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1006 ft**	Date Completed:	**Sep 30, 10**
Location:	**Open Pit Area**	Total Depth:	**139 ft**	Logged by:	**BH/BO**
Coordinates:	**2,159,171 N , 1,405,547 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		Gravelly, silty SAND, trace clay, medium grained, subangular clasts up to gravel size, trace cobbles, poorly graded, low plasticity, brown, moist. (Glaciofluvial)	33							PQ Casing to 73'. Core Size: PQ3 to 55', HQ3 to 139'.	
5	1				22	☒	GH10-221 SPT #1	4/5/9	14	●		
	2			10								
10	3		Gravelly SAND, some silt, trace clay, subangular to subrounded clasts up to gravel size, trace cobbles, well graded, low plasticity, grey brown, moist. (Glaciofluvial)		67	☒	GH10-221 SPT #2	6/6/10	16	●		
	4			38								
15	5				56	☒	GH10-221 SPT #3	5/21/36	57	●		
				73								
20	6				89	☒	GH10-221 SPT #4	8/9/7	16	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	7			81								
25	8		Silty SAND, some gravel, some clay, some gravelly zones, subrounded to subangular, clasts up to large cobble size, mostly gravel size, gap graded, low plasticty, brown, moist. (Glacial Drift)		72	☒	GH10-221 SPT #5	7/11/12	23	●		
				27								
30	9				67	☒	GH10-221 SPT #6	7/14/14	28	●		
	10			7								
35	11										SPT not completed due to rods not reaching testing interval due to possible heaving sands.	
				15								
40	12											
	13			45								
45	14				94	☒	GH10-221 SPT #7	8/10/13	23	●		
	15											

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-221**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 24, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1006 ft**	Date Completed:	**Sep 30, 10**
Location:	**Open Pit Area**	Total Depth:	**139 ft**	Logged by:	**BH/BO**
Coordinates:	**2,159,171 N , 1,405,547 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	16			42								
55	17			65								
	18											
60	19			12								
65	20		No recovery 64 - 69'.	0							Heaving sands 65 - 73'.	
	21		SAND, some gravel, trace to some silt, trace clay, subrounded to subangular, clasts up to cobble size, mostly gravel size, poorly graded, non plastic, brown, moist, fines washed away. (Glacial Drift)	16								
70	22											
75	23		No recovery 74 - 79'.	0								
	24		Silty SAND, some gravel, trace to some clay, subrounded to subangular, clasts up to large cobble size, gap graded, low plasticity, brown, moist, most fines washed away. (Glacial Drift)	7								
80	25											
85	26			27								
	27		BEDROCK, Tertiary Conglomerate/Wacke, fine grained wacke, coarse-grained clast supported conglomerate, sedimentary and volcanic conglomerate clasts, rounded to subrounded, grey, slightly weathered, competent.	98						■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
90	28			100						■		
95	29			100						■		
	30											

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-221**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 24, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1006 ft**	Date Completed:	**Sep 30, 10**
Location:	**Open Pit Area**	Total Depth:	**139 ft**	Logged by:	**BH/BO**
Coordinates:	**2,159,171 N , 1,405,547 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			100								
105	32			100								
	33											
110	34			100								
	35											
115	36			100								
120	37			100								
	38											
125	39			100								
130	40			100								
	41											
135	42			100								
140	43		END OF HOLE @ 139 FT									
	44											
145	45											

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-222**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 30, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1054 ft**	Date Completed:	**Oct 2, 10**
Location:	**Open Pit Area**	Total Depth:	**130 ft**	Logged by:	**BO/BH**
Coordinates:	**2,156,961 N , 1,406,600 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Gravelly SAND, some silt, trace clay, trace cobbles, subrounded, poorly graded, low plasticity, brown, moist. (Glacial Drift)	37							PQ casing installed to 75'. Core Size: PQ3 to 70', HQ3 to 130'.	
5	1				50		GH10-222 SPT #1	6/6/6	12			
	2		Sandy, silty GRAVEL, trace to some clay, trace cobble and boulders, coarse gravel, subrounded to subangular, gap graded, low plasticity, brown, moist. (Glacial Drift)	20								
10	3				0		GH10-222 SPT #2	6/7/5	12			
	4			20								
15	5				67		GH10-222 SPT #3	6/6/8	14			
				12								
20	6				0		GH10-222 SPT #4	11/9/14	23		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	7			55								
25	8				61		GH10-222 SPT #5	8/7/9	16			
				10								
30	9		Gravelly, silty SAND, trace clay, trace cobbles and boulders, gap graded, low plasticity, light brown, moist. (Glacial Drift)		39		GH10-222 SPT #6	14/20/18	38			
	10			47								
35	11				56		GH10-222 SPT #7	6/11/13	24			
				24								
40	12		Silty, gravelly SAND, some clay, trace cobbles and boulders, subrounded to subangular, well graded, low plasticity, light brown, moist. (Glacial Drift)		0		GH10-222 SPT #8	13/14/18	32			
	13			33								
45	14											
				24								

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-222**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 30, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1054 ft**	Date Completed:	**Oct 2, 10**
Location:	**Open Pit Area**	Total Depth:	**130 ft**	Logged by:	**BO/BH**
Coordinates:	**2,156,961 N , 1,406,600 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
50	16			25	11		GH10-222 SPT #10	21/20/44	64			
55	17			33	22		GH10-222 SPT #11	2/15/25	40			
60	18			28	44		GH10-222 SPT #12	18/41/32	73			
65	19			92	100		GH10-222 TILL #1	//				
70	20			46								
75	21		Gravelly SAND, some silt, trace clay, trace cobbles, subrounded to subangular, well graded, low plasticity, light brown, moist, fines washed away. (Glacial Drift)	70								
80	22			91								
85	23		HIGHLY WEATHERED BEDROCK, Tertiary Conglomerate, heavily iron oxidized, highly fractured, fine grained wacke matrix, rounded to subrounded clasts up to 2" diameter, clasts are of various lithology, becoming more competent with depth.	100							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
90	24			99								
95	25			100								
	26											
	27		BEDROCK, Tertiary Conglomerate, less iron oxidation, fine grained wacke matrix, rounded to subrounded clasts up to 2" diameter, clasts are of various lithology, competent, becoming more clast supported with depth, lower contact is sharp at 75°tca.									
	28											
	29											

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-222**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Sep 30, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1054 ft**	Date Completed:	**Oct 2, 10**
Location:	**Open Pit Area**	Total Depth:	**130 ft**	Logged by:	**BO/BH**
Coordinates:	**2,156,961 N , 1,406,600 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
100	30											
	31			100						■		
105	32											
			BEDROCK, Tertiary Siltstone/Mudstone, dark grey to black, finely laminated, bedding ranges from 65 - 75°tca, lower contact is gradational over 2".	91						■		
	33											
110	34			98						■		
			BEDROCK, Tertiary Volcaniclastic Conglomerate, grey, polylithic clasts ranging from 0.1 - 1.2", subangular, clasts are moderately well sorted and comprise 30% of interval, matrix is soft, grey mudstone, weakly developed fabric ~65 - 70°tca, minor fine grained pyrite.									
115	35											
	36			100						■		
120												
	37			99						■		
	38											
125												
	39			99						■		
130			END OF HOLE @ 130 FT									
	40											
135	41											
	42											
140	43											
	44											
145												

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Project:	**Pebble Project**	Drill Hole No.	**GH10-223**	Page	**1** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 3, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1005 ft**	Date Completed:	**Oct 5, 10**
Location:	**Open Pit Area**	Total Depth:	**110 ft**	Logged by:	**BO/BH/AA**
Coordinates:	**2,156,284 N , 1,404,713 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			SAND and GRAVEL, trace silt, trace clay, trace cobbles, subangular to subrounded, well graded, non plastic, brown, dry to moist, fines mostly washed away. (Glaciofluvial)	33							PQ casing installed to 45'. Core Size: PQ3 to 43', HQ3 to 110'	
5	1				39		GH10-223 SPT #1	7/23/25	48			
	2			68								
10	3				50		GH10-223 SPT #2	13/18/50+	68+			
	4			38								
15	5		Silty, gravelly SAND, trace clay, trace cobbles, trace boulders, subangular to subrounded, well graded, low plasticity, brown, moist. (Glacial Drift)		17		GH10-223 SPT #3	40/50+/-	50++			
				67								
20	6				72		GH10-223 SPT #4	37/41/48	89		***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	7			55								
25	8		SAND and GRAVEL, trace silt, trace clay, trace cobbles, subangular to subrounded, poorly graded, non plastic, brown, moist, iron oxide on joint surfaces, fines mostly washed away. (Glacial Drift)	27								
30	9		Sandy SILT, some clay, some gravel, some gravelly zones, trace cobbles, subangular to subrounded, gap graded, low plasticity, grey, moist. (Glacial Drift)		50		GH10-223 SPT #5	4/8/7	15			
	10			28								
35	11		Sandy, silty GRAVEL, trace clay, trace cobbles, trace boulders, subangular to subrounded, gap graded, low plasticity, light brown, moist. (Glacial Drift)	75	89 92		GH10-223 SPT #6 GH10-223 TILL #1	8/18/26 //	44			
40	12				56		GH10-223 SPT #7	23/48/47	95			
	13		Gravelly SAND, some silt, trace clay, trace boulders, subangular to subrounded, gap graded, low plasticity, light brown, moist, fines washed away. (Glacial Drift)	33								

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Project:	**Pebble Project**	Drill Hole No.	**GH10-223**	Page	**2** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 3, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1005 ft**	Date Completed:	**Oct 5, 10**
Location:	**Open Pit Area**	Total Depth:	**110 ft**	Logged by:	**BO/BH/AA**
Coordinates:	**2,156,284 N , 1,404,713 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
45	14		BEDROCK, Tertiary Basalt, dark grey, fine grained, weakly porphyritic, calcite veinlets, chlorite alteration, lower contact is soft and bleached, competent, moderately fractured.	105							* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	15			97								
50			BEDROCK, Cretaceous Diorite, fine grained, massive, dark brown to black, moderately soft, pyrite veins, chlorite, calcite, sericite, silicification, trace disseminated chalcopyrite, highly fractured.									
	16			100								
55	17			80								
	18		BEDROCK, Cretaceous Granodiorite, light grey to tan, moderately fractured, upper and lower contacts are broken but appear sharp and planar, ~30°tca.									
60			BEDROCK, Cretaceous Diorite, fine grained, massive, dark brown to black, moderately soft, pyrite veins, chlorite, calcite, sericite, silicification, trace disseminated chalcopyrite, highly fractured, more altered zone from 62 - 64.7', core is greenish white.									
	19			70								
65	20		BEDROCK, Granodiorite, light grey to tan, upper contact is sharp and planar ~30°tca, lower contact is irregular ~35°tca, pyrite and quartz veins, silicification, sericite, relatively soft, fine disseminated pyrite, moderately fractured.	100								
70	21		BEDROCK, Cretaceous Diorite, dark brown to tan, fine grained, porphyritic, moderately soft, some irregular white zones brecciated with white clay cement, rare chalcopyrite, some pyrite, more competent than rock above.									
	22			100								
75	23			100								
	24											
80												
	25			100								
85	26											

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-223**	Page	**3** of **3**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 3, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1005 ft**	Date Completed:	**Oct 5, 10**
Location:	**Open Pit Area**	Total Depth:	**110 ft**	Logged by:	**BO/BH/AA**
Coordinates:	**2,156,284 N , 1,404,713 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
90	27			100								
	28			98								
95	29											
	30			100								
100			BEDROCK, Cretaceous Granodiorite, could also be highly altered Diorite but most likely Granodiorite intrusion, light grey to tan, pyrite veins, sericite, quartz, competent, fractured.									
	31			100								
105	32		BEDROCK, Cretaceous Diorite, dark brown to tan, fine grained, porphyritic, moderately soft, rare chalcopyrite, some pyrite, slightly more competent.									
	33			100								
110			END OF HOLE @ 110 FT									
	34											
115	35											
	36											
120	37											
	38											
125	39											

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-224**	Page	**1** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 6, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1009 ft**	Date Completed:	**Oct 7, 10**
Location:	**Open Pit Area**	Total Depth:	**80 ft**	Logged by:	**SC/BH**
Coordinates:	**2,154,519 N , 1,403,806 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			SILT and SAND, some gravel, trace clay, trace cobbles, subangular, clasts up to boulder size, well graded, medium plasticity, brown, compact, moist. (Glacial Drift)	41							Core Size: PQ3 to 25', HQ3 to 80'.	
5	1		SAND, some gravel, trace silt, trace clay, fine to medium grained sand, fine grained gravel, angular to subangular, poorly graded, no to low plasticity, brown, moist, fines washed away. (Glacial Drift)	37	17	☒	SPT 1	2/3/6	9	●		
10	3		Silty SAND, some gravel, some clay, trace cobbles, fine to medium grained sand, subangular, gap graded, low plasticity, dense, brown, moist. (Glacial Drift)	85	0	☒	SPT 2	9/11/8	19	●		
15	4		WEATHERED BEDROCK, Granodiorite, fine grained, porphyritic, white to light grey, strong to moderate iron oxide alteration, quartz and sericite alteration, destructive clay alteration from 24 - 25', disseminated pyrite, highly fractured, soft zone from 20 - 25'.	55						■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	5			49						■	Lost circulation from 16 to 19'.	
20	6										Hole caved in at 20'.	
	7			94						■		
25	8			28						■		
30	9		BEDROCK, Granodiorite, light grey to tan, porphyritic, core is locally very fractured, quartz and pyrite veins, some clay alteration, disseminated pyrite, trace chalcocite, trace chalcopyrite.	100						■	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
35	10											
	11			98						■		
40	12											
	13			97						■		
45	14			100						■		
	15											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-224

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

GH10-224

Rev. 0 - Issued for Report

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-224**	Page	**2** of **2**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT**	Date Started:	**Oct 6, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**1009 ft**	Date Completed:	**Oct 7, 10**
Location:	**Open Pit Area**	Total Depth:	**80 ft**	Logged by:	**SC/BH**
Coordinates:	**2,154,519 N , 1,403,806 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			96								
	17											
				95								
60	18											
	19			100								
65	20											
	21			91								
70	22		BEDROCK, Diorite? difficult to tell lithology as there is only 5', dark grey, fine to medium grained, porphyritic, local hematite, weak chlorite alteration, sericite and quartz alteration, moderately fractured, competent, trace chalcopyrite, trace disseminated pyrite, thin pyrite veins.	60								
75	23			100								
	24											
80	25		END OF HOLE @ 80 FT									
85	26											
	27											
90	28											
95	29											
	30											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-224

Knight Piésold CONSULTING	Project No.	Ref. No.	Rev.
	VA101-176/35	1	0
	GH10-224		

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SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-225**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**Oct 6, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1960 ft**	Date Completed:	**Oct 27, 10**
Location:	**Area L**	Total Depth:	**600 ft**	Logged by:	**DDF/CBN**
Coordinates:	**2,147,632 N , 1,367,812 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**322, -66**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		SAND and GRAVEL, some cobbles and boulders, trace silt, trace clay, subangular clasts up to boulder size, gap graded, low plasticity, brown, some organics, moist, no recovery from 1 - 3.75' as 10" boulder was pushed through ground surface while drilling. (Felsenmeer)	25							PQ Casing to 23', HQ Casing to 400'. Core Size: PQ3 to 19', HQ3 to 400', NQ3 to 600'. * See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
5	1		No recovery.	0								
10	2		HIGHLY WEATHERED BEDROCK, Granodiorite, brown to whitish-pink, weathered to sand-size particles, soft, sugary texture, clay in groundmass, clay infilling in fractures >0.2", some more competent pieces, propylitic alteration.	100								
15	3			75								
20	4			91								
25	5			25								
30	6			54								
35	7			100								
40	8			90								
45	9			96								
50	10			96								
55	11			98								
60	12			97							***Depths are not corrected for hole inclination and are downhole***.	
65	13			97								
70	14			99								
75	15			100								
80	16			23								
85	17			90								
90	18			100							Four Vibrating Wire Piezometers installed in this drillhole.	
95	19			99								
100	20			100								
105	21			100							***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
110	22			100								
115	23			100								
120	24			100								
	25			100								
	26			100								
	27			100								
	28			100								
	29			100								
	30			100								
	31			100								
	32			100								
	33			100								
	34			100								
	35			100								
	36			100								
	37			100								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-225

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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

GH10-225

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-225**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**Oct 6, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1960 ft**	Date Completed:	**Oct 27, 10**
Location:	**Area L**	Total Depth:	**600 ft**	Logged by:	**DDF/CBN**
Coordinates:	**2,147,632 N , 1,367,812 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**322, -66**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
130	39			100								
	40		BEDROCK, Granodiorite, medium grained, light grey to pink, equigranular to porphyritic, local chlorite alteration, clay altered from 141.7 - 142.4', small fault zone from 203 - 204' with 20% weak iron oxide alteration, clay gouge, abrupt 35°tca contact, some clay rich veins/gouge intervals from 236 - 256' ranging from 15 - 35°tca, gouge intervals are likely due to groundwater flow, local chlorite, epidote and iron oxide alteration along quartz veins and fractures, locally vugs, aplite dykes from 293 - 297', 307 - 309' and 345 - 345.5'.	83							
135	41			100								
	42											
140	43			100								
	44											
145	45			96								
	46											
150	47			100								
	48											
155	49			100								
	50											
160	51			97								
	52											
165	53			100								
	54											
170	55			97								
	56											
175	57			100								
	58											
180	59			100								
	60											
185	61			100								
	62											
190	63			100								
	64											
195	65			100								
	66											
200	67			100								
	68											
205	69			100								
	70											
210	71			98								
	72											
215	73			100								
	74											
220	75			100								
	76											
225				100								
230				96								
235				100								
240				100							Vibrating Wire Piezometer VW15410 (Black wire) installed at 241'.	
245				100								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-225

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VA101-176/35	**1**	**0**

GH10-225

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-225**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**Oct 6, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1960 ft**	Date Completed:	**Oct 27, 10**
Location:	**Area L**	Total Depth:	**600 ft**	Logged by:	**DDF/CBN**
Coordinates:	**2,147,632 N , 1,367,812 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**322, -66**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
255	77			100								
	78			100								
260	79											
	80			83								
265	81			100								
	82											
270	83			100							Hole becomes slightly artesian.	
	84			100								
275	85											
	86			100								
280	87											
	88			96								
285	89			96								
	90											
290	91			100								
	92			95								
295	93											
	94			100								
300	95			100								
	96											
305	97			98								
	98			100								
310	99											
	100			98								
315	101			100								
	102											
320	103			100								
	104			100								
325	105											
	106			99								
330	107											
	108			99								
335	109											
	110			99								
340	111			100								
	112			100							Vibrating Wire Piezometer VW15411 (White wire) installed at 371'.	
345	113			100								
	114											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

Pebble Limited Partnership
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Knight Piésold CONSULTING

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-225**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**Oct 6, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1960 ft**	Date Completed:	**Oct 27, 10**
Location:	**Area L**	Total Depth:	**600 ft**	Logged by:	**DDF/CBN**
Coordinates:	**2,147,632 N , 1,367,812 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**322, -66**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
380	115			100								
	116			100								
385	117											
	118			100								
390	119			100								
	120											
395	121			96								
400	122			94								
	123											
405	124			96								
410	125			84							Artesian flow measured at 0.5 - 1gpm.	
	126											
415	127			100								
420	128			100								
	129											
425	130			100								
430	131			95								
	132											
435	133			100								
440	134			98								
	135											
445	136			100							Vibrating Wire Piezometer VW15414 (Blue wire) was installed at 446'.	
450	137			100								
	138											
455	139			99								
460	140			100								
	141											
465	142			100								
470	143			100								
	144											
475	145			96								
480	146			100								
	147											
485	148			98								
490	149			97								
	150											
495	151			86							Lost circulation from 499 - 500'.	
	152											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

Pebble Limited Partnership
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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-225**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**NONE**	Date Started:	**Oct 6, 10**
Drilling Method:	**HT-750 Mud Rotary Diamond**	Elevation:	**1960 ft**	Date Completed:	**Oct 27, 10**
Location:	**Area L**	Total Depth:	**600 ft**	Logged by:	**DDF/CBN**
Coordinates:	**2,147,632 N , 1,367,812 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**322, -66**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
505	153			100							Artesian flow measured at 1 - 2.5 gpm.	
	154			100								
510	155											
	156			100								
515	157											
	158			100								
520	159			94								
525	160			100								
	161											
530	162			97								
	163											
535	164			100								
	165											
540	166			92								
545	167			92								
	168											
550	169			83							Lost circulation from 551.5 - 552.5'. Vibrating Wire Piezometer VW15416 (Green Wire) installed at 553'.	
555	170			97								
	171											
560	172			100								
565	173			100								
	174											
570	175			99								
575	176			96								
	177											
580	178			92								
585	179			99								
	180											
590	181			100								
595	182			100								
600	183		END OF HOLE @ 600 FT									
	184											
605	185											
	186											
610	187											
615	188											
	189											
620	190											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-226**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 8, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**998 ft**	Date Completed:	**Oct 14, 10**
Location:	**Area A, Valley Bottom**	Total Depth:	**160 ft**	Logged by:	**SC/BH**
Coordinates:	**2,142,009 N , 1,403,372 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Gravelly SILT, some sand, some clay, subrounded to subangular, clasts up to large cobble size, mostly gravel size, poorly graded, low plasticity, brown, some root inclusions, moist. (Glacial Drift)	0							Hole triconed with 7.75" bit to 5', Permanent 6" casing installed to 22'. Core Size: PQ3 to 160'.	
5	1				67		GH10-226 SPT #1	7/5/6	11	●		
			Sandy, silty GRAVEL, some clay, subangular to subrounded, clasts up to boulder size, poorly graded, low plasticity, brown, moist. (Glacial Drift)	40								
10	3				17		GH10-226 Shelby #1	//				
				37								
15	4		Clayey SILT, some gravel, some sand to sandy, subrounded, clasts up to cobble size, poorly graded, low to medium plasticity, brown, moist. (Glaciolacustrine)		50		GH10-226 Shelby #2	//				
	5			24								
20	6				88		GH10-226 Shelby #3	//			***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	7			49								
25	8		Sandy GRAVEL, some silt/clay, subrounded to subangular, clasts up to cobble size, poorly graded, low to no plasticity, brown, moist, fine washed away. (Glacial Drift)		61		GH10-226 SPT #2	8/15/14	29	●		
				15								
30	9				72		GH10-226 SPT #3	10/16/22	38	●		
	10			14								
											Hole collapsed from 35' to 160'.	
35	11			16								
			Sandy, gravelly SILT, trace clay, subangular to subrounded, clasts up to cobble size, poorly graded, low plasticity, brown, moist, fines washed away. (Glacial Drift)		39		GH10-226 SPT #4	21/19/24	43	●		
40	12			10								

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-226

Knight Piésold CONSULTING

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VA101-176/35	**1**	**0**

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-226**	Page	**2** of **4**		
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 8, 10**		
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**998 ft**	Date Completed:	**Oct 14, 10**		
Location:	**Area A, Valley Bottom**	Total Depth:	**160 ft**	Logged by:	**SC/BH**		
Coordinates:	**2,142,009 N , 1,403,372 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**		

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
45	13				44		GH10-226 SPT #5	30/26/21	47			
	14			16								
			Clayey SILT, some sand, trace gravel, subrounded, clasts up to cobble size, mostly gravel size, poorly graded, low to medium plasticity, brown, moist. (Glaciolacustrine)		28		GH10-226 SPT #6	3/17/24	41			
50	15			18								
	16				78		GH10-226 SPT #7	3/8/12	20			
55			SAND, some silt/clay, trace gravel, subrounded to subangular, clasts up to cobble size, poorly graded, low to no plasticity, brown, moist, poor recovery. (Glaciofluvial)									
	17			23								
	18				72		GH10-226 SPT #8	25/29/34	63			
60				0								
	19				22		GH10-226 SPT #9	4/15/20	35			
				21								
65	20				111		GH10-226 SPT #10	10/25/31	56			
	21			13								
70			Clayey SILT, some sand, trace gravel, subrounded to subangular, clasts up to gravel size, poorly graded, low to medium plasticity, brown, moist. (Glaciolacustrine)									
	22			18								
75	23		Gravelly SAND, trace to some silt/clay, subrounded to subangular, clasts up to cobble size, mostly gravel size, poorly graded, low to no plasticity, brown, moist, fines washed away. (Glaciofluvial)	31								
	24											
80			Sandy, Silty GRAVEL, trace clay, subangular to subrounded, clasts up to boulder size, well graded, low plasticity, brown, moist, good recovery (Glacial Drift)		0		GH10-226 SPT #11	50+/-/-	N/A			
	25			100								

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Pebble Limited Partnership
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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-226**	Page	**3** of **4**		
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 8, 10**		
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**998 ft**	Date Completed:	**Oct 14, 10**		
Location:	**Area A, Valley Bottom**	Total Depth:	**160 ft**	Logged by:	**SC/BH**		
Coordinates:	**2,142,009 N , 1,403,372 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**		

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
85	26			43								
	27											
90			Sandy GRAVEL, some silt, trace clay, subangular to subrounded, clasts up to cobble size, poorly graded, low to no plasticity, brown, moist, gravel content decreases at 105', fines washed away. (Glaciofluvial)	15								
	28											
95	29			7	72	☒	GH10-226 SPT #12	14/27/34	61	●		
	30											
100	31			16								
105	32			12	6	☒	GH10-226 SPT #13	20/46/41	87	●		
	33											
110	34			10								
115	35		No Recovery	0								
	36											
120	37			0								
125	38				56	☒	GH10-226 SPT #14	36/50+/-	50++			

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-226

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

GH10-226

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-226**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 8, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**998 ft**	Date Completed:	**Oct 14, 10**
Location:	**Area A, Valley Bottom**	Total Depth:	**160 ft**	Logged by:	**SC/BH**
Coordinates:	**2,142,009 N , 1,403,372 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	39			0								
130	40		Gravelly SAND, some silt, some clay, subrounded to subangular, mostly subrounded, clasts up to cobble size, poorly graded, low to no plasticity, brown, moist, fines washed away. (Glaciofluvial)	18								
135	41				17		GH10-226 SPT #15	12/40/50+	50+			
	42			22								
140	43			12								
145	44				28		GH10-226 SPT #16	50+/-/-	N/A			
	45			27								
150	46			33								
155	47				17		GH10-226 SPT #17	4/7/9	16		Lost circulation at 160'.	
	48			30								
160	49		END OF HOLE @ 160 FT									
165	50											
	51											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

Pebble Limited Partnership
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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-227**	Page	**1** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 16, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**798 ft**	Date Completed:	**Oct 20, 10**
Location:	**Upper Talarik Creek Area**	Total Depth:	**200 ft**	Logged by:	**SC/AL**
Coordinates:	**2,155,964 N , 1,421,653 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
			Silty SAND and GRAVEL, trace clay, subrounded to subangular, clasts up to fine gravel size, poorly graded, low plasticity, light brown, loose, root inclusions to 5' depth, moist. (Glacial Drift)	27							PQ casing installed to 10'. Core Size: PQ3 to 30', HQ3 to 200'.	
5	1				79		GH10-227 Shelby #1	//				
	2		Gravelly SAND, some silt, trace clay, fine to coarse grained sand, fine grained gravel, subangular and angular, well graded, low plasticity, brown, moist, fines washed away in drill return. (Glacial Drift)	5								
10	3				56		GH10-227 SPT #1	7/8/10	18	●		
	4			22								
15	5				0		GH10-227 SPT #2	17/21/15	36	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
	6			24								
20	7				28		GH10-227 SPT #3	6/8/10	18	●		
				22								
25	8		HIGHLY WEATHERED BEDROCK, Tertiary Monzonite, light green to dark grey-green, highly fractured, chlorite alteration, minor veins of calcite in some of the pieces, weak.	40						■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
30	9		BEDROCK, Tertiary Monzonite, light green to dark grey-green, moderately fractured, becoming more competent with depth, white phenocrysts, chlorite alteration, vugs of calcite, minor veins of calcite at 70°tca, pseudobreccia.	80						■		
35	10											
	11			93						■		
40	12											
	13			100						■		
45	14											
				100						■		
50	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-227

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-227**	Page	**2** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 16, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**798 ft**	Date Completed:	**Oct 20, 10**
Location:	**Upper Talarik Creek Area**	Total Depth:	**200 ft**	Logged by:	**SC/AL**
Coordinates:	**2,155,964 N , 1,421,653 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	16		FAULT ZONE, white clay gouge, poor recovery, weak.	80								
55	17			12							Artesian conditions encountered @ 55', ~0.05gpm during drilling process.	
	18											
60	19			17								
65	20											
	21			28								
70	22		BEDROCK, Tertiary Volcaniclastic Conglomerate, matrix supported fragmental rock, fragments are 0.4 - 1.2", matrix is light olive green to grey green, moderately to highly altered, some pyrite nodules, very weathered zones from 100 - 115' and 164 - 165', moderately to highly fractured, some zones near bottom look like TX unit.	100								
75	23			100								
	24											
80	25			81								
85	26			100								
	27											
90	28			77								
95	29			90								
	30											
100	31			87								

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-227**	Page	**3** of **4**		
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 16, 10**		
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**798 ft**	Date Completed:	**Oct 20, 10**		
Location:	**Upper Talarik Creek Area**	Total Depth:	**200 ft**	Logged by:	**SC/AL**		
Coordinates:	**2,155,964 N , 1,421,653 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**		

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
105	32											
	33			92								
110	34			100								
115	35											
	36			100								
120	37			89								
125	38											
	39			98								
130	40			89								
	41											
135	42			100								
140	43			93								
	44											
145	45			91								
150	46			100								
155	47											

SOILS LOG WITH WELL DETAILS 2010 WMF SI_MASTER-COPY.GPJ DRILL TEMPLATE.GDT Feb 9, 11

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Project No.	Ref. No.	Rev.
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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-227**	Page	**4** of **4**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 16, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**798 ft**	Date Completed:	**Oct 20, 10**
Location:	**Upper Talarik Creek Area**	Total Depth:	**200 ft**	Logged by:	**SC/AL**
Coordinates:	**2,155,964 N , 1,421,653 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
160	48			64						■		
	49											
165	50			68						■		
	51			90						■		
170	52											
	53			91						■		
175	54			100						■		
180	55											
	56			88						■		
185	57			94						■		
190	58											
	59			96						■		
195	60			100						■		
200	61		END OF HOLE @ 200 FT									
	62											
205	63											

Pebble Limited Partnership
Pebble Project
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Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-228**	Page	**1** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 20, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**762 ft**	Date Completed:	**Oct 23, 10**
Location:	**Upper Talarik Creek Area**	Total Depth:	**240 ft**	Logged by:	**AL/CBN**
Coordinates:	**2,158,170 N , 1,421,905 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
0	0		SILT and CLAY, trace sand, trace gravel, trace cobbles, subrounded, clasts up to gravel size, poorly graded, medium plasticity, firm, brown, root inclusions up to 5' depth, moist. (Glaciolacustrine)	20							PQ casing installed to 45'. Core Size: PQ3 to 45', HQ3 to 240'.	
5	1				42		GH10-228 Shelby #1	//				
	2			25	78		GH10-228 SPT #1	2/3/4	7	●		
10	3				71		GH10-228 Shelby #2	//				
	4			49	72		GH10-228 SPT #2	2/11/11	22	●		
15	5		Clayey SILT, trace sand, trace gravel, subrounded, poorly graded, medium plasticity, firm, brown, moist, possible frozen soil material encountered in this zone. (Glaciolacustrine)	38	33		GH10-228 Shelby #3	//				
					94		GH10-228 SPT #3	11/15/18	33	●		
20	6		Gravelly SAND, some silt, trace clay, some zones with higher silt content but fines are mostly washed away, trace cobbles and boulders, subangular to subrounded, clasts up to boulder size but mostly gravel size, poorly, low to no plasticity, brown, moist. (Glacial Drift)	42	89		GH10-228 SPT #4	6/9/25	34	●	***Drillhole logs represent an interpretation of field logs and laboratory testing results combined with PLP Lithology Logs***	
25	8			15	56		GH10-228 SPT #5	15/40/50+	90+	●		
30	9			28								
35	11			15								
40	12		Silty, gravelly SAND, some clay, trace cobbles and boulders, subangular to subrounded, clasts up to boulder size but mostly gravel size, well graded, low plasticity, grey brown, dense, moist. (Glacial Drift)	93								
45	14			27								
	15											

Pebble Limited Partnership
Pebble Project
Overburden Log For GH10-228

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-176/35	**1**	**0**

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-228**	Page	**2** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 20, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**762 ft**	Date Completed:	**Oct 23, 10**
Location:	**Upper Talarik Creek Area**	Total Depth:	**240 ft**	Logged by:	**AL/CBN**
Coordinates:	**2,158,170 N , 1,421,905 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
55	16			53								
	17			93								
60	18											
	19			72								
65	20											
	21			100								
70	22			96								
75	23			100								
	24											
80	25			100								
85	26		BEDROCK, Tertiary Volcaniclastic Conglomerate, light reddish brown to pale green yellow in sections, matrix supported, clasts or fragments are 0.01 - 0.5" in diameter, subrounded, and are of various lithologies, bleaching, oxidized zones, becomes more competent with depth, strong in some sections, fractured.	98						■	* See GEOTECHNICAL BEDROCK GEOLOGY LOGGING SHEET for additional information (RMR89).	
	27			92						■		
90	28			100						■		
95	29			100						■		
	30											

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Pebble Limited Partnership
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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-228**	Page	**3** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 20, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**762 ft**	Date Completed:	**Oct 23, 10**
Location:	**Upper Talarik Creek Area**	Total Depth:	**240 ft**	Logged by:	**AL/CBN**
Coordinates:	**2,158,170 N , 1,421,905 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	31			87								
105	32			92								
	33											
110	34			97								
	35											
115	36			77								
	37			100								
120	38											
	39			97								
125	40			100								
	41											
130	42			98								
	43			96								
135	44											
	45			97								
140												
145												

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Date Revised: Jan 28, 11

Project:	**Pebble Project**	Drill Hole No.	**GH10-228**	Page	**4** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 20, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**762 ft**	Date Completed:	**Oct 23, 10**
Location:	**Upper Talarik Creek Area**	Total Depth:	**240 ft**	Logged by:	**AL/CBN**
Coordinates:	**2,158,170 N , 1,421,905 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
	46			97								
	47											
155				85								
	48											
160				92								
	49											
	50											
165				100								
	51											
170				99								
	52											
	53											
175				95								
	54											
180				97								
	55											
	56											
185				96								
	57											
190				100								
	58											
	59											
195				100								
	60											

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Project:	**Pebble Project**	Drill Hole No.	**GH10-228**	Page	**5** of **5**
Drilling Co:	**Foundex**	In-Situ Sampler:	**SPT/Shelby**	Date Started:	**Oct 20, 10**
Drilling Method:	**HT-700 Mud Rotary Diamond**	Elevation:	**762 ft**	Date Completed:	**Oct 23, 10**
Location:	**Upper Talarik Creek Area**	Total Depth:	**240 ft**	Logged by:	**AL/CBN**
Coordinates:	**2,158,170 N , 1,421,905 E, Alaska State Plane Zone 5**	Azimuth, Inclination:	**0, -90**	Reviewed by:	**LS**

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	DRILL RUN RECOVERY (%)	SAMPLE RECOVERY (%)	SAMPLES	SAMPLE NO.	BLOW COUNT	SPT 'N' VALUE	SPT TEST DATA Uncorrected 'N' values vs. depth (●) / RQD DATA (%) (■) 20 40 60 80	NOTES	WELL DETAILS
205	62			53								
	63			100							Lost circulation at 205'.	
210	64			98								
	65											
215	66			91								
220	67			98								
	68											
225	69			94								
230	70											
	71			95								
235	72			99								
240	73		END OF HOLE @ 240 FT									
	74											
245	75											
	76											

Pebble Limited Partnership
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Knight Piésold CONSULTING

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Date Revised: Jan 28, 11

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APPENDIX B

HYDROGEOLOGICAL DRILLHOLE DATA

Appendix B1 Well Completion Details
Appendix B2 Packer Hydraulic Conductivity (Lugeon) Test Sheets
Appendix B3 Rising/Falling Head Hydraulic Conductivity Test Sheets
Appendix B4 Vibrating Wire Pressure Transducer Calibration Records

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APPENDIX B1

WELL COMPLETION DETAILS

- GH11-229
- GH11-231
- GH11-232
- GH11-233
- GH11-234
- GH11-235
- GH11-236
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- GH11-238
- GH11-239
- GH11-240
- GH11-241
- GH11-242
- GH11-243
- GH11-245
- GH11-246
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- GH11-277
- GH11-281
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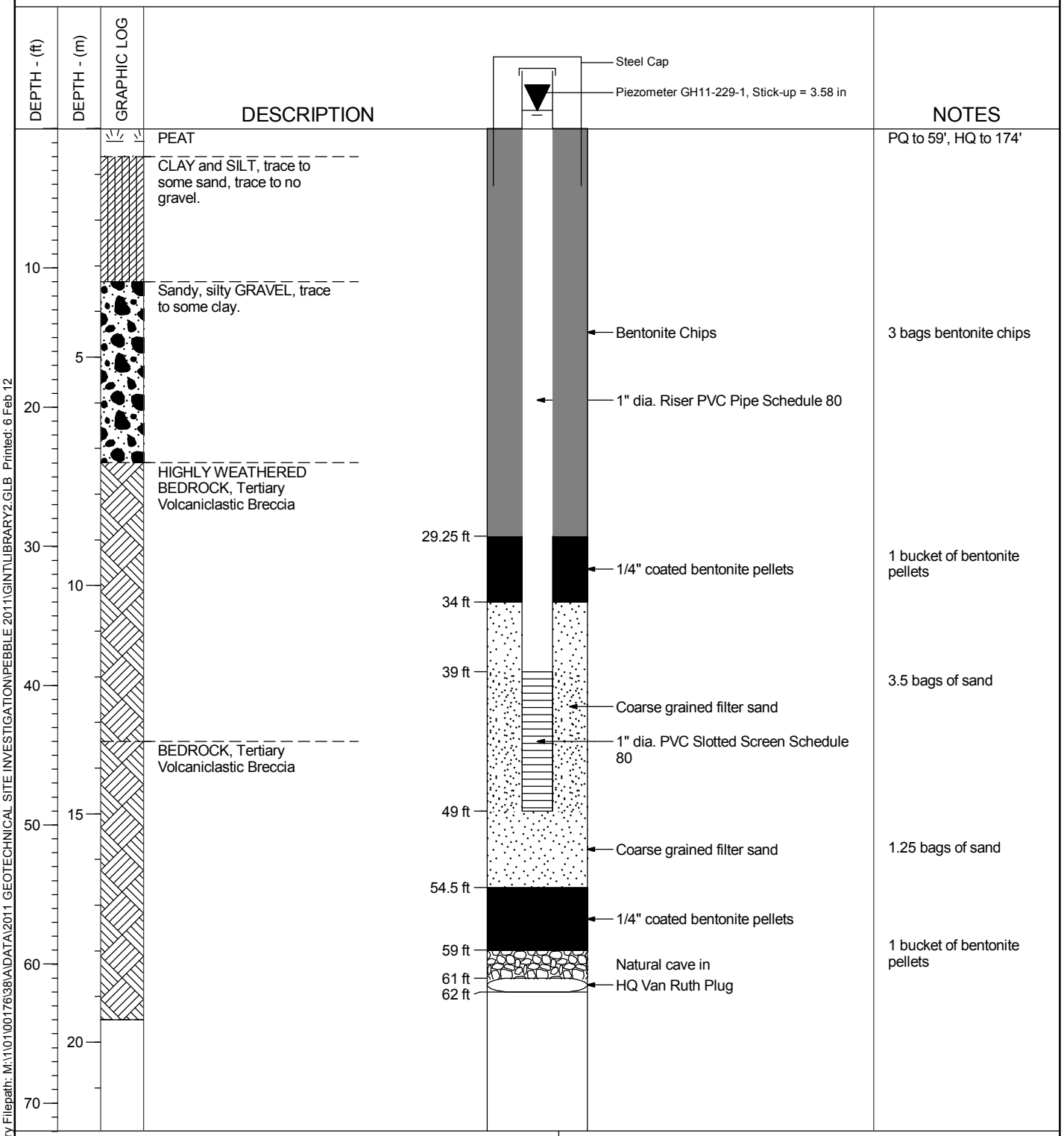
- GH11-294
- GH11-296

(Pages B1-1 to B1-23)

Project:	**Pebble Project**			Drill Hole No.:	**GH11-229**	Page	**1 of 1**
Hole Depth:	**174 ft**	Hole Diameter:	**PQ to 58, HQ to 174'**	Date Started:	**5 Jun 11**	Date Completed:	**8 Jun 11**
Collar Elev:	**804 ft**	PVC Pipe I.D.:	**1 in**	Logged by:	**LS/DLP/GD**	Reviewed by:	**LS**

Water Level Readings: Depth to Water / Date Measured

Well 1: -1.33 ft bgs / 21 Jul 11



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-229

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

Rev. 0 - Issued for Report VA101-176/38-3

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Date Revised: 7 Dec 11

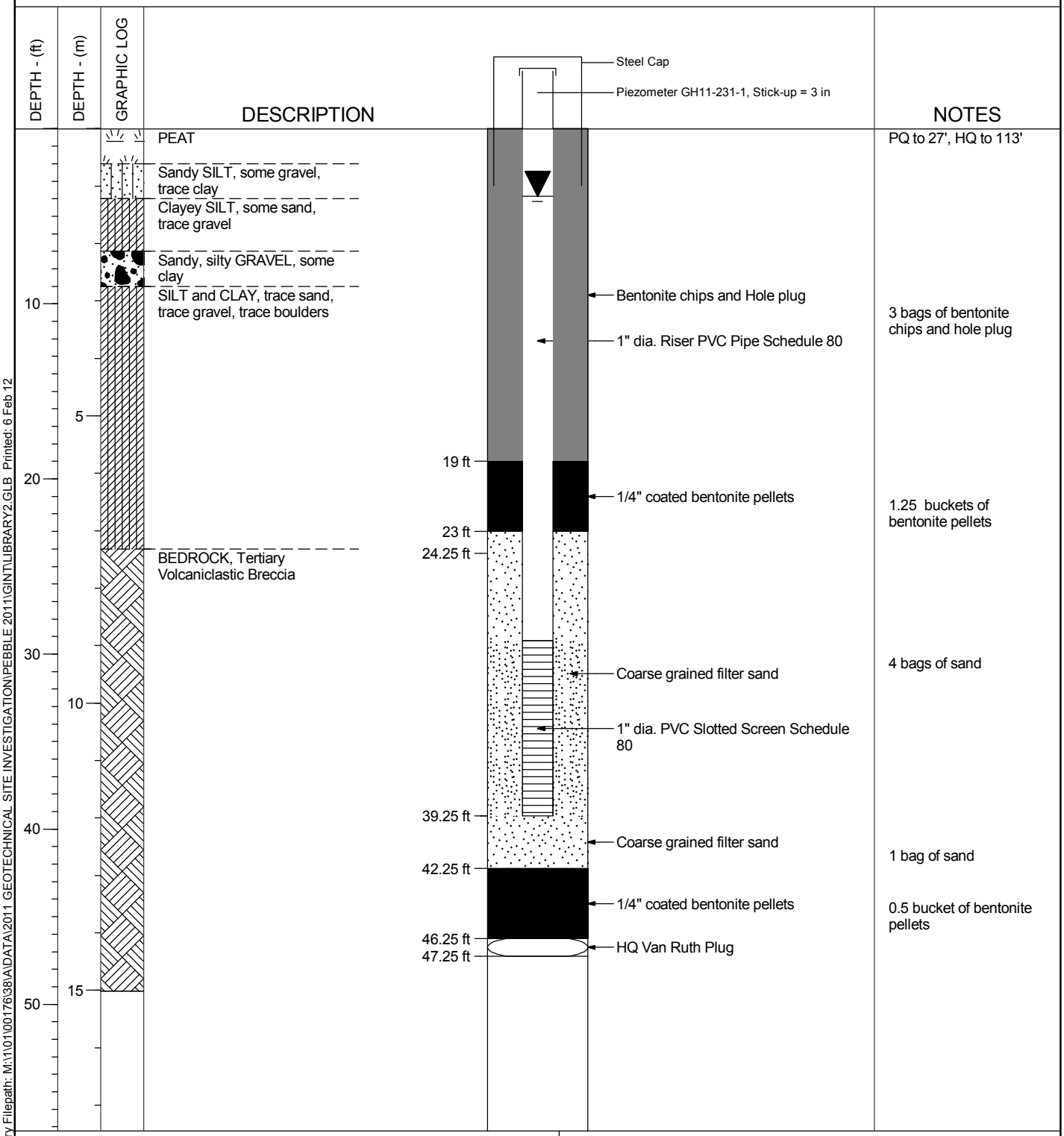
Project: Pebble Project | Drill Hole No.: GH11-231 | Page 1 of 1

Hole Depth: 114 ft | Hole Diameter: PQ to 26', HQ to 114' | Date Started: 11 Jun 11 | Date Completed: 12 Jun 11

Collar Elev: 821 ft | PVC Pipe I.D.: 1 in | Logged by: LS/DLP | Reviewed by: LS

Water Level Readings: Depth to Water / Date Measured

Well 1: 3.86 ft bgs / 21 Jul 11



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Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-231

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Project No.	Ref. No.	Rev.
101-176/38	3	0

B1-2

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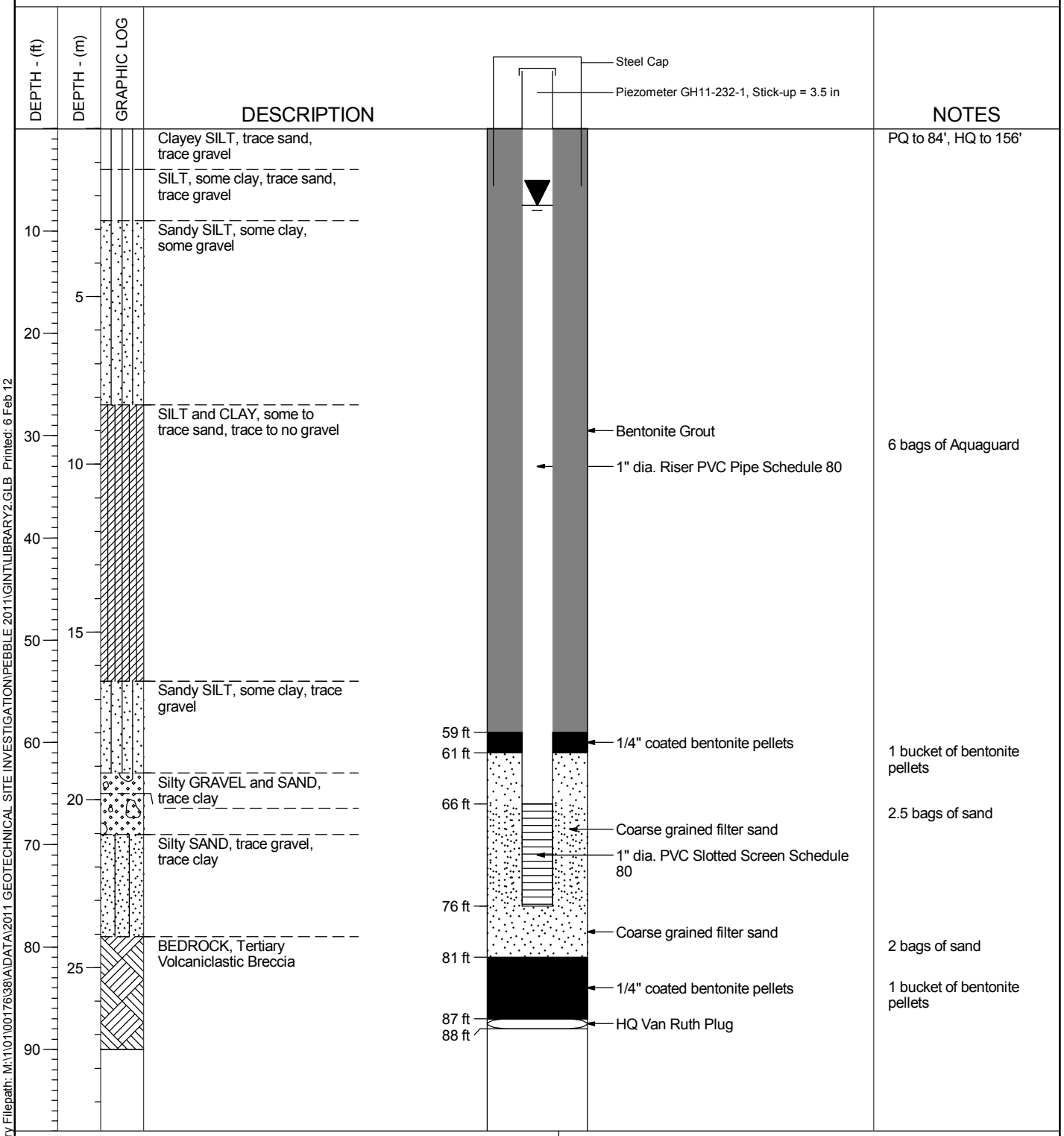
Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.:	**GH11-232**	Page	**1 of 1**
Hole Depth:	**156 ft**	Hole Diameter:	**PQ to 84', HQ to 156'**	Date Started:	**12 Jun 11**
Date Completed:	**14 Jun 11**	Collar Elev:	**795 ft**	PVC Pipe I.D.:	**1 in**
Logged by:	**LS/DLP**	Reviewed by:	**LS**		

Water Level Readings: Depth to Water / Date Measured

Well 1: 7.5 ft bgs / 21 Jul 11



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-232

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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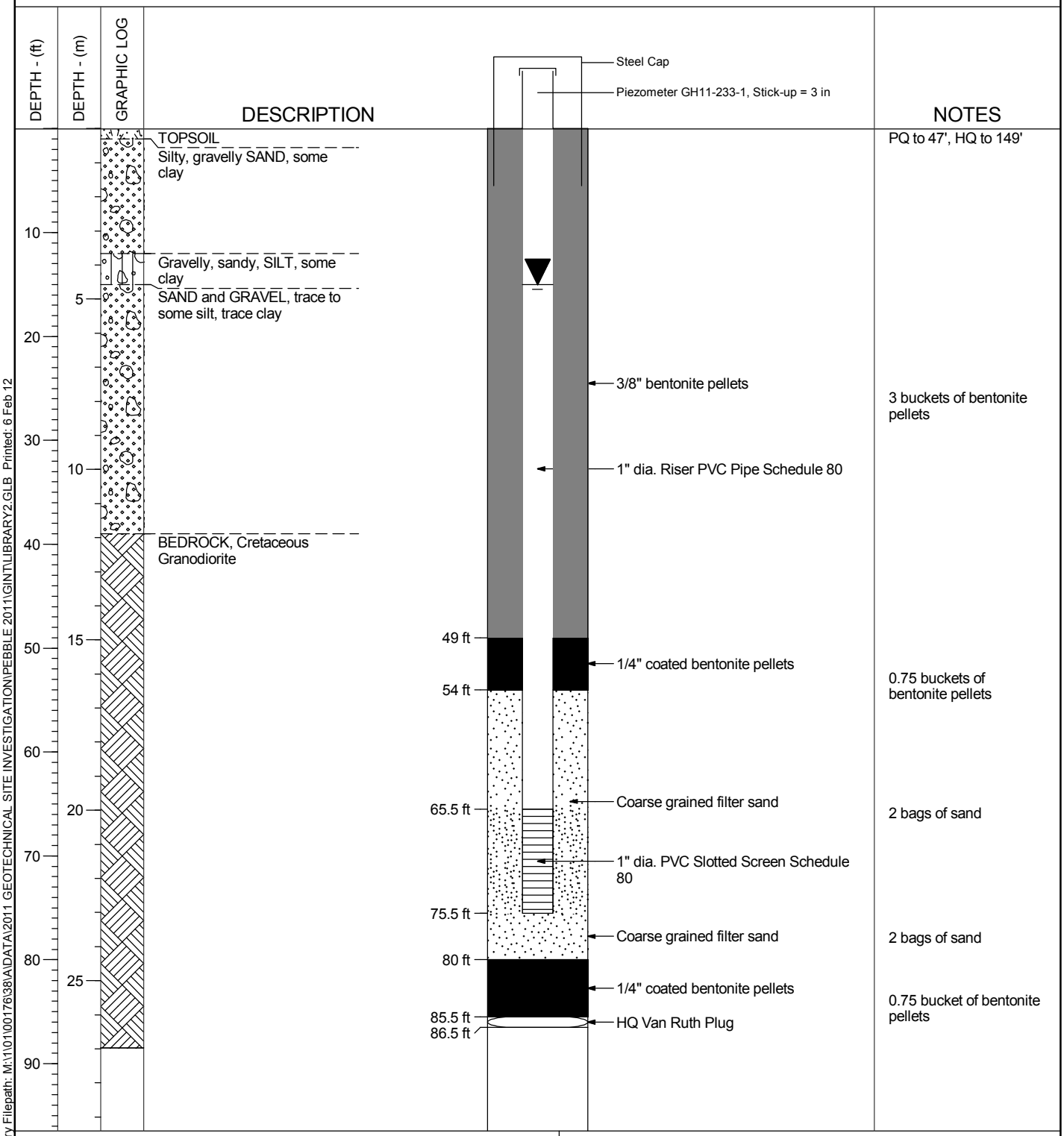
Date Revised: 13 Jun 11

Project:	**Pebble Project**	Drill Hole No.:	**GH11-233**	Page	**1 of 1**
Hole Depth:	**149 ft**	Hole Diameter:	**PQ to 47', HQ to 149'**	Date Started:	**15 Jun 11**
Collar Elev:	**1036 ft**	PVC Pipe I.D.:	**1 in**	Logged by:	**LS/DLP**
Date Completed:	**16 Jun 11**	Reviewed by:	**LS**		

Water Level Readings: Depth to Water / Date Measured

Well 1: 15 ft bgs / 20 Jul 11



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-233

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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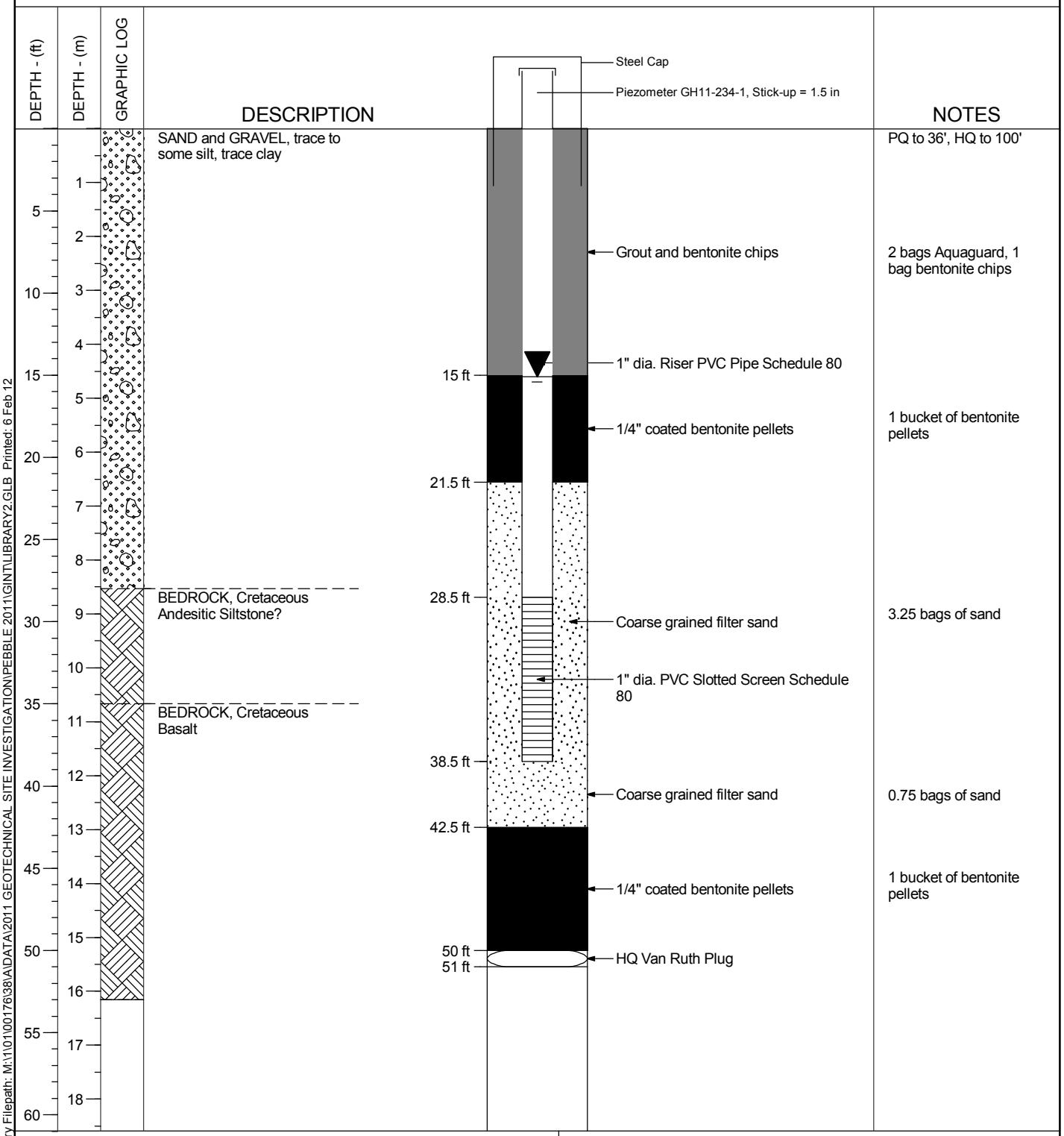
Project: Pebble Project | Drill Hole No.: GH11-234 | Page 1 of 1

Hole Depth: 100 ft | Hole Diameter: PQ to 36', HQ to 100' | Date Started: 16 Jun 11 | Date Completed: 18 Jun 11

Collar Elev: 1205 ft | PVC Pipe I.D.: 1 in | Logged by: LS/DLP | Reviewed by: LS

Water Level Readings: Depth to Water / Date Measured

Well 1: 15.1 ft bgs / 20 Jul 11



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-234

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	3	0

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Date Revised: 16 Jun 11

Project: Pebble Project | Drill Hole No.: GH11-235 | Page 1 of 1

Hole Depth: 139 ft | Hole Diameter: PW to 22', PQ to 56', HQ to 86.3', NQ to 139' | Date Started: 19 Jun 11 | Date Completed: 22 Jun 11

Collar Elev: 1245 ft | PVC Pipe I.D.: 1" | Logged by: LS/DLP | Reviewed by: LS

Water Level Readings: Depth to Water / Date Measured

Well 1: 26.1 ft bgs / 20 Jul 11

DEPTH - (ft)	DEPTH - (m)	GRAPHIC LOG	DESCRIPTION	NOTES
0	0		Steel Cap	
			Piezometer GH11-235-1, Stick-up = 3 in	
0	0		Silty SAND and GRAVEL, trace clay	PW to 22', PQ to 56', HQ to 86.3', NQ to 139'
10			GRAVEL and SAND, trace to some silt, trace clay, trace cobbles	
	5			
20				
			3/8" bentonite pellets, Aquaguard, hole plug	6 bags of hole plug, 3 buckets of bentonite pellets, 3 bags Aquaguard
30	10		1" dia. Riser PVC Pipe Schedule 80	
40			SAND, some silt, some gravel, trace clay	
50	15		Silty, gravelly, SAND, trace clay	
55 ft			1/4" coated bentonite pellets	1.25 bucket of bentonite pellets
60			No Recovery from 56 - 60 ft due to HQ triconing.	
60 ft			BEDROCK, Cretaceous Basalt	
65.5 ft	20		Coarse grained filter sand	2.25 bags of sand
70			1" dia. PVC Slotted Screen Schedule 80	
75.5 ft			Coarse grained filter sand	1 bag of sand
80	25			
82.25 ft			1/4" coated bentonite pellets	0.75 bucket of bentonite pellets
90			BEDROCK, Cretaceous Basalt	
90 ft			Natural cave in	
91 ft			NQ Van Ruth Plug	
100	30			

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Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-235

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	3	0

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Rev. 0 - Issued for Report VA101-176/38-3

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Date Revised: 19 Jun 11

Project:	**Pebble Project**	Drill Hole No.:	**GH11-236**	Page	**1** of **1**
Hole Depth:	**169 ft**	Hole Diameter:	**PQ to 51.5', HQ to 109', NQ to**	Date Started:	**22 Jun 11**
Collar Elev:	**1340 ft**	PVC Pipe I.D.:	**2"**	Logged by:	**LS/DLP**
				Date Completed:	**25 Jun 11**
				Reviewed by:	**LS**

Water Level Readings: Depth to Water / Date Measured

Well 1: 37 ft bgs / 20 Jul 11

DEPTH - (ft)	DEPTH - (m)	GRAPHIC LOG	DESCRIPTION	NOTES
0	0		Gravelly, Silty SAND, trace clay	PQ to 51.5', HQ to 109', NQ to 169'
10			SAND and GRAVEL, some to trace silt, trace clay	
	5			
20				
30	10			2 buckets of bentonite pellets and Natural cave in
40			No Recovery from 39 to 44', materials washed away.	
			Silty, Sandy GRAVEL, some clay	
50	15		No Recovery from 49 to 51.5 ft due to Tricone.	
			Silty, Sandy GRAVEL, some clay	
60			HIGHLY TO COMPLETELY WEATHERED BEDROCK, Sandy SILT, some gravel, some clay	
70	20			0.5 bucket of bentonite pellets
80				3 bags of sand
	25			
90				
100	30			1.5 bags of sand
110			BEDROCK, Cretaceous Gabbro	1.5 bucket of bentonite pellets
	35			

Steel Cap

Piezometer GH11-236-1, Stick-up = 3 in

3/8" bentonite pellets and Natural cave in

2" dia. Riser PVC Pipe Schedule 80

62 ft

1/4" coated bentonite pellets

69 ft

79 ft

Coarse grained filter sand

2" dia. PVC Slotted Screen Schedule 80

89 ft

89.25 ft

Natural cave in

Coarse grained filter sand

98 ft

1/4" coated bentonite pellets

106 ft

107 ft

HQ Van Ruth Plug

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Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-236

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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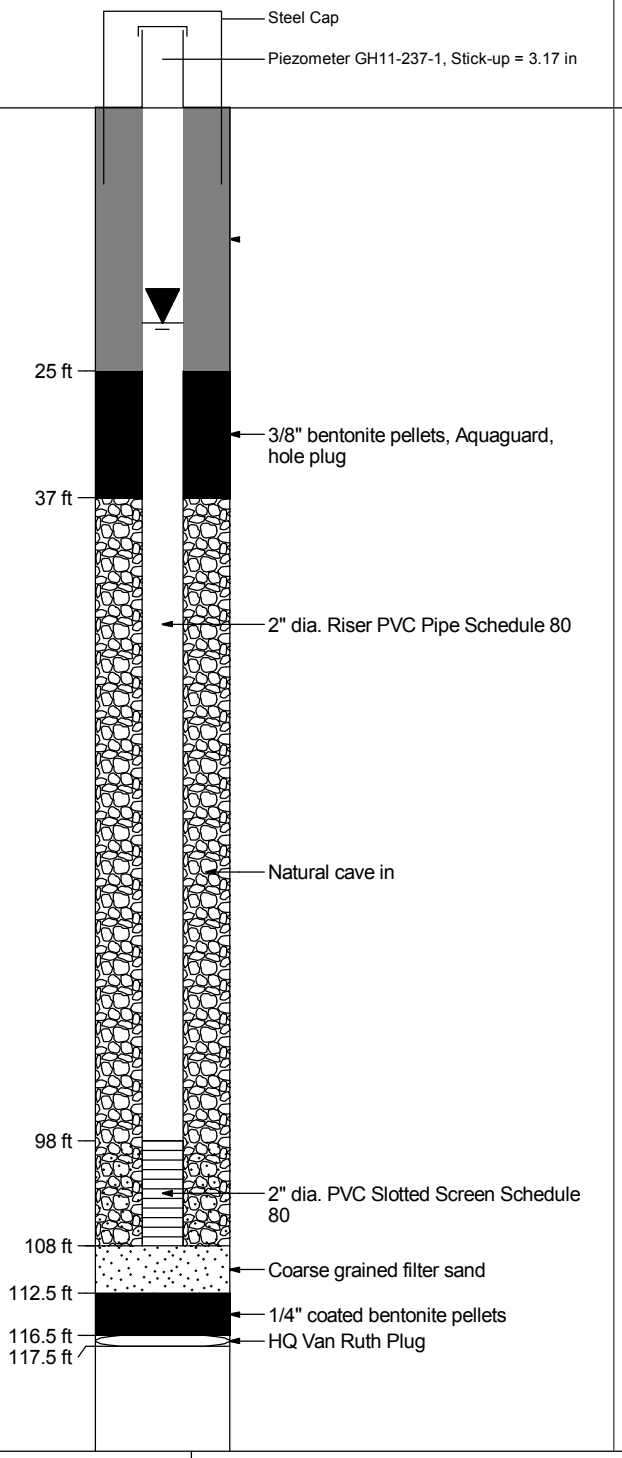
Date Revised: 23 Jun 11

Project:	**Pebble Project**	Drill Hole No.:	**GH11-237**	Page	**1 of 1**
Hole Depth:	**203 ft**	Hole Diameter:	**PQ to 39', HQ to 138', NQ to 203'**	Date Started:	**25 Jun 11**
Collar Elev:	**1306 ft**	PVC Pipe I.D.:	**2 in**	Logged by:	**LS/DLP**
Date Completed:	**28 Jun 11**	Reviewed by:	**LS**		

Water Level Readings: Depth to Water / Date Measured

Well 1: 20.43 ft bgs / 21 Jul 11

DEPTH - (ft)	DEPTH - (m)	GRAPHIC LOG	DESCRIPTION	NOTES
0	0		Sandy GRAVEL, trace silt, trace clay	
10				1 bucket of bentonite pellets and 1 bag Aquaguard
20	5			
25 ft				PQ to 39', HQ to 138', NQ to 203'
30	10		SAND and GRAVEL, some silt, trace clay	1 bucket of bentonite pellets
37 ft				
40				
50	15		Gravelly, silty SAND, trace clay	
60				
70	20			
80				
90	25		Silty, gravelly SAND, some clay	
			Sandy GRAVEL, some silt, trace clay	
98 ft				
100	30			
108 ft			HIGHLY WEATHERED BEDROCK, Highly to completely weathered Cretaceous Basalt	
110				
112.5 ft			BEDROCK, Cretaceous Basalt	1 bag sand
116.5 ft	35			1 bucket of bentonite pellets
117.5 ft				
120			BEDROCK, Cretaceous Granodiorite (Kaskanak)	



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-237

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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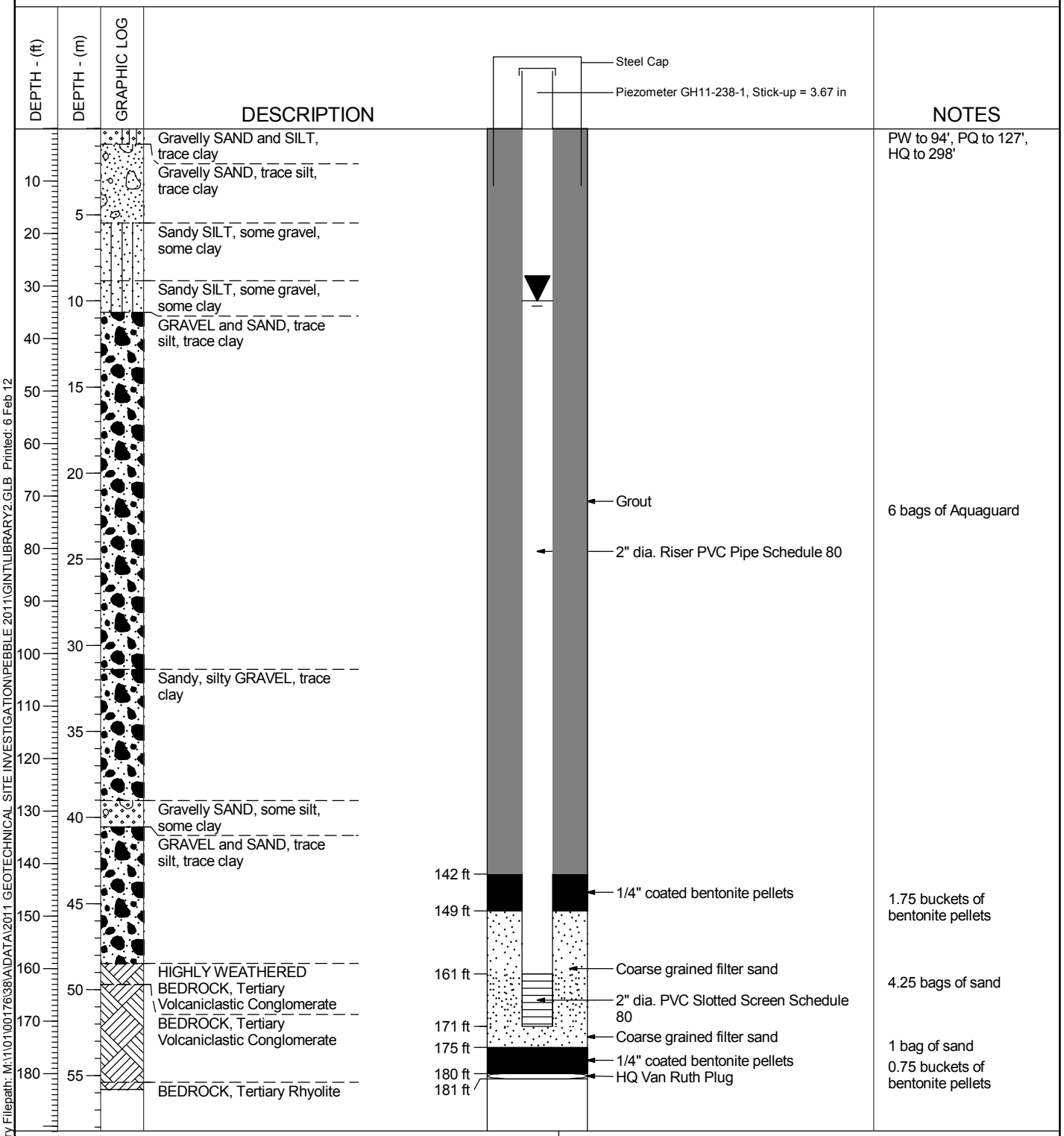
Project: Pebble Project | Drill Hole No.: GH11-238 | Page 1 of 1

Hole Depth: 298 ft | Hole Diameter: PW to 94', PQ to 127', HQ to 298' | Date Started: 28 Jun 11 | Date Completed: 5 Jul 11

Collar Elev: 975 ft | PVC Pipe I.D.: 2 in | Logged by: LS/DLP | Reviewed by: LS

Water Level Readings: Depth to Water / Date Measured

Well 1: 32.83 ft bgs / 19 Jul 11



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-238

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	3	0

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Date Revised: 28 Jun 11

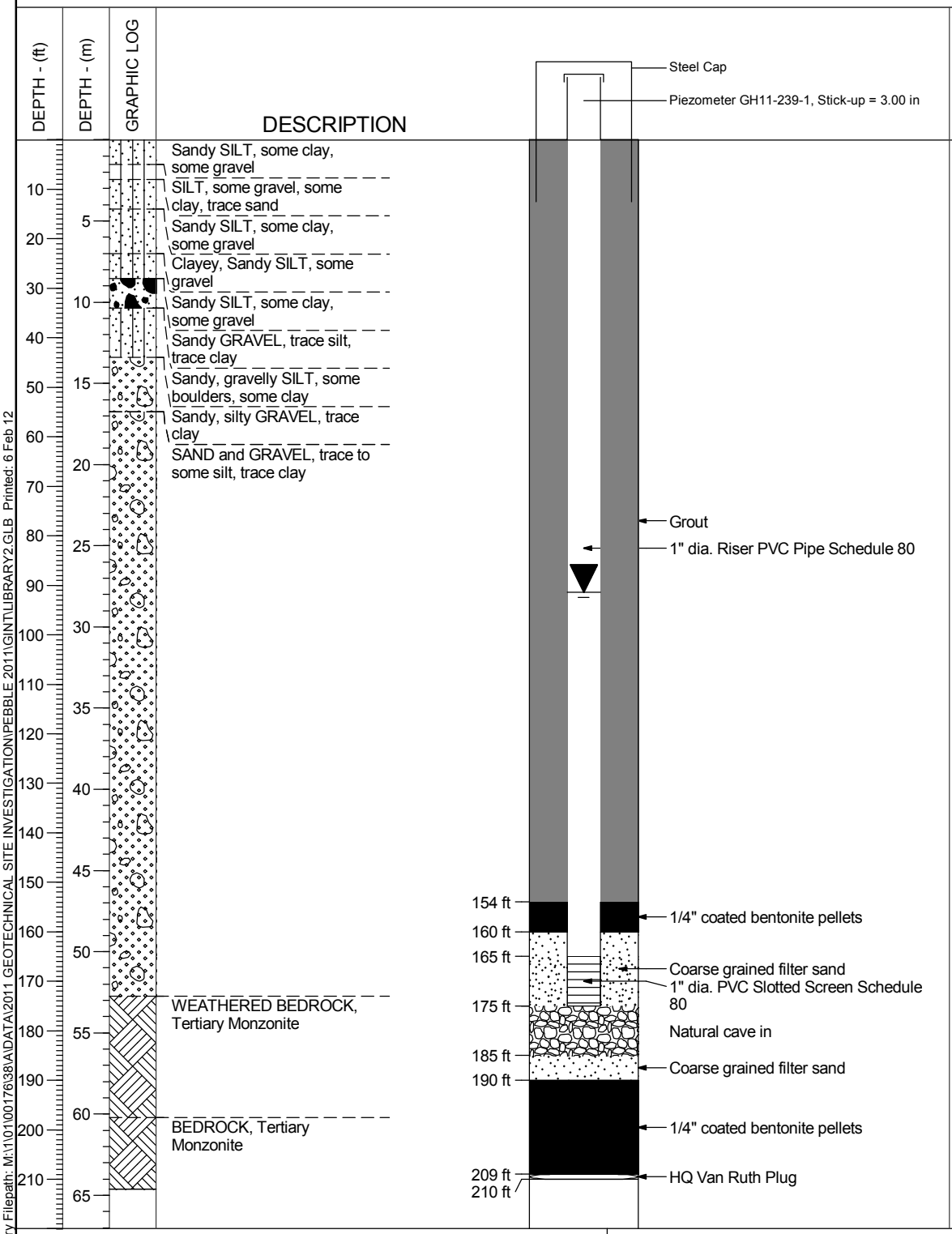
Project: Pebble Project | Drill Hole No.: GH11-239 | Page 1 of 1

Hole Depth: 264 ft | Hole Diameter: PQ to 190', HQ to 264' | Date Started: 5 Jul 11 | Date Completed: 10 Jul 11

Collar Elev: 1045 ft | PVC Pipe I.D.: 1 in | Logged by: LS/DLP/SR/AA | Reviewed by: LS

Water Level Readings: Depth to Water / Date Measured

Well 1: 91.40 ft bgs / 19 Jul 11



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Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-239

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	3	0

B1-10

Rev. 0 - Issued for Report VA101-176/38-3

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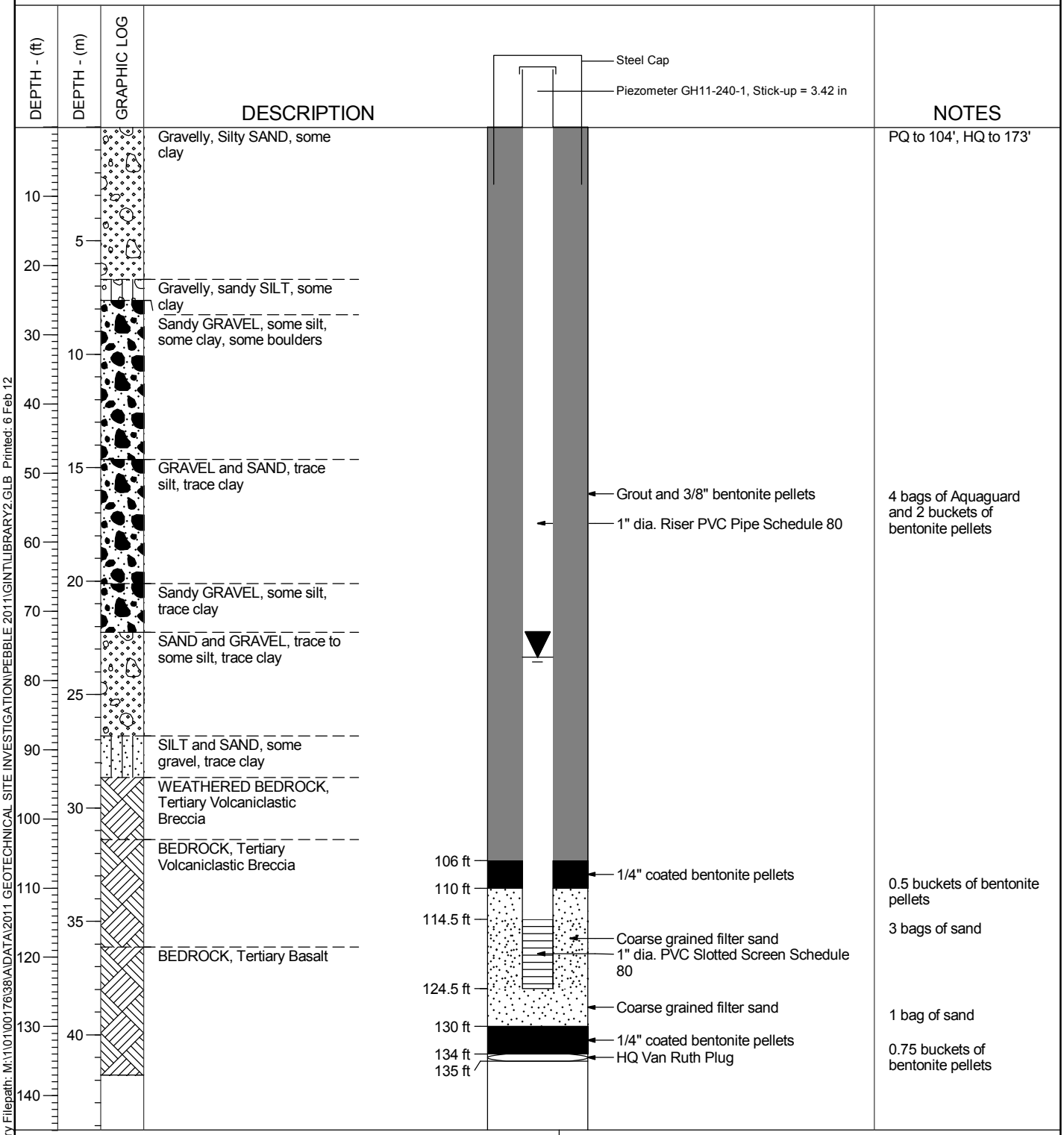
Date Revised: 21 Jul 11

Project:	**Pebble Project**			Drill Hole No.:	**GH11-240**	Page	**1 of 1**
Hole Depth:	**173 ft**	Hole Diameter:	**PQ to 104', HQ to 173'**	Date Started:	**10 Jul 11**	Date Completed:	**14 Jul 11**
Collar Elev:	**1046 ft**	PVC Pipe I.D.:	**1 in**	Logged by:	**AA/SR**	Reviewed by:	**LS**

Water Level Readings: Depth to Water / Date Measured

Well 1: 76.58 ft bgs / 19 Jul 11



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-240

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

B1-11

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Date Revised: 21 Jul 11

Project: Pebble Project | Drill Hole No.: GH11-241 | Page 1 of 1

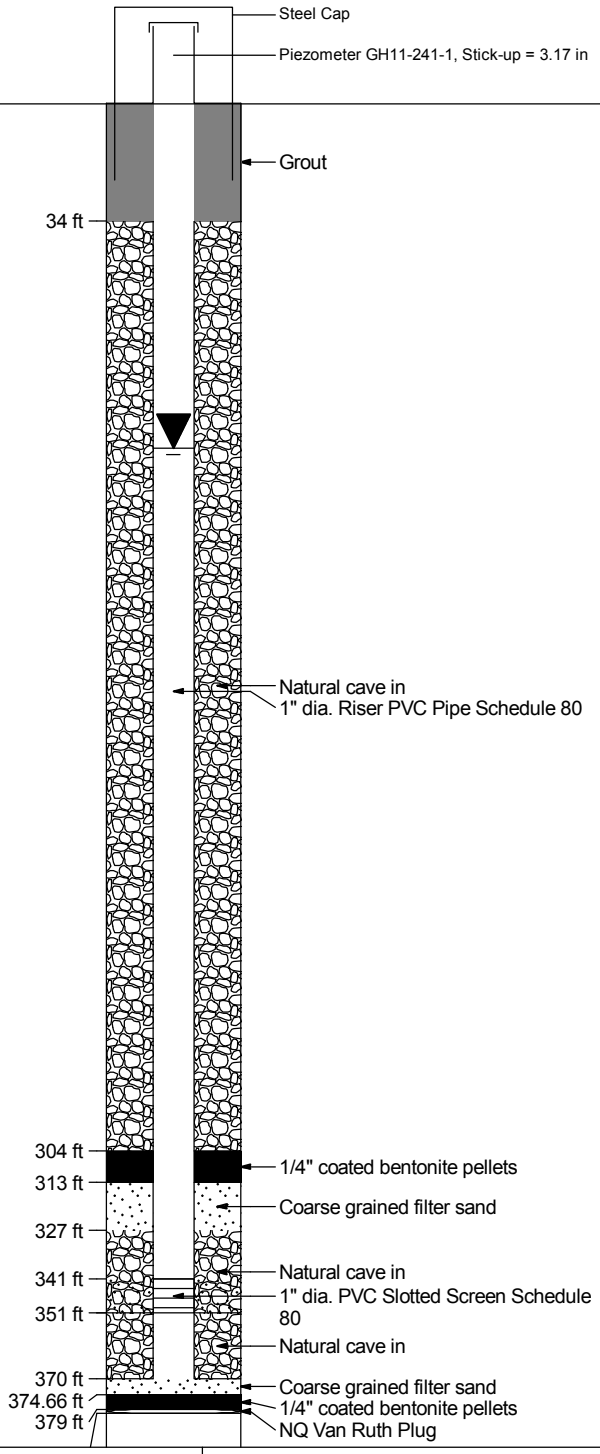
Hole Depth: 404 ft | Hole Diameter: PW to 84', PQ to 285', HQ to 349', NQ to 404' | Date Started: 14 Jul 11 | Date Completed: 22 Jul 11

Collar Elev: 1050 ft | PVC Pipe I.D.: NQ to 404' | Logged by: AA/SR/DLP/LS | Reviewed by: LS

Water Level Readings: Depth to Water / Date Measured

Well 1: 99.93 ft bgs / 25 Jul 11

DEPTH - (ft)	DEPTH - (m)	DESCRIPTION
10	5	TOPSOIL
20		Silty, Gravelly SAND, some clay, trace cobbles
30	10	Sandy, Silty GRAVEL, trace clay
40		Gravelly SAND and SILT, trace clay
50	15	Silty SAND, some gravel, some clay
60		Gravelly SAND, trace silt, trace clay
70	20	
80	25	Sandy, clayey SILT, trace gravel
90		No Recovery from 86 to 95ft.
100	30	SILT, some clay, some sand, trace gravel
110		SAND and GRAVEL, some silt, trace clay
120	35	
130	40	
140		
150	45	
160		No Recovery from 154-159'.
170	50	Silty SAND, some gravel to gravelly, trace clay
180	55	
190		
200	60	
210	65	Clayey SILT, trace sand, no gravel
220		No Recovery from 214 to 219'.
230	70	SAND and GRAVEL, trace silt, trace clay
240		
250	75	
260		
270	80	
280	85	
290		No Recovery from 287 to 297 ft due to Triconing.
300	90	SAND and GRAVEL, trace silt, trace clay
310	95	
320		
330	100	
340		HIGHLY WEATHERED BEDROCK, Cretaceous Andesitic Siltstone
350	105	BEDROCK, Cretaceous Andesitic Siltstone
360	110	
370		
380	115	



NOTES
PW to 84', PQ to 285', HQ to 349', NQ to 404'
5 bags of Grout, 1 bag of Aquaguard, 1 bucket Baroid 3/8" pellets
1 bucket of bentonite pellets 1.5 bags of sand
1 bag of sand 1 bucket of bentonite pellets

Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-241

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	3	0

B1-12

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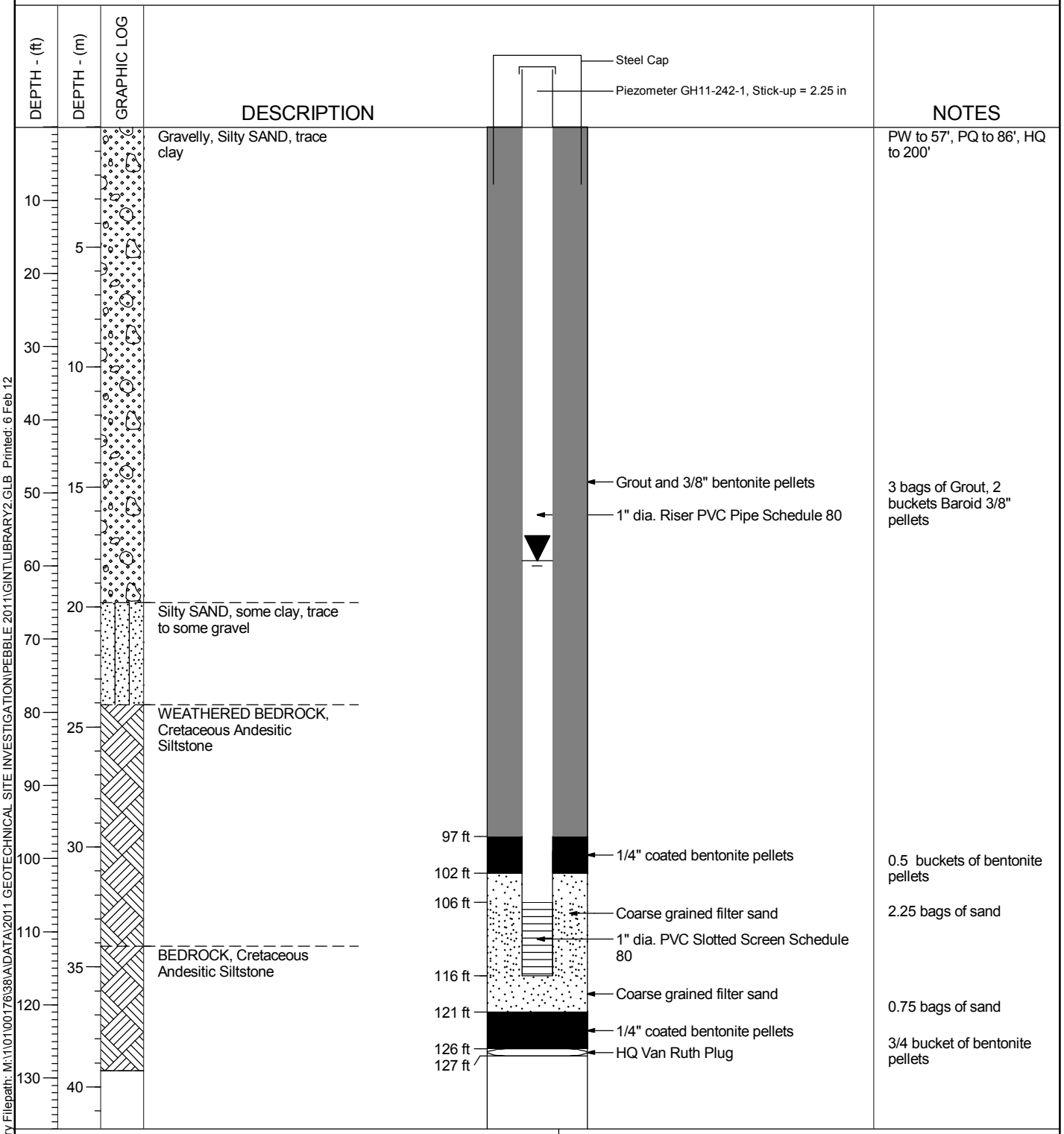
Project:	**Pebble Project**	Drill Hole No.:	**GH11-242**	Page	**1 of 1**
Hole Depth:	**200 ft**	Hole Diameter:	**PW to 57', PQ to 86', HQ to 200'**	Date Started:	**23 Jul 11**
Collar Elev:	**1150 ft**	PVC Pipe I.D.:	**1 in**	Logged by:	**LS/DLP**
Date Completed:	**27 Jul 11**	Reviewed by:	**LS**		

Water Level Readings: Depth to Water / Date Measured

Well 1: 59.3 ft bgs / 7 Aug 11



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-242

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

B1-13

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Date Revised: 24 Jul 11

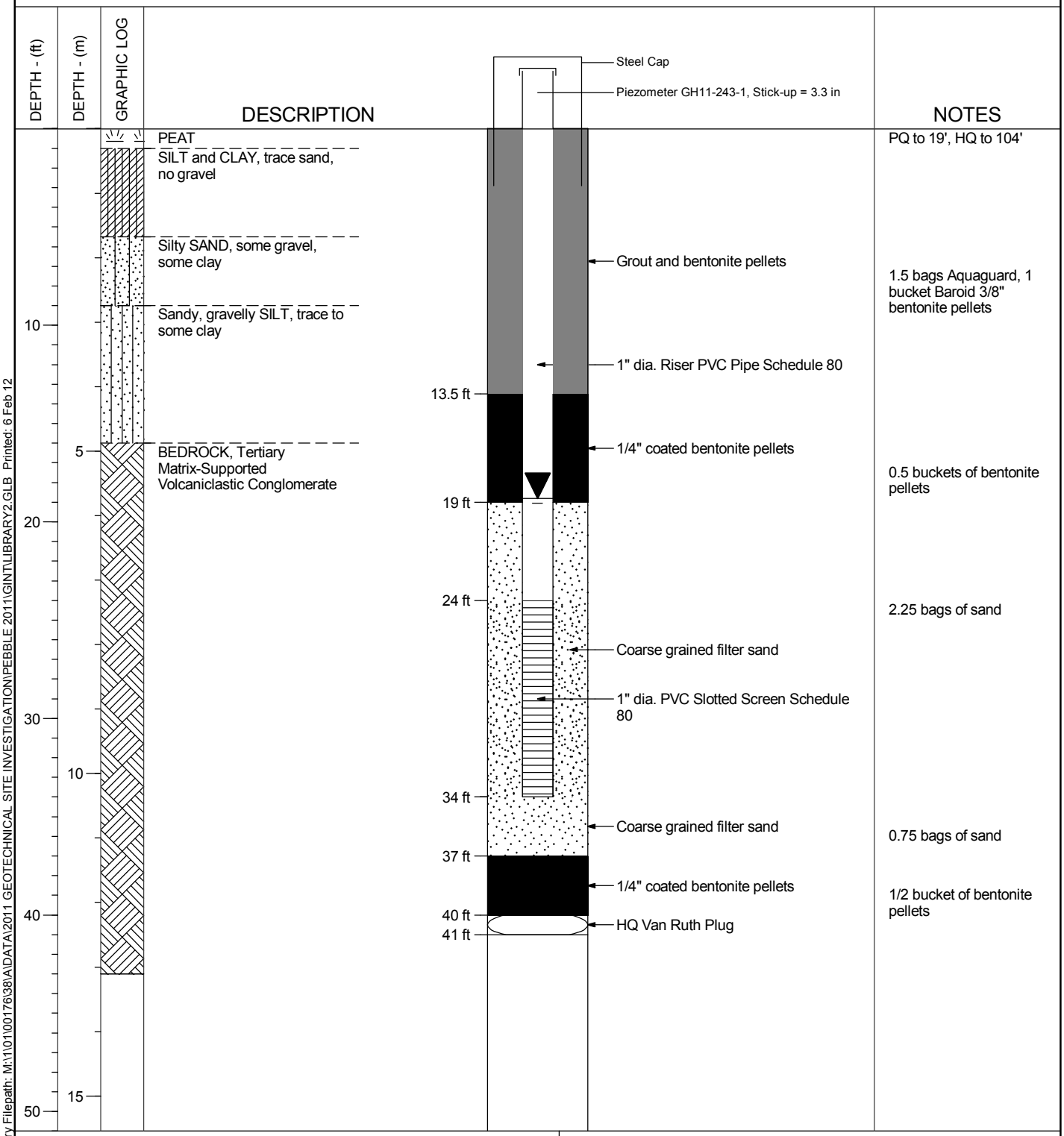
Project: Pebble Project | Drill Hole No.: GH11-243 | Page 1 of 1

Hole Depth: 104 ft | Hole Diameter: PQ to 19', HQ to 104' | Date Started: 27 Jul 11 | Date Completed: 29 Jul 11

Collar Elev: 828 ft | PVC Pipe I.D.: 1 in | Logged by: LS/DLP | Reviewed by: LS

Water Level Readings: Depth to Water / Date Measured

Well 1: 18.8 ft bgs / 8 Aug 11



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Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-243

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	3	0

B1-14

Rev. 0 - Issued for Report VA101-176/38-3

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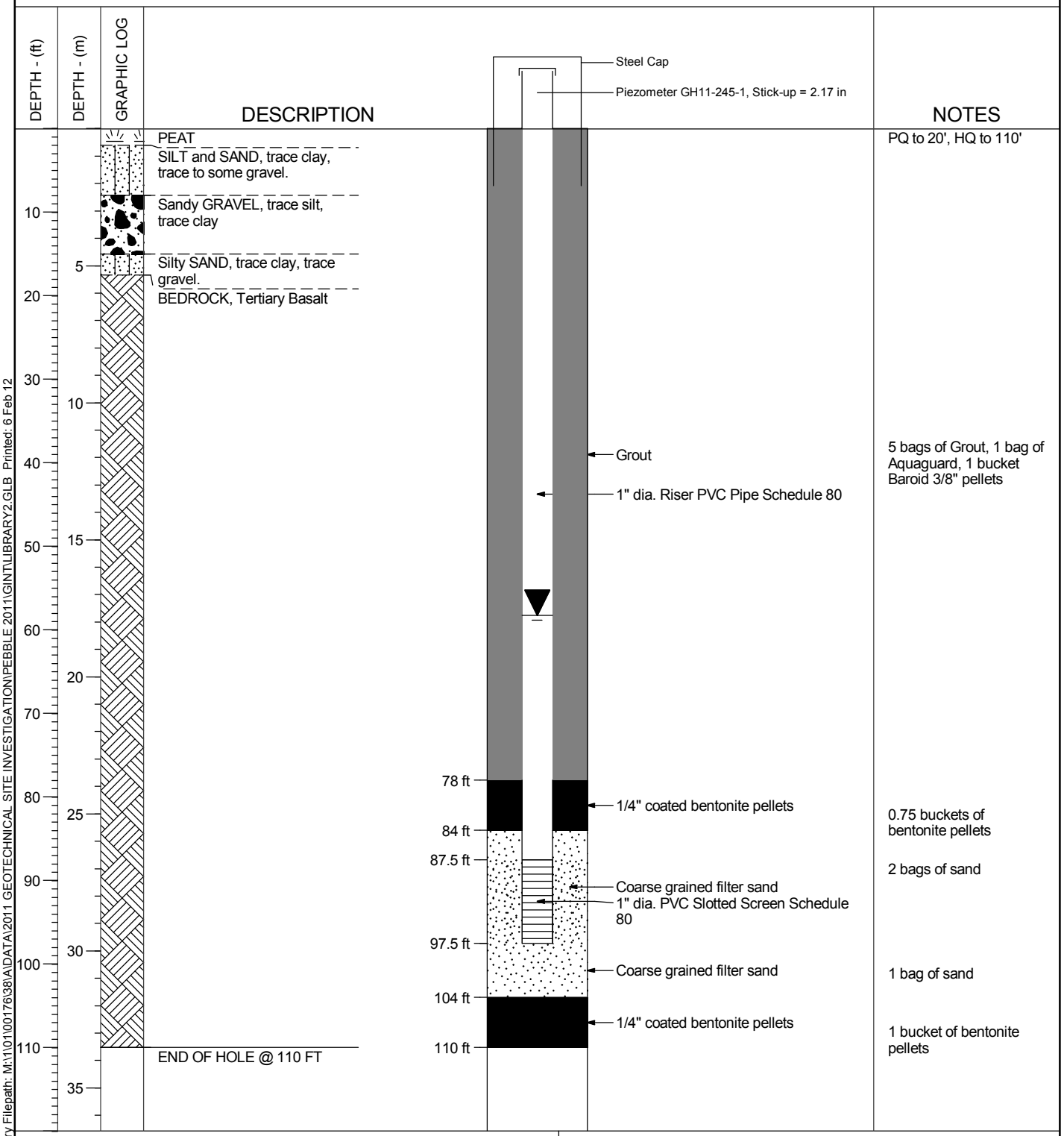
Date Revised: 30 Jul 11

Project:	**Pebble Project**			Drill Hole No.:	**GH11-245**	Page	**1 of 1**
Hole Depth:	**110 ft**	Hole Diameter:	**PQ to 20, HQ to 110'**	Date Started:	**30 Jul 11**	Date Completed:	**31 Jul 11**
Collar Elev:	**908 ft**	PVC Pipe I.D.:	**1 in**	Logged by:	**LS/DLP**	Reviewed by:	**LS**

Water Level Readings: Depth to Water / Date Measured

Well 1: 58.23 ft bgs / 8 Aug 11



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-245

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

B1-15

Rev. 0 - Issued for Report VA101-176/38-3

Log Type: WELL Library Filepath: M:\1\01\00176\38\A\DATA\2011 GEOTECHNICAL SITE INVESTIGATION\PEBBLE 2011\GINT\LIBRARY2.GLB Printed: 6 Feb 12

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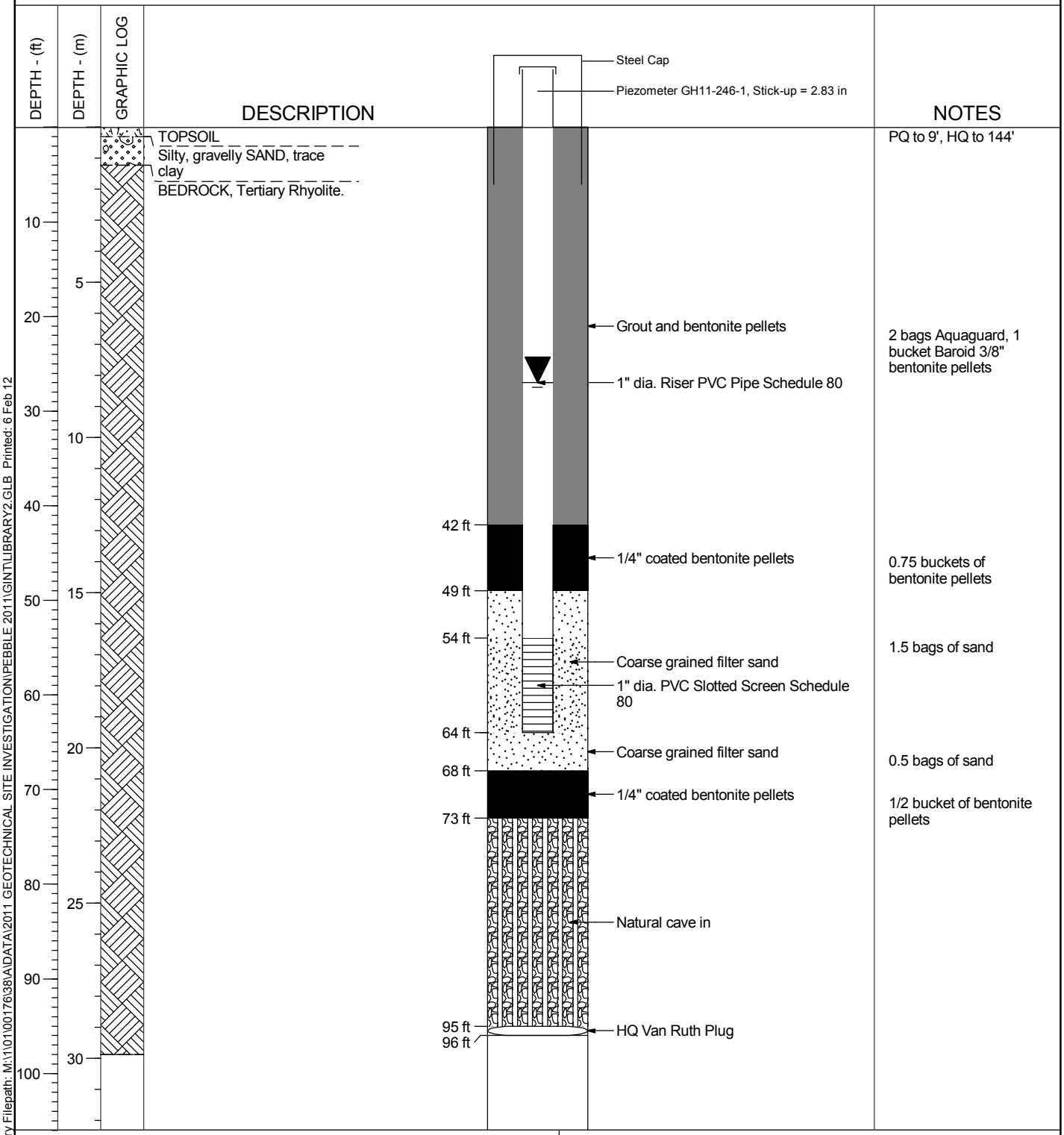
Date Revised: 30 Jul 11

Project:	**Pebble Project**			Drill Hole No.:	**GH11-246**	Page	**1 of 1**
Hole Depth:	**144 ft**	Hole Diameter:	**PQ to 9, HQ to 144'**	Date Started:	**1 Aug 11**	Date Completed:	**3 Aug 11**
Collar Elev:	**1016 ft**	PVC Pipe I.D.:	**1 in**	Logged by:	**LS/DLP**	Reviewed by:	**LS**

Water Level Readings: Depth to Water / Date Measured

Well 1: 26.97 ft bgs / 8 Aug 11



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Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-246

Rev. 0 - Issued for Report VA101-176/38-3

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

B1-16

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Date Revised: 4 Aug 11

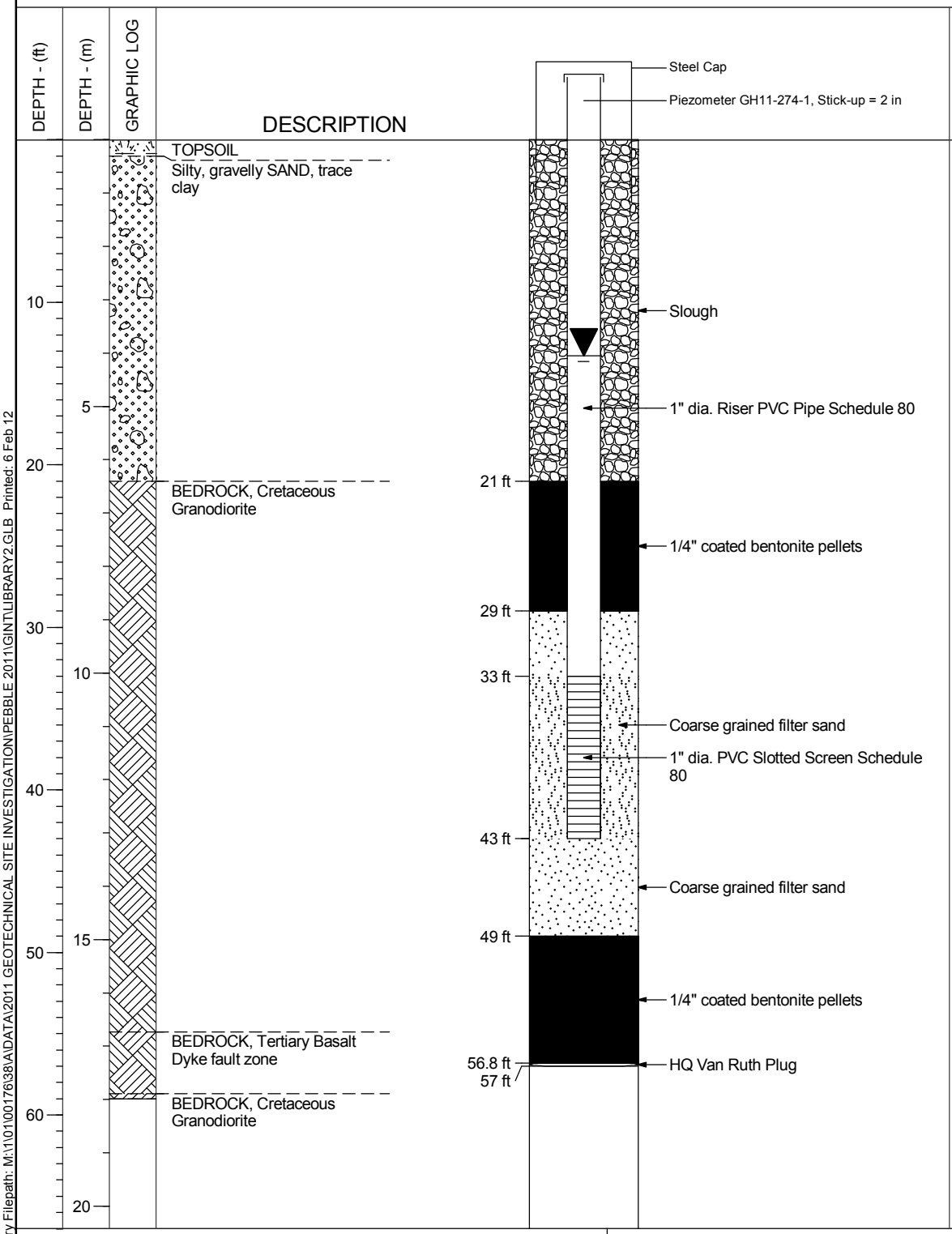
Project: Pebble Project | Drill Hole No.: GH11-274 | Page 1 of 1

Hole Depth: 179 ft | Hole Diameter: PQ to 31.5', HQ to 179' | Date Started: 16 Sep 11 | Date Completed: 18 Sep 11

Collar Elev: 1078 ft | PVC Pipe I.D.: 1 in | Logged by: LS/EEB | Reviewed by: LS

Water Level Readings: Depth to Water / Date Measured

Well 1: 13.3 ft bgs / 1 Oct 11



Log Type: WELL Library Filepath: M:\1\01\00176\38\A\DATA\2011 GEOTECHNICAL SITE INVESTIGATION\PEBBLE 2011\GINT\LIBRARY2.GLB Printed: 6 Feb 12

Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-274

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	3	0

Rev. 0 - Issued for Report VA101-176/38-3

B1-17

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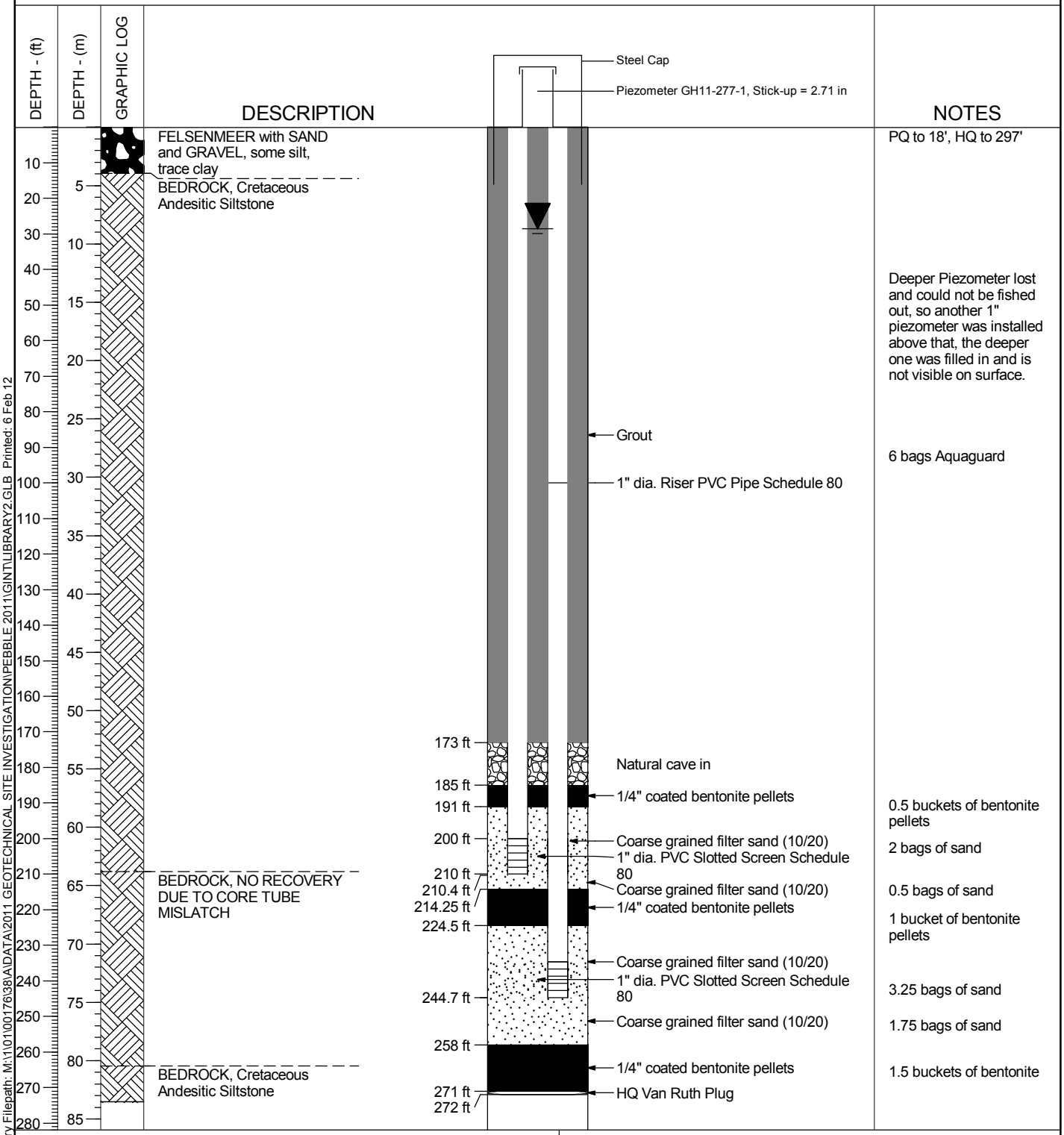
Date Revised: 19 Sep 11

Project:	**Pebble Project**			Drill Hole No.:	**GH11-277**	Page	**1 of 1**
Hole Depth:	**297 ft**	Hole Diameter:	**PQ to 18', HQ to 297'**	Date Started:	**19 Sep 11**	Date Completed:	**23 Sep 11**
Collar Elev:	**1692 ft**	PVC Pipe I.D.:	**1 in**	Logged by:	**LS/EEB**	Reviewed by:	**LS**

Water Level Readings: Depth to Water / Date Measured

Well 1: 28.5 ft bgs / 1 Oct 11



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Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-277

Rev. 0 - Issued for Report VA101-176/38-3

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

B1-18

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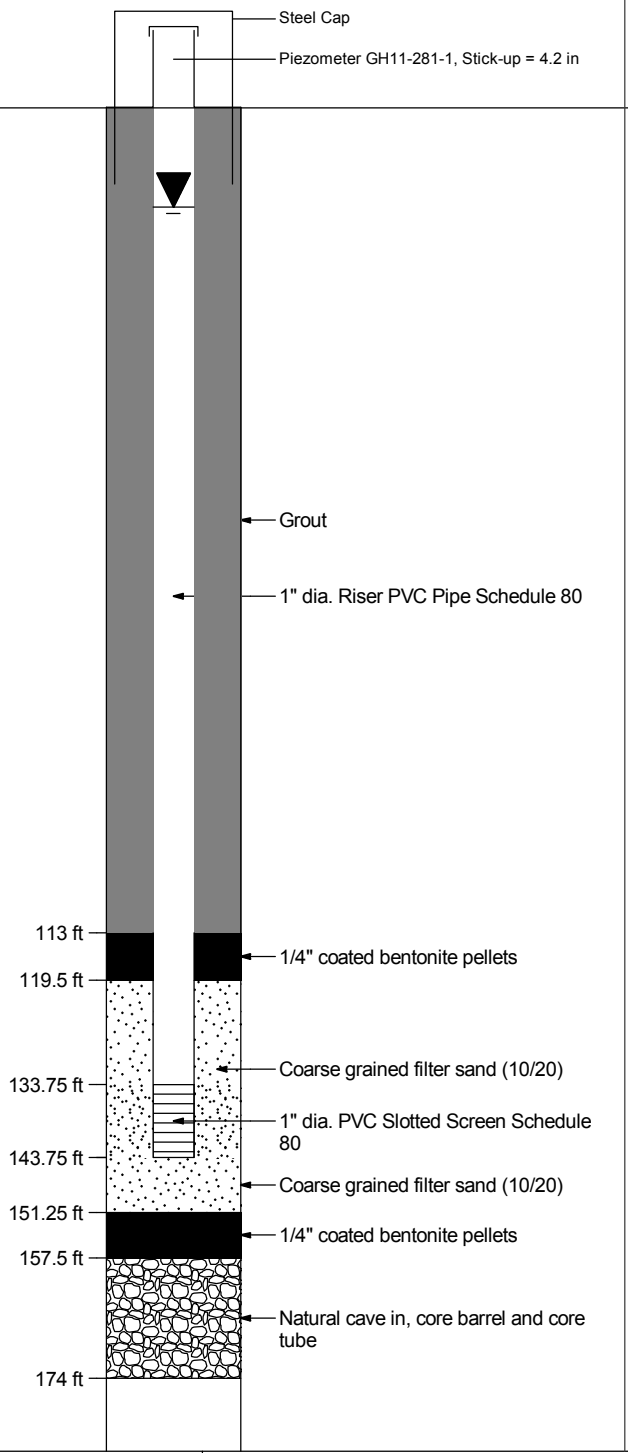
Date Revised: 23 Sep 11

Project:	**Pebble Project**	Drill Hole No.:	**GH11-281**	Page	**1** of **1**
Hole Depth:	**169 ft**	Hole Diameter:	**PQ to 9', HQ to 169', HWT to 20'**	Date Started:	**23 Sep 11**
Collar Elev:	**1591 ft**	PVC Pipe I.D.:	**1 in**	Logged by:	**LS/EEB**
Date Completed:	**26 Sep 11**	Reviewed by:	**LS**		

Water Level Readings: Depth to Water / Date Measured

Well 1: 13.6 ft bgs / 2 Oct 11

DEPTH - (ft)	DEPTH - (m)	DESCRIPTION	NOTES
0	0	TOPSOIL, SAND, some silt, trace gravel, trace clay	PQ to 20', HQ to 169'
10	5	Gravelly, silty SAND, trace clay	
20	10	BEDROCK, Cretaceous Diorite	
30	10	BEDROCK, Cretaceous Andesitic Siltstone	
40	15		
50	15		
60	20		
70	20		
80	25		
90	25		
100	30		
110	30		
120	35		
130	40		
140	40		
150	45	BEDROCK, Cretaceous Andesitic Siltstone Fault Zone	
160	50	BEDROCK, Cretaceous Andesitic Siltstone	
170	50	END OF HOLE @ 169 FT	
180	55		



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-281

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

B1-19

Rev. 0 - Issued for Report VA101-176/38-3

Log Type: WELL Library Filepath: M:\1\01\00176\38\A\DATA\2011 GEOTECHNICAL SITE INVESTIGATION\PEBBLE 2011\GINT\LIBRARY2.GLB Printed: 6 Feb 12

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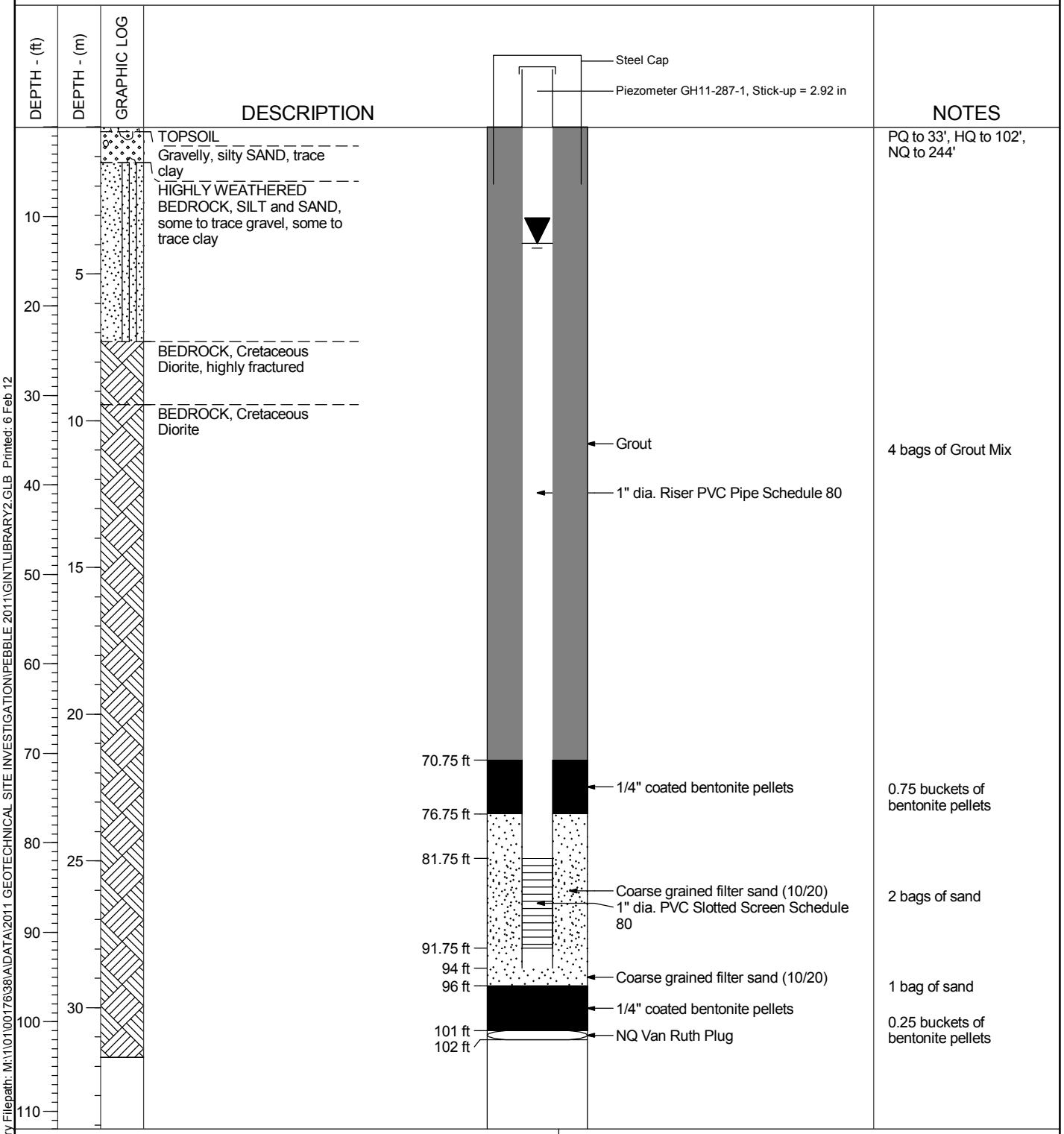
Date Revised: 25 Sep 11

Project:	**Pebble Project**	Drill Hole No.:	**GH11-287**	Page	**1 of 1**
Hole Depth:	**244 ft**	Hole Diameter:	**PQ to 33', HQ to 102', NQ to 244'**	Date Started:	**27 Sep 11**
Collar Elev:	**1569 ft**	PVC Pipe I.D.:	**1 in**	Logged by:	**LS/EEB**
Date Completed:	**30 Sep 11**	Reviewed by:	**LS**		

Water Level Readings: Depth to Water / Date Measured

Well 1: 12.98 ft bgs / 2 Oct 11



Log Type: WELL Library Filepath: M:\1\01\00176\38\A\DATA\2011 GEOTECHNICAL SITE INVESTIGATION\PEBBLE 2011\GINT\LIBRARY2.GLB Printed: 6 Feb 12

Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-287

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

B1-20

Rev. 0 - Issued for Report VA101-176/38-3

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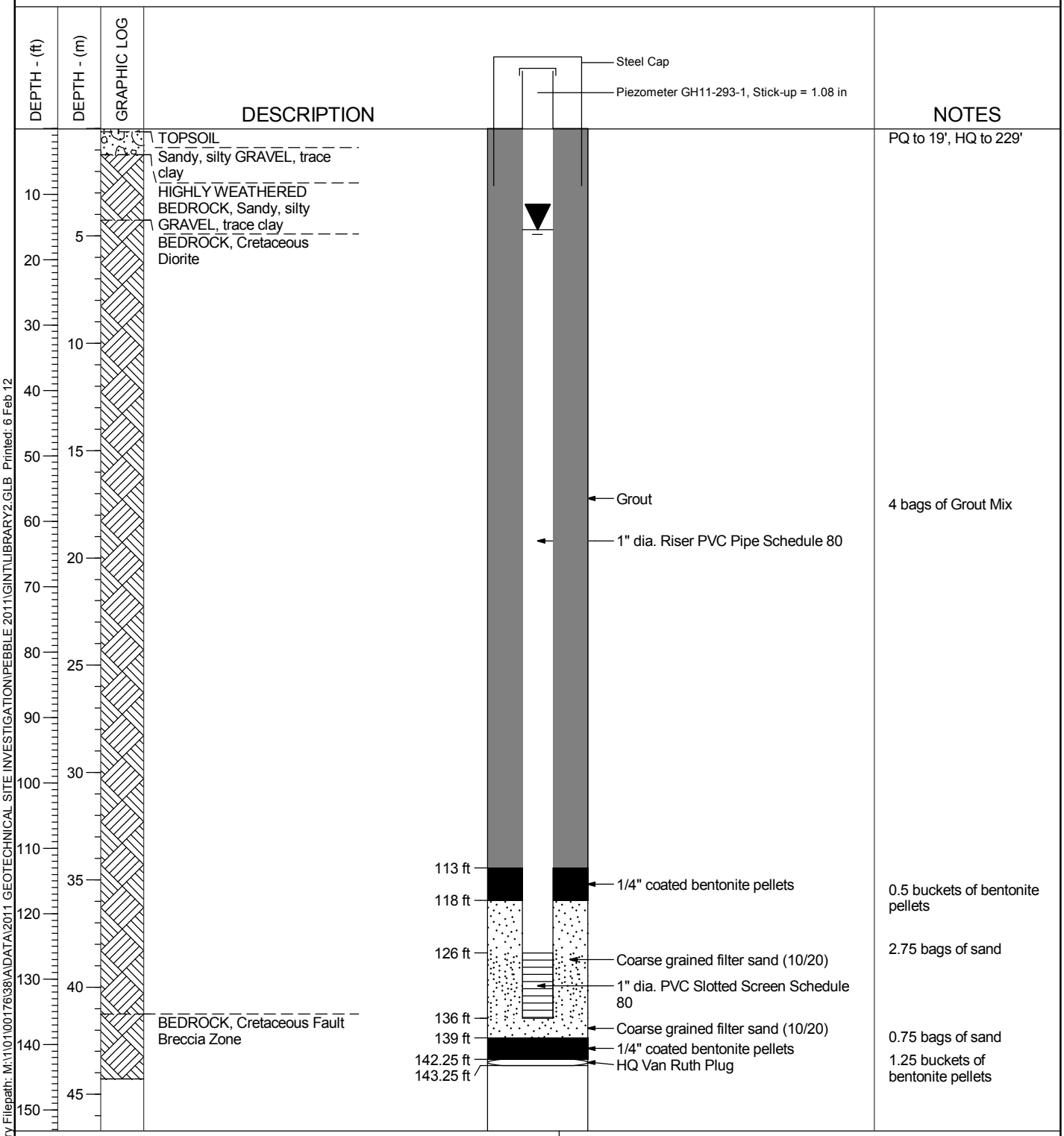
Date Revised: 30 Sep 11

Project:	**Pebble Project**			Drill Hole No.:	**GH11-293**	Page	**1 of 1**
Hole Depth:	**229 ft**	Hole Diameter:	**PQ to 19', HQ to 229'**	Date Started:	**4 Oct 11**	Date Completed:	**6 Oct 11**
Collar Elev:	**1483 ft**	PVC Pipe I.D.:	**1 in**	Logged by:	**LS/EEB**	Reviewed by:	**LS**

Water Level Readings: Depth to Water / Date Measured

Well 1: 15.42 ft bgs / 12 Oct 11



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-293

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

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Rev. 0 - Issued for Report VA101-176/38-3

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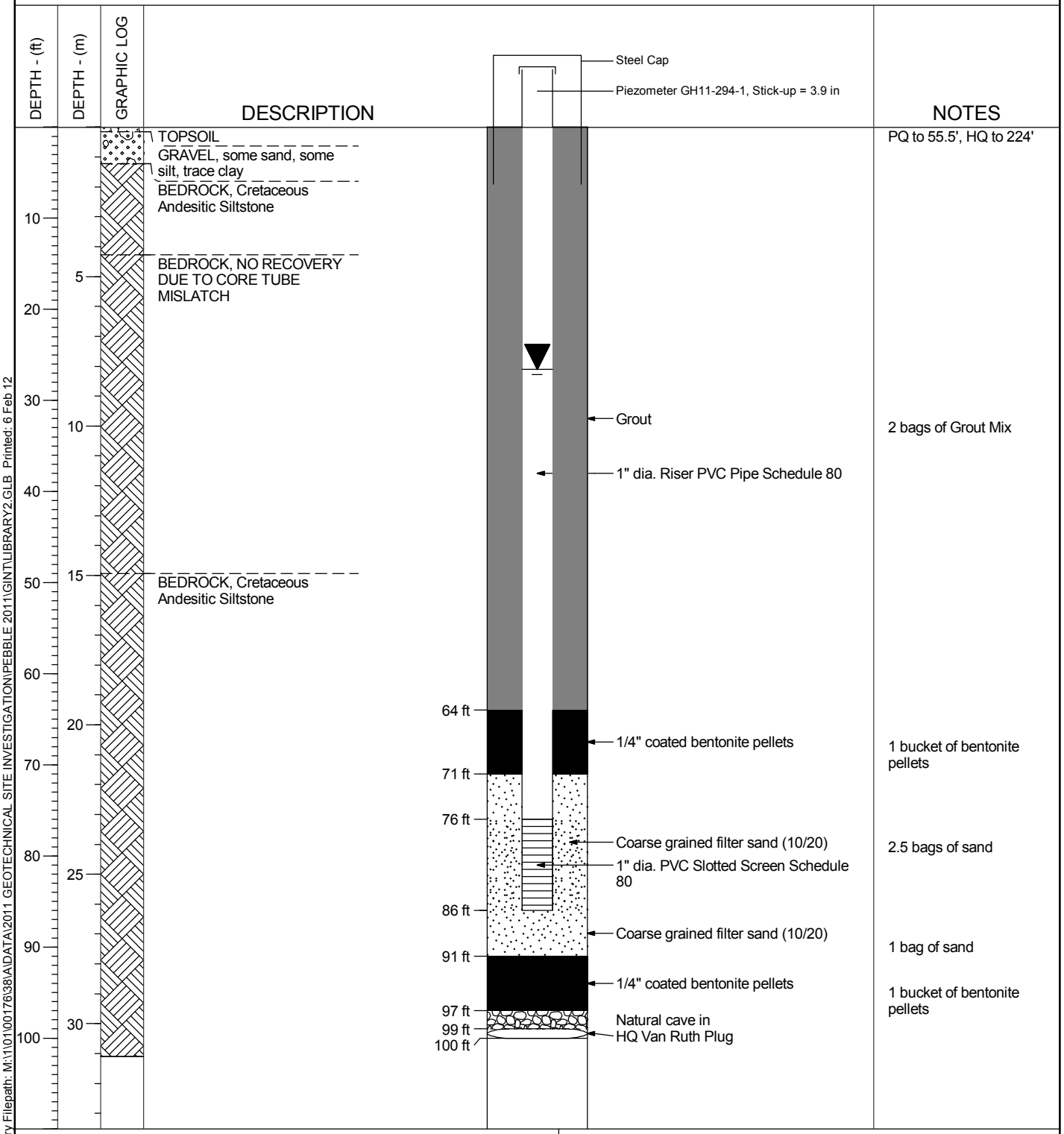
Date Revised: 1 Oct 11

Project:	**Pebble Project**			Drill Hole No.:	**GH11-294**	Page	**1 of 1**
Hole Depth:	**224 ft**	Hole Diameter:	**PQ to 55.5, HQ to 224'**	Date Started:	**6 Oct 11**	Date Completed:	**8 Oct 11**
Collar Elev:	**1574 ft**	PVC Pipe I.D.:	**1 in**	Logged by:	**LS/EEB**	Reviewed by:	**LS**

Water Level Readings: Depth to Water / Date Measured

Well 1: 26.6 ft bgs / 12 Oct 11



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-294

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	**3**	**0**

B1-22

Rev. 0 - Issued for Report VA101-176/38-3

Log Type: WELL Library Filepath: M:\1\01\00176\38\A\DATA\2011 GEOTECHNICAL SITE INVESTIGATION\PEBBLE 2011\GINT\LIBRARY2.GLB Printed: 6 Feb 12

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Date Revised: 10 Oct 11

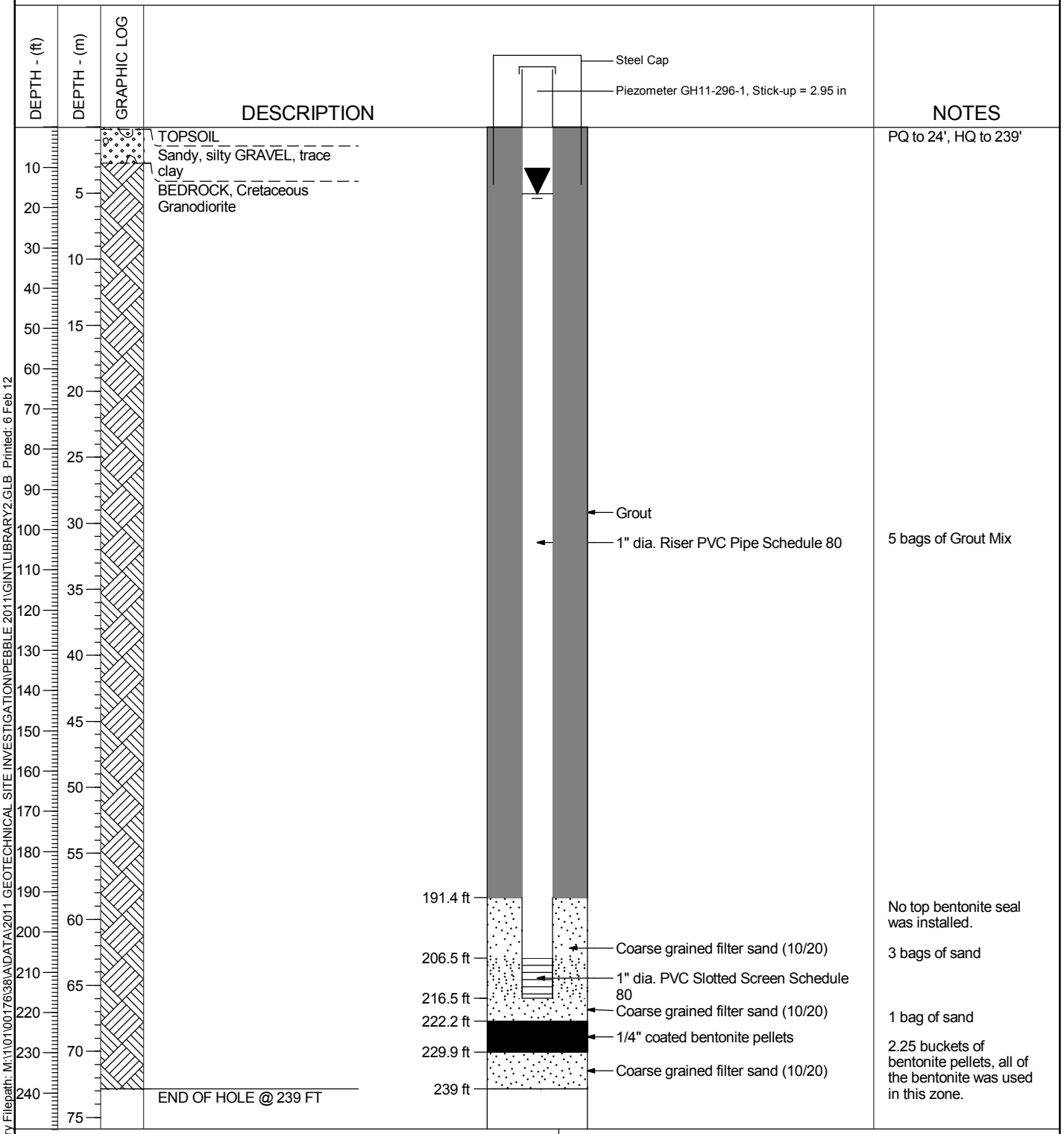
Project: Pebble Project | Drill Hole No.: GH11-296 | Page 1 of 1

Hole Depth: 239 ft | Hole Diameter: PQ to 24', HQ to 239' | Date Started: 9 Oct 11 | Date Completed: 10 Oct 11

Collar Elev: 1647 ft | PVC Pipe I.D.: 1 in | Logged by: LS/EEB | Reviewed by: LS

Water Level Readings: Depth to Water / Date Measured

Well 1: 16.5 ft bgs / 12 Oct 11



Pebble Limited Partnership
Pebble Project
Well Completion Details For GH11-296

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
101-176/38	3	0

B1-23

Rev. 0 - Issued for Report VA101-176/38-3

Log Type: WELL Library Filepath: M:\1\01\00176\38\A\DATA\2011 GEOTECHNICAL SITE INVESTIGATION\PEBBLE 2011\GINT\LIBRARY2.GLB Printed: 6 Feb 12

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Date Revised: 12 Oct 11

Knight Piésold
CONSULTING

APPENDIX B2

PACKER HYDRAULIC CONDUCTIVITY (LUGEON) TEST SHEETS

- GH11-229
- GH11-230
- GH11-231
- GH11-232
- GH11-234
- GH11-235
- GH11-236
- GH11-237
- GH11-238
- GH11-239
- GH11-240
- GH11-241
- GH11-242
- GH11-243
- GH11-245
- GH11-246

(Pages B2-1 to B2-37)

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

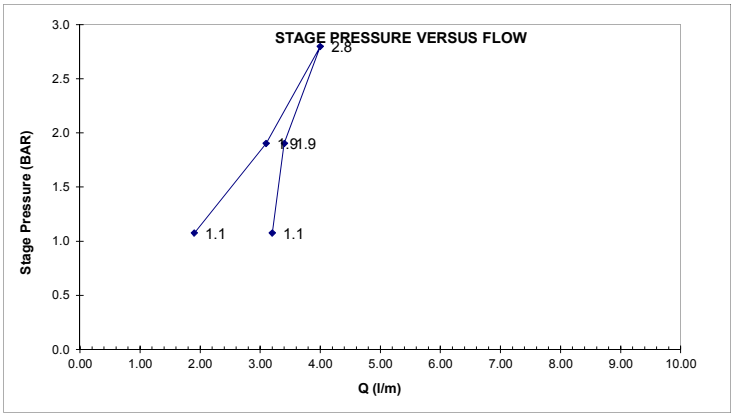
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-229

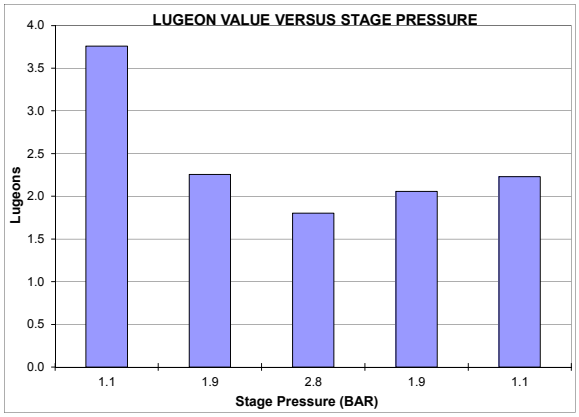
AREA: UPPER TALARIK CREEK AREA | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 1.5 m (bgs) | TOP OF TEST INTERVAL: 73.00 ft (DOWN HOLE) / 22.25 m (DOWN HOLE)

DATE: 7-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 0.3 m | BOTTOM OF TEST INTERVAL: 99.00 ft (DOWN HOLE) / 30.18 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	186805.0	186808.0	186811.5	186815.0	186818.0	186821.0				
		Take	litres		3.00	3.50	3.50	3.00	3.00				
0.90	1.07	Average Take	l/m		3.00	3.50	3.50	3.00	3.00			3.20	3.76
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	186825.0	186828.5	186832.0	186835.0	186839.0	186842.0				
		Take	litres		3.50	3.50	3.00	4.00	3.00				
1.72	1.90	Average Take	l/m		3.50	3.50	3.00	4.00	3.00			3.40	2.26
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	186847.0	186851.0	186855.0	186859.0	186863.0	186867.0				
		Take	litres		4.00	4.00	4.00	4.00	4.00				
2.62	2.80	Average Take	l/m		4.00	4.00	4.00	4.00	4.00			4.00	1.80
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	186869.0	186872.0	186875.0	186878.0	186881.0	186884.5				
		Take	litres		3.00	3.00	3.00	3.00	3.50				
1.72	1.90	Average Take	l/m		3.00	3.00	3.00	3.00	3.50			3.10	2.06
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	186885.0	186886.5	186888.5	186890.5	186892.5	186894.5				
		Take	litres		1.50	2.00	2.00	2.00	2.00				
0.90	1.07	Average Take	l/m		1.50	2.00	2.00	2.00	2.00			1.90	2.23





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 9.7 ft below stickup, stickup 4'10".

DRILLING FLUIDS USED/ TIME FOR FLUSHING:

Lu= 1.804 | k (cm/s) = 2.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	YES
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Outside air temperature: 9°C

Pressured up to approx. 100 psi by accident at start of test

TEST BY: Dalton Pajak | ANALYZED BY: Dalton Pajak | REVIEWED BY: Louise Shannon

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-229\[GH11-229 Packer Test.xls]1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	7JUN'11	ISSUED WITH REPORT VA101-176/38-3	DLP	CHS	KJB

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

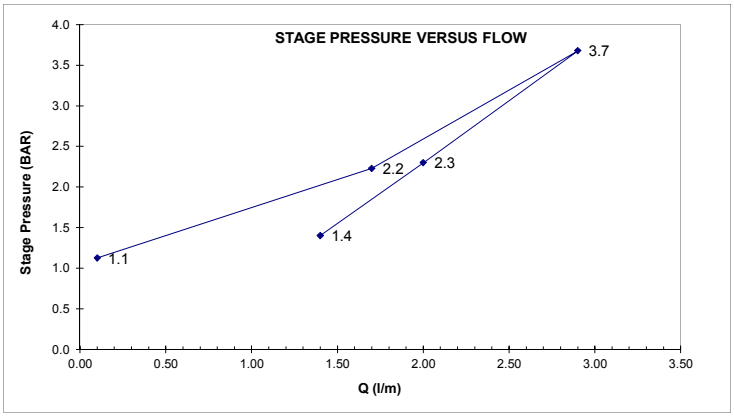
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-229

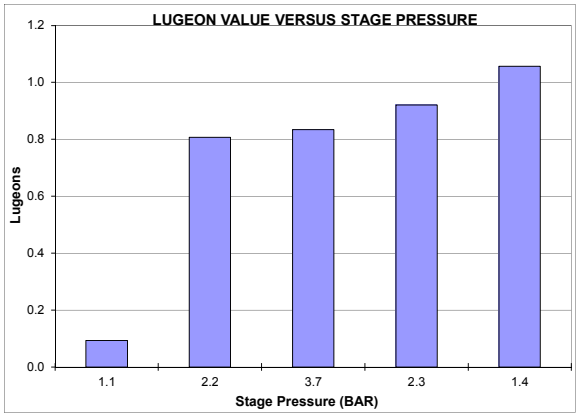
AREA: UPPER TALARIK CREEK AREA | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 0.3 m (bgs) | TOP OF TEST INTERVAL: 93.0 ft (DOWN HOLE) / 28.35 m (DOWN HOLE)

DATE: 7-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 124.0 ft (DOWN HOLE) / 37.80 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	186920.5	186920.5	186920.5	186921.0	186921.0	186921.0				
		Take	litres		0.00	0.00	0.50	0.00	0.00				
0.97	1.13	Average Take	l/m		0.00	0.00	0.50	0.00	0.00			0.10	0.09
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	186923.0	186924.0	186926.0	186928.0	186929.5	186931.5				
		Take	litres		1.00	2.00	2.00	1.50	2.00				
2.07	2.23	Average Take	l/m		1.00	2.00	2.00	1.50	2.00			1.70	0.81
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	186935.0	186938.0	186941.0	186944.0	186946.5	186949.5				
		Take	litres		3.00	3.00	3.00	2.50	3.00				
3.52	3.68	Average Take	l/m		3.00	3.00	3.00	2.50	3.00			2.90	0.83
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	186965.0	186967.0	186969.0	186971.0	186973.0	186975.0				
		Take	litres		2.00	2.00	2.00	2.00	2.00				
2.14	2.30	Average Take	l/m		2.00	2.00	2.00	2.00	2.00			2.00	0.92
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	186977.0	186978.5	186979.5	186981.0	186982.5	186984.0				
		Take	litres		1.50	1.00	1.50	1.50	1.50				
1.24	1.40	Average Take	l/m		1.50	1.00	1.50	1.50	1.50			1.40	1.06





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Before test W.L. ~ 1 ft (bgs)

DRILLING FLUIDS USED/ TIME FOR FLUSHING:

Lu= 0.094 | k (cm/s) = 9.E-07

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	YES
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3
Outside air temperature: 0°C
Pressured up to approx. 100 psi by accident at start of test

Leak out of water swivel (Measured flows):
P3 ~ 3 L/min
P5 ~ 2 L/min
Therefore, used lowest Lugeon for calculation above.

TEST BY: Greg Davis | ANALYZED BY: Greg Davis | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	07JUN'11	ISSUED WITH REPORT VA101-176/38-3	GD	CHS	KJB

SHEET 1 OF 5

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

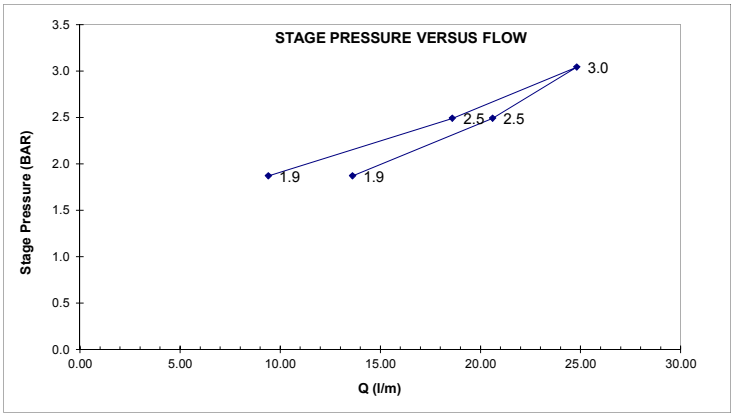
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-230

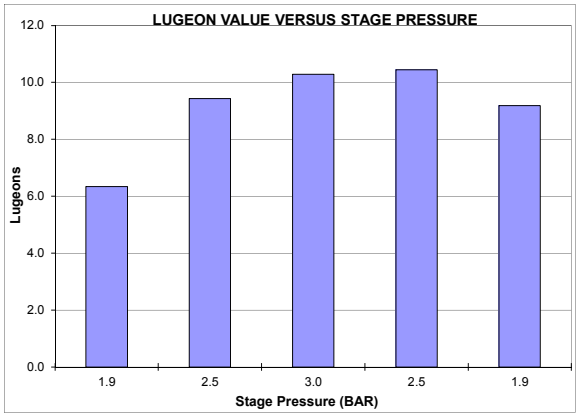
AREA: UPPER TALARIK CREEK AREA | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 13.0 m (bgs) | TOP OF TEST INTERVAL: 47.00 ft (DOWN HOLE) / 14.33 m (DOWN HOLE)

DATE: 9-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 0.1 m | BOTTOM OF TEST INTERVAL: 73.00 ft (DOWN HOLE) / 22.25 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	187236.0	187244.0	187256.0	187266.0	187274.0	187283.0				
		Take	litres		8.00	12.00	10.00	8.00	9.00				
0.55	1.87	Average Take	l/m		8.00	12.00	10.00	8.00	9.00			9.40	6.35
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	187310.0	187330.0	187347.0	187366.0	187383.5	187403.0				
		Take	litres		20.00	17.00	19.00	17.50	19.50				
1.17	2.49	Average Take	l/m		20.00	17.00	19.00	17.50	19.50			18.60	9.43
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	187421.0	187446.0	187471.0	187495.0	187520.0	187545.0				
		Take	litres		25.00	25.00	24.00	25.00	25.00				
1.72	3.04	Average Take	l/m		25.00	25.00	24.00	25.00	25.00			24.80	10.29
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	187562.0	187582.0	187603.0	187624.0	187644.5	187665.0				
		Take	litres		20.00	21.00	21.00	20.50	20.50				
1.17	2.49	Average Take	l/m		20.00	21.00	21.00	20.50	20.50			20.60	10.44
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	187675.0	187690.5	187704.0	187717.0	187730.0	187743.0				
		Take	litres		15.50	13.50	13.00	13.00	13.00				
0.55	1.87	Average Take	l/m		15.50	13.50	13.00	13.00	13.00			13.60	9.18





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Water level measured before test at 40 ftbgs

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water only, flushed for 15 minutes

Lu= 9.137 | k (cm/s) = 9.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	YES
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Outside Air Temperature: 10°C

~0.1 L/min leaking out of swivel at 8 psi, ~0.5 L/min at 18 psi, ~0.75L/min at 25 psi

High Take. Head loss through tool likely.

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	09JUN'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 2 OF 5

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

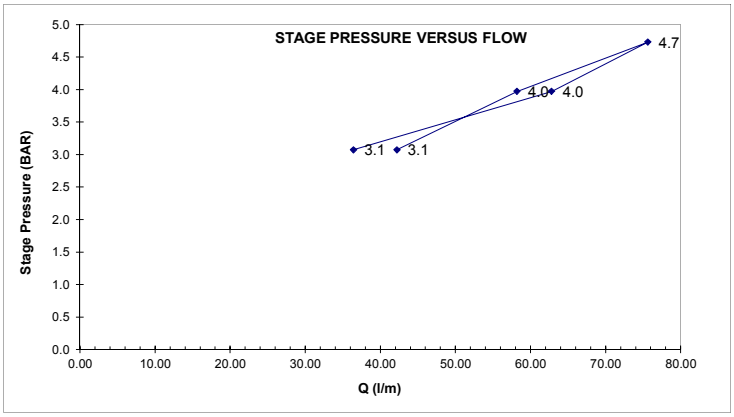
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-230

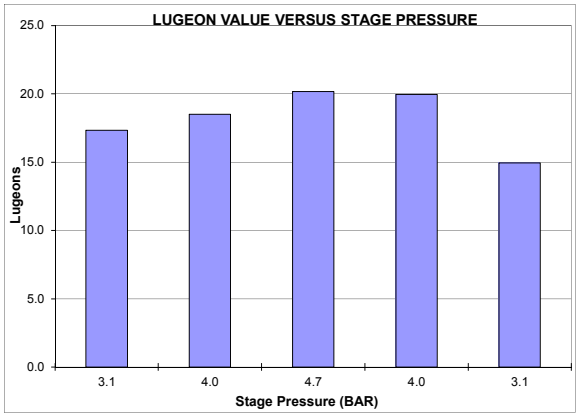
AREA: UPPER TALARIK CREEK AREA | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 21.9 m (bgs) | TOP OF TEST INTERVAL: 72.00 ft (DOWN HOLE) / 21.95 m (DOWN HOLE)

DATE: 9-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 98.00 ft (DOWN HOLE) / 29.87 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	189000.0	189043.0	189085.0	189128.0	189169.0	189211.0				
		Take	litres		43.00	42.00	43.00	41.00	42.00				
0.76	3.07	Average Take	l/m		43.00	42.00	43.00	41.00	42.00			42.20	17.33
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	189490.0	189550.0	189608.0	189665.0	189723.0	189781.0				
		Take	litres		60.00	58.00	57.00	58.00	58.00				
1.65	3.97	Average Take	l/m		60.00	58.00	57.00	58.00	58.00			58.20	18.50
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	190195.0	190271.0	190347.0	190421.0	190497.0	190573.0				
		Take	litres		76.00	76.00	74.00	76.00	76.00				
2.41	4.73	Average Take	l/m		76.00	76.00	74.00	76.00	76.00			75.60	20.18
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	191075.0	191138.0	191201.0	191265.0	191326.0	191389.0				
		Take	litres		63.00	63.00	64.00	61.00	63.00				
1.65	3.97	Average Take	l/m		63.00	63.00	64.00	61.00	63.00			62.80	19.96
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	191660.0	191697.0	191733.0	191770.0	191805.0	191842.0				
		Take	litres		37.00	36.00	37.00	35.00	37.00				
0.76	3.07	Average Take	l/m		37.00	36.00	37.00	35.00	37.00			36.40	14.94





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 77.21' below stickup, stickup is 5.45'; Measured after packer test

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Pur-vis polymer. Flushed with water.

Lu= 17.683 | k (cm/s) = 2.E-04

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	YES
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Small leak out of water swivel.

Had to wait 15 minutes between packer tests for water tub to fill.

TEST BY: Dalton Pajak | ANALYZED BY: Dalton Pajak | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	09JUN'11	ISSUED WITH REPORT VA101-176/38-3	DLP	CHS	KJB

SHEET 3 OF 5

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

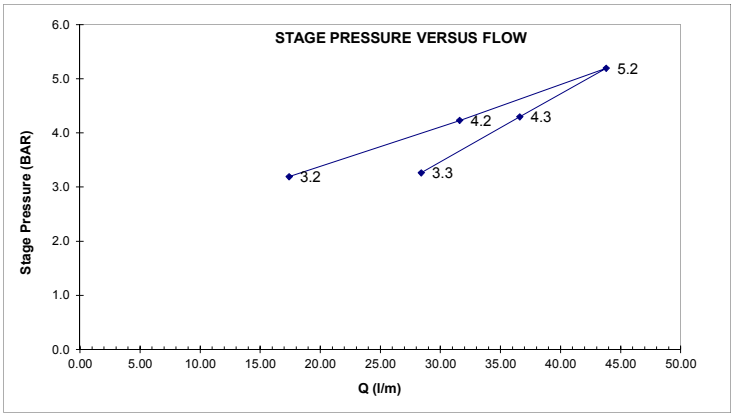
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-230

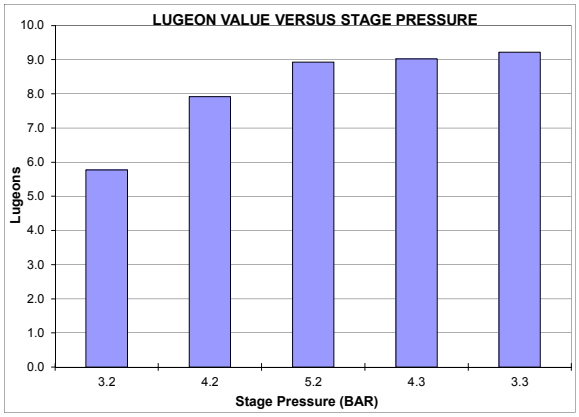
AREA: UPPER TALARIK CREEK AREA | TEST NO: 3

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 20.3 m (bgs) | TOP OF TEST INTERVAL: 92.00 ft (DOWN HOLE) / 28.04 m (DOWN HOLE)

DATE: 9-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 123.00 ft (DOWN HOLE) / 37.49 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	192083.0	192101.0	192118.0	192135.0	192152.0	192170.0				
		Take	litres		18.00	17.00	17.00	17.00	18.00				
1.03	3.19	Average Take	l/m		18.00	17.00	17.00	17.00	18.00			17.40	5.77
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	192300.0	192331.0	192364.0	192394.0	192425.0	192458.0				
		Take	litres		31.00	33.00	30.00	31.00	33.00				
2.07	4.23	Average Take	l/m		31.00	33.00	30.00	31.00	33.00			31.60	7.91
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	192688.0	192732.0	192776.0	192819.0	192864.0	192907.0				
		Take	litres		44.00	44.00	43.00	45.00	43.00				
3.03	5.19	Average Take	l/m		44.00	44.00	43.00	45.00	43.00			43.80	8.93
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	192975.0	193011.0	193049.0	193085.0	193121.0	193158.0				
		Take	litres		36.00	38.00	36.00	36.00	37.00				
2.14	4.30	Average Take	l/m		36.00	38.00	36.00	36.00	37.00			36.60	9.02
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	193245.0	193274.0	193302.0	193331.0	193360.0	193387.0				
		Take	litres		29.00	28.00	29.00	29.00	27.00				
1.10	3.26	Average Take	l/m		29.00	28.00	29.00	29.00	27.00			28.40	9.22





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY:

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Pur-vis polymer. Flushed with water.

Lu= 9.217 | k (cm/s) = 9.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	YES
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Small amount of water leaking out of water swivel.

TEST BY: Dalton Pajak | ANALYZED BY: Dalton Pajak | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	09JUN'11	ISSUED WITH REPORT VA101-176/38-3	DLP	CHS	KJB

SHEET 4 OF 5

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

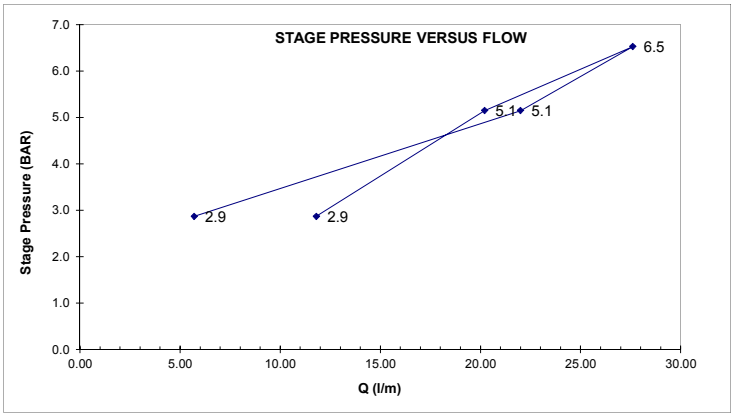
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-230

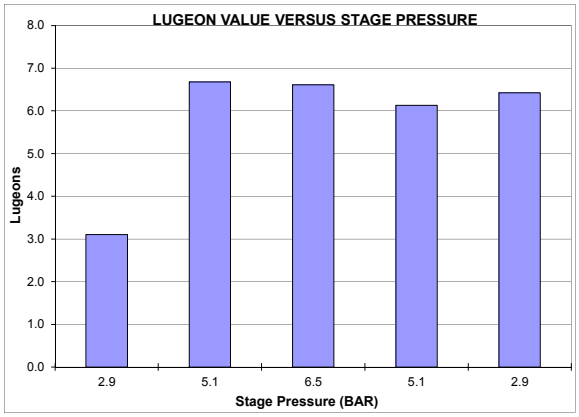
AREA: UPPER TALARIK CREEK AREA | TEST NO: 4

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 20.3 m (bgs) | TOP OF TEST INTERVAL: 127.00 ft (DOWN HOLE) / 38.71 m (DOWN HOLE)

DATE: 10-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 0.1 m | BOTTOM OF TEST INTERVAL: 148.00 ft (DOWN HOLE) / 45.11 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	193510.0	193515.0	193520.0	193526.0	193532.0	193538.5				
		Take	litres		5.00	5.00	6.00	6.00	6.50				
0.83	2.87	Average Take	l/m		5.00	5.00	6.00	6.00	6.50			5.70	3.10
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	193613.0	193636.0	193658.0	193679.0	193701.0	193723.0				
		Take	litres		23.00	22.00	21.00	22.00	22.00				
3.10	5.14	Average Take	l/m		23.00	22.00	21.00	22.00	22.00			22.00	6.68
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	193770.0	193800.0	193830.0	193856.0	193883.0	193908.0				
		Take	litres		30.00	30.00	26.00	27.00	25.00				
4.48	6.52	Average Take	l/m		30.00	30.00	26.00	27.00	25.00			27.60	6.61
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	193927.0	193949.0	193968.0	193987.0	194008.0	194028.0				
		Take	litres		22.00	19.00	19.00	21.00	20.00				
3.10	5.14	Average Take	l/m		22.00	19.00	19.00	21.00	20.00			20.20	6.13
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	194034.0	194046.0	194059.5	194070.0	194081.0	194093.0				
		Take	litres		12.00	13.50	10.50	11.00	12.00				
0.83	2.87	Average Take	l/m		12.00	13.50	10.50	11.00	12.00			11.80	6.43





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Measured prior to falling head test at 71.9' below stickup stickup 5.33'

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Purevis polymer. Flushed with water.

Lu= 5.791 | k (cm/s) = 6.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	YES
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Water leaking out of water swivel. P1=0.25gpm, P2=0.5gpm, P3=0.5gpm

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	10JUN'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 5 OF 5

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

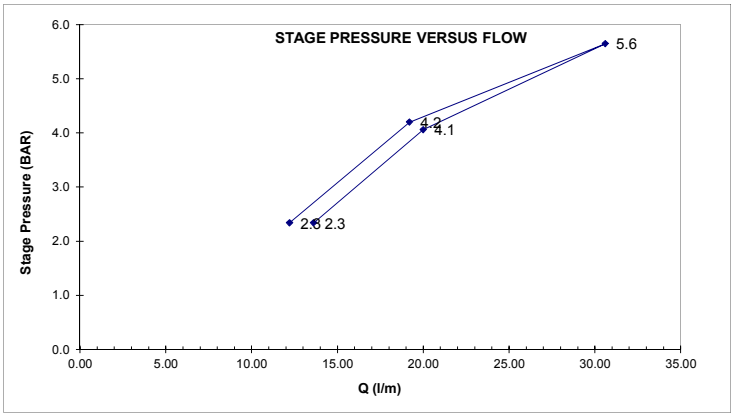
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-230

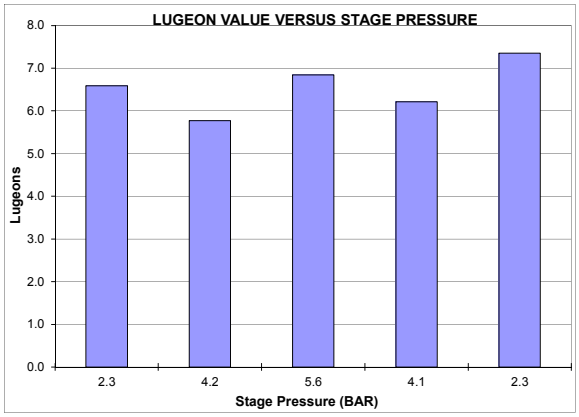
AREA: UPPER TALARIK CREEK AREA | TEST NO: 5

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 6.0 m (bgs) | TOP OF TEST INTERVAL: 147.00 ft (DOWN HOLE) / 44.81 m (DOWN HOLE)

DATE: 10-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 0.1 m | BOTTOM OF TEST INTERVAL: 173.00 ft (DOWN HOLE) / 52.73 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	194205.0	194217.0	194230.0	194242.0	194254.0	194266.0				
		Take	litres		12.00	13.00	12.00	12.00	12.00				
1.72	2.34	Average Take	l/m		12.00	13.00	12.00	12.00	12.00			12.20	6.59
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	194278.0	194298.0	194317.0	194336.0	194355.0	194374.0				
		Take	litres		20.00	19.00	19.00	19.00	19.00				
3.59	4.20	Average Take	l/m		20.00	19.00	19.00	19.00	19.00			19.20	5.77
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	194390.0	194422.0	194454.0	194483.0	194513.0	194543.0				
		Take	litres		32.00	32.00	29.00	30.00	30.00				
5.03	5.65	Average Take	l/m		32.00	32.00	29.00	30.00	30.00			30.60	6.84
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	194553.0	194573.0	194593.0	194613.0	194634.0	194653.0				
		Take	litres		20.00	20.00	20.00	21.00	19.00				
3.45	4.06	Average Take	l/m		20.00	20.00	20.00	21.00	19.00			20.00	6.22
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	194663.0	194676.5	194690.0	194704.0	194712.5	194731.1				
		Take	litres		13.50	13.50	14.00	8.50	18.55				
1.72	2.34	Average Take	l/m		13.50	13.50	14.00	8.50	18.55			13.61	7.35





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Measured prior to falling head test at 71.9' below stickup stickup 5.33'

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Drilled with water only. Flushed with water.

Lu= 6.554 | k (cm/s) = 7.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	YES
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3
Water leaking out of water swivel, ~0.1L/min
Outside Air Temperature: 10°C

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	10JUN'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 1 OF 3

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

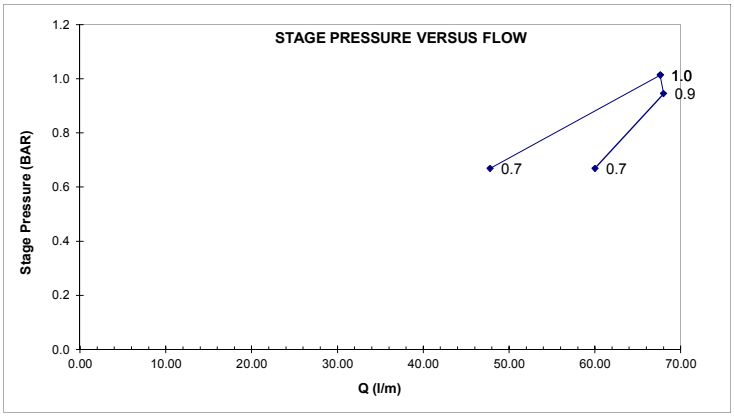
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-231

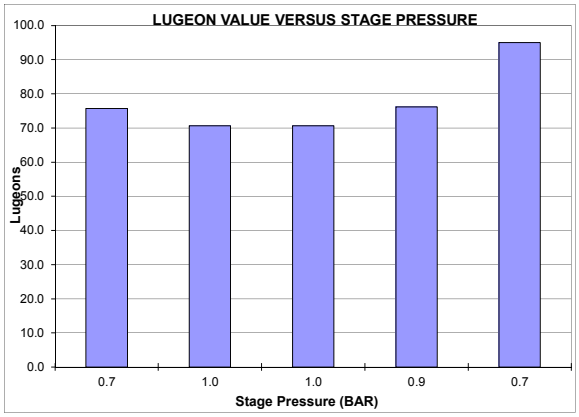
AREA: UPPER TALARIK CREEK AREA | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 1.3 m (bgs) | TOP OF TEST INTERVAL: 38.00 ft (DOWN HOLE) / 11.58 m (DOWN HOLE)

DATE: 11-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 69.00 ft (DOWN HOLE) / 21.03 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	195185.0	195233.0	195281.0	195329.0	195376.0	195424.0				
		Take	litres		48.00	48.00	48.00	47.00	48.00				
0.41	0.67	Average Take	l/m		48.00	48.00	48.00	47.00	48.00			47.80	75.65
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	195545.0	195613.0	195680.0	195748.0	195816.0	195883.0				
		Take	litres		68.00	67.00	68.00	68.00	67.00				
0.76	1.01	Average Take	l/m		68.00	67.00	68.00	68.00	67.00			67.60	70.60
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	195545.0	195613.0	195680.0	195748.0	195816.0	195883.0				
		Take	litres		68.00	67.00	68.00	68.00	67.00				
0.76	1.01	Average Take	l/m		68.00	67.00	68.00	68.00	67.00			67.60	70.60
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	196025.0	196094.0	196161.0	196229.0	196297.0	196365.0				
		Take	litres		69.00	67.00	68.00	68.00	68.00				
0.69	0.94	Average Take	l/m		69.00	67.00	68.00	68.00	68.00			68.00	76.20
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	196475.0	196535.0	196595.0	196655.0	196715.0	196775.0				
		Take	litres		60.00	60.00	60.00	60.00	60.00				
0.41	0.67	Average Take	l/m		60.00	60.00	60.00	60.00	60.00			60.00	94.96





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 4.1' below stickup, stickup 4.3'

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Pur-vis Polymer; Flushed with water for 15 min

Lu= 70.596 | k (cm/s) = 7.E-04

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	YES
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3
Could not get higher than 11 psi
Same results for P2 were entered into P3.

High Take. Head loss through tool likely.

TEST BY: Dalton Pajak | ANALYZED BY: Dalton Pajak | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	11JUN'11	ISSUED WITH REPORT VA101-176/38-3	DLP	CHS	KJB

$$Lu = \frac{Q}{L} * \frac{10}{(0.1 * H * \sin(\alpha) * SG + P_{gauge})} * \frac{M}{28}$$

SHEET 2 OF 3

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

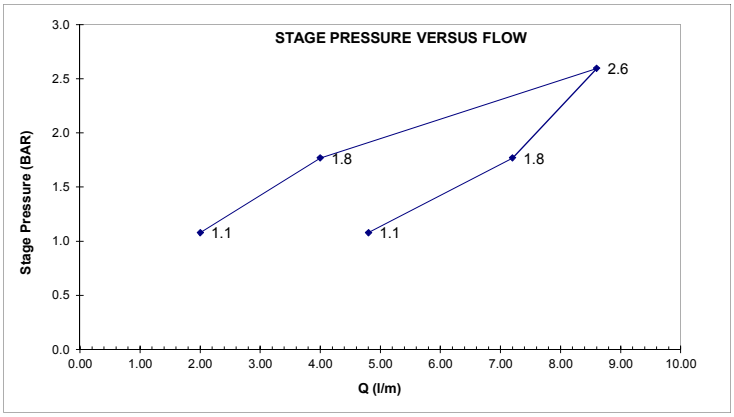
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-231

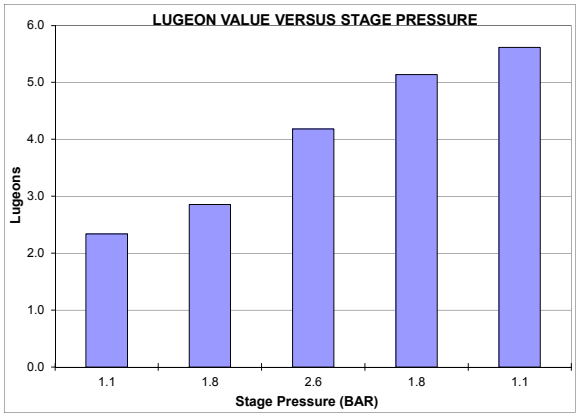
AREA: UPPER TALARIK CREEK AREA | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 1.2 m (bgs) | TOP OF TEST INTERVAL: 68.00 ft (DOWN HOLE) / 20.73 m (DOWN HOLE)

DATE: 11-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 94.00 ft (DOWN HOLE) / 28.65 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	196863.0	196865.0	196867.0	196869.0	196871.0	196873.0				
		Take	litres		2.00	2.00	2.00	2.00	2.00				
0.83	1.08	Average Take	l/m		2.00	2.00	2.00	2.00	2.00			2.00	2.34
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	196880.0	196884.0	196888.0	196892.0	196896.0	196900.0				
		Take	litres		4.00	4.00	4.00	4.00	4.00				
1.52	1.77	Average Take	l/m		4.00	4.00	4.00	4.00	4.00			4.00	2.86
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	196915.0	196923.0	196931.0	196940.0	196949.0	196958.0				
		Take	litres		8.00	8.00	9.00	9.00	9.00				
2.34	2.60	Average Take	l/m		8.00	8.00	9.00	9.00	9.00			8.60	4.18
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	196968.0	196975.0	196982.0	196990.0	196997.0	197004.0				
		Take	litres		7.00	7.00	8.00	7.00	7.00				
1.52	1.77	Average Take	l/m		7.00	7.00	8.00	7.00	7.00			7.20	5.14
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	197010.0	197015.0	197019.0	197024.0	197029.0	197034.0				
		Take	litres		5.00	4.00	5.00	5.00	5.00				
0.83	1.08	Average Take	l/m		5.00	4.00	5.00	5.00	5.00			4.80	5.62





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 0.1' above ground surface

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Pur-vis Polymer; Flushed with water for 20 min

Lu= 5.617 | k (cm/s) = 6.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	YES
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

TEST BY: Dalton Pajak | ANALYZED BY: Dalton Pajak | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	11JUN'11	ISSUED WITH REPORT VA101-176/38-3	DLP	CHS	KJB

$$Lu = \frac{Q}{L} * \frac{10}{(0.1 * H * \sin(\alpha P.SG + P_{gauge}))} * \frac{M_{ref}}{28}$$

SHEET 3 OF 3

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

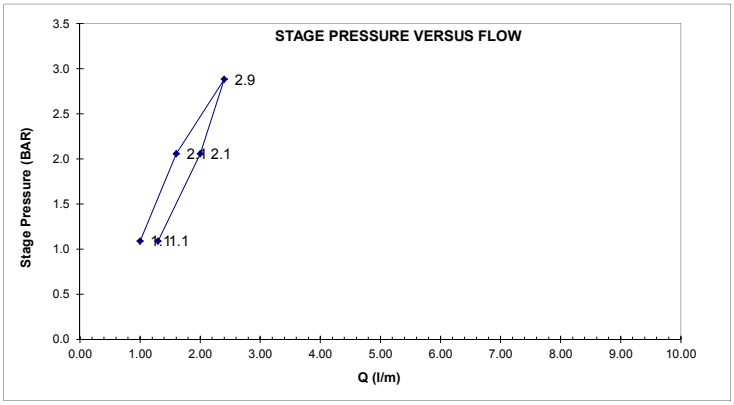
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-231

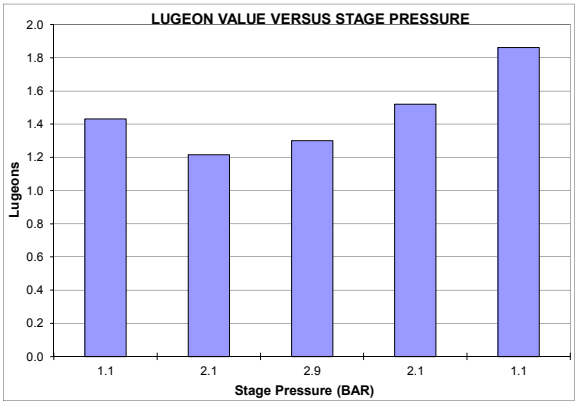
AREA: UPPER TALARIK CREEK AREA | TEST NO: 3

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 1.1 m (bgs) | TOP OF TEST INTERVAL: 93.00 ft (DOWN HOLE) / 28.35 m (DOWN HOLE)

DATE: 12-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 0.1 m | BOTTOM OF TEST INTERVAL: 114.00 ft (DOWN HOLE) / 34.75 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)												FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5					
		Flowmeter	litres	197199.0	197200.0	197201.0	197202.0	197203.0	197204.0					
		Take	litres		1.00	1.00	1.00	1.00	1.00					
0.97	1.09	Average Take	l/m		1.00	1.00	1.00	1.00	1.00				1.00	1.43
GAUGE P (BAR)		Time	min	0	1	2	3	4	5				FLOW litres/min	LUGEON
		Flowmeter	litres	197206.0	197207.5	197209.5	197211.0	197212.5	197214.0					
		Take	litres		1.50	2.00	1.50	1.50	1.50					
1.93	2.06	Average Take	l/m		1.50	2.00	1.50	1.50	1.50				1.60	1.22
GAUGE P (BAR)		Time	min	0	1	2	3	4	5				FLOW litres/min	LUGEON
		Flowmeter	litres	197216.0	197218.5	197221.0	197223.5	197226.0	197228.0					
		Take	litres		2.50	2.50	2.50	2.50	2.00					
2.76	2.88	Average Take	l/m		2.50	2.50	2.50	2.50	2.00				2.40	1.30
GAUGE P (BAR)		Time	min	0	1	2	3	4	5				FLOW litres/min	LUGEON
		Flowmeter	litres	197230.0	197232.0	197234.0	197236.0	197238.0	197240.0					
		Take	litres		2.00	2.00	2.00	2.00	2.00					
1.93	2.06	Average Take	l/m		2.00	2.00	2.00	2.00	2.00				2.00	1.52
GAUGE P (BAR)		Time	min	0	1	2	3	4	5				FLOW litres/min	LUGEON
		Flowmeter	litres	197241.0	197242.5	197243.8	197245.0	197246.3	197247.5					
		Take	litres		1.50	1.25	1.25	1.25	1.25					
0.97	1.09	Average Take	l/m		1.50	1.25	1.25	1.25	1.25				1.30	1.86





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 1.1m

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Pur-vis Polymer to 104', then water only / Flushed with water for 15 min

Lu= 1.861 | k (cm/s) = 2.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	YES
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m3
Outside Air Temperature 10°C
Water dripping out of water swivel

TEST BY: Dalton Pajak | ANALYZED BY: Dalton Pajak | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	12JUN'11	ISSUED WITH REPORT VA101-176/38-3	DLP	CHS	KJB

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

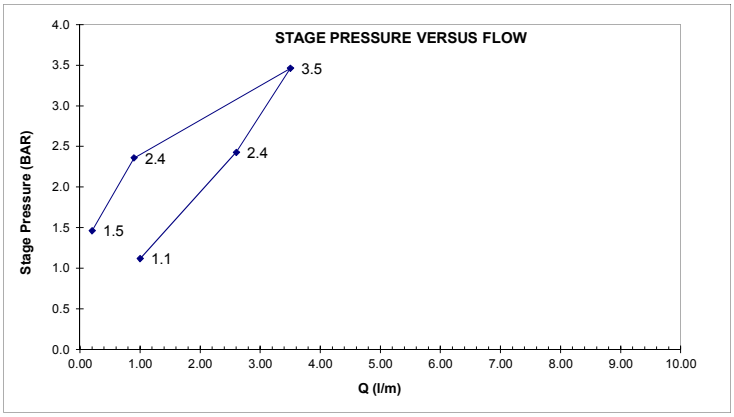
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-232

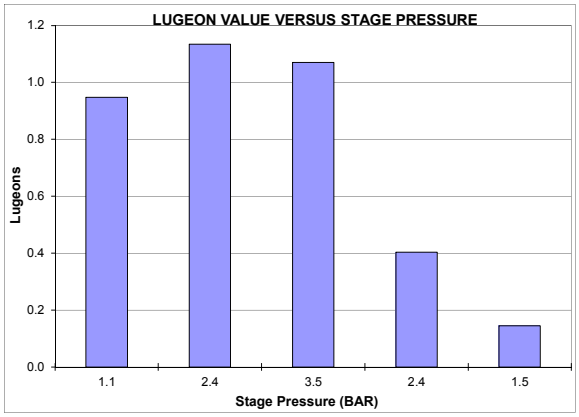
AREA: UPPER TALARIK CREEK AREA | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 0.0 m (bgs) | TOP OF TEST INTERVAL: 100.00 ft (DOWN HOLE) / 30.48 m (DOWN HOLE)

DATE: 14-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 0.1 m | BOTTOM OF TEST INTERVAL: 131.00 ft (DOWN HOLE) / 39.93 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	197999.0	198000.0	198002.0	198003.0	198004.0	198004.0				
		Take	litres		1.00	2.00	1.00	1.00	0.00				
1.10	1.12	Average Take	l/m		1.00	2.00	1.00	1.00	0.00			1.00	0.95
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198011.0	198015.0	198018.5	198021.0	198023.0	198024.0				
		Take	litres		4.00	3.50	2.50	2.00	1.00				
2.41	2.43	Average Take	l/m		4.00	3.50	2.50	2.00	1.00			2.60	1.13
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198030.0	198037.0	198040.0	198042.5	198045.0	198047.5				
		Take	litres		7.00	3.00	2.50	2.50	2.50				
3.45	3.46	Average Take	l/m		7.00	3.00	2.50	2.50	2.50			3.50	1.07
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198042.0	198043.0	198044.0	198044.8	198045.5	198046.5				
		Take	litres		1.00	1.00	0.75	0.75	1.00				
2.34	2.36	Average Take	l/m		1.00	1.00	0.75	0.75	1.00			0.90	0.40
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198038.0	198038.0	198038.3	198038.5	198038.8	198039.0				
		Take	litres		0.00	0.25	0.25	0.25	0.25				
1.45	1.46	Average Take	l/m		0.00	0.25	0.25	0.25	0.25			0.20	0.14





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Water measured at surface, drillhole is artesian

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Pur-vis was used and the hole was flushed for 15 min

Lu= 0.145 | k (cm/s) = 1.E-06

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	YES
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3
Outside Air Temp: ~ 10°C
Flowmeter started running backwards for last two pressure steps, flow was adjusted until it was moving in the right direction.

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	14JUN'11	ISSUED WITH REPORT VA101-16/38-3	LS	CHS	KJB

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

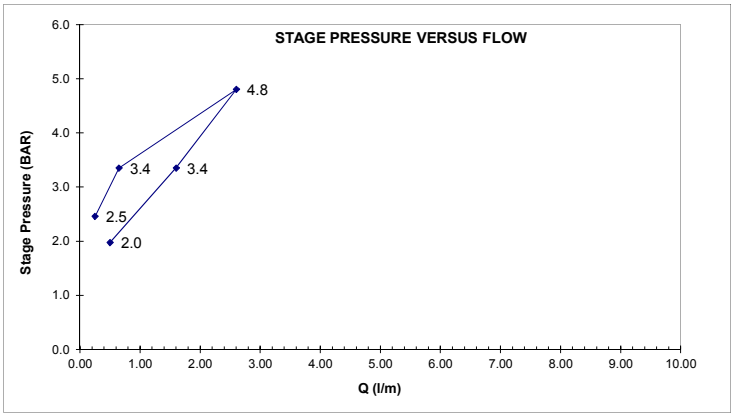
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-232

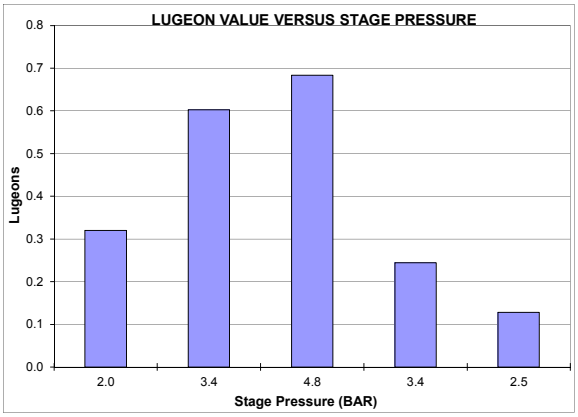
AREA: UPPER TALARIK CREEK AREA | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 5.8 m (bgs) | TOP OF TEST INTERVAL: 130.00 ft (DOWN HOLE) / 39.62 m (DOWN HOLE)

DATE: 14-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 0.1 m | BOTTOM OF TEST INTERVAL: 156.00 ft (DOWN HOLE) / 47.55 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	198034.5	198035.0	198035.5	198036.0	198036.5	198037.0				
		Take	litres		0.50	0.50	0.50	0.50	0.50				
1.38	1.97	Average Take	l/m		0.50	0.50	0.50	0.50	0.50			0.50	0.32
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198039.0	198040.3	198041.5	198043.3	198045.0	198047.0				
		Take	litres		1.25	1.25	1.75	1.75	2.00				
2.76	3.35	Average Take	l/m		1.25	1.25	1.75	1.75	2.00			1.60	0.60
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198049.0	198052.0	198055.3	198582.5	198060.3	198062.0				
		Take	litres		3.00	3.25	527.25	-522.25	1.75				
4.21	4.80	Average Take	l/m		3.00	3.25	527.25	-522.25	1.75			2.60	0.68
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198063.0	198063.5	198064.3	198065.0	198065.3	198066.3				
		Take	litres		0.50	0.75	0.75	0.25	1.00				
2.76	3.35	Average Take	l/m		0.50	0.75	0.75	0.25	1.00			0.65	0.24
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198066.0	198066.3	198066.5	198066.8	198067.0	198067.3				
		Take	litres		0.25	0.25	0.25	0.25	0.25				
1.86	2.46	Average Take	l/m		0.25	0.25	0.25	0.25	0.25			0.25	0.13





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Water measured at 23.3' below 4.25' stickup

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Drilled with water only, flushed for 15 min

Lu= 0.324 | k (cm/s) = 3.E-06

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	YES
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Outside Air Temp: ~ 10°C

Flowmeter trying to go backwards at 2nd P1 stage. Water steadily dripping out of water swivel, ~0.1L/min.

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	14JUN'11	ISSUED WITH REPORT VA101-16/38-3	LS	CHS	KJB

SHEET 1 OF 2

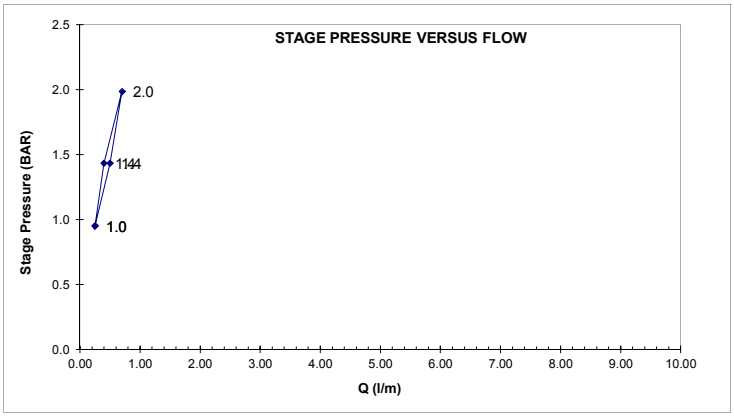
LUGEON TEST FIELD DATA SHEET

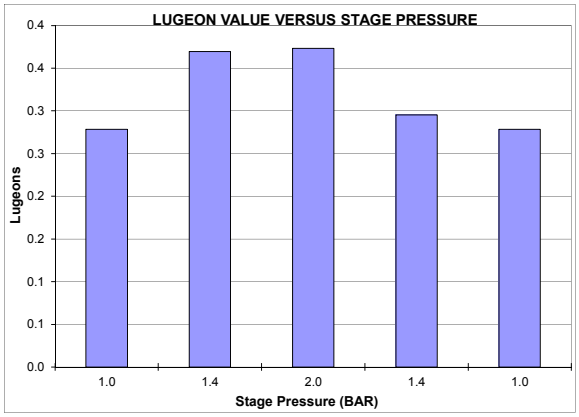
Knight Piésold CONSULTING

PROJECT:	PEBBLE PROJECT	PROJECT NO:	VA101-176/38	DRILLHOLE:	GH11-234
AREA:	AREA E			TEST NO:	1

DIP:	90 ° (FROM HORIZONTAL)	DEPTH TO GROUNDWATER:	3.9 m (bgs)	TOP OF TEST INTERVAL:	44.00 ft (DOWN HOLE)	13.41 m (DOWN HOLE)
DATE:	18-Jun-11	GAUGE HEIGHT ABOVE GROUND:	0.1 m	BOTTOM OF TEST INTERVAL:	75.00 ft (DOWN HOLE)	22.86 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	198076.0	198076.3	198076.5	198076.8	198077.0	198077.3				
		Take	litres		0.25	0.25	0.25	0.25	0.25				
0.55	0.95	Average Take	l/m		0.25	0.25	0.25	0.25	0.25			0.25	0.28
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198078.0	198078.5	198079.0	198079.5	198080.0	198080.5				
		Take	litres		0.50	0.50	0.50	0.50	0.50				
1.03	1.43	Average Take	l/m		0.50	0.50	0.50	0.50	0.50			0.50	0.37
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198082.0	198082.8	198083.5	198084.3	198085.0	198085.5				
		Take	litres		0.75	0.75	0.75	0.75	0.50				
1.59	1.98	Average Take	l/m		0.75	0.75	0.75	0.75	0.50			0.70	0.37
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198086.0	198086.3	198086.8	198087.3	198087.5	198088.0				
		Take	litres		0.25	0.50	0.50	0.25	0.50				
1.03	1.43	Average Take	l/m		0.25	0.50	0.50	0.25	0.50			0.40	0.30
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198089.0	198089.3	198089.5	198089.8	198090.0	198090.3				
		Take	litres		0.25	0.25	0.25	0.25	0.25				
0.55	0.95	Average Take	l/m		0.25	0.25	0.25	0.25	0.25			0.25	0.28





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 3.9m

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water only, flushed for 10 min

Lu= 0.305 k (cm/s) = 3.E-06

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	YES
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3
Outside air temperature: 18°C
No water leaking out of water swivel.

TEST BY: Louise Shannon ANALYZED BY: Louise Shannon REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	18JUN'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

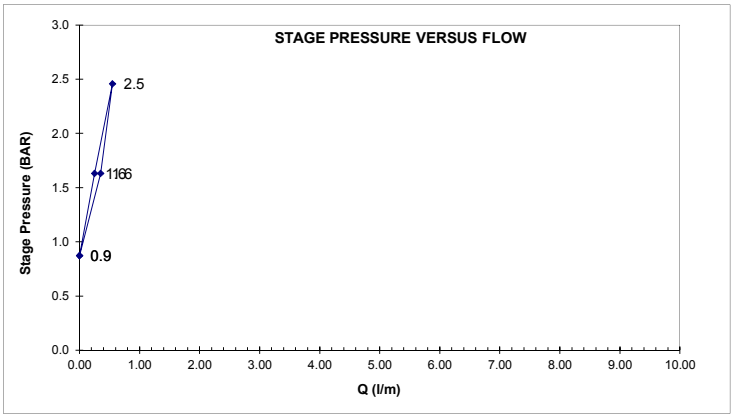
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-234

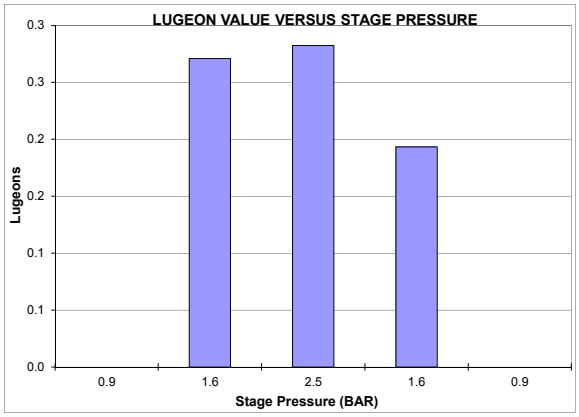
AREA: AREA E | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 0.3 m (bgs) | TOP OF TEST INTERVAL: 74.00 ft (DOWN HOLE) / 22.56 m (DOWN HOLE)

DATE: 18-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 0.1 m | BOTTOM OF TEST INTERVAL: 100.00 ft (DOWN HOLE) / 30.48 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)			0	1	2	3	4	5			FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	198097.0	198097.0	198097.0	198097.0	198097.0	198097.0				
		Take	litres		0.00	0.00	0.00	0.00	0.00				
0.83	0.87	Average Take	l/m		0.00	0.00	0.00	0.00	0.00			0.00	0.00
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198098.3	198098.5	198099.0	198099.3	198099.8	198100.0				
		Take	litres		0.25	0.50	0.25	0.50	0.25				
1.59	1.63	Average Take	l/m		0.25	0.50	0.25	0.50	0.25			0.35	0.27
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198101.0	198101.5	198102.0	198102.8	198103.3	198103.8				
		Take	litres		0.50	0.50	0.75	0.50	0.50				
2.41	2.46	Average Take	l/m		0.50	0.50	0.75	0.50	0.50			0.55	0.28
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198104.0	198104.3	198104.5	198104.8	198105.0	198105.3				
		Take	litres		0.25	0.25	0.25	0.25	0.25				
1.59	1.63	Average Take	l/m		0.25	0.25	0.25	0.25	0.25			0.25	0.19
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198107.0	198107.0	198107.0	198107.0	198090.0	198107.0				
		Take	litres		0.00	0.00	0.00	-17.00	17.00				
0.83	0.87	Average Take	l/m		0.00	0.00	0.00	-17.00	17.00			0.00	0.00





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 0.32m

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water only, flushed for 10 min

Lu= 0.249 | k (cm/s) = 2.E-06

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	YES
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3
Outside air temperature: 15°C
Very slow drip out of water swivel.

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	18JUN'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

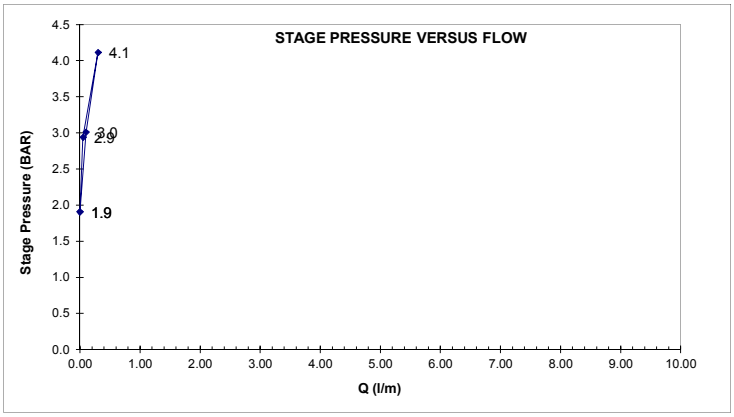
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-235

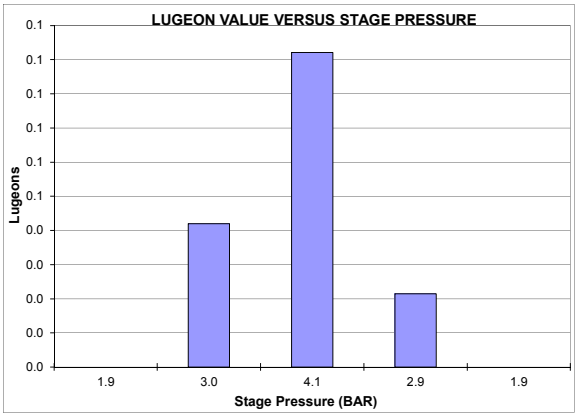
AREA: AREA E | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 7.4 m (bgs) | TOP OF TEST INTERVAL: 93.00 ft (DOWN HOLE) / 28.35 m (DOWN HOLE)

DATE: 21-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 119.00 ft (DOWN HOLE) / 36.27 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	198209.8	198209.8	198209.8	198209.8	198209.8	198209.8				
		Take	litres		0.00	0.00	0.00	0.00	0.00				
1.03	1.90	Average Take	l/m		0.00	0.00	0.00	0.00	0.00			0.00	0.00
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198211.3	198211.3	198211.3	198211.5	198211.8	198211.8				
		Take	litres		0.00	0.00	0.25	0.25	0.00				
2.14	3.01	Average Take	l/m		0.00	0.00	0.25	0.25	0.00			0.10	0.04
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198212.8	198213.0	198213.3	198213.5	198214.0	198214.3				
		Take	litres		0.25	0.25	0.25	0.50	0.25				
3.24	4.11	Average Take	l/m		0.25	0.25	0.25	0.50	0.25			0.30	0.09
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198214.3	198214.3	198214.3	198214.3	198214.5	198214.5				
		Take	litres		0.00	0.00	0.00	0.25	0.00				
2.07	2.94	Average Take	l/m		0.00	0.00	0.00	0.25	0.00			0.05	0.02
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198214.8	198214.8	198214.8	198214.8	198214.8	198214.8				
		Take	litres		0.00	0.00	0.00	0.00	0.00				
1.03	1.90	Average Take	l/m		0.00	0.00	0.00	0.00	0.00			0.00	0.00





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 24.35' bgs

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Pur-Vis Polymer; 10 minutes

Lu= 0.016 | k (cm/s) = 2.E-07

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	YES
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3
Outside Air Temperature: 5°C
No circulation during drilling prior to 93 ft

TEST BY: Dalton Pajak | ANALYZED BY: Dalton Pajak | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	22JUN'11	ISSUED WITH REPORT VA101-176/38-3	DLP	CHS	KJB

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

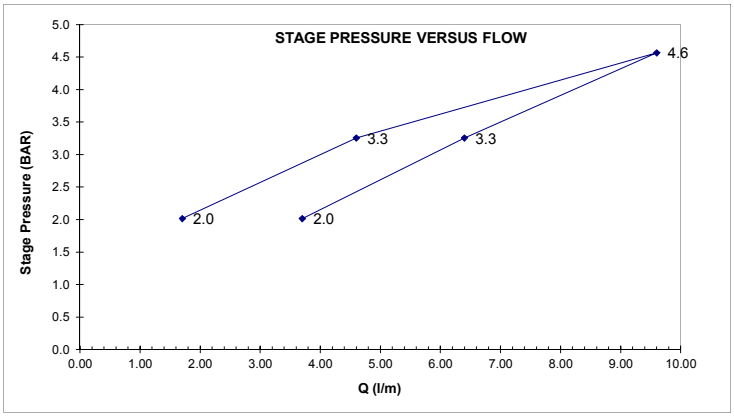
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-235

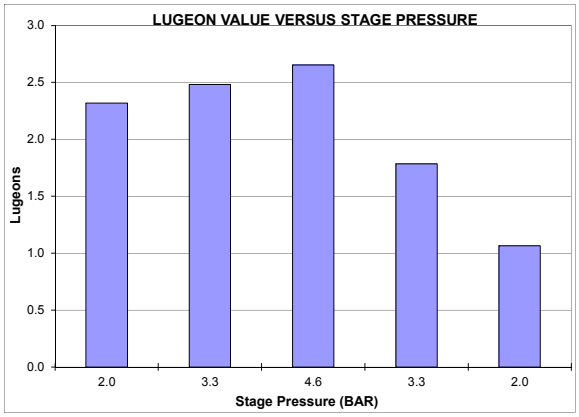
AREA: AREA E | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 7.4 m (bgs) | TOP OF TEST INTERVAL: 113.00 ft (DOWN HOLE) / 34.44 m (DOWN HOLE)

DATE: 22-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 0.3 m | BOTTOM OF TEST INTERVAL: 139.00 ft (DOWN HOLE) / 42.37 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	198235.0	198239.0	198242.5	198246.5	198250.0	198253.5				
		Take	litres		4.00	3.50	4.00	3.50	3.50				
1.24	2.01	Average Take	l/m		4.00	3.50	4.00	3.50	3.50			3.70	2.32
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198261.0	198268.5	198275.0	198281.0	198287.0	198293.0				
		Take	litres		7.50	6.50	6.00	6.00	6.00				
2.48	3.25	Average Take	l/m		7.50	6.50	6.00	6.00	6.00			6.40	2.48
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198300.0	198311.0	198320.0	198329.0	198338.5	198348.0				
		Take	litres		11.00	9.00	9.00	9.50	9.50				
3.79	4.56	Average Take	l/m		11.00	9.00	9.00	9.50	9.50			9.60	2.65
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198352.0	198356.5	198361.0	198366.0	198370.5	198375.0				
		Take	litres		4.50	4.50	5.00	4.50	4.50				
2.48	3.25	Average Take	l/m		4.50	4.50	5.00	4.50	4.50			4.60	1.78
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198376.0	198377.3	198379.0	198380.8	198382.5	198384.5				
		Take	litres		1.25	1.75	1.75	1.75	2.00				
1.24	2.01	Average Take	l/m		1.25	1.75	1.75	1.75	2.00			1.70	1.07





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 24.35 ft below ground surface

DRILLING FLUIDS USED/ TIME FOR FLUSHING: water only; 10 minutes

Lu= 1.913 | k (cm/s) = 2.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	YES
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3
Outside air temp: 5°C
No circulation during drilling prior to 93 ft

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	22JUN'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

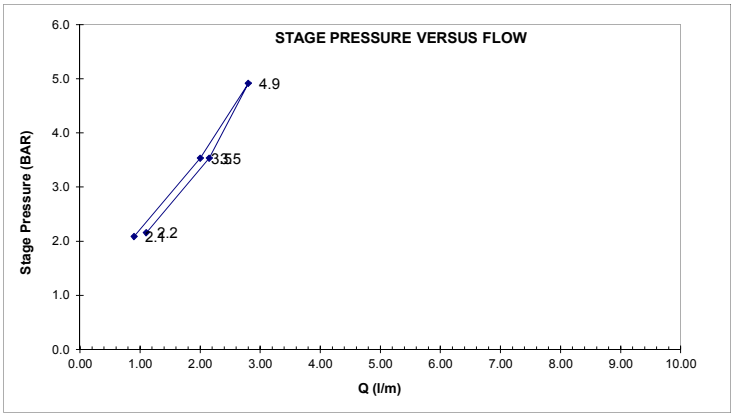
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-236

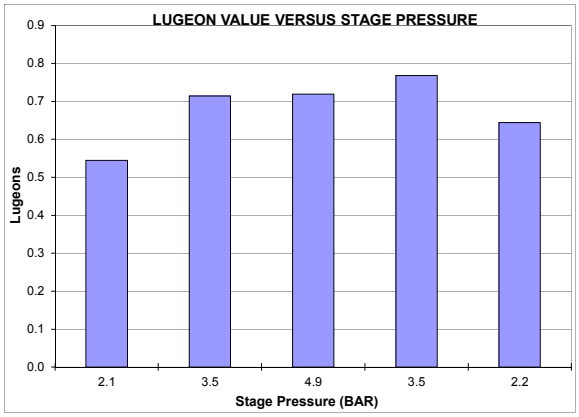
AREA: AREA E | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 6.5 m (bgs) | TOP OF TEST INTERVAL: 118.00 ft (DOWN HOLE) / 35.97 m (DOWN HOLE)

DATE: 24-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 144.00 ft (DOWN HOLE) / 43.89 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	198397.5	198398.0	198399.0	198400.0	198401.0	198402.0				
		Take	litres		0.50	1.00	1.00	1.00	1.00				
1.31	2.09	Average Take	l/m		0.50	1.00	1.00	1.00	1.00			0.90	0.54
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198407.0	198409.0	198411.0	198413.0	198415.0	198417.0				
		Take	litres		2.00	2.00	2.00	2.00	2.00				
2.76	3.53	Average Take	l/m		2.00	2.00	2.00	2.00	2.00			2.00	0.71
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198425.0	198428.0	198430.5	198433.5	198436.0	198439.0				
		Take	litres		3.00	2.50	3.00	2.50	3.00				
4.14	4.91	Average Take	l/m		3.00	2.50	3.00	2.50	3.00			2.80	0.72
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198441.3	198443.5	198446.0	198448.0	198450.0	198452.0				
		Take	litres		2.25	2.50	2.00	2.00	2.00				
2.76	3.53	Average Take	l/m		2.25	2.50	2.00	2.00	2.00			2.15	0.77
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198453.0	198454.0	198455.3	198456.8	198457.5	198458.5				
		Take	litres		1.00	1.30	1.45	0.75	1.00				
1.38	2.15	Average Take	l/m		1.00	1.30	1.45	0.75	1.00			1.10	0.64





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 6.45m below ground surface

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water only; 15min

Lu= 0.678 | k (cm/s) = 7.E-06

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	YES
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Outside Air Temp: 7°C

TEST BY: Dalton Pajak | ANALYZED BY: Dalton Pajak | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JUN'11	ISSUED WITH REPORT VA101-176/38-3	DLP	CHS	KJB

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

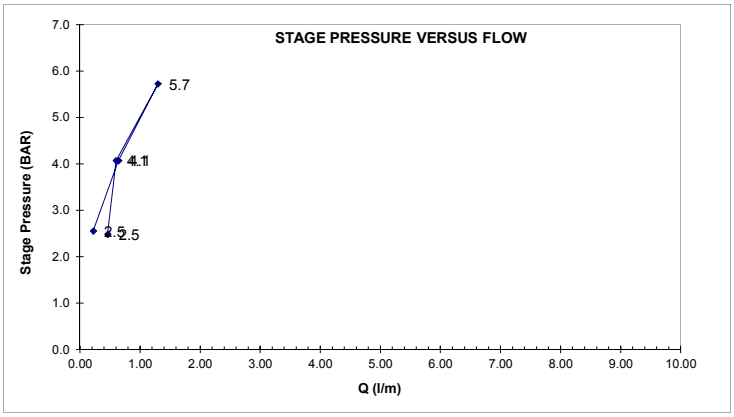
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-236

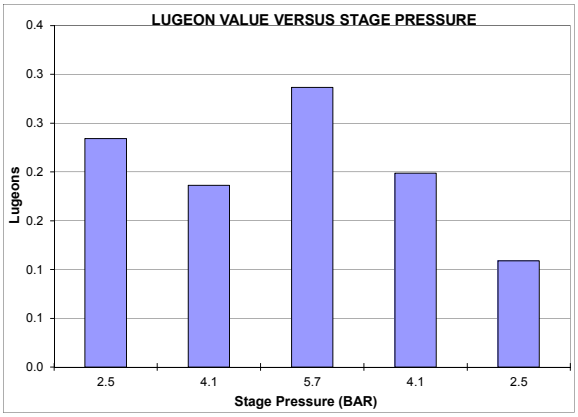
AREA: AREA E | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 7.7 m (bgs) | TOP OF TEST INTERVAL: 143.00 ft (DOWN HOLE) / 43.59 m (DOWN HOLE)

DATE: 24-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 169.00 ft (DOWN HOLE) / 51.51 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	198463.0	198463.5	198464.0	198464.5	198465.0	198465.3				
		Take	litres		0.50	0.50	0.50	0.50	0.30				
1.59	2.48	Average Take	l/m		0.50	0.50	0.50	0.50	0.30			0.46	0.23
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198468.3	198469.0	198469.7	198470.0	198470.5	198471.3				
		Take	litres		0.70	0.70	0.30	0.50	0.80				
3.17	4.07	Average Take	l/m		0.70	0.70	0.30	0.50	0.80			0.60	0.19
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198475.0	198476.5	198477.8	198479.0	198480.0	198481.5				
		Take	litres		1.50	1.27	1.23	1.00	1.50				
4.83	5.72	Average Take	l/m		1.50	1.27	1.23	1.00	1.50			1.30	0.29
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198482.5	198483.0	198483.7	198484.2	198485.0	198485.7				
		Take	litres		0.50	0.70	0.50	0.80	0.70				
3.17	4.07	Average Take	l/m		0.50	0.70	0.50	0.80	0.70			0.64	0.20
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198485.7	198485.9	198485.9	198486.1	198486.4	198486.8				
		Take	litres		0.20	0.00	0.20	0.30	0.40				
1.65	2.55	Average Take	l/m		0.20	0.00	0.20	0.30	0.40			0.22	0.11





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 7.7m below ground surface.

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water only; 15min

Lu= 0.182 | k (cm/s) = 2.E-06

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	YES
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3
Outside Air Temp: 7°C
Slow drip from water swivel.

TEST BY: Dalton Pajak | ANALYZED BY: Dalton Pajak | REVIEWED BY: Louise Shannon

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-236\[GH11-236 Packer Test.xlsx]2

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	25JUN'11	ISSUED WITH REPORT VA101-176/38-3	DLP	CHS	KJB

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

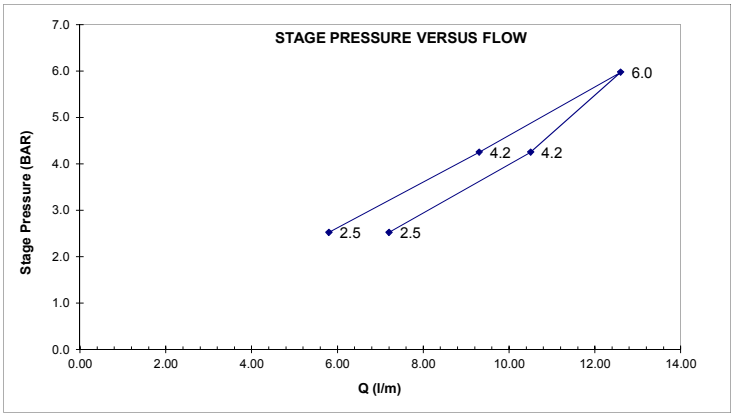
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-237

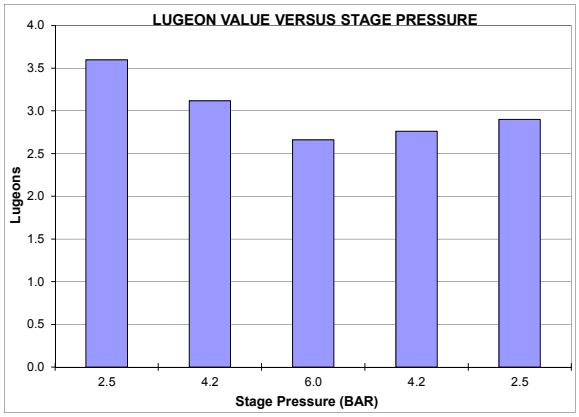
AREA: AREA E | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 6.7 m (bgs) | TOP OF TEST INTERVAL: 152.00 ft (DOWN HOLE) / 46.33 m (DOWN HOLE)

DATE: 27-Jun-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 178.00 ft (DOWN HOLE) / 54.25 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	198523.0	198530.5	198538.0	198545.0	198552.0	198559.0				
		Take	litres		7.50	7.50	7.00	7.00	7.00				
1.72	2.52	Average Take	l/m		7.50	7.50	7.00	7.00	7.00			7.20	3.60
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198577.0	198588.0	198598.5	198609.0	198619.0	198629.5				
		Take	litres		11.00	10.50	10.50	10.00	10.50				
3.45	4.25	Average Take	l/m		11.00	10.50	10.50	10.00	10.50			10.50	3.12
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198655.0	198668.0	198680.0	198693.0	198705.5	198718.0				
		Take	litres		13.00	12.00	13.00	12.50	12.50				
5.17	5.97	Average Take	l/m		13.00	12.00	13.00	12.50	12.50			12.60	2.66
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198737.0	198746.5	198756.0	198765.0	198774.0	198783.5				
		Take	litres		9.50	9.50	9.00	9.00	9.50				
3.45	4.25	Average Take	l/m		9.50	9.50	9.00	9.00	9.50			9.30	2.76
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198792.0	198798.0	198803.5	198809.0	198815.0	198821.0				
		Take	litres		6.00	5.50	5.50	6.00	6.00				
1.72	2.52	Average Take	l/m		6.00	5.50	5.50	6.00	6.00			5.80	2.90





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 22' below ground surface

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water, flushed for 15 minutes.

Lu= 2.662 | k (cm/s) = 3.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	YES
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3
Outside Air Temp: 6°C
Slow drip from water swivel during P1, faster drip during P2 and P3.

TEST BY: Dalton Pajak | ANALYZED BY: Dalton Pajak | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	28JUN'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 2 OF 2

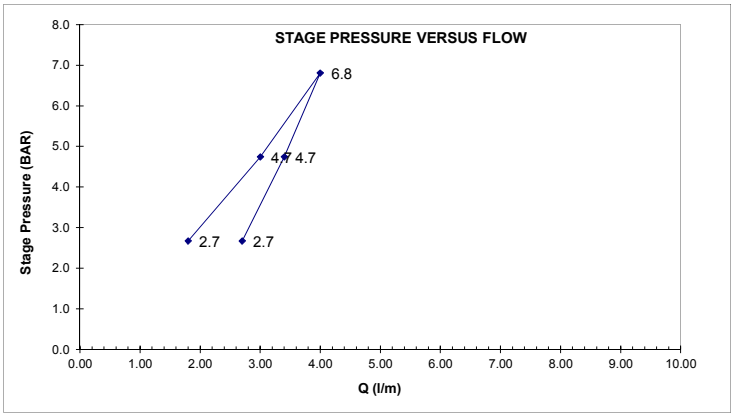
LUGEON TEST FIELD DATA SHEET

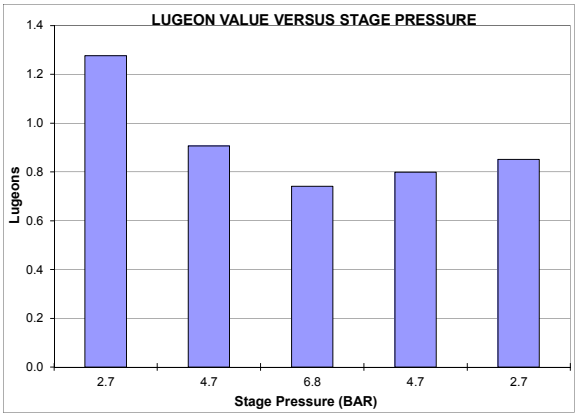
Knight Piésold CONSULTING

PROJECT:	PEBBLE PROJECT	PROJECT NO:	VA101-176/38	DRILLHOLE:	GH11-237
AREA:	AREA E			TEST NO:	2

DIP:	90 ° (FROM HORIZONTAL)	DEPTH TO GROUNDWATER:	5.7 m (bgs)	TOP OF TEST INTERVAL:	177.00 ft (DOWN HOLE)	53.95 m (DOWN HOLE)
DATE:	28-Jun-11	GAUGE HEIGHT ABOVE GROUND:	0.3 m	BOTTOM OF TEST INTERVAL:	203.00 ft (DOWN HOLE)	61.87 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	198835.0	198838.0	198841.3	198843.5	198846.0	198848.5				
		Take	litres		3.00	3.25	2.25	2.50	2.50				
2.07	2.67	Average Take	l/m		3.00	3.25	2.25	2.50	2.50			2.70	1.28
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198855.0	198858.5	198862.5	198866.5	198868.8	198872.0				
		Take	litres		3.50	4.00	4.00	2.25	3.25				
4.14	4.74	Average Take	l/m		3.50	4.00	4.00	2.25	3.25			3.40	0.91
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198879.0	198883.3	198887.0	198891.0	198895.0	198899.0				
		Take	litres		4.25	3.75	4.00	4.00	4.00				
6.21	6.81	Average Take	l/m		4.25	3.75	4.00	4.00	4.00			4.00	0.74
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198902.0	198905.0	198908.0	198911.0	198914.0	198917.0				
		Take	litres		3.00	3.00	3.00	3.00	3.00				
4.14	4.74	Average Take	l/m		3.00	3.00	3.00	3.00	3.00			3.00	0.80
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	198917.0	198918.5	198920.5	198922.5	198924.3	198926.0				
		Take	litres		1.50	2.00	2.00	1.75	1.75				
2.07	2.67	Average Take	l/m		1.50	2.00	2.00	1.75	1.75			1.80	0.85





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 22.6' below stickup of 4'

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water, flushed for 15 minutes.

Lu= 0.742 k (cm/s) = 7.E-06

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	YES
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3
Outside Air Temp: 10°C
Slow drip from water swivel, water flow is surging at high pressure, hose kicks noted.

TEST BY: Louise Shannon ANALYZED BY: Louise Shannon REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	28JUN'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 1 OF 3

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

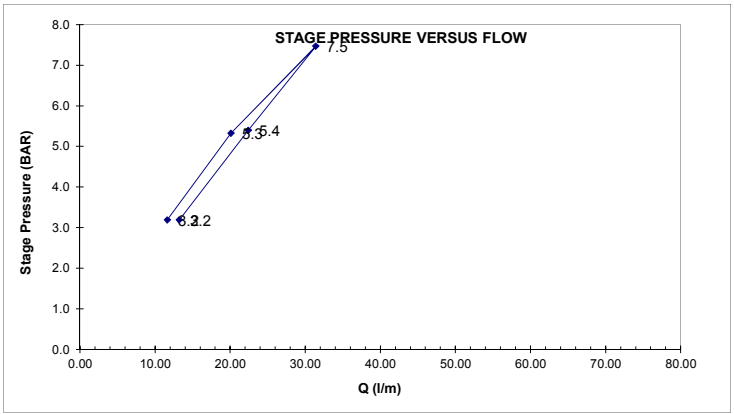
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-238

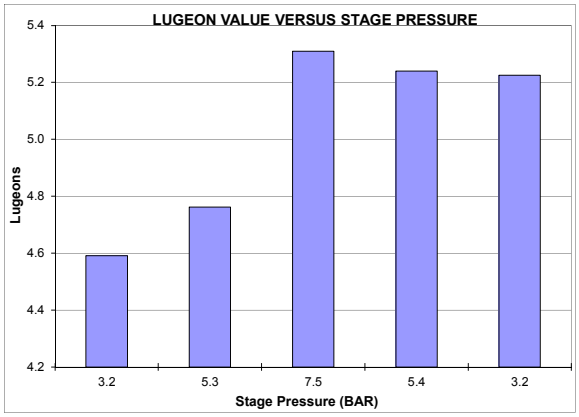
AREA: AREA A | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 9.9 m (bgs) | TOP OF TEST INTERVAL: 187.00 ft (DOWN HOLE) / 57.00 m (DOWN HOLE)

DATE: 4-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 0.6 m | BOTTOM OF TEST INTERVAL: 213.00 ft (DOWN HOLE) / 64.92 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)			0	1	2	3	4	5			FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	198990.0	199003.0	199015.0	199026.0	199037.0	199048.0				
		Take	litres		13.00	12.00	11.00	11.00	11.00				
2.14	3.19	Average Take	l/m		13.00	12.00	11.00	11.00	11.00			11.60	4.59
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	199060.0	199080.5	199100.0	199121.0	199140.5	199160.5				
		Take	litres		20.50	19.50	21.00	19.50	20.00				
4.27	5.33	Average Take	l/m		20.50	19.50	21.00	19.50	20.00			20.10	4.76
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	199185.0	199216.0	199248.0	199279.0	199311.0	199342.0				
		Take	litres		31.00	32.00	31.00	32.00	31.00				
6.41	7.46	Average Take	l/m		31.00	32.00	31.00	32.00	31.00			31.40	5.31
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	199356.0	199378.0	199400.0	199422.0	199444.0	199468.0				
		Take	litres		22.00	22.00	22.00	22.00	24.00				
4.34	5.39	Average Take	l/m		22.00	22.00	22.00	22.00	24.00			22.40	5.24
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	199475.0	199488.0	199501.5	199515.0	199528.0	199541.0				
		Take	litres		13.00	13.50	13.50	13.00	13.00				
2.14	3.19	Average Take	l/m		13.00	13.50	13.50	13.00	13.00			13.20	5.22





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 32.5' bgs

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water only / 15 min

Lu= 5.309 | k (cm/s) = 5.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	YES
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Outside air temperature: ~7C

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	04JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

$$Lu = \frac{Q}{L} * \frac{10}{(0.1 * H * \sin(a)^* SG + P_{gauge})} * \frac{M_f}{28}$$

SHEET 1 OF 3

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

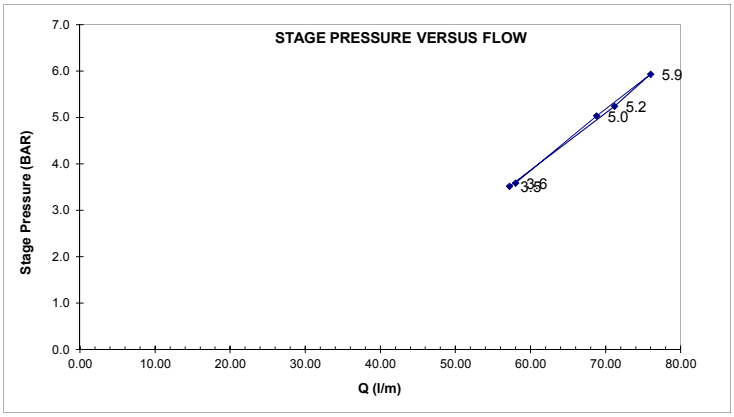
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-238

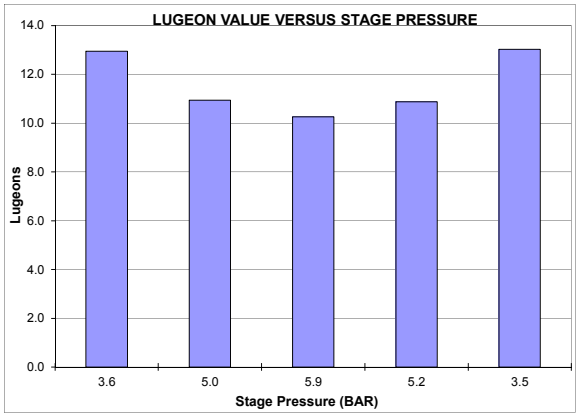
AREA: AREA A | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 9.7 m (bgs) | TOP OF TEST INTERVAL: 232.00 ft (DOWN HOLE) / 70.71 m (DOWN HOLE)

DATE: 4-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 273.00 ft (DOWN HOLE) / 83.21 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)			0	1	2	3	4	5			FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	200080.0	200139.0	200196.0	200254.0	200311.0	200370.0				
		Take	litres		59.00	57.00	58.00	57.00	59.00				
2.48	3.58	Average Take	l/m		59.00	57.00	58.00	57.00	59.00			58.00	12.95
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	200490.0	200560.0	200628.0	200697.0	200766.0	200834.0				
		Take	litres		70.00	68.00	69.00	69.00	68.00				
3.93	5.03	Average Take	l/m		70.00	68.00	69.00	69.00	68.00			68.80	10.94
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	200985.0	201061.0	201137.0	201213.0	201289.0	201365.0				
		Take	litres		76.00	76.00	76.00	76.00	76.00				
4.83	5.93	Average Take	l/m		76.00	76.00	76.00	76.00	76.00			76.00	10.26
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	201525.0	201596.0	201667.0	201739.0	201809.0	201881.0				
		Take	litres		71.00	71.00	72.00	70.00	72.00				
4.14	5.24	Average Take	l/m		71.00	71.00	72.00	70.00	72.00			71.20	10.88
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	202140.0	202197.0	202254.0	202311.0	202368.0	202426.0				
		Take	litres		57.00	57.00	57.00	57.00	58.00				
2.41	3.52	Average Take	l/m		57.00	57.00	57.00	57.00	58.00			57.20	13.02





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 31.9' bgs

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Purvis polymer, 15 min

Lu= 10.258 | k (cm/s) = 1.E-04

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	YES
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Outside air temperature: ~7C

TEST BY: Dalton Pajak | ANALYZED BY: Louise Shannon | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	04JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

$$Lu = \frac{Q}{L} * \frac{10}{(0.1 * H * \sin(a) * SG + P_{gauge})} * \frac{M_f}{28}$$

SHEET 1 OF 3

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

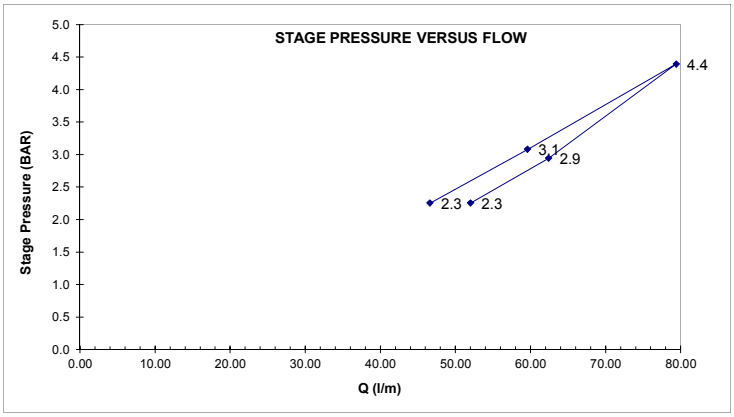
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-238

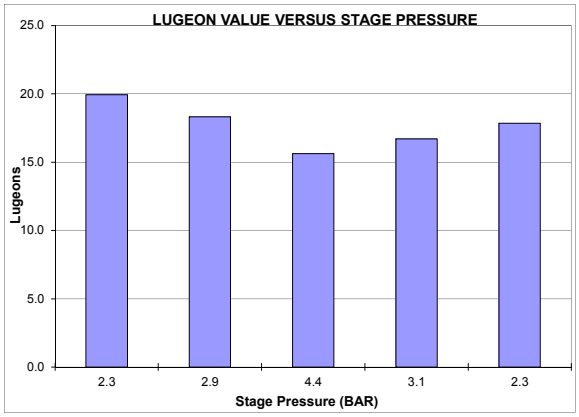
AREA: AREA A | TEST NO: 3

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 7.4 m (bgs) | TOP OF TEST INTERVAL: 260.00 ft (DOWN HOLE) / 79.25 m (DOWN HOLE)

DATE: 4-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 298.00 ft (DOWN HOLE) / 90.83 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	204000.0	204053.0	204104.0	204156.0	204208.0	204260.0				
		Take	litres		53.00	51.00	52.00	52.00	52.00				
1.38	2.25	Average Take	l/m		53.00	51.00	52.00	52.00	52.00			52.00	19.93
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	204430.0	204492.0	204555.0	204618.0	204680.0	204742.0				
		Take	litres		62.00	63.00	63.00	62.00	62.00				
2.07	2.94	Average Take	l/m		62.00	63.00	63.00	62.00	62.00			62.40	18.31
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	204860.0	204940.0	205019.0	205098.0	205178.0	205257.0				
		Take	litres		80.00	79.00	79.00	80.00	79.00				
3.52	4.39	Average Take	l/m		80.00	79.00	79.00	80.00	79.00			79.40	15.61
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	205595.0	205655.0	205715.0	205774.0	205834.0	205893.0				
		Take	litres		60.00	60.00	59.00	60.00	59.00				
2.21	3.08	Average Take	l/m		60.00	60.00	59.00	60.00	59.00			59.60	16.71
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	206090.0	206137.0	206183.0	206230.0	206277.0	206323.0				
		Take	litres		47.00	46.00	47.00	47.00	46.00				
1.38	2.25	Average Take	l/m		47.00	46.00	47.00	47.00	46.00			46.60	17.86





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 24.4' bgs

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water; 15 min

Lu= 15.614 | k (cm/s) = 2.E-04

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	YES
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Outside air temperature: ~7C

TEST BY: Dalton Pajak | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	04JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

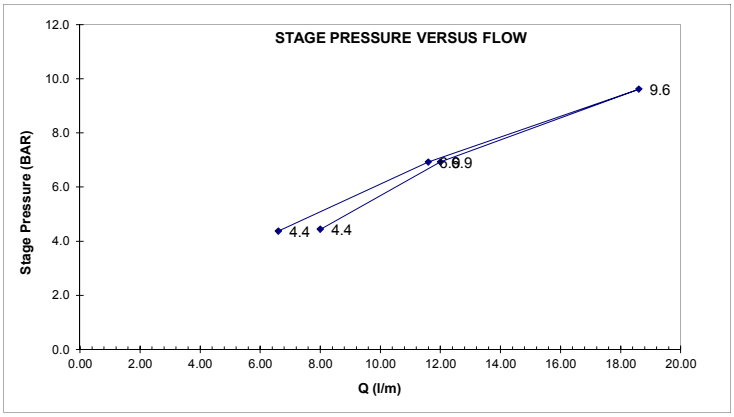
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-239

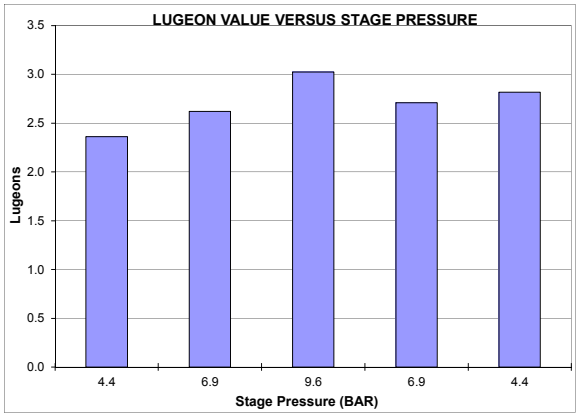
AREA: AREA A | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 17.4 m (bgs) | TOP OF TEST INTERVAL: 218.00 ft (DOWN HOLE) / 66.45 m (DOWN HOLE)

DATE: 9-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 1.5 m | BOTTOM OF TEST INTERVAL: 239.00 ft (DOWN HOLE) / 72.85 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	206993.0	207001.0	207007.0	207013.0	207019.0	207026.0				
		Take	litres		8.00	6.00	6.00	6.00	7.00				
2.48	4.37	Average Take	l/m		8.00	6.00	6.00	6.00	7.00			6.60	2.36
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	207063.0	207074.0	207086.0	207098.0	207109.0	207121.0				
		Take	litres		11.00	12.00	12.00	11.00	12.00				
5.03	6.92	Average Take	l/m		11.00	12.00	12.00	11.00	12.00			11.60	2.62
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	207179.0	207197.0	207215.0	207234.0	207253.0	207272.0				
		Take	litres		18.00	18.00	19.00	19.00	19.00				
7.72	9.61	Average Take	l/m		18.00	18.00	19.00	19.00	19.00			18.60	3.02
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	207300.0	207312.0	207324.0	207336.0	207348.0	207360.0				
		Take	litres		12.00	12.00	12.00	12.00	12.00				
5.03	6.92	Average Take	l/m		12.00	12.00	12.00	12.00	12.00			12.00	2.71
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	207387.0	207395.0	207402.0	207410.0	207418.0	207427.0				
		Take	litres		8.00	7.00	8.00	8.00	9.00				
2.55	4.44	Average Take	l/m		8.00	7.00	8.00	8.00	9.00			8.00	2.82





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Yes

DRILLING FLUIDS USED/ TIME FOR FLUSHING:

Lu= 2.705 | k (cm/s) = 3.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	YES
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Flushed hole with clean water prior to test.

No leaks. Difficult to control the pressure on the 4th interval (P2) - water supply ran low unnoticed.

TEST BY: Scott Rees | ANALYZED BY: Louise Shannon | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	09JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

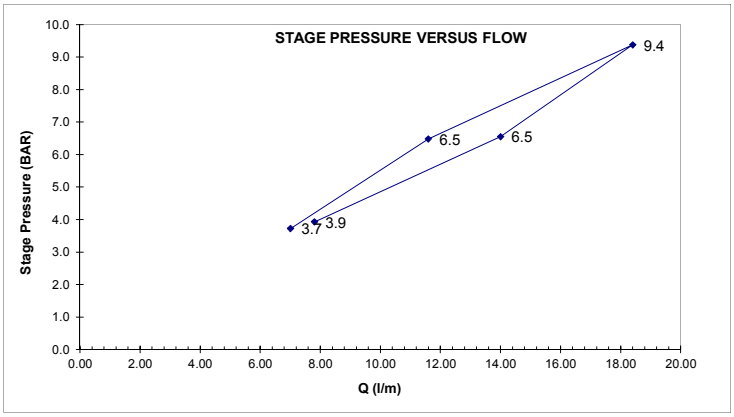
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-239

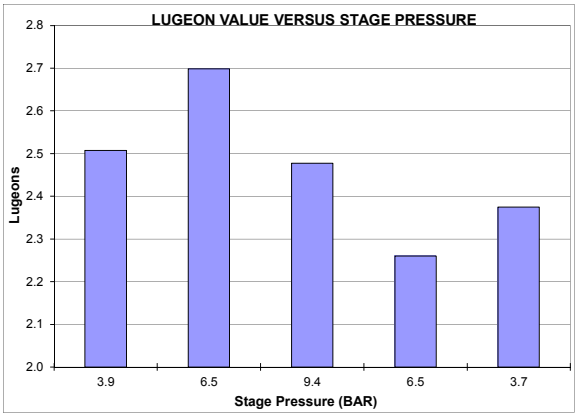
AREA: AREA A | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 8.8 m (bgs) | TOP OF TEST INTERVAL: 238.00 ft (DOWN HOLE) / 72.54 m (DOWN HOLE)

DATE: 9-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 1.5 m | BOTTOM OF TEST INTERVAL: 264.00 ft (DOWN HOLE) / 80.47 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)			0	1	2	3	4	5			FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	207491.0	207499.0	207507.0	207514.0	207522.0	207530.0				
		Take	litres		8.00	8.00	7.00	8.00	8.00				
2.90	3.93	Average Take	l/m		8.00	8.00	7.00	8.00	8.00			7.80	2.51
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	207572.0	207586.0	207600.0	207614.0	207628.0	207642.0				
		Take	litres		14.00	14.00	14.00	14.00	14.00				
5.52	6.55	Average Take	l/m		14.00	14.00	14.00	14.00	14.00			14.00	2.70
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	207714.0	207733.0	207752.0	207770.0	207788.0	207806.0				
		Take	litres		19.00	19.00	18.00	18.00	18.00				
8.34	9.37	Average Take	l/m		19.00	19.00	18.00	18.00	18.00			18.40	2.48
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	207844.0	207856.0	207868.0	207879.0	207891.0	207902.0				
		Take	litres		12.00	12.00	11.00	12.00	11.00				
5.45	6.48	Average Take	l/m		12.00	12.00	11.00	12.00	11.00			11.60	2.26
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	207925.0	207932.0	207939.0	207946.0	207953.0	207960.0				
		Take	litres		7.00	7.00	7.00	7.00	7.00				
2.69	3.72	Average Take	l/m		7.00	7.00	7.00	7.00	7.00			7.00	2.38





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Yes

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Drilled with water; Flushed hole for 10 minutes before test.

Lu= 2.375 | k (cm/s) = 2.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	YES
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Drilled with water and flushed hole with clean water prior to test.

No leaks. Difficult to control the pressure on the 2nd interval (P2)

TEST BY: Scott Rees | ANALYZED BY: Louise Shannon | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	09JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

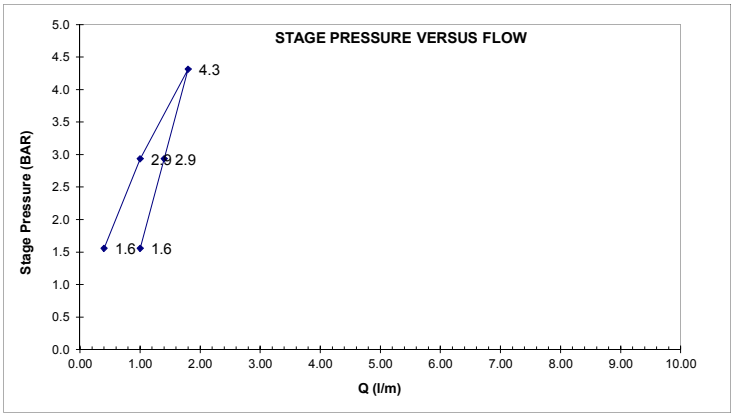
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-240

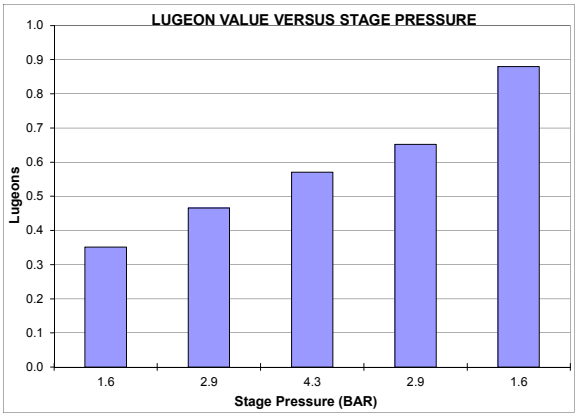
AREA: AREA A | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 1.6 m (bgs) | TOP OF TEST INTERVAL: 124.00 ft (DOWN HOLE) / 37.80 m (DOWN HOLE)

DATE: 13-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 0.2 m | BOTTOM OF TEST INTERVAL: 148.00 ft (DOWN HOLE) / 45.11 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	207983.0	207984.0	207984.5	207985.0	207985.0	207985.0				
		Take	litres		1.00	0.50	0.50	0.00	0.00				
1.38	1.55	Average Take	l/m		1.00	0.50	0.50	0.00	0.00			0.40	0.35
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	207987.0	207989.0	207990.0	207991.0	207991.5	207992.0				
		Take	litres		2.00	1.00	1.00	0.50	0.50				
2.76	2.93	Average Take	l/m		2.00	1.00	1.00	0.50	0.50			1.00	0.47
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208000.0	208002.0	208004.0	208005.5	208007.5	208009.0				
		Take	litres		2.00	2.00	1.50	2.00	1.50				
4.14	4.31	Average Take	l/m		2.00	2.00	1.50	2.00	1.50			1.80	0.57
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208009.0	208010.0	208011.5	208013.0	208014.5	208016.0				
		Take	litres		1.00	1.50	1.50	1.50	1.50				
2.76	2.93	Average Take	l/m		1.00	1.50	1.50	1.50	1.50			1.40	0.65
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208016.0	208017.0	208018.0	208019.0	208020.0	208021.0				
		Take	litres		1.00	1.00	1.00	1.00	1.00				
1.38	1.55	Average Take	l/m		1.00	1.00	1.00	1.00	1.00			1.00	0.88





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Yes

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Drilled with just water and flushed for 15 minutes

Lu= 0.880 | k (cm/s) = 9.E-06

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	YES
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

TEST BY: Anna Akkerman | ANALYZED BY: Louise Shannon | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	13JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

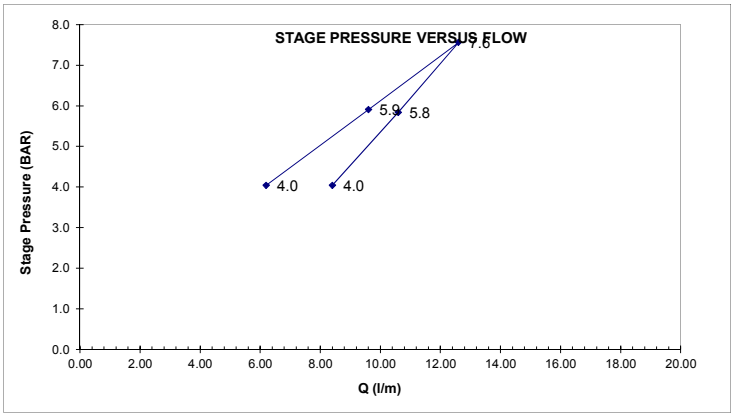
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-240

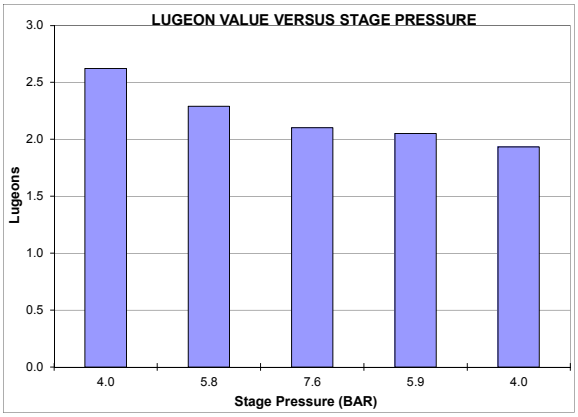
AREA: AREA A | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 21.6 m (bgs) | TOP OF TEST INTERVAL: 147.00 ft (DOWN HOLE) / 44.81 m (DOWN HOLE)

DATE: 13-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 1.6 m | BOTTOM OF TEST INTERVAL: 173.00 ft (DOWN HOLE) / 52.73 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	208253.0	208261.0	208270.0	208278.0	208287.0	208295.0				
		Take	litres		8.00	9.00	8.00	9.00	8.00				
1.72	4.04	Average Take	l/m		8.00	9.00	8.00	9.00	8.00			8.40	2.62
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208320.0	208331.0	208342.0	208352.0	208362.0	208373.0				
		Take	litres		11.00	11.00	10.00	10.00	11.00				
3.52	5.84	Average Take	l/m		11.00	11.00	10.00	10.00	11.00			10.60	2.29
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208405.0	208418.0	208431.0	208444.0	208456.0	208468.0				
		Take	litres		13.00	13.00	13.00	12.00	12.00				
5.24	7.56	Average Take	l/m		13.00	13.00	13.00	12.00	12.00			12.60	2.10
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208485.0	208495.0	208505.0	208514.0	208524.0	208533.0				
		Take	litres		10.00	10.00	9.00	10.00	9.00				
3.59	5.91	Average Take	l/m		10.00	10.00	9.00	10.00	9.00			9.60	2.05
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208548.0	208555.0	208561.0	208567.0	208573.0	208579.0				
		Take	litres		7.00	6.00	6.00	6.00	6.00				
1.72	4.04	Average Take	l/m		7.00	6.00	6.00	6.00	6.00			6.20	1.93





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Yes

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Drilled with just water and flushed for 15 minutes

Lu= 1.935 | k (cm/s) = 2.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	YES
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

No Leaks

TEST BY: Scott Rees | ANALYZED BY: Louise Shannon | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	13JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 1 OF 1

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

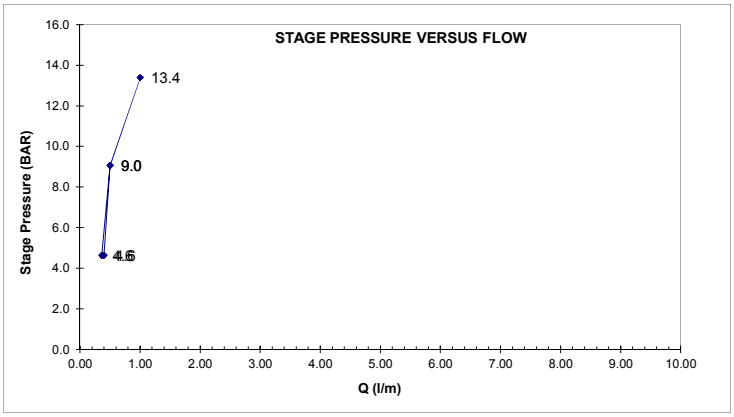
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-241

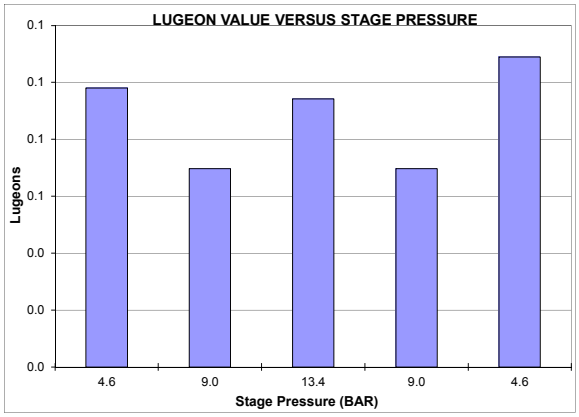
AREA: AREA A | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 1.5 m (bgs) | TOP OF TEST INTERVAL: 378.00 ft (DOWN HOLE) / 115.21 m (DOWN HOLE)

DATE: 21-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 1.4 m | BOTTOM OF TEST INTERVAL: 404.00 ft (DOWN HOLE) / 123.14 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	208663.0	208663.0	208663.2	208663.6	208664.2	208664.8				
		Take	litres		0.00	0.20	0.40	0.60	0.60				
4.34	4.64	Average Take	l/m		0.00	0.20	0.40	0.60	0.60			0.36	0.10
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208667.5	208668.0	208668.5	208669.0	208669.5	208670.0				
		Take	litres		0.50	0.50	0.50	0.50	0.50				
8.76	9.05	Average Take	l/m		0.50	0.50	0.50	0.50	0.50			0.50	0.07
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208673.0	208674.0	208675.0	208676.0	208677.0	208678.0				
		Take	litres		1.00	1.00	1.00	1.00	1.00				
13.10	13.39	Average Take	l/m		1.00	1.00	1.00	1.00	1.00			1.00	0.09
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208679.5	208680.0	208680.5	208681.0	208681.5	208682.0				
		Take	litres		0.50	0.50	0.50	0.50	0.50				
8.76	9.05	Average Take	l/m		0.50	0.50	0.50	0.50	0.50			0.50	0.07
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208682.0	208682.3	208682.7	208683.1	208683.5	208684.0				
		Take	litres		0.30	0.40	0.40	0.40	0.50				
4.34	4.64	Average Take	l/m		0.30	0.40	0.40	0.40	0.50			0.40	0.11





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Water measured at 9' below stickup; Stickup = 4 ft

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water only

Lu= 0.088 | k (cm/s) = 9.E-07

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	YES
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Outside Air Temperature: 11C

No leaks

TEST BY: Scott Rees | ANALYZED BY: Louise Shannon | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

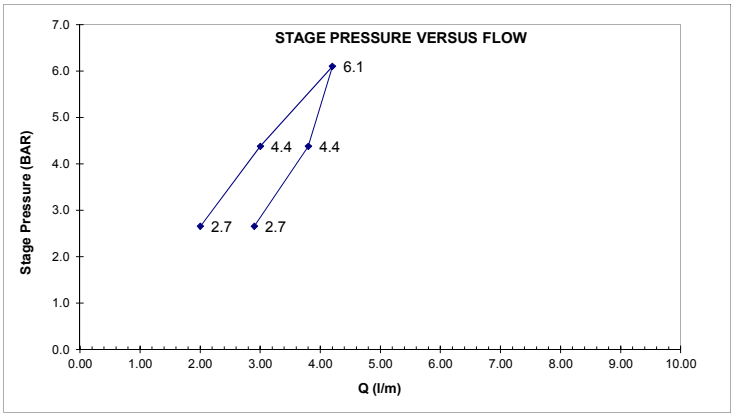
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-242

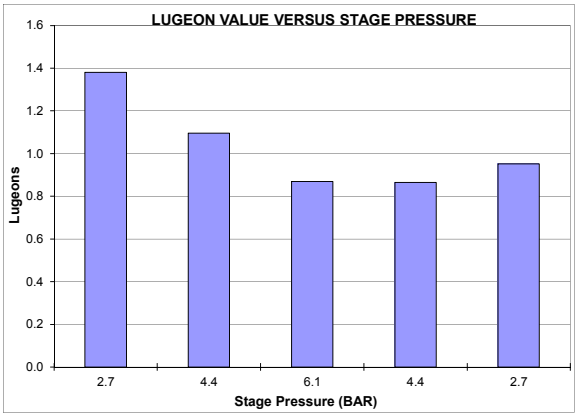
AREA: AREA A | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 9.0 m (bgs) | TOP OF TEST INTERVAL: 149.00 ft (DOWN HOLE) / 45.42 m (DOWN HOLE)

DATE: 26-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 0.3 m | BOTTOM OF TEST INTERVAL: 175.00 ft (DOWN HOLE) / 53.34 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	208775.0	208778.0	208781.0	208784.0	208787.0	208789.5				
		Take	litres		3.00	3.00	3.00	3.00	2.50				
1.72	2.65	Average Take	l/m		3.00	3.00	3.00	3.00	2.50			2.90	1.38
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208792.0	208796.0	208800.0	208803.5	208807.0	208811.0				
		Take	litres		4.00	4.00	3.50	3.50	4.00				
3.45	4.37	Average Take	l/m		4.00	4.00	3.50	3.50	4.00			3.80	1.10
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208814.0	208818.5	208822.5	208827.0	208831.0	208835.0				
		Take	litres		4.50	4.00	4.50	4.00	4.00				
5.17	6.10	Average Take	l/m		4.50	4.00	4.50	4.00	4.00			4.20	0.87
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208837.0	208840.2	208843.0	208846.0	208849.0	208852.0				
		Take	litres		3.20	2.80	3.00	3.00	3.00				
3.45	4.37	Average Take	l/m		3.20	2.80	3.00	3.00	3.00			3.00	0.87
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208853.0	208855.0	208857.0	208859.0	208861.0	208863.0				
		Take	litres		2.00	2.00	2.00	2.00	2.00				
1.72	2.65	Average Take	l/m		2.00	2.00	2.00	2.00	2.00			2.00	0.95





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Yes

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water

Lu= 0.869 | k (cm/s) = 9.E-06

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	YES
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	26JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

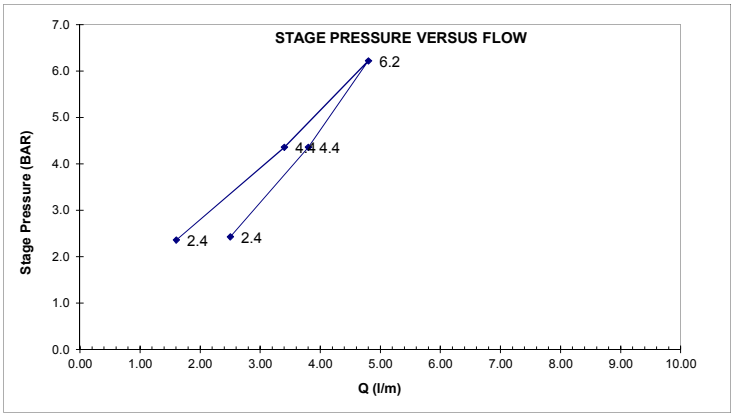
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-242

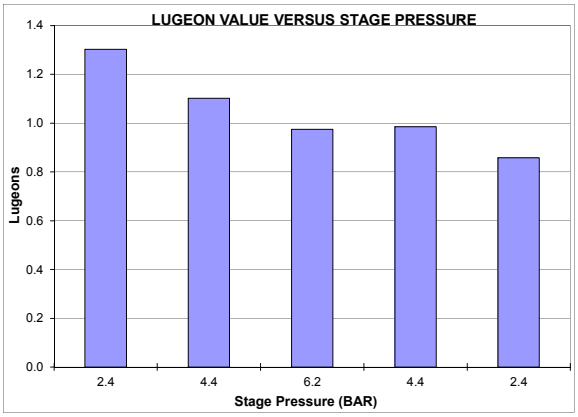
AREA: AREA A | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 2.2 m (bgs) | TOP OF TEST INTERVAL: 174.00 ft (DOWN HOLE) / 53.04 m (DOWN HOLE)

DATE: 26-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 200.00 ft (DOWN HOLE) / 60.96 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	208904.0	208907.0	208909.5	208912.0	208914.0	208916.5				
		Take	litres		3.00	2.50	2.50	2.00	2.50				
2.07	2.42	Average Take	l/m		3.00	2.50	2.50	2.00	2.50			2.50	1.30
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208933.0	208937.0	208941.0	208945.0	208948.7	208952.0				
		Take	litres		4.00	4.00	4.00	3.70	3.30				
4.00	4.35	Average Take	l/m		4.00	4.00	4.00	3.70	3.30			3.80	1.10
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	208986.0	208991.0	208996.0	209000.0	209005.0	209010.0				
		Take	litres		5.00	5.00	4.00	5.00	5.00				
5.86	6.22	Average Take	l/m		5.00	5.00	4.00	5.00	5.00			4.80	0.97
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	209020.0	209023.5	209027.0	209030.5	209033.7	209037.0				
		Take	litres		3.50	3.50	3.50	3.20	3.30				
4.00	4.35	Average Take	l/m		3.50	3.50	3.50	3.20	3.30			3.40	0.99
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	209040.0	209041.5	209043.0	209044.5	209046.0	209048.0				
		Take	litres		1.50	1.50	1.50	1.50	2.00				
2.00	2.35	Average Take	l/m		1.50	1.50	1.50	1.50	2.00			1.60	0.86





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 2.2m bgs

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water, 15 min

Lu= 0.858 | k (cm/s) = 9.E-06

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	YES
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Water level was still slowly dropping when it was measured before test.

TEST BY: Dalton Pajak | ANALYZED BY: Louise Shannon | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	26JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

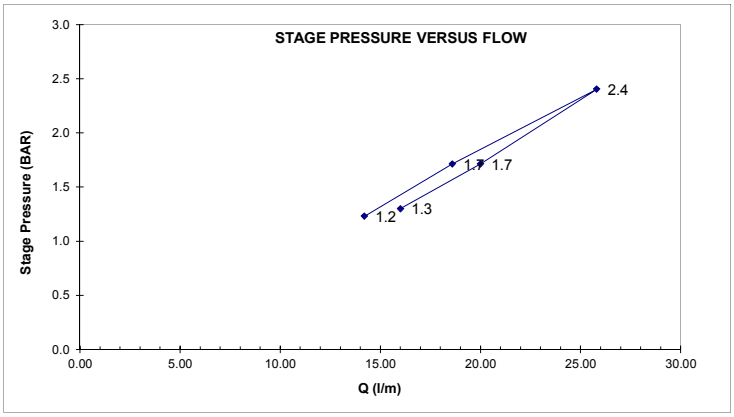
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-243

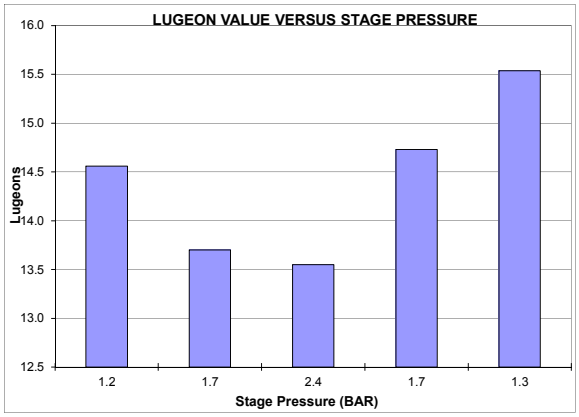
AREA: UPPER TALARIK CREEK AREA | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 6.6 m (bgs) | TOP OF TEST INTERVAL: 48.00 ft (DOWN HOLE) / 14.63 m (DOWN HOLE)

DATE: 29-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 0.2 m | BOTTOM OF TEST INTERVAL: 74.00 ft (DOWN HOLE) / 22.56 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	210048.0	210062.0	210075.0	210089.0	210104.0	210119.0				
		Take	litres		14.00	13.00	14.00	15.00	15.00				
0.55	1.23	Average Take	l/m		14.00	13.00	14.00	15.00	15.00			14.20	14.56
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	210153.0	210171.0	210189.5	210208.0	210227.0	210246.0				
		Take	litres		18.00	18.50	18.50	19.00	19.00				
1.03	1.71	Average Take	l/m		18.00	18.50	18.50	19.00	19.00			18.60	13.70
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	210266.0	210292.0	210318.0	210344.0	210369.5	210395.0				
		Take	litres		26.00	26.00	26.00	25.50	25.50				
1.72	2.40	Average Take	l/m		26.00	26.00	26.00	25.50	25.50			25.80	13.55
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	210405.0	210425.0	210445.0	210465.0	210485.0	210505.0				
		Take	litres		20.00	20.00	20.00	20.00	20.00				
1.03	1.71	Average Take	l/m		20.00	20.00	20.00	20.00	20.00			20.00	14.73
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	210514.0	210530.5	210547.0	210562.5	210578.0	210594.0				
		Take	litres		16.50	16.50	15.50	15.50	16.00				
0.62	1.30	Average Take	l/m		16.50	16.50	15.50	15.50	16.00			16.00	15.54





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 26.7' below stickup, stickup = 61"

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water only, flushed cuttings for 15

Lu= 13.550 | k (cm/s) = 1.E-04

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	YES
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Outside Air Temperature: 15C

Put coffee filter on suction and impeded flow, a hole was poked in it before the final two pressure steps, drip out of water swivel, ~0.1L/min

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	29JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

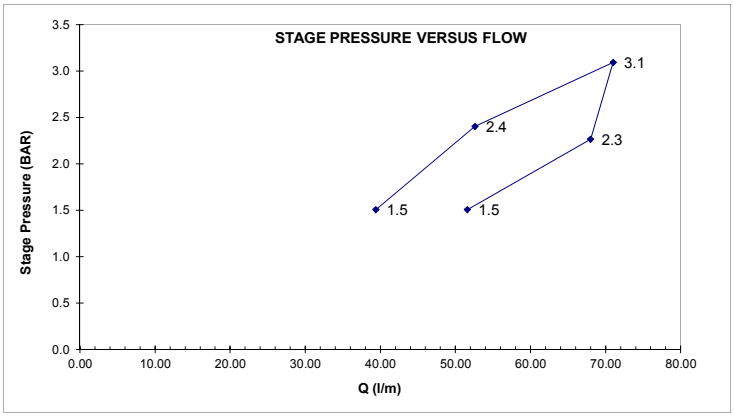
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-243

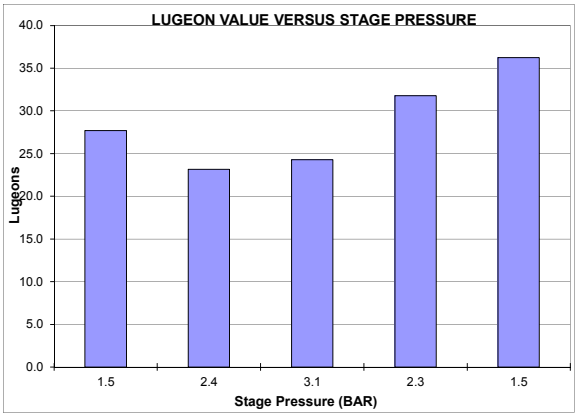
AREA: UPPER TALARIK CREEK AREA | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 6.6 m (bgs) | TOP OF TEST INTERVAL: 73.00 ft (DOWN HOLE) / 22.25 m (DOWN HOLE)

DATE: 29-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 0.2 m | BOTTOM OF TEST INTERVAL: 104.00 ft (DOWN HOLE) / 31.70 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	211635.0	211674.0	211713.0	211753.0	211792.0	211832.0				
		Take	litres		39.00	39.00	40.00	39.00	40.00				
0.83	1.51	Average Take	l/m		39.00	39.00	40.00	39.00	40.00			39.40	27.68
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	211870.0	211923.0	211976.0	212028.0	212080.0	212133.0				
		Take	litres		53.00	53.00	52.00	52.00	53.00				
1.72	2.40	Average Take	l/m		53.00	53.00	52.00	52.00	53.00			52.60	23.17
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	212180.0	212247.0	212314.0	212382.0	212458.0	212535.0				
		Take	litres		67.00	67.00	68.00	76.00	77.00				
2.41	3.09	Average Take	l/m		67.00	67.00	68.00	76.00	77.00			71.00	24.30
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	212615.0	212682.0	212751.0	212819.0	212886.0	212955.0				
		Take	litres		67.00	69.00	68.00	67.00	69.00				
1.59	2.26	Average Take	l/m		67.00	69.00	68.00	67.00	69.00			68.00	31.78
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	212975.0	213027.0	213088.0	213130.0	213182.0	213233.0				
		Take	litres		52.00	61.00	42.00	52.00	51.00				
0.83	1.51	Average Take	l/m		52.00	61.00	42.00	52.00	51.00			51.60	36.25





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 26.7' below stickup, stickup = 61"

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water only, flushed cuttings for 15

Lu= 24.301 | k (cm/s) = 2.E-04

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	YES
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m^3

Outside Air Temperature: 15C

Slow drip out of water swivel. Could not get higher than 35 psi.

High take, Head loss through tool likely

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	29JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 1 OF 3

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

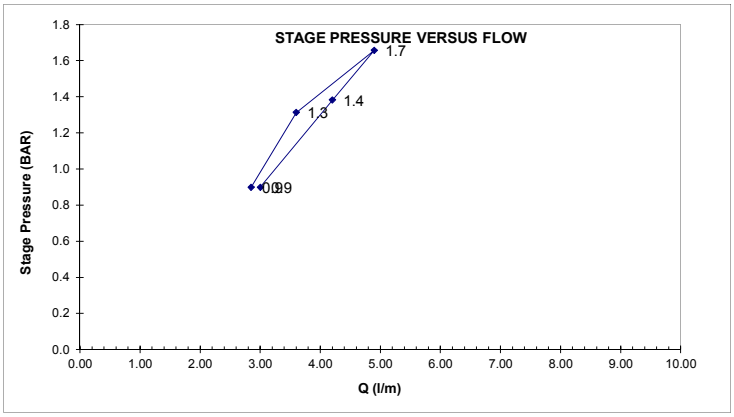
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-245

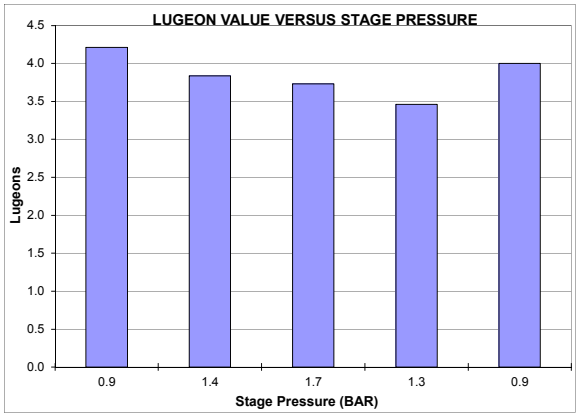
AREA: Upper Talarik Creek Area | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 4.7 m (bgs) | TOP OF TEST INTERVAL: 34.00 ft (DOWN HOLE) / 10.36 m (DOWN HOLE)

DATE: 31-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 0.2 m | BOTTOM OF TEST INTERVAL: 60.00 ft (DOWN HOLE) / 18.29 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	213790.0	213793.0	213796.0	213799.0	213802.0	213805.0				
		Take	litres		3.00	3.00	3.00	3.00	3.00				
0.41	0.90	Average Take	l/m		3.00	3.00	3.00	3.00	3.00			3.00	4.21
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	213809.0	213813.0	213817.0	213821.6	213826.0	213830.0				
		Take	litres		4.00	4.00	4.55	4.45	4.00				
0.90	1.38	Average Take	l/m		4.00	4.00	4.55	4.45	4.00			4.20	3.84
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	213834.0	213839.5	213844.5	213849.0	213854.0	213858.5				
		Take	litres		5.50	5.00	4.50	5.00	4.50				
1.17	1.66	Average Take	l/m		5.50	5.00	4.50	5.00	4.50			4.90	3.73
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	213862.0	213865.5	213869.5	213873.0	213876.5	213880.0				
		Take	litres		3.50	4.00	3.50	3.50	3.50				
0.83	1.31	Average Take	l/m		3.50	4.00	3.50	3.50	3.50			3.60	3.46
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	213882.0	213885.0	213888.0	213891.0	213893.5	213896.3				
		Take	litres		3.00	3.00	3.00	2.50	2.75				
0.41	0.90	Average Take	l/m		3.00	3.00	3.00	2.50	2.75			2.85	4.00





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY:

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water only; 15 minutes

Lu= 3.849 | k (cm/s) = 4.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	YES
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m³

Outside Air Temperature: 10C

Water intermittantly dripping out of swivel.

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-245\[GH11-245 Packer Test.xlsx]1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	31JUL'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 2 OF 3

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

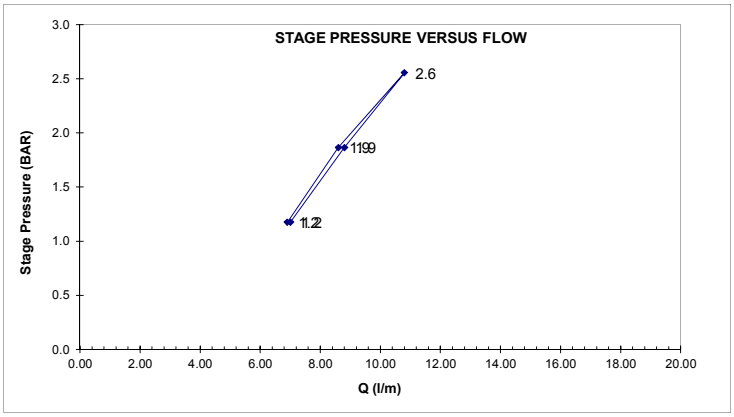
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-245

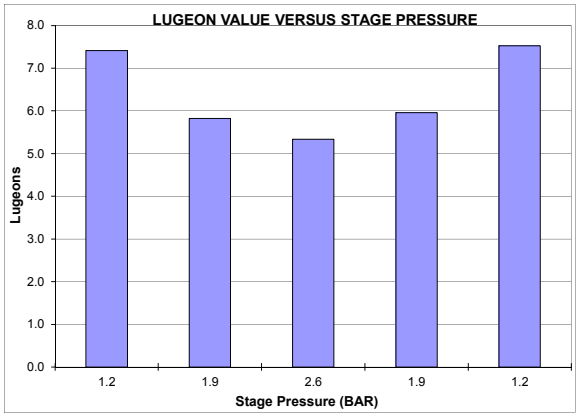
AREA: Upper Talarik Creek Area | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 4.7 m (bgs) | TOP OF TEST INTERVAL: 59.00 ft (DOWN HOLE) / 17.98 m (DOWN HOLE)

DATE: 31-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 0.2 m | BOTTOM OF TEST INTERVAL: 85.00 ft (DOWN HOLE) / 25.91 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	213912.0	213919.0	213926.0	213933.0	213940.0	213946.5				
		Take	litres		7.00	7.00	7.00	7.00	6.50				
0.69	1.17	Average Take	l/m		7.00	7.00	7.00	7.00	6.50			6.90	7.41
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	213952.0	213961.0	213969.5	213978.0	213986.5	213995.0				
		Take	litres		9.00	8.50	8.50	8.50	8.50				
1.38	1.86	Average Take	l/m		9.00	8.50	8.50	8.50	8.50			8.60	5.82
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	214000.0	214011.0	214021.5	214032.5	214043.5	214054.0				
		Take	litres		11.00	10.50	11.00	11.00	10.50				
2.07	2.55	Average Take	l/m		11.00	10.50	11.00	11.00	10.50			10.80	5.34
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	214058.0	214067.0	214076.0	214084.5	214093.0	214102.0				
		Take	litres		9.00	9.00	8.50	8.50	9.00				
1.38	1.86	Average Take	l/m		9.00	9.00	8.50	8.50	9.00			8.80	5.96
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	214107.0	214114.0	214121.0	214128.0	214135.0	214142.0				
		Take	litres		7.00	7.00	7.00	7.00	7.00				
0.69	1.17	Average Take	l/m		7.00	7.00	7.00	7.00	7.00			7.00	7.52





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY:

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Water only; 15 minutes

Lu= 5.337 | k (cm/s) = 5.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	YES
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m³

Outside Air Temperature: 10C

Water intermittantly dripping out of swivel.

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-245\[GH11-245 Packer Test.xlsx]2

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	31JUL'11	ISSUED WITH REPORT VA101/176/38-3	LS	CHS	KJB

SHEET 3 OF 3

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

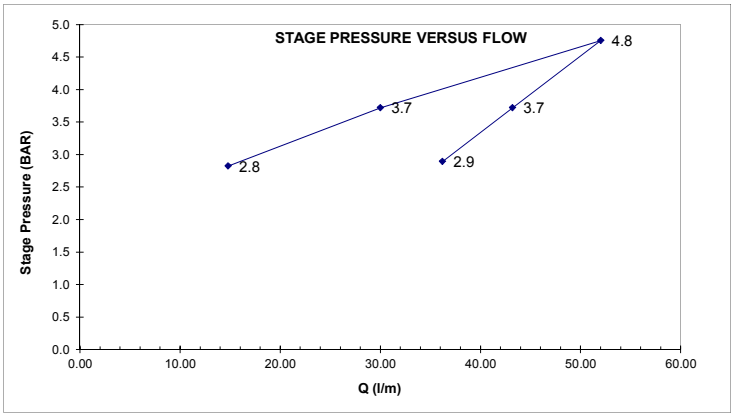
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-245

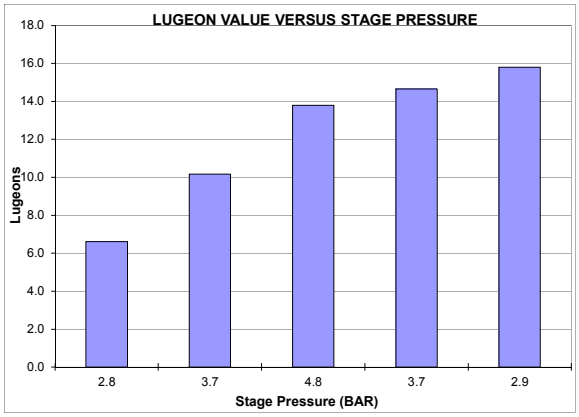
AREA: Upper Talarik Creek Area | TEST NO: 3

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 18.7 m (bgs) | TOP OF TEST INTERVAL: 84.00 ft (DOWN HOLE) / 25.60 m (DOWN HOLE)

DATE: 31-Jul-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 110.00 ft (DOWN HOLE) / 33.53 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	214244.0	214258.5	214272.5	214287.5	214303.0	214318.0				
		Take	litres		14.50	14.00	15.00	15.50	15.00				
0.83	2.82	Average Take	l/m		14.50	14.00	15.00	15.50	15.00			14.80	6.61
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	214415.0	214445.0	214475.0	214504.5	214535.0	214565.0				
		Take	litres		30.00	30.00	29.50	30.50	30.00				
1.72	3.72	Average Take	l/m		30.00	30.00	29.50	30.50	30.00			30.00	10.18
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	215005.0	215057.5	215109.0	215161.0	215213.0	215265.0				
		Take	litres		52.50	51.50	52.00	52.00	52.00				
2.76	4.75	Average Take	l/m		52.50	51.50	52.00	52.00	52.00			52.00	13.80
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	215430.0	215473.0	215516.0	215559.0	215602.0	215646.0				
		Take	litres		43.00	43.00	43.00	43.00	44.00				
1.72	3.72	Average Take	l/m		43.00	43.00	43.00	43.00	44.00			43.20	14.66
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	215740.0	215776.0	215812.0	215848.5	215885.0	215921.0				
		Take	litres		36.00	36.00	36.50	36.50	36.00				
0.90	2.89	Average Take	l/m		36.00	36.00	36.50	36.50	36.00			36.20	15.79





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: 18.7m bgs

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Polymer, 25 minutes

Lu= 15.793 | k (cm/s) = 2.E-04

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	YES
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m³

Outside Air Temperature: 10C

Water intermittantly dripping out of swivel.

TEST BY: Dalton Pajak | ANALYZED BY: Dalton Pajak | REVIEWED BY: Louise Shannon

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-245\[GH11-245 Packer Test.xlsx]3

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	31JUL'11	ISSUED WITH REPORT VA101/176/38-3	LS	CHS	KJB

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

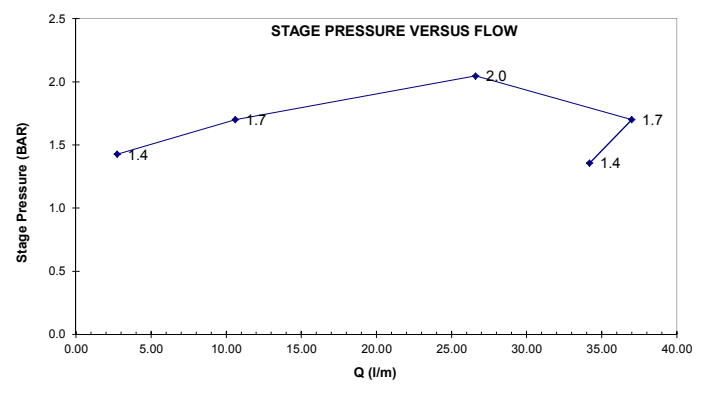
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-246

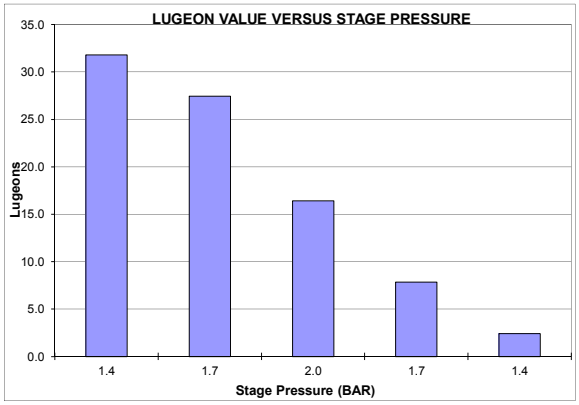
AREA: UPPER TALARIK CREEK AREA | TEST NO: 1

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 9.8 m (bgs) | TOP OF TEST INTERVAL: 93.00 ft (DOWN HOLE) / 28.35 m (DOWN HOLE)

DATE: 3-Aug-11 | GAUGE HEIGHT ABOVE GROUND: 0.3 m | BOTTOM OF TEST INTERVAL: 119.00 ft (DOWN HOLE) / 36.27 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	216550.0	216583.0	216617.0	216652.0	216686.0	216721.0				
		Take	litres		33.00	34.00	35.00	34.00	35.00				
0.34	1.36	Average Take	l/m		33.00	34.00	35.00	34.00	35.00			34.20	31.81
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	216750.0	216791.0	216832.0	216871.0	216904.0	216935.0				
		Take	litres		41.00	41.00	39.00	33.00	31.00				
0.69	1.70	Average Take	l/m		41.00	41.00	39.00	33.00	31.00			37.00	27.44
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	216980.0	217007.0	217035.0	217060.0	217085.0	217113.0				
		Take	litres		27.00	28.00	25.00	25.00	28.00				
1.03	2.05	Average Take	l/m		27.00	28.00	25.00	25.00	28.00			26.60	16.40
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	217140.0	217154.0	217160.0	217161.5	217181.0	217193.0				
		Take	litres		14.00	6.00	1.50	19.50	12.00				
0.69	1.70	Average Take	l/m		14.00	6.00	1.50	19.50	12.00			10.60	7.86
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	217194.0	217196.8	217199.0	217202.0	217205.0	217207.8				
		Take	litres		2.75	2.25	3.00	3.00	2.75				
0.41	1.43	Average Take	l/m		2.75	2.25	3.00	3.00	2.75			2.75	2.43





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY:

DRILLING FLUIDS USED/ TIME FOR FLUSHING:

Lu= 2.434 | k (cm/s) = 2.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	YES
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m3
Outside Air Temperature: 13C
Water dripping out of swivel, ~0.1L/min, maximum pressure that could be reached was 17 psi.

TEST BY: Louise Shannon | ANALYZED BY: Louise Shannon | REVIEWED BY: Cathy Safadi

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Pebble 2011\2011 Geotech Drillholes\GH11-246\[GH11-246 Packer Test.xlsx]1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	03AUG'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET

Knight Piésold CONSULTING

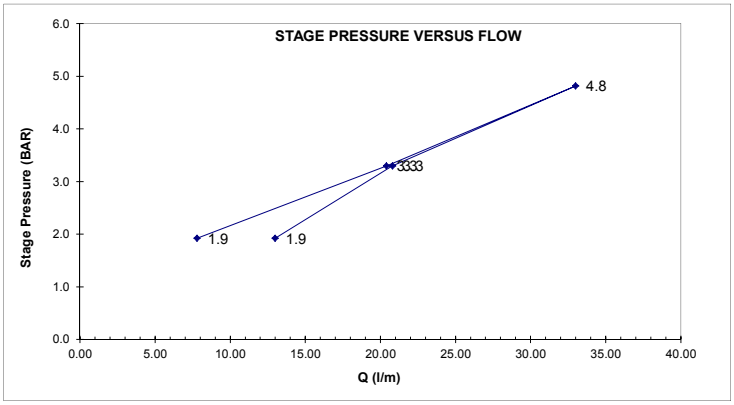
PROJECT: PEBBLE PROJECT | PROJECT NO: VA101-176/38 | DRILLHOLE: GH11-246

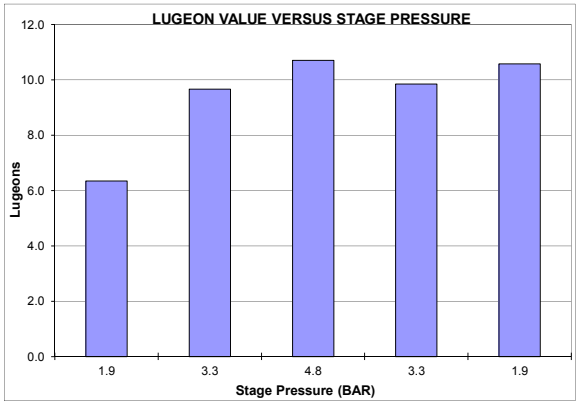
AREA: UPPER TALARIK CREEK AREA | TEST NO: 2

DIP: 90 ° (FROM HORIZONTAL) | DEPTH TO GROUNDWATER: 4.1 m (bgs) | TOP OF TEST INTERVAL: 123.00 ft (DOWN HOLE) / 37.49 m (DOWN HOLE)

DATE: 3-Aug-11 | GAUGE HEIGHT ABOVE GROUND: 1.3 m | BOTTOM OF TEST INTERVAL: 144.00 ft (DOWN HOLE) / 43.89 m (DOWN HOLE)

GAUGE P (BAR)	CORRECTED GAUGE P (BAR)											FLOW litres/min	LUGEON
		Time	min	0	1	2	3	4	5				
		Flowmeter	litres	217333.0	217341.5	217349.5	217357.0	217365.0	217372.0				
		Take	litres		8.50	8.00	7.50	8.00	7.00				
1.38	1.92	Average Take	l/m		8.50	8.00	7.50	8.00	7.00			7.80	6.35
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	217420.0	217440.0	217461.0	217481.0	217501.5	217522.0				
		Take	litres		20.00	21.00	20.00	20.50	20.50				
2.76	3.30	Average Take	l/m		20.00	21.00	20.00	20.50	20.50			20.40	9.66
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	217610.0	217645.0	217679.0	217712.5	217745.0	217775.0				
		Take	litres		35.00	34.00	33.50	32.50	30.00				
4.27	4.82	Average Take	l/m		35.00	34.00	33.50	32.50	30.00			33.00	10.71
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	217877.0	217998.0	217919.0	217940.0	217960.5	217981.0				
		Take	litres		121.00	-79.00	21.00	20.50	20.50				
2.76	3.30	Average Take	l/m		121.00	-79.00	21.00	20.50	20.50			20.80	9.85
GAUGE P (BAR)		Time	min	0	1	2	3	4	5			FLOW litres/min	LUGEON
		Flowmeter	litres	218017.0	218030.0	218043.0	218056.0	218069.0	218082.0				
		Take	litres		13.00	13.00	13.00	13.00	13.00				
1.38	1.92	Average Take	l/m		13.00	13.00	13.00	13.00	13.00			13.00	10.58





DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY:

DRILLING FLUIDS USED/ TIME FOR FLUSHING:

Lu= 9.429 | k (cm/s) = 9.E-05

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	YES
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	YES
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING / TEST RESULTS COMMENTS:

Flowmeter units: m3

Outside Air Temperature: 10C

TEST BY: Dalton Pajak | ANALYZED BY: Louise Shannon | REVIEWED BY: Louise Shannon

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	04AUG'11	ISSUED WITH REPORT VA101-176/38-3	LS	CHS	KJB

Knight Piésold CONSULTING

APPENDIX B3

RISING/FALLING HEAD HYDRAULIC CONDUCTIVITY TEST SHEETS

- GH11-229
- GH11-231
- GH11-232
- GH11-233
- GH11-234
- GH11-235
- GH11-236
- GH11-237
- GH11-238
- GH11-239
- GH11-240
- GH11-241
- GH11-242
- GH11-243
- GH11-245
- GH11-246
- GH11-274
- GH11-277
- GH11-281
- GH11-287
- GH11-293
- GH11-294
- GH11-296

(Pages B3-1 to B3-23)

Knight Piésold CONSULTING

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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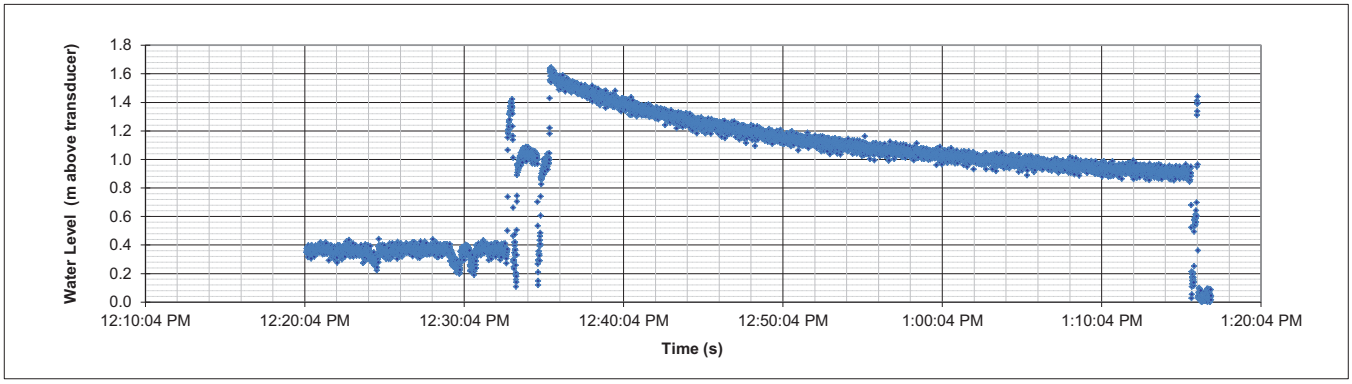
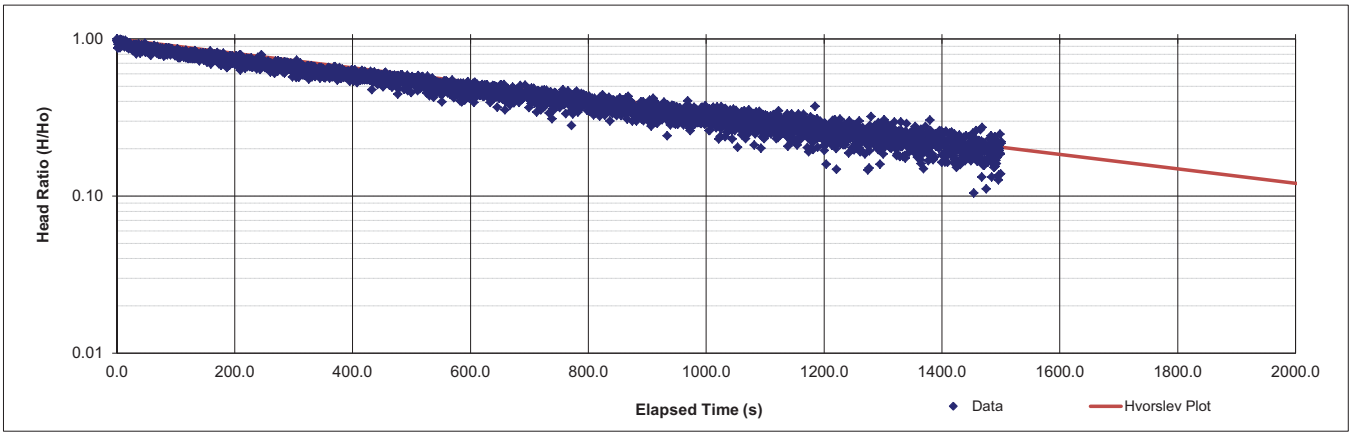
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-229		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	21-Jul-11		
Test Time	12:35:27 PM		

Drill-hole diameter, D	0.123	**m**	**Time Slug Injected, t_o**	12:35:27	**PM**
Effective diameter of drill pipe, d_e	0.024	**m**	**Initial Water Level, WL_o**	0.88	**m above transducer**
Top of test interval	11.89	**mbgs**			
Bottom of test interval	14.94	**mbgs**			
Test length, L	3.05	**m**			
Drill-hole angle	90				

Transmissivity, T	3.0E-07	**m^2/s**		
Hydraulic Conductivity, K	1.0E-07	**m/s**	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	23JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL	RDS	KJB

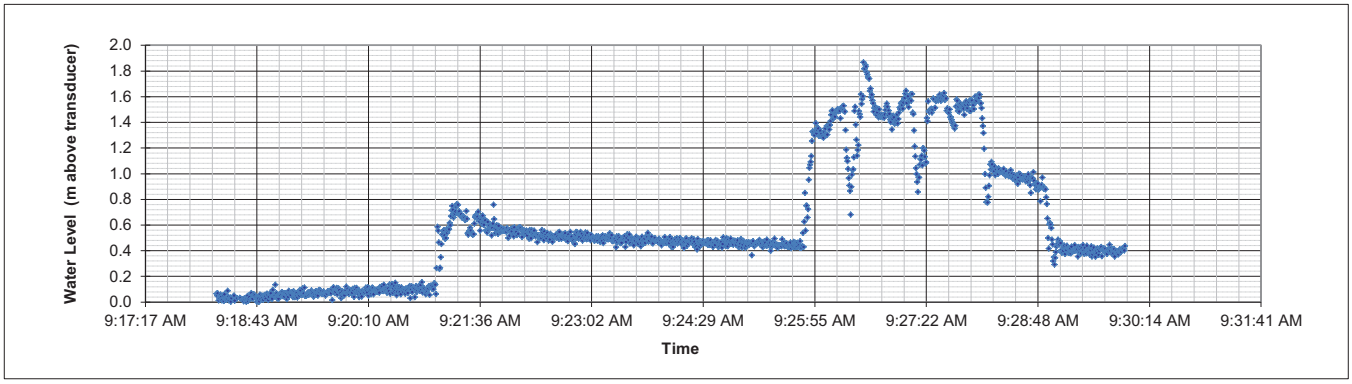
Knight Piésold CONSULTING

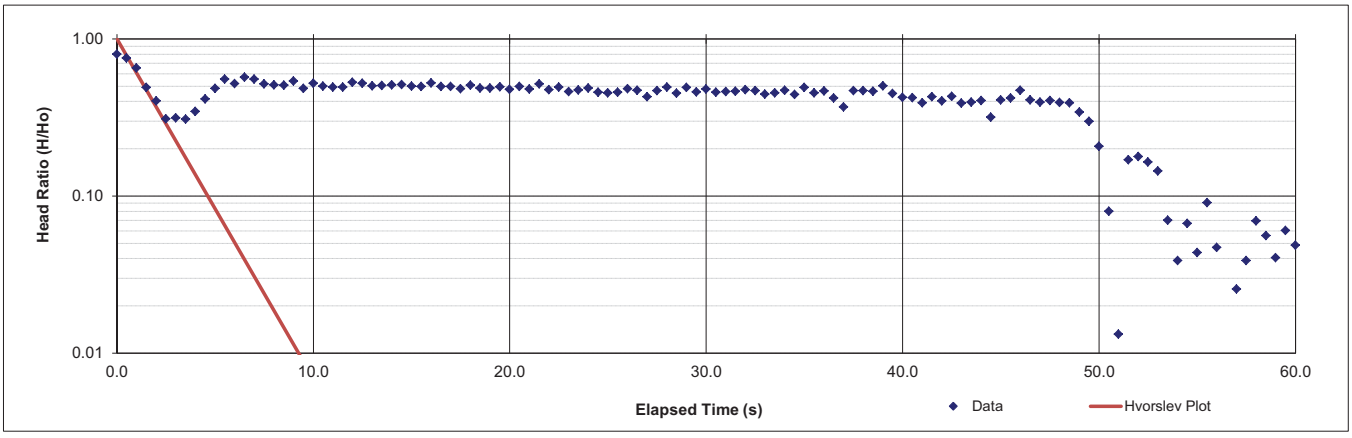
PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

Print 01/08/10 14:19

Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-231		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	25-Jul-11		
Test Time	9:28:05 AM		
Drill-hole diameter, D	0.096 m	**Time Slug Injected, t_o**	9:28:05 AM
Effective diameter of drill pipe, d_e	0.024 m	**Initial Water Level, WL_o**	0.40 mat
Top of test interval	8.92 mbgs		
Bottom of test interval	11.97 mbgs		
Test length, L	3.05 m		
Drill-hole angle	90		
Transmissivity, T	1.5E-04 m^2/s		
Hydraulic Conductivity, K	5.0E-05 m/s	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

The elevated water level above transduer approximately from 9:25 AM to 9:28 AM was the result of re-filling the piezometer with water multiple times because water level dropped rather rapidly. The fast dropping water level in piezometer indicated a relatively permeable test zone that is consistent with the results obtained during manual test (retured to static water level in 60 seconds).

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	23JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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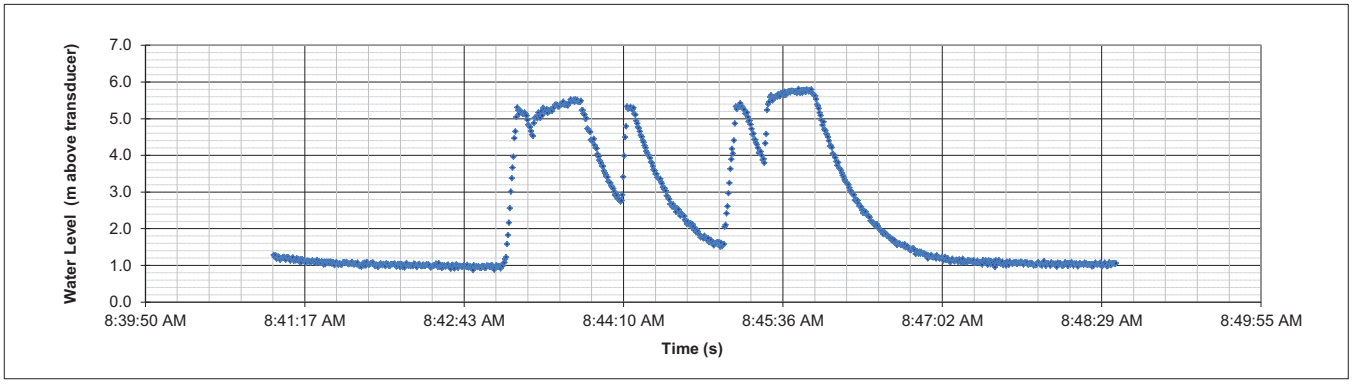
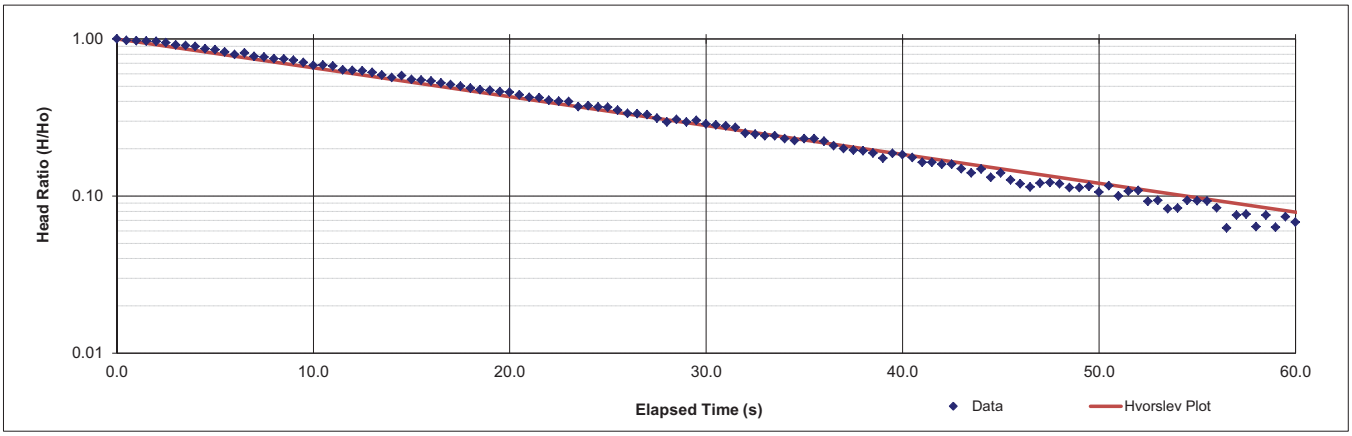
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-232		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	25-Jul-11		
Test Time	8:45:51 AM		
Drill-hole diameter, D	0.123 m	**Time Slug Injected, t_o**	8:45:51 AM
Effective diameter of drill pipe, d_e	0.024 m	**Initial Water Level, WL_o**	1.01 mat
Top of test interval	20.12 mbgs		
Bottom of test interval	23.17 mbgs		
Test length, L	3.05 m		
Drill-hole angle	90		
Transmissivity, T	1.2E-05 m^2/s		
Hydraulic Conductivity, K	4.0E-06 m/s	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	23JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
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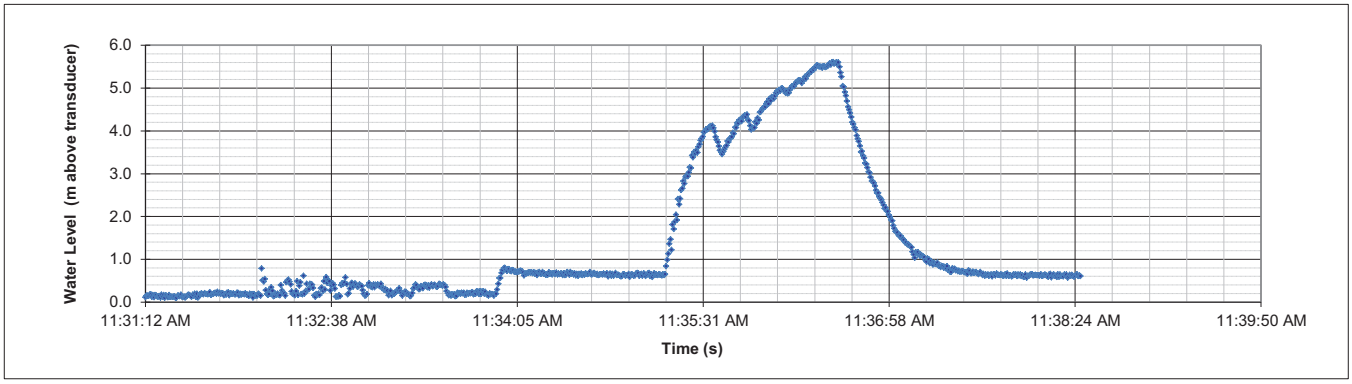
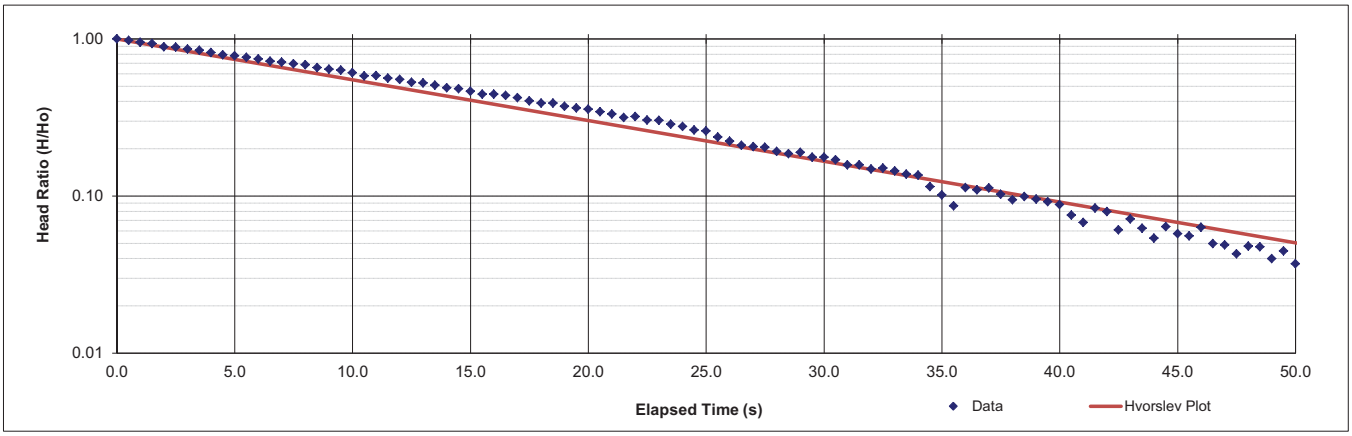
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-233		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	20-Jul-11		
Test Time	11:36:34 AM		
Drill-hole diameter, D	0.096 **m**	**Time Slug Injected, t_o**	11:36:34 AM
Effective diameter of drill pipe, d_e	0.024 **m**	**Initial Water Level, WL_o**	0.60 **mat**
Top of test interval	19.97 **mbgs**		
Bottom of test interval	23.02 **mbgs**		
Test length, L	3.05 **m**		
Drill-hole angle	90		
Transmissivity, T	1.8E-05 **m^2/s**		
Hydraulic Conductivity, K	6.0E-06 **m/s**	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	23JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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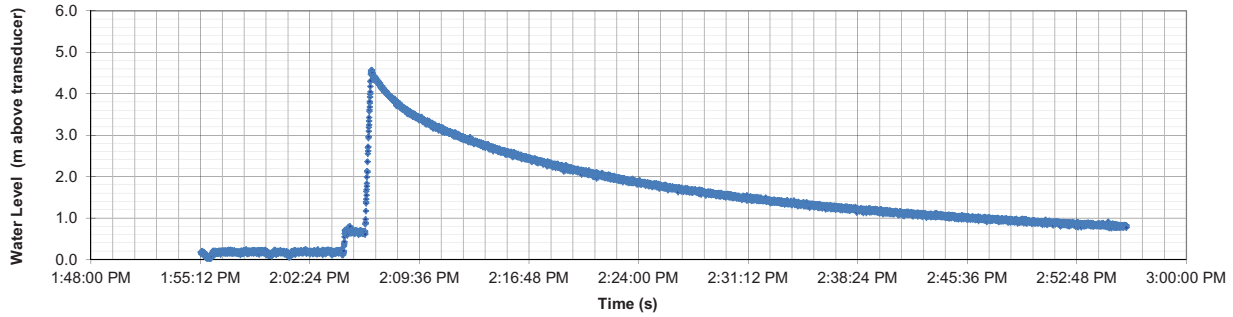
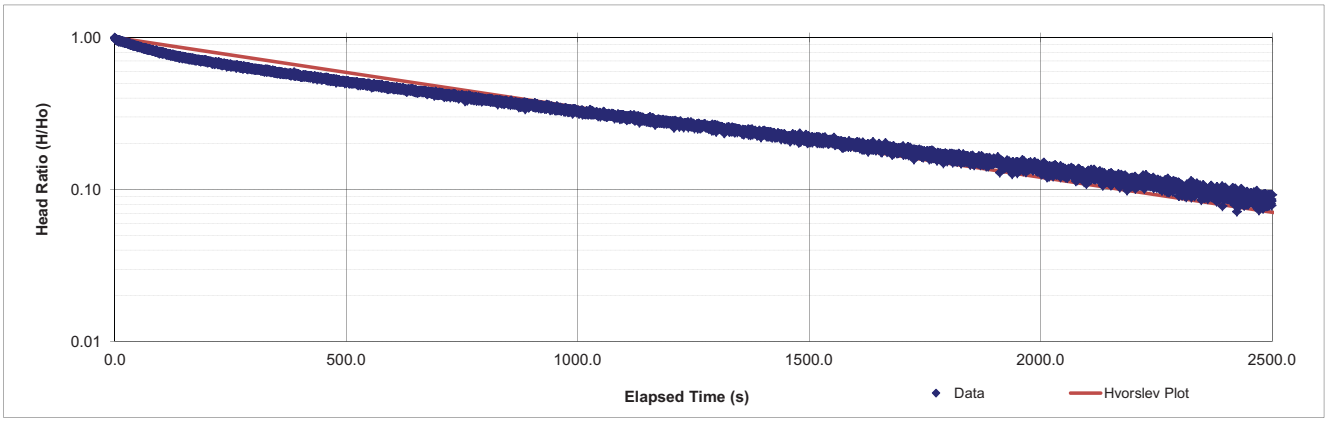
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-234		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	20-Jul-11		
Test Time	2:06:28 PM		
Drill-hole diameter, D	0.123 m	**Time Slug Injected, t_o**	2:06:28 PM
Effective diameter of drill pipe, d_e	0.024 m	**Initial Water Level, WL_o**	0.62 mat
Top of test interval	8.69 mbgs		
Bottom of test interval	11.74 mbgs		
Test length, L	3.05 m		
Drill-hole angle	90		
Transmissivity, T	3.0E-07 m^2/s		
Hydraulic Conductivity, K	1.0E-07 m/s	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	23JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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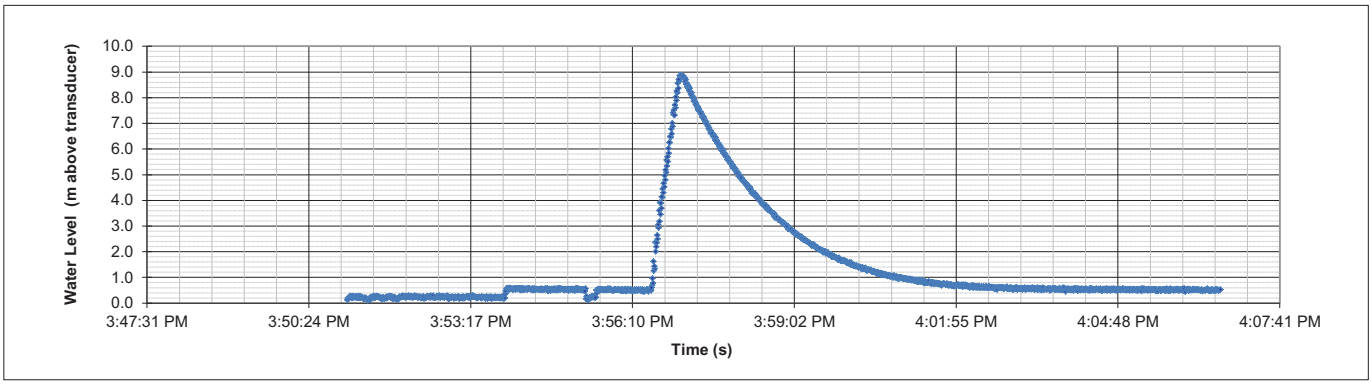
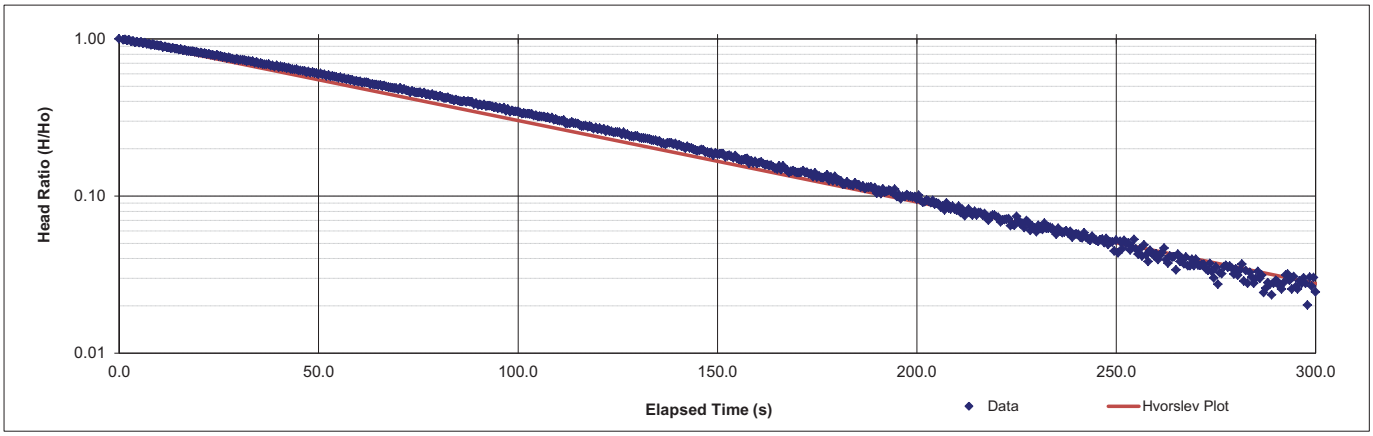
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-235		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	20-Jul-11		
Test Time	3:57:04 PM		
Drill-hole diameter, D	0.096 m	**Time Slug Injected, t_o**	3:57:04 PM
Effective diameter of drill pipe, d_e	0.024 m	**Initial Water Level, WL_o**	0.45 mbt
Top of test interval	19.97 mbgs		
Bottom of test interval	23.02 mbgs		
Test length, L	3.05 m		
Drill-hole angle	90		
Transmissivity, T	3.7E-06 m^2/s		
Hydraulic Conductivity, K	1.2E-06 m/s	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	23JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
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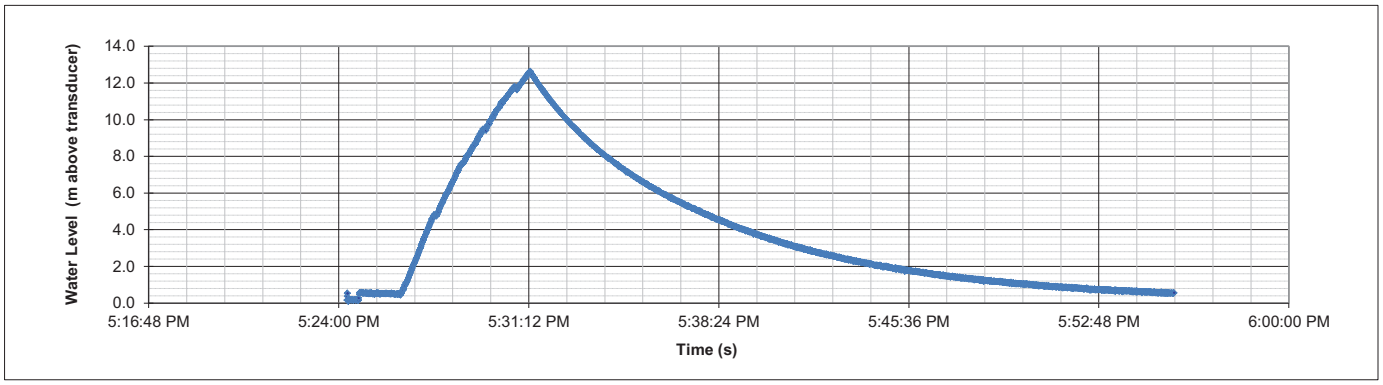
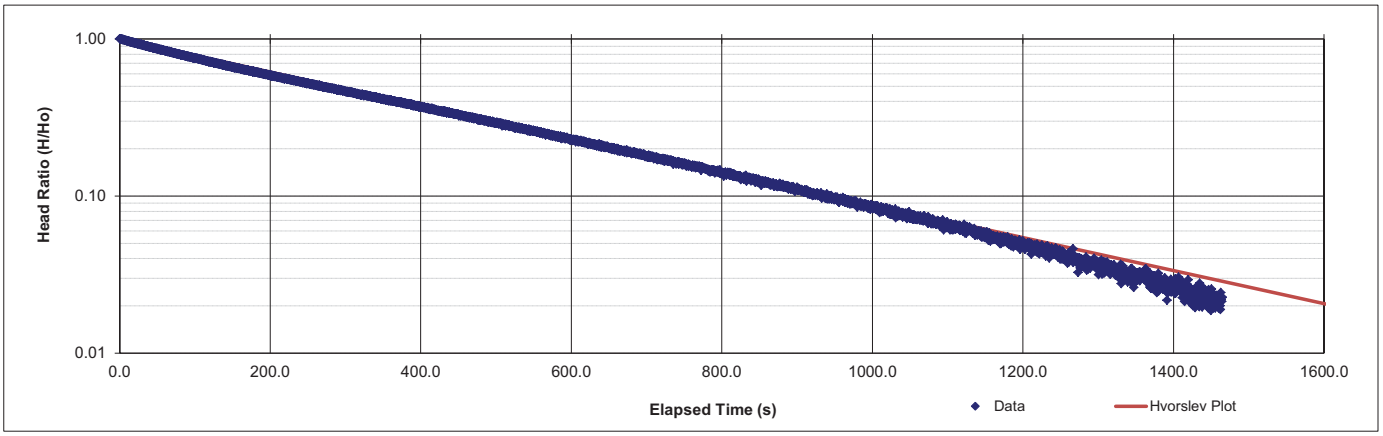
Project No.	VA101-176/38			
Monitoring Well/Piezometer	GH11-236			
Monitoring Instrument Type	Transducer		**Field Technician**	LS
Slug Type	Poured water into piezometer		**Analyst**	AL
Test Date	20-Jul-11			
Test Time	5:31:14 PM			
Drill-hole diameter, D	0.0960628	m	**Time Slug Injected, t_o**	5:31:14 PM
Effective diameter of drill pipe, d_e	0.049	m	**Initial Water Level, WL_o**	0.27 mat
Top of test interval	24.09	mbgs		
Bottom of test interval	27.13	mbgs		
Test length, L	3.05	m		
Drill-hole angle	90			
Transmissivity, T	3.0E-06	m^2/s		
Hydraulic Conductivity, K	1.0E-06	m/s	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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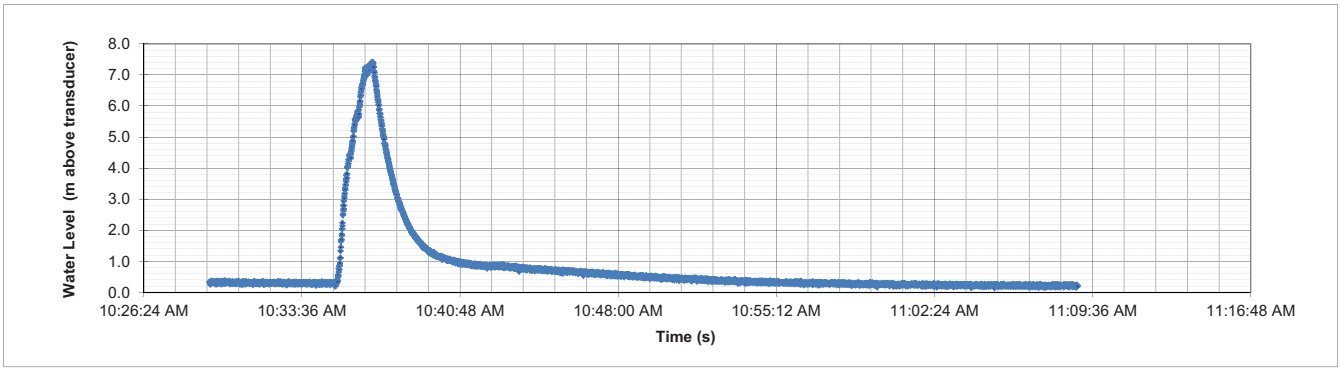
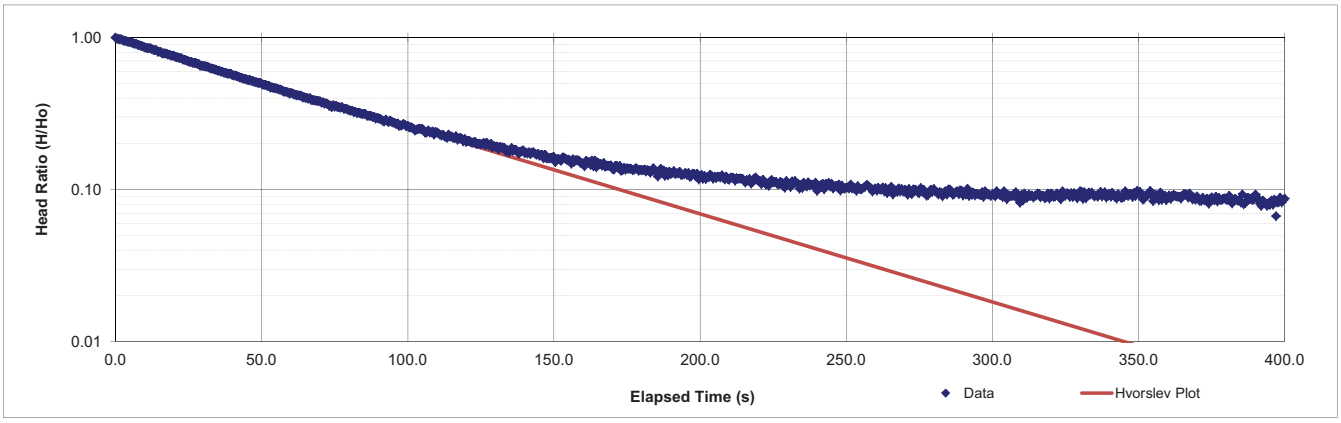
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-237		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	25-Jul-11		
Test Time	10:36:52 AM		
Drill-hole diameter, D	0.096 **m**	Time Slug Injected, t_o	10:36:52 AM
Effective diameter of drill pipe, d_e	0.049 **m**	Initial Water Level, WL_o	0.20 **mat**
Top of test interval	29.88 **mbgs**		
Bottom of test interval	32.93 **mbgs**		
Test length, L	3.05 **m**		
Drill-hole angle	90		
Transmissivity, T	1.7E-05 **m^2/s**		
Hydraulic Conductivity, K	5.5E-06 **m/s**	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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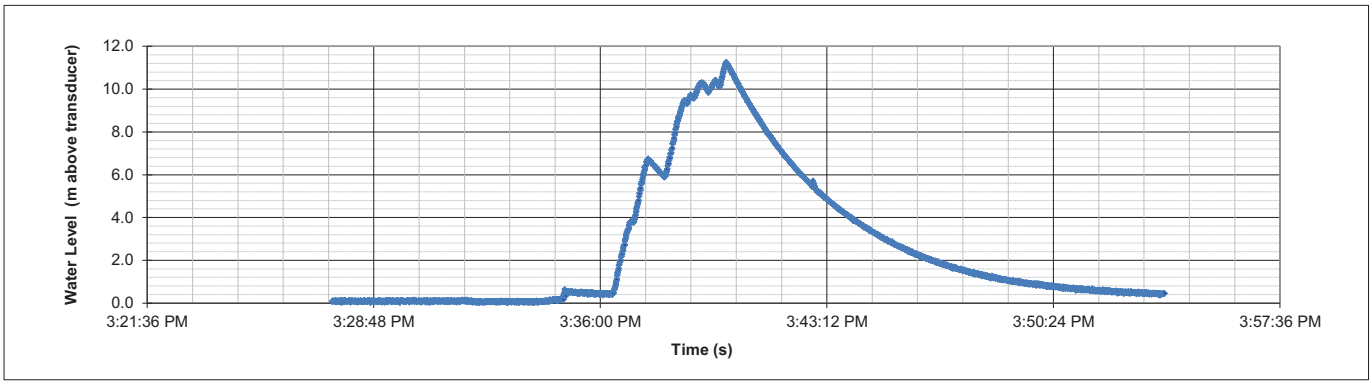
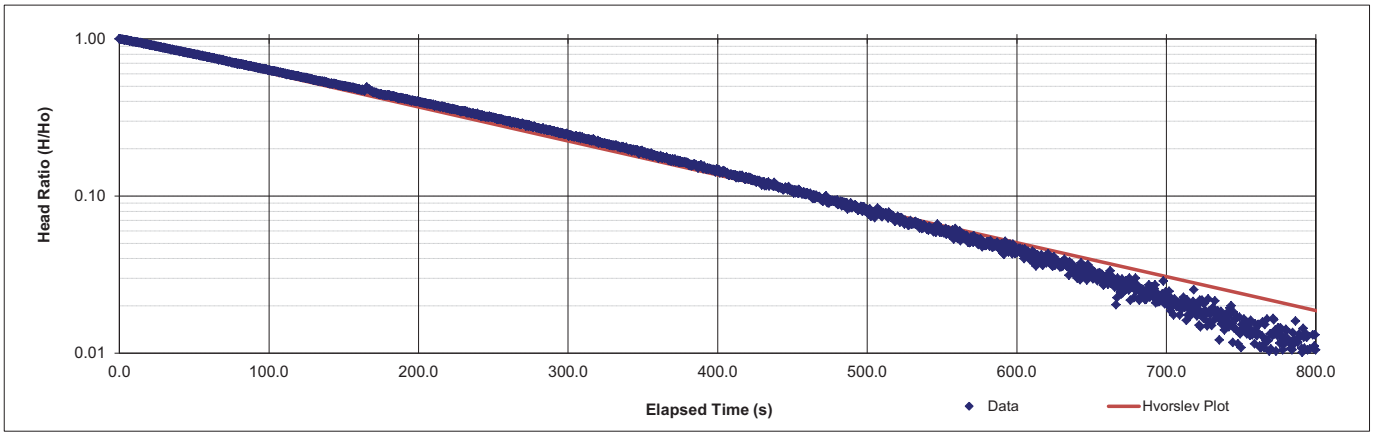
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-238		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	19-Jul-11		
Test Time	3:40:00 PM		
Drill-hole diameter, D	0.096 m	**Time Slug Injected, t_o**	3:40:00 PM
Effective diameter of drill pipe, d_e	0.024 m	**Initial Water Level, WL_o**	0.35 mat
Top of test interval	49.09 mbgs		
Bottom of test interval	52.13 mbgs		
Test length, L	3.05 m		
Drill-hole angle	90		
Transmissivity, T	1.5E-06 m^2/s		
Hydraulic Conductivity, K	5.0E-07 m/s	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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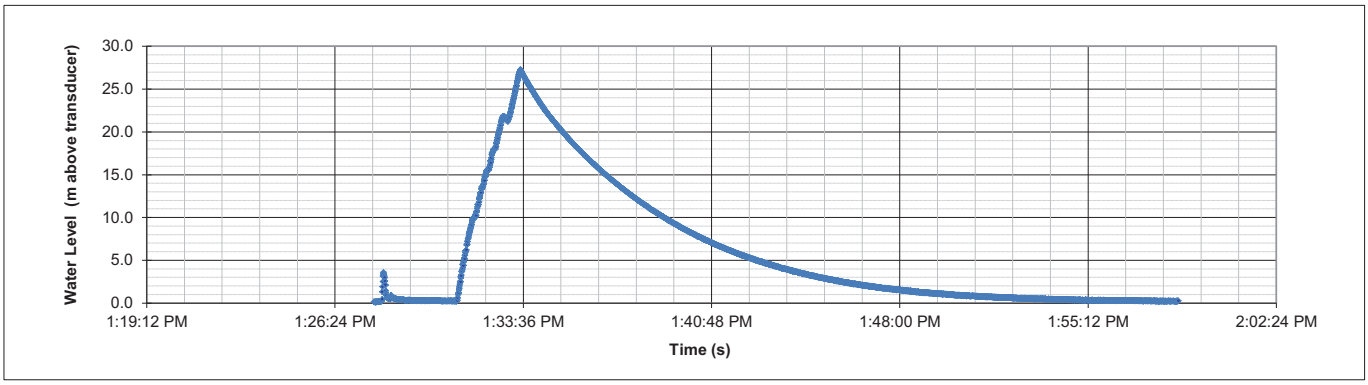
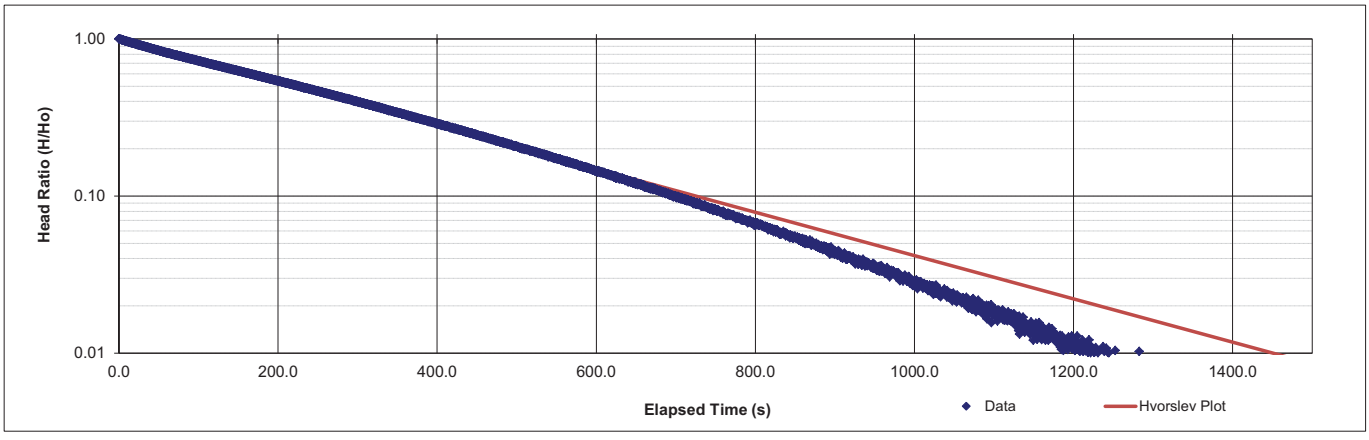
Project No.	VA101-176/38			
Monitoring Well/Piezometer	GH11-239			
Monitoring Instrument Type	Transducer		**Field Technician**	LS
Slug Type	Poured water into piezometer		**Analyst**	AL
Test Date	19-Jul-11			
Test Time	1:33:29 PM			
Drill-hole diameter, D	0.123	**m**	**Time Slug Injected, t_o**	1:33:29 PM
Effective diameter of drill pipe, d_e	0.024	**m**	**Initial Water Level, WL_o**	0.15 **mat**
Top of test interval	50.30	**mbgs**		
Bottom of test interval	53.35	**mbgs**		
Test length, L	3.05	**m**		
Drill-hole angle	90			
Transmissivity, T	9.1E-07	**m^2/s**		
Hydraulic Conductivity, K	3.0E-07	**m/s**	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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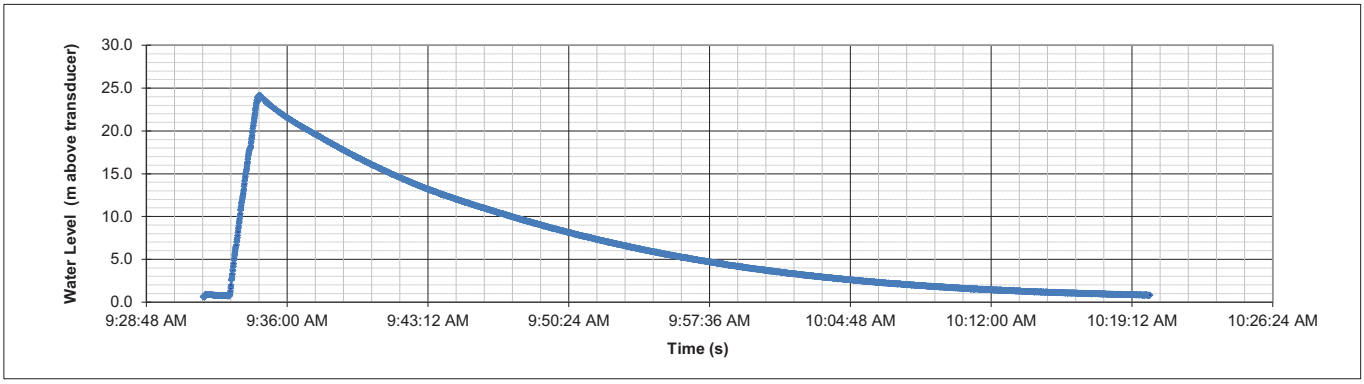
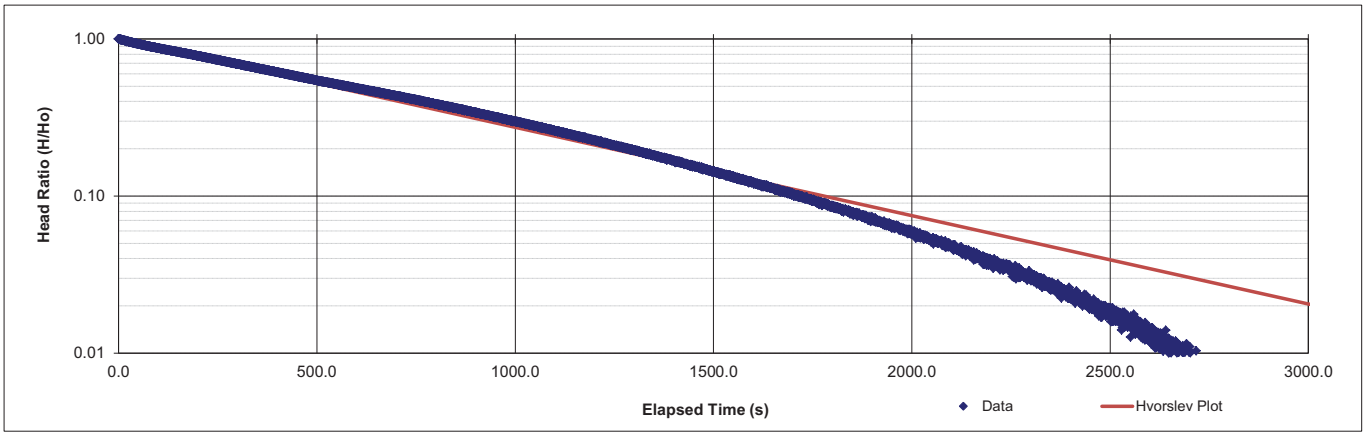
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-240		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	19-Jul-11		
Test Time	9:34:36 AM		
Drill-hole diameter, D	0.096 **m**	**Time Slug Injected, t_o**	9:34:36 AM
Effective diameter of drill pipe, d_e	0.024 **m**	**Initial Water Level, WL_o**	0.60 **mat**
Top of test interval	34.91 **mbgs**		
Bottom of test interval	37.96 **mbgs**		
Test length, L	3.05 **m**		
Drill-hole angle	90		
Transmissivity, T	4.0E-07 **m^2/s**		
Hydraulic Conductivity, K	1.3E-07 **m/s**	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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USING HVORSLEV (1951) METHOD

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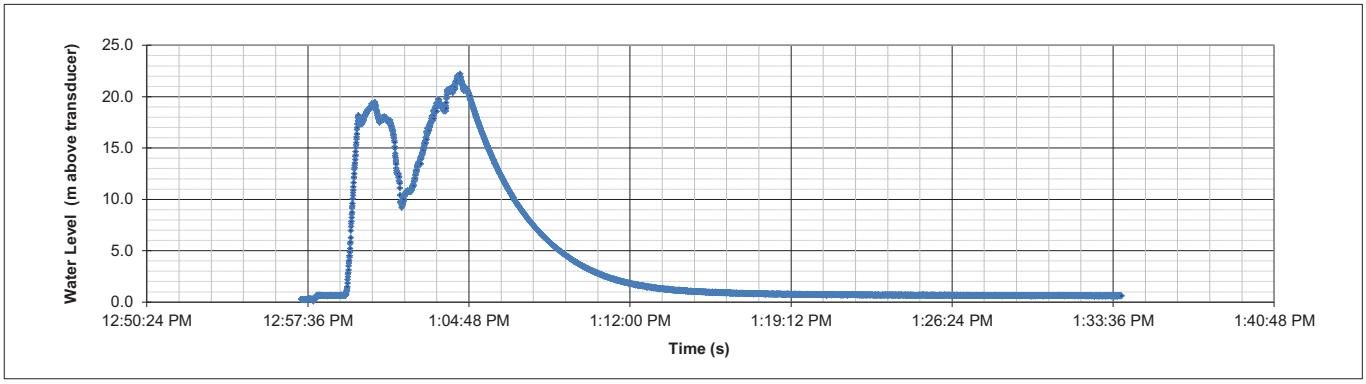
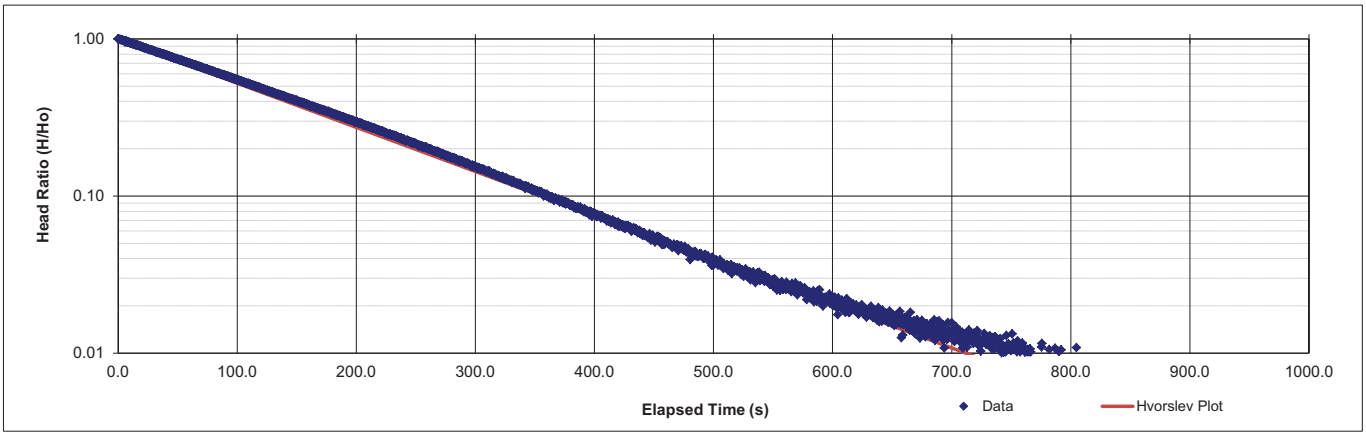
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-241		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	25-Jul-11		
Test Time	1:04:44 PM		
Drill-hole diameter, D	0.096 m	**Time Slug Injected, t_o**	1:04:44 PM
Effective diameter of drill pipe, d_e	0.024 m	**Initial Water Level, WL_o**	0.61 mat
Top of test interval	103.96 mbgs		
Bottom of test interval	107.01 mbgs		
Test length, L	3.05 m		
Drill-hole angle	90		
Transmissivity, T	2.0E-06 m^2/s		
Hydraulic Conductivity, K	6.5E-07 m/s	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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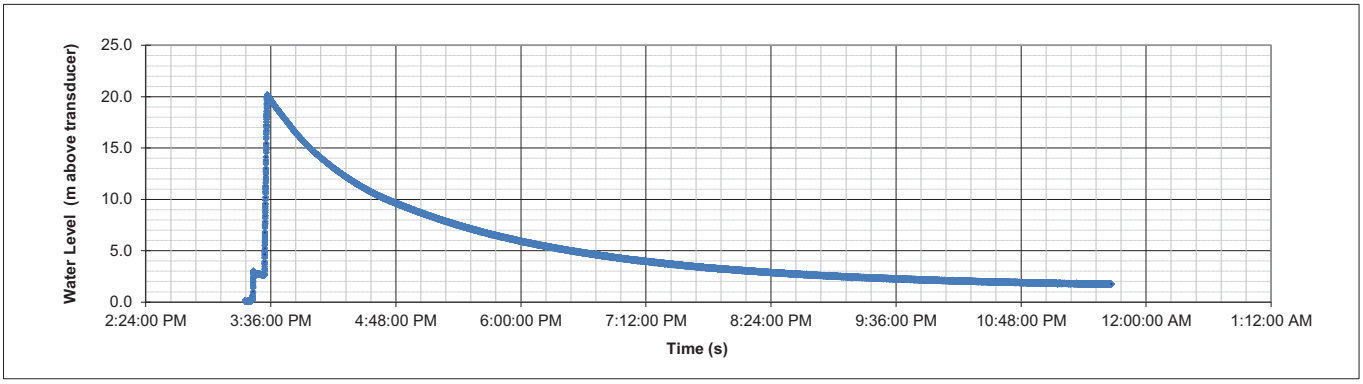
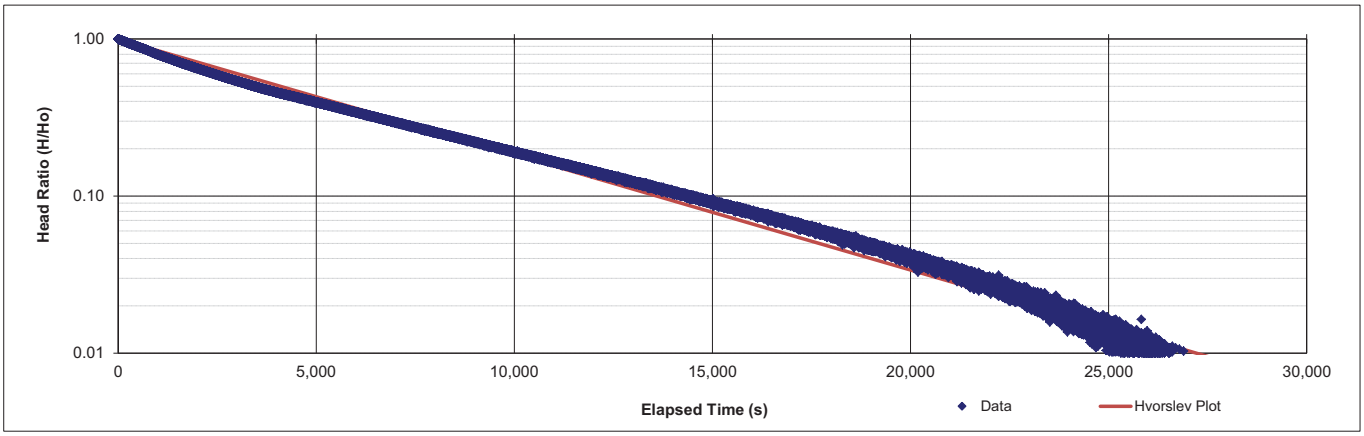
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-242		
Monitoring Instrument Type	Transducer	**Field Technician**	DLP
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	07-Aug-11		
Test Time	3:33:58 PM		
Drill-hole diameter, D	0.096 **m**	**Time Slug Injected, t_o**	3:33:58 PM
Effective diameter of drill pipe, d_e	0.024 **m**	**Initial Water Level, WL_o**	1.70 **mat**
Top of test interval	32.32 **mbgs**		
Bottom of test interval	35.37 **mbgs**		
Test length, L	3.05 **m**		
Drill-hole angle	90		
Transmissivity, T	5.2E-08 **m^2/s**		
Hydraulic Conductivity, K	1.7E-08 **m/s**	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Falling Head Test Analysis - Updated\[GH11-242 Falling Head Test.xlsx]Hvorslev_GH11-242 Test 1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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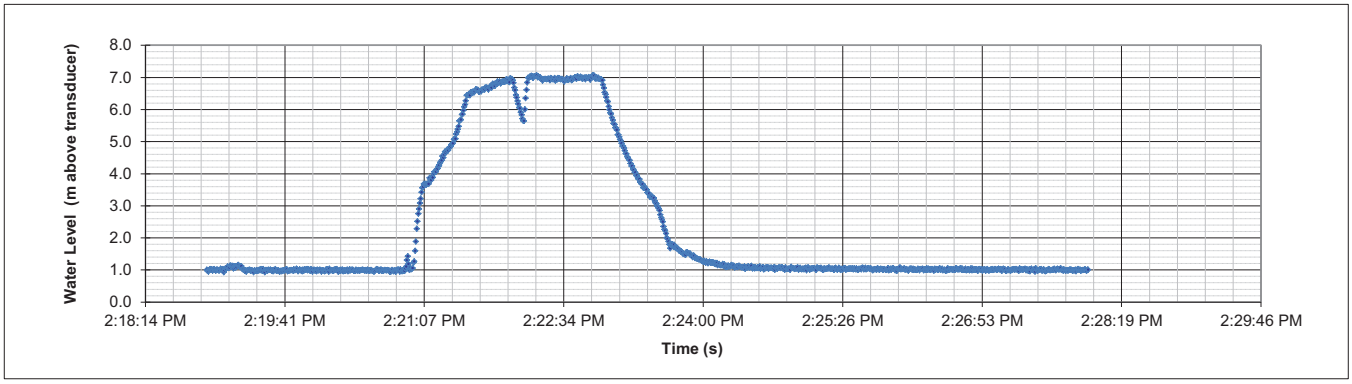
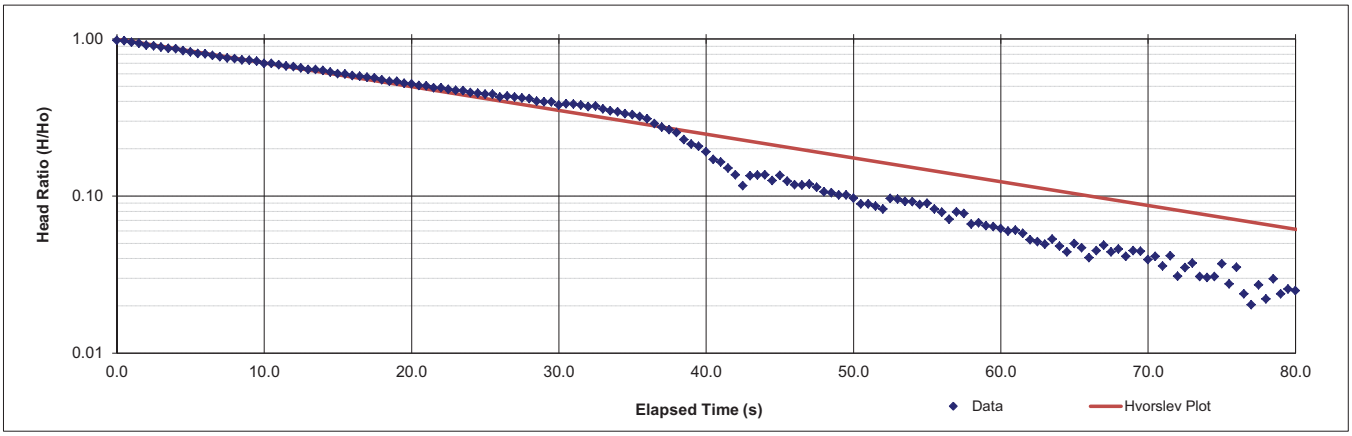
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-243		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	08-Aug-11		
Test Time	2:22:57 PM		
Drill-hole diameter, D	0.0960628 m	**Time Slug Injected, t_o**	2:22:57 PM
Effective diameter of drill pipe, d_e	0.024 m	**Initial Water Level, WL_o**	0.96 mat
Top of test interval	7.32 mbgs		
Bottom of test interval	10.37 mbgs		
Test length, L	3.05 m		
Drill-hole angle	90		
Transmissivity, T	1.1E-05 m^2/s		
Hydraulic Conductivity, K	3.5E-06 m/s	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.
Trend of data broken possibly due to unintentional movement of transducer or undeveloped well with drill cuttings accumulated around drill hole.

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Falling Head Test Analysis - Updated\[GH11-243 Falling Head Test.xlsx]Hvorslev_GH11-243 Test 1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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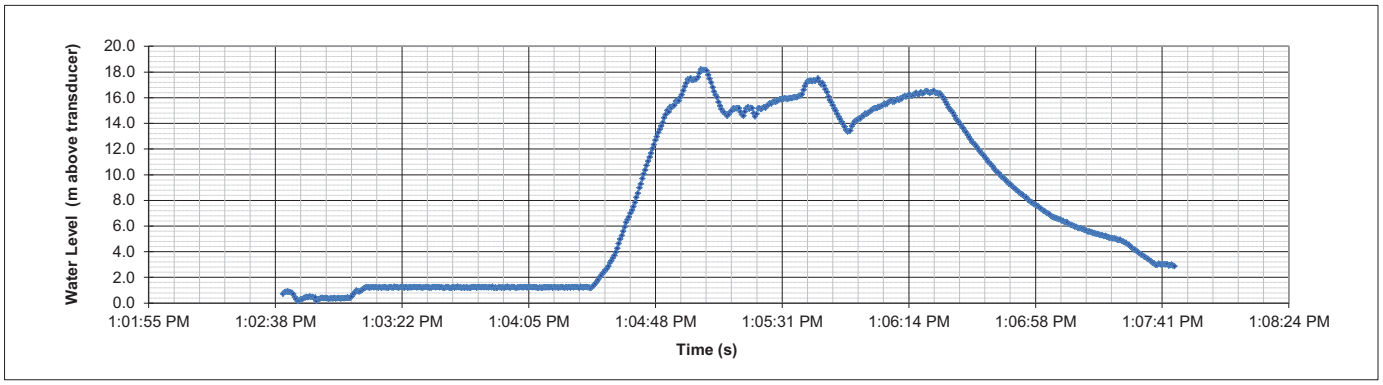
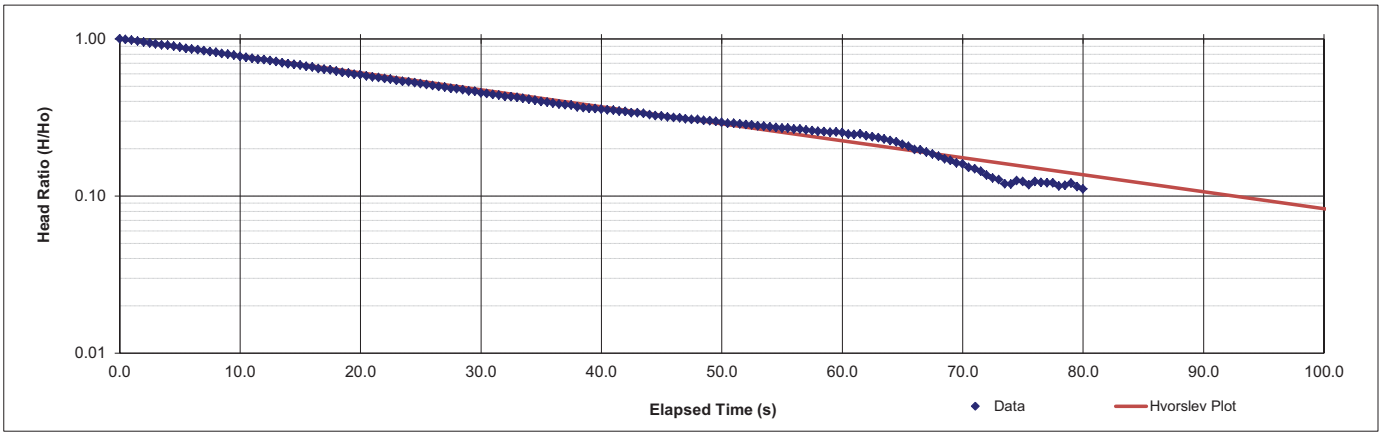
Project No.	VA101-176/38				
Monitoring Well/Piezometer	GH11-245				
Monitoring Instrument Type	Transducer			**Field Technician**	LS
Slug Type	Poured water into piezometer			**Analyst**	AL
Test Date	08-Aug-11				
Test Time	1:06:25 PM				
Drill-hole diameter, D	0.096	**m**		**Time Slug Injected, t_o**	1:06:25 PM
Effective diameter of drill pipe, d_e	0.024	**m**		**Initial Water Level, WL_o**	1.17 **mat**
Top of test interval	26.68	**mbgs**			
Bottom of test interval	29.73	**mbgs**			
Test length, L	3.05	**m**			
Drill-hole angle	90				
Transmissivity, T	7.6E-06	**m^2/s**			
Hydraulic Conductivity, K	2.5E-06	**m/s**		Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

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REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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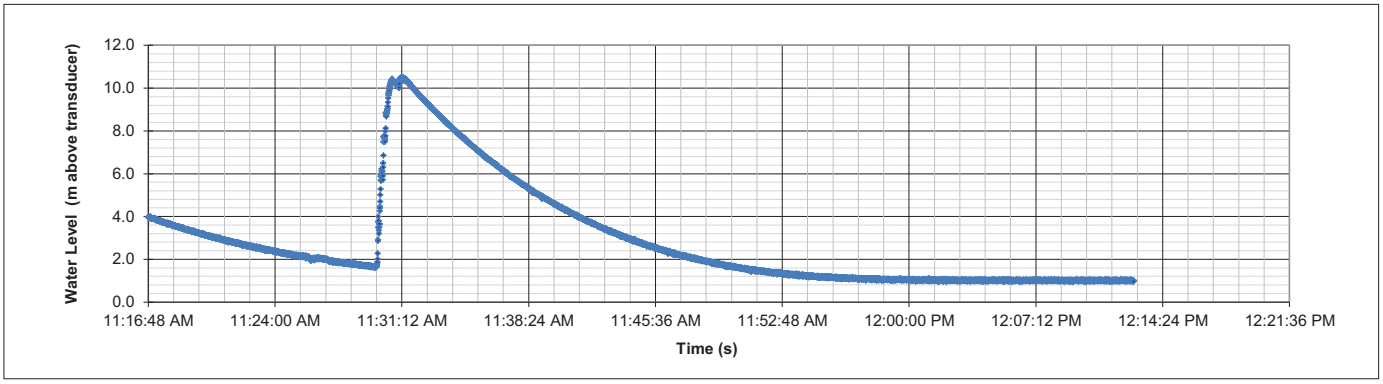
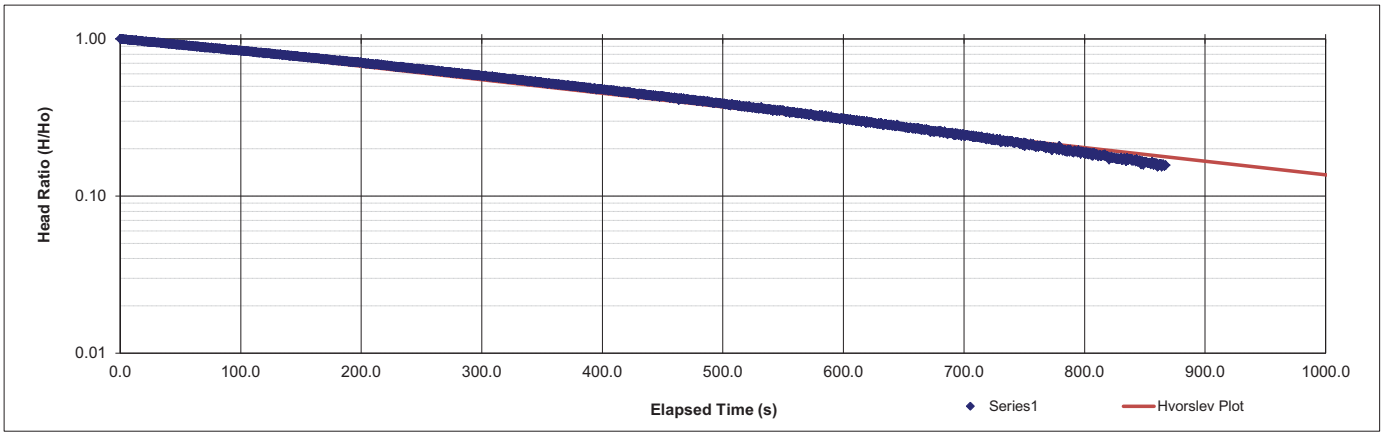
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-246		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	08-Aug-11		
Test Time	11:31:26 AM		
Drill-hole diameter, D	0.096 m	**Time Slug Injected, t_o**	11:31:26 AM
Effective diameter of drill pipe, d_e	0.024 m	**Initial Water Level, WL_o**	0.99 mat
Top of test interval	16.46 mbgs		
Bottom of test interval	19.51 mbgs		
Test length, L	3.05 m		
Drill-hole angle	90		
Transmissivity, T	6.1E-07 m^2/s		
Hydraulic Conductivity, K	2.0E-07 m/s	Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

Analyzed the first curve as the water level fell lower than that during the second curve.

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Falling Head Test Analysis - Updated\[GH11-246 Falling Head Test.xlsx]Hvorslev_GH11-246 Test 1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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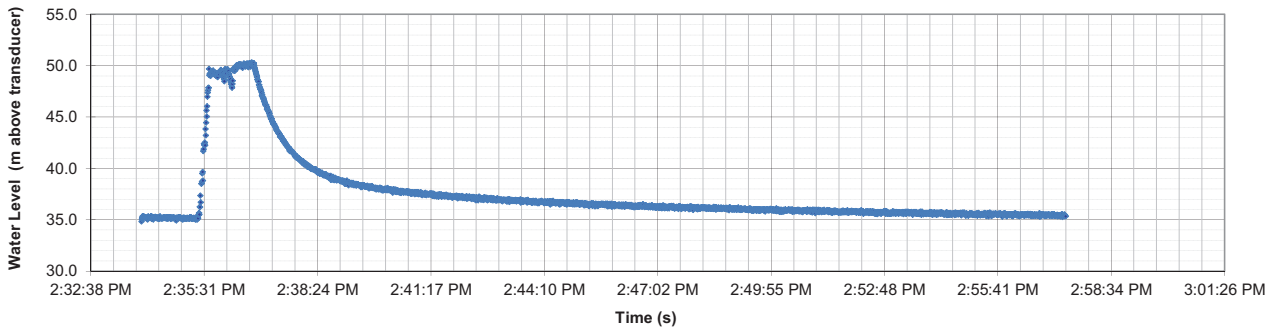
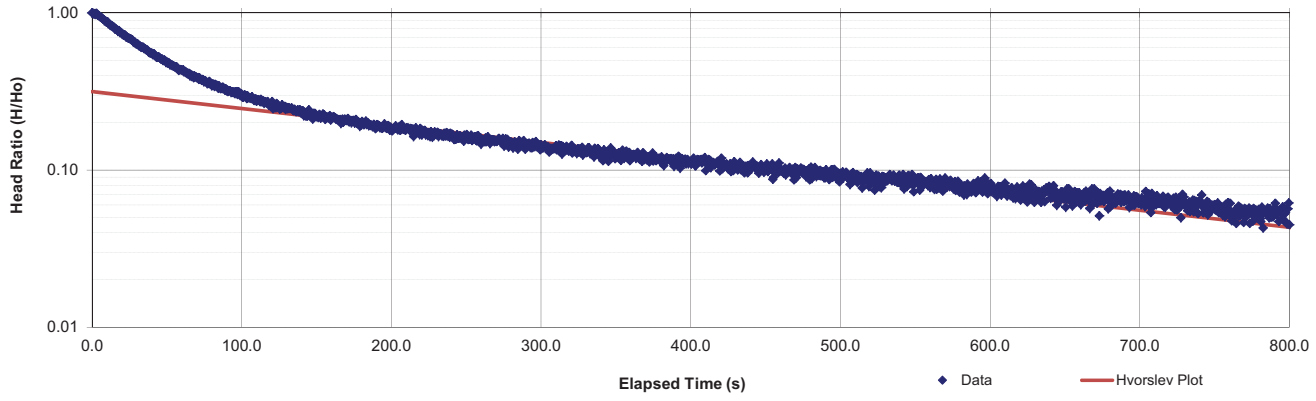
Project No.	VA101-176/38				
Monitoring Well/Piezometer	GH11-274				
Monitoring Instrument Type	Transducer			**Field Technician**	LS
Slug Type	Poured water into piezometer			**Analyst**	AL
Test Date	1-Oct-11				
Test Time	2:36:43 PM				
Drill-hole diameter, D	0.096	m		**Time Slug Injected, t_o**	2:36:43 PM
Effective diameter of drill pipe, d_e	0.024	m		**Initial Water Level, WL_o**	35.15 mat
Top of test interval	10.06	mbgs			
Bottom of test interval	13.11	mbgs			
Test length, L	3.05	m			
Drill-hole angle	90				
Transmissivity, T	7.6E-07	m^2/s			
Hydraulic Conductivity, K	2.5E-07	m/s		Intercept	0.61





TEST COMMENTS:

Well was not developed prior to test.

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Falling Head Test Analysis - Updated\[GH11-274 Falling Head Test.xlsx]Hvorslev_GH11-274 Test 1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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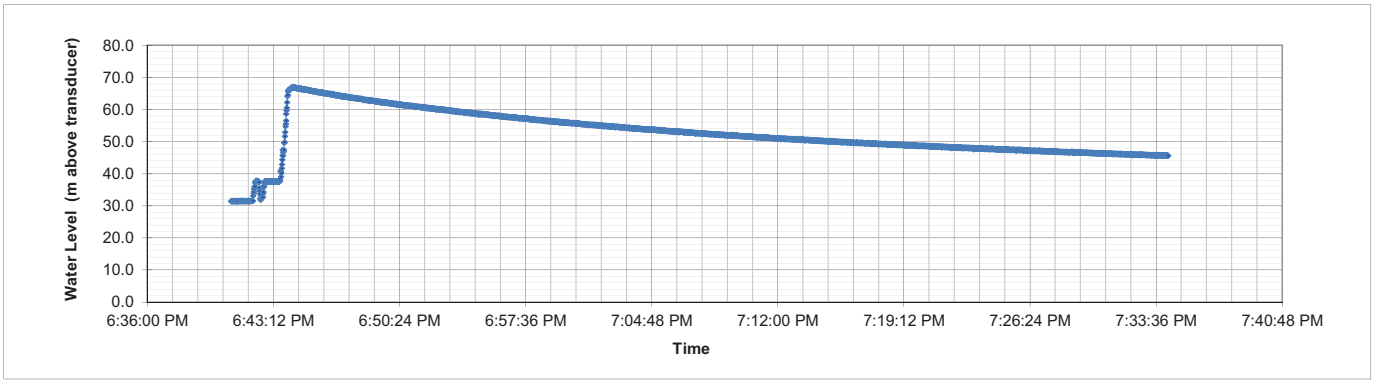
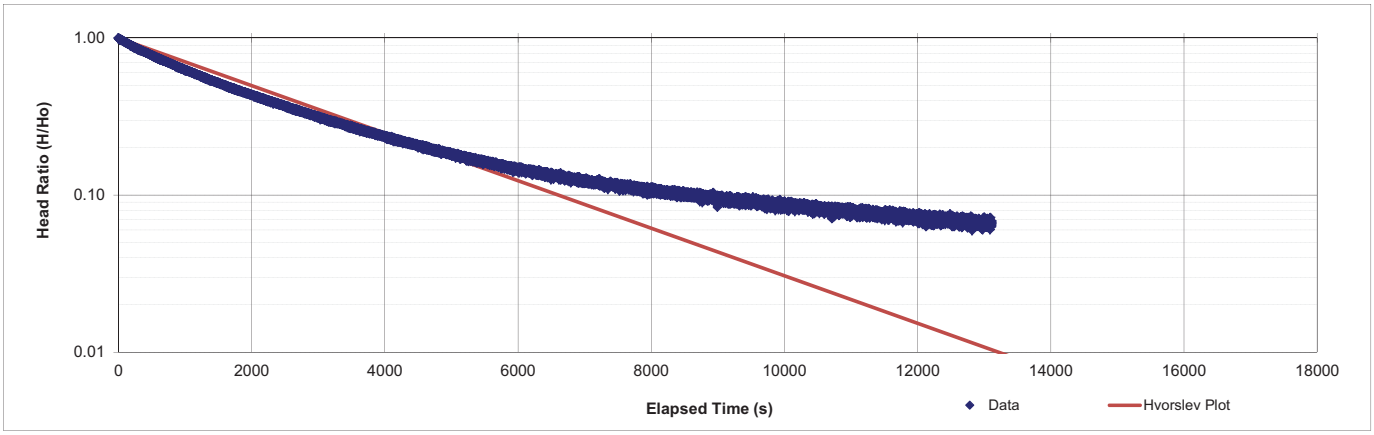
Project No.	VA101-176/38				
Monitoring Well/Piezometer	GH11-277				
Monitoring Instrument Type	Transducer		**Field Technician**	LS	
Slug Type	Poured water into piezometer		**Analyst**	AL	
Test Date	1-Oct-11				
Test Time	6:44:27 PM				
Drill-hole diameter, D	0.096	m	**Time Slug Injected, t_o**	6:44:27 PM	
Effective diameter of drill pipe, d_e	0.024	m	**Initial Water Level, WL_o**	35.75	mat
Top of test interval	60.98	mbgs			
Bottom of test interval	64.02	mbgs			
Test length, L	3.05	m			
Drill-hole angle	90				
Transmissivity, T	1.1E-07	m^2/s			
Hydraulic Conductivity, K	3.5E-08	m/s	Intercept	1.00	





TEST COMMENTS:

Well was not developed prior to test.

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Falling Head Test Analysis - Updated\[GH11-277 Falling Head Test.xlsx]Hvorslev_GH11-277 Test 1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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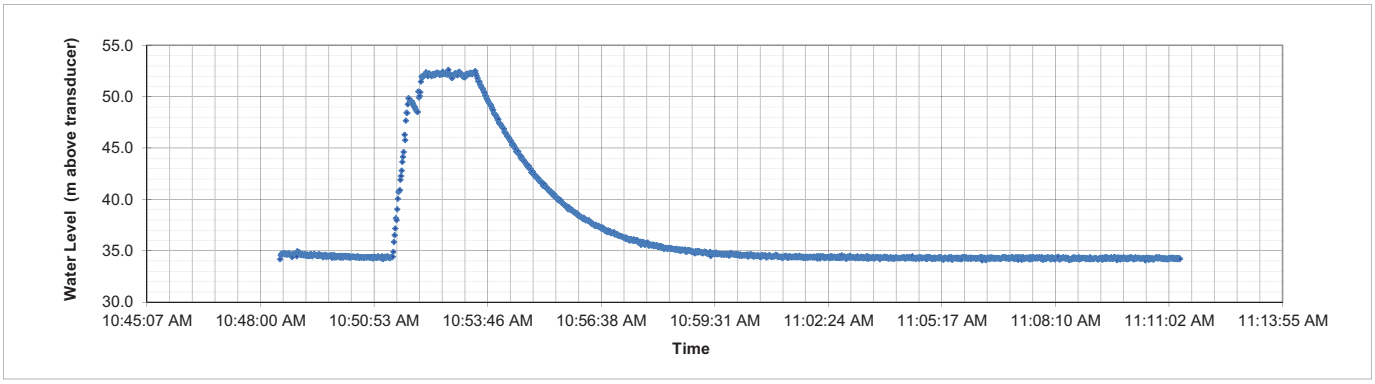
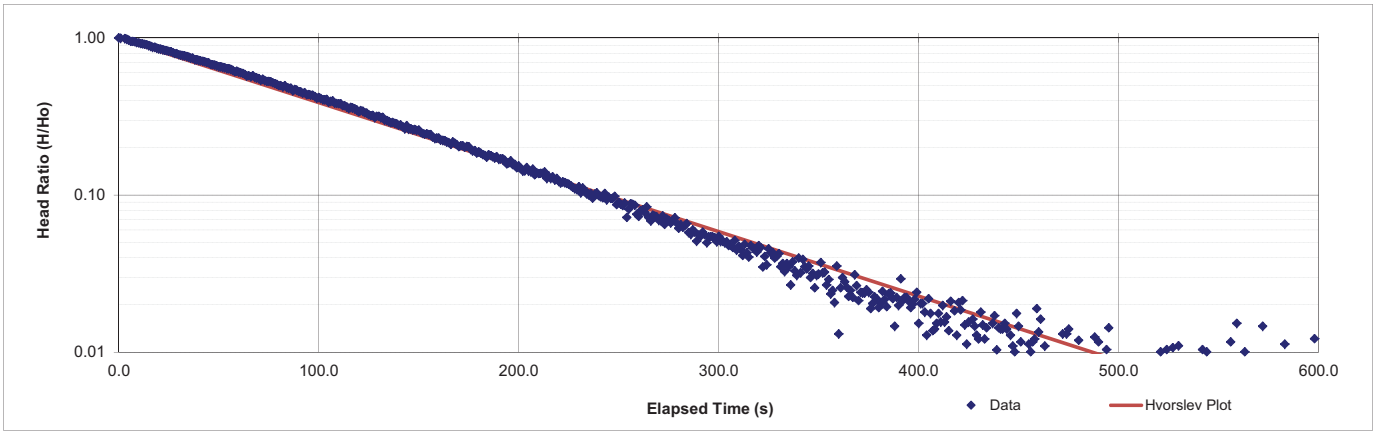
Project No.	VA101-176/38				
Monitoring Well/Piezometer	GH11-281				
Monitoring Instrument Type	Transducer		**Field Technician**	LS	
Slug Type	Poured water into piezometer		**Analyst**	AL	
Test Date	2-Oct-11				
Test Time	10:53:25 AM				
Drill-hole diameter, D	0.096	m	**Time Slug Injected, t_o**	10:53:25 AM	
Effective diameter of drill pipe, d_e	0.024	m	**Initial Water Level, WL_o**	34.25	mat
Top of test interval	40.78	mbgs			
Bottom of test interval	43.83	mbgs			
Test length, L	3.05	m			
Drill-hole angle	90				
Transmissivity, T	2.9E-06	m^2/s			
Hydraulic Conductivity, K	9.5E-07	m/s	Intercept	1.00	





TEST COMMENTS:

Well was not developed prior to test.

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Falling Head Test Analysis - Updated\[GH11-281 Falling Head Test.xlsx]Hvorslev_GH11-281 Test 1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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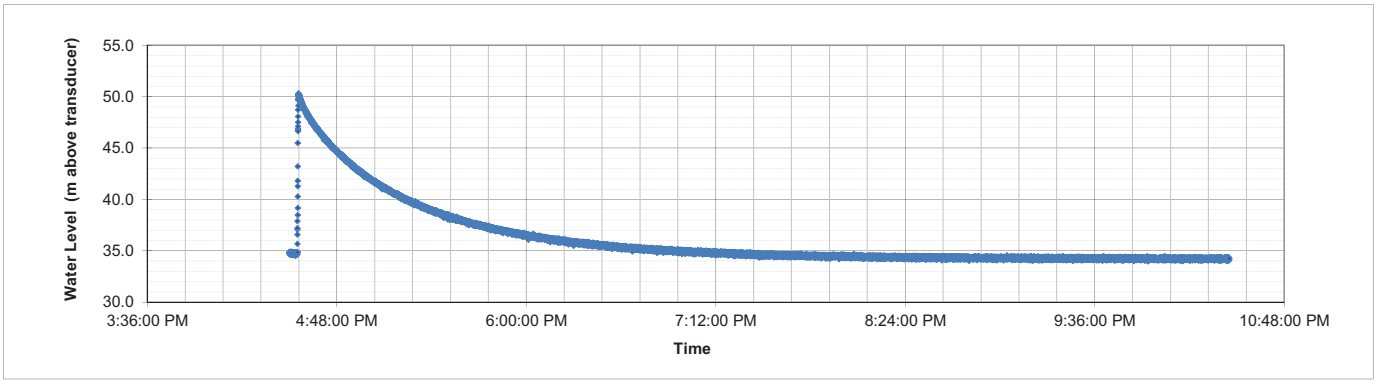
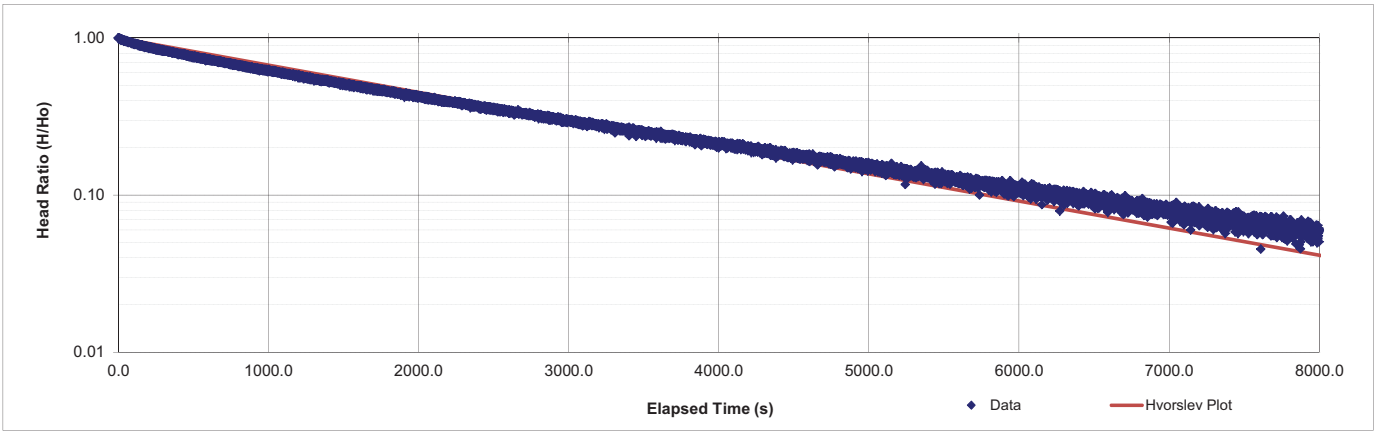
Project No.	VA101-176/38				
Monitoring Well/Piezometer	GH11-287				
Monitoring Instrument Type	Transducer			**Field Technician**	LS
Slug Type	Poured water into piezometer			**Analyst**	AL
Test Date	2-Oct-11				
Test Time	4:33:26 PM				
Drill-hole diameter, D	0.096	m		**Time Slug Injected, t_o**	4:33:26 PM
Effective diameter of drill pipe, d_e	0.024	m		**Initial Water Level, WL_o**	34.20 mat
Top of test interval	24.94	mbgs			
Bottom of test interval	27.99	mbgs			
Test length, L	3.05	m			
Drill-hole angle	90				
Transmissivity, T	1.2E-07	m^2/s			
Hydraulic Conductivity, K	4.0E-08	m/s		Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Falling Head Test Analysis - Updated\[GH11-287 Falling Head Test.xlsx]Hvorslev_GH11-287 Test 1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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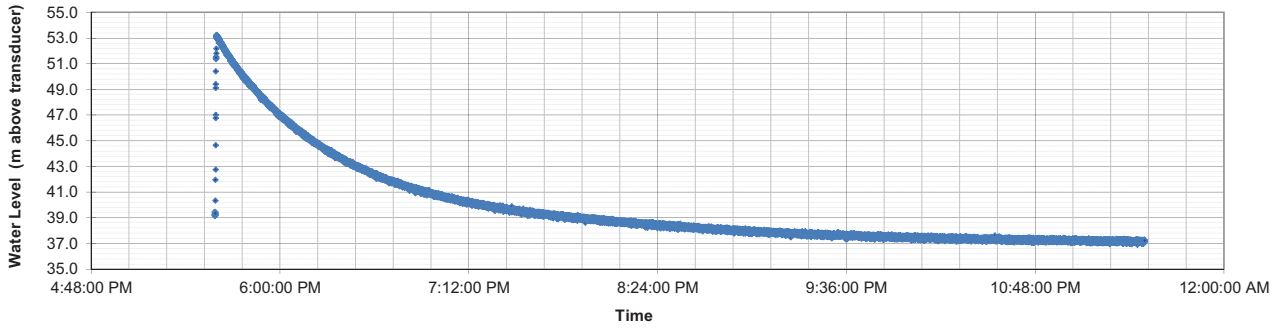
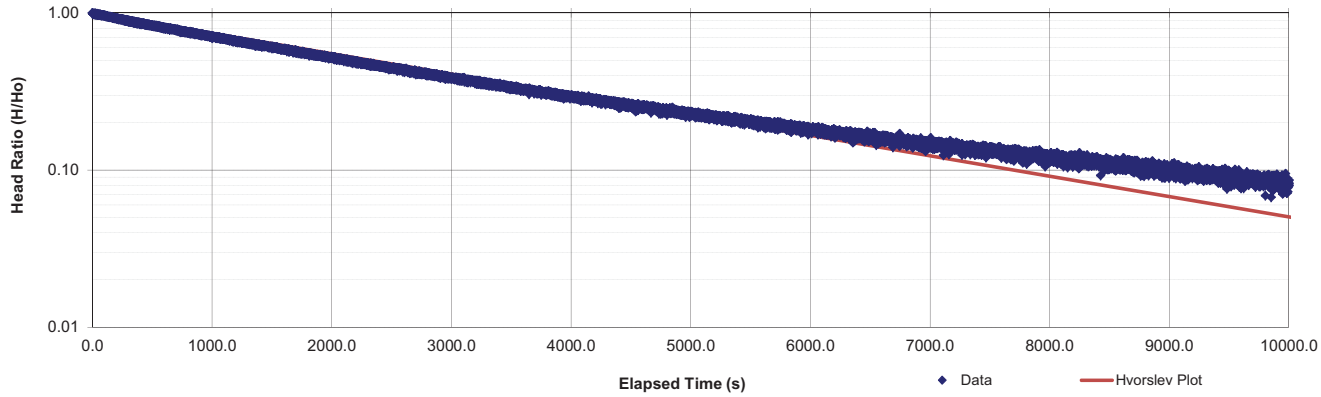
Project No.	VA101-176/38				
Monitoring Well/Piezometer	GH11-293				
Monitoring Instrument Type	Transducer		**Field Technician**	LS	
Slug Type	Poured water into piezometer		**Analyst**	AL	
Test Date	12-Oct-11				
Test Time	5:35:53 PM				
Drill-hole diameter, D	0.096	m	**Time Slug Injected, t_o**	5:35:53 PM	
Effective diameter of drill pipe, d_e	0.024	m	**Initial Water Level, WL_o**	37.14	mat
Top of test interval	38.41	mbgs			
Bottom of test interval	41.46	mbgs			
Test length, L	3.05	m			
Drill-hole angle	90				
Transmissivity, T	9.1E-08	m^2/s			
Hydraulic Conductivity, K	3.0E-08	m/s	Intercept	1.00	





TEST COMMENTS:

Well was not developed prior to test.

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Falling Head Test Analysis - Updated\[GH11-293 Falling Head Test.xlsx]Hvorslev_GH11-293 Test 1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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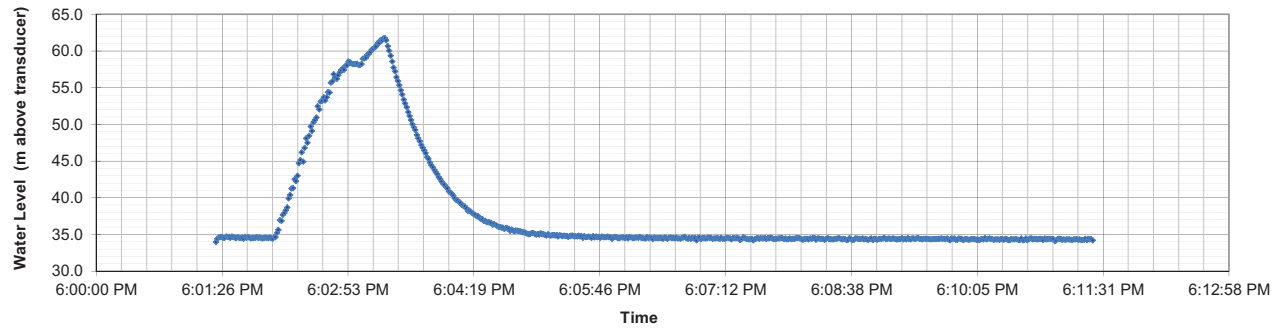
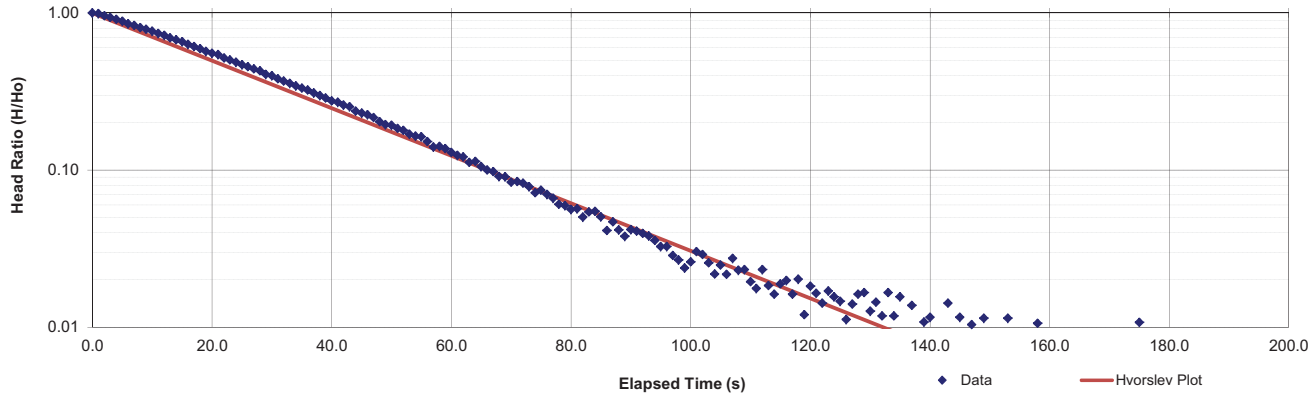
Project No.	VA101-176/38				
Monitoring Well/Piezometer	GH11-294				
Monitoring Instrument Type	Transducer			**Field Technician**	LS
Slug Type	Poured water into piezometer			**Analyst**	AL
Test Date	12-Oct-11				
Test Time	6:03:18 PM				
Drill-hole diameter, D	0.096	**m**		**Time Slug Injected, t_o**	6:03:18 PM
Effective diameter of drill pipe, d_e	0.024	**m**		**Initial Water Level, WL_o**	34.36 **mat**
Top of test interval	23.17	**mbgs**			
Bottom of test interval	26.22	**mbgs**			
Test length, L	3.05	**m**			
Drill-hole angle	90				
Transmissivity, T	1.1E-05	**m^2/s**			
Hydraulic Conductivity, K	3.5E-06	**m/s**		Intercept	1.00





TEST COMMENTS:

Well was not developed prior to test.

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Falling Head Test Analysis - Updated\[GH11-294 Falling Head Test.xlsx]Hvorslev_GH11-294 Test 1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD

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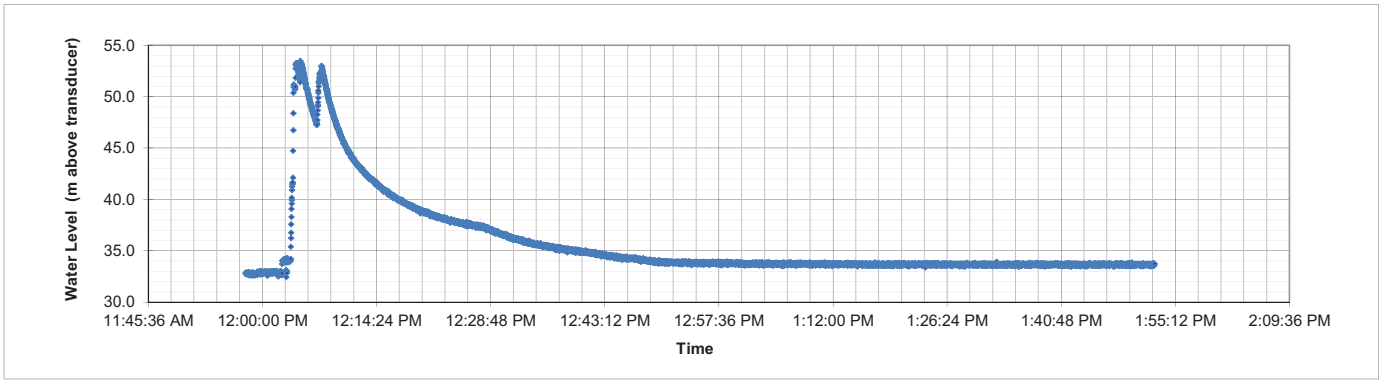
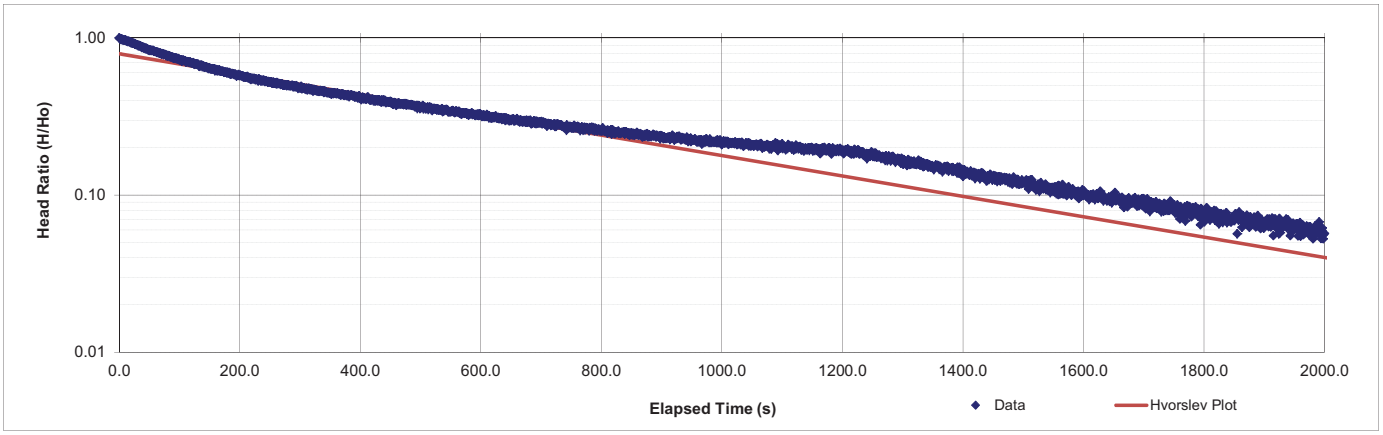
Project No.	VA101-176/38		
Monitoring Well/Piezometer	GH11-296		
Monitoring Instrument Type	Transducer	**Field Technician**	LS
Slug Type	Poured water into piezometer	**Analyst**	AL
Test Date	12-Oct-11		
Test Time	12:07:34 PM		
Drill-hole diameter, D	0.096 m	**Time Slug Injected, t_o**	12:07:34 PM
Effective diameter of drill pipe, d_e	0.024 m	**Initial Water Level, WL_o**	33.76 mat
Top of test interval	62.96 mbgs		
Bottom of test interval	66.01 mbgs		
Test length, L	3.05 m		
Drill-hole angle	90		
Transmissivity, T	4.6E-07 m^2/s		
Hydraulic Conductivity, K	1.5E-07 m/s	Intercept	0.90





TEST COMMENTS:

Well was not developed prior to test.
Probable unintentional movement of transducer could be responsible for the irregularity of data curve.

M:\1\01\00176\38\A\Data\2011 Geotechnical Site Investigation\Falling Head Test Analysis - Updated\[GH11-296 Falling Head Test.xlsx]Hvorslev_GH11-296 Test 1

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	24JAN'12	ISSUED WITH REPORT VA101-176/38-3	AL/CG	RDS	KJB

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APPENDIX C

PHOTOGRAPHS

Appendix C1 Drill Site Photographs
Appendix C2 Standard Penetration Test Photographs
Appendix C3 Core Photographs

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APPENDIX C1

DRILL SITE PHOTOGRAPHS

- GH11-229
- GH11-230
- GH11-231
- GH11-232
- GH11-233
- GH11-234
- GH11-235
- GH11-236
- GH11-237
- GH11-238
- GH11-239
- GH11-240
- GH11-241
- GH11-242
- GH11-243
- GH11-245
- GH11-246
- GH11-247
- GH11-274
- GH11-277
- GH11-281
- GH11-287
- GH11-293
- GH11-294
- GH11-296

(Pages C1-1 to C1-13)



PHOTO 1 – GH11-229 Looking South



PHOTO 2 – GH11-230 Looking East

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PHOTO 3 – GH11-231 Looking West



PHOTO 4 – GH11-232 Looking East

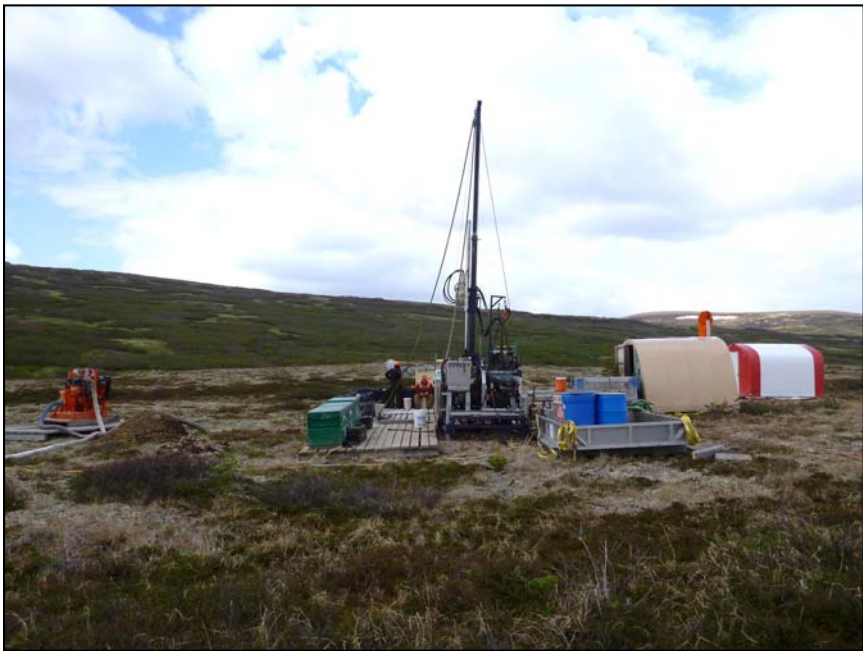

PHOTO 5 – GH11-233 Looking West

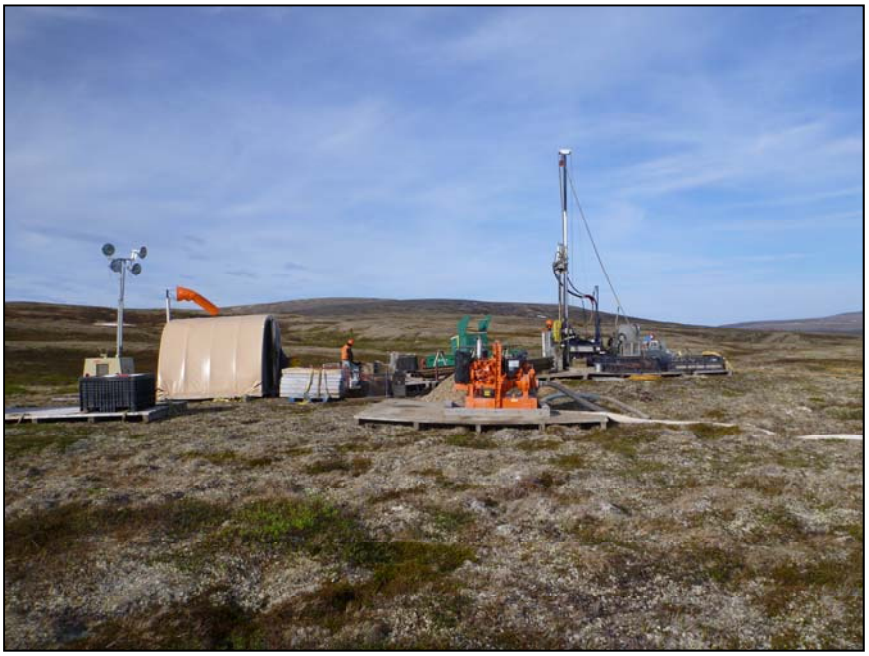

PHOTO 6 – GH11-234 Looking South



PHOTO 7 – GH11-235 Looking North



PHOTO 8 – GH11-236 Looking South

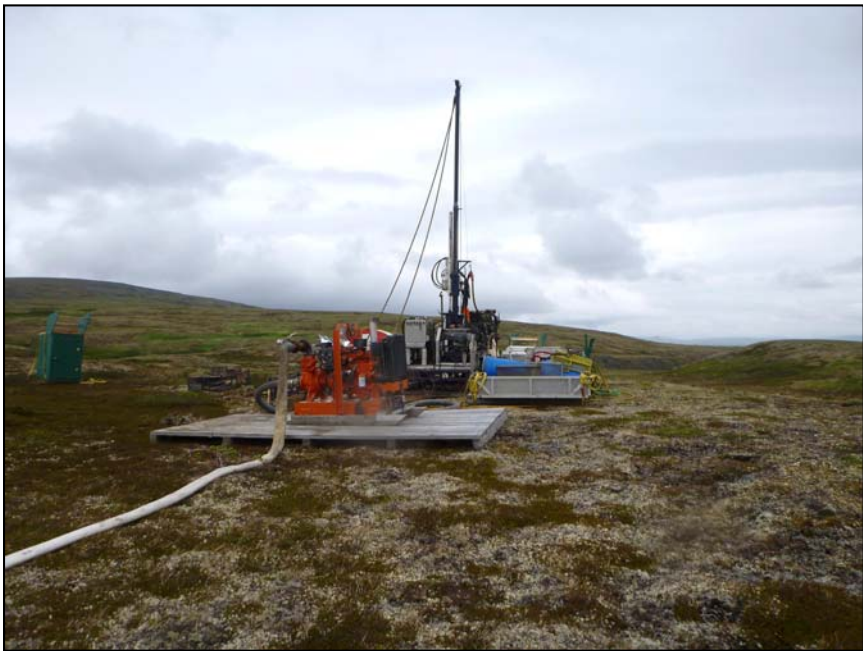

PHOTO 9 – GH11-237 Looking West



PHOTO 10 – GH11-238 Looking North



PHOTO 11 – GH11-239 Looking East



PHOTO 12 – GH11-240 Looking West



PHOTO 13 – GH11-241 Looking North



PHOTO 14 – GH11-242 Looking North



PHOTO 15 – GH11-243 Looking South



PHOTO 16 – GH11-245 Looking East



PHOTO 17 – GH11-246 Looking South



PHOTO 18 – GH11-247 Looking East



PHOTO 19 – GH11-274 Looking West

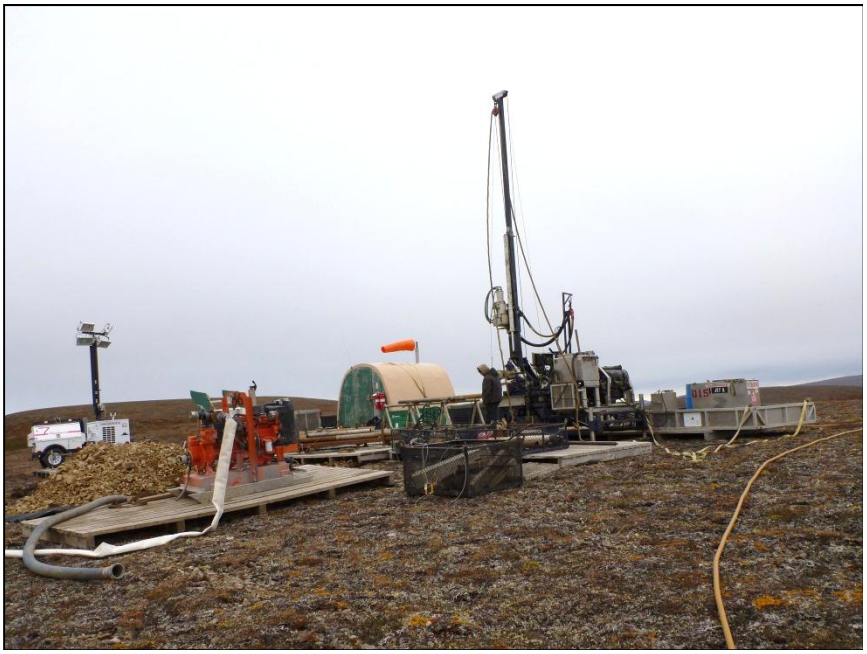

PHOTO 20 – GH11-277 Looking North

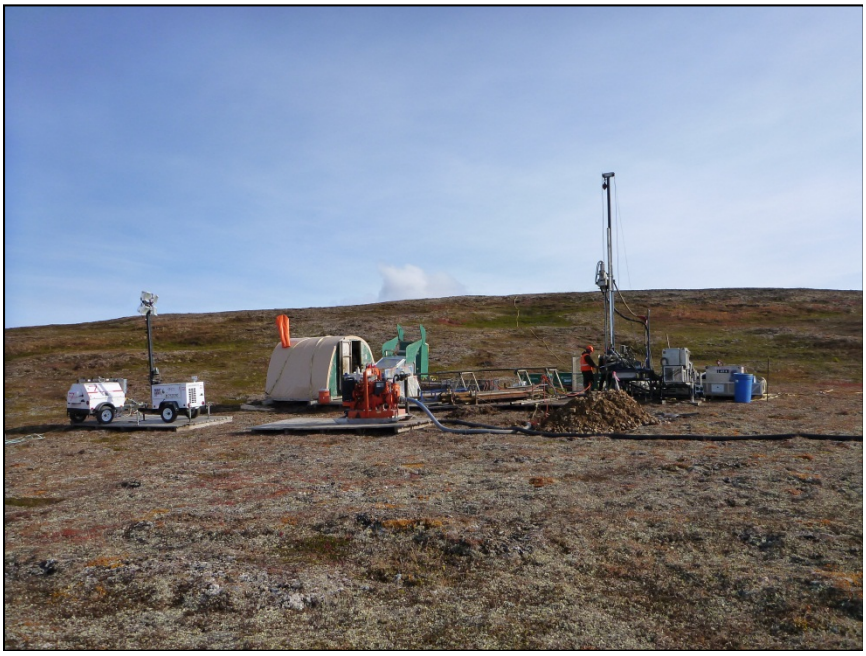

PHOTO 21 – GH11-281 Looking East

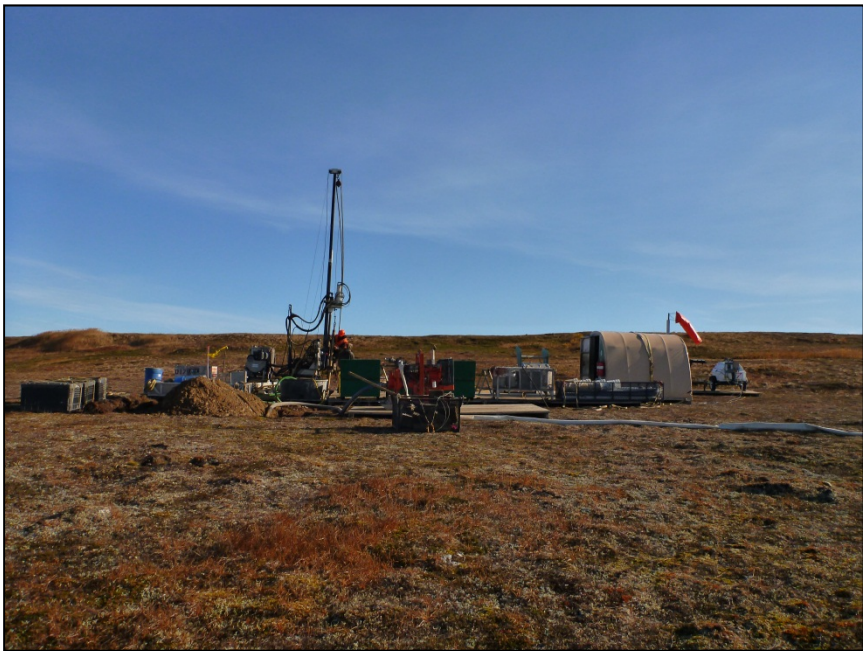

PHOTO 22 – GH11-287 Looking East



PHOTO 23 – GH11-293 Looking West

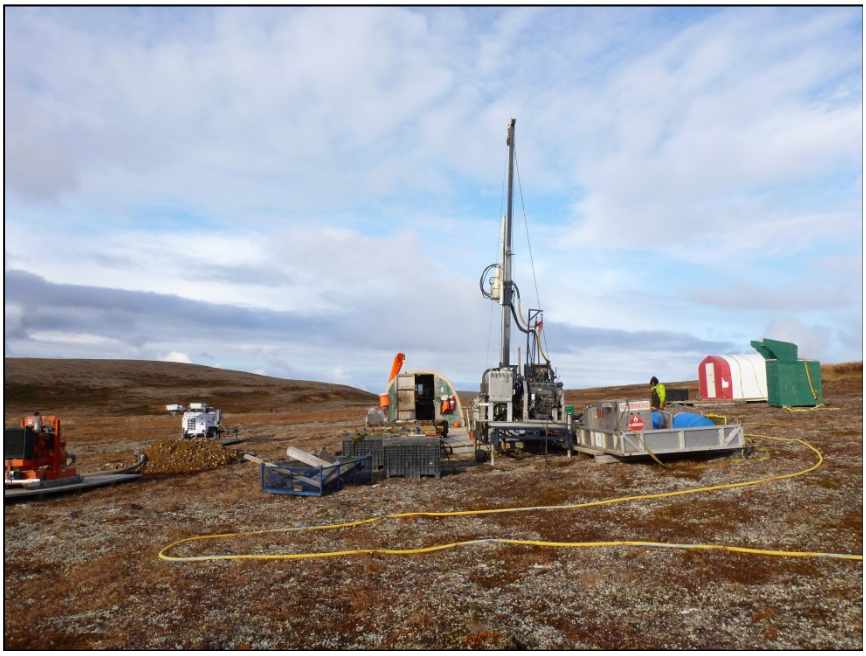

PHOTO 24 – GH11-294 Looking North

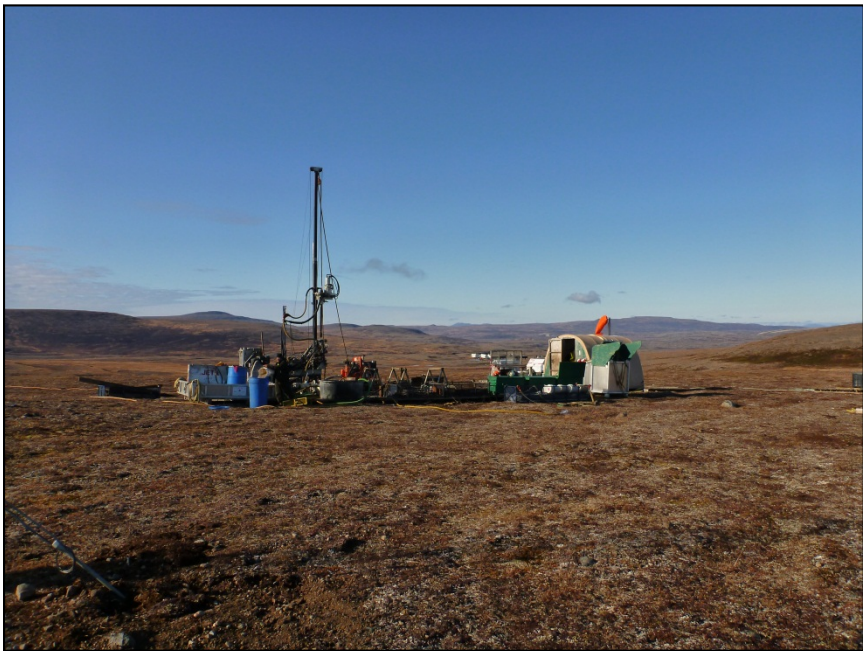

PHOTO 25 – GH11-296 Looking West

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APPENDIX C2

STANDARD PENETRATION TEST PHOTOGRAPHS

- GH11-229
- GH11-230
- GH11-231
- GH11-232
- GH11-233
- GH11-234
- GH11-235
- GH11-236
- GH11-237
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- GH11-241
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PHOTO 1 - GH11-229 SPT #1 6-7.5'



PHOTO 2 - GH11-229 SPT #2 9-10.5'



PHOTO 3 - GH11-229 SPT #3 14-15.5'

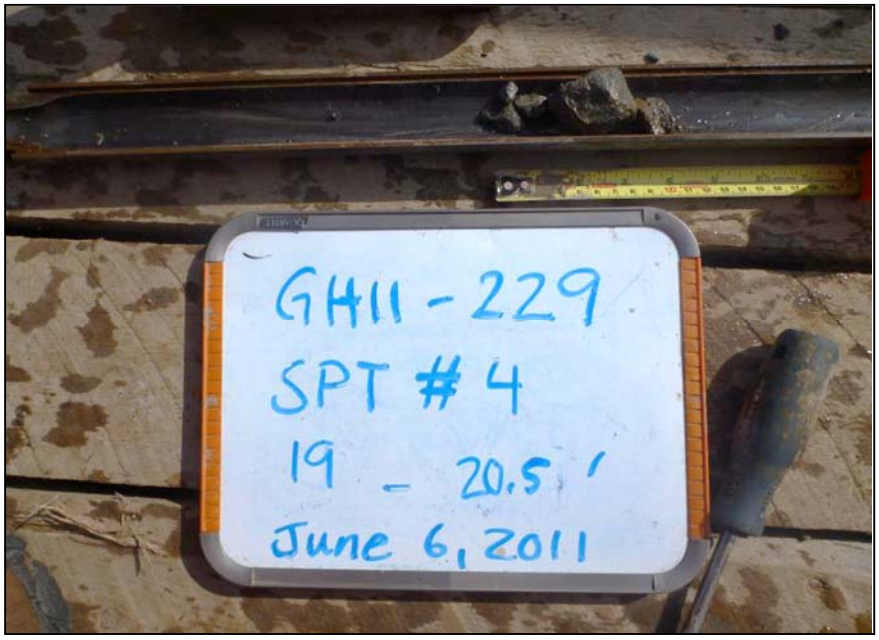

PHOTO 4 - GH11-229 SPT #4 19-20.5'

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PHOTO 5 - GH11-230 SPT #1 3-4.5'



PHOTO 6 - GH11-231 SPT #1 9-10.5'



PHOTO 7 - GH11-231 SPT #2 14-15.5'



PHOTO 8 - GH11-231 SPT #3 19-20.5'



PHOTO 9 - GH11-231 SPT #4 24-25.5'



PHOTO 10 - GH11-232 SPT #1 6-7.5'



PHOTO 11 - GH11-232 SPT #2 9-10.5'



PHOTO 12 - GH11-232 SPT #3 14-15.5'



PHOTO 13 - GH11-232 SPT #4 19-20.5'

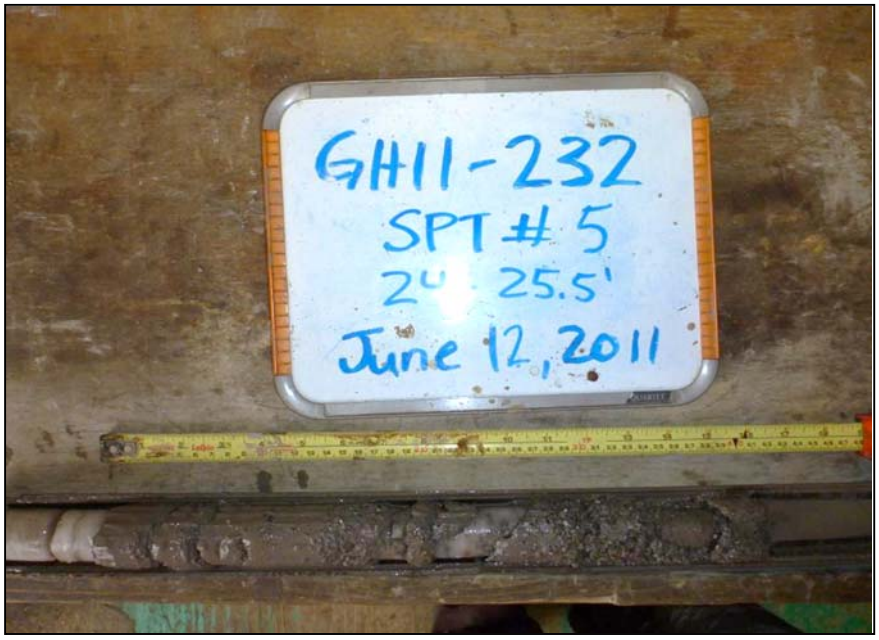

PHOTO 14 - GH11-232 SPT #5 24-25.5'



PHOTO 15 - GH11-232 SPT #6 29-30.5'

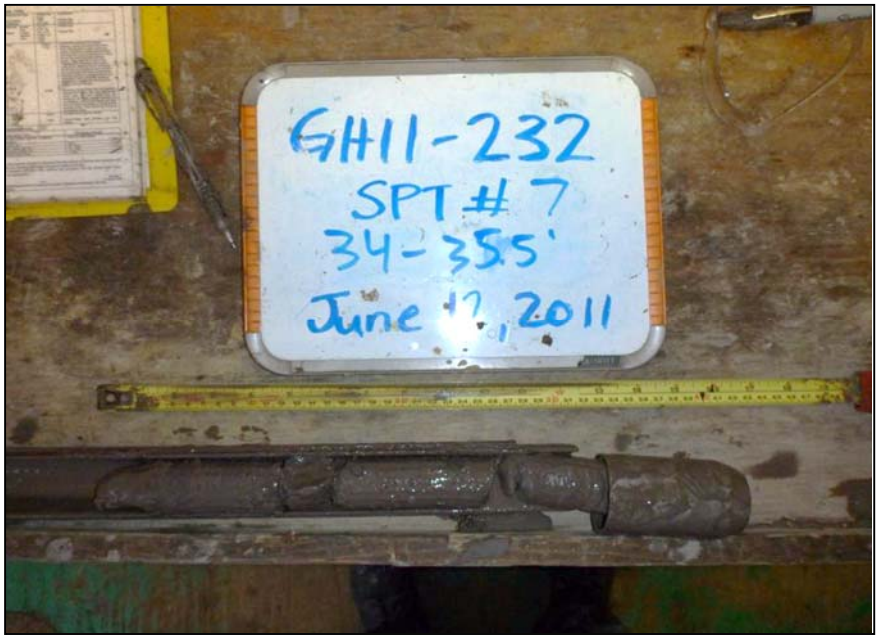

PHOTO 16 - GH11-232 SPT #7 34-35.5'



PHOTO 17 - GH11-232 SPT #8 39-40.5

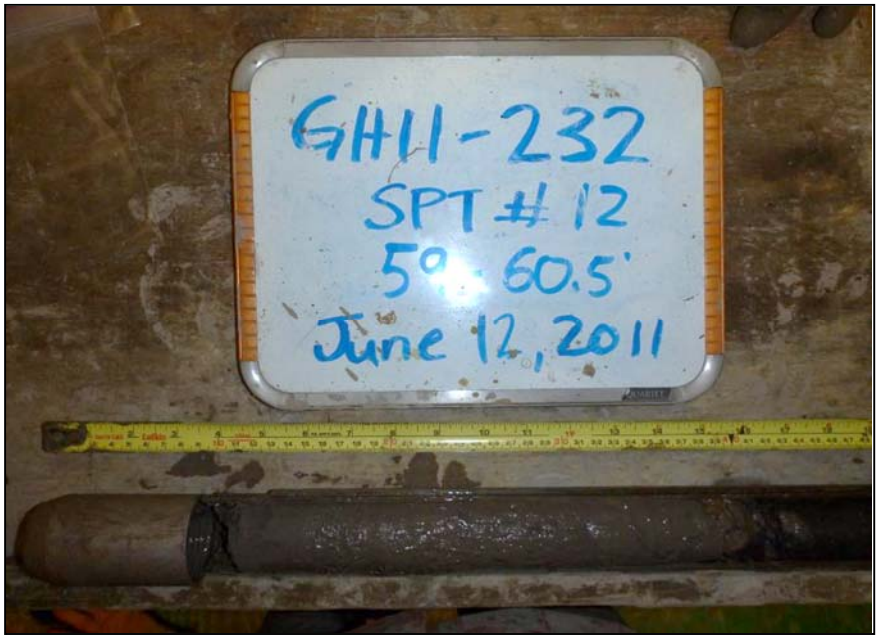

PHOTO 18 - GH11-232 SPT #12 59-60.5'

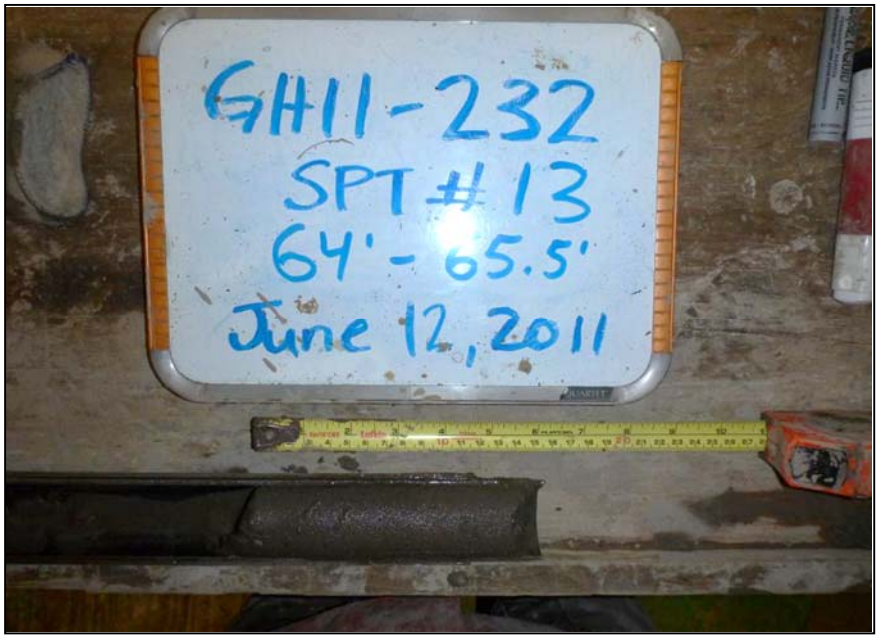

PHOTO 19 - GH11-232 SPT #13 64-65.5'

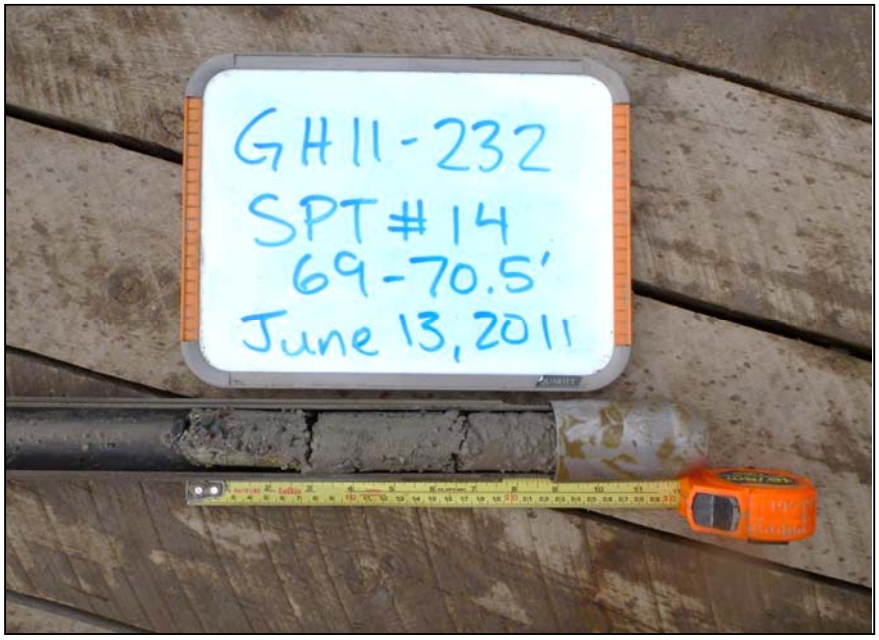

PHOTO 20 - GH11-232 SPT #14 69-70.5'



PHOTO 21 - GH11-232 SPT #15 79-80.5'

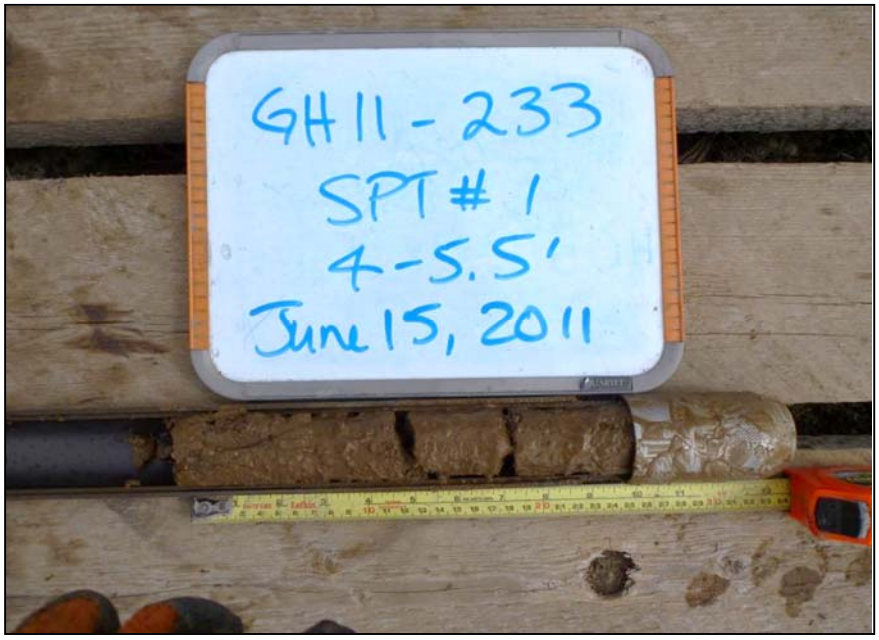

PHOTO 22 - GH11-233 SPT #1 4-5.5'



PHOTO 23 - GH11-233 SPT #3 14-15.5'



PHOTO 24 - GH11-233 SPT #4 19-20.5'



PHOTO 25 - GH11-233 SPT #5 24-25.5'



PHOTO 26 - GH11-233 SPT #6 29-30.5'



PHOTO 27 - GH11-234 SPT #1 5-6.5



PHOTO 28 - GH11-234 SPT #2 10-11.5'

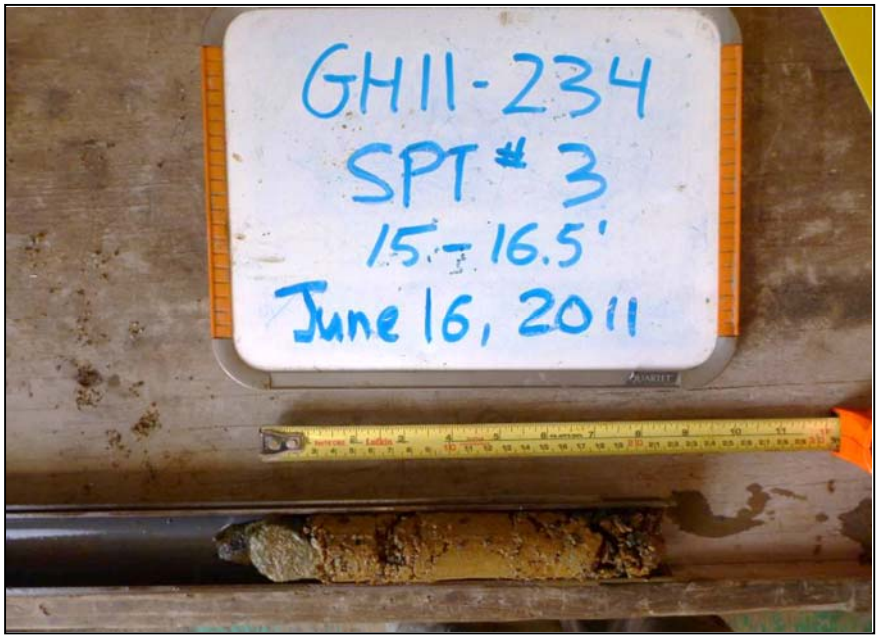

PHOTO 29 - GH11-234 SPT #3 15-16.5'

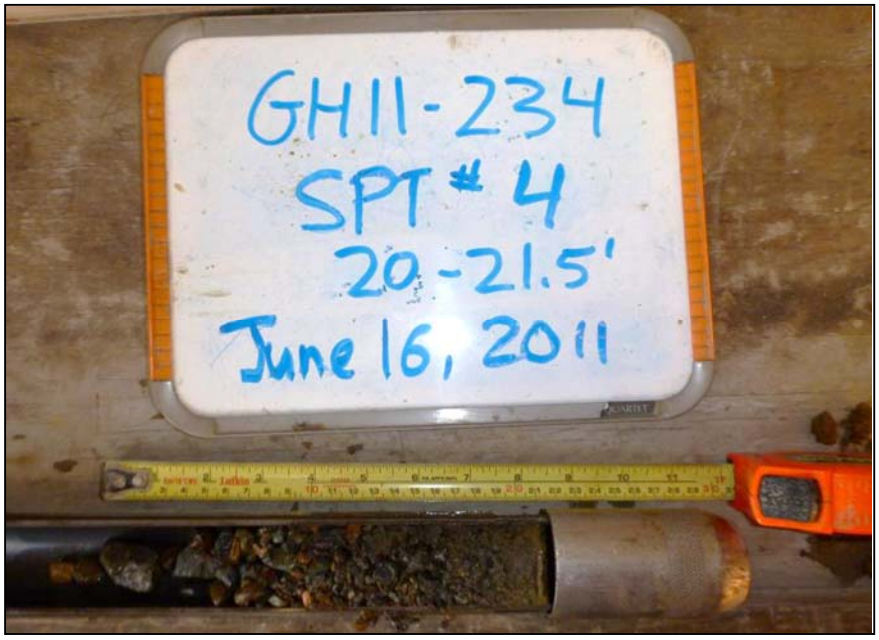

PHOTO 30 - GH11-234 SPT #4 20-21.5'

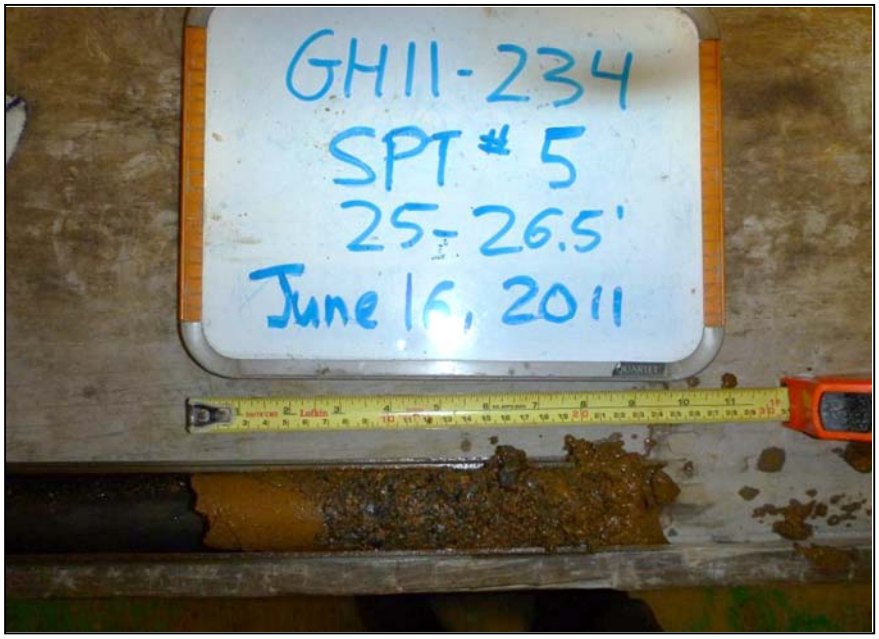

PHOTO 31 - GH11-234 SPT #5 25-26.5'

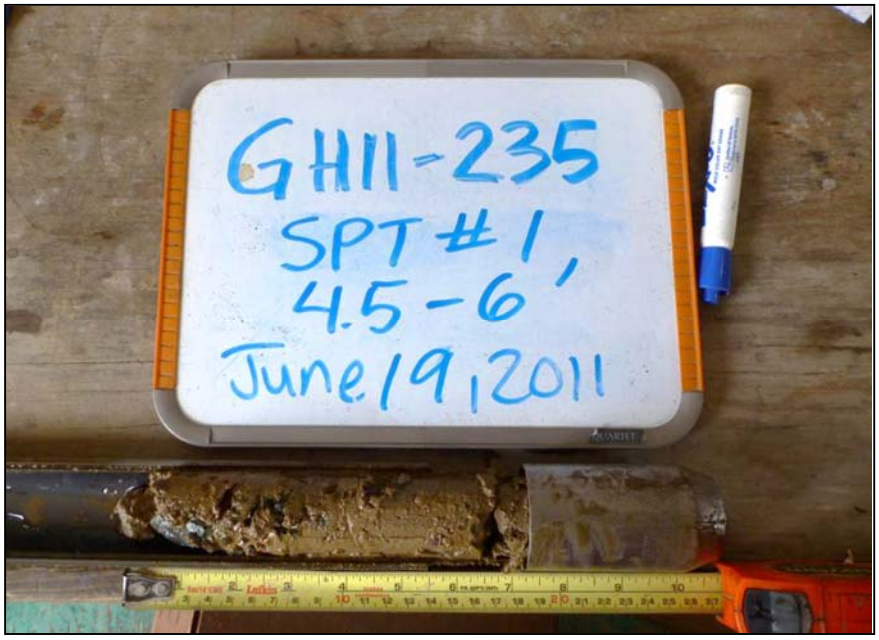

PHOTO 32 - GH11-235 SPT #1 4.5-6'

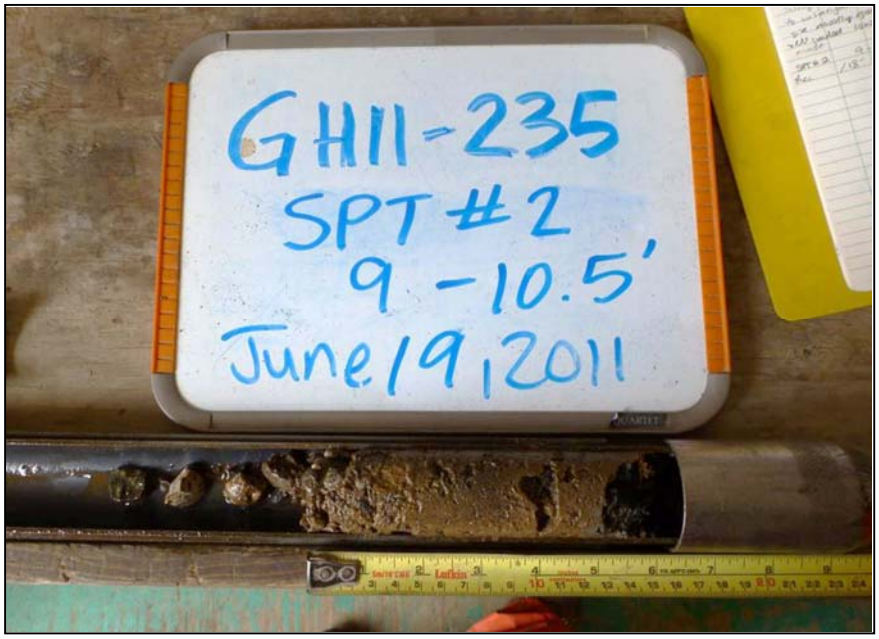

PHOTO 33 - GH11-235 SPT #2 9-10.5'

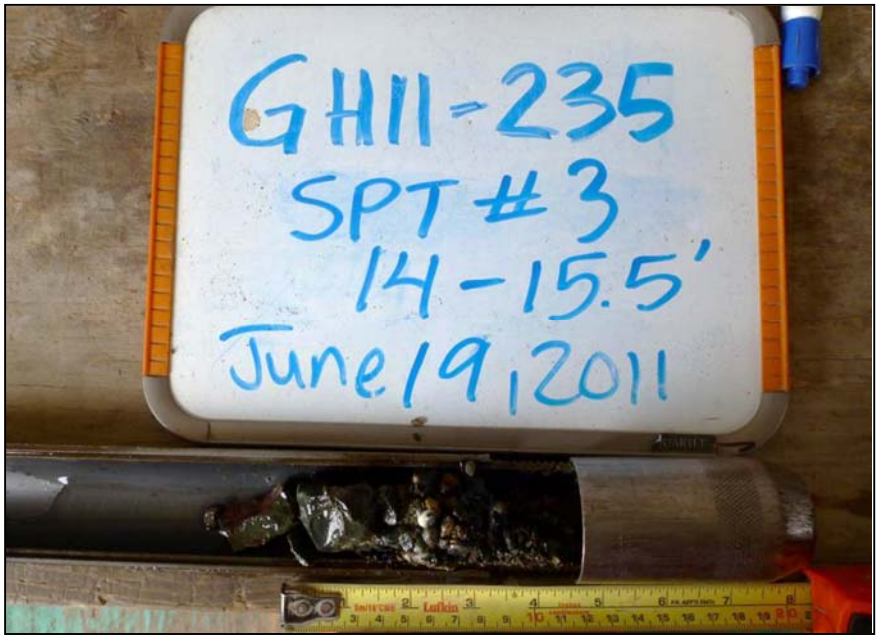

PHOTO 34 - GH11-235 SPT #3 14-15.5'

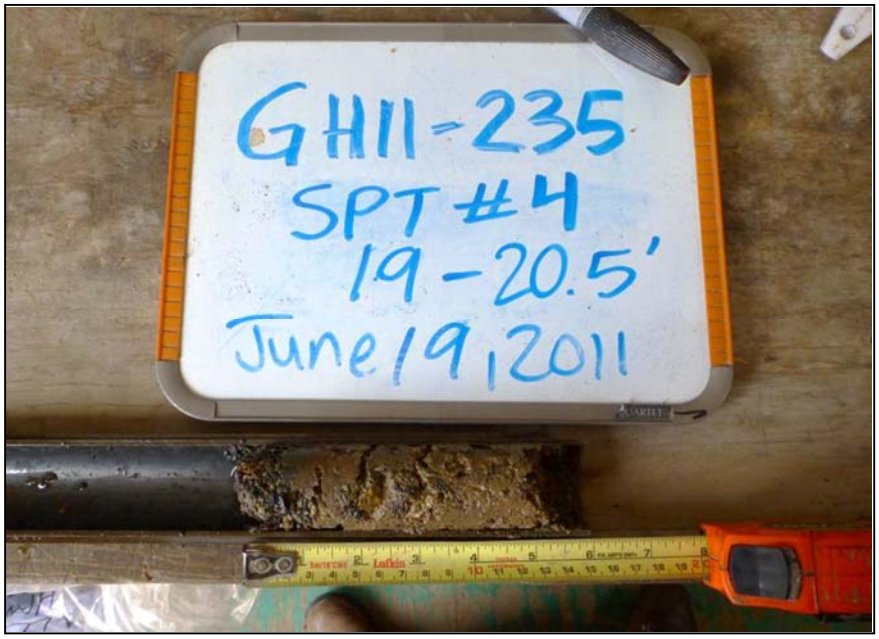

PHOTO 35 - GH11-235 SPT #4 19-20.5'

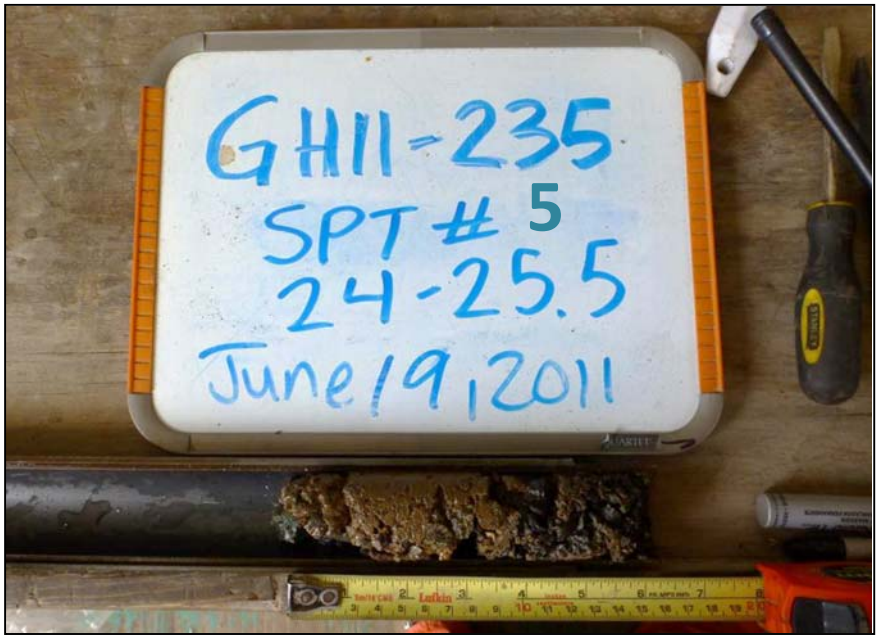

PHOTO 36 - GH11-235 SPT #5 24-25.5'



PHOTO 37 - GH11-235 SPT #6 29-30.5'



PHOTO 38 - GH11-235 SPT #7 34.5-36'



PHOTO 39 - GH11-235 SPT #8 39.5-41'



PHOTO 40 - GH11-235 SPT #9 44.5-46'



PHOTO 41 - GH11-235 SPT #10 50-51.5'

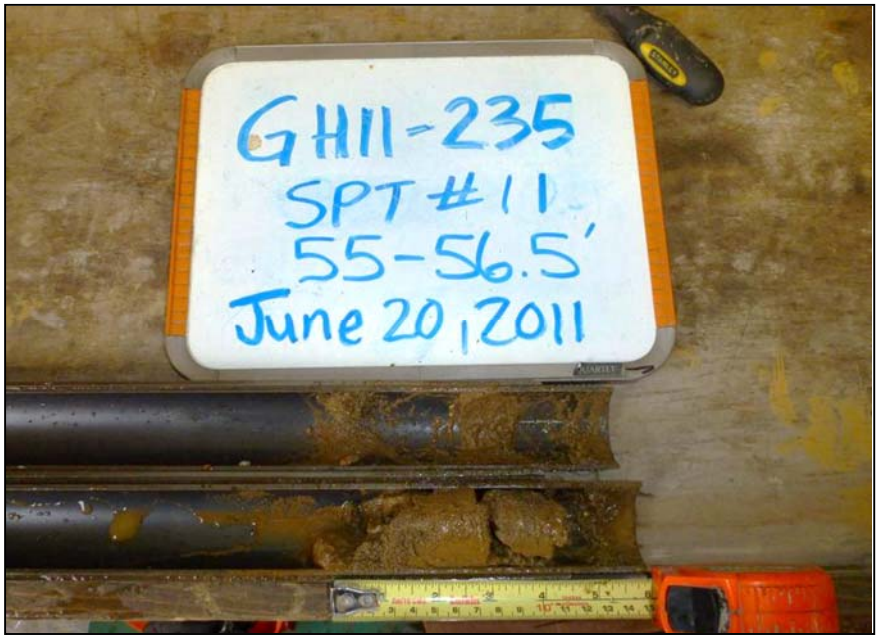

PHOTO 42 - GH11-235 SPT #11 55-56.5'

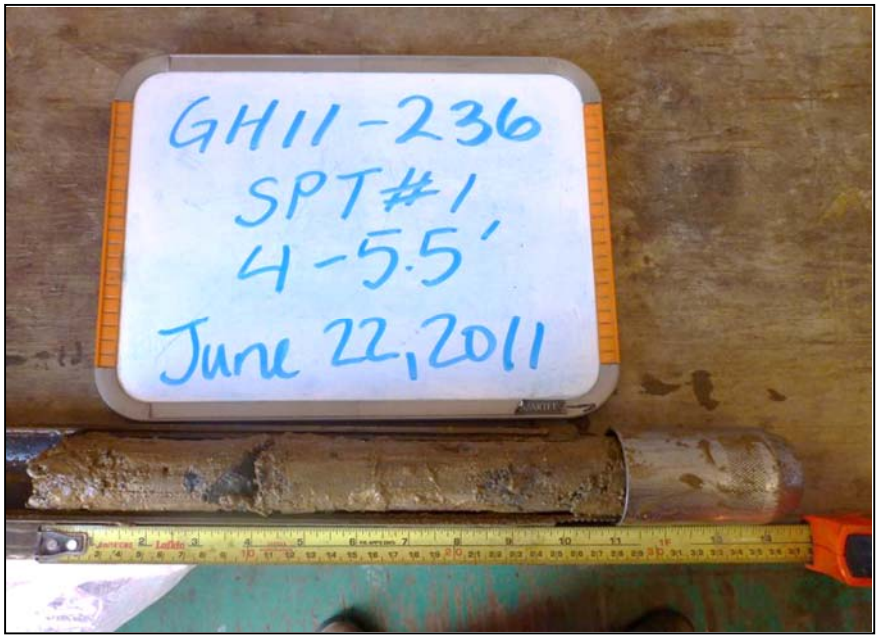

PHOTO 43 - GH11-236 SPT #1 4-5.5'

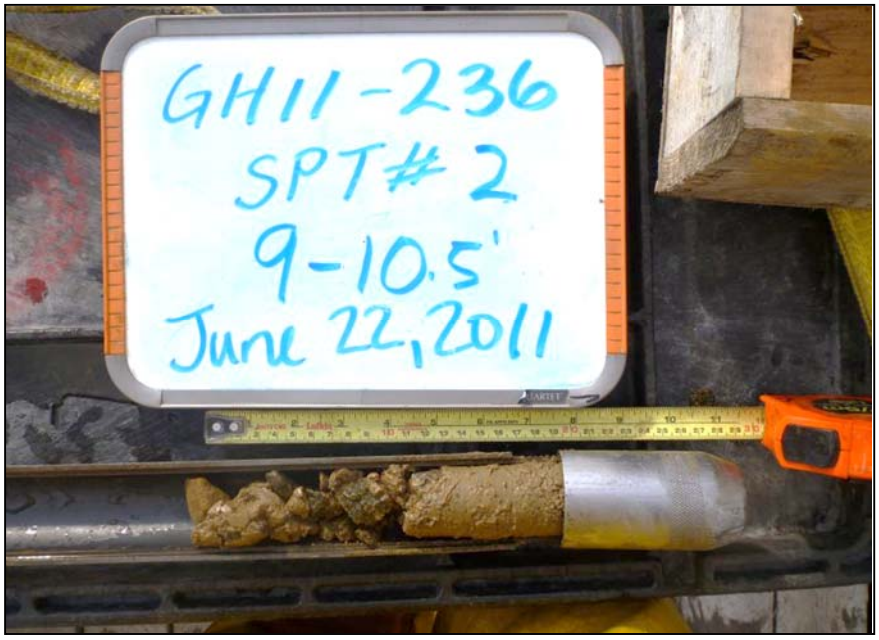

PHOTO 44 - GH11-236 SPT #2 9-10.5'

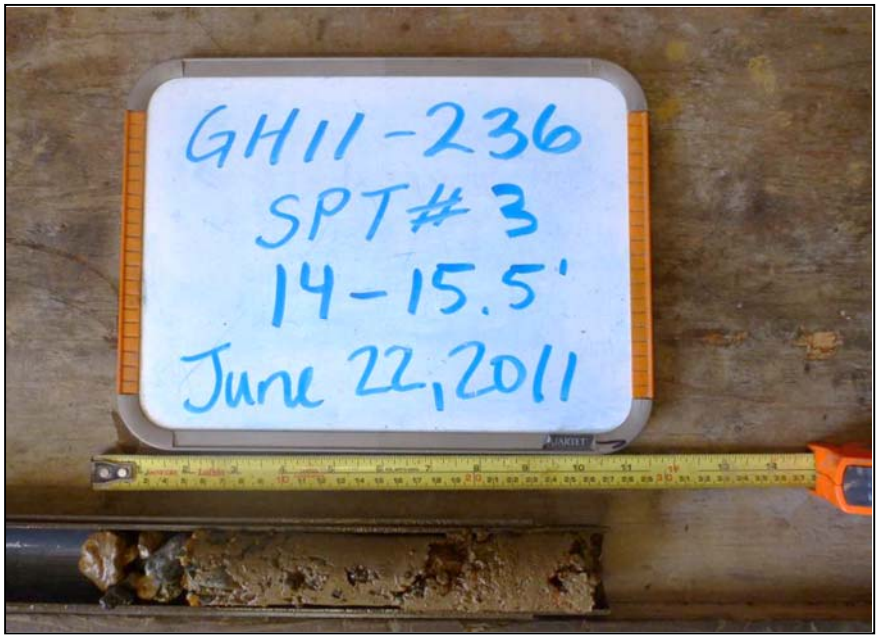

PHOTO 45 - GH11-236 SPT #3 14-15.5'

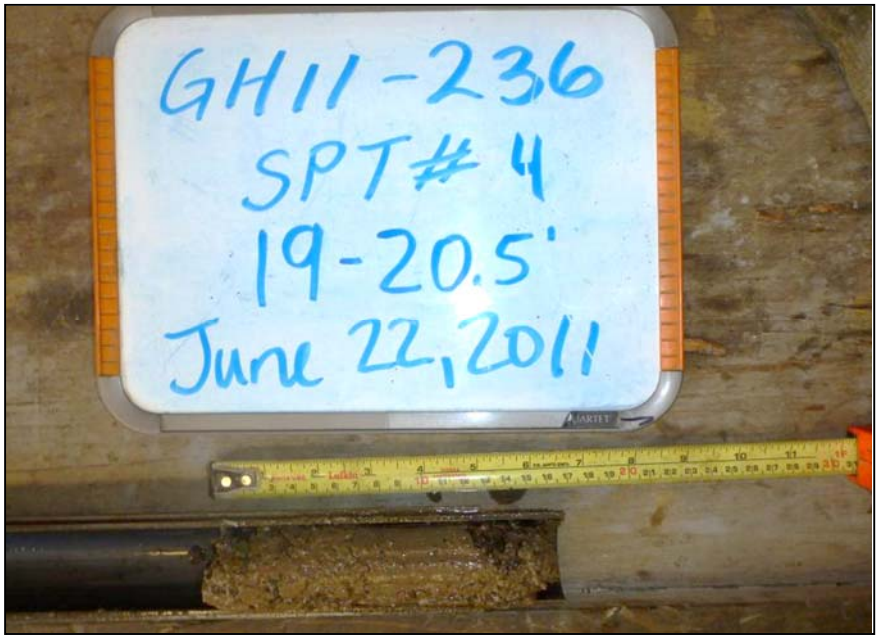

PHOTO 46 - GH11-236 SPT #4 19-20.5'



PHOTO 47 - GH11-236 SPT #5 24-25.5'

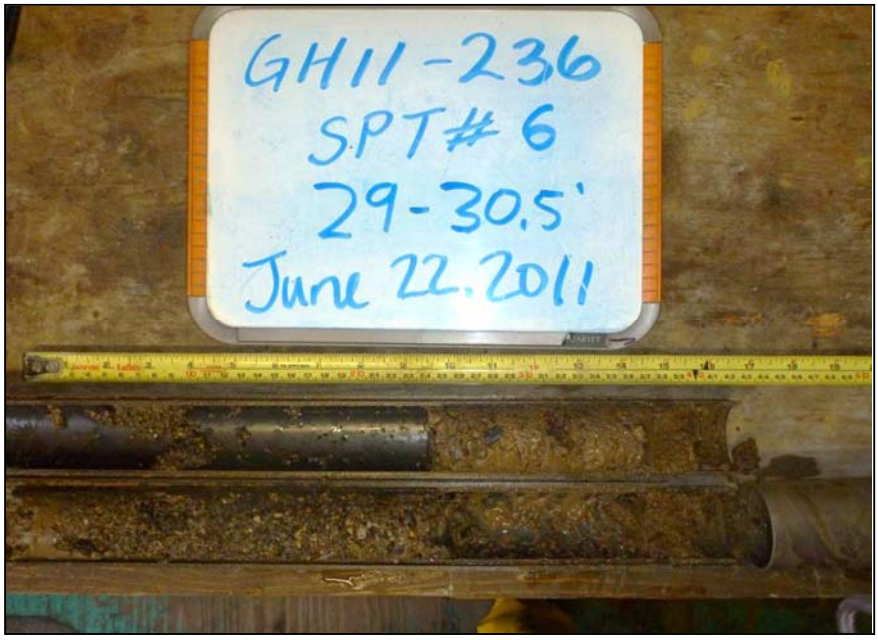

PHOTO 48 - GH11-236 SPT #6 29-30.5'



PHOTO 49 - GH11-236 SPT #7 34-35.5'

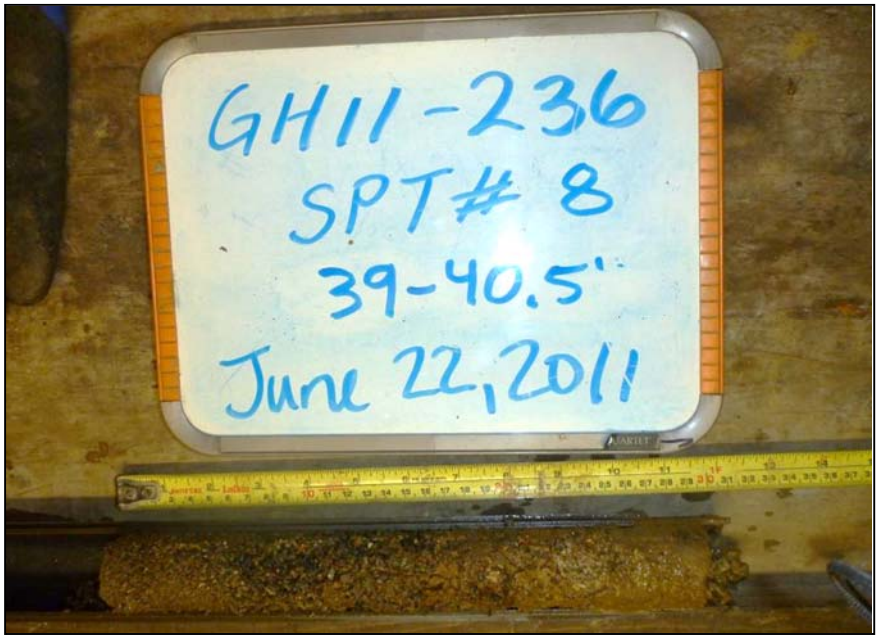

PHOTO 50 - GH11-236 SPT #8 39-40.5'

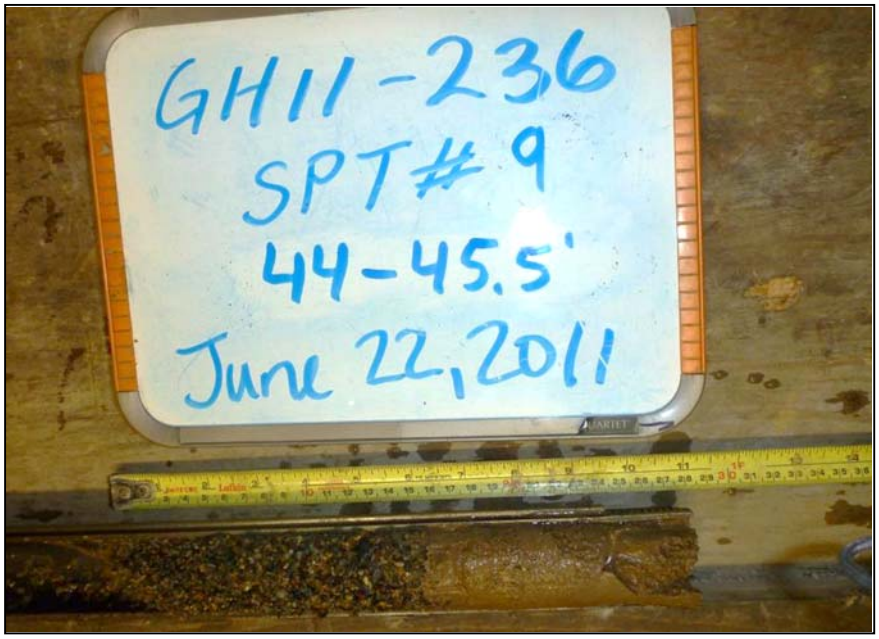

PHOTO 51 - GH11-236 SPT #9 44-45.5'

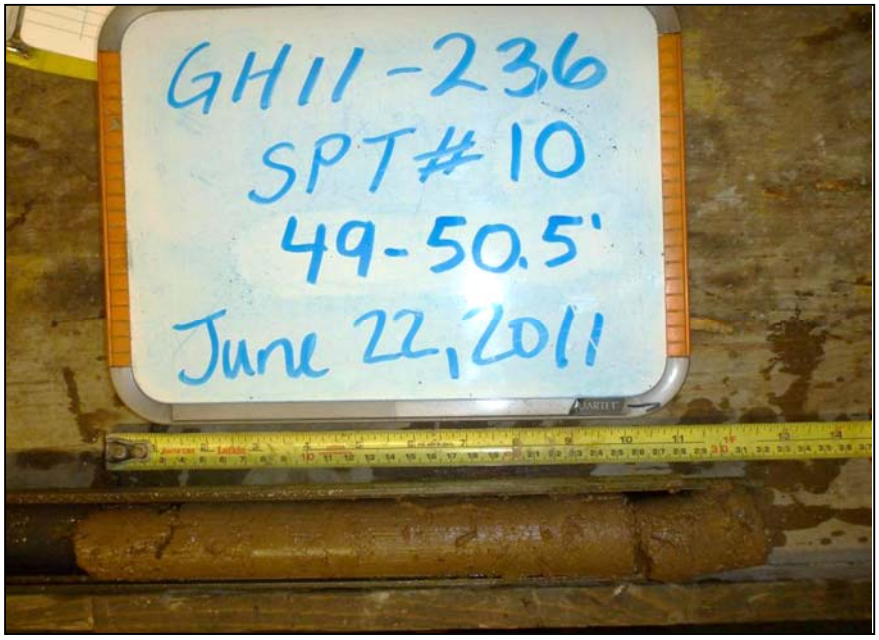

PHOTO 52 - GH11-236 SPT #10 49-50.5'

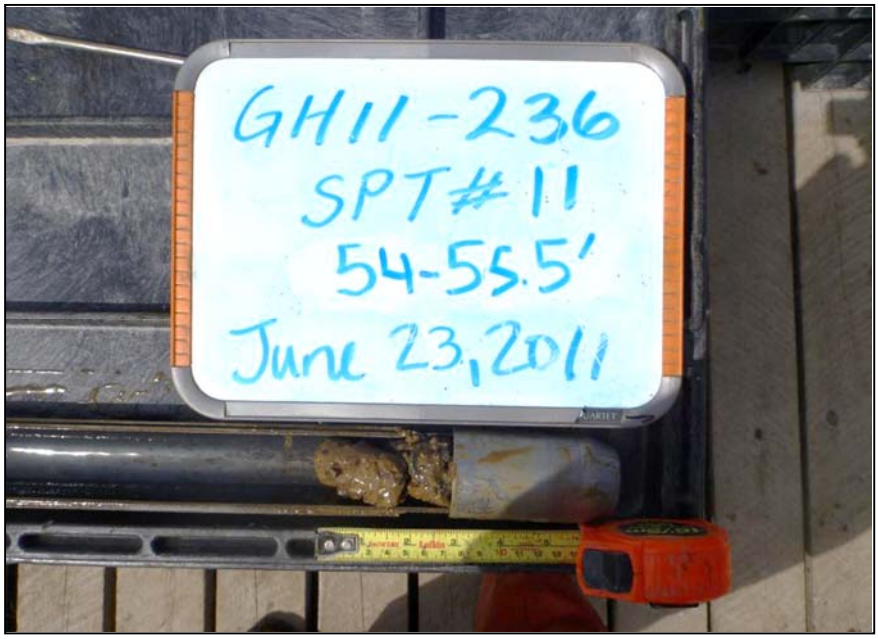

PHOTO 53 - GH11-236 SPT #11 54-55.5'



PHOTO 54 - GH11-236 SPT #12 59.5-61'



PHOTO 55 - GH11-236 SPT #13 64-65.5'



PHOTO 56 - GH11-236 SPT #14 69-70.5'

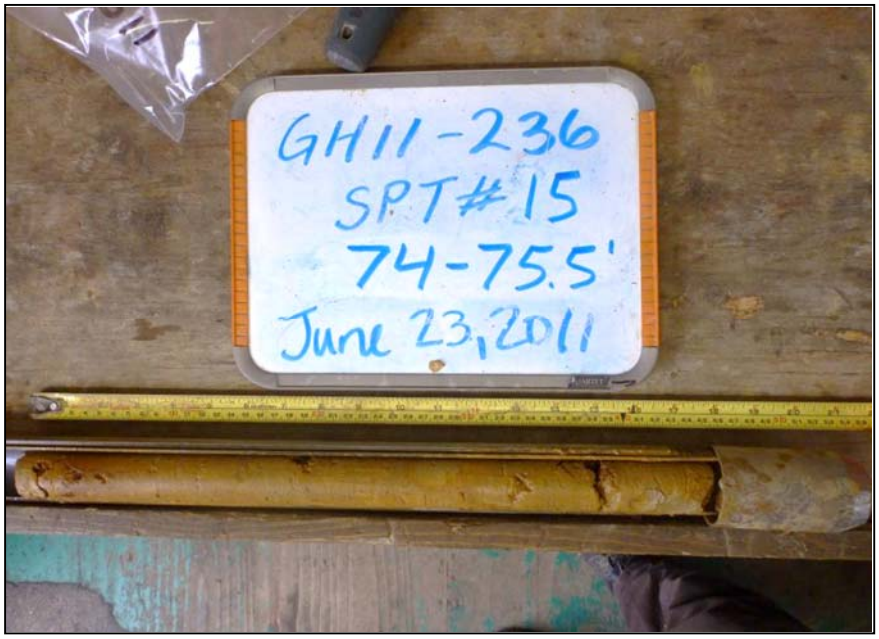

PHOTO 57 - GH11-236 SPT #15 74-75.5'

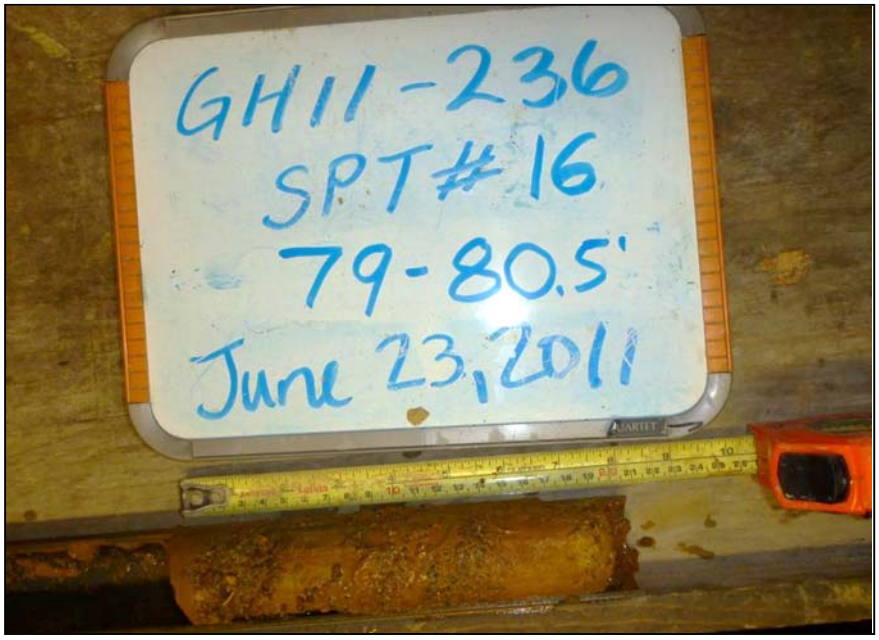

PHOTO 58 - GH11-236 SPT #16 79-80.5'



PHOTO 59 - GH11-236 SPT #18 89-90.5'

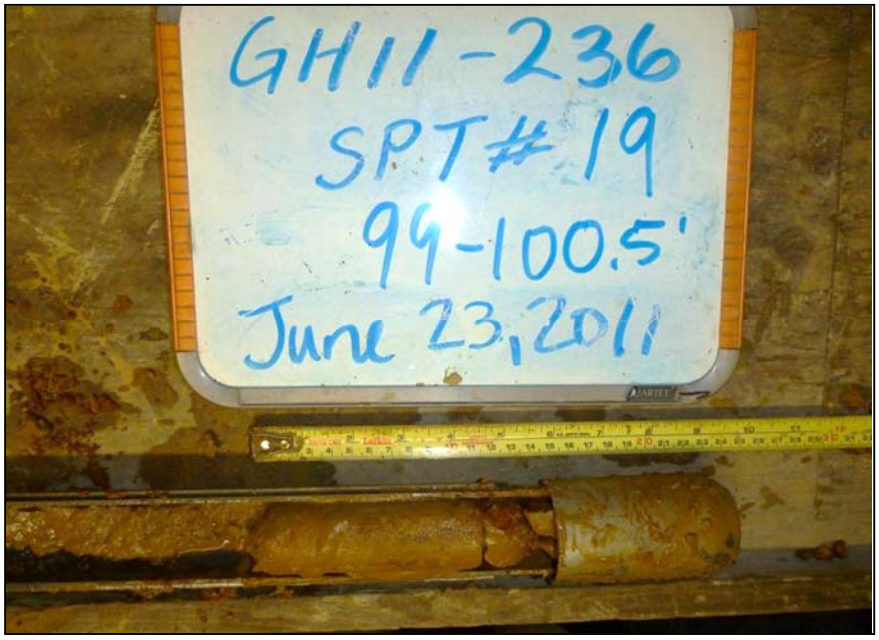

PHOTO 60 - GH11-236 SPT #19 99-100.5'



PHOTO 61 - GH11-237 SPT #2 9-10.5'



PHOTO 62 - GH11-237 SPT #3 14-15.5'

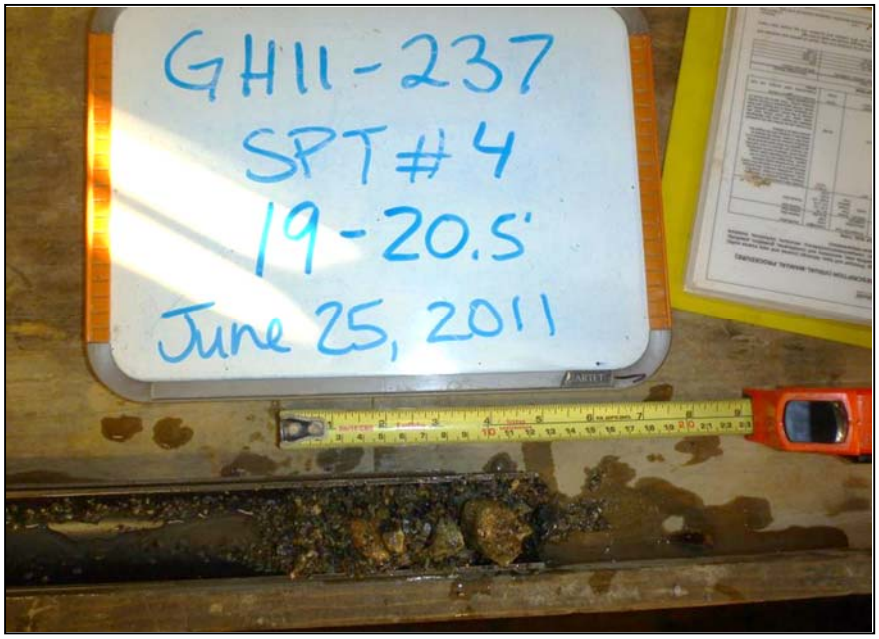

PHOTO 63 - GH11-237 SPT #4 19-20.5'



PHOTO 64 - GH11-237 SPT #5 24-25.5'



PHOTO 65 - GH11-237 SPT #6 29-30.5'



PHOTO 66 - GH11-237 SPT #7 34-35.5'



PHOTO 67 - GH11-237 SPT #8 39-40.5'



PHOTO 68 - GH11-237 SPT #9 44-45.5'

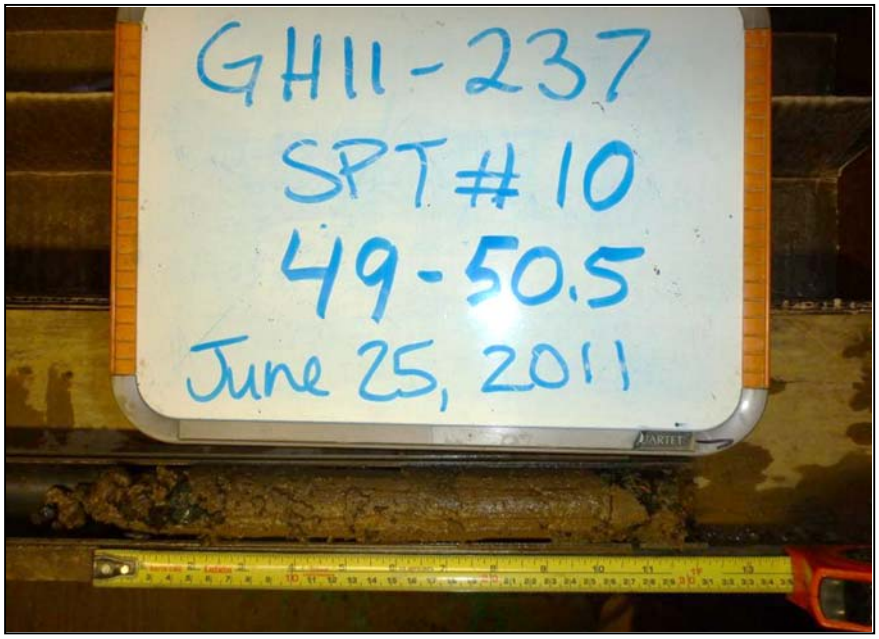

PHOTO 69 - GH11-237 SPT #10 49-50.5'

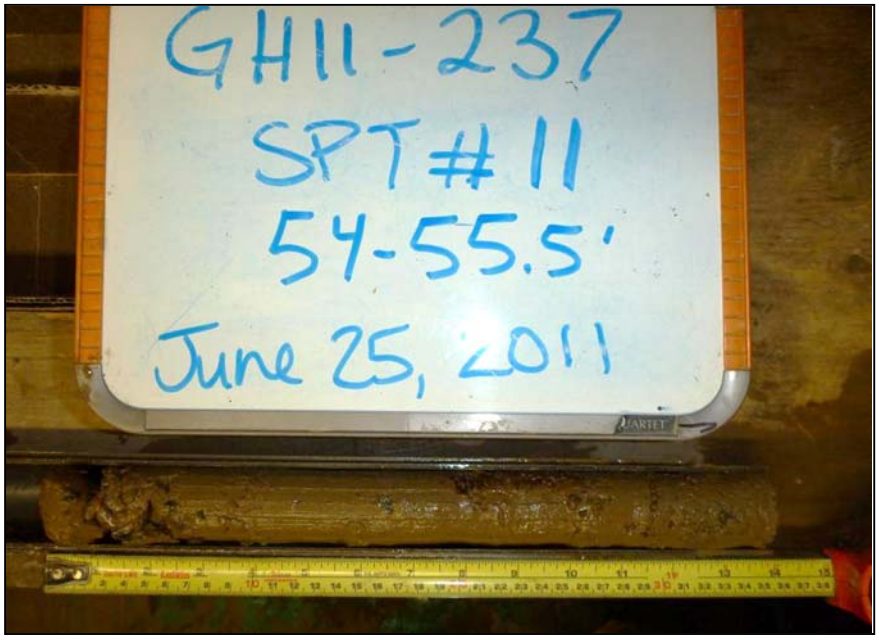

PHOTO 70 - GH11-237 SPT #11 54-55.5'

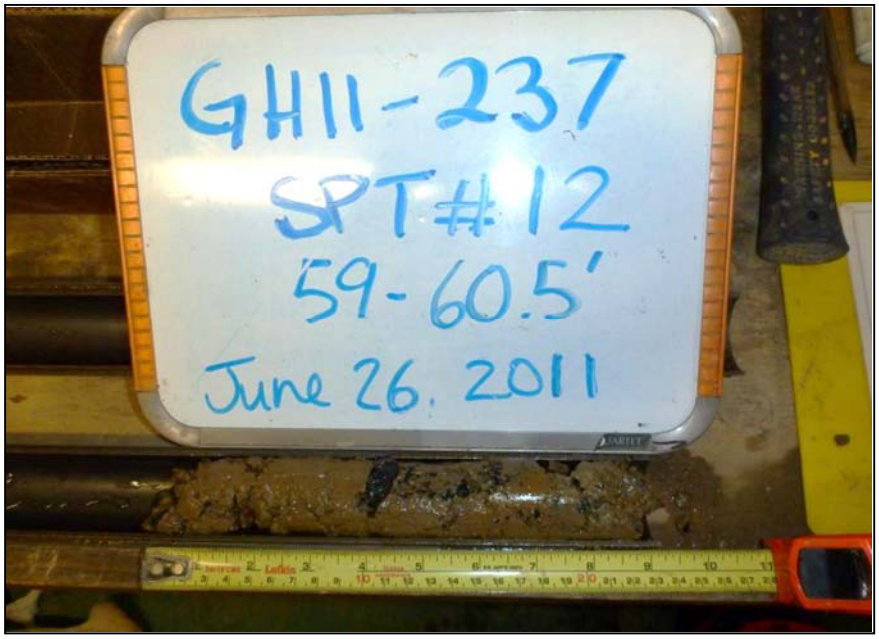

PHOTO 71 - GH11-237 SPT #12 59-60.5'



PHOTO 72 - GH11-237 SPT #16 79-80.5'



PHOTO 73 - GH11-237 SPT #17 84-85.5'

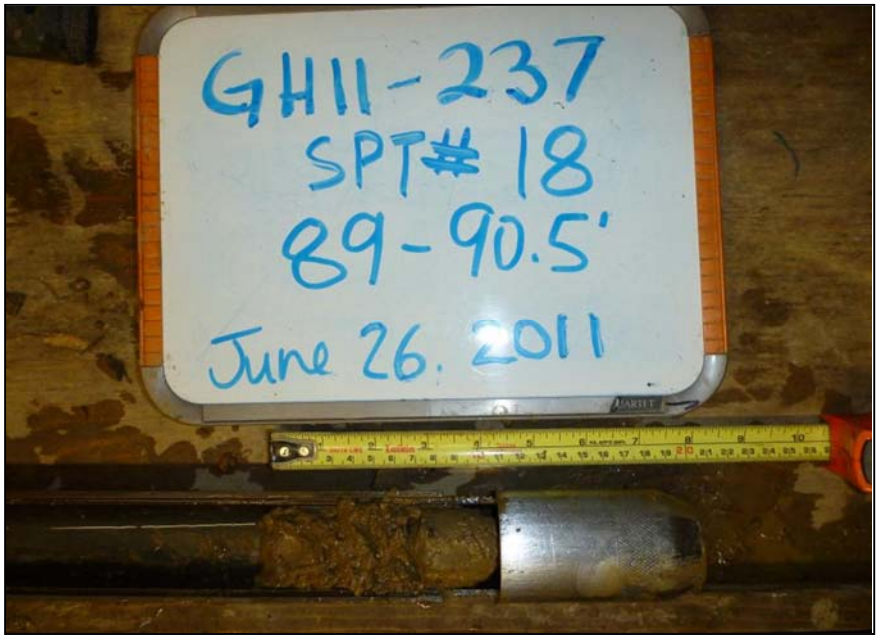

PHOTO 74 - GH11-237 SPT #18 89-90.5'

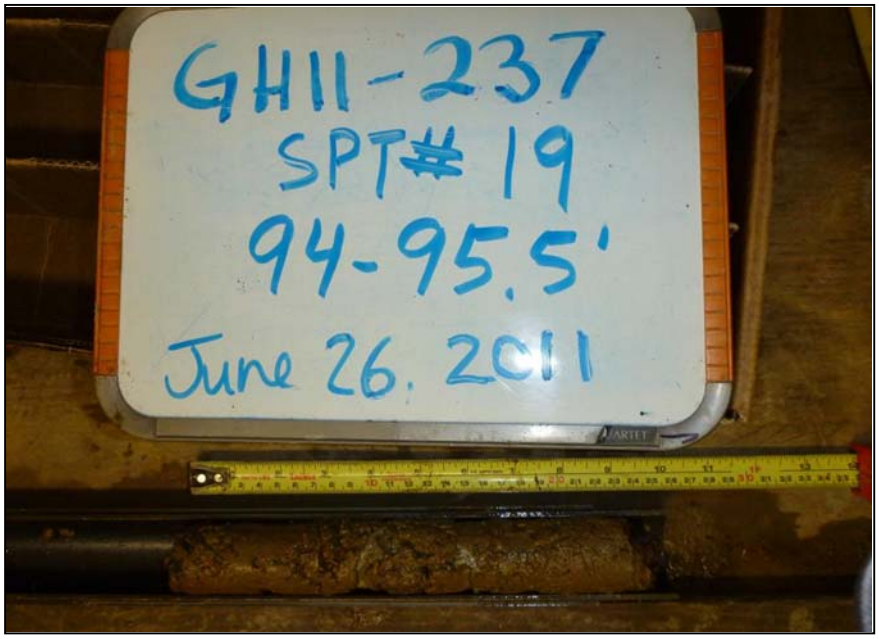

PHOTO 75 - GH11-237 SPT #19 94-95.5'



PHOTO 76 - GH11-237 SPT #20 99-100.5'

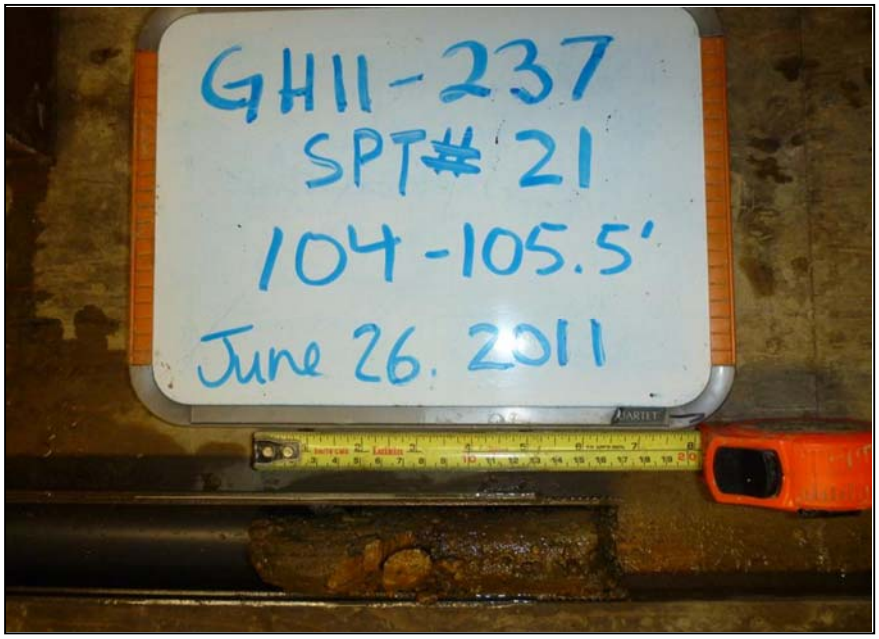

PHOTO 77 - GH11-237 SPT #21 104-105.5'



PHOTO 78 - GH11-237 SPT #22 109-110.5'



PHOTO 79 - GH11-238 SPT #1 3-4.5'



PHOTO 80 - GH11-238 SPT #2 8-9.5'



PHOTO 81 - GH11-238 SPT #3 13-14.5'

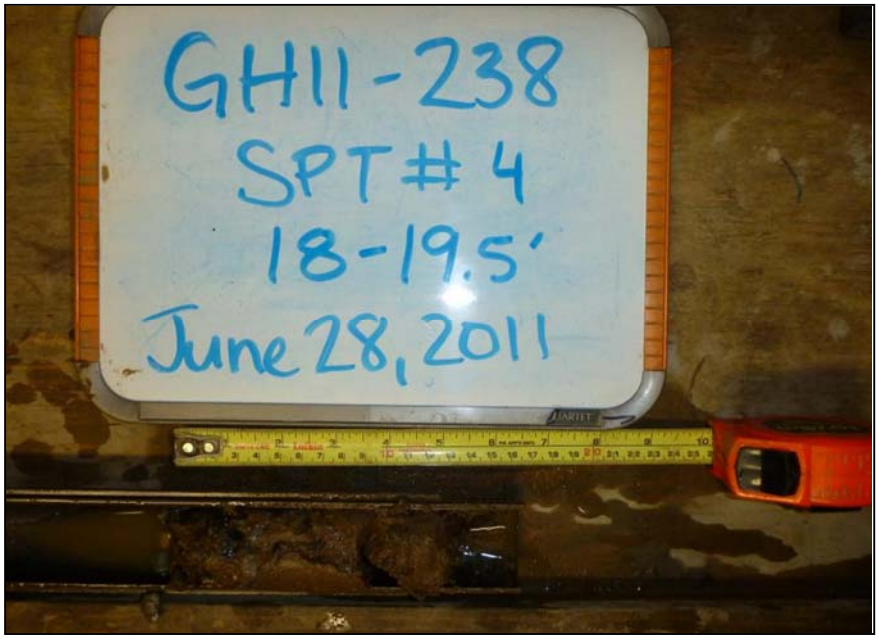

PHOTO 82 - GH11-238 SPT #4 18-19.5'



PHOTO 83 - GH11-238 SPT #5 23-24.5'



PHOTO 84 - GH11-238 SPT #6 28-29.5'



PHOTO 85 - GH11-238 SPT #7 33-34.5'



PHOTO 86 - GH11-238 SPT #8 38-39.5'



PHOTO 87 - GH11-238 SPT #9 43-44.5'



PHOTO 88 - GH11-238 SPT #10 48-49.5'

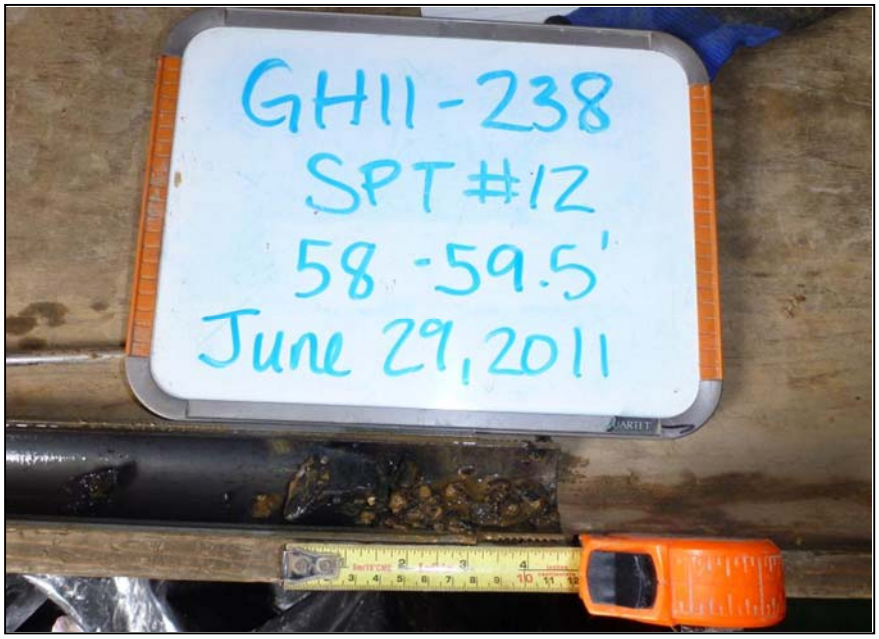

PHOTO 89 - GH11-238 SPT #12 58-59.5'

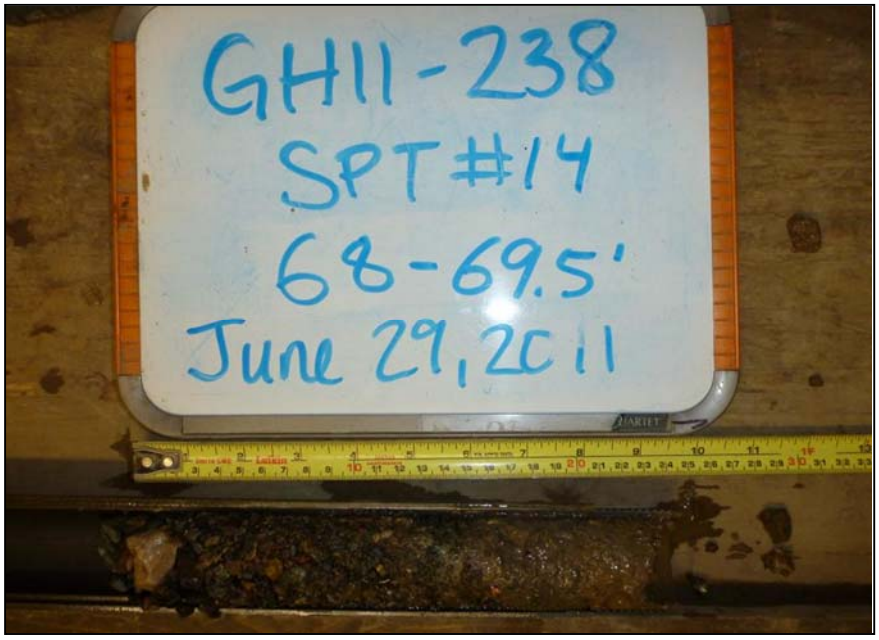

PHOTO 90 - GH11-238 SPT #14 68-69.5'

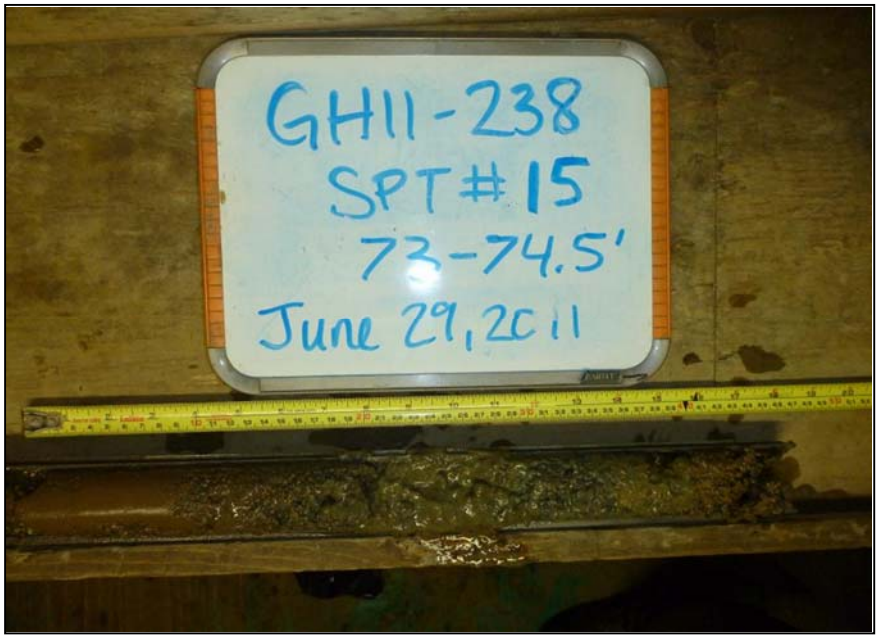

PHOTO 91 - GH11-238 SPT #15 73-74.5'



PHOTO 92 - GH11-238 SPT #16 78-79.5'

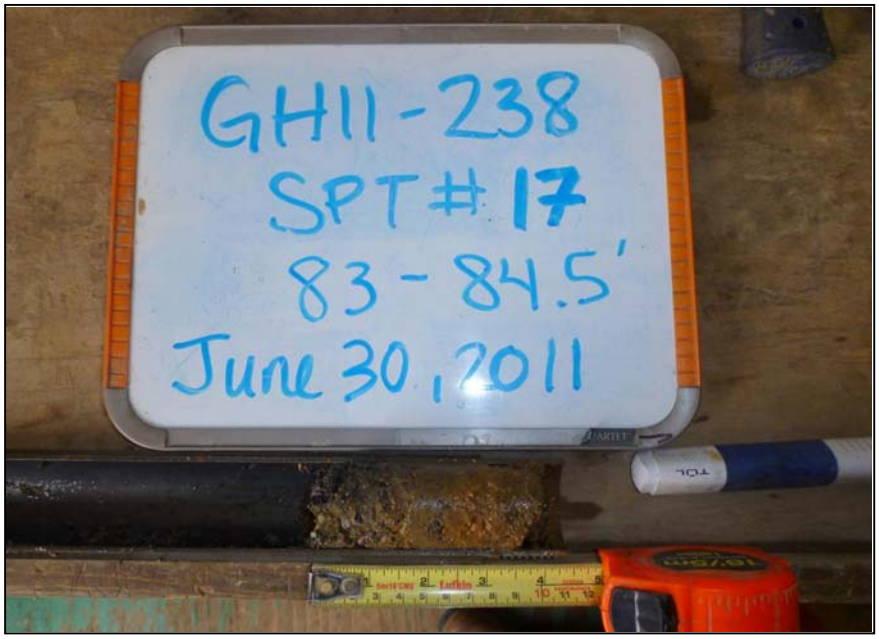

PHOTO 93 - GH11-238 SPT #17 83-84.5'

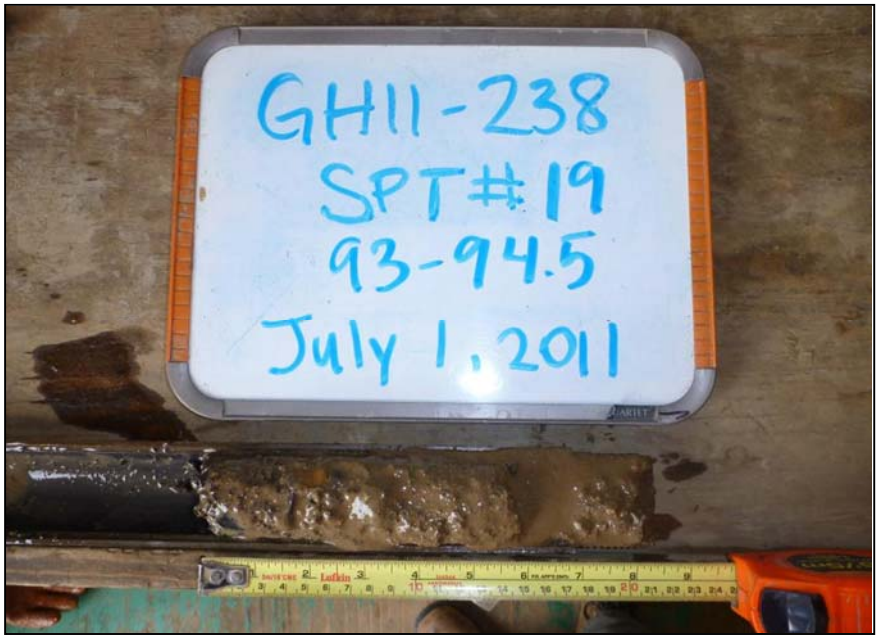

PHOTO 94 - GH11-238 SPT #19 93-94.5'

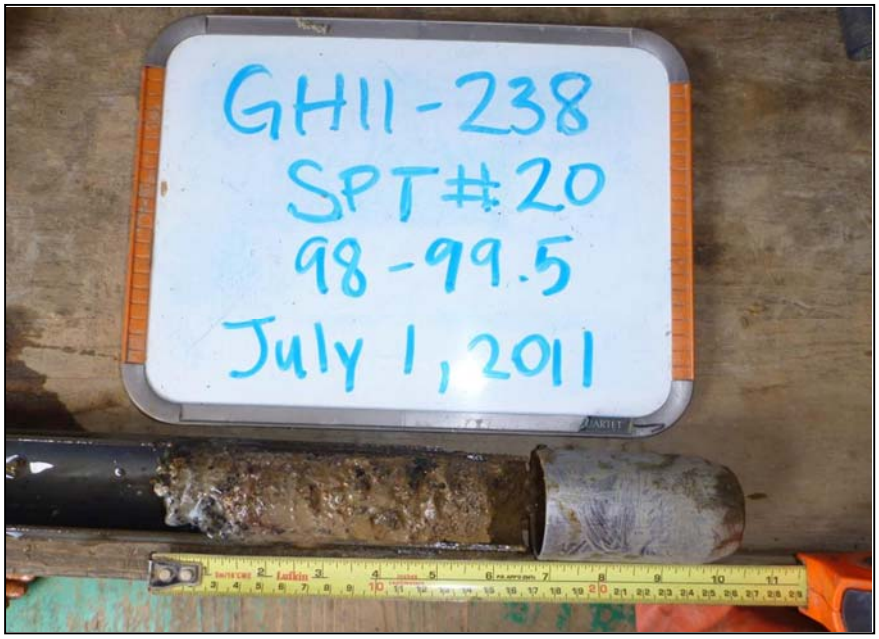

PHOTO 95 - GH11-238 SPT #20 98-99.5'

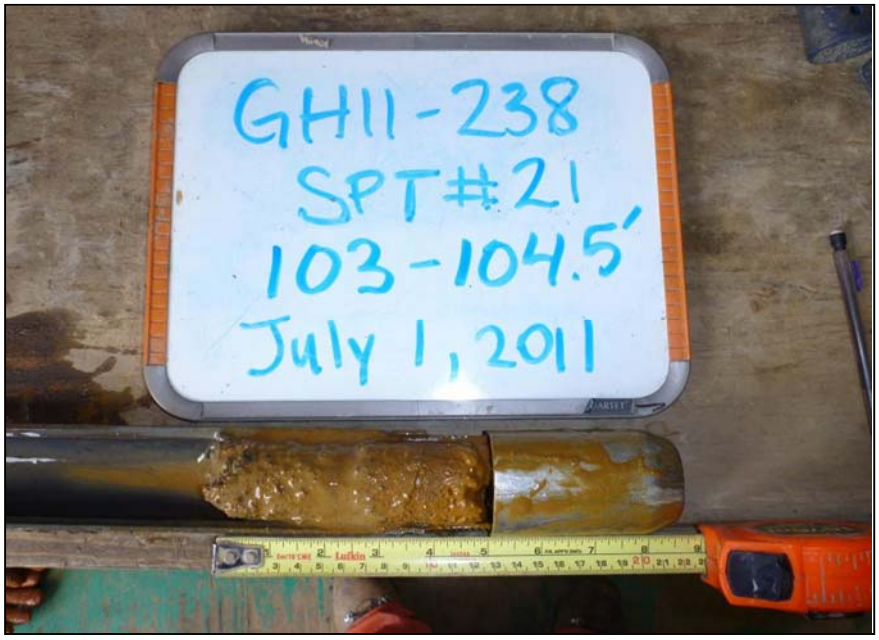

PHOTO 96 - GH11-238 SPT #21 103-104.5'



PHOTO 97 - GH11-238 SPT #22 108-109.5'

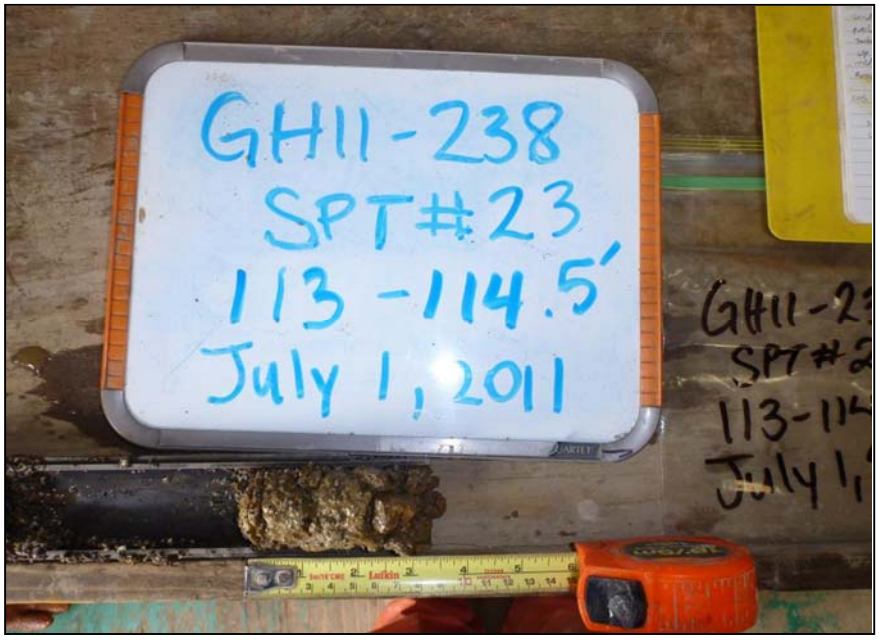

PHOTO 98 - GH11-238 SPT #23 113-114.5'



PHOTO 99 - GH11-238 SPT #25 123-124.5'



PHOTO 100 GH11-238 SPT #26 128-129.5'



PHOTO 101 GH11-238 SPT #27 133-134.5'

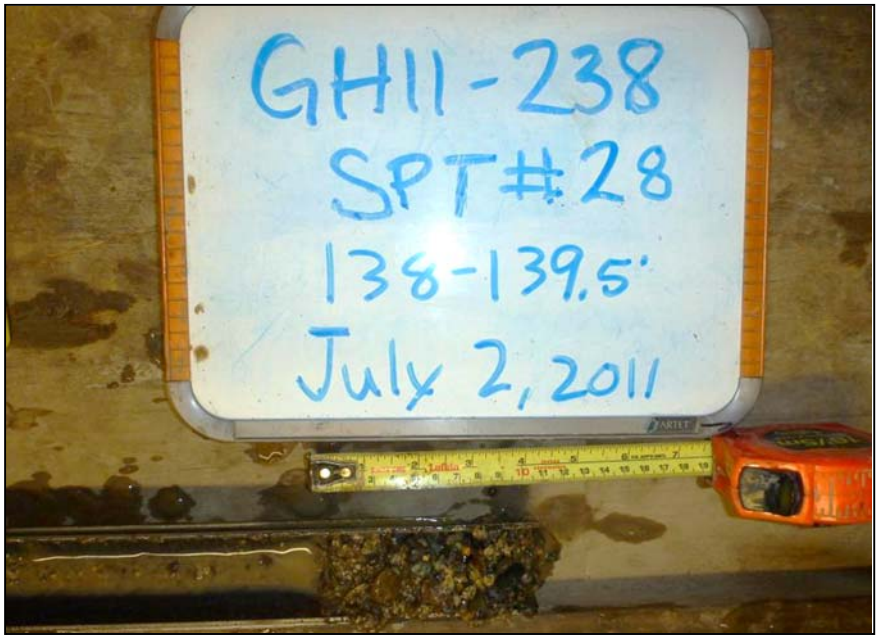

PHOTO 102 GH11-238 SPT #28 138-139.5'



PHOTO 103 GH11-238 SPT #29 143-144.5'

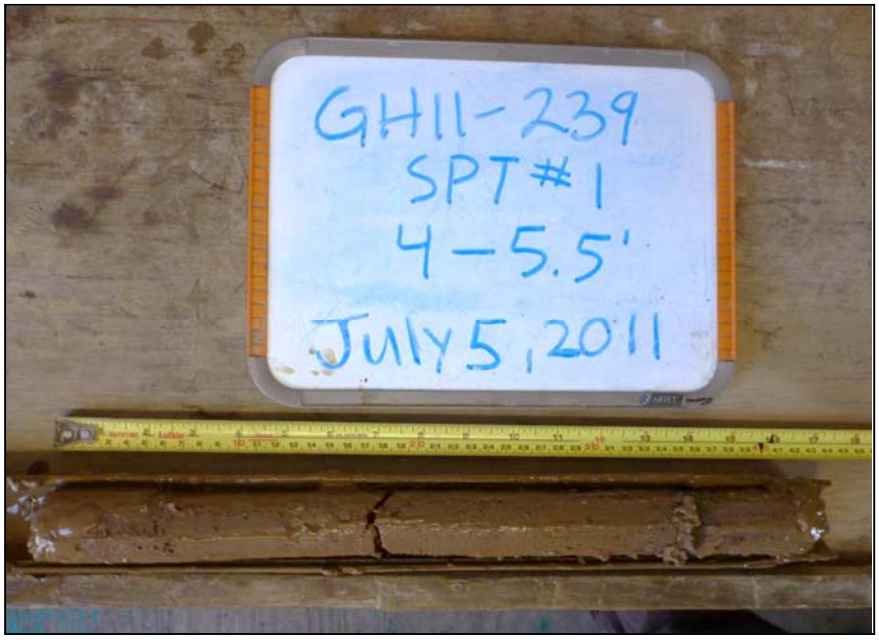

PHOTO 104 GH11-239 SPT #1 4-5.5'



PHOTO 105 GH11-239 SPT #2 9-10.5'



PHOTO 106 GH11-239 SPT #3 15.5-17'



PHOTO 107 GH11-239 SPT #4 19-20.5'

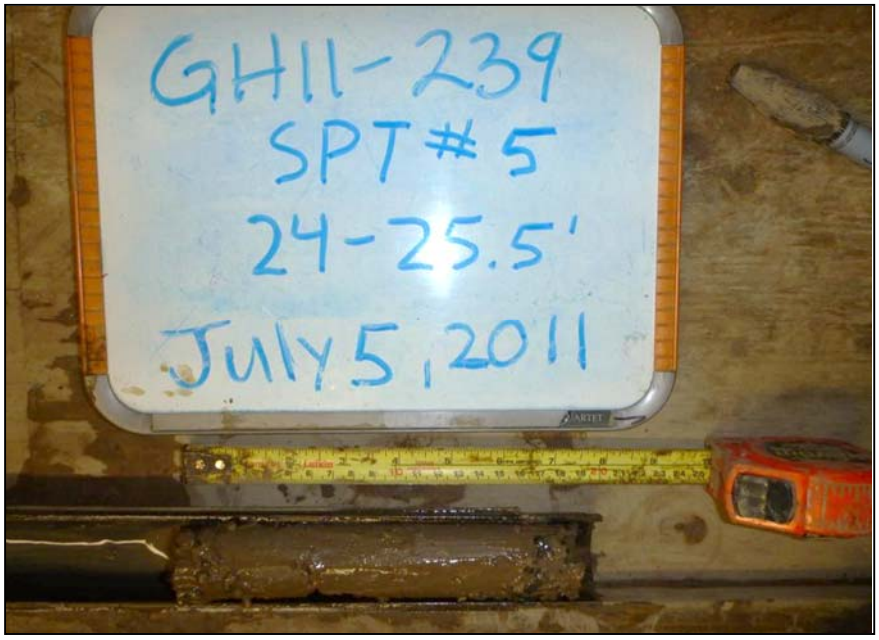

PHOTO 108 GH11-239 SPT #5 24-25.5'



PHOTO 109 GH11-239 SPT #6 29-30.5'



PHOTO 110 GH11-239 SPT #7 34-35.5'

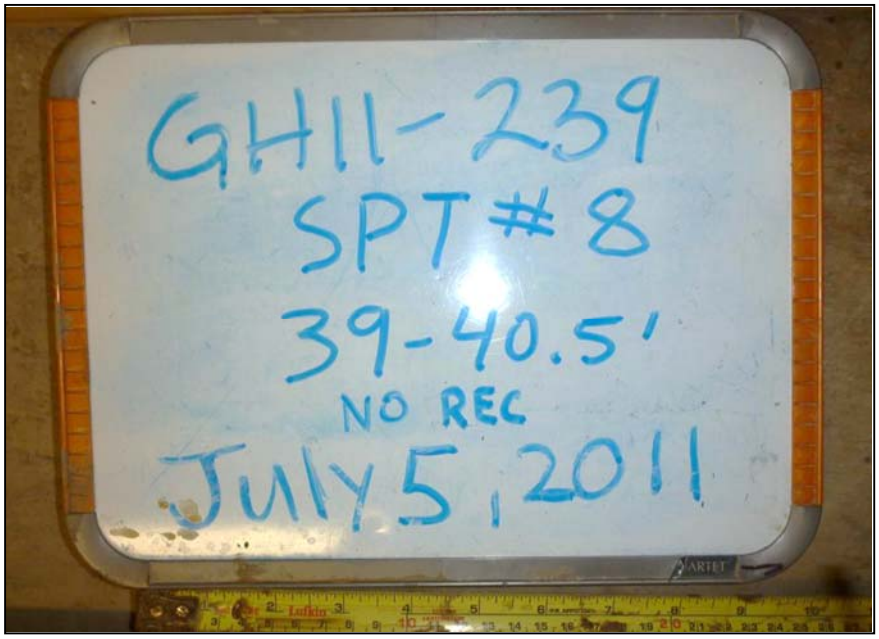

PHOTO 111 GH11-239 SPT #8 39-40.5'

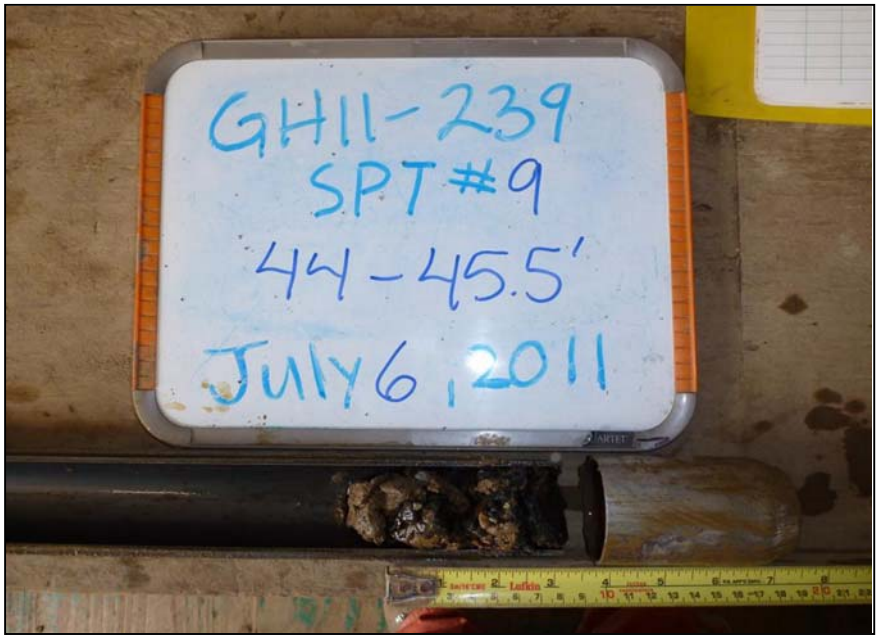

PHOTO 112 GH11-239 SPT #9 44-45.5'

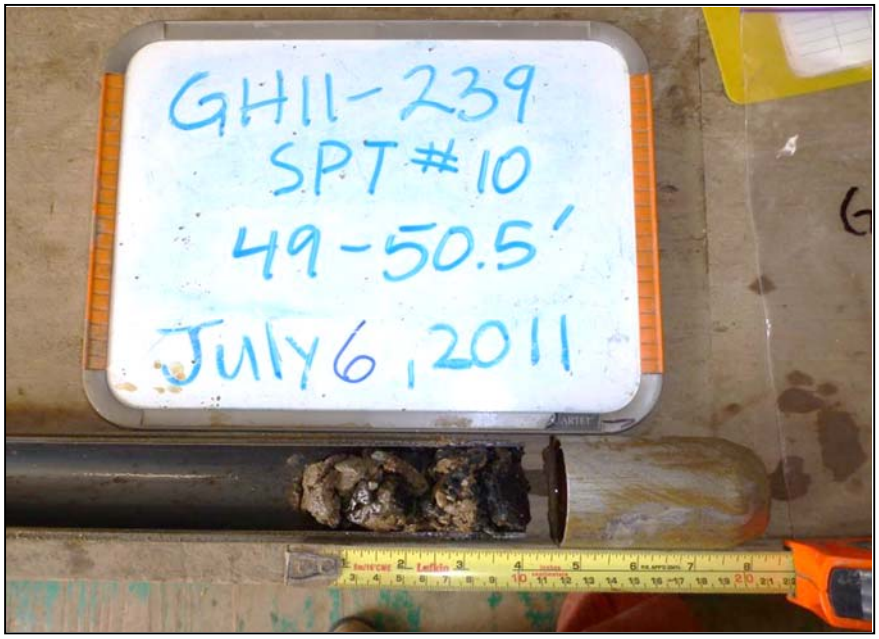

PHOTO 113 GH11-239 SPT #10 49-50.5'

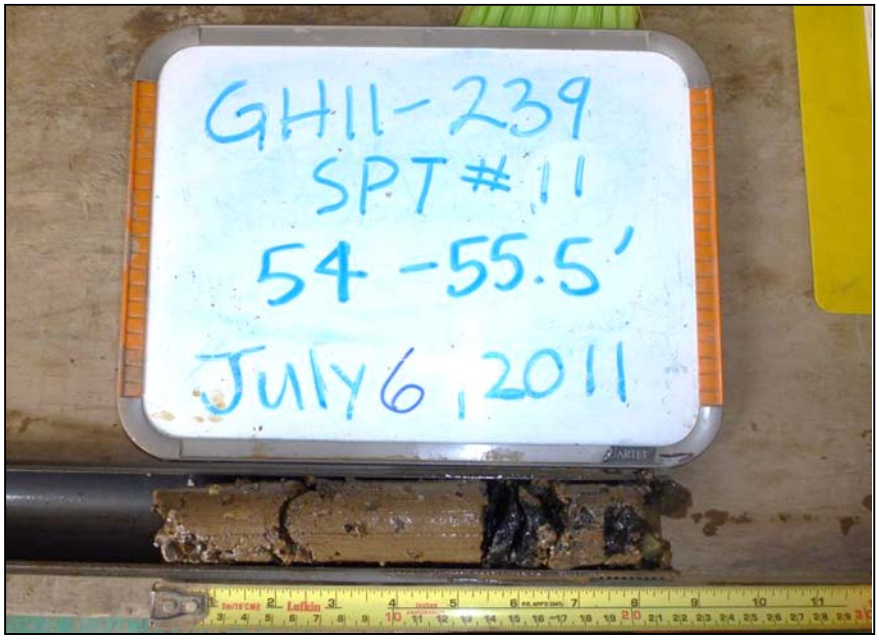

PHOTO 114 GH11-239 SPT #11 54-55.5'



PHOTO 115 GH11-239 SPT #12 59-60.5'

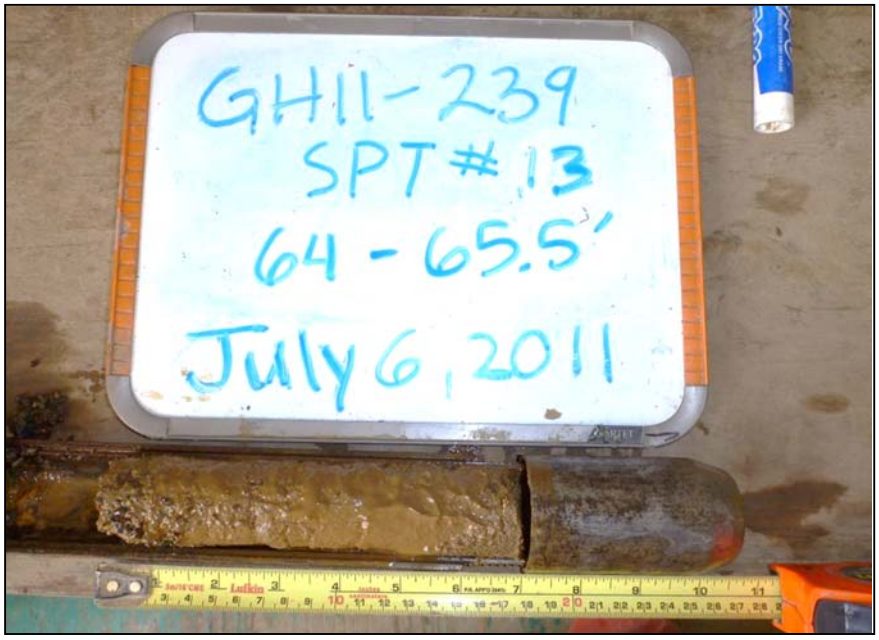

PHOTO 116 GH11-239 SPT #13 64-65.5'

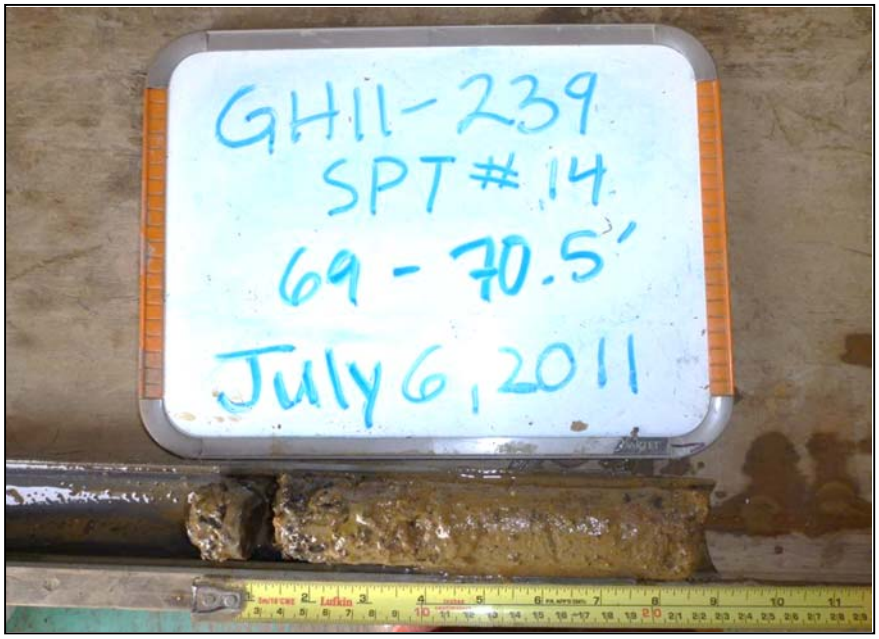

PHOTO 117 GH11-239 SPT #14 69-70.5'



PHOTO 118 GH11-239 SPT #15 74-75.5'



PHOTO 119 GH11-239 SPT #16 79-80.5'



PHOTO 120 GH11-239 SPT #17 84-85.5'

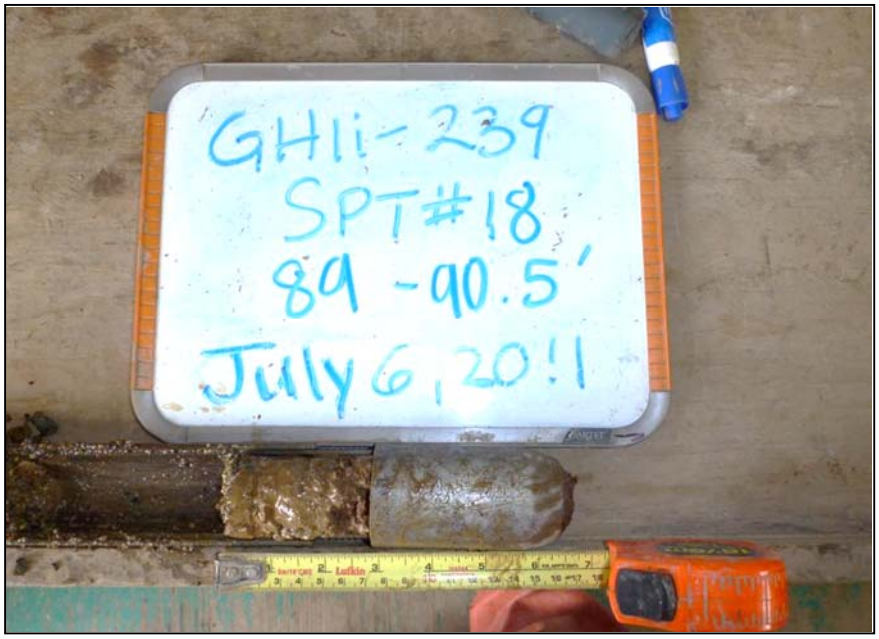

PHOTO 121 GH11-239 SPT #18 89-90.5'



PHOTO 122 GH11-239 SPT #19 94-95.5'



PHOTO 123 GH11-239 SPT #20 99-100.5'

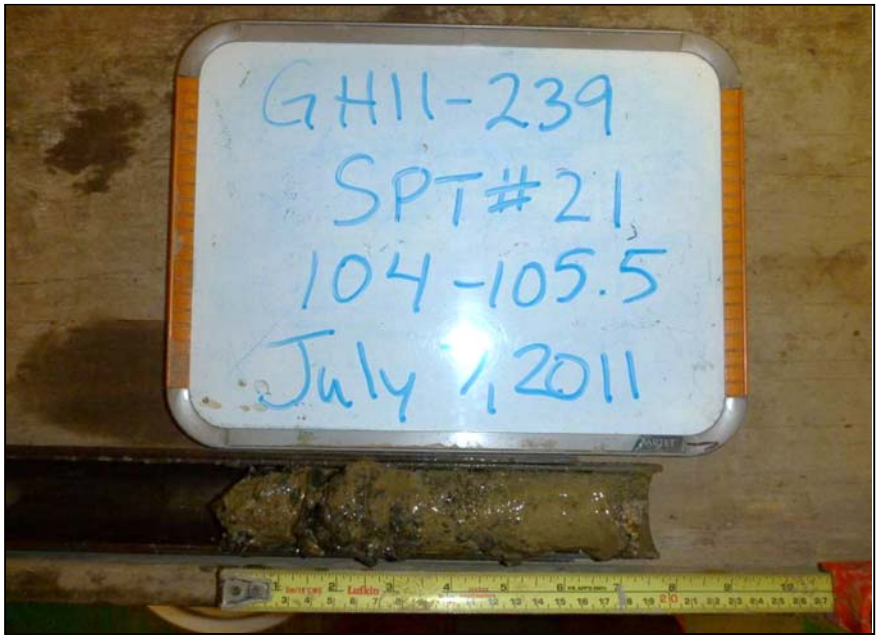

PHOTO 124 GH11-239 SPT #21 104-105.5'

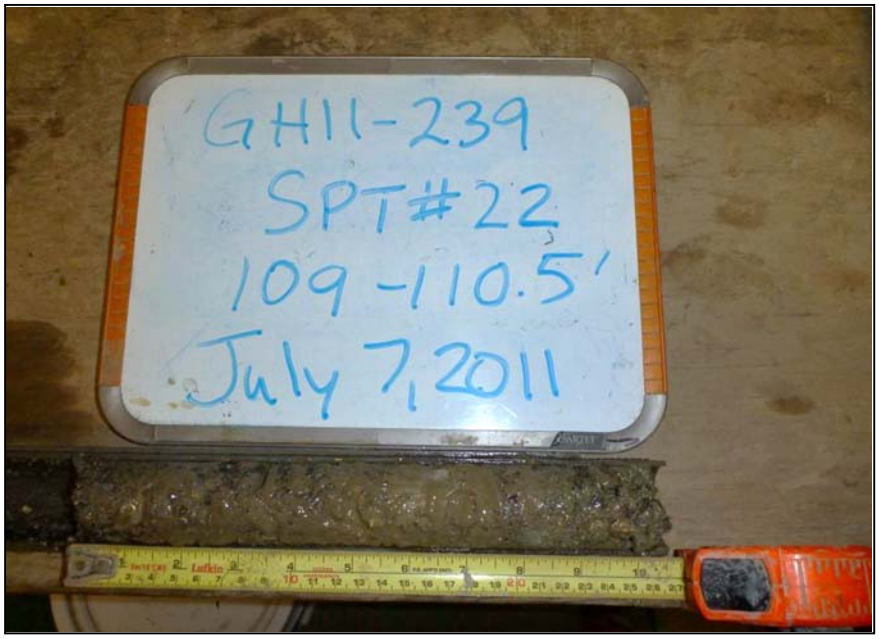

PHOTO 125 GH11-239 SPT #22 109-110.5'



PHOTO 126 GH11-239 SPT #23 114-115.5'

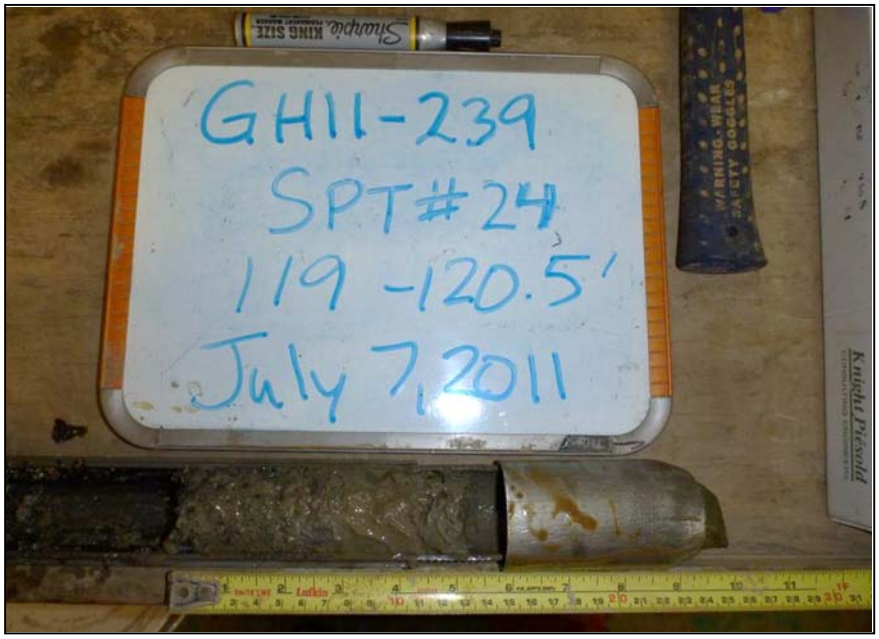

PHOTO 127 GH11-239 SPT #24 119-120.5'

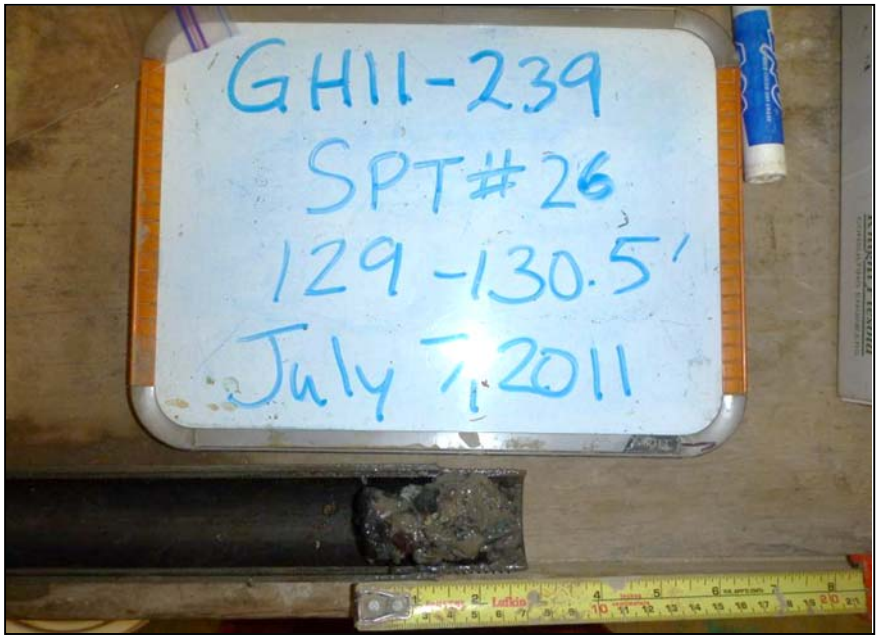

PHOTO 128 GH11-239 SPT #26 129-130.5'



PHOTO 129 GH11-239 SPT #27 139-140.5'



PHOTO 130 GH11-239 SPT #28 144-145.5'

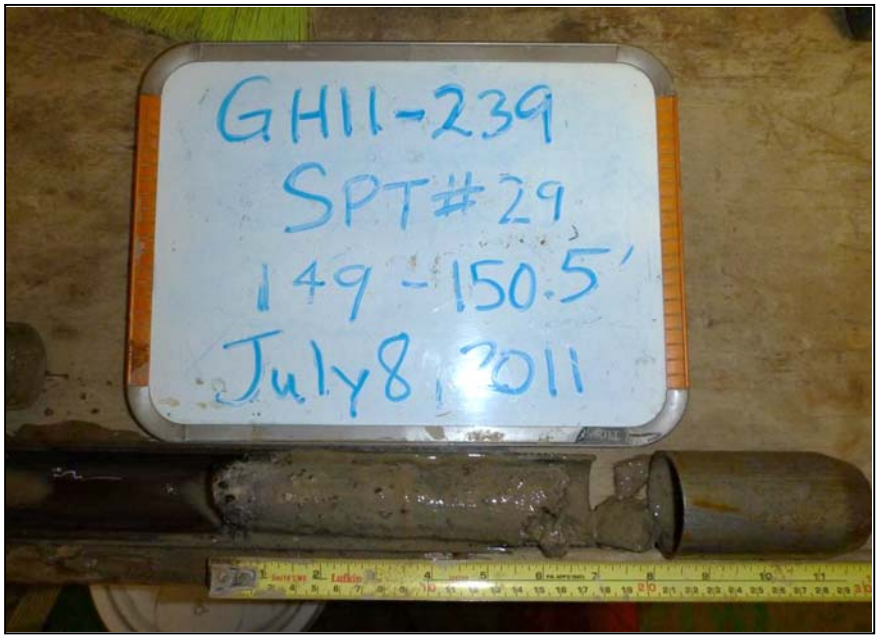

PHOTO 131 GH11-239 SPT #29 149-150.5'

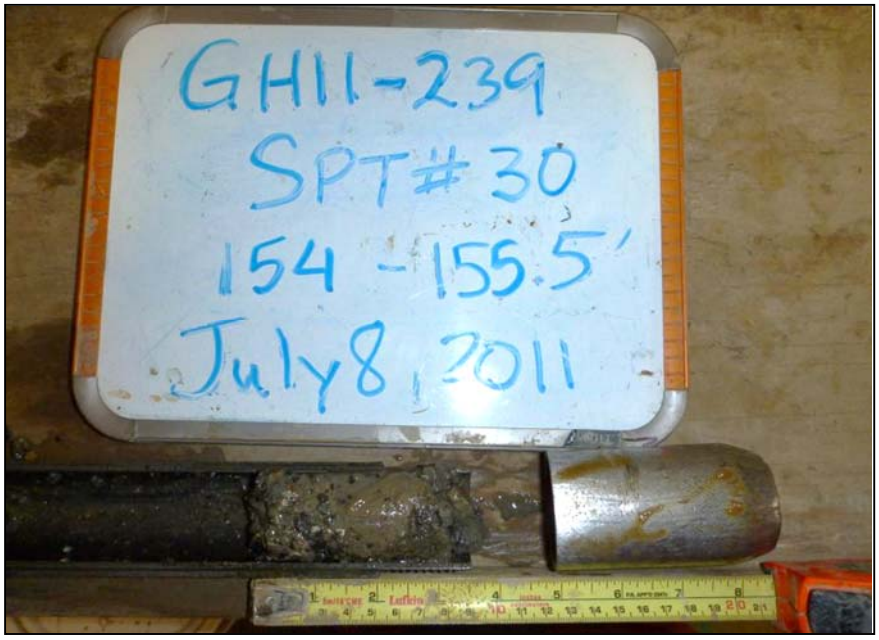

PHOTO 132 GH11-239 SPT #30 154-155.5'



PHOTO 133 GH11-239 SPT #31 159-160.5'



PHOTO 134 GH11-239 SPT #32 164-165.5'



PHOTO 135 GH11-239 SPT #33 169-170.5'

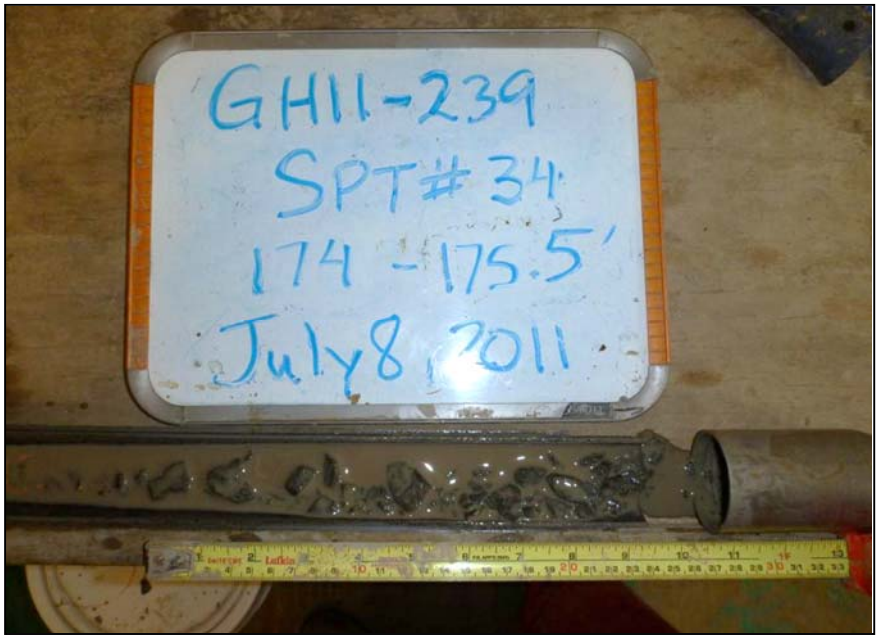

PHOTO 136 GH11-239 SPT #34 174-175.5'

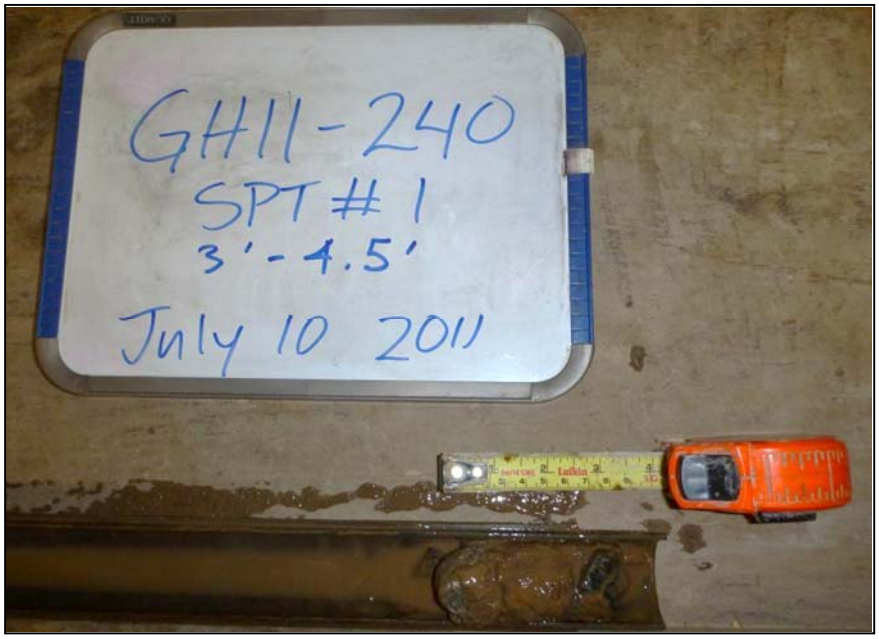

PHOTO 137 GH11-240 SPT #1 3-4.5'

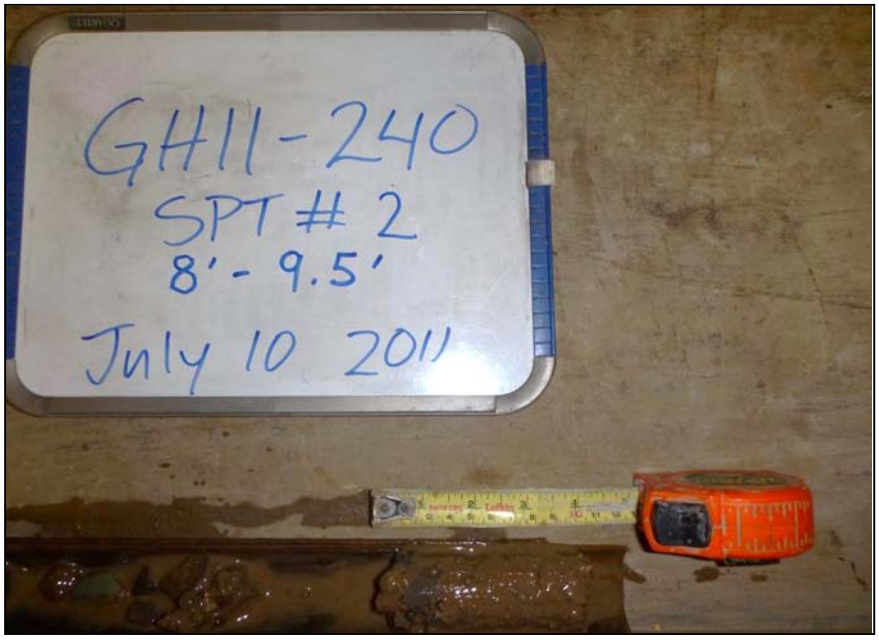

PHOTO 138 GH11-240 SPT #2 8-9.5'

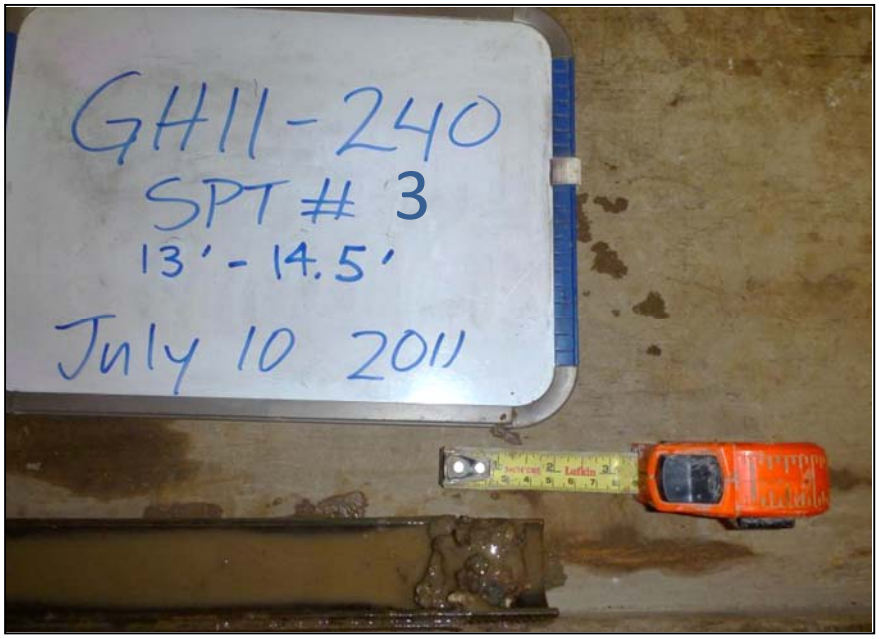

PHOTO 139 GH11-240 SPT #3 13-14.5'



PHOTO 140 GH11-240 SPT #4 18-19.5'



PHOTO 141 GH11-240 SPT #5 23-24.5'

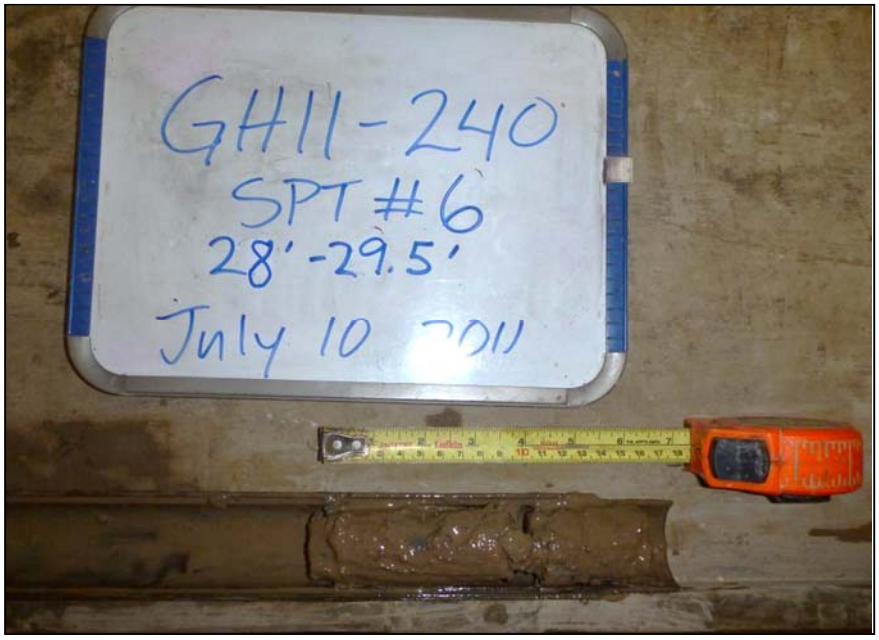

PHOTO 142 GH11-240 SPT #6 28-29.5'

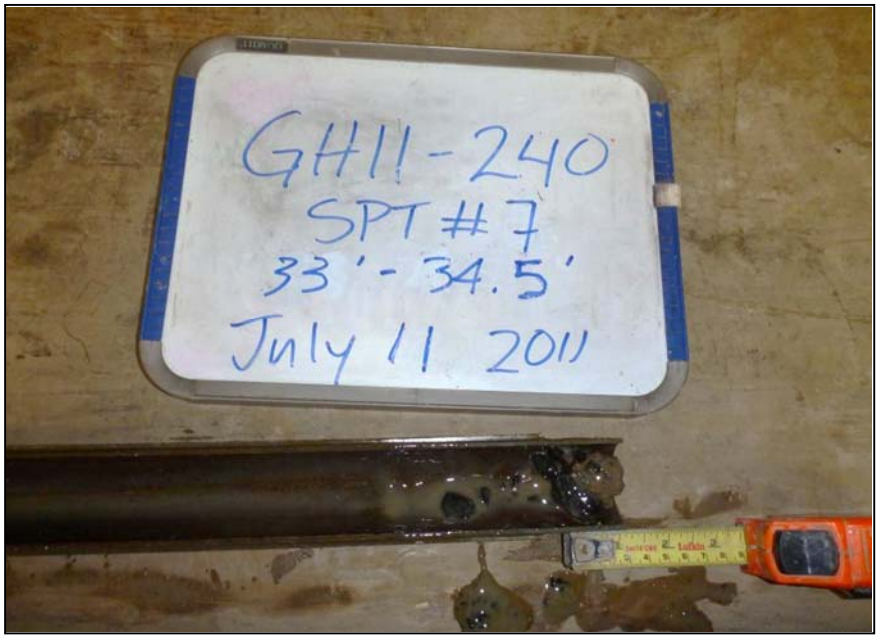

PHOTO 143 GH11-240 SPT #7 33-34.5'



PHOTO 144 GH11-240 SPT #8 38-39.5'

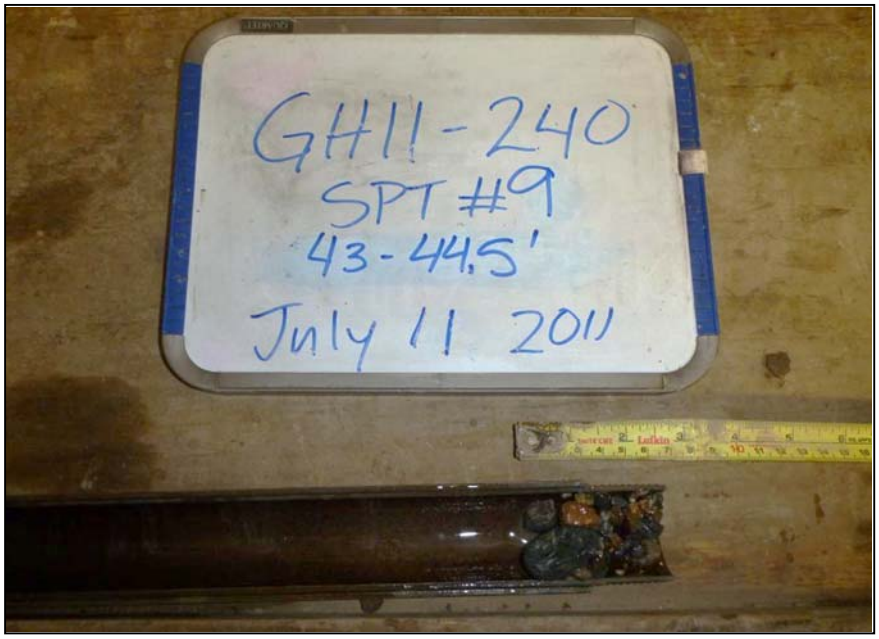

PHOTO 145 GH11-240 SPT #9 43-44.5'



PHOTO 146 GH11-240 SPT #10 48-49.5'

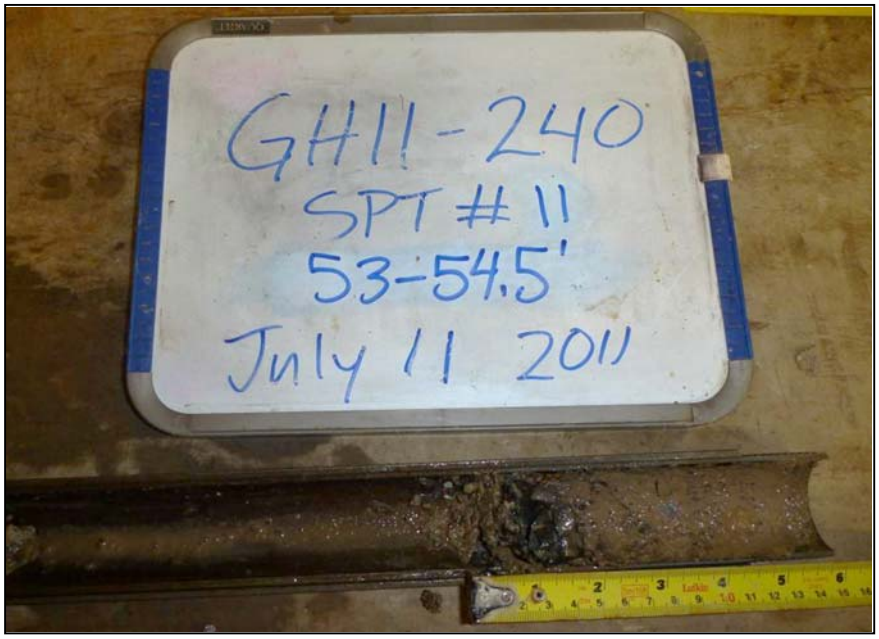

PHOTO 147 GH11-240 SPT #11 53-54.5'



PHOTO 148 GH11-240 SPT #12 58-59.5'



PHOTO 149 GH11-240 SPT #13 63-64.5'

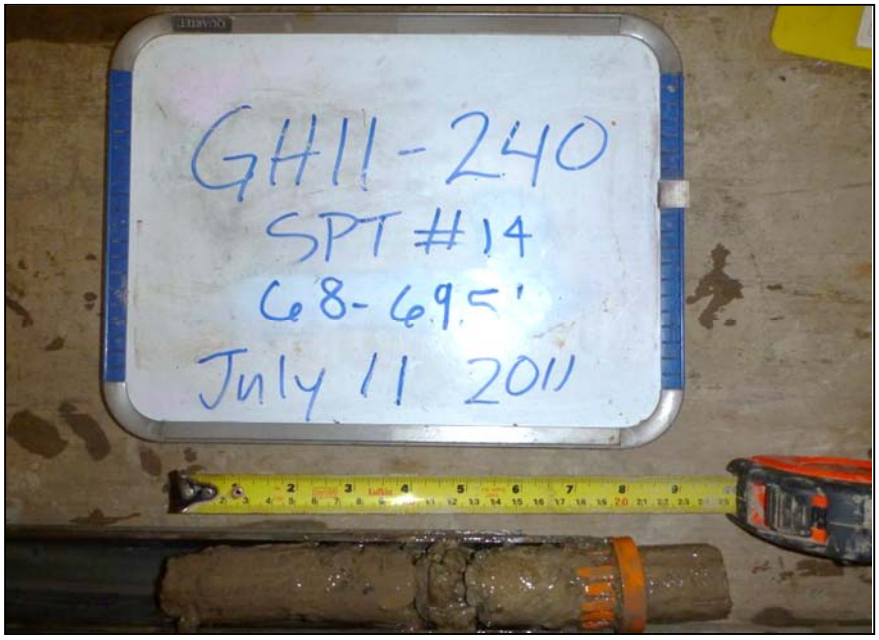

PHOTO 150 GH11-240 SPT #14 68-69.5'

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PHOTO 151 GH11-240 SPT #15 73-74.5'



PHOTO 152 GH11-240 SPT #16 78-79.5'

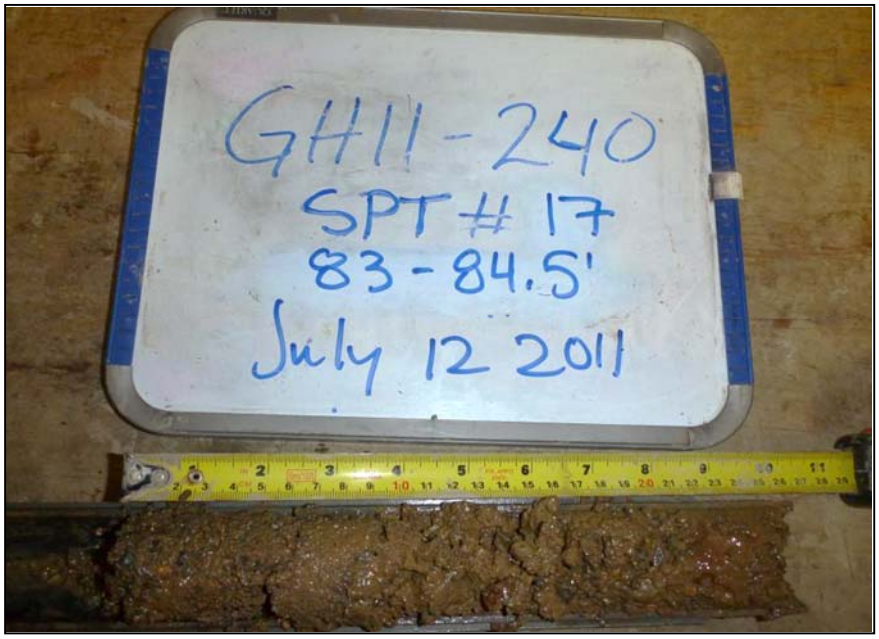

PHOTO 153 GH11-240 SPT #17 83-84.5'

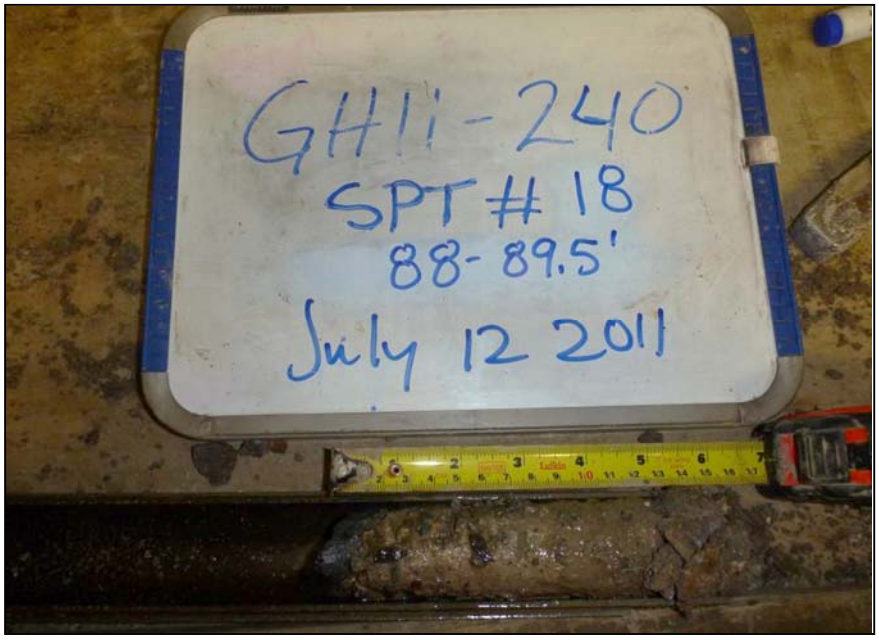

PHOTO 154 GH11-240 SPT #18 88-89.5'



PHOTO 155 GH11-240 SPT #19 93-94.5'



PHOTO 156 GH11-240 SPT #20 98-99.5'

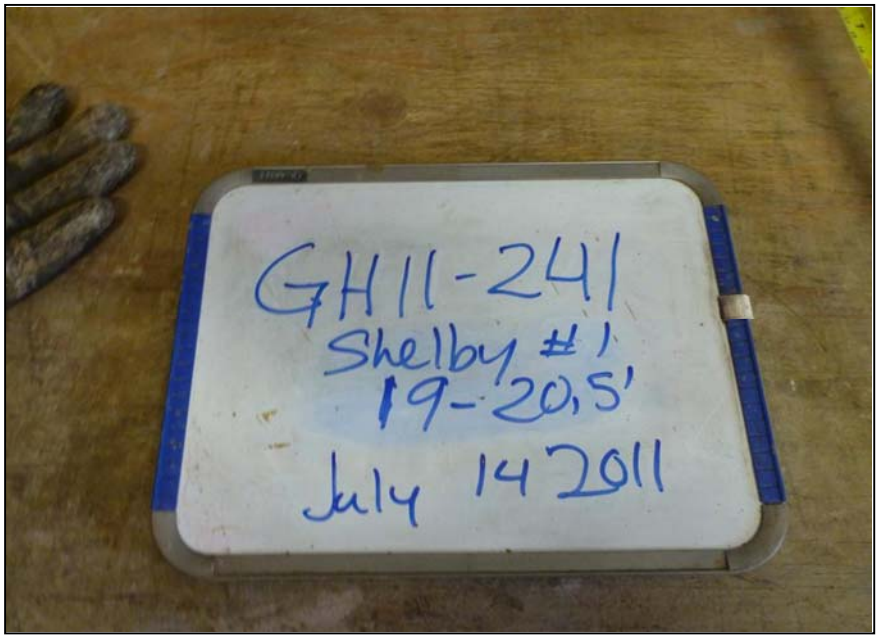

PHOTO 157 GH11-241 SHELBY #1 19-20.5'



PHOTO 158 GH11-241 SPT #1 4-5.5'



PHOTO 159 GH11-241 SPT #2 9-10.5'



PHOTO 160 GH11-241 SPT #3 14-15.5'

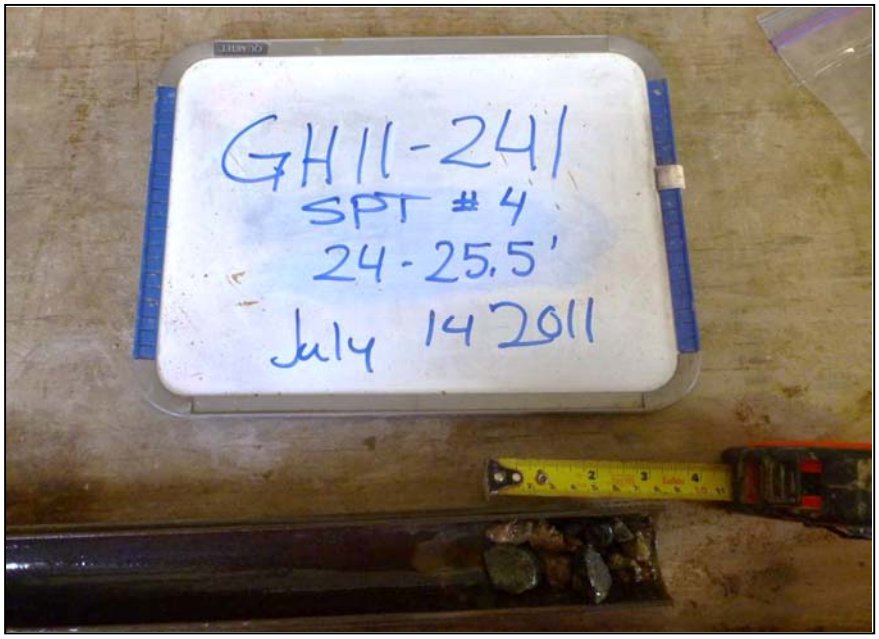

PHOTO 161 GH11-241 SPT #4 24-25.5'



PHOTO 162 GH11-241 SPT #5 29-30.5'



PHOTO 163 GH11-241 SPT #6 34-35.5'



PHOTO 164 GH11-241 SPT #7 39-40.5'



PHOTO 165 GH11-241 SPT #8 44-45.5'

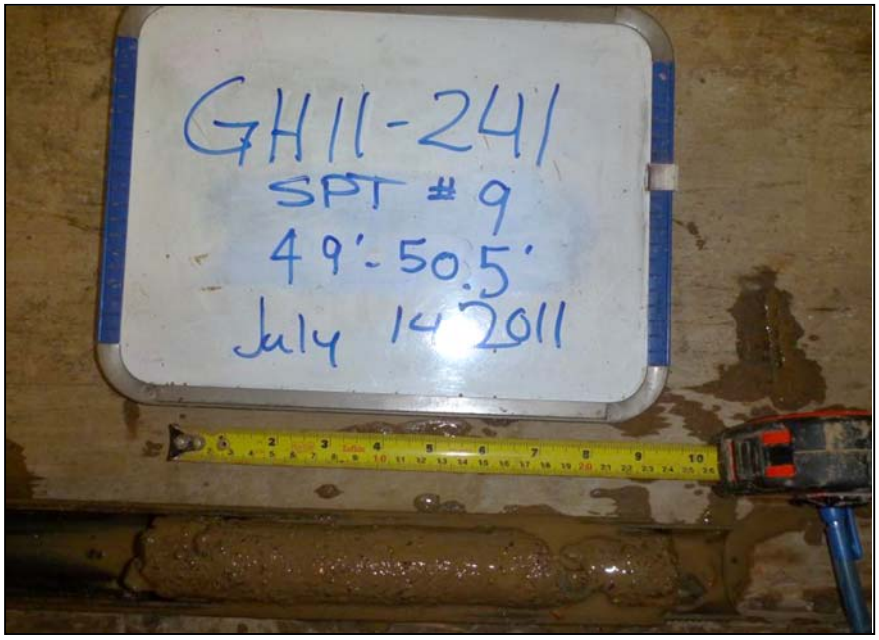

PHOTO 166 GH11-241 SPT #9 49-50.5'

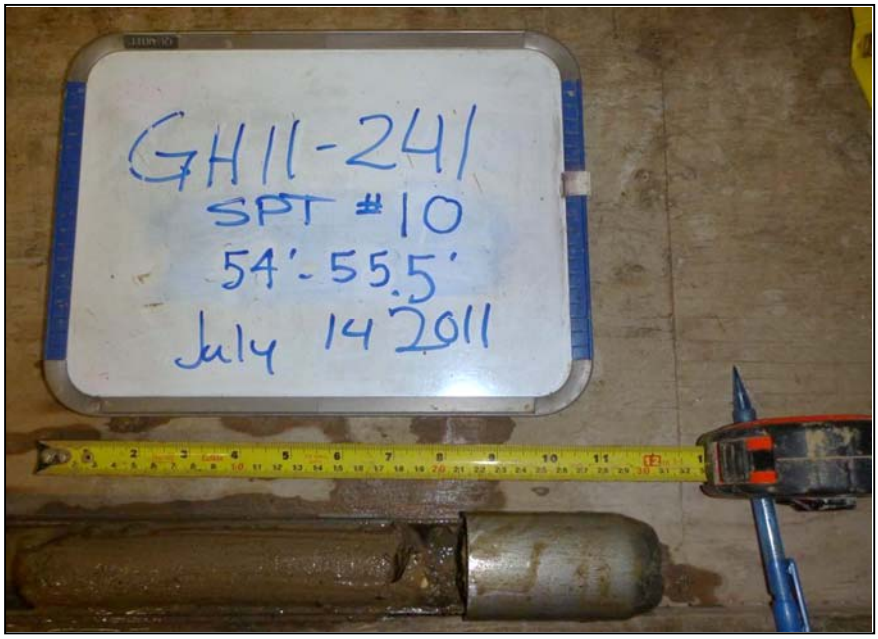

PHOTO 167 GH11-241 SPT #10 54-55.5'



PHOTO 168 GH11-241 SPT #11 59-60.5'

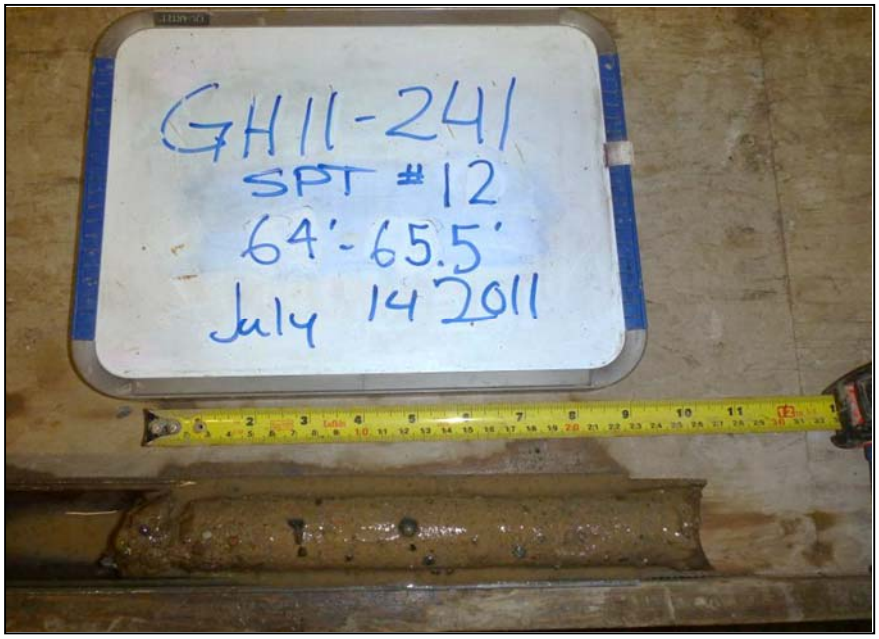

PHOTO 169 GH11-241 SPT #12 64-65.5'



PHOTO 170 GH11-241 SPT #13 69-70.5'



PHOTO 171 GH11-241 SPT #14 74-75.5'

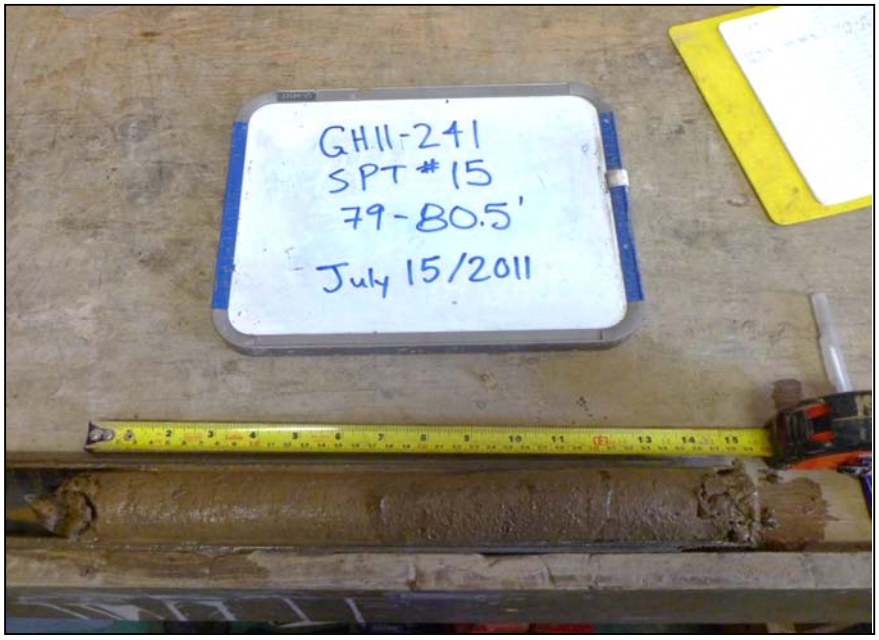

PHOTO 172 GH11-241 SPT #15 79-80.5'

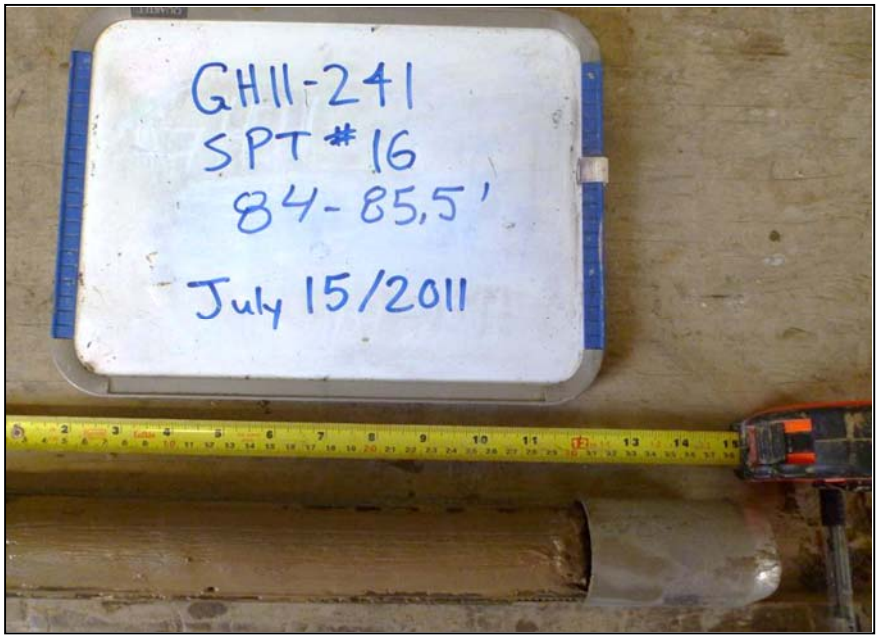

PHOTO 173 GH11-241 SPT #16 84-85.5'



PHOTO 174 GH11-241 SPT #17 90-91.5'

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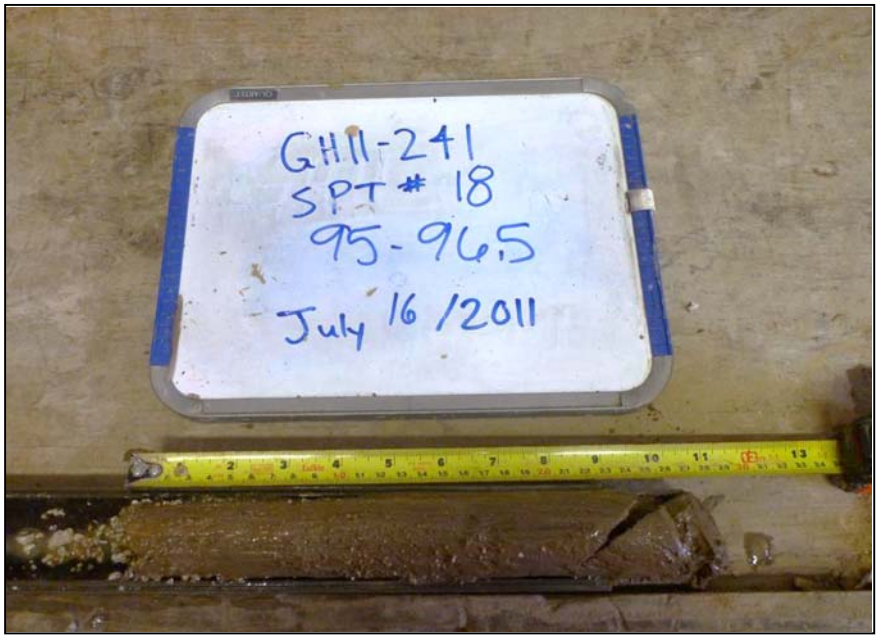

PHOTO 175 GH11-241 SPT #18 95-96.5'

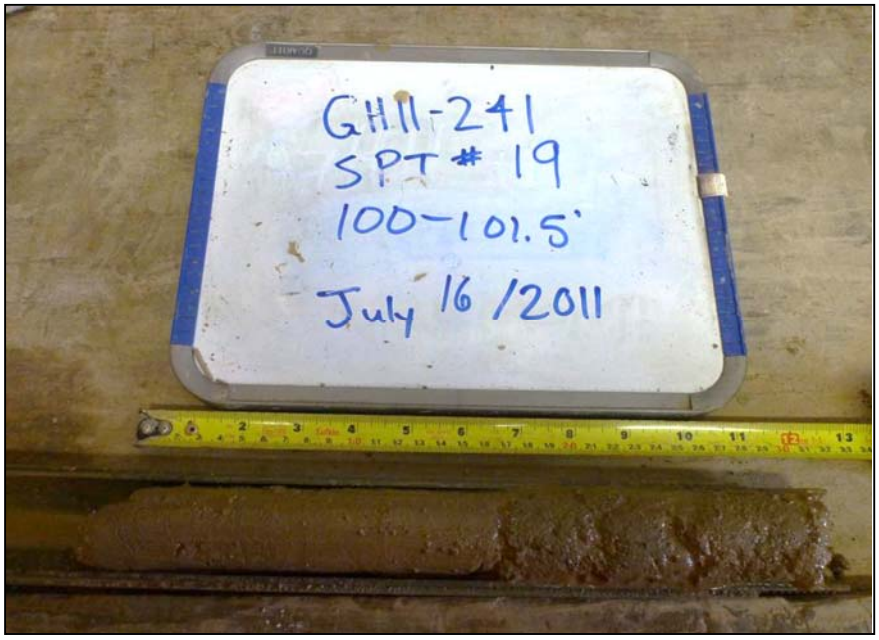

PHOTO 176 GH11-241 SPT #19 100-101.5'



PHOTO 177 GH11-241 SPT #20 105-106.5'



PHOTO 178 GH11-241 SPT #21 110-111.5'



PHOTO 179 GH11-241 SPT #22 115-116.5'



PHOTO 180 GH11-241 SPT #23 120-121.5'



PHOTO 181 GH11-241 SPT #24 125-126.5'



PHOTO 182 GH11-241 SPT #25 129-130.5'

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 183 GH11-241 SPT #26 134-135.5'



PHOTO 184 GH11-241 SPT #28 144-145.5'



PHOTO 185 GH11-241 SPT #29 149-150.5'



PHOTO 186 GH11-241 SPT #30 154-155.5'



PHOTO 187 GH11-241 SPT #31 164-165.5'



PHOTO 188 GH11-241 SPT #32 169-170.5'



PHOTO 189 GH11-241 SPT #33 174-175.5'



PHOTO 190 GH11-241 SPT #34 179-180.5'

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 191 GH11-241 SPT #35 184-185.5'



PHOTO 192 GH11-241 SPT #36 189-190.5'



PHOTO 193 GH11-241 SPT #37 194-195.5'

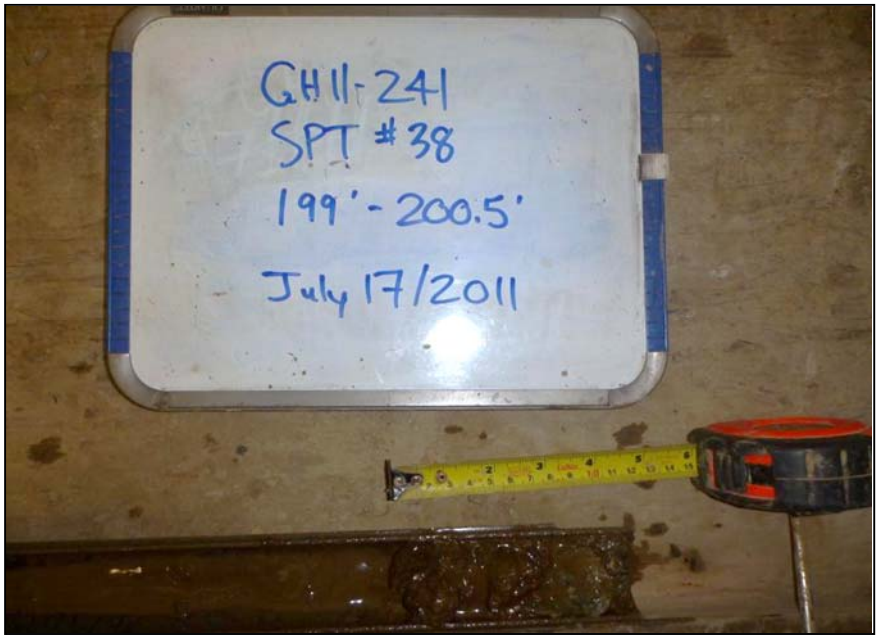

PHOTO 194 GH11-241 SPT #38 199-200.5'

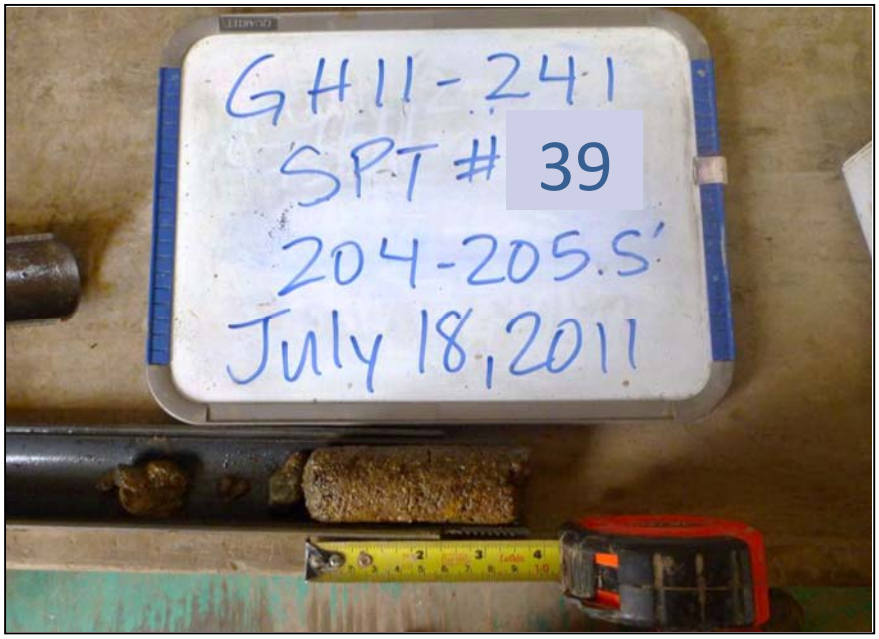

PHOTO 195 GH11-241 SPT #39 204-205.5'



PHOTO 196 GH11-241 SPT #40 209-210.5'

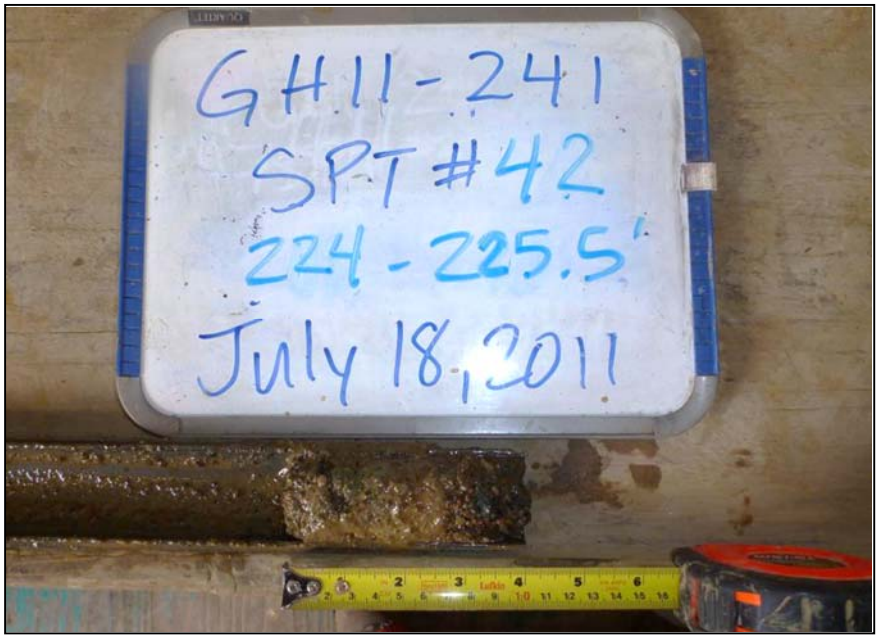

PHOTO 197 GH11-241 SPT #42 224-225.5'



PHOTO 198 GH11-241 SPT #43 229-230.5'



PHOTO 199 GH11-241 SPT #44 234-235.5'



PHOTO 200 GH11-241 SPT #45 239-240.5'

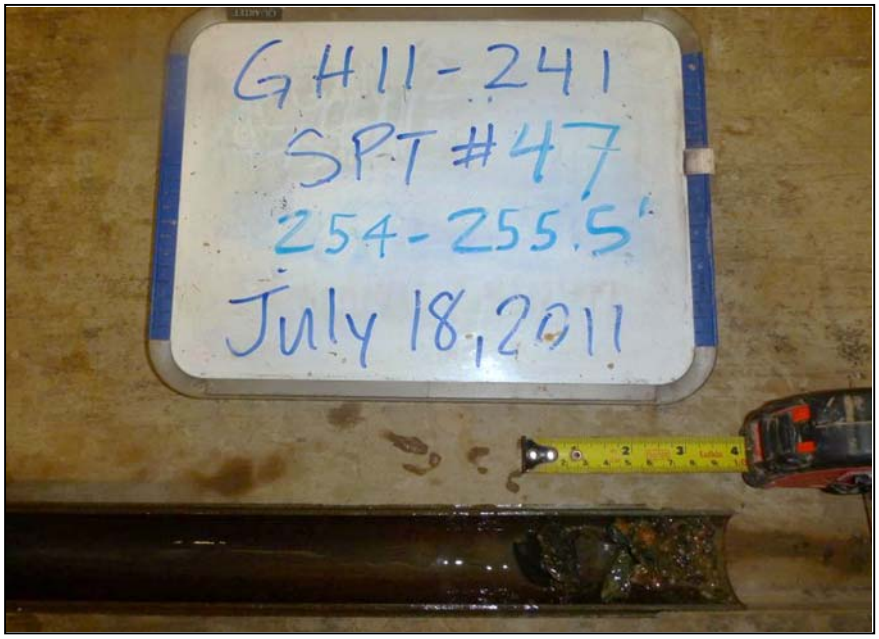

PHOTO 201 GH11-241 SPT #47 254-255.5'

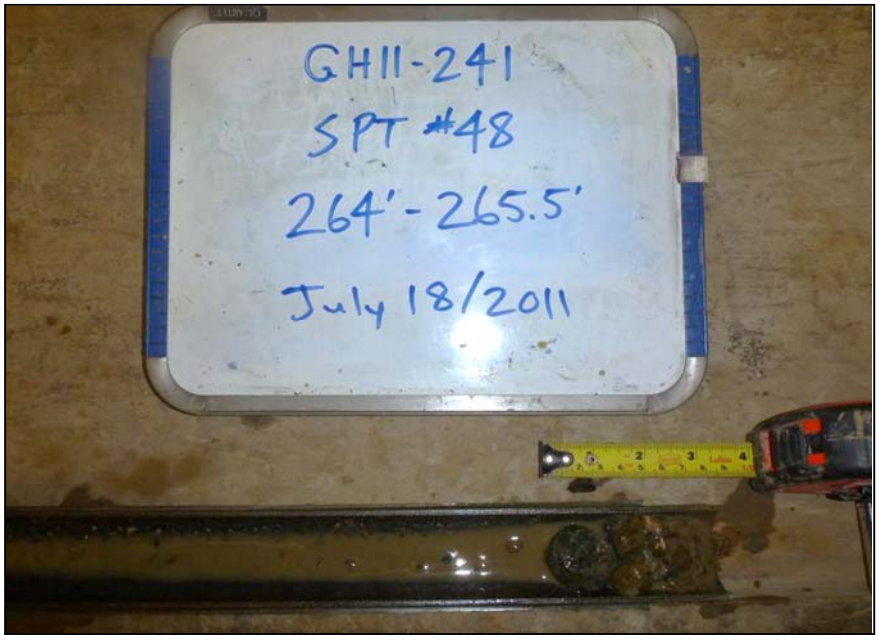

PHOTO 202 GH11-241 SPT #48 264-265.5'



PHOTO 203 GH11-241 SPT #49 274-275.5'



PHOTO 204 GH11-241 SPT #50 284-285.5'

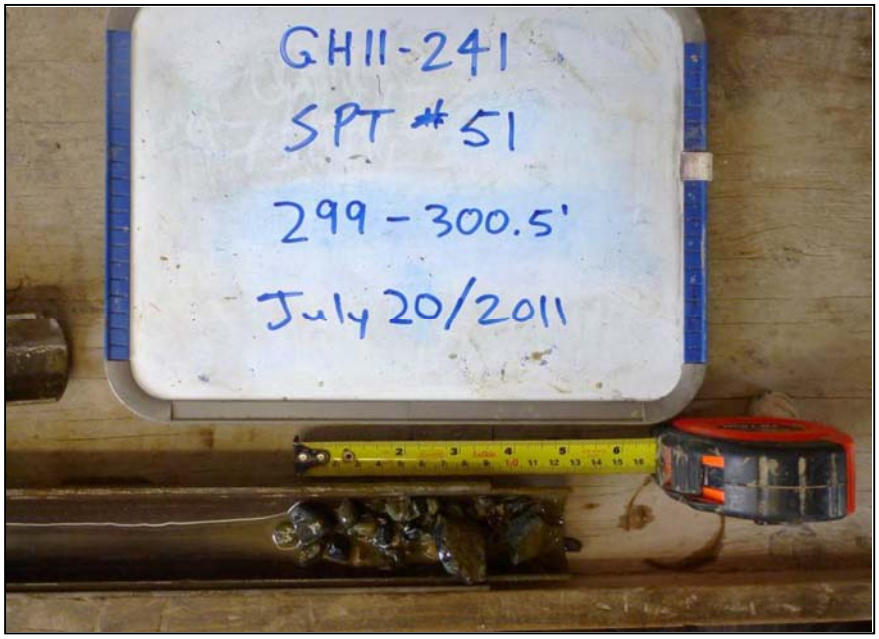

PHOTO 205 GH11-241 SPT #51 299-300.5'



PHOTO 206 GH11-241 SPT #52 309-310.5'



PHOTO 207 GH11-241 SPT #53 319-320.5'



PHOTO 208 GH11-241 SPT #54 329-330.5'



PHOTO 209 GH11-241 SPT #55 339-340.5'

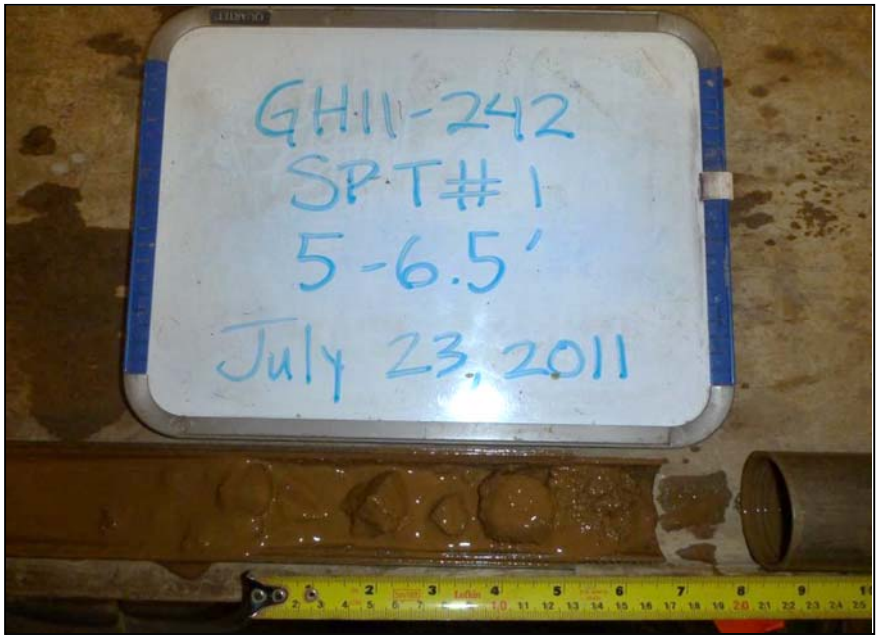

PHOTO 210 GH11-242 SPT #1 5-6.5'

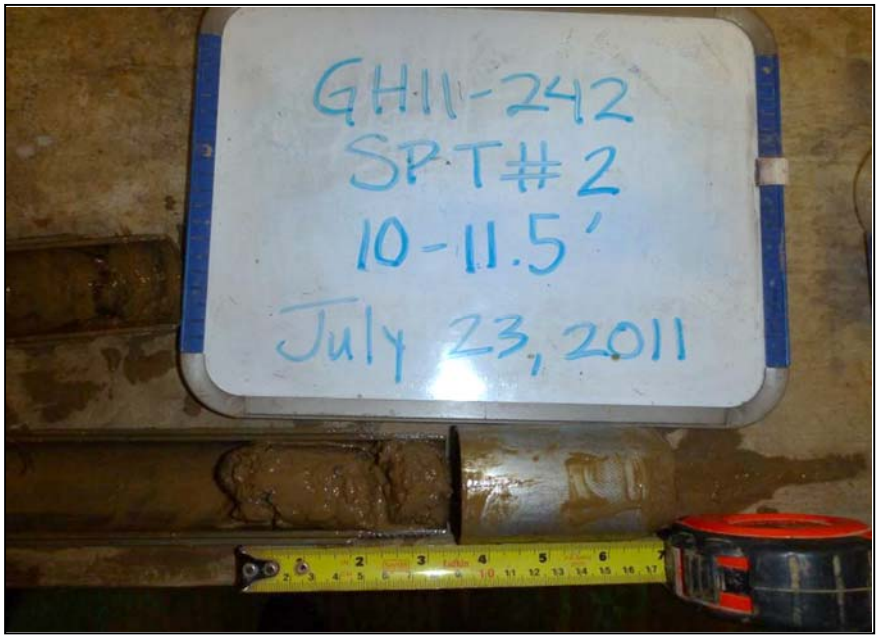

PHOTO 211 GH11-242 SPT #2 10-11.5'

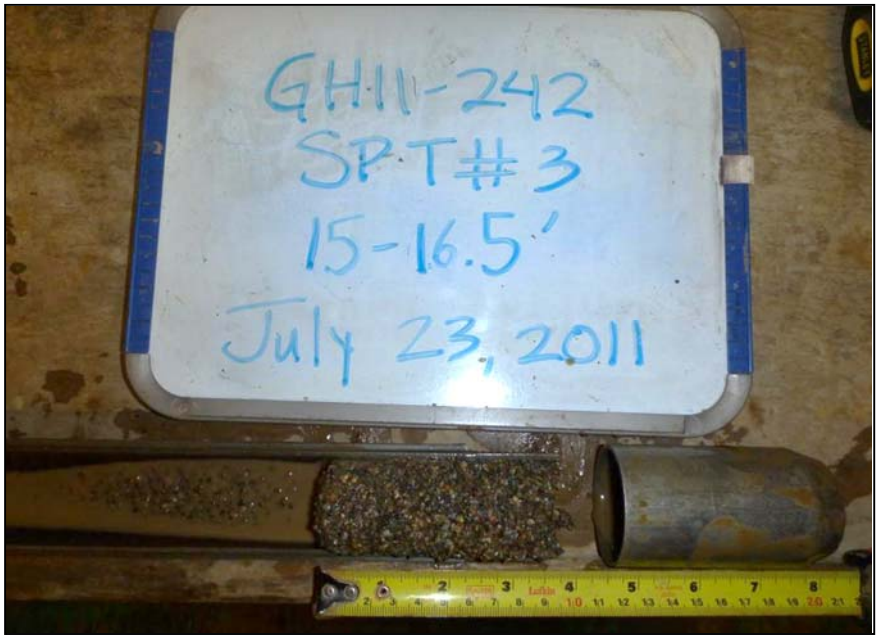

PHOTO 212 GH11-242 SPT #3 15-16.5'



PHOTO 213 GH11-242 SPT #4 20-21.5'

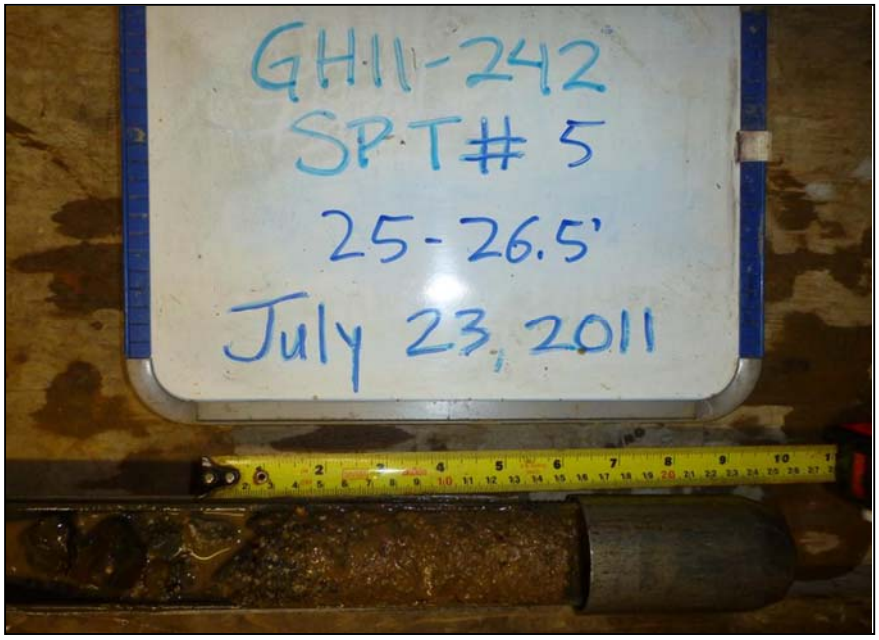

PHOTO 214 GH11-242 SPT #5 25-26.5'



PHOTO 215 GH11-242 SPT #6 30-31.5'

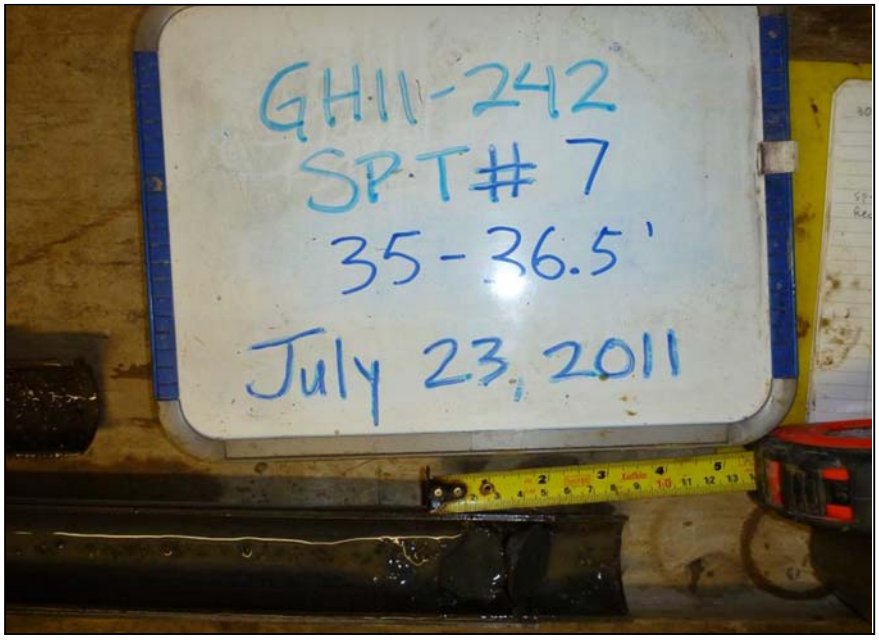

PHOTO 216 GH11-242 SPT #7 35-36.5'

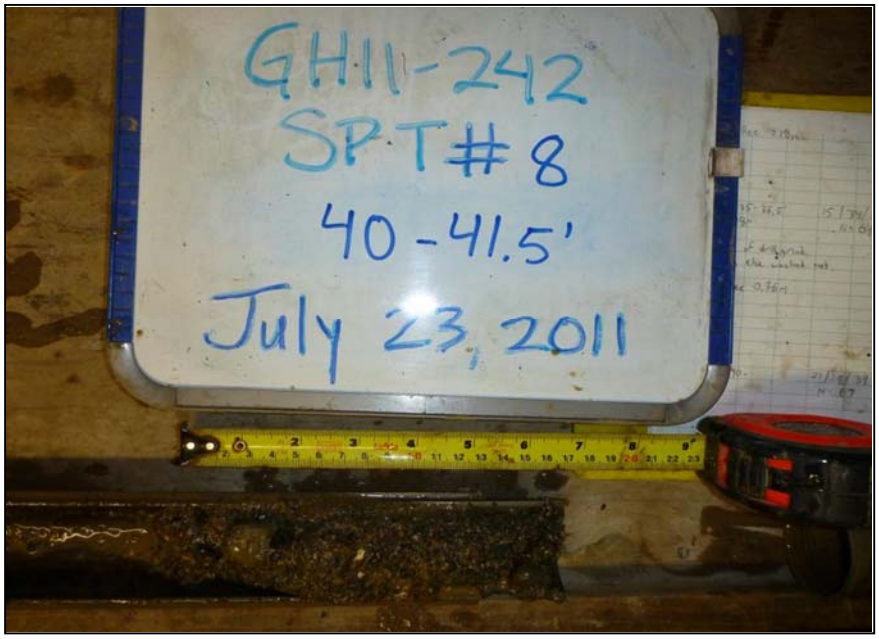

PHOTO 217 GH11-242 SPT #8 40-41.5'



PHOTO 218 GH11-242 SPT #9 45-46.5'



PHOTO 219 GH11-242 SPT #10 50-51.5'



PHOTO 220 GH11-242 SPT #11 55-56.5'



PHOTO 221 GH11-242 SPT #12 60-61.5'



PHOTO 222 GH11-242 SPT #13 65-66.5'



PHOTO 223 GH11-242 SPT #14 70-71.5'

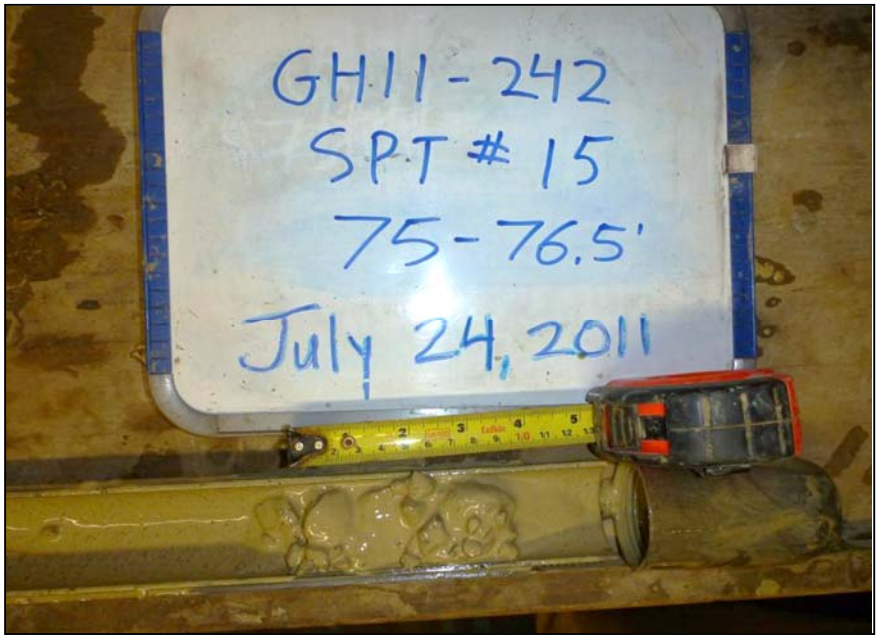

PHOTO 224 GH11-242 SPT #15 75-76.5'

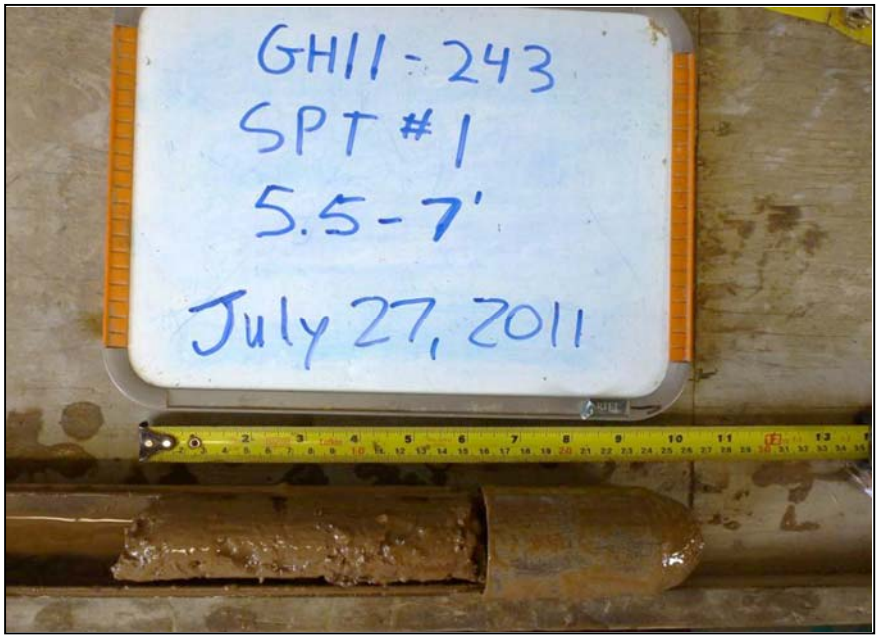

PHOTO 225 GH11-243 SPT #1 5.5-7'



PHOTO 226 GH11-243 SPT #2 9-10.5'



PHOTO 227 GH11-243 SPT #3 14-15.5'



PHOTO 228 GH11-245 SPT #1 5-6.5'



PHOTO 229 GH11-245 SPT #2 15-16.5'



PHOTO 230 GH11-246 SPT #1 4-5.5'

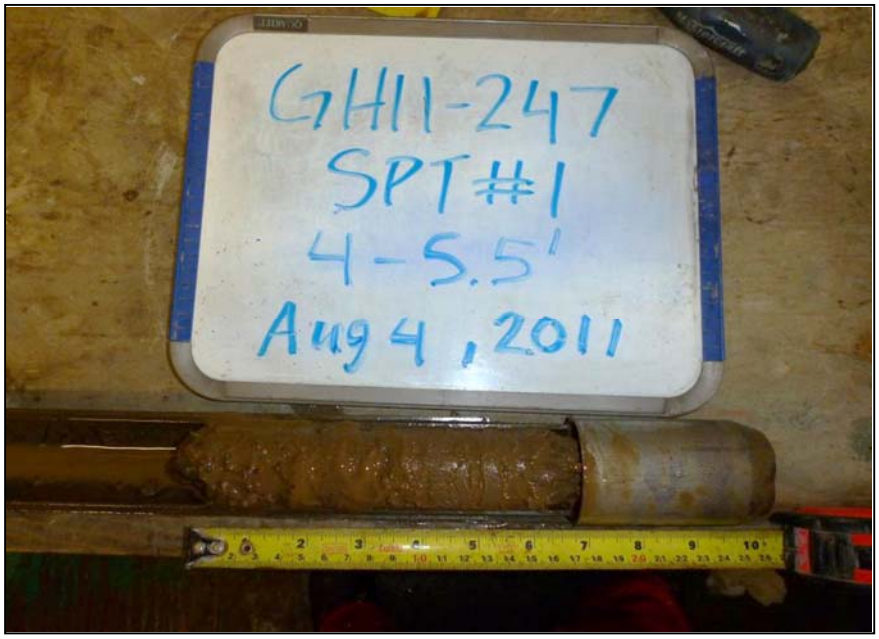

PHOTO 231 GH11-247 SPT #1 4.0-5.5'



PHOTO 232 GH11-247 SPT #3 14.0-15.5'

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PHOTO 233 GH11-247 SPT #4 19.0-20.5'



PHOTO 234 GH11-247 SPT #6 29.0-30.5'



PHOTO 235 GH11-247 SPT #7 34.0-35.5'

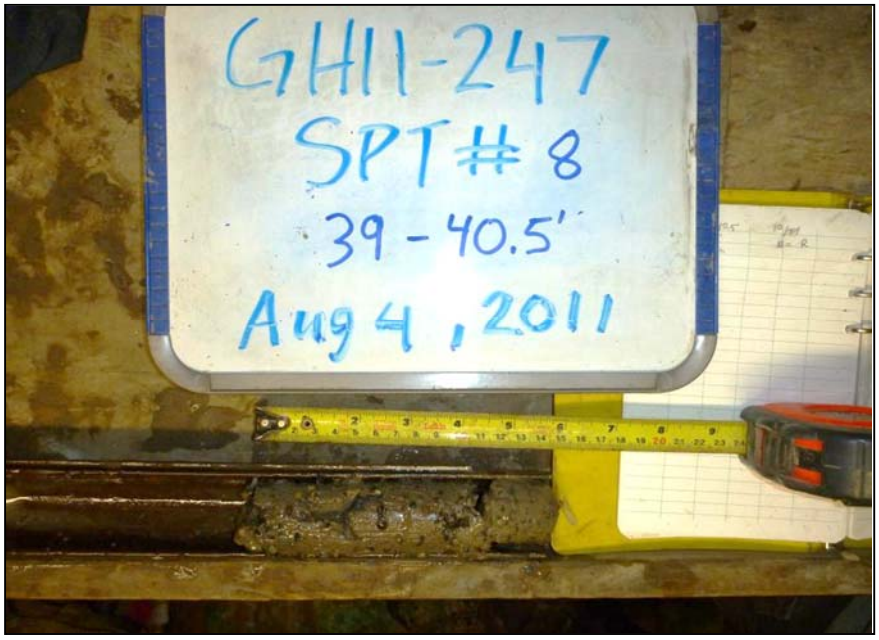

PHOTO 236 GH11-247 SPT #8 39.0-40.5'

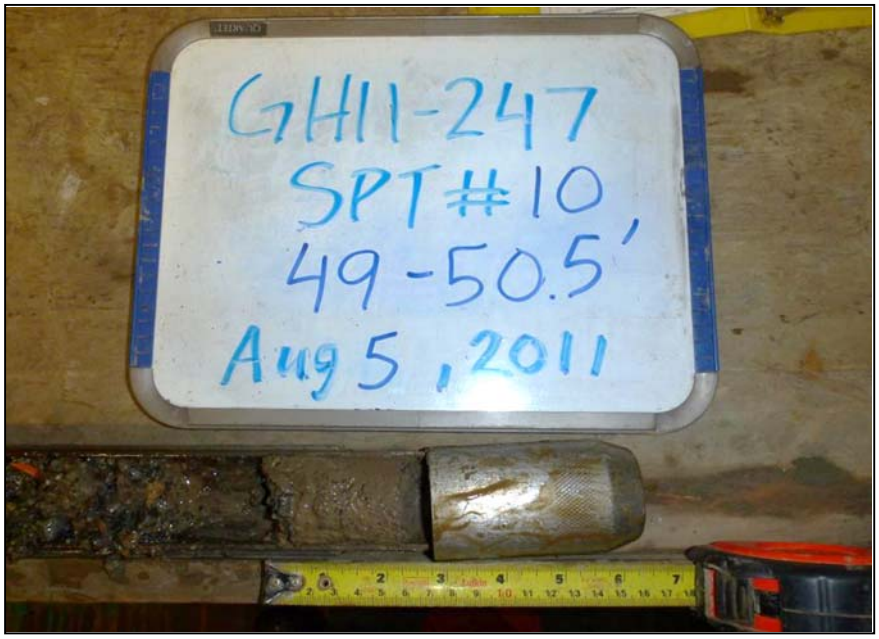

PHOTO 237 GH11-247 SPT #10 49.0-50.5'



PHOTO 238 GH11-247 SPT #11 54.0-55.5'

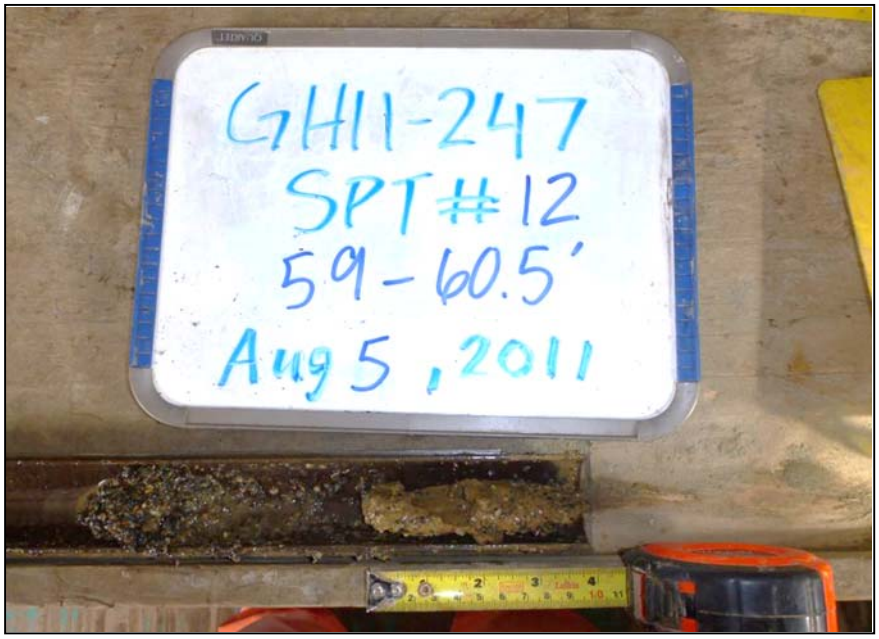

PHOTO 239 GH11-247 SPT #12 59.0-60.5'



PHOTO 240 GH11-247 SPT #13 64.0-65.5'



PHOTO 241 GH11-274 SPT #1 4-5.5'

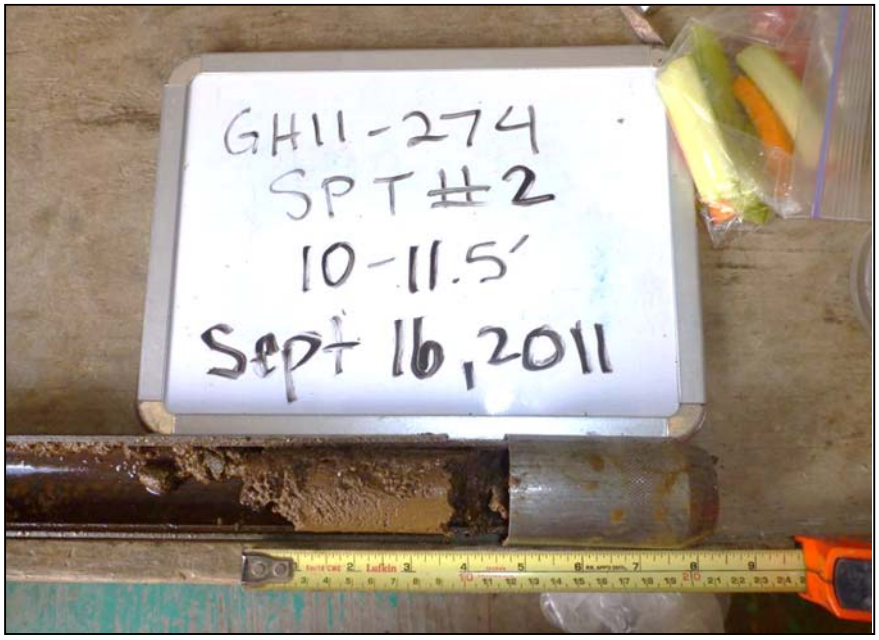

PHOTO 242 GH11-274 SPT #2 10-11.5'



PHOTO 243 GH11-274 SPT #3 14-15.5'



PHOTO 244 GH11-274 SPT #4 19-20.5'



PHOTO 245 GH11-274 SPT #5 24-25.5'

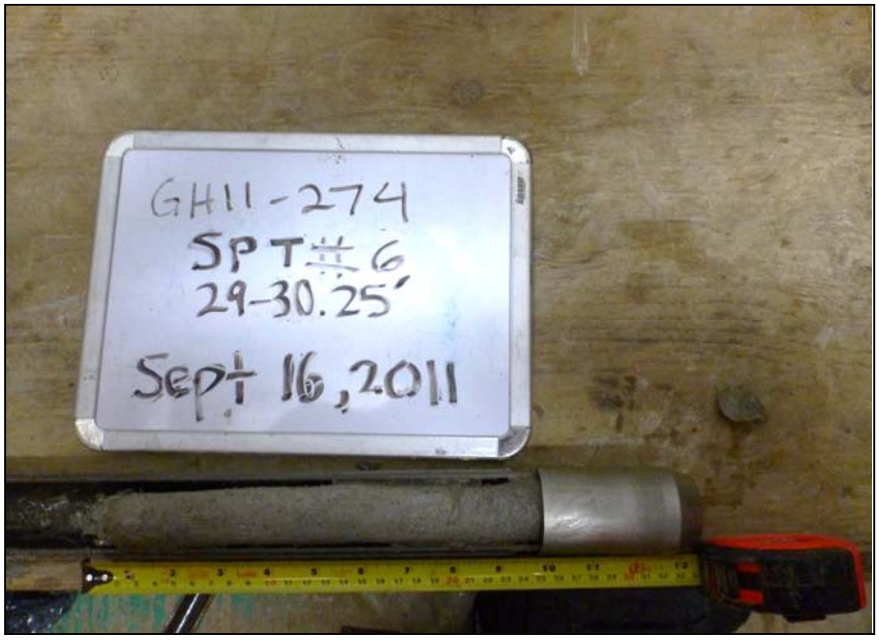

PHOTO 246 GH11-274 SPT #6 29-30.25

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PEBBLE PROJECT



PHOTO 247 GH11-287 SPT #1 4-5.6'



PHOTO 248 GH11-287 SPT #2 9-10.5'



PHOTO 249 GH11-287 SPT #3 14-15.5'

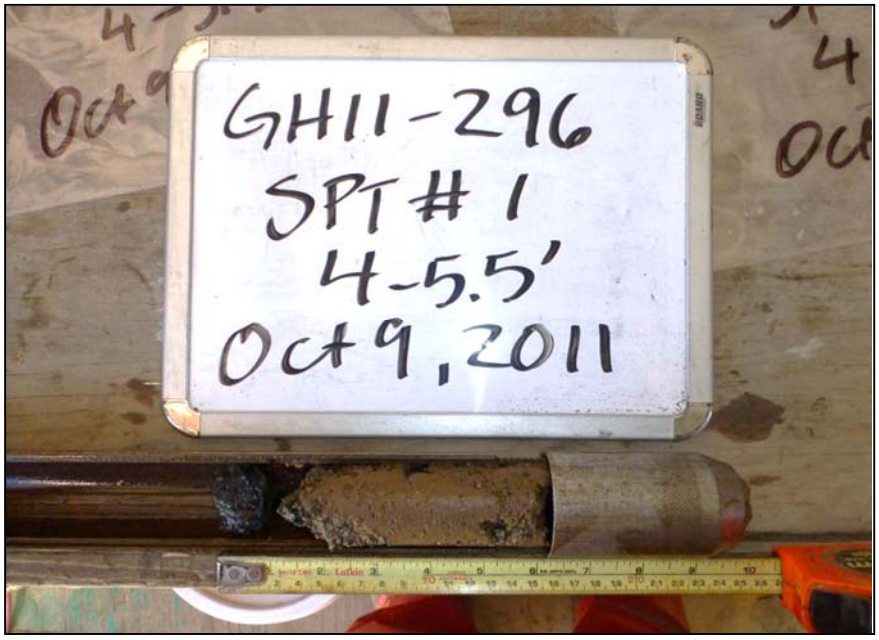

PHOTO 250 GH11-296 SPT #1 4-5.5'

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

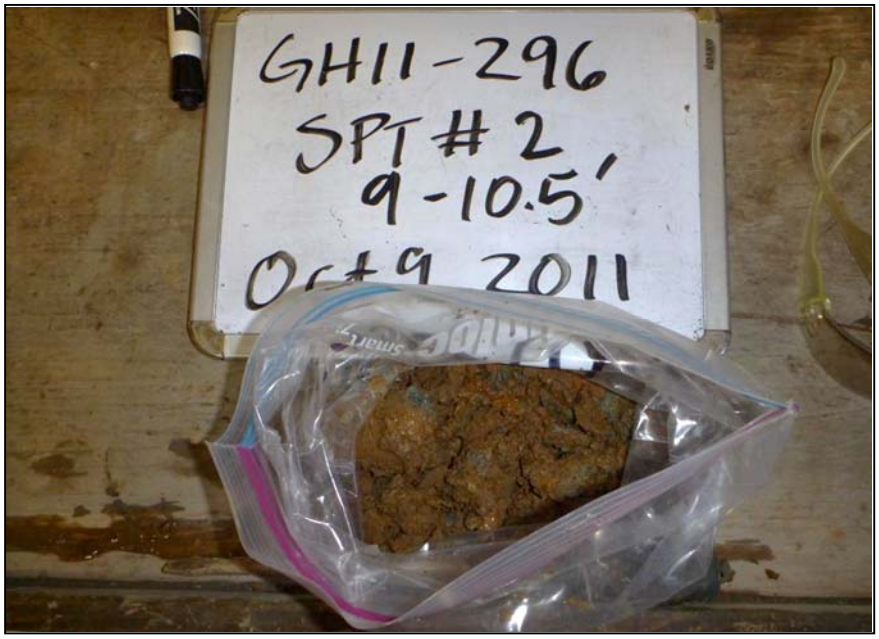

PHOTO 251 GH11-296 SPT #2 9-10.5'

Knight Piésold
CONSULTING

APPENDIX C3

CORE PHOTOGRAPHS

- GH11-229
- GH11-230
- GH11-231
- GH11-232
- GH11-233
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- GH11-287
- GH11-293
- GH11-294
- GH11-296
- 11534

(Pages C3-1 to C3-202)



PHOTO 1 – GH11-229 Box 1 & 2, 0 to 49 ft



PHOTO 2 – GH11-229 Box 3, 49 to 58 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 3 – GH11-229 Box 4, 58 to 67 ft



PHOTO 4 – GH11-229 Box 5, 67 to 75 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 5 – GH11-229 Box 6, 75 to 82.5 ft



PHOTO 6 – GH11-229 Box 7, 82.5 to 90.8 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 7 – GH11-229 Box 8, 90.8 to 98.5 ft



PHOTO 8 – GH11-229 Box 9, 98.5 to 106.5 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 9 – GH11-229 Box 10, 106.5 to 114 ft



PHOTO 10 – GH11-229 Box 11, 114 to 123.3 ft



PHOTO 11 – GH11-229 Box 12, 123.3 to 132 ft



PHOTO 12 – GH11-229 Box 13, 132 to 139.5 ft



PHOTO 13 – GH11-229 Box 14, 139.5 to 148 ft



PHOTO 14 – GH11-229 Box 15, 148 to 156.5 ft



PHOTO 15 – GH11-229 Box 16, 156.5 to 165 ft



PHOTO 16 – GH11-229 Box 17, 165 to 172.5 ft



PHOTO 17 – GH11-229 Box 18, 172.5 to 174 ft EOH



PHOTO 18 – GH11-230 Box 1 & 2, 0 to 19 ft



PHOTO 19 – GH11-230 Box 3, 19 to 26.5 ft



PHOTO 20 – GH11-230 Box 4, 26.5 to 35 ft



PHOTO 21 – GH11-230 Box 5, 35 to 43 ft



PHOTO 22 – GH11-230 Box 6, 43 to 52 ft



PHOTO 23 – GH11-230 Box 7, 52 to 59.5 ft



PHOTO 24 – GH11-230 Box 8, 59.5 to 67.3 ft



PHOTO 25 – GH11-230 Box 9, 67.3 to 75.3 ft



PHOTO 26 – GH11-230 Box 10, 75.3 to 83.5 ft



PHOTO 27 – GH11-230 Box 11, 83.5 to 91.75 ft



PHOTO 28 – GH11-230 Box 12, 91.75 to 100 ft



PHOTO 29 – GH11-230 Box 13, 100 to 108.5 ft



PHOTO 30 – GH11-230 Box 14, 108.5 to 117 ft



PHOTO 31 – GH11-230 Box 15, 117 to 124.8 ft



PHOTO 32 – GH11-230 Box 16, 124.8 to 132.5 ft



PHOTO 33 – GH11-230 Box 17, 132.5 to 141 ft



PHOTO 34 – GH11-230 Box 18, 141 to 148.25 ft



PHOTO 35 – GH11-230 Box 19, 148.25 to 157 ft



PHOTO 36 – GH11-230 Box 20, 157 to 165 ft



PHOTO 37 – GH11-230 Box 21, 168 to 173 ft EOH



PHOTO 38 – GH11-231 Box 1, 0 to 9 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 39 – GH11-231 Box 2, 9 to 26 ft



PHOTO 40 – GH11-231 Box 3, 26 to 35 ft



PHOTO 41 – GH11-231 Box 4, 35 to 42.5 ft



PHOTO 42 – GH11-231 Box 5, 42.5 to 51.3 ft



PHOTO 43 – GH11-231 Box 6, 51.3 to 59.7 ft



PHOTO 44 – GH11-231 Box 7, 59.7 to 68.2 ft



PHOTO 45 – GH11-231 Box 8, 68.2 to 76.5 ft



PHOTO 46 – GH11-231 Box 9, 76.5 to 85.4 ft



PHOTO 47 – GH11-231 Box 10, 85.4 to 94 ft



PHOTO 48 – GH11-231 Box 11, 94 to 102.7 ft



PHOTO 49 – GH11-231 Box 12, 102.7 to 111 ft



PHOTO 50 – GH11-231 Box 13, 111 to 114 ft EOH



PHOTO 51 – GH11-232 Box 1 & 2, 0 to 35.5 ft



PHOTO 52 – GH11-232 Box 3 & 4, 35.5 to 69 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 53 – GH11-232 Box 5, 69 to 88.5 ft



PHOTO 54 – GH11-232 Box 6, 88.5 to 96.25 ft



PHOTO 55 – GH11-232 Box 7, 96.25 to 104.3 ft



PHOTO 56 – GH11-232 Box 8, 104.3 to 113 ft



PHOTO 57 – GH11-232 Box 9, 113 to 121.5 ft



PHOTO 58 – GH11-232 Box 10, 121.5 to 130 ft



PHOTO 59 – GH11-232 Box 11, 130 to 138 ft



PHOTO 60 – GH11-232 Box 12, 138 to 147 ft



PHOTO 61 – GH11-232 Box 13, 147 to 156 ft EOH



PHOTO 62 – GH11-233 Box 1, 0 to 39 ft



PHOTO 63 – GH11-233 Box 2, 39 to 47.3 ft



PHOTO 64 – GH11-233 Box 3, 47.3 to 56.5 ft



PHOTO 65 – GH11-233 Box 4, 56.5 to 64 ft



PHOTO 66 – GH11-233 Box 5, 64 to 72.5 ft



PHOTO 67 – GH11-233 Box 6, 72.5 to 81 ft



PHOTO 68 – GH11-233 Box 7, 81 to 89 ft



PHOTO 69 – GH11-233 Box 8, 89 to 97.5 ft



PHOTO 70 – GH11-233 Box 9, 97.5 to 105 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 71 – GH11-233 Box 10, 105 to 113 ft



PHOTO 72 – GH11-233 Box 11, 113 to 120.75 ft



PHOTO 73 – GH11-233 Box 12, 120.75 to 127.7 ft



PHOTO 74 – GH11-233 Box 13, 127.7 to 136 ft



PHOTO 75 – GH11-233 Box 14, 136 to 144 ft



PHOTO 76 – GH11-233 Box 15, 144 to 149 ft EOH

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 77 – GH11-234 Box 1, 0 to 29 ft



PHOTO 78 – GH11-234 Box 2, 29 to 36 ft



PHOTO 79 – GH11-234 Box 3, 36 to 44.75 ft



PHOTO 80 – GH11-234 Box 4, 44.75 to 52.3 ft



PHOTO 81 – GH11-234 Box 5, 52.3 to 60.25 ft



PHOTO 82 – GH11-234 Box 6, 60.25 to 68 ft



PHOTO 83 – GH11-234 Box 7, 68 to76 ft



PHOTO 84 – GH11-234 Box 8, 76 to 84.5 ft



PHOTO 85 – GH11-234 Box 9, 84.5 to 92 ft



PHOTO 86 – GH11-234 Box 10, 92 to100 ft EOH



PHOTO 87 – GH11-235 Box 1 & 2, 0 to 56 ft



PHOTO 88 – GH11-235 Box 3, 55 to 68.3 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 89 – GH11-235 Box 4, 68.3 to 76.2 ft



PHOTO 90 – GH11-235 Box 5, 76.2 to 84 ft



PHOTO 91 – GH11-235 Box 6, 84 to 93.7 ft



PHOTO 92 – GH11-235 Box 7, 93.7 to 101.8 ft



PHOTO 93 – GH11-235 Box 8, 101.8 to 110.5 ft



PHOTO 94 – GH11-235 Box 9, 110.5 to 118.8 ft



PHOTO 95 – GH11-235 Box 10, 118.8 to 128 ft



PHOTO 96 – GH11-235 Box 11, 118.8 to 137 ft



PHOTO 97 – GH11-235 Box 12 137 to 139 ft EOH



PHOTO 98 – GH11-236 Box 1 & 2, 0 to 62 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 99 – GH11-236 Box 3, 62 to 74.3 ft



PHOTO 100 – GH11-236 Box 4, 74.3 to 84.9 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 101 – GH11-236 Box 5, 84.9 to 95.2 ft



PHOTO 102 – GH11-236 Box 6, 95.2 to 105.7 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 103 – GH11-236 Box 7, 105.7 to 116 ft



PHOTO 104 – GH11-236 Box 8, 116 to 124.3 ft



PHOTO 105 – GH11-236 Box 9, 124.3 to 133 ft



PHOTO 106 – GH11-236 Box 10, 133 to 140.75 ft



PHOTO 107 – GH11-236 Box 11, 140.75 to 150 ft



PHOTO 108 – GH11-236 Box 12, 150 to 158.5 ft



PHOTO 109 – GH11-236 Box 13, 158.5 to 167.5 ft



PHOTO 110 – GH11-236 Box 14, 167 to 169 ft EOH

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

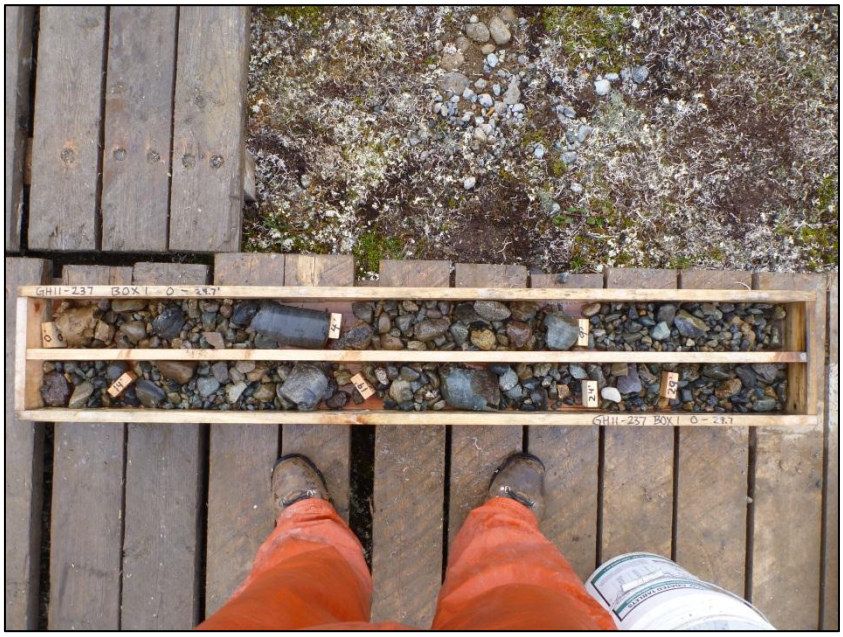

PHOTO 111 – GH11-237 Box 1, 0 to 29.7 ft



PHOTO 112 – GH11-237 Box 2, 29.7 to 49.6 ft



PHOTO 113 – GH11-237 Box 3, 49.6 to 74 ft



PHOTO 114 – GH11-237 Box 4, 74 to 90.5 ft



PHOTO 115 – GH11-237 Box 5, 90.5 to 110.3 ft



PHOTO 116 – GH11-237 Box 6, 110.3 to 118.9 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 117 – GH11-237 Box 7, 118.9 to 129 ft



PHOTO 118 – GH11-237 Box 8, 129 to 149.7 ft



PHOTO 119 – GH11-237 Box 9, 149.7 to 159 ft



PHOTO 120 – GH11-237 Box 10, 159 to 167.8 ft



PHOTO 121 – GH11-237 Box 11, 167.8 to 176.7 ft



PHOTO 122 – GH11-237 Box 12, 176.7 to 185 ft



PHOTO 123 – GH11-237 Box 13, 185 to 197.6 ft



PHOTO 124 – GH11-237 Box 14, 197.6 to 203 ft EOH



PHOTO 125 – GH11-238 Box 1 & 2, 0 to 68 ft



PHOTO 126 – GH11-238 Box 3 & 4, 68 to 128 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 127 – GH11-238 Box 5, 128 to 148 ft



PHOTO 128 – GH11-238 Box 6, 148 to 165.7 ft



PHOTO 129 – GH11-238 Box 7, 165.5 to 173 ft



PHOTO 130 – GH11-238 Box 8, 173 to 181.7 ft



PHOTO 131 – GH11-238 Box 9, 181.7 to 190.3 ft



PHOTO 132 – GH11-238 Box 10, 190.3 to 201 ft



PHOTO 133 – GH11-238 Box 11, 201 to 210 ft



PHOTO 134 – GH11-238 Box 12, 210 to 220 ft



PHOTO 135 – GH11-238 Box 13, 220 to 229.5 ft



PHOTO 136 – GH11-238 Box 14, 229.5 to 237 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 137 – GH11-238 Box 15, 237 to 244.5 ft



PHOTO 138 – GH11-238 Box 16, 244.5 to 252 ft



PHOTO 139 – GH11-238 Box 17, 252 to 259.5 ft



PHOTO 140 – GH11-238 Box 18, 259.5 to 268 ft



PHOTO 141 – GH11-238 Box 19, 268 to 276.7 ft



PHOTO 142 – GH11-238 Box 20, 276.7 to 285.7 ft



PHOTO 143 – GH11-238 Box 21, 285.7 to 294 ft



PHOTO 144 – GH11-238 Box 22, 294 to 298 ft EOH



PHOTO 145 – GH11-239 Box 1 & 2, 0 to 43.25 ft



PHOTO 146 – GH11-239 Box 3, 43.25 to 89 ft



PHOTO 147 – GH11-239 Box 4, 89 to 144 ft



PHOTO 148 – GH11-239 Box 5, 144 to 179 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT

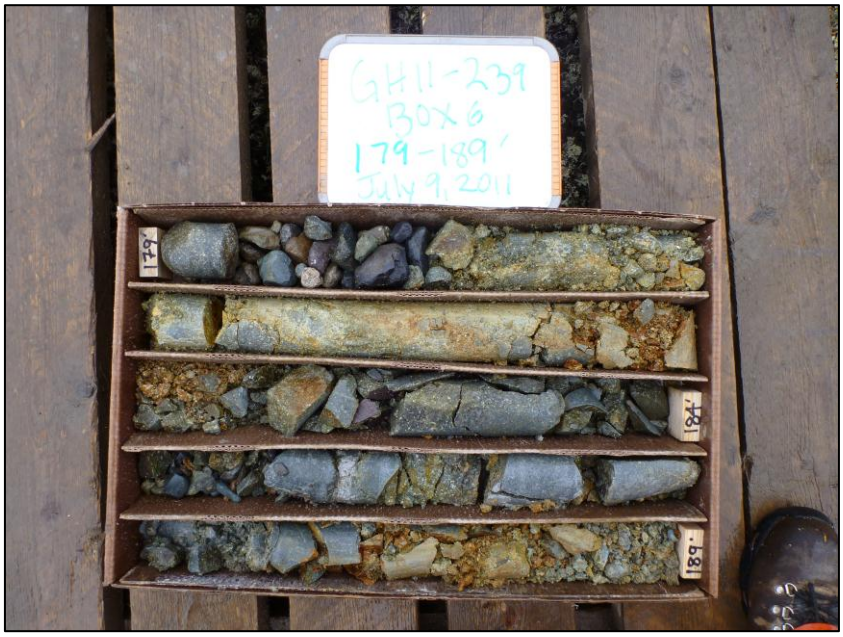

PHOTO 149 – GH11-239 Box 6, 179 to 189 ft



PHOTO 150 – GH11-239 Box 7, 189 to 197.5 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 151 – GH11-239 Box 8, 197.5 to 210.5 ft



PHOTO 152 – GH11-239 Box 9, 210.5 to 219 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 153 – GH11-239 Box 10, 219 to 227.5 ft



PHOTO 154 – GH11-239 Box 11, 227.5 to 236 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 155 – GH11-239 Box 12, 236 to 245.5 ft



PHOTO 156 – GH11-239 Box 13, 245.5 to 254 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 157 – GH11-239 Box 14, 254 to 264 ft EOH



PHOTO 158 – GH11-240 Box 1 & 2, 0 to 47 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 159 – GH11-240 Box 3 & 4, 47 to 94 ft



PHOTO 160 – GH11-240 Box 5, 94 to 106.5 ft



PHOTO 161 – GH11-240 Box 6, 106.5 to 115 ft



PHOTO 162 – GH11-240 Box 7, 115 to 123.5 ft



PHOTO 163 – GH11-240 Box 8, 123.5 to 132.5 ft



PHOTO 164 – GH11-240 Box 9, 132.5 to 140.5 ft



PHOTO 165 – GH11-240 Box 10, 140.5 to 149.5 ft



PHOTO 166 – GH11-240 Box 11, 149.5 to 160 ft



PHOTO 167 – GH11-240 Box 12, 160 to 169 ft



PHOTO 168 – GH11-240 Box 13, 169 to 173 ft EOH



PHOTO 169 – GH11-241 Box 1 & 2, 0 to 105 ft



PHOTO 170 – GH11-241 Box 3 & 4, 105 to 184 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 171 – GH11-241 Box 5 & 6, 184 to 259 ft



PHOTO 172 – GH11-241 Box 7, 259 to 304 ft



PHOTO 173 – GH11-241 Box 8, 304 to 334 ft



PHOTO 174 – GH11-241 Box 9, 334 to 347.5 ft



PHOTO 175 – GH11-241 Box 10, 347.5 to 360.2 ft



PHOTO 176 – GH11-241 Box 11, 360.2 to 369 ft



PHOTO 177 – GH11-241 Box 12, 369 to 378.2 ft



PHOTO 178 – GH11-241 Box 13, 378.2 to 387.4 ft



PHOTO 179 – GH11-241 Box 14, 387.4 to 396.5 ft



PHOTO 180 – GH11-241 Box 15, 396.5 to 404 ft EOH

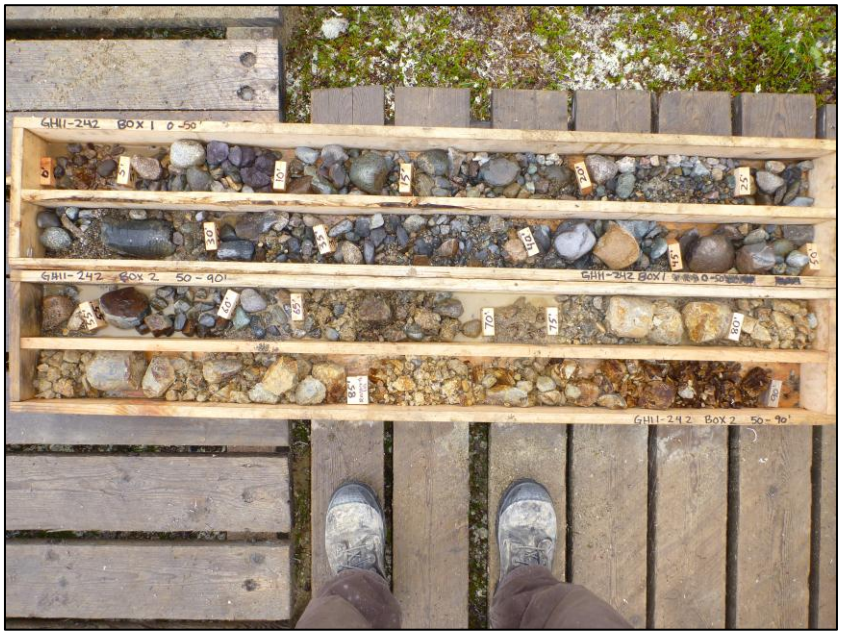

PHOTO 181 – GH11-242 Box 1 & 2, 0 to 90 ft



PHOTO 182 – GH11-242 Box 3, 90 to 98 ft



PHOTO 183 – GH11-242 Box 4, 98 to 107 ft



PHOTO 184 – GH11-242 Box 5, 107 to 115.5 ft



PHOTO 185 – GH11-242 Box 6, 115.5 to 123.3 ft



PHOTO 186 – GH11-242 Box 7, 123.3 to 131.6 ft



PHOTO 187 – GH11-242 Box 8, 131.6 to 140 ft



PHOTO 188 – GH11-242 Box 9, 140 to 148.4 ft



PHOTO 189 – GH11-242 Box 10, 148.4 to 157.3 ft



PHOTO 190 – GH11-242 Box 11, 157.3 to 165.2 ft



PHOTO 191 – GH11-242 Box 12, 165.2 to 173.2 ft



PHOTO 192 – GH11-242 Box 13, 173.2 to 181.5 ft



PHOTO 193 – GH11-242 Box 14, 181.5 to 190 ft



PHOTO 194 – GH11-242 Box 15, 190 to 197.7 ft



PHOTO 195 – GH11-242 Box 16, 197.7 to 200 ft EOH



PHOTO 196 – GH11-243 Box 1, 0 to 19.5 ft



PHOTO 197 – GH11-243 Box 2, 19.5 to 27.5 ft



PHOTO 198 – GH11-243 Box 3, 27.5 to 36.3 ft



PHOTO 199 – GH11-243 Box 4, 36.3 to 44.4 ft



PHOTO 200 – GH11-243 Box 5, 44.4 to 53.2 ft



PHOTO 201 – GH11-243 Box 6, 53.2 to 60.8 ft



PHOTO 202 – GH11-243 Box 7, 60.8 to 69 ft



PHOTO 203 – GH11-243 Box 8, 69 to 77.75 ft



PHOTO 204 – GH11-243 Box 9, 77.75 to 86.5 ft



PHOTO 205 – GH11-243 Box 10, 86.5 to 94.75 ft



PHOTO 206 – GH11-243 Box 11, 94.75 to 103.5 ft



PHOTO 207 – GH11-243 Box 12, 103.5 to 104 ft EOH



PHOTO 208 – GH11-245 Box 1, 0 to 21.8 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 209 – GH11-245 Box 2, 21.8 to 30.4 ft



PHOTO 210 – GH11-245 Box 3, 30.4 to 39 ft



PHOTO 211 – GH11-245 Box 4, 39 to 47.1 ft



PHOTO 212 – GH11-245 Box 5, 47.1 to 56.1 ft



PHOTO 213 – GH11-245 Box 6, 56.1 to 64.5 ft



PHOTO 214 – GH11-245 Box 7, 64.5 to 73.5 ft



PHOTO 215 – GH11-245 Box 8, 73.5 to 82.4 ft



PHOTO 216 – GH11-245 Box 9, 82.4 to 91 ft



PHOTO 217 – GH11-245 Box 10, 91 to 99.7 ft



PHOTO 218 – GH11-245 Box 11, 99.7 to 108.5 ft



PHOTO 219 – GH11-245 Box 12, 108.5 to 110 ft EOH



PHOTO 220 – GH11-246 Box 1, 0 to14 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 221 – GH11-246 Box 2, 14 to 23.3 ft



PHOTO 222 – GH11-246 Box 3, 23.3 to 30.3 ft



PHOTO 223 – GH11-246 Box 4, 30.3 to 38.7 ft



PHOTO 224 – GH11-246 Box 5, 38.7 to 47.4 ft



PHOTO 225 – GH11-246 Box 6, 47.4 to 56 ft



PHOTO 226 – GH11-246 Box 7, 56 to 65 ft



PHOTO 227 – GH11-246 Box 8, 65 to 72.75 ft



PHOTO 228 – GH11-246 Box 9, 72.75 to 80 ft



PHOTO 229 – GH11-246 Box 10, 80 to 87.5 ft



PHOTO 230 – GH11-246 Box 11, 87.5 to 95.7 ft



PHOTO 231 – GH11-246 Box 12, 95.7 to 104 ft



PHOTO 232 – GH11-246 Box 13, 104 to 112.2 ft



PHOTO 233 – GH11-246 Box 14, 112.2 to 120.1 ft



PHOTO 234 – GH11-246 Box 15, 120.1 to 129.2 ft



PHOTO 235 – GH11-246 Box 16, 129.2 to 138.5 ft



PHOTO 236 – GH11-246 Box 17, 138.5 to 144 ft EOH



PHOTO 237 – GH11-247 Box 1 & 2, 0 to 67 ft EOH



PHOTO 238 – GH11-274 Box 1 & 2, 0 to 34 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 239 – GH11-274 Box 3, 34 to 42.5 ft



PHOTO 240 – GH11-274 Box 4, 42.5 to 50.1 ft



PHOTO 241 – GH11-274 Box 5, 50.1 to 58.75 ft



PHOTO 242 – GH11-274 Box 6, 58.75 to 66.75 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 243 – GH11-274 Box 7, 66.75 to 74.75 ft



PHOTO 244 – GH11-274 Box 8, 74.75 to 82.25 ft



PHOTO 245 – GH11-274 Box 9, 82.25 to 89.66 ft



PHOTO 246 – GH11-274 Box 10, 89.66 to 97.9 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 247 – GH11-274 Box 11, 97.9 to 105.66 ft



PHOTO 248 – GH11-274 Box 12, 105.66 to 113.2 ft



PHOTO 249 – GH11-274 Box 13, 113.2 to 121.5 ft



PHOTO 250 – GH11-274 Box 14, 121.5 to 129.7 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 251 – GH11-274 Box 15, 129.7 to 137.75 ft



PHOTO 252 – GH11-274 Box 16, 137.75 to 145.6 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 253 – GH11-274 Box 17, 145.6 to 154 ft



PHOTO 254 – GH11-274 Box 18, 154 to 162.1 ft



PHOTO 255 – GH11-274 Box 19, 162.1 to 169.4 ft



PHOTO 256 – GH11-274 Box 20, 169.4 to177.3 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 257 – GH11-274 Box 21, 177.3 to 179 ft EOH



PHOTO 258 – GH11-277 Box 1 & 2, 0 to 25.3 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 259 – GH11-277 Box 3, 25.3 to 34 ft



PHOTO 260 – GH11-277 Box 4, 34 to 41.25 ft



PHOTO 261 – GH11-277 Box 5, 41.25 to 48.66 ft



PHOTO 262 – GH11-277 Box 6, 48.66 to 57.2 ft



PHOTO 263 – GH11-277 Box 7, 57.2 to 64.75 ft



PHOTO 264 – GH11-277 Box 8, 64.75 to 73.3 ft



PHOTO 265 – GH11-277 Box 9, 73.3 to 82.9 ft



PHOTO 266 – GH11-277 Box 10, 82.9 to 91 ft



PHOTO 267 – GH11-277 Box 11, 91 to 99.4 ft



PHOTO 268 – GH11-277 Box 12, 99.4 to 108.3 ft



PHOTO 269 – GH11-277 Box 13, 108.3 to 117 ft



PHOTO 270 – GH11-277 Box 14, 117 to 124.8 ft



PHOTO 271 – GH11-277 Box 15, 124.8 to 133.6 ft



PHOTO 272 – GH11-277 Box 16, 133.6 to 142.7 ft



PHOTO 273 – GH11-277 Box 17, 142.7 to 151.6 ft



PHOTO 274 – GH11-277 Box 18, 151.6 to 160.3 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 275 – GH11-277 Box 19, 160.3 to 169 ft



PHOTO 276 – GH11-277 Box 20, 169 to 176.7 ft



PHOTO 277 – GH11-277 Box 21, 176.7 to 184.3 ft



PHOTO 278 – GH11-277 Box 22, 184.3 to 192.5 ft



PHOTO 279 – GH11-277 Box 23, 192.5 to 200.8 ft



PHOTO 280 – GH11-277 Box 24, 200.8 to 214 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 281 – GH11-277 Box 25, 214 to 275.75 ft



PHOTO 282 – GH11-277 Box 26, 275.75 to 284 ft



PHOTO 283 – GH11-277 Box 27, 284 to 292.1 ft



PHOTO 284 – GH11-277 Box 28, 292.1 to 297 ft EOH



PHOTO 285 – GH11-281 Box 1 & 2, 0 to 24 ft



PHOTO 286 – GH11-281 Box 3, 24 to 32.75 ft



PHOTO 287 – GH11-281 Box 4, 32.75 to 41.4 ft



PHOTO 288 – GH11-281 Box 5, 41.4 to 49 ft



PHOTO 289 – GH11-281 Box 6, 49 to 57.7 ft



PHOTO 290 – GH11-281 Box 7, 57.7 to 65.6 ft



PHOTO 291 – GH11-281 Box 8, 65.6 to 73.75 ft



PHOTO 292 – GH11-281 Box 9, 73.75 to 81.6 ft



PHOTO 293 – GH11-281 Box 10, 81.6 to 89.4 ft



PHOTO 294 – GH11-281 Box 11, 89.4 to 97.3 ft



PHOTO 295 – GH11-281 Box 12, 97.3 to 105 ft



PHOTO 296 – GH11-281 Box 13, 105 to 113.1 ft



PHOTO 297 – GH11-281 Box 14, 113.1 to 121.3 ft



PHOTO 298 – GH11-281 Box 15, 121.3 to 129 ft



PHOTO 299 – GH11-281 Box 16, 129 to 138 ft



PHOTO 300 – GH11-281 Box 17, 138 to 146 ft



PHOTO 301 – GH11-281 Box 18, 146 to 154 ft



PHOTO 302 – GH11-281 Box 19, 154 to 162.3 ft



PHOTO 303 – GH11-281 Box 20, 162.3 to 169 ft EOH



PHOTO 304 – GH11-287 Box 1 & 2, 0 to 33 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 305 – GH11-287 Box 3, 33 to 40.7 ft



PHOTO 306 – GH11-287 Box 4, 40.7 to 49 ft



PHOTO 307 – GH11-287 Box 5, 49 to 57.5 ft



PHOTO 308 – GH11-287 Box 6, 57.5 to 65.3 ft



PHOTO 309 – GH11-287 Box 7, 65.3 to 72.6 ft



PHOTO 310 – GH11-287 Box 8, 72.6 to 80.7 ft



PHOTO 311 – GH11-287 Box 9, 80.7 to 94 ft



PHOTO 312 – GH11-287 Box 10, 94 to 102 ft



PHOTO 313 – GH11-287 Box 11, 102 to 112.5 ft



PHOTO 314 – GH11-287 Box 12, 112.5 to 120.6 ft



PHOTO 315 – GH11-287 Box 13, 120.6 to 129 ft



PHOTO 316 – GH11-287 Box 14, 129 to 137.75 ft



PHOTO 317 – GH11-287 Box 15, 137.75 to 145.9 ft



PHOTO 318 – GH11-287 Box 16, 145.9 to 154 ft



PHOTO 319 – GH11-287 Box 17, 154 to 164 ft



PHOTO 320 – GH11-287 Box 18, 164 to 172.5 ft



PHOTO 321 – GH11-287 Box 19, 172.5 to 186.8 ft



PHOTO 322 – GH11-287 Box 20, 186.8 to 197 ft



PHOTO 323 – GH11-287 Box 21, 197 to 207 ft



PHOTO 324 – GH11-287 Box 22, 207 to 216.25 ft



PHOTO 325 – GH11-287 Box 23, 216.25 to 225 ft



PHOTO 326 – GH11-287 Box 24, 225 to 234 ft



PHOTO 327 – GH11-287 Box 25, 234 to 244 ft EOH



PHOTO 328 – GH11-293 Box 1, 0 to 19 ft



PHOTO 329 – GH11-293 Box 2, 19 to 27.5 ft



PHOTO 330 – GH11-293 Box 3, 27.5 to 37 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 331 – GH11-293 Box 4, 37 to 44 ft



PHOTO 332 – GH11-293 Box 5, 44 to 52 ft



PHOTO 333 – GH11-293 Box 6, 52 to 59.3 ft



PHOTO 334 – GH11-293 Box 7, 59.3 to 68 ft



PHOTO 335 – GH11-293 Box 8, 68 to 75.66 ft



PHOTO 336 – GH11-293 Box 9, 75.66 to 84 ft



PHOTO 337 – GH11-293 Box 10, 84 to 92.9 ft



PHOTO 338 – GH11-293 Box 11, 92.9 to 101 ft



PHOTO 339 – GH11-293 Box 12, 101 to 109.5 ft



PHOTO 340 – GH11-293 Box 13, 109.5 to 117.5 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 341 – GH11-293 Box 14, 117.5 to 126 ft



PHOTO 342 – GH11-293 Box 15, 126 to 134 ft



PHOTO 343 – GH11-293 Box 16, 134 to 146.3 ft



PHOTO 344 – GH11-293 Box 17, 146.3 to 154 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 345 – GH11-293 Box 18, 154 to 162.5 ft



PHOTO 346 – GH11-293 Box 19, 162.5 to 170.8 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 347 – GH11-293 Box 20, 170.8 to 179 ft



PHOTO 348 – GH11-293 Box 21, 179 to 187.3 ft



PHOTO 349 – GH11-293 Box 22, 187.3 to 194 ft



PHOTO 350 – GH11-293 Box 23, 194 to 202.3 ft



PHOTO 351 – GH11-293 Box 24, 202.3 to 210.3 ft



PHOTO 352 – GH11-293 Box 25, 210.3 to 219 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 353 – GH11-293 Box 26, 219 to 226.8 ft



PHOTO 354 – GH11-293 Box 27, 226.8 to 229 ft EOH



PHOTO 355 – GH11-294 Box 1 & 2, 0 to 59 ft



PHOTO 356 – GH11-294 Box 3, 59 to 67.5 ft



PHOTO 357 – GH11-294 Box 4, 67.5 to 75.7 ft



PHOTO 358 – GH11-294 Box 5, 75.7 to 84 ft



PHOTO 359 – GH11-294 Box 6, 84 to 94 ft



PHOTO 360 – GH11-294 Box 7, 94 to 102.7 ft



PHOTO 361 – GH11-294 Box 8, 102.7 to 110 ft



PHOTO 362 – GH11-294 Box 9, 110 to 118 ft



PHOTO 363 – GH11-294 Box 10, 118 to 125 ft



PHOTO 364 – GH11-294 Box 11, 125 to 132.25 ft



PHOTO 365 – GH11-294 Box 12, 132.25 to 140.75 ft



PHOTO 366 – GH11-294 Box 13, 140.75 to 148.5 ft



PHOTO 367 – GH11-294 Box 14, 148.5 to 157.6 ft



PHOTO 368 – GH11-294 Box 15, 157.6 to 165.25 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 369 – GH11-294 Box 16, 165.25 to173.5 ft



PHOTO 370 – GH11-294 Box 17, 173.5 to 181.75 ft



PHOTO 371 – GH11-294 Box 18, 181.75 to 190.5 ft



PHOTO 372 – GH11-294 Box 19, 190.5 to 199 ft



PHOTO 373 – GH11-294 Box 20, 199 to 207.5 ft



PHOTO 374 – GH11-294 Box 21, 207.5 to 215.9 ft



PHOTO 375 – GH11-294 Box 22, 215.9 to 224 ft EOH

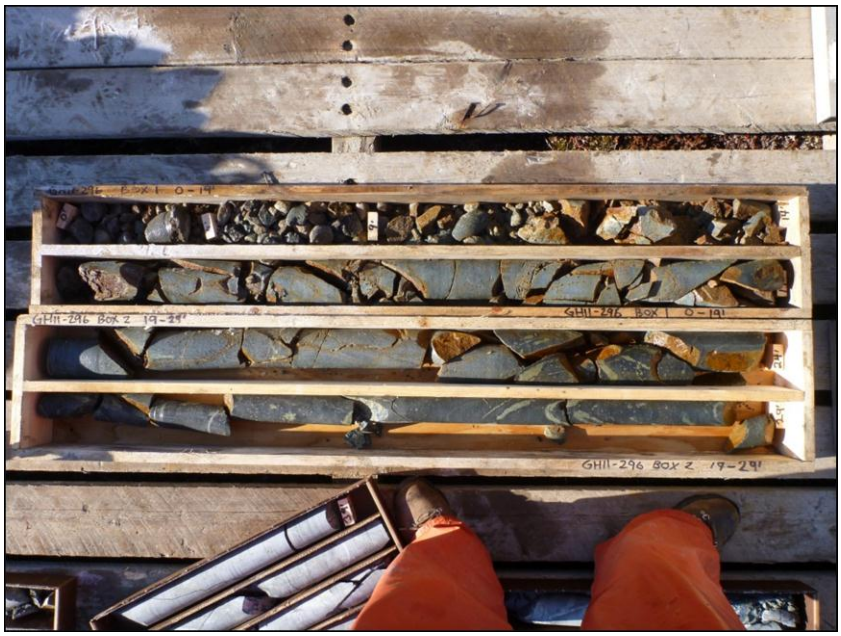

PHOTO 376 – GH11-296 Box 1 & 2, 0 to 29 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 377 – GH11-296 Box 3, 29 to 37.5 ft



PHOTO 378 – GH11-296 Box 4, 37.5 to 45.7 ft



PHOTO 379 – GH11-296 Box 5, 45.7 to 54 ft



PHOTO 380 – GH11-296 Box 6, 54 to 62.5 ft



PHOTO 381 – GH11-296 Box 7, 62.5 to 70.8 ft



PHOTO 382 – GH11-296 Box 8, 70.8 to 78.6 ft



PHOTO 383 – GH11-296 Box 9, 78.6 to 85.3 ft



PHOTO 384 – GH11-296 Box 10, 85.3 to 92.4 ft



PHOTO 385 – GH11-296 Box 11, 92.4 to 100.5 ft



PHOTO 386 – GH11-296 Box 12, 100.5 to 108.5 ft



PHOTO 387 – GH11-296 Box 13, 108.5 to 115.3 ft



PHOTO 388 – GH11-296 Box 14, 115.3 to 123.5 ft



PHOTO 389 – GH11-296 Box 15, 123.5 to 131.1 ft



PHOTO 390 – GH11-296 Box 16, 131.1 to 139 ft

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT



PHOTO 391 – GH11-296 Box 17, 139 to 147.2 ft



PHOTO 392 – GH11-296 Box 18, 147.2 to 155.75 ft



PHOTO 393 – GH11-296 Box 19, 155.75 to 164 ft



PHOTO 394 – GH11-296 Box 20, 164 to 173.7 ft



PHOTO 395 – GH11-296 Box 21, 173.7 to 181.5 ft



PHOTO 396 – GH11-296 Box 22, 181.5 to 189.9 ft



PHOTO 397 – GH11-296 Box 23, 189.9 to 198 ft



PHOTO 398 – GH11-296 Box 24, 198 to 205.5 ft



PHOTO 399 – GH11-296 Box 25, 205.5 to 214 ft



PHOTO 400 – GH11-296 Box 26, 214 to 222.5 ft



PHOTO 401 – GH11-296 Box 27, 222.5 to 230.9 ft



PHOTO 402 – GH11-296 Box 28, 230.9 to 238.25 ft



PHOTO 403 – GH11-296 Box 29, 238.2 to 239 ft EOH



PHOTO 404 – 11534 Box 1, 0 to 34 ft (overburden only, all core not shown as drillhole continues to 1917 ft)

PEBBLE LIMITED PARTNERSHIP
PEBBLE PROJECT